APPENDIX

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DUNGOWAN DAM AND PIPELINE EIS

Aboriginal Cultural Heritage Assessment

NSW GOVERNMENT | EMM creating opportunities

Dungowan Dam and pipeline project

Aboriginal Cultural Heritage Assessment

Prepared for Water Infrastructure NSW

July 2022

Dungowan Dam and pipeline project

Aboriginal Cultural Heritage Assessment

Water Infrastructure NSW

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Executive Summary

The Peel River, part of the Namoi River catchment, provides water for irrigation as well as being the primary water supply for the city of Tamworth. Prompted by the millennium drought, investigations into the future water supply and demand for bulk water were undertaken for the regional city of Tamworth and the Peel Valley water users. The Dungowan Dam and pipeline project (the project) is a critical project to improving long-term water security for the region. The project includes a new dam at Dungowan (new Dungowan Dam) approximately 3.5 km downstream of the existing Dungowan Dam and a new section of pipeline about 32 km long between the proposed Dam outlet and the tie in point to an existing pipeline from Dungowan Showground to the Calala Water Treatment Plant (WTP).

In September 2022, the Minister for Planning and Homes declared the project to be Critical State Significant Infrastructure (CSSI) as it is a development that is essential for the State for economic and social reasons. This requires Schedule 5 of the *State Environmental Planning Policy (Planning Systems) 2021* (Planning Systems SEPP) to be updated to reflect the CSSI status of the project. As CSSI, the project is subject to Part 5, Division 5.2 of the *Environmental Planning and Assessment Act 1979* (EP&A Act), which requires the preparation of an environmental impact statement (EIS) and the approval of the NSW Minister for Planning and Homes.

The EIS has been prepared for the planning approval application for the project. This Aboriginal Cultural Heritage Assessment (ACHA) has been prepared to support the EIS.

The ACHA was conducted to present the findings of the Aboriginal community consultation, previous investigations regarding Aboriginal cultural and archaeological heritage values, and physical investigation and ground-truthing associated with the project. It provides information on the location, distribution and significance of Aboriginal objects within the study area; and the likely harm to objects by the project; and recommendations for the management of such harm.

The ACHA adopted the processes and methods outlined in the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (DECCW, 2010a), as well as more extensive activities stemming from a project specific Aboriginal engagement strategy (EMM 2021). The strategy was developed to promote transparent and frequent two way dialogue between the Aboriginal community and the project, and aligns with the requirements of the *Engage Early: Guidance for proponents on best practice Indigenous engagement for environmental assessments under the Environment Protection and Biodiversity Conservation Act 1999* (Department of the Environment, 2016). It includes:

- the identification of local Aboriginal community individuals and/or organisations who were known to participate in cultural heritage in recent years for inclusion, and liaison with and/or searches of Government organisations such as Native Title Tribunal and Heritage NSW; and has subsequently been supplemented with others that registered formally through the Heritage NSW consultation process;
- details of a range of EMM, proponent and other government personnel that can be contacted to discuss the project and identify any grievances or concerns;
- outlines a range of mechanisms for information exchange through the project, including regular face-to-face and/or digital meetings, provision of regular project information via e-mail and/or post, and opportunities to meet/participate in activities on-Country; and
- outlines detailed timing and schedule of the consultation process between April 2020 and June 2022.

The strategy was developed with the participating Aboriginal stakeholders and has been subject to continual refinement and improvement over the life of the project. Each of the four iterations of the strategy since April 2020 was provided to the participating Aboriginal stakeholders for review, input and comment before its finalisation and implementation. Further details are presented in Chapter 3.

Overall, the project has been liaising with between 10 and 18 registered Aboriginal party (RAP) organisations and/or individuals since its inception in April 2020. These include those identified as part of the consultation strategy, and through formal notification as part of the Heritage NSW consultation requirements. The RAPs include a large number of local Aboriginal organisations and/or individuals based in Tamworth and/or immediate surrounds, as well as a smaller proportion that are based in Sydney and Brisbane but have ancestral connections to the region. Following notification, 10 organisations registered an interest in the early stages of the project (April – June 2020); and a further eight Aboriginal individuals and/or organisations registered later in the project (July 2020 - April 2022). (One of the additional RAPs was a retired sites officer of the Tamworth Local Aboriginal Land Council who had been involved in the project from the start). The project has registered any Aboriginal organisation and/or individual throughout the project regardless of when they have become known or identified their interest. However, where involvement has occurred late in the project, on-Country opportunities has been limited.

Opportunity for Aboriginal involvement in the project was provided throughout the ACHA, including the following key activities:

1. attendance at nine Aboriginal focus group meetings held in Tamworth and/or on-site to allow observation of the proposed impact footprint and/or investigative activities;

2. participation in a two week field survey of the project footprint;

3. participation in a five week archaeological test excavation of the project footprint; and

4. participation for key knowledge-holders identified by the RAPs to visit the site with a highly experienced anthropologist to discuss cultural values.

Ultimately, some 450 interactions have been undertaken with the RAPs across these opportunities. Some 11 of the RAP organisations participated in these opportunities, totalling over 200 days on site cumulatively,[1] and included Tamworth Local Aboriginal Land Council (LALC), The Gomeroi People native title applicants, Nunawanna Aboriginal Corporation, DFTV Enterprises, Corroboree Aboriginal Corporation, AT Gomilaroi Cultural Consultancy, Galamaay Cultural Consultants, Huckada Dreamin Heritage Group, Wattaka Cultural Service, Wurrumay Pty Ltd, and Hunters and Collectors. Consultation with Heritage NSW (formerly Biodiversity and Conservation Division, Department of Planning, Industry and Environment (BCD DPIE)) was also undertaken in accordance with approval requirements. Overall, the feedback from the Aboriginal participants on the project to date has been supportive, with a strong focus on continued involvement in understanding the deep-time and cultural values of the project footprint as the project progresses, and the potential Aboriginal interpretation and acknowledgement opportunities from the project (eg education area, cultural centre, signage, etc). General concerns and issues were mostly focussed on the level of on-Country participation, especially in relation to RAPs not from the local area; the level of investigation along the proposed pipeline with limited land access; and the suitable conservation and management of important sites, such as a gender-specific site (DDCS1). These are all acknowledged in this report in Section 3.4, Appendix B.5, and/or proposed for management following project approval.

[1] This number excludes activities associated with undertaking additional assessment of the replacement pipeline between Dungowan Station and Calala WTP; and through archaeological mitigations of proposed geotechnical investigations across the project footprint.

The assessment undertook cultural mapping, archaeological field survey and test excavations to explore and document the Aboriginal objects, site and places within the project footprint, and to align them within the regional context. Overall, the findings largely conform with the regional models, although an increasing focus on intangible and spiritual values was undertaken to supplement the observed archaeological record. When combining and ratifying the findings of these various activities, there are some 17 identified sites and places, along with a continuous and complex distribution of surface and shallowly buried stone artefacts distributed across the project footprint. These can be broken down as:

- Six cultural sites, including a gender-specific site (DDCS1) encompassing parts of Terrible Billy Creek, a stone arrangement associated with a Creation Ancestor story (DDSA3), two culturally modified trees (DDST1, DDST2), a grinding groove (DDGG1), and the former Dungowan Station where post-contact activities are believed to have occurred (DDPC1). Three social history places, reflecting locales of importance to the specific Aboriginal participants, and including a former residence (DDCS3), an environmental reserve (DDCS4) and a former school site (DDCS5). Three purported cultural sites that were identified by RAPs, but which cannot be anthropologically or scientifically validated as part of the ACHA, and including a natural ambush site (DDCS2), and two stone arrangements that were considered to reflect burials (DDB1, DDB3). Further recommendations to explore these are proposed.

- Five archaeological sites, including three stone arrangements (DDB2, DDSA1, DDSA2) and two potentially culturally modified trees (DDST3, DDST4), all of which are assigned a 'tentative' classification with further research recommended.

- A stone artefact background scatter across the entire project footprint and extending beyond its limits within which artefact densities of 10-15/m^2 may be expected, and that includes identified isolated Aboriginal objects (DDIF2-11 inclusive) and low density artefact scatters (DDOS3, 8-14 inclusive). These sites are typically of low significance and reflect the long-term use of the entire landscape by Aboriginal people in the past. Eight areas of past foci and activity (DDFA A-H inclusive) within the dam and inundation footprint, characterised by high densities of primarily sub-surface artefacts ranging from 30->272/m^2, and that reflect long term and/or repeat visitation and occupation by people over at least the last 5,000 years (5ka). Several of the field observations are also encompassed within these site's curtilage (DDIF1, DDOS1, 2, 4-7 inclusive). These foci are generally small, <2,800 m^2 (<60 x 60 m), but in some areas extended 350 m in length along the river's edge.

- A zone of 69 m either side of major creeks and tributaries (>3rd order) within which higher densities of stone artefacts and/or other areas of past foci may be expected to be present.

Cultural mapping found that the RAPs with connections to Dungowan Creek perceive the area, along with the surrounding country, as the product of deeds by the Creation Ancestors, such as the Catfish, and believe that it is within a mountainous region that is still being occupied by spirit beings, such as the 'hairy men'. Cultural flows were explored in the cultural mapping study, but no specific values were identified. However, associations with the Catfish as a Creation Ancestor, and frequent mention of fishing and hunting along the river in living memory, suggests that Dungowan Creek and Peel River are akin to broader Aboriginal people's views of other major river systems and play an important role in the culture of the local community. As such the maintenance of the river downstream following any development is essential to avoid impacts to cultural flows.

Of the 17 discrete Aboriginal sites and places sites within, or near the project footprint, between 4 and 6 would be subject to direct construction impacts resulting in their complete or partial loss; five would be unaffected, including several of high cultural value; and six would be inundated by the eventual reservoir created. In addition, the project would directly impact some 4.5 ha of identified areas of high artefact densities and ~47 ha where such cultural material is more likely to be present based on predictive models; and inundate a further ~72 ha of these deposits. Academic studies demonstrate that submerged soil profiles within dams experience limited modification, and as such these sites and cultural deposits can be considered largely unaffected by the project. A

low-density stone artefact background scatter is considered present across the entire project footprint and would also be adversely affected.

While the project would result in some intergenerational/cumulative loss to material culture, the ACHA concludes that there would be numerous cultural heritage benefits. These include the long-term preservation of substantive inundated cultural material that would be inaccessible from future harm, a greater understanding of the past and contemporary values in the region, new 'created' Aboriginal spaces and opportunities for heritage interpretation and public outreach.

Recommendations are proposed for inclusion in the EIS to guide post-approval requirements for Aboriginal heritage. These include (further discussion is presented in Section 11.2):

- Prior to ground disturbance, an Aboriginal Cultural Heritage Management Plan (ACHMP) must be developed by a heritage specialist in consultation with the RAPs and consent authority to provide the post-approval framework for managing Aboriginal heritage within the project area. The ACHMP should include addressing the following issues:

    - processes, timing, communication methods and project involvement (eg on-site activities) for maintaining Aboriginal community consultation and participation through the remainder of the project. This should include a grievance mechanism that is readily available and designed for use by the local Aboriginal community;

    - if not previously completed, provide descriptions and methods for undertaking further investigation and assessment of the sites currently assigned a tentative classification (DDBB1-3 inclusive, DDSA1 and 2, DDST3) to gain a comprehensive understanding of these sites for subsequent management through the project;

    - if not previously completed, provide descriptions, methods and timing for undertaking further investigation, assessment and management of the existing Dungowan Dam inundation zones following de-watering, to gain a comprehensive understanding of any cultural materials for subsequent management through the project (and with specific reference to impacts from any spoil emplacement);

    - detail descriptions and methods of any additional investigative and/or mitigative archaeological actions that may be required prior to works commencing or during the project. These should include, but not be limited to, archival recording of all identified Aboriginal objects, sites and places; archaeological excavation of areas of significant buried cultural material (DDFA A-H inclusive) and where direct impacts are proposed within 69 m of 3rdorder or higher creeks (including Dungowan Creek and Peel River); targeted archaeological excavation of areas where indirect impacts (eg inundation, vegetation removal) are proposed within 69 m of 3rd order or higher creeks (including Dungowan Creek and Peel River); and/or cultural monitoring for any areas identified by Aboriginal community as having cultural value. Further details of these activities are presented in Section 11.2. For these activities, details of location/s, methods, personnel, and timing should be included;

    - description and methods of actions to minimise any inadvertent impacts to identified Aboriginal objects and/or sites and areas of archaeological sensitivity outside of the construction footprint. This should include, but not be limited to, cultural inductions for all personnel and subcontractors outlining their location and significance, fencing and clear marking of heritage sites and zones of interest in close proximity to proposed works, appropriate screening for sensitive and gender-specific areas, and any additional requirements identified by the Aboriginal community. A suitable regime of monitoring these activities should also be outlined, including locations, methods, personnel and timing;

- description and methods for undertaking further Aboriginal heritage assessment, investigation and mitigation of any areas of the project footprint that have changed following completion of the ACHA and/or during the final design and construction phases of the project;

- description and methods of post-excavation analysis and reporting of the archaeological investigations and activities implemented as part of the ACHMP. For excavations, these should include suitable collection and processing of stone artefacts, and chronological, soil, and environmental samples;

- procedures following current Water Infrastructure NSW guidelines for managing the unexpected discovery of Aboriginal objects, sites and/or human remains during the project;

- procedures for the curation and long-term management of cultural materials recovered as part of the works outlined in the ACHMP and any preceding stages associated with the project. Discussions with RAPs indicate that any curation should remain on Country and remain accessible to the local Aboriginal community into the future; and

- processes for reviewing, monitoring, and updating the ACHMP as the project progresses.

- A heritage-interpretation strategy must be developed by a heritage specialist to identify the interpretive values of the project footprint, and specifically Aboriginal heritage values across the project footprint, and to provide direction for potential interpretive installations and devices. This strategy should be made available for consultation and feedback with the RAPs. Following consultation and feedback on this strategy, a heritage interpretation plan should refine the content (visual and textual) and design details in order to allow the implementation stage. The interpretation strategy and interpretation plan must include consideration of three main components identified though the ACHA process:

  - input and feedback from the RAPs, which to date include a number of cultural sites and social history places from both traditional and contemporary connection of the project footprint with the Aboriginal community; and a range of flora and fauna that have totemic, medicinal and/or economic association with the Aboriginal community;

  - the historical record of the study and its immediate environs, which has documented associations with Aboriginal people, dating to the post-contact period; and

  - the past cultural and environmental landscape informed by current archaeological investigations and analysis of the ACHA, and any future activities that may result from the project (eg archaeological salvage of key locales).

- Whilst impacts to streamflow within Dungowan Creek and the Peel River are anticipated to be minor, some change to the existing streamflow regime will occur as a result of the project. To ensure potential impacts to Aboriginal sites, objects and/or places are considered in the development of environmental water release plans and other mitigation strategies for the project, a Cultural Flow Management Plan (CFMP) must be developed by heritage and water specialists in consultation with the RAPs and consent authority to provide the post approval framework for management and monitoring of water regimes in the vicinity of key Aboriginal sites, objects and/or places within the project area. The CFMP should include the following issues:

  - processes, timing, and communication methods for maintaining Aboriginal community consultation and participation through the development and operation of the document;

- a background description of the Aboriginal sites, objects, places and values, and their significance; and information on how water influences their significance and integrity. This may require additional investigations of affected areas to identify Aboriginal sites, objects, places and values that are not addressed in the ACHA;
- an overview of the catchment or river systems, including hydrological information from prior to, and following establishment of the dam;
- clear objectives for the cultural flow in maintaining the significance of the Aboriginal sites, objects, places and values;
- description of how water will be managed into the future to maintain necessary water regimes; and any constraints/limitations. This should include information on key personnel to manage and monitor these regimes;
- a risk assessment, with a description of how they would be minimised, and any management requirements if they eventuate; and
- how the water regime associated with the Aboriginal sites, objects, places and values would be monitored, including methods and timing.

- In addition to the ACHMP, the Construction Environment Management Plan (CEMP) should reinforce how the cultural landscape is considered throughout the project and detail the rehabilitation of the project area. In discussion with the Aboriginal community, rehabilitation of areas where infrastructure is not remaining after the project should be undertaken to determine suitable ecological communities and other factors in returning the cultural landscape as close to its current state as feasible.
- Consultation should be maintained with the RAPs during the finalisation of the assessment process and throughout the project.
- A copy of the Aboriginal Cultural Heritage Assessment Report should be lodged with the Aboriginal Heritage Information Management System (AHIMS) and provided to each of the RAPs.
- AHIMS Site Recording Forms for the newly identified Aboriginal objects and/or sites within the project area and areas of archaeological sensitivity should be submitted to the AHIMS database once their validation has been completed.
- Where the heritage consultant changes through the project, suitable hand over should be undertaken to minimise loss or mistranslation of the intent of the information, findings and future steps in heritage management occur.

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1 Introduction

1.1 The project

The Peel River, part of the Namoi River catchment, provides water for irrigation as well as being the primary water supply for the city of Tamworth. Prompted by the millennium drought, investigations into the future water supply and demand for bulk water were undertaken for the regional city of Tamworth and the Peel Valley water users. The Dungowan Dam and pipeline project (the project) is a critical project to improving long-term water security for the region. The project includes a new dam at Dungowan (new Dungowan Dam) approximately 3.5 km downstream of the existing Dungowan Dam and a new section of pipeline about 32km long between the proposed Dam outlet and the tie in point to an existing pipeline from Dungowan Showground to the Calala Water Treatment Plant (WTP).

In September 2022, the Minister for Planning and Homes declared the project to be Critical State Significant Infrastructure (CSSI) as it is a development that is essential for the State for economic and social reasons. This requires Schedule 5 of the *State Environmental Planning Policy (Planning Systems) 2021* (Planning Systems SEPP) to be updated to reflect the CSSI status of the project. As CSSI, the project is subject to Part 5, Division 5.2 of the *Environmental Planning and Assessment Act 1979* (EP&A Act), which requires the preparation of an environmental impact statement (EIS) and the approval of the NSW Minister for Planning and Homes.

The EIS has been prepared for the planning approval application for the project. This Aboriginal Cultural Heritage Assessment (ACHA) has been prepared to support the EIS.

In addition to requiring approval from the NSW Minister for Planning and Homes, the project has been deemed a controlled action under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and requires approval from the Commonwealth Minister for the Environment and Water. The Minister for the Environment has accredited the NSW planning process for the assessment of the project. Therefore, a single EIS has been prepared to address the requirements set out by the NSW Department of Planning and Environment (DPE) and the Commonwealth Department of Climate Change, Energy, the Environment and Water.

1.2 Project location

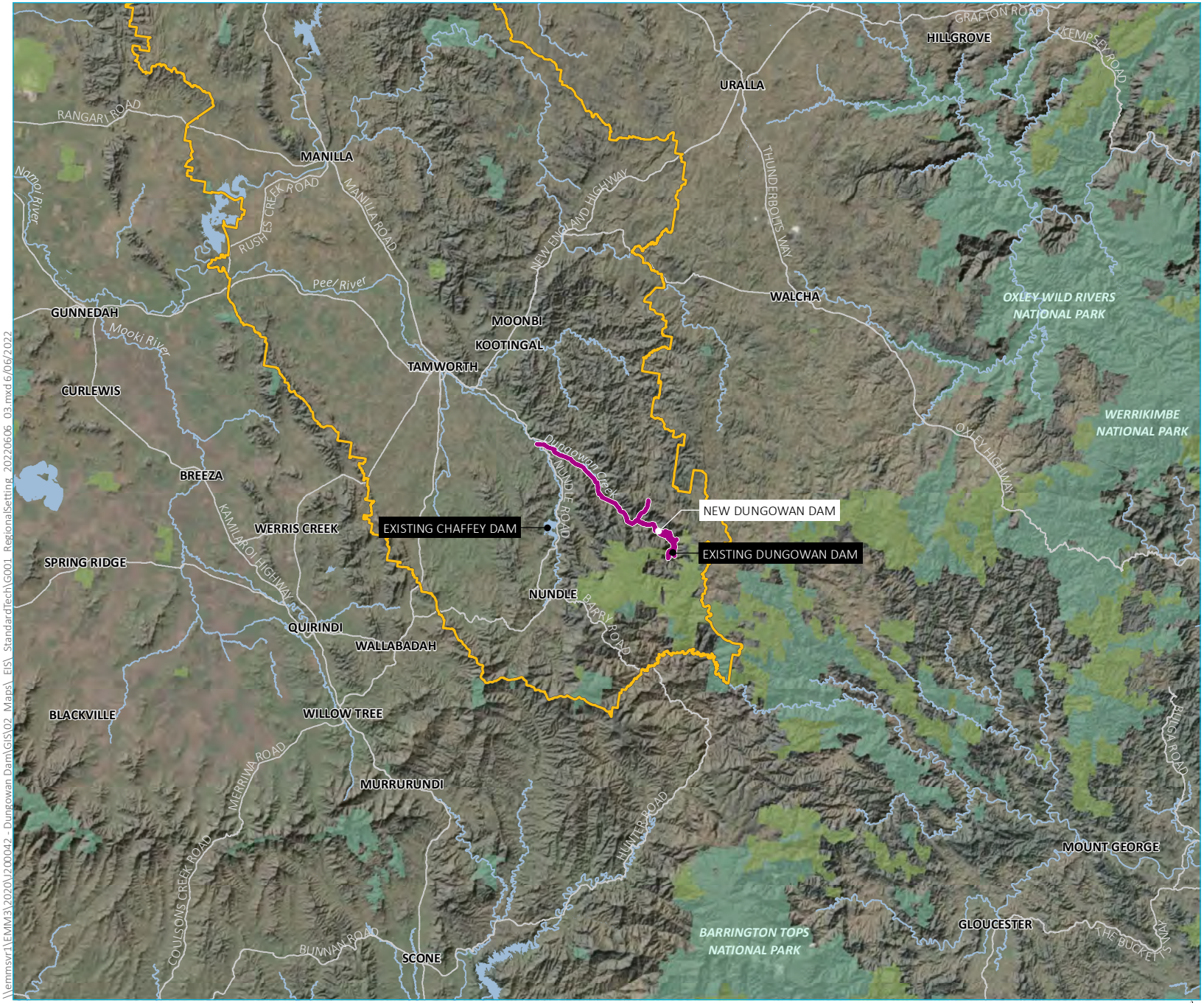
The project is located in the Tamworth Regional local government area (LGA), the New England Tablelands bioregion and part of the New England and North West region of NSW, west of the Great Dividing Range (DPE 2017). The New England and North West region is home to approximately 186,900 people and has a total area of around 99,100 km2 (ABS 2018).

The city of Tamworth is the nearest (and largest) town to the project with over 40,000 residents. Other nearby regional towns include Quirindi (70 km west), Manilla (90 km north-west), Gloucester (90 km south-east), Armidale (100 km north) and Gunnedah (110 km west of the project).

The existing Dungowan Dam is in the Namoi River catchment approximately 50 km south-east of Tamworth in NSW. The Namoi catchment covers 4,700 km^2 and borders the Gwydir and Castlereagh catchments and is bounded by the Great Dividing Range in the east, the Liverpool Ranges and Warrumbungle Ranges in the south, and the Nandewar Ranges and Mount Kaputar to the north.

The existing Dungowan Dam is on Dungowan Creek, which is a tributary of the Peel River. Dungowan Creek is confined by the existing Dungowan Dam, while the Peel River system is regulated by Chaffey Dam, located in the upper catchment near the town of Woolomin, approximately 45 km from Tamworth.

The project's regional setting is shown in Figure 1.1.



Source: EMM (2022); WaterNSW (2021); DFSI (2017); GA (2013)

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Regional setting

Dungowan Dam and pipeline project
Figure 1.1

EMM creating opportunities

1.2.1 Project impact areas

In outlining the project, a project footprint has been defined to facilitate the assessment of direct impacts from the project:

- Project footprint: all areas where direct impacts may be experienced during construction and/or operation.

The project footprint has an area of 315 ha and is comprised of the construction and operational footprints, of which there is some overlap:

- Construction footprint: areas where vegetation clearing and/or ground disturbance is required for construction of the dam, pipeline and ancillary facilities, including the area needed to decommission and rehabilitate the existing dam.

- Operational footprint: areas where there will be permanent operational elements or easements, including infrastructure needed to operate the new Dungowan Dam and pipeline. The operation footprint includes the inundation area, being the area defined by the proposed full supply level (FSL) for the project.

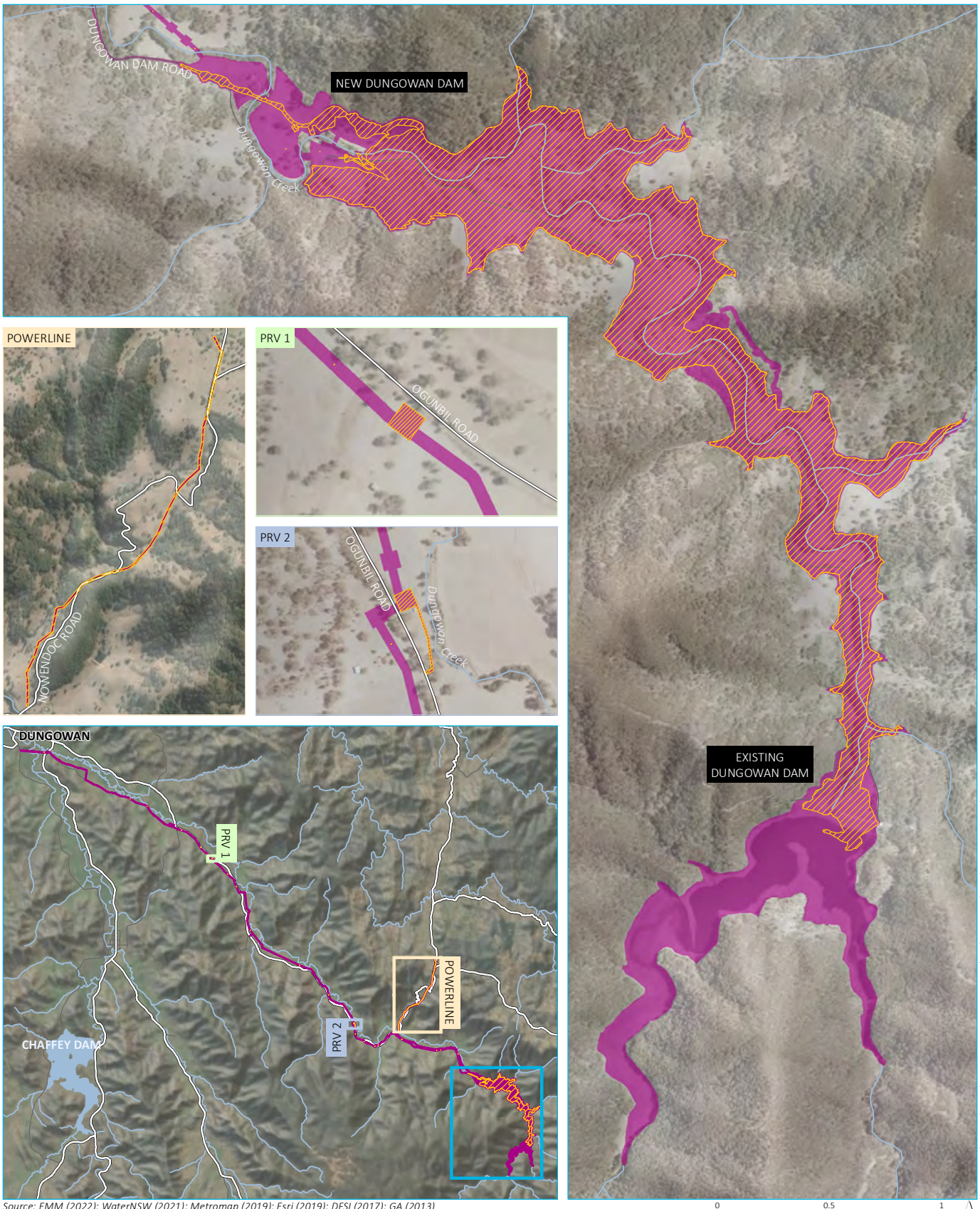
Additional areas outside the project footprint have also been considered where relevant to the assessment of project impacts and include:

- Upstream flood extent: An area above the FSL to the level of a probable maximum flood (PMF) event that would be inundated for relatively short periods during operation associated with extreme rainfall events.

- Project area: A 10 km buffer around the project footprint defined to allow for assessment of potential indirect impacts.

- Downstream impact area: the area where hydrological changes may occur due to the project. This area is discussed in detail in the Surface Water Assessment (EMM 2022a) as well as other technical reports subject to changed flow regimes as a result of the new Dungowan Dam operation. The downstream impact area includes Dungowan Creek and also the Peel River downstream of Chaffey Dam.

The project construction and operational footprints are shown in Figure 1.2.



Source: EMM (2022); WaterNSW (2021); Metromap (2019); Esri (2019); DFSI (2017); GA (2013)

0 0.5 1 km

GDA 1994 MGA Zone 56

N

KEY

- Construction footprint
- Operational footprint

Existing environment

- Major road
- Minor road
- Named watercourse
- Named waterbody

Project footprint

Dungowan Dam and pipeline project

Figure 1.2

EMM creating opportunities

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1.3 Purpose of this report

This ACHA supports the EIS for the project. It documents the results of archaeological and anthropological investigations undertaken to identify the extent and significance of any physical remains and intangible values of past Aboriginal visitation, use and occupation within the project area. The objectives of the investigation were to:

- consult with and involve key Aboriginal community members and knowledge holders to identify areas and places of cultural value within or in the vicinity of the project area;
- compile a review of existing environmental, historical and archaeological information for the project area, by identifying and summarising known and previously recorded Aboriginal heritage places, cultural values areas and landforms of archaeological interest in its immediate surrounds;
- determine if any Aboriginal objects, places, cultural values areas, or areas of archaeological potential are present (or are likely to be present) within the project footprint, as well as areas of existing disturbance, through ground-truthing, including field survey and test excavations;
- identify the type, nature, and extent of any Aboriginal sites, objects, archaeological deposits, potential archaeological deposits, and cultural values areas within the project footprint;
- map the locations of known and potential Aboriginal sites, objects and deposits and cultural values areas identified;
- assess the archaeological and cultural significance of the project footprint;
- assess and identify heritage constraints and opportunities and the potential impacts of the project; and
- identify and recommend measures to mitigate any heritage impacts and risks to the project.

1.4 Legislative context

There are several Commonwealth and State Acts (and associated regulations) that manage and protect Aboriginal cultural heritage (Annexure A provides further details). These are summarised in Table 1.1.

Table 1.1 Commonwealth and State legislation relevant to the project.

Legislation	Description	Relevant to the project?	Details
Commonwealth			
Environment Protection and Biodiversity Conservation Act 1999	Recognises sites with universal value on the World Heritage List (WHL). Protects Indigenous heritage places with outstanding heritage value to the nation on the National Heritage List (NHL), and significant heritage value on the Commonwealth Heritage List (CHL).	No	There are no Indigenous heritage places within the project area that are listed on the WHL, NHL, or the CHL.

Table 1.1 Commonwealth and State legislation relevant to the project.

Legislation	Description	Relevant to the project?	Details
Native Title Act 1993	Established a system for recognising Aboriginal and Torres Strait Islander peoples' rights and interests over lands and waters by Aboriginal people. Provides for negotiation and registration of Indigenous Land Use Agreements (ILUAs). Often used in NSW to identify relevant stakeholders for consultation.	No	There is one active (ie non finalised) claim encompassing parts of the project area – Gomeroi People (NC2011/006). Representatives of this organisation were consulted as part of the ACHA.
Aboriginal and Torres Strait Islander Heritage Protection Act 1984	Preserves and protects declared areas and objects of particular significance to Aboriginal and Torres Strait Islander people that are under threat from injury or desecration.	No	There are no areas or objects within the project area subject to a Declaration under the Act.
State			
Environmental Planning and Assessment Act 1979	Requires environmental impacts, including to Aboriginal heritage, to be considered in land use planning. Provides for the development of environmental planning instruments, including State Environmental Planning Policies and Local Environmental Plans.	Yes	The project is being assessed as a CSSI project under Part 5, Division 5.2, of this Act, and is subject to project-specific environmental assessment and reporting requirements (Section 1.4.1). These requirements (SEARs) stipulate that Aboriginal heritage impact assessment is required (in accordance with standard Heritage NSW procedures and guidelines) to assess whether the project has the potential to impact on Aboriginal objects, sites, or places of Aboriginal heritage significance.
National Parks and Wildlife Act 1974	Provides blanket protection for all Aboriginal objects and declared Aboriginal places. Includes processes and mechanisms for development where Aboriginal objects are present, or where Aboriginal Places are proposed for harm.	Yes	While an Aboriginal heritage impact permit to harm tangible Aboriginal cultural heritage under this Act is not required for CSSI projects, the SEARs applies guidelines prepared under this Act relating to consultation and assessment of impacts of CSSI projects on cultural heritage.
Aboriginal Land Rights Act 1983	Establishes Local Aboriginal Land Councils (LALCs). Allows transfer of ownership of vacant crown land to a LALC. The Office of the Registrar, *Aboriginal Land Rights Act 1983 (ORALRA)*, registers Aboriginal land claims and maintains the Register of Aboriginal Owners. Often used in NSW to identify relevant stakeholders for consultation.	No	The project area is within the boundaries of the Tamworth Local Aboriginal Land Council, which is a RAP for this project and has been consulted. A request to search the Register of Aboriginal Owners was made to the ORALRA on 9 April 2020. The project area does not appear to have Registered Aboriginal Owners pursuant to Division 3 of the Act.

1.4.1 Assessment guidelines and requirements

This ACHA has been prepared in accordance with the Secretary's Environmental Assessment Requirements (SEARs) for the Dungowan Dam and Pipeline project as well as relevant government assessment requirements, guidelines and policies, and in consultation with the relevant government agencies.

The SEARs must be addressed in the EIS. Table 1.2 lists the matters relevant to this assessment and where they are addressed in this report.

Table 1.2 Relevant matters raised in the SEARs

Requirement	Chapter/Section addressed
23. Identification, description and assessment of impacts upon Aboriginal cultural heritage values that across the whole area that will be affected by the project, and any other area which the project could directly or indirectly impact.	Chapters 7-11
24. Documentation of impacts to Aboriginal cultural heritage in an Aboriginal Cultural Heritage Assessment Report (ACHAR) in accordance with the Aboriginal Cultural Heritage Consultation Requirements for Proponents (DECCW 2010) and guided by the Guide to investigating, assessing and reporting on Aboriginal Cultural Heritage in NSW (DECCW 2011, which must:	Entire report
a) be prepared in consultation with the local Aboriginal community and other relevant stakeholders.	Chapter 3
b) be prepared in consultation with DPIE Biodiversity and Conservation Division regional branch officers	Chapter 3
c) document all surface survey and test excavations.	Chapter 7
d) demonstrate attempts to avoid impact upon cultural heritage values and identify any conservation outcomes.	Chapters 10 and 11
e) outline measures proposed to mitigate impacts, and identify any conservation outcomes, where impacts are unavoidable.	Chapters 10 and 11
f) any objects recorded as part of the assessment must be documented and notified DPC Heritage.	AHIMS site cards have been developed and submitted to Heritage NSW for all newly documented sites.

To inform preparation of the SEARs, the DPE invited relevant government agencies to advise on matters to be addressed in the EIS. These matters were taken into account by the Secretary for DPE when preparing the SEARs.

1.5 Other relevant reports

This ACHA has been prepared with reference to other technical reports that were compiled as part of the EIS. The other relevant reports referenced in this ACHA are listed below.

- Aboriginal community engagement strategy (EMM 2021);
- Surface Water Assessment (EMM 2022) – Appended to the EIS;
- Lands, Soil and Erosion Assessment (EMM 2022) – Appended to the EIS;
- Biodiversity Development Assessment Report (EMM 2022) – Appended to the EIS; and
- Statement of Heritage Impact (EMM 2022) – Appended to the EIS.

1.6 Other relevant development activities

Water Infrastructure NSW is currently delivering a replacement pipeline between Dungowan Showground and Calala WTP, referred to as the Stage 1 Dungowan pipeline replacement. This project is classified as 'permissible without consent' under the provisions of *State Environmental Planning Policy (Infrastructure) 2007* (the Infrastructure SEPP). Because development consent is not required, the project falls within the definition of an 'activity' under Division 5.1 and was therefore assessed under Division 5.1 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). An AHIP was required for this project, which is detailed further in Chapter 6 of this ACHA.

Stage 2 of the pipeline replacement is part of the Dungowan Dam and pipeline project and the subject of this ACHA. Community and stakeholder involvement has been ongoing and integrated for both Stage 1 of the pipeline replacement and for the Dungowan Dam and pipeline project, given the key stakeholders, including the RAPs, are consistent for both.

As part of the investigative activities required to inform design for the Dungowan Dam and pipeline project, numerous geotechnical activities have also been undertaken within the footprint of the Dungowan Dam and pipeline project. These geotechnical activities were also 'permissible without consent' and also required a separate AHIP (detailed further in Chapter 6).

1.7 Limitations

This report is based on existing and publicly available environmental and archaeological information (including the AHIMS data) and reports about the project area. The background research did not include any independent verification of the results and interpretations of externally sourced existing reports (except where the ground-truthing was undertaken). The report further makes archaeological predictions based on these existing data and targeted ground-truthing, and that may contain errors depending on the accuracy of these third-party studies and the extent of ground-truthing investigations.

Ground-truthing of parts of the proposed pipeline and existing Dungowan Dam were not feasible during the preparation of the ACHA. Numerous localised investigations and various portions of the alignment (notably those along road corridors) were inspected, but an investigation of the entire pipeline from end-to-end was not undertaken. Areas where ground-truthing were not undertaken are assessed using desktop information and site predictions, with recommendations for further investigation and management following the project approval.

Due to the steep terrain in the upper parts of the project footprint, field investigation of the PMF was limited, and is considered primarily through desktop research and information. Where the PMF had the potential to interact with identified areas of cultural value (notably along Terrible Billy Creek), ground-truthing was undertaken.

No specific field investigation has been undertaken to inform the assessment of downstream impacts outside of the proposed pipeline and work areas immediately around the dam wall. The hydrological information shows that changes to streamflow are considered minor and corresponding changes to stream depth shown to be negligible (see Section 10). However, recommendations have been included in the ACHA to ensure further consideration, exploration and management of hydrological change is captured following determination of the project through the development of a Cultural Flow Management Plan.

This report does not consider historical and/or built heritage unless specifically related to Aboriginal heritage values. Such heritage items are addressed in the Statement of Heritage Impact (SOHI) appended to the EIS (see Section 1.5).

2 Description of the project

This chapter provides a summary of the Dungowan Dam and pipeline project. It outlines the permanent infrastructure required to operate the project, as well as the key construction elements and activities required to construct the project. A comprehensive and detailed description of the project is provided as Appendix B1 of the EIS, which has been relied upon for the basis of this technical assessment.

2.1 Project overview

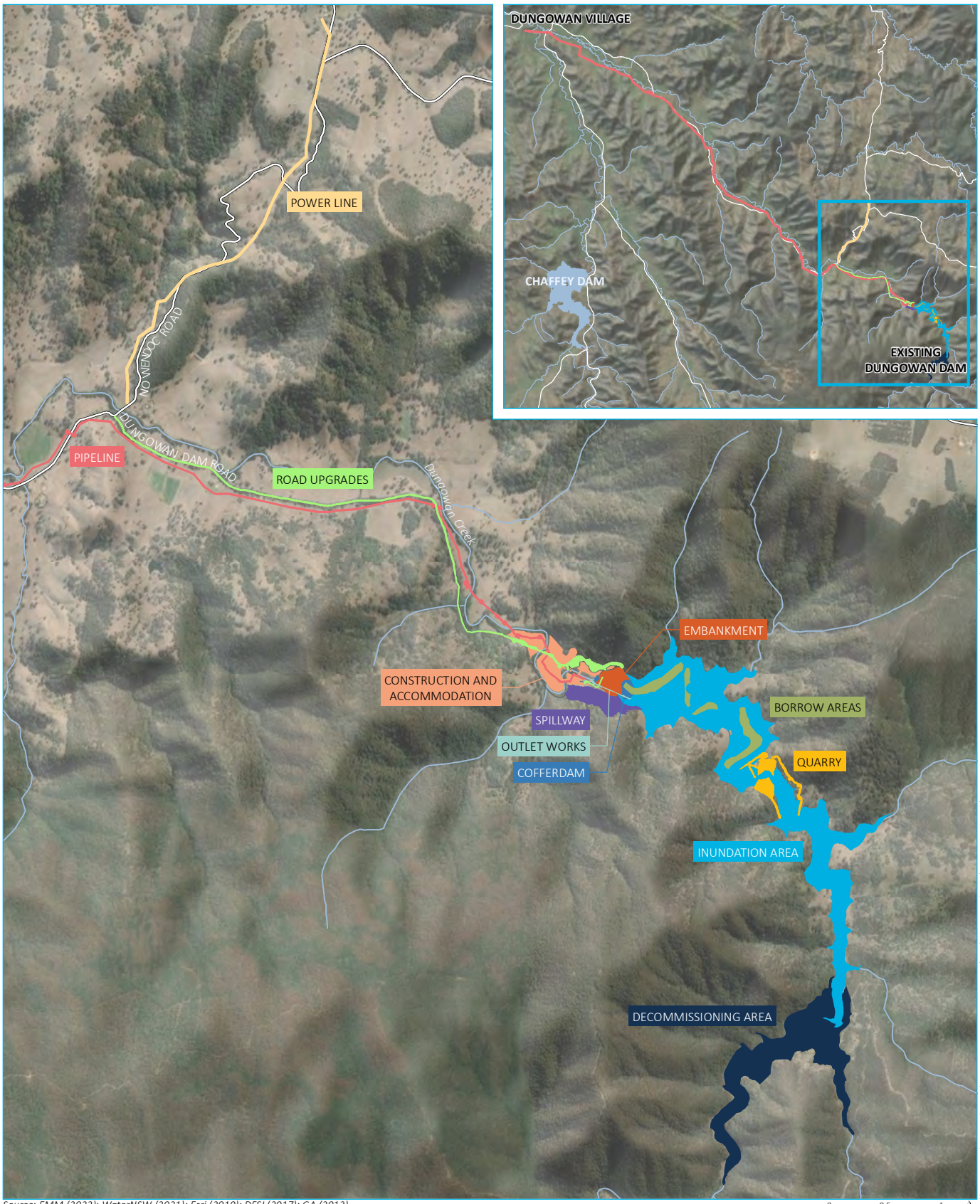
Water Infrastructure NSW proposes to build a new dam at Dungowan (new Dungowan Dam) about 3.5 km downstream of the existing Dungowan Dam and an enlarged delivery pipeline from the new Dungowan Dam outlet to the tie in point to the existing pipeline from Dungowan Showground to the Calala WTP. The existing pipeline from Dungowan Showground to the Calala WTP is not part of the Dungowan Dam and pipeline project. A summary of project elements is provided in Table 2.1. An overview of the project is provided in Figure 1.2.

Table 2.1 Overview of the project

Project element	Summary of the project
New Dungowan Dam infrastructure	Earth and rockfill embankment dam with height of ~58 m and a dam crest length of ~270 m.
	Storage capacity of 22.5 GL at full supply level (FSL) of RL 660.2 m AHD.
	The new Dungowan Dam on Dungowan Creek has a catchment size of 175 km^2 and is part of the Peel Valley and Namoi River catchment.
	Inundation extent (to FSL) of 130 ha (1.3 km^2)
	Spillway to the south of the dam wall including an approach channel, uncontrolled concrete ogee crest, chute and stilling basin. Free standing multiple-level intake tower connected with a bridge to the embankment, diversion tunnel with outlet conduit, valve house and associated pipework and valves.
	A permanent access road over the Dam crest to the valve house for operation and maintenance.
	Water diversion works including a diversion tunnel and temporary pipeline and upstream and downstream cofferdams to facilitate construction of the dam wall embankment.
Pipeline infrastructure	31.6 km of buried high density polyethylene (HDPE) pipe between 710 mm to 900 mm nominal diameter.
	Maximum 71 ML/day from the proposed dam to the junction with the pipeline from Chaffey Dam to the Calala Water Treatment Plant, to replace the existing 22 ML/day pipeline. The pipeline would connect to the valve house on the left abutment of the embankment. Valve infrastructure would include control valves installed in two above ground buildings along the pipeline.
	10 m wide easement for the 31.6 km length of the pipeline. The replacement pipeline extends from the new Dungowan Dam to a connection point with the existing pipeline between Dungowan Showground and Calala WTP.
Ancillary infrastructure and works	Road works to improve existing roads to provide construction access, temporary establishment and use of a construction compound, an accommodation camp, two upstream quarries and four borrow areas within the inundation area.
	A new 4.2 km long 11 kV overhead powerline (including a new easement and access track) connecting to an existing overhead line approximately 6 km north west of the dam. The existing overhead line that extends approximately 13.2 km to the Niangala area would also require minor upgrades, including re-stringing of new overhead wiring and replacement of some poles.
Decommissioning of existing Dungowan Dam	Dewatering of existing dam, removal of existing Dungowan Dam infrastructure and full height breach of the existing Dungowan Dam wall. Rehabilitation of inundation area of the existing Dungowan Dam.

Table 2.1 Overview of the project

Project element	Summary of the project
Disturbance	Areas of disturbance have been identified based on the direct impacts of the project. There is some overlap in the areas disturbed during construction and operation, with a resulting total disturbance area proposed for the project of 315 ha (project footprint). Disturbance would occur in a staged manner, with construction requiring disturbance of approximately 315 ha (construction footprint). Following construction and once rehabilitation is completed, there would be a permanent disturbance of approximately 158 ha comprising the inundation area and permanent infrastructure (operational footprint).
Construction	Construction duration of approximately 6 years.
	Construction workforce of approximately 125 workers at construction peak.
Operation	WaterNSW will be responsible for management, operation and general maintenance of the new dam. Tamworth Regional Council will be responsible for the management, operation and general maintenance of the pipeline. Public use and access to the dam would not be permitted and there would be no public facilities available during operation.
	One to two new full time workers plus part time work for existing WaterNSW operations team. Due to the new Dungowan Dam being prioritised over Chaffey Dam for Tamworth's future water supply, the water reserved for town water in Chaffey Dam would increase from 14.3 GL to 30 GL to ensure that water is set aside to meet Tamworth's town water supply water demand in years when rainfall is low.
Design life	100 years for zoned earthen embankment, structural concrete elements of the dam and the pipeline. 15 to 50 years for other non-structural project elements and pavements.
Assessment period (operational)	The assessment end point is when the water system performance reaches a level when an additional water supply option or change to the Water Sharing Plan is required. This has been estimated to be when the mean average annual water demand from Tamworth increases to 11 GL/year.



Source: EMM (2022); WaterNSW (2021); Esri (2019); DFSI (2017); GA (2013)

0 0.5 1 km

GDA 1994 MGA Zone 56

N

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KEY

- Inundation area
- Borrow areas
- Construction and accommodation camp
- Outlet works
- Cofferdams
- Embankment
- Quarries
- Spillway
- Road upgrade
- Decommissioning area
- Power line footprint
- Pipeline construction footprint

Existing environment

- Major road
- Minor road
- Named watercourse
- Named waterbody

Project overview

Dungowan Dam and pipeline project

Figure 2.1

EMM creating opportunities

3 Aboriginal consultation

3.1 Key findings

- The ACHA adopted the processes and methods outlined in the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (DECCW, 2010), as well as more extensive activities outlined in a project specific Aboriginal communication strategy (EMM 2021) (the strategy). The strategy was developed to promote transparent and frequent two way dialogue between the Aboriginal community and the project, and aligns with the requirements of the *Engage Early: Guidance for proponents on best practice Indigenous engagement for environmental assessments under the Environment Protection and Biodiversity Conservation Act 1999* (Department of the Environment, 2016). It includes:

  - the identification of local Aboriginal community individuals and/or organisations who were known to participate in cultural heritage in recent years for inclusion, and liaison with and/or searches of Government organisations such as Native Title Tribunal and Heritage NSW; and has subsequently been supplemented with others that registered formally through the Heritage NSW consultation process;

  - details of a range of EMM, proponent and other government personnel that can be contacted to discuss the project and identify any grievances or concerns;

  - outlines a range of mechanisms for information exchange through the project, including regular face-to-face and/or digital meetings, provision of regular project information via e-mail and/or post, and opportunities to meet/participate in activities on-Country; and

  - outlines detailed timing and schedule of the consultation process between April 2020 and June 2022.

  The strategy was developed with the participating Aboriginal stakeholders, and has been subject to continual refinement and improvement over the life of the project. Each of the four iterations of the strategy since April 2020 was provided to the participating Aboriginal stakeholders for review, input and comment before its finalisation and implementation.

- Consultation with Heritage NSW (formerly BCD DPIE) has conformed with the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (DECCW, 2010), and included provision of information on RAPs, and notification of the various field survey and excavation activities associated with the project. Various informal discussions with Heritage NSW were also undertaken and included the early phases of the project as Aboriginal stakeholders were being identified and investigative methods were becoming established, and more recently in discussions of the content and recommendations of the report.

- Overall, the project has been liaising with between 10 and 18 RAP organisations and/or individuals since its inception in April 2020. These include those identified as part of the consultation strategy, and through formal notification as part of the Heritage NSW consultation requirements. The RAPs include a large number of local Aboriginal organisations and/or individuals based on Tamworth and/or immediate surrounds, as well as a smaller proportion that are based on Sydney and Brisbane but have ancestral connections to the region. Following notification, 10 organisations registered an interest in the early stages of the project (April – June 2020); and a further eight Aboriginal individuals and/or organisations registered later in the project (July 2020 - April 2022). (One of these later registrants was a sites officer from Tamworth LALC who had retired, and who was involved extensively in the project). The project has registered any Aboriginal organisation and/or individual throughout the project regardless of when they

have become known or identified their interest. However, where involvement has occurred late in the project, on-Country opportunities has been limited.

- Opportunity for Aboriginal involvement in the project was provided throughout the ACHA, including: 1) attendance at nine Aboriginal focus group meetings held in Tamworth and/or on-site to allow observation of the proposed impact footprint and/or investigative activities; 2) participation in a two week field survey of the project footprint; 3) participation in a five week archaeological test excavation of the project footprint; and 4) participation for key knowledge-holders to visit the site with a highly experienced anthropologist to discuss cultural values. Ultimately, some 450 interactions have been undertaken with the RAPs across these opportunities. Some 11 of the RAP organisations participated in these opportunities, totalling over 200 days on site cumulatively, and included Tamworth LALC, The Gomeroi People native title applicants, Nunawanna Aboriginal Corporation, DFTV Enterprises, Corroboree Aboriginal Corporation, AT Gomilaroi Cultural Consultancy, Galamaay Cultural Consultants, Huckada Dreamin Heritage Group, Wattaka Cultural Service, Wurrumay Pty Ltd, and Hunters and Collectors.

- Discussions with the RAPs have been wide-ranging over the 16-month assessment process. In general, feedback on the project and ACHA activities have been positive. Specific inputs varied as the project progressed, but often focussed on key sites within or near the project footprint, in their identification, potential impacts and future management. This included several potential stone arrangements (possibly burials in some cases), and the cultural importance of Terrible Billy Creek and tangible sites around it. The desire for suitable recovery and re-location of cultural materials, as well as maintaining connection to important locales that would remain once the dam is established was frequently voiced. General concerns and issues were mostly focussed on the level of on-Country participation, especially in relation to RAPs not from the local area; the level of investigation along the proposed pipeline with limited land access; and the suitable conservation and management of important sites, such as DDCS1. These are all acknowledged in this report in Section 3.4, Appendix B.5, and/or proposed for management following project approval.

- Aboriginal consultation has remained ongoing since the completion of the ACHA in late 2021 through other related assessment and development activities for the project. These include undertaking additional assessment of the replacement pipeline between Dungowan Station and Calala WTP; and through archaeological mitigations of proposed geotechnical investigations across the project footprint.

3.2 The process

Two parallel and overlapping consultation processes were undertaken as part of the ACHA. As a requirement of the SEARs, consultation was undertaken in accordance with Heritage NSW guidelines (Section 3.2.1). In addition, due to the size, complexity and fluidity of the project, a project specific consultation strategy that included additional activities with the Aboriginal participants was also implemented (Section 3.2.2).

3.2.1 Heritage NSW guidelines

Aboriginal consultation for this project has been undertaken in accordance with procedures set out in the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (DECCW, 2010). These guidelines identify a five-stage process:

1. pre-notification – identification of the Aboriginal individuals and/or communities relevant to the project area by contacting several state government agencies;

2. notification – contacting all Aboriginal individuals and/or communities identified in Stage 1 to determine their interest in being consulted during the project. This includes direct communication and the placement of advertisements in local media seeking further expressions of interest from Aboriginal individuals and/or communities that may have been missed through Stage 1. Those Aboriginal individuals and/or communities that wish to be consulted become a 'registered' Aboriginal party (RAP);

3. presentation of project information/assessment methodology – briefing RAPs about the project and scope of any Aboriginal heritage assessment and investigations. This is usually undertaken through written correspondence, but can include meetings, and may undergo several iterations through the project as the nature of the assessment changes (eg surface ground-truthing may lead to a requirement for test excavations);

4. impacts and mitigation strategies – discussion of potential impacts to cultural materials and mitigation options with the RAPs prior to developing the ACHA. This is often undertaken either onsite at the end of any field program and/or as part of Stage5; and

5. report review – the RAPs are provided an opportunity to review and comment upon the draft ACHA, to contribute input into the overall findings, significance and management of cultural heritage.

The consultation process for the project had two aims:

1. to comply with the Heritage NSW consultation procedures to obtain input on the ACHA process; and

2. to identify cultural places and intangible values that may be affected by the proposed activity.

3.2.2 Consultation strategy

In addition to the required steps outlined in Section 3.2.1, EMM implemented a project specific Aboriginal communication strategy (EMM 2021) (the strategy). The strategy was developed to promote transparent and frequent two way dialogue between the Aboriginal community and the project, and aligns with the requirements of the *Engage Early: Guidance for proponents on best practice Indigenous engagement for environmental assessments under the Environment Protection and Biodiversity Conservation Act 1999* (Department of the Environment, 2016).

The strategy was developed when WaterNSW was the project proponent, however on 1 September 2021, responsibility for delivery of the project transitioned from WaterNSW to Water Infrastructure NSW. This included transfer of responsibility for strategy implementation to Water Infrastructure NSW.

The key objectives of the strategy are:

- promote a two-way dialogue between the proponent and the Aboriginal community, with clear scope that outlines key areas for information exchange and input;

- to provide clear and consistent project messages across all methods of Aboriginal community interaction;

- to provide a framework for Aboriginal communities to understand the consultation process, methods and timing through the development and construction of the projects;

- to manage Aboriginal community issues through proactive and transparent communication and feedback; and

- to prevent delays to the projects as a result of Aboriginal community concerns and/or issues.

The key rationale for developing a consultation strategy is the risk of Aboriginal cultural heritage being affected by the project, and the potential consequences of such impacts. A full understanding of the significance of identified Aboriginal sites and places, their context and inter-connectiveness is essential to the projects' success and can similarly only be understood with Aboriginal community involvement. The development of the strategy provides both the proponent and the Aboriginal community with a framework for the methods, approaches and expectations of sharing this type of information for the benefit of both parties.

The rationale for the approaches outlined in the strategy are based on the desire to maximise face-to-face interactions, which, based on our experience, achieves greater exchange of information, improved trust between parties, and more comprehensive project input. It also allows for rapid identification and management of potentially key issues for the project.

The use of face-to-face communication is balanced with other written and verbal methods of communication proposed to ensure those individuals unable, or unwilling, to attend community gatherings to remain involved in the project. This document is consistent with the objectives of Heritage NSW's *Aboriginal Consultation Requirements for Proponents 2010*.

Specifically, the strategy included the following additional activities:

- face-to-face meetings - Aboriginal focus group (AFG) meetings were held to promote two-way dialogue, allow project flexibility and to maintain regular interaction with the RAPs. These were held monthly, at a location within the project area and/or nearby venue, with options for online and/or phone meetings as required;[2]
- resourcing from the Aboriginal community – the project employed two young Aboriginal representatives from the local community to train and mentor them in the broader environmental impact process, and to provide a local conduit for the transfer of cultural information to assist in the ACHA process;
- field investigation participation – all RAPs were offered the opportunity to attend a range of geotechnical monitoring, field survey and test excavations activities carried out across the project footprint. Overall, over 200 person days of participation in the project were undertaken by the RAPs; and
- information packs and publications – the project distributed regular information to the RAPs via e-mail, phone and/or post. This was primarily a project update distributed in the middle of each month through the main stages of the ACHA to keep RAPs briefed on activities. In addition, this also included the distribution of various project documents, including revisions to the ACHA methodology, maps, and various interim reporting throughout the 9-month ACHA process.

The strategy was developed in consultation with the Aboriginal stakeholders and RAPs, and has been subject to four updates throughout the development of the ACHA (May 2020, August 2020, January 2021, and May 2021). At each of the updates, the RAPs were provided an opportunity to comment and review the document both at AFG meetings and/or via written communication, and provide inputs or changes if required. Any requested changes are sought are outlined in the strategy itself.

[2] While the ACHA was undertaken during the height of the COVID-19 pandemic, Aboriginal participants still generally wanted to meet in person, and hence this was the primary format of the AFG meetings. Those individuals that did not want to meet in person due to the pandemic, were invited to participate in online meetings (such as Teams, Zoom, etc) to ensure their inclusion in this process. Payment was made to all participants of this activity to support good representation in the ACHA process.

3.3 This project

3.3.1 Liaising with Heritage NSW

As part of the ACHA, various interactions with Heritage NSW have been undertaken:

- notification of the Aboriginal stakeholders involved in the project – 21 April 2020 (Annexures B.1 and B.2);
- notification of the initiation of archaeological test excavations for the project – 28 July 2020 and 16 November 2020 (Annexure B.3); and
- informal consultation – various discussions have occurred with Phil Purcell (Regional Archaeologist) and Samantha Higgs (A/Manager Aboriginal Cultural Heritage Regulation) from Heritage NSW over the life of the ACHA. These included:
    - initial discussions during the scoping phase to identify Aboriginal stakeholders for the project area, and methods of consultation;
    - interactions during the formulation and terminology of the SEARs; and
    - discussions and explorations of archaeological excavation methods that deviate from the Heritage NSW guidelines, and mechanisms for their application.
- presentation of the ACHA process, the findings of this report and the proposed recommendations that would be included – 17 February 2021.
- discussions of the hydrological changes downstream of the project, and the most suitable way for its inclusion in the ACHA and consultation process – 4 May 2022.

3.3.2 Liaising with the RAPs

Aboriginal consultation for this project has been undertaken in accordance with procedures set out in Section 3.2 and included over 450 interactions with the RAPs between April 2020 and June 2022 (Table 3.1; Annexures B.1 and B.2); and over 200 person days of on-site participation.

Initial stages of the consultation process identified 23 Aboriginal stakeholders in the region (Annexure B.2). Following notification, 10 organisations and/or individuals registered an interest in the early stages of the project (April to June 2020); and a further eight Aboriginal individuals and/or organisations registered later in the project (July 2020 - April 2022) (Table 3.2). The RAPs include a large number of local Aboriginal organisations and/or individuals based on Tamworth and/or immediate surrounds, as well as a smaller proportion that are based on Sydney and Brisbane but have ancestral connections to the region. These later organisations registered largely after the main on-site investigation activities for the ACHA had been completed. The project has registered any Aboriginal organisation and/or individual throughout the project regardless of when they have become known or identified their interest. However, where involvement has occurred late in the project, on-Country opportunities has been limited.

Table 3.1 provides a summary of the main steps undertaken to conform with Heritage NSW guidelines. This summary includes activities associated with undertaking additional assessment of the replacement pipeline between Dungowan Station and Calala WTP; and through archaeological mitigations of proposed geotechnical investigations across the project footprint. These activities have been assessed and approved under separate approval processes, however consultation was undertaken jointly. A summary of the additional activities outlined in Section 3.2.2 included:

- distribution of consultation strategy – 15 May 2020;

- Aboriginal focus group meeting 1 (introduction to project and assessment aims and methods) – 28 May 2020;
- early field components (including survey and geotechnical monitoring) – 10-17 June 2020;[3]
- Aboriginal focus group meeting 2 (onsite familiarisation) – 22 June 2020;
- field survey of main dam works – 30 June – 14 July 2020;
- monthly update – 16 July 2020;
- Aboriginal focus group meeting 3 (results of field survey, discussion of test excavations) – 28 July 2020;
- test excavation program – 14 August – 11 September 2020;
- monthly update – 12 August 2020;
- update and distribution of consultation strategy – 26 August 2020;
- Aboriginal focus group meeting 4 (updating consultation strategy, discussion of ongoing test excavations, initial exploration of management and mitigation measures) – 31 August 2020;
- monthly update – 14 September 2020;
- Aboriginal focus group meeting 5 (presentation of test excavation results, discussion of cultural mapping, continued exploration of management and mitigation measures) – 30 September 2020;
- cultural mapping field investigations – 12-15 October 2020
- Aboriginal focus group meeting 6 (initial results of cultural mapping, continued exploration of management and mitigation measures) – 26 October 2020;
- monthly update – 16 November 2020;
- distribution of an interim report summarising the findings of the on-site activities – 1 December 2020;
- Aboriginal focus group meeting 7 (detailed discussion of potential impacts, drafted general principles around management and mitigation measures) – 15 December 2020;
- update and distribution of consultation strategy – 19 January 2021;
- monthly update – 17 February 2021;
- distribution of cultural values mapping report to all Aboriginal participants – 19 February 2021;
- Aboriginal focus group meeting 8 (detailed discussion of the significance, impacts, conclusions and recommendations of this report) – 1 March 2021;
- monthly update – 9 April 2021;

[3] All field activities included the participation of RAP representatives. Generally, between three and five RAP representatives were involved in each day of field activities.

- monthly update – 30 April 2021;
- monthly update – 30 June 2021;
- distribution of draft ACHA and archaeological research design for a geotechnical component of the project – 15 July – 20 August 2021;
- monthly update – 4 August 2021;
- Aboriginal focus group meeting 9 (overview and run through of the ACHA that had remained relatively unchanged since previous AFG meeting discussions, detailed discussion of proposed investigations and AHIP process as part of a separate component of the project) – 12 August 2021;
- monthly update – 7 September 2021;
- monthly update – 8 October 2021;
- field survey of replacement pipeline – 17-19 November 2021;
- field survey of main works pipeline – 22-25 November 2021;
- distribution of draft ACHA for the replacement pipeline for comment – 3 December 2021;
- distribution of AHIP for the geotechnical component of the project – 13 December 2021;
- archaeological test excavations of the replacement pipeline – 31 January – 11 February 2022;
- monthly update – 15 February 2022;
- distribution of draft replacement pipeline ACHA for input and comment – 17 March 2022;
- archaeological test excavations of the geotechnical component – 21 March – present (intermittent)

Table 3.1 Summary of Aboriginal consultation steps required by Heritage NSW guidelines.

Consultation Stage	Description	Date Initiated	Date Completed	Notes
1	Government agency pre-notification	9 April 2020	-	Additional details provided in Annexure B.2.
	Advertisement in the *Northern Daily Leader*	17 April 2020		A tearsheet is provided in Annexure B.2
	Notification and registration of potential Aboriginal stakeholders	17 April 2020	1 May 2020	Additional details are provided in Annexure B.2.
	Advising Heritage NSW of RAPs	21 April 2020		Additional details are provided in Annexure B.2.
2/3	Presentation of information about the proposed project; and gathering information about cultural significance	7 May 2020 21 July 2020	8 June 2020 17 August 2020	Additional details are provided in Annexure B.3.

Table 3.1 Summary of Aboriginal consultation steps required by Heritage NSW guidelines.

Consultation Stage	Description	Date Initiated	Date Completed	Notes
	Field investigation	10 June 2020 30 June 2020 14 August 2020 20 November 2021	17 June 2020 14 July 2020 11 September 2020 22 November 2021	Additional details are provided in Chapter 7.
4	Review of draft report	15 July 2021	20 August 2021	Additional details are provided in Annexure B.4.
		23 June 2022	21 July 2022	

Table 3.2 List of RAPs for the project.

Organisation	Location	Date of registration	Aboriginal focus group meetings									Participation in fieldwork
			28 May 2020	22 June 2020	28 July 2020	31 August 2020	30 September 2020	26 October 2020	15 December 2020	1 March 2021	12 August 2021	
Tamworth Local Aboriginal Land Council	Tamworth	17 April 2020	✓	✓		✓	✓	✓	✓	✓	✓	✓
Nunawanna Aboriginal Corporation	Armidale	17 April 2020	✓	✓								✓
The Gomeroi People	Gilleston Heights	20 April 2020		✓	✓	✓	✓		✓		✓	✓
DFTV Enterprises	Rutherford	20 April 2020	✓	✓	✓		✓	✓	✓	✓	✓	✓
Corroboree Aboriginal Corporation	Rouse Hill	21 April 2020	✓	✓	✓				✓	✓	✓	✓
AT Gomilaroi Cultural Consultancy	Gunnedah	23 April 2020	✓	✓	✓		✓			✓		✓
Galamaay Cultural Consultants	Tamworth	30 April 2020	✓	✓	✓		✓	✓	✓	✓	✓	✓
Huckada Dreamin Heritage Group	Tamworth	14 May 2020	✓	✓		✓	✓	✓	✓	✓	✓	✓
Wattaka Cultural Service	Singleton	15 May 2020	✓									✓
Wurrumay Pty Ltd	Penrith	1 June 2020				✓						✓
Hunters and Collectors	Gunnedah	24 July 2020										✓
Natasha Rodgers (nee Long)		7 September 2020										
Yvonne Rodgers	Upper Kedron (QLD)	8 September 2020										
Warrigal Cultural Services	Oxley Park	8 September 2020										

Table 3.2 List of RAPs for the project.

Organisation	Location	Date of registration	Aboriginal focus group meetings									Participation in fieldwork
			28 May 2020	22 June 2020	28 July 2020	31 August 2020	30 September 2020	26 October 2020	15 December 2020	1 March 2021	12 August 2021	
Wonn 1 Consulting	Glendale	11 January 2021										
Didge Ngunawal Clan	Cambridge Gardens	19 February 2021									✓	
Donny Fermor	Bendemeer	1 March 2021	✓	✓		✓	✓	✓	✓	✓	✓	✓
Cindy Foley		7 April 2022										

Notes: ✓ denotes attendance either in in person and/or online.

3.4 Aboriginal stakeholder feedback

Aboriginal consultation has been extensive between April 2020 and June 2022, and included some 450 interactions, - including 18 discrete meetings with RAPs in groups or one-on-one. As such, discussions have been wide-ranging, initially focussing on who is relevant to the project area, then the methods and approach to field investigation, and finally into the potential impacts and management of identified cultural sites and values. The minutes of each AFG meeting summarising the evolution of these discussions and key outputs is provided in Annexure B.5.

In summary, the main discussion topics have included:

- assessment process – understanding how Critical State Significant Infrastructure projects are assessed and how Aboriginal heritage fits into this process;
- early works activities – investigation, management and discussions about the Stage 1 Dungowan pipeline replacement works (from the Chaffey pipeline tie in to the Calala WTP), and geotechnical investigations across the project footprint;
- cultural values mapping – understanding the intangible and spiritual values of the project footprint, sourced from both traditional and contemporary information, and subsequently discussions on the findings of these investigations towards the end of the project (Section 5.6);
- Chaffey Dam pipeline – discussions around lessons learned from a recently completed nearby project to connect Chaffey Dam to the existing Dungowan Dam pipeline, which had a number of cultural heritage issues;
- field survey and excavation findings – the nature of cultural materials found within the project footprint, and how they may be further investigated, managed and/or protected into the future. Sites of importance focussed upon those with high artefact densities (especially test pit 12 and surrounds), some of the stone arrangements, an artefact scatter (DDOS11), and the cultural values of Terrible Billy Creek;
- compilation of data, potential impacts and possible management measures – working out how the numerous cultural sites and values could be combined into a single spatial map for management purposes, discussions on the important aspects of the map produced, and how to manage these values. This included the need to conserve sites that are unaffected by the works and/or inundated, and conservation ex situ (eg salvage excavations) for those in impact zones; and
- post-construction interpretation and ongoing access – the need to acknowledge the local Aboriginal community and heritage as part of post-approval activities; and the desire for future access to areas of cultural value around the project area following construction – and specifically the Terrible Billy Creek catchment.

General concerns and issues have been mostly focussed on the level of on-Country participation, especially in relation to RAPs not from the local area; the level of investigation along the proposed pipeline with limited land access (see Section 1.6); and the suitable conservation and management of important sites, such as DDCS1.

The outcomes of these discussions have been considered in the development and content of the ACHA. While not necessarily individually mentioned throughout the report, they have nonetheless been considered throughout the formulation of the ACHA.

A copy of the ACHA has been provided to the RAPs (Table 3.2). An original draft was provided 15 July 2021; a revised version was provided 23 June 2022. Any comments are provided in Annexure B.4 and summarised below:

- The Gomeroi People provided a short response indicating support for the findings and recommendations of the report, but seeking further clarification of where the cultural assemblage would be eventually housed/stored. This latter issue was mostly in relation to a proposed AHIP and archaeological research design associated with a discrete geotechnical program, however is pertinent to the ACHA. The management strategy (Section 11.2) has been updated to reflect that the curation of artefacts needs to be undertaken in close consultation and agreement of the RAPs to address this issue.

- Tamworth LALC provided a short response supporting the findings and recommendations of the report, but that similarly identified concerns with the curation of any recovered cultural assemblage. The management strategy (Section 11.2) has been updated to reflect that the curation of artefacts needs to be undertaken in close consultation and agreement of the RAPs to address this issue.

4 Existing environment

4.1 Key findings

- The project footprint is defined by two distinct environments:
  - the proposed new Dungowan Dam and inundation areas within a narrow, steep V-shaped valley centred on Dungowan Creek. The proposed power easement near Ogunbil is also in this type of steep terrain; and
  - the proposed pipeline alignment situated on the wide alluvial floodplains of the Peel River.

  These environments would have contained a variety of resources that would have been attractive to Aboriginal people in the past, but also would have influenced the potential cultural materials that may have been deposited and survived. Specifically, the alluvial terraces and lower slopes and adjacent waterways would have been conducive to surface and/or shallowly buried stone and shell cultural materials, while more rugged country has some potential for grinding grooves, engravings, rockshelter and associated features.

- The geology of the region includes a range of raw materials, including jasper, chert and serpentine, that were used by Aboriginal people in the past for producing stone artefacts. Other sources are known at nearby Mt Pleasant, Hanging Rock and near to Chaffey Dam.

- A detailed field investigation of the soil profiles was undertaken focussing on the proposed new Dungowan Dam and inundation footprint. These found two main soil profiles, both of which exhibit shallow topsoil units, within which cultural material is commonly found and unlikely to extend >80 cm below current ground surface. Although some geotechnical evidence references deeper alluvium may be present in some locales (mostly within the dam footprint and inundation zones), and that may be of archaeological interest depending on the age of formation.

- The project footprint contains a wide variety of flora and fauna that would have been used by Aboriginal people in the past for food, medicinal, totemic and cultural purposes. An extensive description of flora and fauna of importance to the contemporary Aboriginal participants was documented as part of a cultural mapping study. These include both native and introduced species, the latter demonstrating the high adaptability of past and contemporary Aboriginal people to integrate useful resources into their established food, medicinal and cultural practises.

- The project area has been subject to both natural and anthropogenic disturbance that will affect the survivability of cultural materials if present. These include agricultural, pastoral and vegetation clearance across most of the project footprint that would have resulted in disruption of the upper soil profile and any associated cultural materials. More extensive disturbance includes the establishment of the current Dungowan Dam in the 1950s at the southern end of the project footprint, and that is considered to have resulted in the loss of cultural materials in these areas.

4.2 General

Understanding environmental context assists with predictions of archaeological potential, such as the likelihood of archaeological material being present in the landscape, its spatial distribution and its preservation. Landscape features were an important factor for the choice of camping, transitory and ceremonial areas used by Aboriginal people. Similarly, these landscape features and historical land-use play a role in the level of preservation and the integrity of archaeological sites.

A landscape consisting of suitable topography, hydrology, geology and soils has strong links with natural resources that would have been available to, and sought after by, Aboriginal people. Flora and fauna would have provided food, tools and ceremony (culturally modified trees); proximity to fresh water was necessary for life and growing crops, as well as gathering fish and eels. Landscape features, such as sandstone overhangs, were useful for shelter; stone artefacts were manufactured from raw stone material that was collected from quarry sites; and stone arrangements relied on the landscape.

4.3 Landscape overview

Bioregions are relatively large land areas characterised by broad, landscape-scale natural features and environmental processes that capture large-scale geophysical patterns at an ecosystem scale. Sub-regions delineate significant geomorphic patterns within a bioregion, and are based on finer differences in geology, vegetation and biophysical attributes (Bannerman & Hazelton 1990).

The project area is within the Nandewar bioregion, a region characterised by the Palaeozoic sedimentary rocks on the western edge of the Northern Tablelands to the Tertiary basalts of Inverell and Kaputar. The project footprint is situated on the eastern edge of the Peel sub-region of the Nandewar bioregion, and is characterised by low peaked hills with north-westerly alignment, moderately sloped, with flat river valleys following the major waterways (eg the Peel River). The project footprint is, however, surrounded by the Walcha Plateau sub-region of the Northern Tablelands bioregion, which is more characteristic of steep rugged basalt geology – and aligns more accurately with elements of the project footprint based on visual observations.

The geology of the Peel subregion is characterised by fine-grained Silurian to Devonian (443 – 359 million years ago) sedimentary rock. In the north of the subregion, near Gravesend, Carboniferous shales and sandstones are common; caps of post-Triassic basalt are present near the Nandewar and Liverpool Ranges (~30 km south-east of Narrabri and ~50 km west of Coolah, respectively). Throughout the subregion, outcrops of serpentinite and limestone may be present. The geology of the Walcha Plateau is comparable, including Devonian and Carboniferous shales and sandstones, as well as basalt elements throughout. Typical soils of the subregion are dependent on the underlying geology; on basalt, black earths are typical; on limestone, dark, alkaline, pedal clays may be present; and, on alluvium, loams and clays are present. Notably, on serpentines and ridges and basalts, the soil profile comprises shallow stony soils, and serpentinites may introduce high concentrations of elements toxic to many plants.

The project footprint is dominated by Dungowan Creek, which is confined in a narrow V-shaped valley between two prominent ridge lines. Narrow alluvial terraces and gentle slopes are found in the base of the valley through which the creek is not truncating. Beyond ~50 m of the creek, slopes become increasingly steep, with average gradients between 22-45°. These values are highly conducive to soil profile erosion (typically >5°), and as such limit the potential for retention of surface and/or shallowly buried cultural materials if present – these would more likely have eroded into the deposits at the base of the valley. The proposed pipeline alignment is dominated by alluvial flats of Dungowan Creek and Peel River, and are characterised by low density residential, cleared pastures and/or native revegetation. The alignment is primarily situated on flat wide alluvial floodplains adjacent the waterways, with occasional low hilly relief. The valley edges where geological exposures and/or outcrops would be expected are generally several hundred metres or more from the project footprint.

Elevation of the project area ranges between 430 m and 480 m Australian Height Datum (AHD) at the western end, to 560 m to 700 m AHD at the eastern end where the project area exhibits significant valley confinement with peaks up to 1,050 m AHD within 1 km of the project footprint (EMM 2022b).

The existing environment heavily influences the potential types of cultural material that may be present and survive in the project footprint. For example, geological formations, notably rock outcrops, are essential for rock shelters and associated features (such as art), while exposures of smooth geology observed in the creek may also be suitable for sites such as grinding grooves. The geology also includes raw materials such as serpentine and chert that is known to have been used for stone tool production in the past. However, within the project area, the

steep relief caused by this geology likely limits many other site types along the edges of the project footprint. In contrast, the potentially deep soil profiles along the river's edge have potential for buried cultural material. However, it should be noted that while the presence of major water courses would have been a key resource for past occupation, they can be subject to significant flooding and scouring. As such, evidence of past occupation may be more likely to survive on elevated areas (eg terraces) above these water courses, despite the likelihood that these riverbanks are likely to have been heavily used in the past.

4.3.1 Geology

The *1:250,000 Geological Sheet for Tamworth* (Offenberg 1971) shows that the project area is encompassed within Quaternary Alluvium overlying Devonian to Ordovician Age Woolomin Group (previously Woolomin Beds). The Woolomin Group are part of the Woolomin Texas Block, which occurs between the Peel Manning Fault in the west and the Demon Fault in the east (Robinson and Phillips 2015). The Woolomin Texas Block is an anticlinal subdivision of the New England Fold Belt (GHD 2020). The geological units relevant to the project are listed in Table 4.1 and presented in Figure 4.1.

The NSW Geological Survey released an updated seamless compilation of the area's geology in May 2020 (Colquhoun et al 2020). This included some nomenclature changes and boundary refinements. The more recent seamless digital data shows the geological unit underlying the Dam site is referred to as the Sandon Association, comprising lithic (meta)wake, slate, phyllite, chert, jasper, amphibolite, metabasalt, greywacke, sandstone, siltstone, mudstone and para-conglomerate of Devonian to Carboniferous age. Herein the more recent terminology will be adopted, with use of the Sandon Association geological unit. Of relevance to this report is that several of these geologies were used for artefact production by Aboriginal people in the past, including jasper, chert and greywacke.

The Sandon Association has a large extent while alluvium deposits are restricted to valley floors. The Quaternary Alluvium in an undifferentiated unit and comprises clay, silt, sand and gravel and can be up to 5 m in thickness (EMM 2022b, SMEC 2020). SMEC (2020) undertook a geotechnical investigation program and observed predominately silicified mudstone, chert, metamudstone and phyllite in boreholes drilled through the Sandon Association at the project footprint. In other parts of the Woolomin Texas Block carboniferous marine sediments and volcanics are noted (Osborne et at 1998). GHD (2017) ground truthed the geology and observed metasedimentary sequences of phyllite and metasiltstone with minor slate, chert and quartz in the Sandon Association.

To the north and west there are intrusions of Permian aged Kilburnie Adamellite, Walcha Road Adamellite and Mt Ephraime Granite and unnamed serpentinite. To the south are the Tertiary Liverpool Range Beds, comprising extrusive igneous flows of basalt as well as intrusive igneous dolerite, and polymictic conglomerate quartzose sandstone and shale. To the east is the Carboniferous-Devonian Tangaratta Formation and the Middle to Lower Devonian Tamworth Group, which has undergone significant folding and fracturing in a north-south orientation. This is part of the Tamworth Synclinorial Zone and comprises a series of mapped faults (including the Peel Fault, Spring Creek Fault, Baldwin Fault) that separates the folded sequences of the Tamworth Group from the older Woolomin Texas Block.

Further afield and pertinent to this report, to the southwest and northwest of the project area is part of the Tamworth Serpentinite Belt within which a range of know raw materials for artefact production have been documented. Three exposures of the belt occur nearby at Mt Pleasant, Hanging Rock and near to Chaffey Dam (see Annexure F.7). A known axe quarry of andesitic greywacke is located <10 km north of the project area at Mount Daruka. Locally available (chert-like) argillite, hornfels, aplite and adamellite have all been reported as raw materials used for artefacts in the region (Wilson & McAdam 2000:26-27). Jasper has also been highlighted in other assessments, and by a number of Aboriginal participants, as an important local resource. Over 60% of the assemblage recovered during test excavation was jasper. Analysis demonstrated that it had been sourced primarily from outcrop exposures and, to a lesser extent, from creeks. Additionally, Donny Fermor (TLALC)

indicated a source for serpentine (a green fine-grained quartz) was located near present day Niangala. The low frequency of serpentine artefacts can be attributed to the distance from the source (~18 km away).

GHD (2017) undertook a literature review of the Dungowan Creek area, focusing on geotechnical reports commissioned for the existing dam. A review of all data indicates the thickness of the weathered rock ranges from 0–5 m, with an average thickness of 2.4 m. SMEC (2020) report the thickness of the weathered rock in the valley floor is between 3.1–6.3 m. The alluvium, present only in valley floors, ranged in thickness from 1.2–4.6 m, with an average thickness of 2.6 m. Alluvium was not continuous and was only observed in 'pockets'. The thicker sections of weathered rock were also encountered in valley floors, with fresh rock often outcropping on steep slopes. There were also observations of fill from the original dam foundation excavations.

Table 4.1 Geological units.

Unit	Code	Age	Description
Quaternary Alluvium	Qa	Quaternary	Quaternary Alluvium, comprising undifferentiated alluvial deposits of sand, silt, clay and gravel
Liverpool Range Beds	Ti	Tertiary	Basalt, dolerite, polymictic conglomerate quartzose sandstone and shale
Walcha Road Adamellite	Paw	Permian	Adamellite
Kilburnie Adamellite	Pak		Adamellite
Mt Ephraime Granite	Pge		Granite
Unnamed serpentinite	Pe		Serpentinite
Tangaratta Formation	C-Dt	Carboniferous – Devonian	Mudstone, feldsoathic argenite
Sandon Association	Csa	Carboniferous - Devonian	Lithic (meta)wake, slate, phyllite, chert, jasper, amphibolite, metabasalt, greywacke, sandstone, siltstone, mudstone and para-conglomerate
Tamworth Group, Moore Creek Limestone	Dty	Middle to Lower Devonian	Cherty argillite, limestone, greywacke, mudstone
Tamworth Group, Silver Gully Formation	Dts		Rudite, polymictic breccia, arenite, limestone
Tamworth Group, Wogarda Argillite	Dtw		Cherty argillite, greywacke

Notes: Source: *Tamworth 1:250,000 Geology Map*

4.3.2 Soil landscapes

The Australian Soil Classification (ASC) scheme (Isbell 2016) is a multi-category scheme with soil classes defined based on diagnostic horizons and their arrangement in vertical sequence as seen in an exposed soil profile. With reference to the NSW Soil and Land Information (SALIS) System (DPIE 2015–2020) through the 'eSPADE' Soil Profile Database (Version 2.0, OEH 2016), the soil types shown in regional soil mapping are presented in Table 4.2.

The soils of the project area are Dermosols, Chromosols, Rudosols and Tenosols. The soil types along the pipeline include Dermosols, Chromosols, Rudosols and Tenosols and some minor instances of Ferrosols. Sodosols are in proximity to the pipeline alignment's western end, although are not intersected by the proposed footprint.

The ASC soil map for the project site (from OEH 2017) is presented in Figure 4.2.

Table 4.2 Summary of regional ASC soil mapping.

Soil Type	ASC description[1]	Agricultural potential [2]
Dermosols	• Soils with structured B2 horizons and lacking strong texture contrast between A and B horizons. • Soils other than Vertosols, Hydrosols, Calcarosols and Ferrosols which: – have B2 horizons with structure more developed than weak[3] throughout the major part of the horizon; and – do not have *clear or abrupt textural B horizons*. • This is a soil order known for its diversity but does bring together a range of soil with important properties in common.	• Generally high agricultural potential, subject to the variability of the soil order. • Good structure, moderate to high chemical fertility and water-holding capacity. • Can be susceptible to soil acidification and soil structural decline.
Chromosols	• Soils with strong texture contrast between A horizons and B horizons where the latter are not strongly acid and are not sodic. • Upper 0.2 m of the B2 horizon (or the major part of the entire B2 horizon if it is less than 0.2 m thick) is not strongly acid and is not sodic.	• Generally moderate agricultural potential with moderate chemical fertility and water holding capacity. • Can be susceptible to soil acidification and soil structural decline. • These soils are among the most widespread soils used for agriculture in Australia, particularly those with red subsoils.
Rudosols	• Soils with negligible pedological development apart from minimal development of an A horizon or presence of less than 10% of a B horizon in fissures of the parent material or saprolite. • Typically young soils where soil forming factors have had little time to pedologically modify parent rock or sediments.	• Most have low or very low agricultural potential. • Typically thin, rocky and/or sandy with low chemical fertility. • Alluvial soils can often have high agricultural potential.
Tenosols	• Soils with generally only weak pedologic organisation apart from A horizons. • Typically very sandy with the surface soils often naturally acidic.	• Generally low or very low agricultural potential. • Typically very sandy with low chemical fertility, water holding capacity and structure. • Alluvial soils are often deep, fertile and have high agricultural potential.
Ferrosols	• Soils with B2 horizons which are high in free iron oxide, and which lack strong texture contrast between A and B horizons. • Soils other than Vertosols, Hydrosols and Calcarosols which: – Have B2 horizons in which the major part has a free iron oxide content greater than 5% Fe in the fine earth fraction (<2 mm); and – do not have *clear or abrupt textural B horizons* or a B2 horizon in which at least 0.3 m has *vertic properties.*	• Generally high agricultural potential. • Good structure, moderate to high chemical fertility and water-holding capacity. • High rainfall equivalents may suffer from soil acidification and nutrient leaching. • May be subject to structural decline after repeated cultivation.

Table 4.2 Summary of regional ASC soil mapping.

Soil Type	ASC description[1]	Agricultural potential [2]
Sodosols	• Soils with strong texture contrast between A horizons and sodic B horizons which are not strongly acid. • Upper 0.2 m of the B2 horizon (or the major part of the entire B2 horizon if it is less than 0.2 m thick) is sodic and not strongly acid.	• Typically have very low agricultural potential with high sodicity leading to high erodibility, poor structure and low permeability. • Subsoils are often dispersive and prone to gully and tunnel erosion. • Often hard- setting when dry and prone to crust formation. • Low to moderate chemical fertility and can be associated with soil salinity.

[1] per Isbell (2016)
[2] per Gray and Murphy (2002)
[3] It is common experience that pedologists are inclined to use the phrase 'weak to moderate' when they are in doubt as to the grade of structure. If such a designation is used it will result in the soil being classed as a Dermosol.

More specifically, geotechnical and soil mapping information has been obtained for the project footprint (and focussing on the proposed dam footprint). Available geotechnical data shows the subsurface generally consists of (in order of depth) sandy loam, clay, gravel, shale and basalt. More specifically, there were five distinct subsurface soil profiles identified within the project footprint (EMM 2022b; SMEC 2020):

- fill and topsoil;
- upper, more cohesive alluvials along the valley floor;
- lower, more granular alluvials along the valley floor;
- colluvial deposits on slopes and directly beneath steep slopes; and
- weathered rock or regolith.

Topsoil was encountered across all depositional environments, at depths of 0.01 - 0.3 m overlying colluvial and residual materials on the valley sides. On the valley floor, topsoil was deeper, up to 0.8 m over the alluvial units (SMEC 2020). Alluvial soils were concentrated close to Dungowan Creek and were more likely to be present in areas where the surface slope was less than 5°. The alluvial profile generally ranges in thickness from 1 m to 5 m and comprises sequential layers of both fine and coarse grain sediment.

Colluvial soils were present on valley slopes and at the break of slope with the valley floor. These soil profiles ranged from 0.25-3.25 m, but with many locations exhibiting regolith and rock on the surface, suggesting shallower deposits were common. On steeper slopes, the colluvium was <1 m thick. Similarly, in these environments, cultural material is commonly found in the over-lying topsoil and/or upper units of these types of deposit.

Further soil mapping of the proposed dam and inundation footprint was undertaken by EMM. These investigations identified two main soil profiles, dermosols and dermosols/rudosols (Figure 4.3) (EMM 2022b):

- Dermosols – primarily located along the fringes of Dungowan Creek. These soil profiles were found on Quaternary alluvium, consists of a 5-30 cm thick topsoil overlying strongly structured clay loams and light clays (Table 4.3). They are typically shallow, ~60 cm, before parent material was observed. The pH for this soil profile was between 6 and 7 (slightly acidic); and

- Dermosols/Rudosols – located mainly on the margins of the inundation footprint on progressively steep slopes. These soil profiles exhibited extremely shallow topsoils (<10 cm) overlying various regolith and/or geological substrate (Table 4.4). The pH for this soil was similarly between 6-7 (slightly acidic).

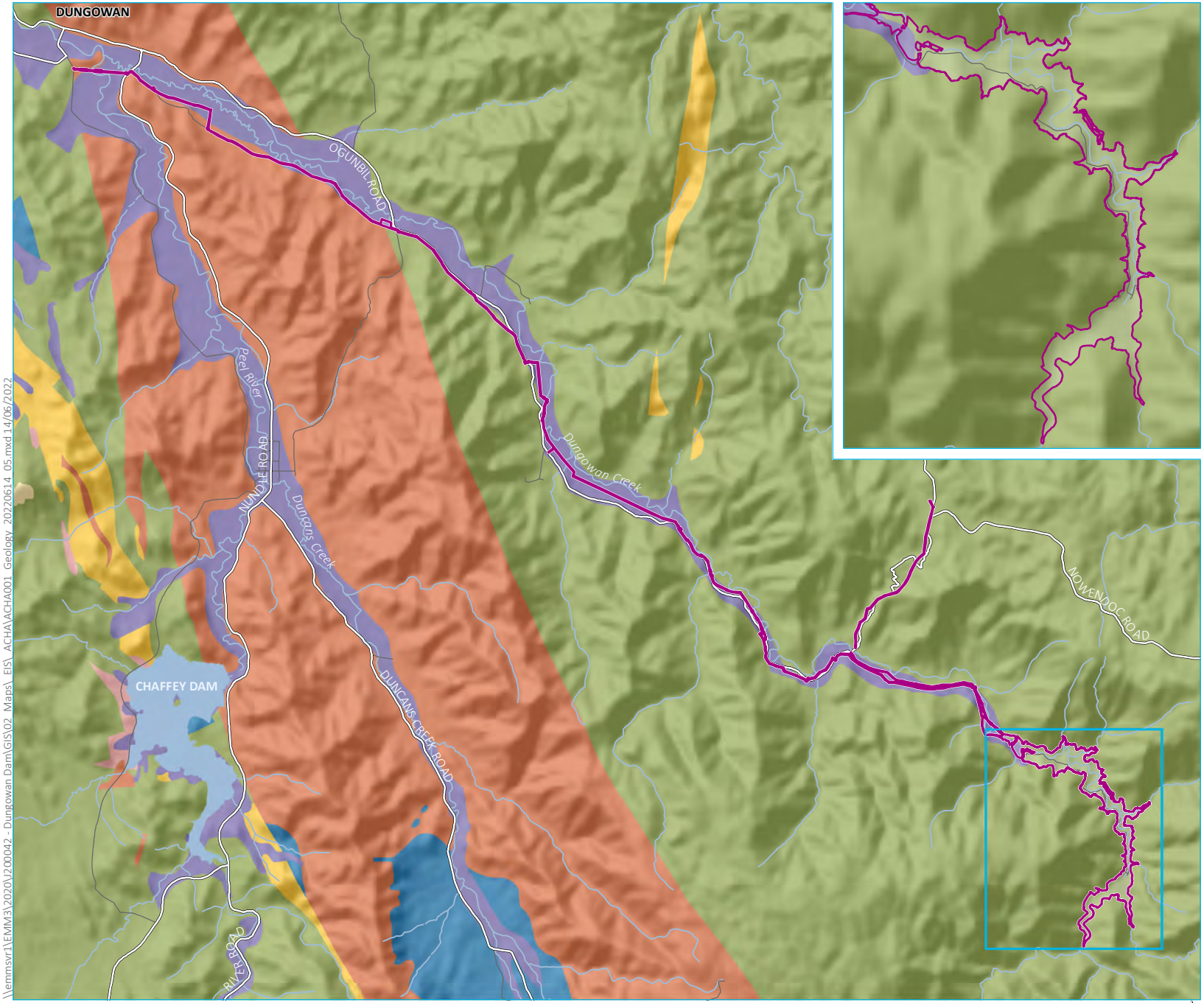
Both the geotechnical and soil investigations are important to inform the potential for buried cultural material. Typically, cultural material is constrained to the topsoil units, and less commonly in under-lying alluvium depending on its age of formation. Based on the results above, it suggests that the potential for deeply buried cultural material in many areas is unlikely, with topsoil units ranging between 10-80 cm in depth. Even accounting for under-lying alluvium, in many areas, the entire depth of the soil profile appears to be <1m. However, there is some potential for deeper deposits in closer proximity to Dungowan Creek.

Table 4.3 Soil Mapping Units (SMU) typical physical characteristics – Dermosols.

Depths (below surface)	Horizon	Colour	Mottles	Field texture	Coarse fragments	Structure	Boundary
0 – 20 cm	A1 - topsoil	Black to dark brown	None	Silty clay loam	Many angular platy medium to large pebbles of shale	Weak to strong polyhedral	Gradual
20 – 60 cm	B2 – subsoil	Brown to dark brown	None	Clay loam to light clay	Many to abundant angular platy medium pebbles to cobble of shale	Moderate to strong polyhedral	Gradual
60 cm +	B/C – parent material						

Table 4.4 SMU typical physical characteristics – Dermosols/Rudosols.

Depths (BGL)	Horizon	Colour	Mottles	Field texture	Coarse fragments	Structure	Boundary
0 – 10 cm	A1 - topsoil	Black to dark brown	None	Silty clay loam	Many to abundant angular platy medium pebbles to cobbles of shale	Weak to moderate polyhedral	Gradual
10 cm +	Refusal on cobbles						



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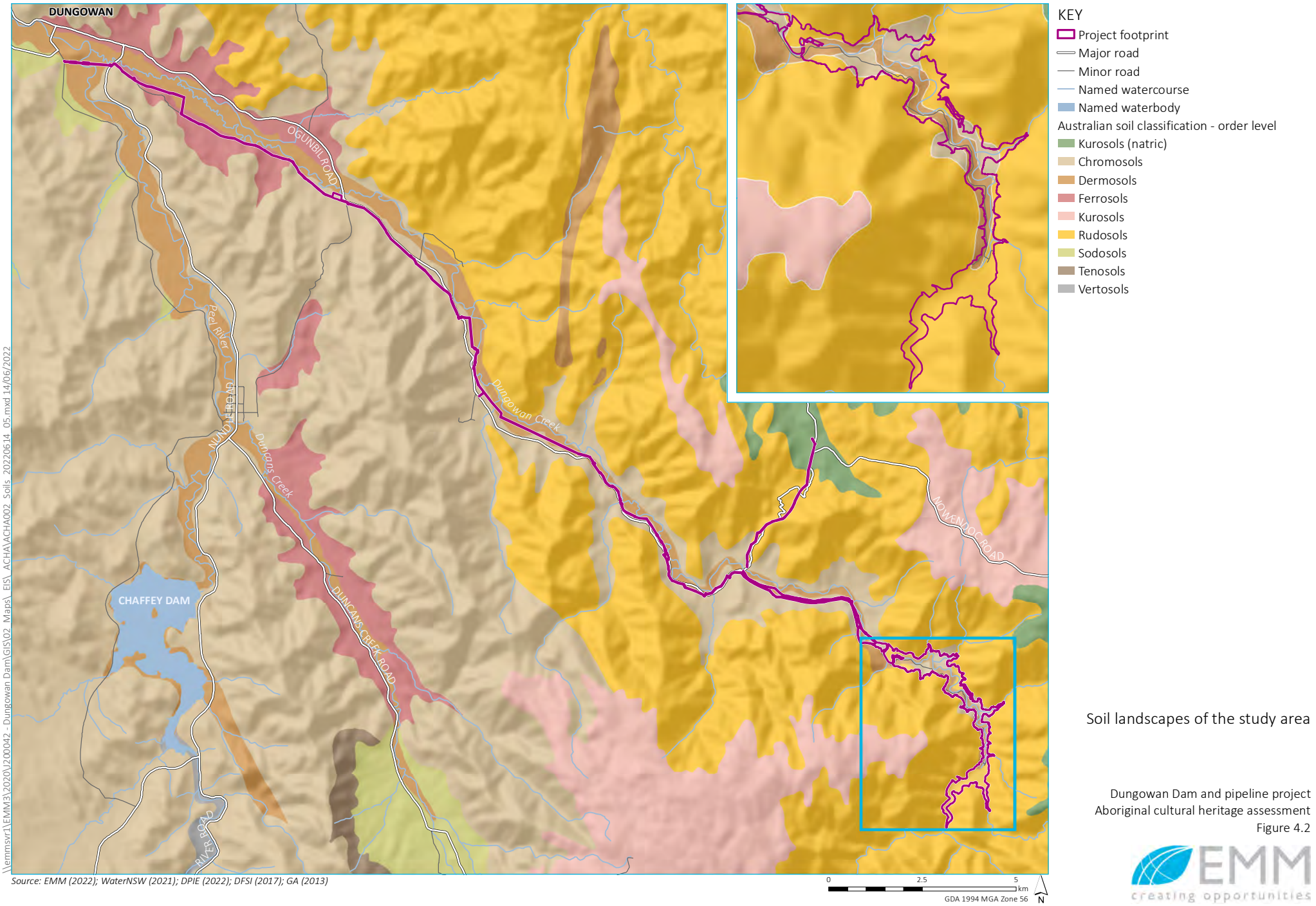
Source: EMM (2022); WaterNSW (2021); DFSI (2017); GA (2013); OEH (2017)

Geology of the study area

Dungowan Dam and pipeline project
Aboriginal cultural heritage assessment
Figure 4.1

EMM
creating opportunities



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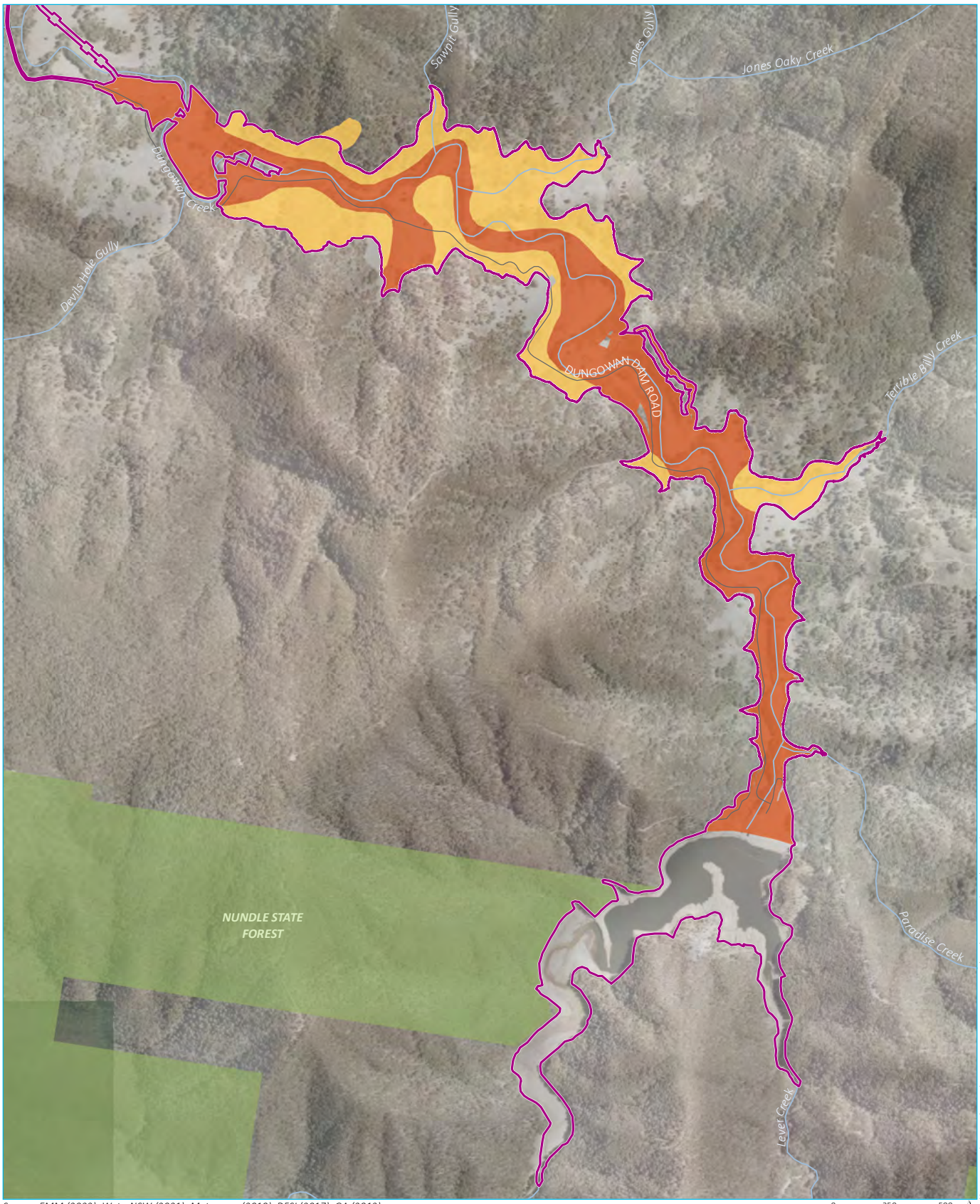
Source: EMM (2022); WaterNSW (2021); DPIE (2022); DFSI (2017); GA (2013)

Soil landscapes of the study area

Dungowan Dam and pipeline project
Aboriginal cultural heritage assessment
Figure 4.2

EMM
creating opportunities



Source: EMM (2022); WaterNSW (2021); Metromap (2019); DFSI (2017); GA (2013)

0 250 500 m

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KEY

- Project footprint

Existing environment

- Minor road
- Named watercourse
- State forest

Soil mapping units

- Dermosol
- Dermosol/Rudosol

Project footprint mapped soil units

Dungowan Dam and pipeline project
Aboriginal cultural heritage assessment
Figure 4.3

EMM creating opportunities

4.4 Hydrology

The project area is encompassed within two main waterways:

i) Peel River (6-7th order) downstream of Chaffey Dam and along parts of the proposed pipe alignment, and;

ii) Dungowan Creek (6th order) that runs through the centre of the proposed dam and inundation footprint and along the length of the proposed pipeline.

The Peel River flows into the Namoi River approximately 60 km downstream from Tamworth. Dungowan Creek has been heavily influenced by the creation of the existing Dungowan Dam in its upper reaches in 1952-1956, and which forms the southern portion of the project footprint. Numerous other lesser tributaries feed into the rivers, notably Terrible Billy Creek and Oaky Creek, which have formed a focus of interest for Aboriginal participants. Based on regional and nearby investigations, archaeologically, these river systems would have formed a focus of occupation and visitation in the past.

The project area also crosses several creeks and drainage lines, many of these unnamed and ephemeral, and which would have only carried flow after heavy rain (Wilson & McAdam 2000:24). Due to the location on a floodplain and the extensive history of vegetation clearing in the area, it is likely that many of the waterways within the local context have not kept a stable course over time. Therefore, modern mapping of the waterways in the project area may not accurately reflect their pre-colonial course; and, subsequently, many sites may have been moved or removed through bank erosion.

Other important water sources in the area would have been springs and soaks; however, the current dependency on groundwater in the area has caused the water table to drop to such a degree that these are no longer visible in the landscape (Wilson & McAdam 2000:25).

4.5 Flora and fauna

Prior to European settlement, the vegetation of the subregion was dominated by the woodlands on the lower slopes, box gums on the flats, and river oaks and gums along the major waterways. Stringybark is prevalent on steeper slopes, particularly in the east, while ironbark thrives on basalt caps, and cypress pine and kurrajong flourish on stony areas in the west and north. Much of this vegetation has been cleared on deep fertile soils of the wheat-sheep belt. However, much of the original native vegetation, with the exception of small areas generally within riparian corridors, has been cleared from the project area as a result of the intensive agricultural activities, particularly on the alluvial plains beside Dungowan Creek since the area was settled by Europeans.

The project footprint is dominated by partially cleared open grassland/woodland for cropping and grazing within the valley floodplain, while the surrounding slopes feature mostly disturbed woodland and open forest. Where remnant (un-cleared) vegetation is present this unit is associated with Belah (*Casuarina cristata*), Capertee Stringybark (*Eucalyptus cannonii*), and other Eucalypts (*Eucalyptus spp.*).

A number of observed vegetation and fauna of value to the Aboriginal community were also identified as part of the cultural mapping investigations of the project footprint (Section 5.3; Annexure D). Plants provided food and medicine as well as serving other uses. For example, eucalypts provided bark for huts and as burial shrouds, resin was mixed with ochre and the leaves were (and are) used for smoking ceremonies. The inner bark of kurrajong was used for making string. Waterways were an important source of plants and fish for food as well as attracting other mammals, reptiles and birds. Importantly, a number of the species reflect introduced species, and demonstrate the readiness that Aboriginal people would adopt useful flora and fauna into their diets and habits were beneficial to do so. These included:

- Flora -
  - Bush tomatoes (*Solanum spp.*) – edible;

- Gumtrees (*Eucalyptus* spp.) – extensive medicinal and practical uses;
- Kurrajong (*Brachychiton populneus*) – used in the production of nets, and seeds were edible in various forms;
- Mistletoe, snotty gobble (*Lysiana* and *Amyema* spp.) – edible;
- Native orange (*Capparis mitchelli*) – edible, and often associated with gender-specific (woman) activities;
- Native passionfruit vine (*Passiflora* species) – edible;
- Native willow (*Pittosporum angustifolium*) – medicinal;
- Quinine-bush (*Petalostigma pubescens*) – used in catching fish;
- River oak (*Casuarina cunninghamiana*) – cultural values;
- River red gum (*Eucalyptus camaldulensis*) – used in determining seasonal hunting and foraging strategies;
- Sandalwood (*Santalum lanceolatum*)- cultural values;
- Stinging nettle (*Urtica* species) – medicinal;
- Tall flat-sedge (*Cyperus exaltatus*)- used in hunting and gathering equipment;
- Yellow box tree (*Eucalyptus melliodora*)- cultural values;
- Watercress (*Centella asiatica*) – edible;
- Wild fig (*Ficus* species) – cultural values;
- Wild tobacco (*Verbascum thapsus*) – used for smoking;
- Wilga (*Geijera parviflora*) - edible, and often associated with gender-specific (woman) activities;
- Wild quince (*Alectryon subcinereus*) – edible;
- Yam daisy (*Microseris lanceolata*) – edible;

• Fauna (hunted unless otherwise specified) –

- Freshwater catfish (*Tandanus tandanus*) – associated with Creation Ancestors in the project footprint;
- Murray cod (*Maccullochella peelii*);
- Trout (*Salmo trutta*);
- Yellowbelly (*Macquaria ambigua*);
- Goanna (various species);

- Red-bellied black snake (*Pseudechis porphyriacus*) – totemic;
- Emu (*Dromaius novaehollandiae*);
- Kookaburra (*Dacelo novaeguineae*) – cultural values;
- Owl (various species)- totemic;
- Wedge-tailed eagle (*Aquila audax*) – cultural values;
- White cockatoos (*Cacatua galerita*)- cultural values;
- Willie-wagtail (*Rhipidura leucophrys*) – cultural values;
- Echidna (*Tachyglossus aculeatus*) – hunted and totemic;
- Eastern grey kangaroo (*Macropus giganteus*);
- Koala (*Phascolarctos cinereus*) – totemic;
- Platypus (*Ornithorhynchus anatinus*);
- Rabbit (*Oryctolagus cuniculus*);
- Red kangaroo (*Osphranter rufus*) – totemic;
- Rock wallaby (*Petrogale lateralis*);
- Pig (*Sus scrofa*);
- Possum (various species) – cultural value;
- Wallaroo (*Osphranter robustus*);
- Wombat (*Vombatus ursinus*).

Wilson and McAdam (2000) have also reported extensively on the plant resources that may have been utilised by Aboriginal people in the region. Of relevance to the project area, this includes but is not limited to (Wilson & McAdam 2000:32):

- bulrush (*Typha sp.*) – new shoots, flowering head and bulb eaten, fibre from bulb used for string;
- field mushroom (*Agaricus campestris*) – whole fungi eaten;
- grass tree (*Xanthorrhoea australis*) – base of leaves/pith eaten, resin used for hafting, flowering stems used for spear shafts;
- kangaroo grass (*Themeda australis*) – seeds ground for flour, leaves/stem used for fibre;
- kurrajong (*Brachuchiton populneus*) – seeds/young roots eaten, underbark used to make string;
- mistletoe (*Amyema sp.*) – berries eaten; and,

- native geranium (*Geranium sp.*) – some species root eaten, others used to treat diarrhoea (high tannin content).

Plate 4.1 **Wild tobacco (*Verbascum thapsus*), an introduced species that has been adopted by Aboriginal people in the recent past for smoking.**

Plate 4.2 **Wild quince (*Alectryon subcinereus*), an edible species, found in the vicinity of Terrible Billy Creek.**

4.6 Previous disturbance and land use

Previous land disturbance has a significant impact to the survivability of cultural materials if present. While there are natural processes that can disturb and/or destroy cultural material, more frequently it is increasing urbanisation over the last 200 years that has resulted in the most significant impacts. The history and land-use of the project area is outlined in detail in the Statement of Heritage Impact (EMM 2022c) and summarised below.

The project area has been subject to various activities that would have affected the landscape since the early nineteenth century. Initially, the region was associated with sheep-grazing for the Australian Agricultural Company (AAC) as a result of a land grant given in 1833. The company also produced tobacco, flax and other crops for export. Settlement associated with the AAC increased from the 1830s, with Tamworth first appearing on a map in 1837 and then being proclaimed a town of around 250 people in 1850. Through the late nineteenth century the fertile soils along the Peel River and Dungowan Creek led to a range of land clearing and establishment of agricultural and pastoral activities across the project area. Profits generated from pastoral and agricultural activity supported the construction of various structures in the Dungowan Valley including homesteads, housing, stock and outbuildings and other pastoral structures, particularly on land owned by free selectors. The townships of Dungowan and Woolomin were established and developed in the late nineteenth century as service centres for the nearby agricultural lands. In much of the project area, private agricultural and pastoral use has been the primary activity until the present day. While this has almost certainly resulted in disturbance of the upper soil profile, this impact may not have necessarily removed Aboriginal objects from the project area, but merely displaced them.

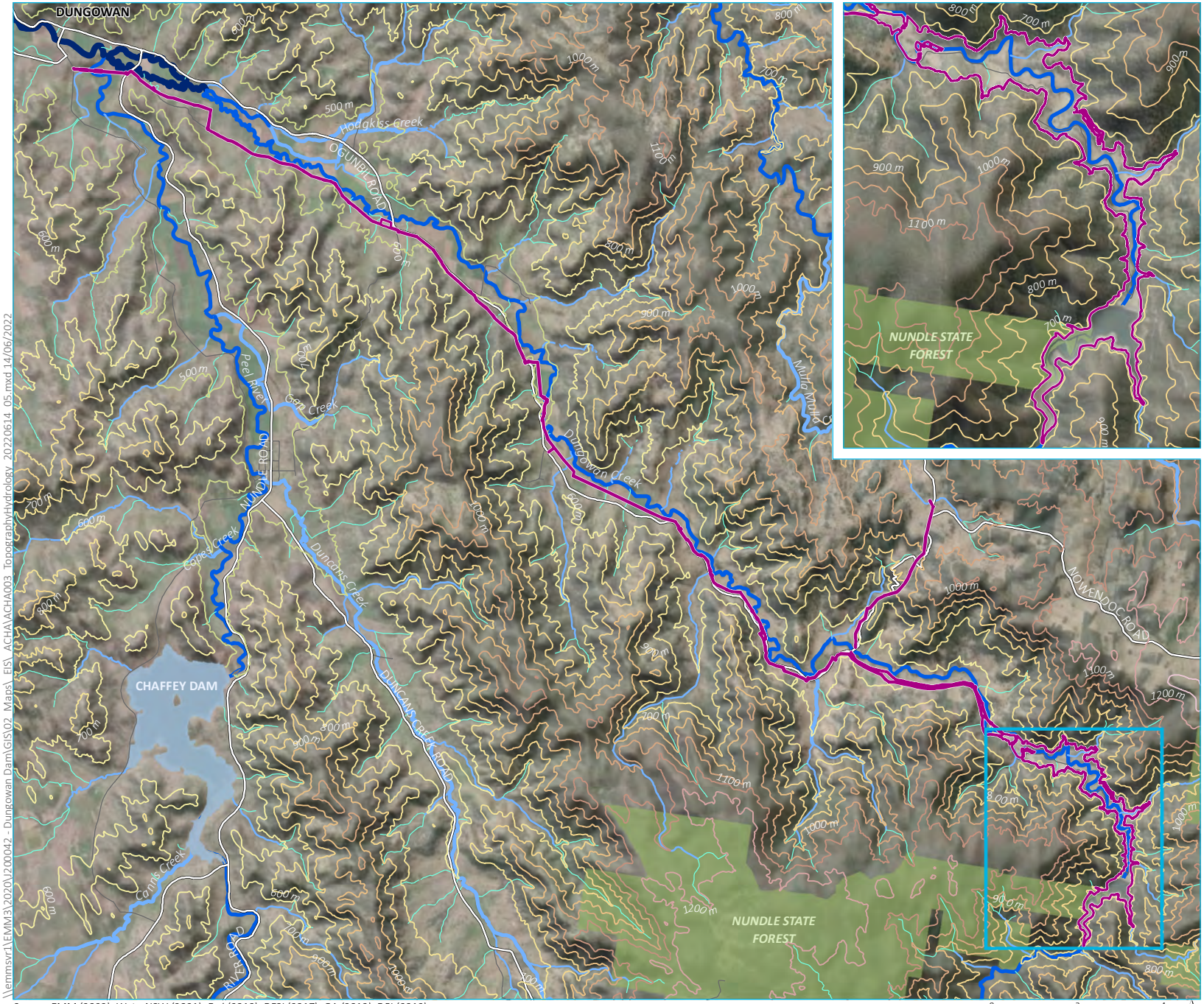
An article in the Maitland Mercury and Hunter River General Advertiser (10 December 1881, p.5) refers to the presence of copper deposits and mining in the area. In particular, a copper lode and mining shaft was reportedly located along a spur line 'about half a mile' (approximately 800 m) from a house in Dungowan, which is within proximity to the proposed pipe alignment. This may correspond with an open cut mine identified from the 1976 topographic map approximately 1 km east of the Dungowan township.

Historical aerial imagery dating from 1960 shows very little change to the project area over the last sixty years (see Annexure C). In the photograph from 1960, a number of small farm residences and buildings are visible throughout the project area, mostly concentrated in proximity to Dungowan Creek. Overall, the project area and surrounds were dominated by partially cleared agricultural land, that was more intensive towards the western end of the project area and along the proposed pipeline, while the eastern portion of the project area was more vegetated and has greater topographic variation.

Flooding has likely been a major source of morphological change within the project footprint. The changes in hydrology across the region have likely accelerated erosion and/or increased alluvial deposition in many areas along the project footprint (and this was observed during the field survey). It also makes the identification of riverbanks from pre-colonial times, within which cultural material may be expected, harder to identify.

More recent impacts are associated with the management of the catchment areas, and include the construction of Chaffey Dam in 1974 and Dungowan Dam, completed in 1958, as well as a road cutting for a gravelled road (Dungowan Dam Road) and the installation of powerlines and other services. The construction and subsequent inundation of the current Dungowan Dam has likely heavily disturbed any cultural materials that may have been present in the southern portion of the project footprint.

Overall, the project area has been subject to a range of past disturbances, varying from low to high impacts. Impacts are generally associated with rural and farming activities, with localised mining and large-scale construction projects. Such activities are likely to have resulted in a range of tangible and intangible impacts from both the damage to the soil profile and removal of vegetation, and any associated cultural materials; and the likely increasing restrictions to Aboriginal people accessing the land over the last 200 or so years.



Source: EMM (2022); WaterNSW (2021); Esri (2019); DFSI (2017); GA (2013); DPI (2013)

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Topography and hydrology

Dungowan Dam and pipeline project
Aboriginal cultural heritage assessment
Figure 4.4

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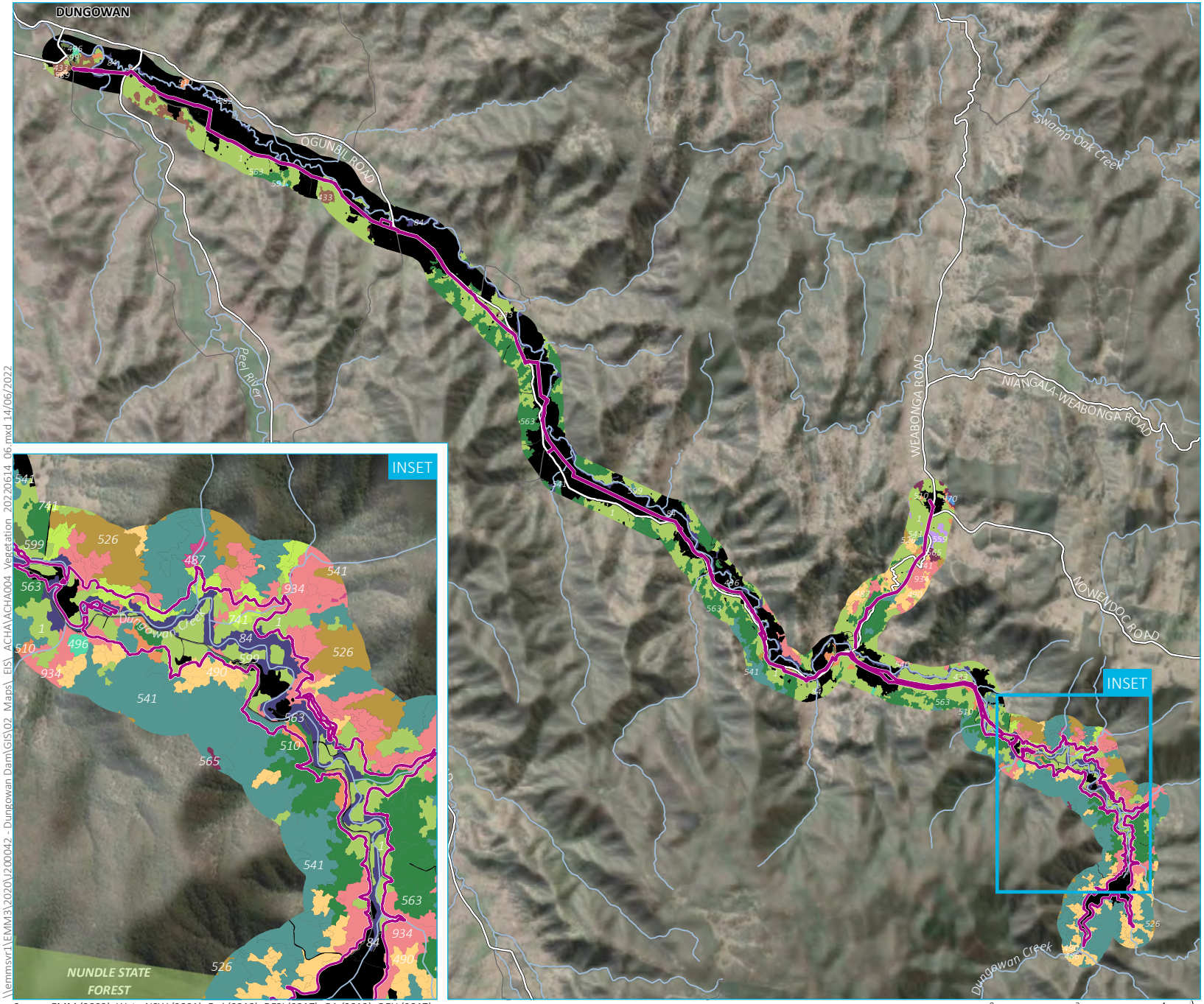

KEY

- Project footprint
- Major road
- Minor road
- Named watercourse
- Non-native vegetation

Plant community type

- 1|Candidate native grasslands
- 84|River Oak - Rough-barked Apple - red gum - box riparian tall woodland (wetland) of the Brigalow Belt South and Nandewar Bioregions
- 433|White Box grassy woodland to open woodland on basalt flats and rises in the Liverpool Plains sub-region, BBS Bioregion
- 486|River Oak moist riparian tall open forest of the upper Hunter Valley, including Liverpool Range
- 487|Sweet Pittosporum - Forest Oak - Rough-barked Apple depauparate gully rainforest on the Liverpool Range
- 490|Silvertop Stringybark - Forest Ribbon Gum very tall moist open forest on basalt plateau on the Liverpool Range, Brigalow Belt South Bioregion
- 496|Yellow Box - White Box - Silvertop Stringybark - Blakely's Red Gum grass shrub woodland mainly on the Liverpool Range, Brigalow Belt South Bioregion
- 510|Blakely's Red Gum - Yellow Box grassy woodland of the New England Tablelands Bioregion
- 526|Mountain Ribbon Gum - Messmate - Broad-leaved Stringybark open forest on granitic soils of the New England Tableland Bioregion
- 540|Silvertop Stringybark - Ribbon Gum - Rough-barked Apple open forest on basalt hills of southern Nandewar Bioregion, southern New England Tableland Bioregion and NSW North Coast Bioregion
- 541|Silvertop Stringybark - Rough-barked Apple grassy open forest of southern Nandewar Bioregion, southern New England Tableland Bioregion and NSW North Coast Bioregion
- 559|Yuman's Stringybark - Mountain Gum open forest of the western New England Tableland Bioregion
- 563|White Box - Silvertop Stringybark +/- White Cypress Pine grass shrub open forest of the southern Nandewar Bioregion and New England Tablelands Bioregion
- 565|Silvertop Stringybark - Mountain Gum grassy open forest of the New England Tableland Bioregion
- 582|Sedgeland fens wetland of impeded drainage of the Nandewar Bioregion and New England Tableland Bioregion
- 589|White Box - White Cypress Pine - Silver-leaved Ironbark grassy woodland on mainly clay loam soils on hills mainly in the Nandewar Bioregion
- 591|White Box shrubby open forest on hills mainly in the Nandewar Bioregion
- 599|Blakely's Red Gum - Yellow Box grassy tall woodland on flats and hills in the Brigalow Belt South Bioregion and Nandewar Bioregion
- 741|Brown Barrel - gum moist open forest of the escarpment ranges of NSW North Coast Bioregion and New England Tableland Bioregion
- 934|Messmate open forest of the tableland edge of the NSW North Coast Bioregionand New England Tableland Bioregion
- 970|Narrow-leaved Peppermint - Wattle-leaved Peppermint shrubby open forest of the New England Tableland Bioregion

Vegetation

Source: EMM (2022); WaterNSW (2021); Esri (2019); DFSI (2017); GA (2013); OEH (2017)

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Dungowan Dam and pipeline project
Aboriginal cultural heritage assessment
Figure 4.5

EMM creating opportunities

5 Ethnography and cultural mapping

5.1 Key findings

- Aboriginal people of the project area spoke the Gamilaroi language (also known as the Gamilaraay), whose territory extended across a vast area from Singleton in the Hunter Valley through to the Warrumbungle Mountains in the west and up to Nindigully in south west Queensland. Gamilaroi groups were distinguished as 'greater' or 'lesser' country depending on whether they inhabited the uplands or lowlands of this area.

- The project area was occupied by the Corbon Gamilaroi, a sub group of the Gamilaroi, whose traditional land covered the Liverpool Plains, and includes the area around the Peel River and its tributaries. The Corbon Gamilaroi likely moved along the landscape, following the major watercourses in the drier months and the minor tributaries when adequate rainfall could support them.

- Cultural mapping was undertaken by a highly experienced anthropologist and key knowledge-holders for the project footprint (and included in Annexure D). It was found that Aboriginal people with connections to Dungowan Creek perceive the area, along with the surrounding country, as the product of deeds by the Creation Ancestors, such as the Catfish, and believe that it is within a mountainous region that is still occupied by spirit beings, such as the 'hairy men'. In addition to providing contextual information, these works identified 11 sites of cultural value. Of these, eight were considered to align with known and contextual information of past and contemporary Aboriginal practises, while three could not be validated. These included both tangible sites (potential grinding groove, potential culturally modified trees, and stone arrangements) and intangible places associated with Creation Ancestors and a men's site in the upper reaches of Terrible Billy Creek.

- Aboriginal people working on Dungowan Station during the post-contact period were also identified during the broader consultation process. Details on any specific areas or sites of value within this station were not articulated during the ACHA process; and as such the entire property has been identified to have cultural values.

- Cultural flows were explored in the cultural mapping study, but no specific values were identified. However, associations with the Catfish as a Creation Ancestor, and frequent mention of fishing and hunting along the river in living memory, suggests that Dungowan Creek and Peel River are akin to Aboriginal people's views of other major river systems and play an important role in the culture of the local community (see Section 5.3; Annexure D). As such the maintenance of the river downstream following any developmental impacts is essential to avoid impacts to cultural flows.

5.2 Documentary ethnography

5.2.1 Regional information

Information about the socio-cultural structure of Aboriginal society prior to European contact largely comes from ethno-historical accounts made by colonial settlers. These accounts and observations were often made after significant social disruption due to disease and displacement. As a result, this information is often contentious, particularly in relation to language group boundaries. Therefore, it is likely that language group boundaries were far more diffuse than the arbitrary demarcations drawn by colonial observers.

The project area falls largely within the traditional country of the *Gamilaroi* (also rendered *Kamilaroi*; Tindale (1974) recorded over 30 spellings), language group that extends as far west as Lightning Ridge, and with the Tamworth region forming the easternmost border (Tindale 1974).[4] However, the project area is on a border of this boundary, and may also have associations with the *Nganyaywana* language group to the north, *Birpai* language to the east and *Geawegal* language to the south. It is important to remember that these groupings represent an account of Aboriginal groups post contact, they may not necessarily present an accurate picture of the way lands were occupied or used in the past. Tindale (1974) estimates that the territory of the Kamilaroi extended across an area approximately 75,400 km^2 and represents one of the largest tribes in eastern Australia, surpassed only by the Wiradjuri whose territory lies on their southern border. Within the *Gamilaroi* tribal group, there are two subdivsions; the *Corbon Gamilaroi* (meaning "the people of the greater country of *Gamilaroi*") whose territory included the Liverpool Plains and beyond, and the *Gammon Gamilaroi* (meaning "the people of the lesser country of the *Gamilaroi*") whose territory included the more southern area from Murrurundi to a very narrow corridor south into the Hunter Valley (Boileau, 2007; Milliss 1980; Telfer & Milliss 1980). The Aboriginal people living around the Peel River and its tributaries, the area of which comprises the project area, were part of the *Corbon Gamilaroi.* The clans within the *Gamilaroi* language group that lived within the Tamworth area, and by extension at least part of the project area, were reported to have been the *Goonoo Goonoo*, *Gunnedah*, *Manilla* and *Moonbi* peoples (Wilson & McAdam 2000:10).

In 1842, it was estimated by Edward Mayne, the first Commissioner of Crown Lands and 'Protector' of Aborigines of Liverpool Plains, that there were 4,000 Aboriginal people living between the Peel, Namoi and Gwydir Rivers (Mayne 1942:169-171). However, this number reflects a population severely impacted by at least two decades of direct European contact, which brought both the loss of resources and the introduction of diseases. Disease in particular decimated Aboriginal populations in the post-contact period; in many instances, diseases spread ahead of the settlement frontier, so that by the time the colonialists settled in the area, the local resistance had already been weakened or destroyed by disease. Indeed, there are reports of a *Gamilaroi* story that testifies to the spread of smallpox ahead of white settlement (Ferry 1978:5, cited in Wilson & McAdam 2000:11).

5.2.2 Local beliefs and ceremonial practices

The Northern Tablelands have a high number of ceremonial sites including Bora rings, stone pathways, carved trees and rock art. It is commonly known that the area is spiritually linked to *Baimai* (creator god), *Birrahgnooloo* (his emu-wife) and *Daramulan* (son of *Baimai*) (Flood 2010, p.238). There are gaps in knowledge regarding information of the use of Bora rings and other ceremonies because Aboriginal people were often unwilling to have Europeans present at the ceremonies, therefore, records of the events tend to be disjointed and mostly speculations.

Through oral recounts recorded at the turn of the 21st century, Moore Creek (~15 km north of the project area) was highlighted as an important ceremonial gathering place for the local area (Wilson & McAdam 2000:34-40). It was reported that sites may be located in the Moore Creek area that are related to the use of the area by local clever-men. These sites are likely to be ritual/ ceremonial in nature and may include art sites and engraving sites. During the course of these interviews, it was reported that there was also a natural mythological site reported at Coledale (>5 km south west of the project area) in 1970s; the status of this site came under dispute when people reportedly moved stones located in the site to form a "bora" ring. However, this may not discount its original recording as a mythological story place; unfortunately, no further details are known of this story (Wilson & McAdam 2000:39).

4 It is important to note that information about the socio-cultural structure of Aboriginal society prior to European contact largely comes from ethno-historical accounts made by colonial settlers. Most ethnographical accounts of Aboriginal life during contact were written in the context of a period of immense change through death and disease, displacement, and a loss of culture, country and knowledge. As a result, this information is often limited and can be contentious.

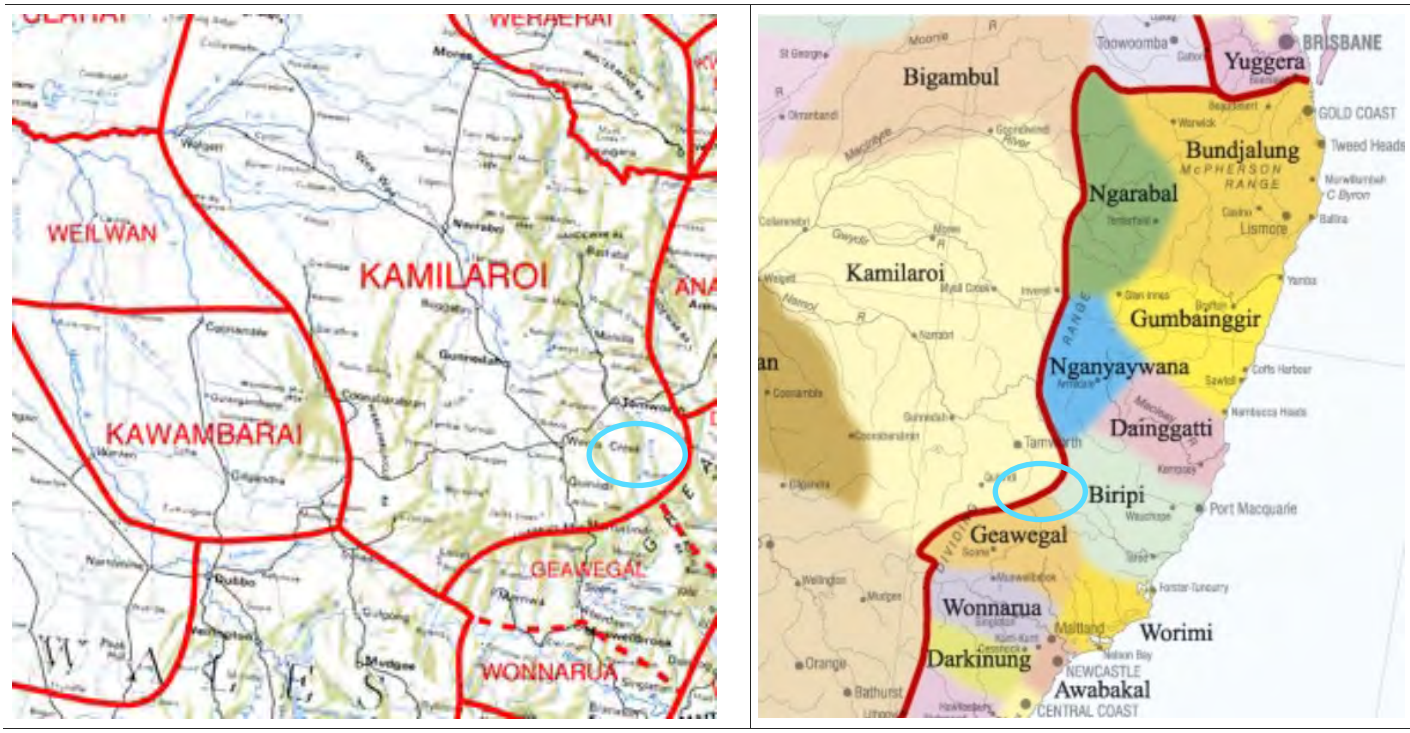


Plate 5.1 **Left: Tindale's map (1974) showing the location of the Kamilaroi (area of interest circled blue). Right: The Encyclopaedia of Aboriginal Australia (AIATSIS) follows Tindale's (area of interest circled blue).**

5.2.3 Tools, weapons and apparel

Observations of the local Aboriginal people to Tamworth and surrounds was made initially by Surveyor-General John Oxley in 1818 during an exploration of the Macquarie River, which resulted in numerous interactions with the Aboriginal people his party encountered along the way. Oxley noted that the groups of Aboriginal people were much more numerous (<25 per group) and different family groups and abandoned campsites much more frequent (<40) than his recent Lachlan expedition. Abandoned campsites were numerous and occurred along the riverbank and elevated land near to the rivers. The men often carried clubs or waddies and banged them together to create noise in an attempt to scare away Oxley's party. The men were carrying spears more like big jagged lances, clubs, chisels, and several workbags filled with feathers, necklaces of teeth, and nets for the head with thread from the sinew of possum tails (Oxley 1820:236-237), while the characteristic possum cloaks were also observed. During his mapping of the Macquarie River, Oxley noted the presence of many fires in the distance when they camped down at night. They came across a burial similar to that at the Lachlan River, encompassing an earthen mound surrounded by carved trees, and somewhat different to the traditions along the east coast.

Ethno-historical information lists an array of tools and weapons and also mentions areas of raw material procurement. Many items are unlikely to have survived as artefacts in the archaeological record because they are susceptible to decomposition. Items made of wood are a primary example. Ethnographic accounts of tools in the Northern Tablelands focus on spears, clubs, waddies (a type of hunting stick) and boomerangs among wooden artefacts and on axes and stone implements such as stone tools (McBryde 1974, p.13). Rugs and cloaks were made of kangaroo and possum skins with the aid of bone needles and animal sinews for thread. Wood, bark and animal materials were also used to make items like bags, fishing nets and wooden vessels (McBryde 1974, p.13).

5.2.4 Contact and post-contact overview

During his exploration in 1818 Oxley did not record any official observations of Aboriginal people. However, without recognising what he saw, he did make notes of the quarrying of andesitic greywacke outcrops for axe manufacture at Mount Daruka, briefly mentioned in section 4.3.1:

> Ascending two of the highest ridges, several circular orifices were observed on them about twelve feet in diameter, and five feet deep. Great quantities of small stones resembling basalts were in heaps around the edges (Oxley 1820: 285).

Tensions between Aboriginal people and settlers mounted throughout the early to mid-19th century. During the 1830s, Northern Tablelands formed one corner of the government's Mounted Police who were often responsible for the escalation of armed conflict and violence in rural districts. The contact period on pastoral runs in the Northern Tablelands featured many interactions with Aboriginal people. These included massacres that increased through the broader region, with the closest at Waterloo Plains (>45 km north of Tamworth) in 1835 (Ryan et al 2019).

Much of the contact history of local Aboriginal people and the Europeans of Tamworth and the surrounding country is attributed to the recollections of William Telfer Jnr (1841 – c. 1903). Born at Calala in July 1841, his journal was published in 1980 as *The Wallabadah Manuscript*, and describes life in Tamworth and the surrounding country from the 1840s to the years after Federation. Among these recollections, Telfer reported a corroboree he witnessed in his childhood (c 1844) of 250 Aboriginal males and females, likely including Aboriginals from outside the Tamworth area, near an unnamed watercourse (Telfer & Milliss 1980; Wilson & McAdam 2000). It is assumed this activity is referencing the nearby Peel River.

Development of land for grazing by settlers followed, primarily for cattle. Although by the end of the 19th century, this had largely changed to sheep grazing. Aboriginal people often worked as stockmen on the stations. By 1851, the town of Tamworth had a white population of over 250. At around the same time, the number of Aboriginal people in the Northern Tablelands region was estimated by Commissioner George McDonald to be around 600 (McDonald 1845 in Hudson 2006). He also noted the impact of disease and land clearance for sheep grazing (in diminishing macropod numbers) on the Aboriginal population.

By the late 19th century, many of the surviving Aboriginal peoples of the Peel River clans were reported to be living in "a blacks' camp at Calala" (Hobden 1988:7). In 1889, the Daily Telegraph published the reminiscence of a man travelling to open store on Australian Agricultural Company station in c. 1835. The story references a "tribe of blacks" encamped near a waterhole on the Peel River at Kalahlah (a historical spelling of 'Calala'), in the vicinity of a sheep station ("Tamworth in embryo" 1889). Ultimately, however, the exact location of this camp, and any notion of its permanency, appears to be unknown (Wilson & McAdam 2000:19).

5.3 Cultural mapping

5.3.1 Rationale and Methods

Cultural mapping is described more fully as cultural resource mapping or cultural landscape mapping, and it refers to an eclectic range of research techniques and scholarly tools that are employed to 'map' the tangible and intangible cultural assets of people within the local landscape. It involves the application of a wide variety of techniques and activities, from community-based participatory data collection and management to the use of sophisticated mapping based on Geographic Information Systems (GIS), in order to come to terms with cultural resources for communities and places. Proponents of cultural mapping as cultural inquiry have claimed that:

> From this perspective, cultural mapping is regarded as a systematic tool to involve communities in the identification and recording of local cultural assets, with the implication that this knowledge will then be used to inform collective strategies, planning processes, or other initiatives. These assets are both tangible, or quantitative (eg, physical spaces, cultural organizations, public forms of promotion and self-representation, public art, cultural industries, natural and cultural heritage, architecture, people, artifacts, and other material resources) and intangible, or qualitative (eg, values and norms, beliefs and philosophies, language, community narratives, histories and memories, relationships, rituals, traditions, identities, and shared sense of place). Together, these assets help define communities (and help communities define themselves) in terms of cultural identity, vitality, sense of place, and quality of life. (Duxbury et al. 2015:2).

To apply these concepts and further understand traditional and contemporary cultural values associated with the project footprint, cultural mapping was undertaken by Dr Philip Clarke, a highly experienced anthropologist, with the participation of key knowledge holders and/or elders (Annexure D). The knowledge-holders, Donny Fermor (Tamworth Local Aboriginal Land Council) and Aaron Talbott (AT Gomilaroi Cultural Consultancy), were identified during the consultation process when the cultural mapping was being discussed and organised. The fieldwork for this activity was undertaken over four days (12-15 October 2020), and included field support from Pamela Chauvel (EMM archaeologist).

A detailed report of the cultural mapping and Dr. Clarke's original field notes are included in Annexure D. The report included a brief review of existing anthropological and ethnobotanical data for the region with which to compare provided oral histories; and the findings of a field investigation with the key knowledge holders identifying sites, locations and values across the project footprint. The method undertaken in the current cultural mapping exercise was to record all places that the Aboriginal participants have declared to have some significance to them, and to determine whether there exists any sense of spatial boundaries. Through documenting the proposed sites an attempt would be made to determine the extent to which the stated importance is based on existing experience and knowledge of the Aboriginal informant, and to ascertain whether this is likely to be a shared opinion with other Aboriginal participants. The cultural mapping determined three types of classification for recording purposes:

- cultural sites that can reasonably be assumed to have been in existence when Europeans first arrived in the region, or at least shortly afterwards when Aboriginal people were still living in a traditional foraging lifestyle (eg specific bora grounds, scarred trees, etc);

- social history places associated with the contemporary local Aboriginal community (eg former Aboriginal house sites, gazetted cemeteries and schools). The documentation of these places helps to build a narrative that explains the experiences that members of local Aboriginal communities have had growing up on Country; or

- purported cultural sites that have come to attention through senior community members travelling to an area, for which they may have little or no direct life experience, and then interpreting the landscape through a process of seeing what is there (eg archaeological material on site, potentially Aboriginal modified trees etc.) and gauging their own reaction to the space (ie their feelings of a spirit's presence, Ancestor's powers etc.). This category of sites highlights the cultural values of the environment as perceived by contemporary Aboriginal people, but can post challenges, such as by asserting the existence of places based on a single person's reactions and by generating sites for which there can be no ready means of scientific or anthropological validation, either through the shared experience of other community members outside the parameters of the project or through matching with existing records. The recording of such sites poses a major risk of juxtaposing a contemporary Aboriginal view of a place with that of a heritage professional, and can often be difficult to scientifically or anthropologically validate.

5.3.2 Findings

The cultural mapping provided the following summary:

- the relevant Aboriginal community to consult with in relation to the project area is the Gamilaraay (sometimes called Gomeroi) people, and in particular members who live in towns and on properties in the greater Tamworth region;
- members of the Fermor family, as represented by senior knowledge-holder Donny Fermor, have relevant experiences and knowledge of the Dungowan Creek area that help explain its cultural and historical relationships with the Gamilaraay community;
- Aboriginal people with connections to Dungowan Creek (within the project area) perceive the area, along with the surrounding country, as the product of deeds by the Creation Ancestors, such as the Catfish, and believe that it is within a mountainous region that is still occupied by spirit beings, such as the 'hairy men';
- the presence of identified cultural sites, which include scarred trees and stone arrangements, as well as gender-specific places, such as the men's area at Terrible Billy Creek, is consistent with the ethnographic model for the whole of Gamilaraay country; and
- while some identified and purported cultural and historical sites are within the project footprint, the men's area is outside the PMF. During the mapping project there were no cultural sites identified within the pipe alignment area (however, see Section 5.4), nor any discussion of areas in the vicinity of the powerline.

Overall, the report identified 11 sites within the project footprint (Table 5.1; Figure 5.1). Of these, eight could be identified as cultural sites and/or social history places, with three considered as purported cultural sites that lacked robust validation. Several of these sites overlap with the archaeological investigations, which due to project timing occurred prior to the cultural mapping, and included stone arrangements, a potential grinding groove and potential culturally modified trees (see Chapter 7). Further, the report included a wide range of flora and fauna that have historical and contemporary importance to the Aboriginal community, both in terms of their medicinal uses and through totemic relationships (see Section 4.5). A number of intangible sites were also documented, most notably a gender-restricted area in the upper reaches of Terrible Billy Creek (outside the project footprint) and a Creation Ancestor story related to a Catfish. Indeed, this Ancestor is documented elsewhere associated with stone arrangements and bora ceremonies. Enright (1932:77) explained, from inland of the Port Stephens area, that:

> Recently I have learnt that when the candidate for initiation was taken to each of the carved trees around the sacred ring he was told a story about the carvings thereon. The aborigines [sic] have a legend that it was the cat-fish who founded the "Keepara" ceremony [Bora for male initiations], and pointed out as proof that the catfish built a ring of stones as a nest, and the male guarded it. If we knew the full story we might find that the catfish embodies one of their ancestral heroes.

Cultural flows were also discussed in the report. Aboriginal people of southeastern Australia believed that the health of the river system was maintained by the Creation Ancestors, whose actions in shaping the land and making the waters were later celebrated in ceremonial dance, ritual and song (Clarke 2018a, 2018b). It was a belief that after the Creation was over, many of these Ancestors took the form of animals and people. In this way, the physical and cultural dimensions of looking after country were closely intertwined. For contemporary Gamilaraay people, the traditions of the past are still relevant, in spite of the last of the bora ceremonies having occurred back in 1895 at Tallwood (Mathews 1897).

Today, it is common for Aboriginal people in southeastern Australia to perceive that the wellbeing of their community is dependent upon the 'cultural flows' in the rivers and creeks of their country (Birckhead et al. 2011; Weir 2006). As such, leaving enough water to flow through the water courses serves to maintain or improve the cultural value of the whole river system (Maclean et al 2012). In the Murray-Darling Basin, Aboriginal people assert that the adequate allocations of water for cultural flow supports the continuation of their cultural activities, such as fishing, hunting, artefact-making, ritual and the maintenance of their knowledge on the tracks of the Ancestors (Jackson and Nias 2019; Mooney and Cullen 2019). While no specific focus on cultural flows was vocalised from the cultural mapping study for the project footprint, the identification of a Catfish Creation Ancestor and frequent references to camping and hunting on Dungowan Creek (Table 5.1), would indicate similar views are likely for this project.

Table 5.1 Aboriginal sites and places identified through cultural mapping.

Site #	Easting	Northing	Description	Anthropological notes	Site validity
DDCS1	[redacted]	[redacted]	Men's site and the upper reaches of Terrible Billy Creek. A creek that runs through a gorge prior to joining with Dungowan Creek within the project area.	This creek has been identified as significant, notably due to a men's site in the upper reaches (outside of the project area). [redacted] Other references suggest a potential bora ring nearby, although the steep nature of the environment would limit the potential location of this type of site. Limited information could be relayed by the knowledge-holder, but anthropologically the information provided appears credible.	Cultural site
DDCS2	[redacted]	[redacted]	Hunting site. A canyon with steep walls that may have formed a suitable ambush site for hunting game.	One of the knowledge-holders considers that the natural features of this canyon would have been suitable for hunting and capturing kangaroos. However, much of the project area contains steep ravines and canyons, and there is little evidence that would differentiate this locale from other similar features throughout the region.	Purported cultural site
DDCS3	[redacted]	[redacted]	Former Fermor family house site. A cleared paddock, with some remains of structures.	This is a social history place for the Fermor family, notably their former house site. The site reflects a local Gamilaraay family headed by Hunter Edward Fermor. This is the father of Donny Fermor, one of the key knowledge-holders for the project.	Social history place
DDCS4	[redacted]	[redacted]	Gun Reserve. A reserve alongside Dungowan Creek.	This site was considered to reflect a long-term Aboriginal camping place. The Fermor family would often camp here during the 1960s and 1970s. This included catching fish such as Murray cod, Catfish and Yellowbelly.	Social history place
DDCS5	[redacted]	[redacted]	Former Dungowan School site. Evidence of some foundations and a shed in a regenerating forest.	A number of the RAPs, championed by Donny Fermor, has sought for post-approval interpretation, cultural activities and assemblage re-burial to occur within this site. The site includes observable cultural materials (stone artefacts) and numerous flora significant to the Gamilaraay people.	Social history place
DDGG1	[redacted]	[redacted]	A grinding groove at the confluence of Terrible Billy Creek and Dungowan Creek. A deep groove in the bedrock close to the creek.	According to knowledge-holders, this is a possible place for grinding wooden spearheads. This site was originally documented as part of the archaeological field investigations and further details are discussed in Chapter 7.	Cultural site

Table 5.1 Aboriginal sites and places identified through cultural mapping.

Site #	Easting	Northing	Description	Anthropological notes	Site validity
DDSA3	[redacted]	[redacted]	A large stone arrangement adjacent Oaky Creek. The stone arrangement incorporates elements of natural and anthropogenically introduced stones.	One of the knowledge-holders found this arrangement as a child (>20 years ago) and has linked it to the Catfish Ancestor through its known association with Terrible Billy Creek. Anthropologically, this account seems credible. This site was originally documented as part of the archaeological field investigations and further details are discussed in Chapter 7.	Cultural site
DDST1	[redacted]	[redacted]	Potentially culturally modified tree. A large white box tree, which is still alive and bears a large scar.	The knowledge-holders believes that the scar was formed when removing bark possibly for a burial shroud, coolamon (container) or even a canoe. This site was originally documented as part of the archaeological field investigations and further details are discussed in Chapter 7.	Cultural site
DDST2	[redacted]	[redacted]	Potentially culturally modified tree. A large dead eucalypt tree that bears a large scar.	The knowledge-holders believes that the scar was formed when removing bark possibly for a burial shroud, coolamon (container) or even a canoe. This site was originally documented as part of the archaeological field investigations and further details are discussed in Chapter 7.	Cultural site
DDB1	[redacted]	[redacted]	A potential burial near the junction of Oaky Creek and Dungowan Creek. A small rockpile on an alluvial flat.	A pile of rocks that one of the knowledge-holders indicated may have been a grave of a young Aboriginal boy who drowned in the 1920/30s. However, such an event has no documentary evidence, and there are several similar natural rock piles across the nearby landforms. Other explanations for the rocks were also provided, including boundary markers and associations with celestial bodies, and which undermine the original identification. Further, the Gamilaraay people would sometimes bury their dead in the ground, using logs and dead wood to keep dingoes away, and so it is possible that stones were similarly used, but previous documentation of this remains absent. This site was originally documented as part of the archaeological field investigations and further details are discussed in Chapter 7.	Purported cultural site

Table 5.1 Aboriginal sites and places identified through cultural mapping.

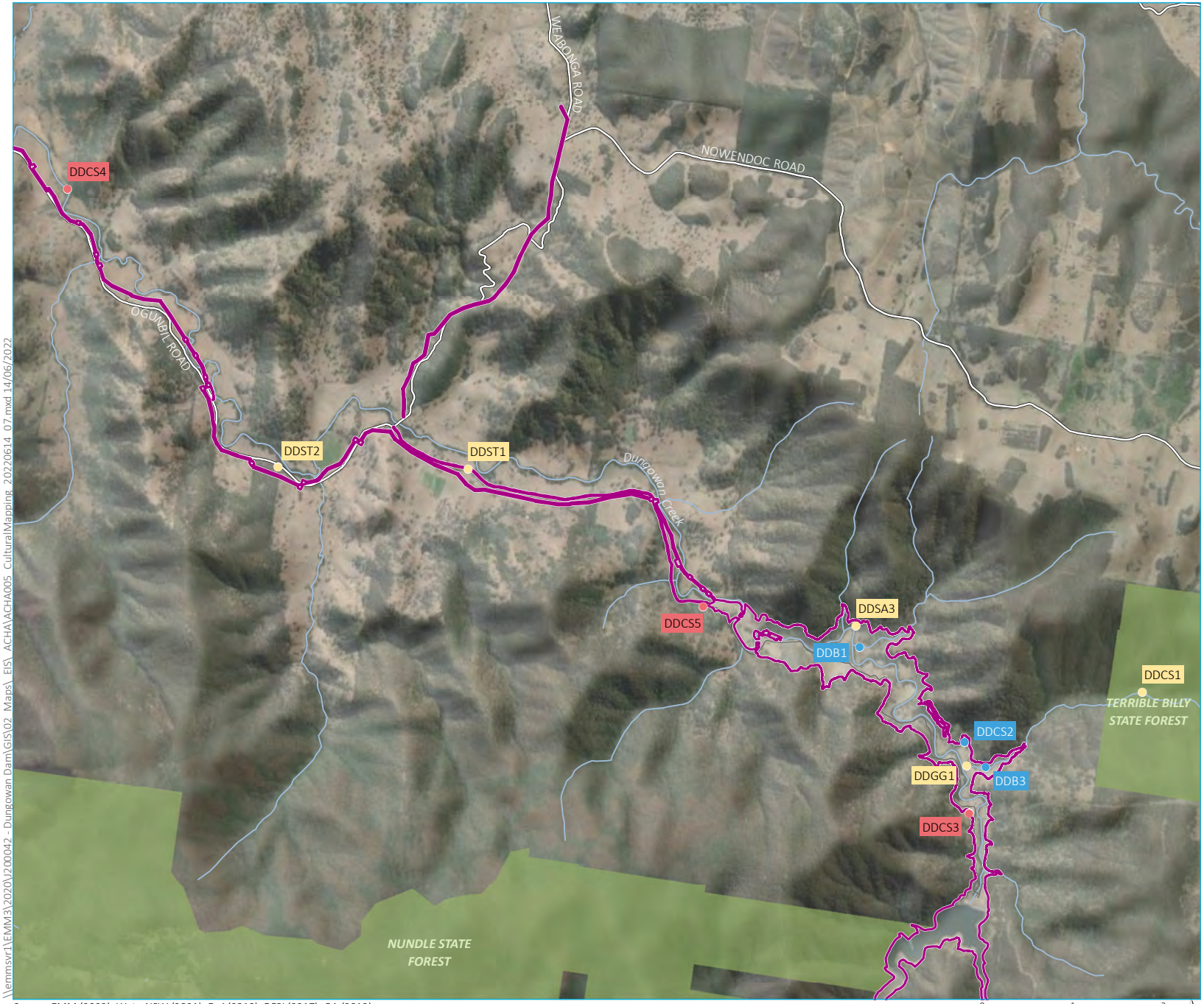
Site #	Easting	Northing	Description	Anthropological notes	Site validity
DDB3	[redacted]	[redacted]	Several potential burials near the Terrible Billy Creek. Several small rockpiles on an alluvial flat, one next to a potential culturally modified tree.	Several piles of rocks considered to reflect burials, although the lack of detail, along with broader ethnography of these site types does not support this identification. The Gamilaraay people would sometimes bury their dead in the ground, using logs and dead wood to keep dingoes away, and so it is possible that stones were similarly used, but previous documentation of this remains absent. This site was originally documented as part of the archaeological field investigations and further details are discussed in Chapter 7.	Purported cultural site

Note. All GPS co-ordinates are presented as MGA Area 56.

5.4 Additional Information provided by RAPs

In addition to the information obtained from documentary sources (Section 5.2) and cultural mapping investigations (Section 5.3), additional comments were made by the RAPs during the consultation process:

- Donny Fermor (Tamworth LALC) indicated that he had knowledge of Aboriginal people working at the Dungowan Station during the post-contact period; and that this site should be considered to have cultural values. While the site has been identified for future management, DDPC 1, no historical or documentary evidence to further understand the nature of the post-contact activities has been sourced as part of the ACHA. For these reasons, the entire station has been de-lineated and identified as a 'purported cultural site' based on the classifications in Section 5.3. For management purposes, it has been labelled as DDPC1.



KEY

- Project footprint

Cultural mapping results

- Cultural site
- Purported cultural site
- Social history place

Existing environment

- Major road
- Minor road
- Named watercourse
- State forest

Source: EMM (2022); WaterNSW (2021); Esri (2019); DFSI (2017); GA (2013)

0 1 2 km

GDA 1994 MGA Zone 56

N

\\emmsvr1\EMM3\2020\200042 - Dungowan Dam\GIS\02 Maps\ EIS\ ACHA\ACHA005 CulturalMapping 20220614 07.mxd 14/06/2022

Cultural mapping results

Dungowan Dam and pipeline project
Aboriginal cultural heritage assessment
Figure 5.1

EMM creating opportunities

6 Archaeological context

6.1 Key findings

- Regional studies of New England suggest that Aboriginal people had inhabited the area by ~5,000 years ago. Currently, a basal age of ~18,000 years ago at the Crazy Man rockshelter site (near Coonabarabran) has been referenced in the wider literature as reflecting the earliest evidence of the peopling of the region to date. Initial archaeological research by University of New England indicated that Aboriginal occupation of the Northern Tablelands was seasonal and transitory due to the cold climate during winter and the associated lack of resources for subsistence (Bowdler 1981). However, more recent studies suggest that the region may have been occupied all year round by small mobile groups who could adapt more quickly to the harsh conditions of the region.

- Previous studies of the region are extremely sparse, and primarily constrained to cultural heritage management studies for various residential and/or industrial activities. Where available, these studies suggest ephemeral past use of the Peel River valley, a prevalence for the use of local lithic material for tool production (such as chert, etc), and activities focussed on areas of elevation (particularly highlighting lower slopes) with a low gradient, near creeks (generally <150 m); and very rarely on other hilly relief.

- The re-development of Chaffey Dam between 2012-2015 likely provides the best analogue for the project footprint. These works identified 40-43 Aboriginal sites all characterised as varying densities of surface and/or shallowly buried (<50 cm) stone artefacts. Three sites of higher significance were identified, all higher density stone artefact scatters (100-508 objects/~14 per m^2) on alluvial terraces of Peel River and/or adjoining lesser tributaries. They mostly reflected ephemeral or transient use of the region probably in the last few thousand years.

- A review of Heritage NSW's AHIMS database identified 151 previously documented sites in the region. These were similarly dominated by sites of varying densities of stone artefacts (67%), but also included rarer site types such as rockshelters, grinding grooves, post-contact habitation sites, ceremonial sites, and culturally modified trees. Prior to fieldwork undertaken for this assessment, no previously documented sites were identified within the project area, with the nearest being >2 km away and the majority further than 10 km.

- Since 2010, one Aboriginal Heritage Impact Permit (AHIP) have been issued within the project footprint. AHIP 4844 allows for geotechnical investigations related to this project to proceed, and permits impacts to AHIMS 29-3-0106 and AHIMS 29-3-0107, which were identified through the fieldwork activities undertaken for this ACHA (see Section 7 & 8). The AHIP was issued in December 2021 and expires June 2023. Another AHIP (#4899) has been issued for activities related to the Stage 1 Dungowan pipeline replacement between Dungowan Showground and Calala – however, the AHIP curtilage does not intersect with the current project footprint.

- Based on the regional information and characteristics of the project footprint, cultural materials dominated by various stone artefact densities would be expected, especially along Dungowan Creek and lesser tributaries. There is also some potential for a range of other site types, including rockshelters, stone arrangements and culturally modified trees. However, the survivability of such cultural materials will be dependent on past disturbance, which in some areas has likely been considerable.

6.2 Regional context

Archaeological studies of the Northern Tablelands have been ongoing since the 1960s and comprise academic studies closely associated with the University of New England (UNE) and/or cultural resource management (CRM) investigations in response to proposed developments across the region. However, the project area is located at the southern extent of the Northern Tablelands and is at a lower elevation (up to 600 m AHD) than some of the more notably cooler areas in the region that these studies documented (such as Armidale at ~1000 m AHD).

Archaeologically, recent genomic research suggests that peopling of Australia had been completed fairly quickly following arrival at ~50,000 years ago, and a form of regional nomadism – whereby resources were only visited and/or occupied for a brief time, but which were repeatedly visited as conditions allowed – was established by ~42,000 years ago, and suggest an extremely long connection with country (Tobler et al. 2017). For much of this time, populations remained low, before undertaking significant increase and socio-economic change in the last 5-10,000 years (Williams et al. 2015).

Archaeological and linguistic evidence suggests that the Northern Tablelands were most intensively occupied from around 4,000 years ago (Beck 2006). This is based on the finds of surface or near-surface artefacts, with very little found at greater depth (Beck 2006). A regional study of New England by McBryde (1974) suggests that Aboriginal people began to inhabit the area by ~5,000 years ago, although a basal age of ~18,000 years ago at the Crazy Man rockshelter site (near Coonabarabran) has been referenced in the wider literature (eg Gaynor 1996). Within closer proximity to the project area, the oldest dated sites include: Bendemeer II rockshelter on Glendon Station, Bendemeer (30 km north-east of Tamworth) which dated to ~5,000 years ago (McBryde 1977:227); and Moore Creek 4 and Moore Creek 6 rockshelters at Moore Creek (10 km north of Tamworth) which dated to ~3-4,000 years ago (Binns & McBryde 1972; McBryde 1977:227).

The academic studies in particular have led to the development of regional Aboriginal occupation models that have been established, debated and refined – particularly from the mid-Holocene onwards (5,000 years ago – present). Initial archaeological research by the UNE indicated that Aboriginal occupation of the New England Tablelands was seasonal and transitory due to the cold climate during winter and the associated lack of resources for subsistence (Bowdler, 1981). In the 1970s, McBryde emphasised the harshness of the Northern Tablelands, suggesting that it would have been a major obstacle to year-round occupation, resulting in a sparse distribution of sites in this zone compared with other more temperate climates (Binns & McBryde, 1972). Others argued that instead, the Northern Tablelands were mainly used for ceremonial purposes which was supported by the rich archaeological record of bora rings, art sites, stone arrangements and carved trees along with Aboriginal knowledge of intangible sites (Flood, 2010). In 1979, rock shelters were excavated by Carol Williams in New England, including the Mt Yarrowyck Art Site. The results indicated that the art site was occupied up to 4,000 years ago and that the area was used primarily as a ceremonial area along with maintenance areas, but not long-term habitation areas (Williams 1980).

These initial hypotheses were challenged as a result of further research at UNE. In a major study, Godwin (1990) argued that the Northern Tablelands were not abandoned in winter at all but occupied all year round by small mobile groups. His evidence based on ethno-history, climate and surface archaeology suggests that the cold winter climate of the Northern Tablelands was not a barrier to year-round settlement (Godwin 1990). Goodwin identified that the Northern Tablelands had varying resources zones of woodland, grassland and wetlands. The notion of year-round occupation sets a frame of reference that the Northern Tablelands were occupied more intensively than once thought and in more utilitarian ways and this may extend to the project area. More recent community archaeology supports this theory through the identification of numerous open camp sites, Aboriginal scarred trees and grinding grooves – sites mainly associated with economic, rather than ceremonial, activities (EMM 2018).

6.3 Local context

Previous studies of the region are extremely sparse, and primarily constrained to cultural heritage management studies as part of various residential and/or industrial activities. Aside from the studies presented below, which focus on studies in close proximity to the project area, a handful of other studies have been undertaken, and similarly suggest increased use of areas with local lithic material for tool production (such as chert, etc), activities focussed on lower slopes with a low gradient, near creeks (generally <150 m but up to 250 m) but above inundation, and occasionally on hilly relief (Davis et al. 1993; Gaynor 2011; Gaynor & Wilson 1995; Wilson & McAdam 2000). It must, however, be noted that ceremonial and natural resource sites do not necessarily conform with these patterns, since they are not necessarily based on resource requirements, and as such may be found in a range of other environmental conditions.

Below are presented a number of nearby studies that more accurately reflect the likely cultural materials within the project area. The locations of these studies in relation to the project area is shown in Figure 6.1.

Study: Due diligence assessment for the Chaffey Dam Pipeline

Reference: Virtus Heritage (2019)

Distance from project area: 24 km north west of Dungowan Dam

This due diligence assessment, and associated survey, was undertaken in advance of works relating to the proposed construction of a pipeline to connect to the existing Chaffey Dam to Tamworth water supply pipeline. The purpose of the due diligence assessment was to: identify whether or not Aboriginal objects are, or have potential to occur, within the project area; if objects are present, whether or not the proposed activity is likely to harm the objects; and, if harm cannot be avoided, determine whether further assessment or an Aboriginal Heritage Impact Permit (AHIP) was required.

The environmental and archaeological background research determined that the project area was within a sensitive cultural landscape due to the proximity to water, and Aboriginal objects, namely isolated artefacts and artefact scatters, had high potential of occurring within the project area, notably within 100 m of watercourses. The survey undertaken for the assessment identified three isolated finds, two potential scarred trees, two artefact scatters with associated potential archaeological deposit (PADs), one isolated find with a PAD, and a further PAD. All sites identified were within 200 m of the Peel River and/or on areas of elevated ground within the associated floodplain.

Two areas of cultural sensitivity were also identified by Donny Fermor of the Tamworth LALC, as retaining potential for cultural deposits. Both areas were in association with lower slopes <250 m from the Peel River. Neither area exhibited material evidence of Aboriginal occupation nor exhibited intact topsoil units. However, their identification was consistent with site prediction models based on regional studies.

The report concluded that should construction methods not be altered to avoid these sites and locales, further impact and significance assessment as part of an ACHA would be required. Ultimately, it is understood that the pipeline alignment was altered to avoid impact to identified cultural heritage.

Study: Aboriginal Cultural Heritage Assessment for the Chaffey Dam Augmentation and Safety Upgrade Project; Chaffey Dam Augmentation and Safety Upgrade – Aboriginal Subsurface Testing & Salvage Collection Program

Reference: Navin Officer (2012; 2015)

Distance from project area: 22km west of Dungowan Dam

This archaeological assessment was undertaken in advance of works relating to the raising of the Chaffey Dam wall and associated inundation (increasing storage capacity from 62GL to 100GL). As the project was classified as a Critical State Significant Infrastructure (CSSI) project, the assessment was tailored to address the Secretary's Environmental Assessments Requirements, but broadly aligned with current Heritage NSW guidelines. The requirements identified that the assessment should determine if any impacts to Aboriginal cultural heritage were likely to occur as a result of the proposed works, and where impacts were identified the aim was to: outline proposed mitigation and management measures; and, demonstrate an appropriate archaeological assessment methodology was undertaken, including reporting on results of the assessment method. The assessment and fieldwork were undertaken in consultation with 18 Aboriginal participants.

The preliminary results of the assessment noted that while the cumulative impact of European land use practices would likely have reduced both the number of sites in the project area, as well as reduced the integrity of any remaining sites. However, a number of previous studies related to the dam had identified artefacts in the vicinity of the inundation area, albeit largely in disturbed contexts, and the potential for further material evidence was identified.

The fieldwork for this assessment comprised two days of field survey in July/August 2012. It should be noted that at this time, the dam was at 100% capacity. When combining existing data and newly identified information, the assessment ultimately identified 32 sites within the additional inundation zone. These included artefact scatters (n=12), isolated Aboriginal objects (n=20), and a potential quarry (n=1). Six artefact scatters were associated with subsurface archaeological deposits, as were two of the isolated finds. A further eight areas of subsurface potential were also identified, bringing the total number of sites (observed and potential) to 40.[5] As the assessment was undertaken in an area dammed in 1979, the relationship of these sites to the natural environment (eg proximity to creeklines) is difficult to assess; and it is also likely that the changing dam supply level has played a role in the observation of these sites (eg through sheet or rill erosion). The areas of subsurface potential were associated with alluvial terraces, basal slopes and spur crests based on the current environment, but which may reflect similar landforms adjacent the now inundated Peel River, especially in the southern part of the dam where flooding was less substantial.

As a result of the findings, a program of mitigation measures was proposed, including surface salvage (artefact collection), and subsurface test and salvage excavations (conservation ex situ). The test and salvage excavations took place over an unspecified number of days in September and October 2014. The excavation comprised five transects, which aimed to sample all landforms represented in the project area, rather than solely targeting areas of high archaeological potential. Additional excavation was undertaken at four Aboriginal sites identified during the survey. Over the course of the test excavation program, 145 0.5 x 1m test pits[6] were excavated, with 67 placed on alluvial terraces, 57 on spur crests, and 21 test pits on basal slopes. In addition, surface salvage was carried out at 25 sites identified during the survey, and along the five test excavation transects.

A total of 903 stone artefacts were recovered during the course of the works, with 140 artefacts from the surface salvage, and 763 artefacts from excavation. These were all found in shallow duplex soils <30 cm composed of silty clay overlying various geological substrates. The assemblage was dominated by hornfels and fine-grained siliceous raw materials and unretouched flakes – an indication of brief and intermittent visitation in the past. The age of the deposits were not explored in the report, but appear likely of late Holocene age (<5,000 years). Three sites were noted to contain high artefact densities:

[5] This number was calculated by adding the number of sites assessed in the significance assessment (n=32) and the eight areas of archaeological potential (n=8) which were specifically noted as *not* included in the significance assessment. The report does not specify a total number of sites assessed within the project area. There are 43 sites currently recorded on AHIMS around the Chaffey Dam inundation area.

[6] The number of test pits excavated during the course of the program is inconsistent throughout the report, and varies between 112 and 145. The number 145 is used here and reflects the sum of tests pits excavated per landform.

- CDAS4, an alluvial terrace at the confluence of Hydes Creek and another waterway, west of the dam, and within which 508 artefacts were recovered from an area some 100 x 50 m in size. The report suggests an artefact density of ~14/m^2 and potentially some 18,000 objects present within the deposit;
- CDAS8, an alluvial terrace adjacent a minor tributary feeding into the western side of the dam, within which 126 artefacts were recovered from an area some 40 x 20 m in size; and
- CDAS13, a probable alluvial terrace/lower slope of Peel River, within which 111 artefacts were recovered from an area some 25 x 25 m in size.

The assessment considered three sites of high (CDAS4) and moderate significance (CDAS8 and CDAS13), with the remainder having low values. As a post-approval mitigation report, recommendations were constrained to the ongoing management and protection of those sites found outside the inundation zone.

Study: The Tamworth Aboriginal/Archaeological Site Study

Reference: Wilson, J & McAdam, L (2000)

Distance from project area: 53 km north west of Dungowan Dam

This study was undertaken to produce a preliminary predictive model for Aboriginal site location within the Tamworth region, including the project area, undertake fieldwork on crown and council land to test the predictive model, and to refine the predictive model based on the findings. The report included recommendations to ensure the long-term conservation of some of the sites, based on their significance.

A total of 28 sites were identified as previously recorded within the study's project area, additional fieldwork identified and recorded 38 sites, bringing the total number of sites to 66. These sites comprised isolated objects (n=20, 30%), artefact scatters (n=40, 61%), scarred trees (n=5, 8%), and a stone quarry (n=1, 1%). The most notable of these sites included the identification of some 10,000 artefacts on the banks of Timbumbri Creek. Timbumbri Creek is a 5th order waterway ~5 km from the project area.

Of the 66 sites, only one site was located in the south-eastern sector (within which a portion of the project area is situated). The artefact scatter, measuring 10 x 10 m, was identified on a gentle upper slope within 100 m of an upper tributary of Goonang Creek, and comprised two flaked artefacts of hornfels and quartz. This site is located 5km south of the current project area.

Based on background research and ground truthing, the study made predictions for the types of Aboriginal sites within the study's project area, and where they may occur. It also identified that past land use and disturbance playing a key role in the perceived survivability of Aboriginal objects (Wilson & McAdam 2000:174-196). The report uses land zoning as a tool to group site predictions. Of relevance to this ACHA are the predictions provided for flood liable and rural zones, as well as future development zones. [7] These broadly align from east to west with the project area – the Calala region includes flood liable and development zones, while Loomberah region is mainly rural. In these areas, the following site predictions were made:

- In rural zones:

[7] Noting that this study uses zoning mapping from the 1996 version of the Tamworth Local Environmental Plan. This plan and project area do not include the Loomberah end of the current project area. However it can be extrapolated that the Loomberah end of the project area broadly fulfils the criteria for these zones.

- Isolated stone artefacts may occur on lower to midslopes (gradients generally from 1° to 8°) north and south of the Peel River. Isolated finds are commonly located within 300 m of watercourses, often in the upper reaches.
- Artefact scatters may occur on creek terraces and lower slopes above flood level near: 1) permanent watercourses (large scatters); 2) in association with springs and swamps (medium scatters); and/or 3) intermittent watercourses (small scatters). Small artefact scatters may also occur on level areas on saddles, hill crests and ridge crests, or in ecotone areas (eg geological boundaries or floodplain/lower slope boundaries).
- Scarred trees may occur within 300 m of a watercourse.
- Stone quarries may occur on steep topography and/or river cobble beds.
- Grinding grooves may occur on outcrops of weathered andesitic greywacke.
- Burials in areas with rock ledges, and along watercourses.

- In flood liable zones, scarred trees may occur within 300 m of a watercourse, north and south of the Peel River. Tree species that are likely to bear scars are limited to yellow box and river red gums. Due to the highly mobile nature of the soils in this zone, other site types are likely to have been removed from the landscape through natural geomorphic processes.
- Ceremonial sites and carved trees may occur within 600 m of the ecotone between alluvial flats and slopes, but out of sight of any watercourse.
- Where surveys fail to locate in the predicted areas, and these areas have not been subject to significant erosion, subsurface testing is recommended to prove/disprove their presence.

Notably, south of the Peel River was considered as a relatively un-investigated locale, and includes portions of the project area.

Study: Archaeological survey of part Lot 191 DP 110783 near Calala Lane at Tamworth in north western NSW

Reference: Gaynor, P (2011)

Distance from project area: 50 km north west of Dungowan Dam

This archaeological survey was undertaken in advance of undisclosed development in Calala. Based on present aerials, it may have been associated with a recreation area south of Calala Creek near the residential area on Warrah Drive. The study area was a small lot adjacent south to Calala Creek, near the residential development area.

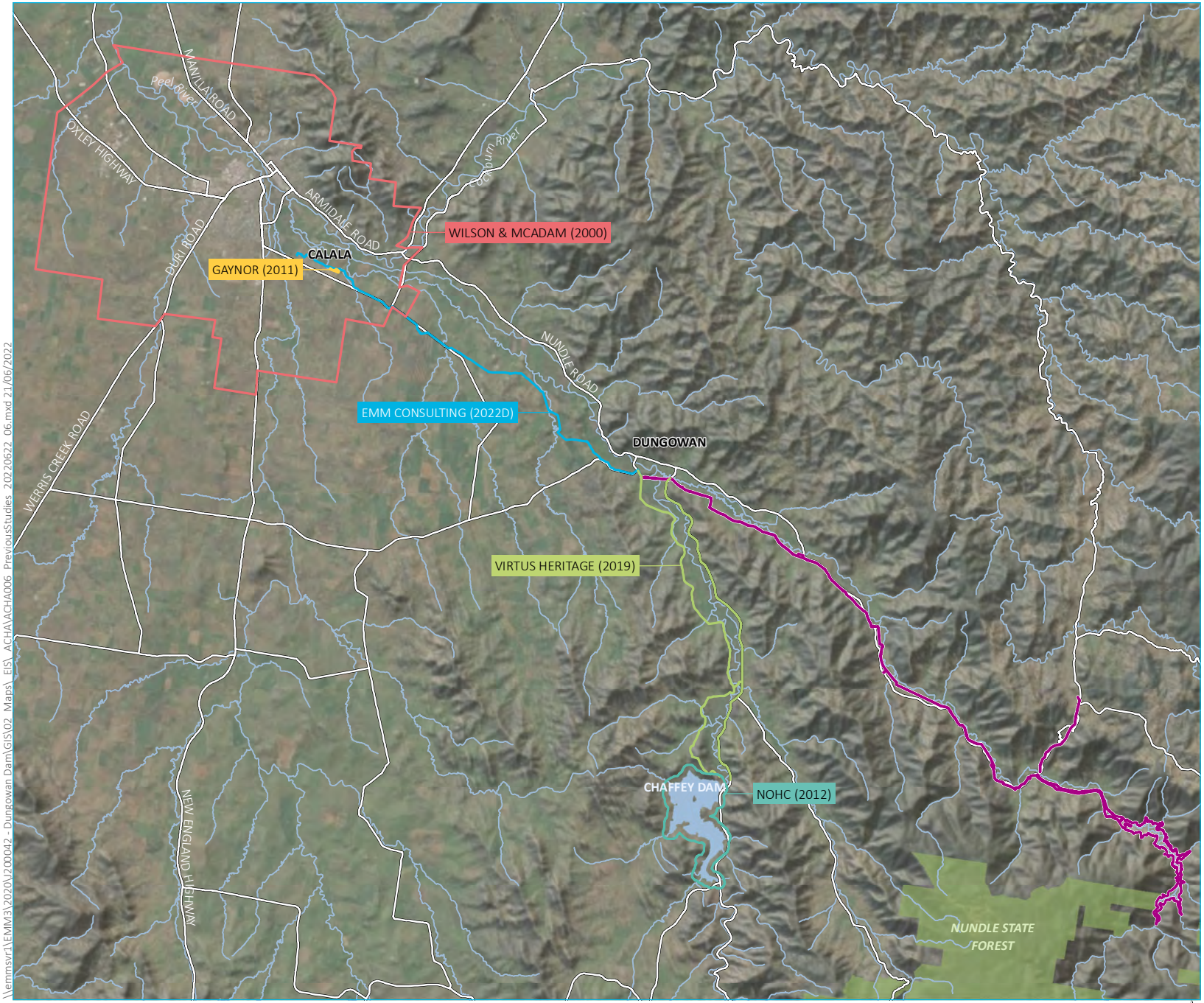
Prior to the survey, one recorded site, a small (n=5, 6 x 2 m) artefact scatter (AHIMS #25-2-0006), was identified within the project area. During the field survey, visibility was noted as very low with little exposures outside access tracks. Attempts were made during the survey to relocate #25-2-0006. None of the original artefacts were identified, however one grey chert core was identified adjacent to the reported location. This artefact was considered likely to relate to the originally recorded site. No updated site extent was provided. No subsurface potential was observed at the time of recording.

Study:	Replacement pipeline between Dungowan Village and Calala: Aboriginal cultural heritage assessment
Reference:	EMM Consulting (2022d)

Distance from project area: Adjacent to current project area, north west

This study was undertaken in advance of the Dungowan Dam and pipeline project. During the course of the fieldwork activities for this assessment, comprising archaeological survey and test excavation, seven Aboriginal objects and/or sites were identified within the study area. These consisted of six isolated stone artefacts (DEW IF1-IF6 inclusive); and a low density stone artefact scatter (Sandy Creek artefact scatter) associated with the riverbanks of Sandy Creek, a 4th order tributary of the Peel River. The extant stone artefacts were all found in fairly disturbed, primarily agricultural landscapes, while archaeological excavations documented a low density of cultural materials in the upper 30 cm of the soil profile adjacent Sandy Creek.

AHIP 4899 was issued in May 2022, authorising impacts to all isolated finds and parts of the Sandy Creek artefact scatter. This AHIP does not intersect with the current project area.



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Source: EMM (2022); WaterNSW (2021); Esri (2019); DFSI (2017); GA (2013)

Previous archaeological studies in the local area

Dungowan Dam and pipeline project
Aboriginal cultural heritage assessment
Figure 6.1

EMM creating opportunities

6.4 AHIMS data

The Aboriginal Heritage Information Management System (AHIMS) database is managed by Heritage NSW and includes a location and description of Aboriginal objects and sites recorded through academic research and cultural resource management (see Annexure E for further explanation of Aboriginal site features). EMM conducted a search of the AHIMS register on 2 January 2020 (ID: 474628) for the broader Dungowan Dam and Pipeline project. The search covered an area of ~6,000 km^2. This search was updated on 21 January 2021 (ID: 562767, 562769) and on 2 March 2022 (ID: 664100, 664110). The search identifies any Aboriginal sites or places registered within the project area; and aids predictions for the project footprint showing the frequency and distribution of Aboriginal site types in the broader landscape. A copy of both AHIMS searches are provided in Annexure E.2.

The AHIMS searches identified 151 Aboriginal sites, which are categorised in Table 6.1 and their locations presented in Figure 6.2. Of these, one site has been deleted (#29-2-0110), three sites have been partially destroyed (#29-3-0035, #29-3-0051, #22-1-0350) and eight sites have been destroyed (#29-3-0050, #29-3-0052, #29-3-0058, #29-3-0060, #29-3-0061, #29-3-0062, #29-3-0067 and #29-3-0071). One site (#29-3-0078) is an artefact reburial location.

A number of site types are represented, and include artefact scatters, potential archaeological deposits, natural resources (notably water holes and quarries), stone arrangements, grinding groove sites and rockshelters. The most common site type in the region are artefactual sites (n=101, 67%). Of these, artefactual sites are most frequently isolated finds (n=47, 31%) or low density (<20) artefact scatters (n=16, 11%), though many remain undefined (n=36, 24%). Two artefact sites (1%) were identified in association with natural resources. Isolated finds are not frequently associated with subsurface potential (n=10, 7%). In fact, relatively few sites have been registered as featuring potential archaeological deposits (PADs) (n=19, 13). Generally, sites appear to be found in close proximity to water, with numerous references in the data to a plethora of relatively minor watercourses. The registered sites in the region also reflect lesser occurrences of rarer site types such as culturally modified trees (n=10, 7%), rockshelters (n=3, 2%), and grinding grooves (n=7, 5%). In the case of modified trees, this might be related to the pastoral use of the region, which often was preceded by vegetation clearing. However, a number of increasingly rare site types are also documented in relative abundance in the region compared with other parts of NSW, including ceremonial sites (n=9, 6%), post-contact habitation structures (n=7, 5%), and natural resource sites (quarries and water-holes) (n=6, 4%). No such sites are previously documented within the project area, nor within close proximity. There is one registered Aboriginal Place documented, Inglebah Aboriginal Place (#29-3-0031), and is composed of a traditional camping area dating to the late 19th Century. It is located ~34km east of the project area, situated in the vicinity of Walcha. Additionally, one contact artefact has been documented; however, this artefact is located over 25km south of the project area, near Nundle.

Of 118 registered sites, none are located within the project footprint. Only two sites, #25-3-0004 and #25-3-0045 (a stone arrangement and culturally modified tree, respectively), are located within a few kilometres of the project footprint. These are situated either side of the proposed pipe alignment in the vicinity of Dungowan Station. All other previously documents sites are considerable distances (>10 km) from the project footprint.

With respect to site distribution, the registered sites in the region appear to reflect a combination of compliance-based assessments and research-based investigations. In particular, the sites registered around Chaffey Dam certainly add an element of recording bias to the registered sites in the region. Along the edges of Chaffey Dam, some 43 sites are documented (see Section 6.3). With the exception of a quarry, these sites are exclusively artefactual sites or areas with the potential for them to occur. These sites are primarily isolated Aboriginal objects and/or low-density artefact scatters (generally less than 20 objects). However, the high-density clustering of sites around the dam site is more likely indicative of the level of investigation in this region, rather than any discernible archaeological patterning.

Since 2010, one Aboriginal Heritage Impact Permit (AHIP) have been issued within the project area. AHIP 4844 allows for geotechnical investigations related to this project to proceed, and permits impacts to AHIMS 29-3-0106 and AHIMS 29-3-0107, which were identified through the fieldwork activities undertaken for this ACHA (see Section 7 & 8). The AHIP was issued in December 2021 and expires June 2023. Another AHIP (#4899) has been issued for activities related to the proposed dam – specifically the replacement of the Dungowan Dam pipeline between Dungowan Village and Calala – however, the AHIP curtilage does not intersect with the current project area. These AHIPs are provided in Annexure E.3.

Table 6.1 Summary of AHIMS site types within the search area.

Site type	Number of sites		% of Total	
	Category total	Sub-category total	Category total	Sub-category total
Aboriginal ceremony and dreaming	7		4.64	
Ceremonial ring		6		3.97
Ceremonial ring with modified tree(s)		1		0.66
Artefactual site	101		66.89	
Low density artefact scatter (<20)		15		9.93
Low density artefact scatter (<20) with potential archaeological deposit		10		6.62
Medium density artefact scatter (20-50)		2		1.32
Isolated object		37		24.5
Isolated object with potential archaeological deposit		10		6.62
Contact artefact(s)		1		0.66
Undefined artefactual site		33		21.85
Undefined artefact with potential archaeological deposit		2		1.32
Burial site	2		1.32	
Burial with ceremonial ring		1		0.66
Burial with undefined ceremonial site		1		0.66
Culturally modified tree (carved or scarred)	10		6.62	
Grinding groove site	7		4.64	
Habitation structure (post-contact)	7		4.64	
Natural resource site	6		3.97	
Water hole		2		1.32
Water hole with isolated artefact		1		0.66
Quarry		1		0.66
Quarry with artefact(s)		2		1.32
Potential archaeological deposit	6		3.97	

Table 6.1 Summary of AHIMS site types within the search area.

Site type	Number of sites		% of Total	
	Category total	Sub-category total	Category total	Sub-category total
Registered Aboriginal Place	1		0.66	
Rockshelter sites	3		1.99	
Rockshelter		1		0.66
Rockshelter with art		2		1.32
Stone arrangement	1		0.66	
TOTAL	**151**	**-**	**100**	**-**

KEY

Project footprint

AHIMS site type

- Culturally modified tree
- Isolated Aboriginal object; potential archaeological deposit
- Stone arrangement

Existing environment

- Major road
- Minor road
- Named watercourse
- Named waterbody
- State forest

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Previously documented Aboriginal objects and sites

Dungowan Dam and pipeline project
Aboriginal cultural heritage assessment
Figure 6.2

EMM
creating opportunities

6.5 Predictive model

Aboriginal occupation of the project footprint in the past is considered likely. Aboriginal objects and/or sites are frequently found on terraces and/or elevations in close proximity to major creek lines, often on flat or near flat surfaces. Numerous examples of higher densities of occupation also extend to lesser creeklines and confluences of waterways. The most common site type is likely to be surface and/or subsurface stone artefactual material reflective of past visitation and/or occupation. Available data suggests that such sites frequently contain few Aboriginal objects (<20) and are reflective of an ephemeral use of the region. No high-density artefact scatters are documented in the available data, so it remains unclear the threshold at which transient use shifts to occupation foci, although Wilson and McAdam (2000: 166) make reference to a site on Timbumburi Creek (#29-2-0052) numbering close to 10,000 artefacts; and more regionally 20-30/m^2 are often adopted. Excavations as part of the Chaffey Dam redevelopment identified three sites with >100 artefacts, and densities of ~14/m^2 that may suggest evidence of longer and/or more intense activity for this region. The presence of alluvial soil profiles along the major waterways may potentially contain deeply buried and/or stratified cultural material, although these waterways have likely been impacted by changes in morphology (increased erosion/sediment deposition); and more commonly excavations where documented suggest shallow cultural deposits (<50 cm).

A range of other site types are known in lesser abundance, and arguably of higher significance, including culturally modified trees, ceremonial sites, quarries, stone arrangements, grinding grooves, rock shelters, habitation structures, and natural resource sites. These consist of about 46% of the documentary record, values that are likely above average for such site types more generally across NSW. Several of these sites are considered unlikely to be present due to the environmental context – a narrow upper reach river valley lacking vertical escarpments and highly erosive limiting the likelihood of rockshelters, grinding grooves and/or quarries, for example. However, a number of these sites – notably ceremonial sites and stone arrangements - are not related to resource exploitation and as such may not follow the environmental site predictions outlined above.

The project can be divided into two main environments:

- the pipeline alignment is largely constrained to alluvial flats that appear to have been largely used for farming and pastoral activities in the past, and which have likely affected the upper soil profile. While complete soil profile replacement is unlikely, such activities are likely to have resulted in disturbance and/or movement of cultural materials from their primary context (if present). While early use of the region involved timber-felling, and significantly reduces the potential for culturally modified trees to have survived – not a common site type in any case – there has only been localised impacts more generally. As such, the survival of cultural material, if ever present, is considered likely, albeit likely in disturbed contexts. The environmental context indicates that Aboriginal visitation within the project footprint may have largely been restricted to transient use, as much of the project area is prone to flooding; and

- the new Dungowan Dam footprint and inundation area is situated within a narrow V-shaped valley, within which Dungowan Creek flows. The power easement near Ogunbil can also be characterised in this type of steep terrain. The slopes on the periphery of the valley are commonly >50° to vertical, and as such are prone to erosion (eg mass movement, soil creep, etc), which limits the potential for cultural materials to survive in these locations if ever present. These types of environment have the potential for rockshelters and associated features where suitable vertical faces, overhangs and/or crevices occur. In the valley floor, the creek is surrounded by alluvial terraces and gentle slopes upon, and within, which cultural material in the form of stone artefacts may be expected. The valley does however exhibit extensive disturbance, both the high energy water flows that run down the valley, the installation of the existing Dungowan dam (especially in the southern parts), and various pastoral activities. As such, the survivability of cultural materials may be localised, with some parts of the catchment heavily modified by these activities. The environmental context indicates that Aboriginal visitation within the project footprint may have been restricted to transient and/or ephemeral use, with resources likely relatively limited given the narrow

(<300 m) geomorphology of the valley, limiting hunting and gathering opportunities, as well as being prone to flooding.

On the basis of the archaeological sites registered in the region, a review of previous archaeological studies and the environmental context, the following conclusions can be drawn regarding the potential presence and location of Aboriginal sites within the project study area:

- isolated finds, artefact scatter sites and potential archaeological deposits are the most common sites within the region and can occur across most landforms, even in disturbed contexts. Open stone artefact sites are usually found close to streams but above flood level on elevated, level to gently inclined landforms such as hill crests and hill spur crests and alluvial terraces. The most common site type is likely to be surface and/or subsurface stone artefactual material reflective of past visitation and/or occupation. Available data suggests that such sites frequently contain few Aboriginal objects (<20) and are reflective of an ephemeral use of the region. With one exception at Chaffey Dam, no high-density artefact scatters are documented in the available data, so it remains unclear the threshold at which transient use shifts to occupation foci, although values of >10,000 artefacts are documented in the broader region;

- rock shelters and/or rock art and engravings are very rare in the regional context, likely due to the lack of suitable topography in settled areas. Where they do occur, they are in areas with sandstone outcropping or near vertical escarpments. This site type is more likely to occur in the rugged Moonbi Ranges to the north east rather than the project area, the majority of which is alluvial flats. However, there is some potential for such sites to be present within the proposed inundation footprint where the steep geomorphology may result in crevices, overhangs, cave, etc;

- grinding grooves and engraving sites are most likely to be present on outcropping sandstone in stream beds or adjacent to streams. Based on previous regional studies in the region, engraving sites have not been documented previously on nearby Peel River nor Dungowan Creek. Where recorded on the AHIMS database, the grinding grooves are located on ridges near waterways, within the Moonbi Ranges to the north east and Crawney Pass to the south. There is a very low likelihood that these sites are present within the project footprint;

- culturally modified trees have not been recorded within the project area previously; given the early use of the region for timber and/or pastoralism are considered unlikely to be present. They may exist where native vegetation has been retained, or can remain present in the landscape for a considerable time where dead or felled trees have been left;

- middens of bone, charcoal, stone and freshwater shells may occur along extensive and reliable river systems. However, none are recorded in the regional landscape, and are unlikely to occur within the project area. If present, they are most likely to occur in association with open camp sites on waterways;

- stone arrangements are most likely to occur on elevated and relatively flat landforms (eg crests, terraces, ridges) near sources of outcropping cobbles or small boulders capable of being moved manually. Where recorded in the landscape, this type of site is located on the steeply elevated topography of the Moonbi Ranges. Within the context of the project area, this site type is restricted to suitably flat areas on locally elevated hills; and

- burials can occur anywhere in the landscape, but are notably more likely on watercourses or under rock ledges; their identification in the landscape is rare. Generally, they would be identified by mounds of earth, carved trees or stone markers. Evidence of burials is generally rare because human bodies are susceptible to the acidic Australian environments and other taphonomic processes. Where sub-surface burial is not performed, human bodies can have limited preservation in the archaeological record. Such sites and their component parts are also more susceptible to the impacts of low-level development (such as farming) than other sites.

7 Field investigation

7.1 Key findings

- On-site validation consisted of field survey and test excavation undertaken by EMM archaeologists and representatives of 11 of the registered Aboriginal parties. The field investigations focussed on the dam footprint and inundation area where access was readily available, with limited targeted observations of the proposed pipeline alignment. The field survey encompassed a two-week period in June and July 2020, while the test excavations consisted of a six-week program between August and September 2020. Some additional survey was undertaken in November 2021 to cover small changes to the pipeline alignment. This ultimately totalled over 200 person days of investigation on-site specifically for the Dungowan Dam and pipeline project.

- The field survey encompassed some 106 kilometres (or some 1,073 hectares) of linear pedestrian transects across the project footprint, and included 613 individual points of observation and documentation. Visibility and coverage were relatively poor (~5%) due to dense vegetation and recent rains. Despite this, some 37 Aboriginal objects, sites and/or places were documented. These included 14 artefact scatters; 11 isolated artefacts; five stone arrangements (with three of these identified as possible burial areas by Aboriginal participants); four potential culturally modified trees; two sites of intangible cultural value identified by Aboriginal participants; and one potential grinding groove site. Several were also considered to have subsurface potential. Of these sites, several (n=8) were duplicates of the cultural mapping investigations (Section 5.3), and 8 have been identified as having only a tentative identification with further investigations needed to validate them as Aboriginal objects/sites.

- Test excavations consisted of 105 1 m^2 manually dug test pits in a systematic grid (30-60 m) focussing on the alluvial terraces and slopes surrounding Dungowan Creek and its major tributaries. Cultural material (stone artefacts) was primarily found within 69 m of the creek's edge, <60 cm in depth, and in densities ranging from 0 – 272/m^2 ($\bar{x}$ = 15.8/m^2). Of note was a single test pit (#12) situated in close proximity to a former residence of one of the Aboriginal participants in which 272 artefacts were recovered, and which may reflect a prolonged use of this locale both before and after contact. The assemblage, totalling 1,662 artefacts, reflected two main periods of past use between ~3.5-5 ka and <0.5 ka in which jasper raw materials were being extracted from the river system – initially during brief foraging visits to the locale, with increasing residence/occupation times in the more recent period. Foci of cultural material were frequently small, <2,800 m^2 (<60 x 60 m), but in some areas extended 350 m along the river's edge.

7.2 Archaeological survey

7.2.1 Approach and methods

EMM conducted an archaeological field survey of the project footprint with the assistance of Aboriginal participants over nine days during a two week period (30 June to 14 July 2020). The survey was directed by Taylar Reid (EMM archaeologist), with the archaeological team consisting of Greg Ho Sing and Anthony Dakhoul (EMM archaeologists). Field support was provided by Brady Porter and Tomesia Fing (Indigeco). A number of stakeholder groups were represented throughout the course of the excavation program; a list of groups present during the survey is presented in Table 7.1.

The survey involved pedestrian, linear transects along the project footprint targeting areas where the dam structures, power easement and pipeline are proposed. A number of other shorter field surveys and/or site inspections were undertaken of the proposed pipe alignment throughout the ACHA process between April 2020 and November 2021.

The primary aims of the survey were to:

- identify Aboriginal archaeological sites and/or places with the assistance of Aboriginal participants;
- characterise the landscape to aid predictions of archaeological potential and sensitivity;
- identify sites or areas that would require further investigation if planned for development as part of the project;
- identify sites or areas to be avoided by development, where possible; and
- identify areas with minor or negligible Aboriginal cultural heritage values that hold no constraint for development.

The archaeological survey and data collection methods followed Section 2.2 of the *Code of Practise for the Archaeological Investigation of Aboriginal Objects in NSW* (DECCW 2010). The entire project footprint was divided into discrete transects, each generally about 2 km in length and aligned with discrete landforms where feasible. Each survey participant was spaced approximately 10-20 m apart for each transect, ultimately allowing survey of areas ~70-140 m in width. This method was considered to be suitable for a largely flat landscape characterised by grassed paddocks, whereby suitable ground exposures were easy to identify and targeted at this spacing. (The extremely steep sides of the valley were largely inaccessible by pedestrians). Due to poor visibility across the entire project footprint the assessment calculations assume that each participant could identify and inspect exposures within 5-10 m either side of them. Notwithstanding, this calculation does not account for more obtrusive site types such as grinding grooves and scar trees which are observable from a much greater distance.

The survey team targeted ground exposures along transects, outcropping bedrock and sandstone overhangs, and other features where cultural material may be expected. It must, however, be noted that archaeological surveys are inherently limited by ground surface visibility conditions and therefore any survey, despite the intensity of survey effort and spacing of survey transects, is considered to only *sample* the archaeological landscape. The archaeological survey did not aim to cover the entire ground surface within the project footprint, but rather to characterise the archaeological landscape.

The effectiveness of the survey is determined through recording and analysing survey coverage data. It is evaluated for its effectiveness in identifying the distribution of Aboriginal objects across the landscape, taking into account the potential for archaeological deposits. The percentage of the ground surface exposed in each landform and the visible ground surface within exposures (as ground exposures are often obscured by vegetation, gravels, etc) influences the survey results. For example, an archaeologically sensitive landform surface that is highly exposed by erosion is likely to reveal Aboriginal objects, whereas a similar landform that is thickly grassed will obscure surface artefacts if they are present. Overall, calculation of effective survey coverage is used to estimate not only how much area was physically surveyed, but also how favourable the survey conditions were for the identification of Aboriginal sites.

Site recording was completed in accordance with the *Code of Practise for the Archaeological Investigation of Aboriginal Objects in NSW* (DECCW 2010). Site locations and their details were recorded with digital tablets using site recording forms created by EMM on the Survey123 application for ArcGIS (Esri© software). The digital tablets had a location accuracy of up to ±3 m which is similar to hand-held non-differential GPS units (~5 m). The Survey123 forms allowed for a site's location, details and representative photographs to be linked together, which avoided potential post-fieldwork issues around data integrity.

Survey transects were recorded as tracks on GPS units and detailed information about each transect recorded on a separate Survey123 form created by EMM. The Survey123 form allowed for survey transects starting points, details and representative photographs to be recorded. The course of survey transects were recorded as tracks on hand-held non-differential GPS units which were linked to the Survey123 forms.

Table 7.1 Aboriginal stakeholder representatives present during the survey.

Organisation	Representatives
Tamworth Local Aboriginal Land Council	Christopher 'Donny' Fermor Michelle Fermor Edward Fermor
The Gomeroi People	Steve Talbot
DFTV Enterprises	Sue Cutmore
Corroboree Aboriginal Corporation	Mike Skinner
AT Gomilaroi Cultural Consultancy	Aaron Talbott
Galamaay Cultural Consultancy	Robert Slater
Huckada Dreamin Heritage Group	Richard Slater

7.2.2 Results

Overall the field survey encompassed 51 discrete transects, extending ~106 km in length and encompassing 1,073 hectares of observations across the project footprint (Figure 7.1; Table 7.2; Annexure F.1). The transects were on average ~2.1 km in length, ranging between ~80 m up to ~15 km. Some 613 discrete observations of the project area were documented (Figure 7.1; Annexure F.2). Overall, exposure was relatively poor ($\bar{x}$ = <25%) due to dense vegetation coverage, with an average visibility of ~21 %, and average effective coverage of ~5% (Table 6.3). A range of discrete and disparate on-site validation was undertaken in all parts of the project area where linear investigation could not occur (eg parts of the pipeline with limited landowner access; road verges, etc). A summary of each transect is provided in Annexure F.1 and a full photographic catalogue is provided in Annexure F.2.

Topographically, the project footprint is dominated by Dungowan Creek and its associated alluvial terraces, situated within a relatively steep V-shaped valley (Plate 7.3 -Plate 7.8). Away from Dungowan Creek, the terrain quickly becomes increasingly steep and near vertical less than 150-200 m from either side of the creek itself. The alluvial terraces vary in size, from narrow and confined where the creek emerges from the steep hills south of the project footprint- the valley perhaps only 100 m wide, and increasing in size as the creek flows northwest towards Dungowan, and the terrain becomes less rugged. At this northern end, the valley floor extends perhaps 400-500 m in width. Two discrete terrace landforms were observed along Dungowan Creek. These included the active terrace usually situated immediately adjacent and at the same level as the current creek level; a second terrace some 2-3 m above the creek level and usually forming the majority of this type of landform in the project footprint, and considered to reflect an earlier higher river system. A potential third terrace was observed in some areas, but these were often in small patches some distance from the creek, and may have been the result of other geomorphological processes. Not enough of these landforms were observed to provide a robust identification of them as a terrace unit.

Other larger water courses included Terrible Billy Creek and Jones Oakey Creek, both of which contained water, but were increasingly steep and narrow as they extended into the uplands away from Dungowan Creek. Notably, the survey confirmed that many of the lower order streams mapped within the project area and surrounding locale were not observable in the field and are likely ephemeral, only carrying flow in the immediate period after heavy rain. They are therefore unlikely to have been a focus of past by Aboriginal people. Some may also be recent additions to the landscape, resulting from various water management practices relating to agricultural use.

The proposed pipeline alignment runs along the Peel River and Dungowan Creek corridors, and is constrained to alluvial terraces and gentle surrounding slopes. Here, the landscape is much flatter, and generally does not exhibit the steep terrain associated with the dam footprint. The Peel River system is more substantial than Dungowan Creek, and the alluvial terraces extend for several hundred metres either side of the creek's edge.

The observed soil profiles are more extensively described by the test excavations (Section 7.3), however as predicted in Section 4.3, were all generally shallow where observed across the project footprint. On the steeper slopes, geological outcrops were frequently present and/or observed beneath a shallow topsoil unit – likely of fairly recent development. On the terraces, there was some variability, but in general these were found to be a ≤1m soil profile composed of a ~40-50 cm topsoil unit (dark brown sandy clay loam) situated on varying sandy clay units of A/B and B2 horizons to the depth of visible exposures. Along the pipeline alignment, the soil profile was consistent with this, but often much shallower, with topsoil units commonly <30 cm.

Vegetation in the project footprint predominantly comprises mature native eucalypt forest on hillslopes, and native grasses on the alluvial terraces. Introduced species are primarily in the vicinity of dwellings, now all disused and uninhabited. Several of these dwellings have recently been removed but this was unrelated to this project. The pipeline alignment has been largely cleared for pastoral use, and thus very little mature native vegetation was observed, although some isolated mature eucalypts were present in areas where agricultural activities have been limited.

The field investigation identified 35 previously undocumented Aboriginal sites (Section 7.2.3; Table 7.2; Figure 7.2). These sites were primarily found on the alluvial terraces (n=18) overlooking Dungowan Creek and/or the hillslopes immediately behind them (n=14) (Table 6.3). Few sites were found in the steeper slopes and/or elevations within the project footprint with much of this ground hard to access and utilise, and likely prone to extensive natural erosion. Few sites were identified along the pipeline alignment or power easement, reflecting both the large alluvial floodplains prone to flooding and scouring, and limited access during the ACHA investigations. Ground-truthing of the condition of several areas of subsurface potential was also undertaken to refine the test excavations being undertaken to identify buried cultural material (Section 7.3).

Table 7.2 Summary of the field survey, showing landforms inspected, visibility and coverage, and number of Aboriginal sites identified.

Landform	Landform area (m^2)	Area effectively surveyed (m^2)	% of landform effectively surveyed	Number of sites
Alluvial terrace*	4,268,950	301,313	7	18
Hillcrest	942,925	77,846	8	4
Hillslope**	4,726,192	271,138	6	14
Steep slope	796,597	244,227	31	1
Total	**10,734,664**	**894,524**		**37**
Average	*2,683,666*	*223,631*	*13*	

* This landform incorporates cultural site DDCS1 however it should be noted that DDCS1 is likely associated with the stream channel, although the site remains poorly defined and likely includes multiple landforms.
** This landform incorporates cultural site DDCS2, however it should be noted that DDCS2 is likely associated with an open depression that forms part of the hillslope, although the site remains poorly defined and likely includes multiple landforms.

Plate 7.1 Drone imagery of the project area, showing the creek valley, view facing north west.

Plate 7.2 Drone imagery of the project area, showing the creek valley, view facing south east.

Plate 7.3 Example of an alluvial terrace on the western bank of Dungowan Creek, view facing south towards Terrible Billy Creek (transect DD29W).

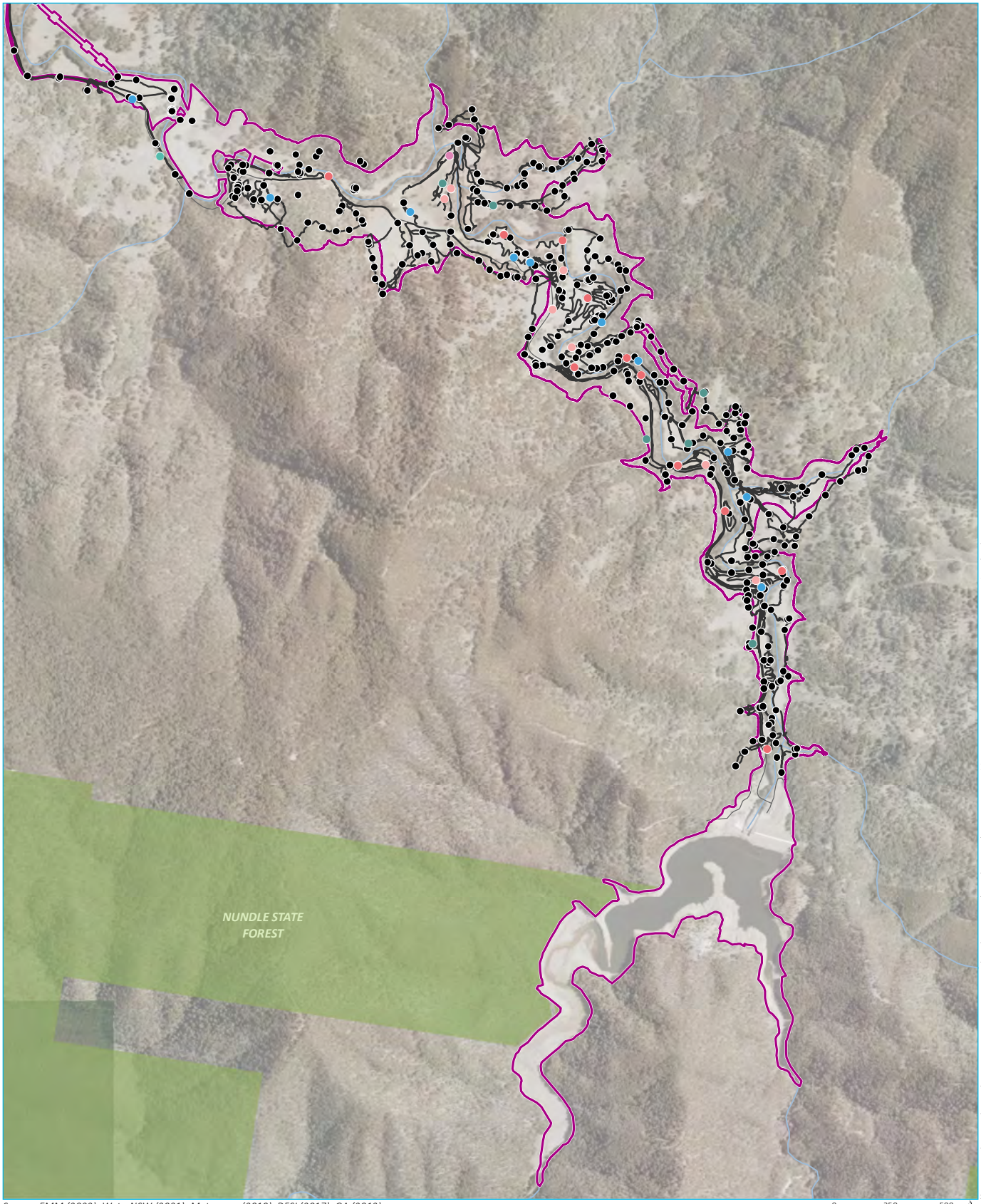
Plate 7.4 Example of an alluvial terrace on the eastern bank of Dungowan Creek, view facing south west (transect DD17W).

Plate 7.5 Example of a moderate hillslope behind a flat alluvial terrace, view facing south east (transect DD22P).

Plate 7.6 Example of a steep slope, typical in the northern portion of the dam footprint. Note the thin topsoil over heavily weathered schist bedrock.

Plate 7.7 Example of a crest within the study area (transect DD39C), view facing east. Jones Oakey Creek is located out of frame to the left.

Plate 7.8 Example of view downslope from a crest (transect DD26S). Dungowan Creek is featured in the background of the photograph, highlighted by dense vegetation.



Source: EMM (2022); WaterNSW (2021); Metromap (2019); DFSI (2017); GA (2013)

0 250 500 m

GDA 1994 MGA Zone 56

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KEY

- Project footprint
- Surveyed documentation point
- Survey tracks

Landform

- Flood plain
- Hills
- Low hills
- Plateau
- Rises
- Terrace

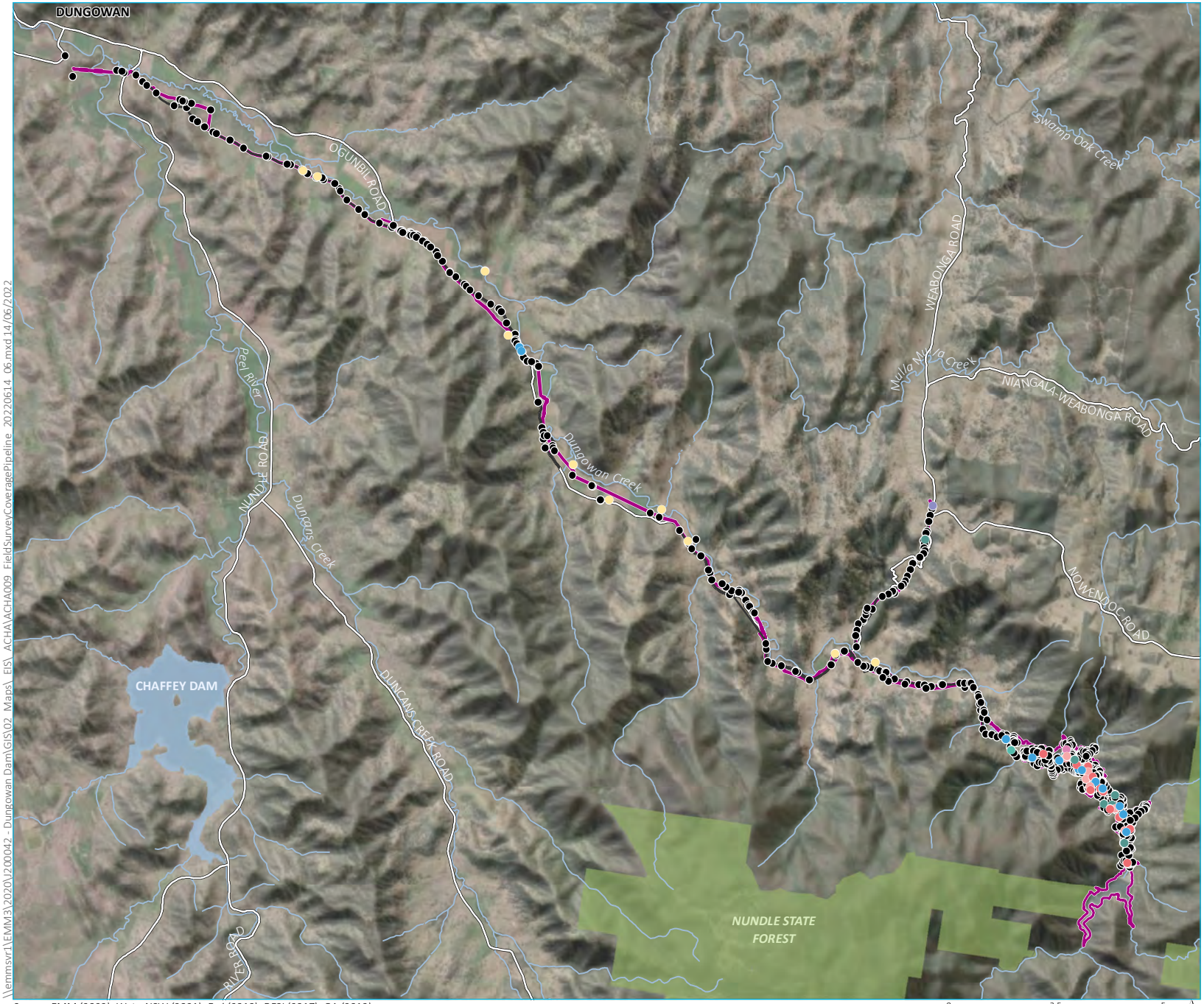
Existing environment

- Minor road
- Named watercourse
- State forest

Field survey transects - dam

Dungowan Dam and pipeline project
Aboriginal cultural heritage assessment
Figure 7.1a

EMM creating opportunities



KEY

- Project footprint
- Surveyed documentation point
- Survey tracks

Landform

- Alluvial plain
- Flood plain
- Hills
- Low hills
- Plain
- Plateau
- Rises
- Terrace

Existing environment

- Major road
- Named watercourse
- Named waterbody
- State forest

Source: EMM (2022); WaterNSW (2021); Esri (2019); DFSI (2017); GA (2013)

0 2.5 5 km

GDA 1994 MGA Zone 56

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Field survey transects - pipeline

Dungowan Dam and pipeline project
Aboriginal cultural heritage assessment
Figure 7.1b

EMM creating opportunities

7.2.3 Aboriginal sites identified

The field investigation identified 37 previously undocumented Aboriginal sites (Figure 7.2; Plate 7.9 – Plate 7.18; Annexure F.1 & F.2). Note, that due to the timing of specific activities, several cultural sites identified in Section 5.3were also documented as part of the field survey; where there is duplication, this is addressed in Chapter 8. Identified sites include: 14 artefact scatters, including six associated with areas of subsurface potential; 11 isolated artefacts, including three associated with areas of subsurface potential; five stone arrangements, with three of these identified as possible burial areas by Aboriginal participants and one associated with a potential culturally modified tree; four potential culturally modified trees; two sites of intangible cultural value identified by Aboriginal participants (Terrible Billy Creek and a wallaby trap – a natural depression considered suitable for hunting wallabies, see Section 5.3); one potential grinding groove site identified by Aboriginal participants.

As predicted by previous studies in the region, the majority of identified sites consisted of stone artefact materials (n=25, 68%). Most of the artefact scatters identified during the survey were small in size (<10 artefacts) and, along with isolated artefacts, were largely constrained to the alluvial terraces and lower slopes of the project footprint area. Occasionally these sites were found on the spurs and crest, but these areas were commonly within sight of the river's edge and usually exhibited little subsurface potential.

In the case of the non-artefactual sites, the potential culturally modified trees and burial sites are located on broad alluvial terraces associated with 4th order and above waterways (namely, Terrible Billy Creek and Dungowan Creek). The two stone arrangements identified were restricted to spurs, and the potential grinding groove site was located on the volcanic rock that forms the underlying geology of the streambed.

However, of the remaining sites, several are recommended for further specialist investigations (Chapter 11), since they exhibit limited evidence within the regional or local context, nor exhibit distinct archaeological characteristics. These include several of the potential burials, grinding groove and culturally modified trees. As outlined in Section 5.3, a number of the stone arrangements have limited contextual evidence to be burials, and may in fact be European features. Only one of the stone arrangements (DDSA3; identified during the cultural mapping), associated with a Creation Ancestor story, was considered to represent a cultural site. Similarly, despite extensive research, there is no documentary evidence of a drowned boy as identified in DDB1 in Table 7.3below, and which makes this site hard to robustly corroborate. In the case of grinding grooves, more commonly they are found in sandstone geology, which is not present within the project footprint; and are sparse across the New England region (Section 6.4). The identified culturally modified trees exhibited few definitive features (such as a symmetrical oval scar or tool marks) that would robustly determine their cultural origins. The age of the trees must also be questioned, with significant European modification of the region having occurred. Such sites are now commonly investigated by an arboriculturist with the Aboriginal stakeholders to further explore their identification. As such, these sites are not identified as 'cultural sites' (Section 5.3) and have all been assigned a 'tentative' identification, with recommendations for further investigation where they may be affected by the project.

Table 7.3 Aboriginal sites identified during the field survey.

Site name	Site type	Landform	Easting	Northing	Description	Site status
DDB1	Stone arrangement, possible burial	Alluvial terrace	[redacted]	[redacted]	A stone arrangement consisting of a large pile of stones (2 m (l) x 1.5 m (w) x 0.5 m (h)) on the river terrace adjacent (south) of Jones Oaky Creek. Donny Fermor (TLALC) recalled stories of a young Aboriginal boy drowned in the creek in early 1900s (potentially around 1930), and indicated the boy was buried nearby to Oaky Creek. It was implied that the stone arrangement could mark his burial, however no historical records have been found to support the death an Aboriginal child at Jones Oaky Creek, or Dungowan Creek more generally, at that time. This is further explored as part of the cultural mapping in Section 5.3.	Tentative –see Section 5.3
DDB2	Stone arrangement, possible burial	Alluvial terrace	[redacted]	[redacted]	A number of stone arrangements, identified as possible burials by RAP participants, on a very gently inclined terrace adjacent to the confluence of Terrible Billy Creek and Dungowan Creek. The site consists of at least four stone piles (generally no larger than 1.5 m (l) x 1.5 m (w) x 0.3 m (h), spaced irregularly in an approximate 30 m x 30 m area. Naturally occurring river rock “mounds” occur throughout the study area near the stream bank of Dungowan Creek. Notably, Donny Fermor (TLALC) identified a slight dip in the otherwise level terrace (NW-SE alignment) as part of the old road, which he said extended all the way to Niangala. This is further explored as part of the cultural mapping in Section 5.3.	Tentative
DDB3	Stone arrangement, possible burial	Alluvial terrace	[redacted]	[redacted]	Several stone arrangements and potential burial area identified by RAP participants. This site is situated on the northern side of Terrible Billy Creek and consists of roughly seven individual stone mounds comprised of local river rock on a small (170 m x 50 m) level terrace. An established kurrajong tree (*Brachychiton populneus*) is located on the terrace and was noted by Aaron Talbott (AT Gomilaroi Cultural Consultancy) as a likely food source and an important element of the site. Naturally occurring river rock “mounds” occur throughout the study area near the stream bank of Dungowan Creek.	Tentative –see Section 5.3

Table 7.3 Aboriginal sites identified during the field survey.

Site name	Site type	Landform	Easting	Northing	Description	Site status
DDCS1	Cultural site	Stream channel	[redacted]		Gender specific (male) cultural area associated with Terrible Billy Creek identified by RAP participants, associated with men's business (initiation specifically) and the Catfish Ancestor. Donny Fermor (TLALC) recalled mention of a bora ring located upstream, however this was not able to be located during the fieldwork, despite extensive investigations. RAP participants considered nearby surface artefacts on a localised hill (DDOS10, DDOS12 and DDIF9) as related to this site. While a definitive curtilage of the site could not be determined, it was indicated that the ceremonial business would primarily be conducted a substantial distance upstream, in the creek gorge. However, while the sites of significance are considered upstream and outside the project footprint, discussions with community have established that significant buffers, including gender restrictions, should be in place for the entire curtilage of Terrible Billy Creek and that its cultural value extends into the project area somewhat. This site was visited again during the cultural mapping fieldwork, and further expanded on as possibly a site of 'increase' rituals to promote fish populations in the creeks. This site is discussed in detail in Section 5.3.	Valid – see Section 5.3
DDCS2	Cultural site	Open depression	[redacted]		Natural landform feature identified by RAP participants as potentially used for hunting and trapping wallabies. The site comprises a low-lying area (70 m (w) x 110 m (l)) surrounded by higher ground. During discussions on site, the feature was compared to a well-known wallaby trap located in Gunnedah which may have influenced its identification here.	Tentative –see Section 5.3
DDGG1	Grinding grooves	Stream channel	[redacted]		Two potential grinding grooves identified by RAP participants, located on flat volcanic rock outcrop within the stream channel of Terrible Billy Creek. One groove is small (10 cm (l) x 6 cm (w) x 4 cm (d)), and is located on the flat rock platform. The other, located ~2 m north east, is located on a vertical ledge wall and comprises one vertical polished groove. The site is located on the northern edge of the stream channel of Terrible Billy Creek. RAP participants suggested that the grooves may have been used for sharpening spear tips or stakes. Both grooves are polished. The dimensions, form and bedrock material would be atypical for grinding grooves in the region, and may be modern damage associated with adjacent concreted weir.	Valid as cultural site

Table 7.3 Aboriginal sites identified during the field survey.

Site name	Site type	Landform	Easting	Northing	Description	Site status
DDIF1	Isolated find, PAD	Alluvial terrace	[redacted]		A light pink quartzite flake (3 cm (l) x 1.5 cm (w) x 1 cm (t)) on an alluvial terrace on the western side of Dungowan Creek. The artefact was visible on a small (~1 m^2) erosion scald in proximity to a (disused) access track. Two other artefact scatters, DDOS3 and DDOS4, were identified in the immediate area, on geotechnical scalds. Visibility outside the exposures was very poor, and it is considered that the sites are likely one site with a number of surface expressions. The alluvial terrace, an L shaped level to gently inclined landform abutting a moderately inclined localised hill, was identified as retaining subsurface archaeological potential. The artefact was considered to have eroded from surrounding soil profiles.	Valid
DDIF2	Isolated find, PAD	Alluvial terrace	[redacted]		A single flake (4 m (l) x 2.5 m (w) x 1 m (t)) on a narrow creek terrace on the western side of Dungowan Creek. The artefact was identified on a small geotechnical scald measuring 4 m (l) x 3 m (w). The artefact was considered to have been exposed during the geotechnical works and as such the alluvial terrace was identified as PAD. Donny Fermor (TLALC) identified the raw material as serpentine, a green microcrystalline material, and indicated that this material may have come from Niangala, located ~5 km to the north-east of the project area.	Valid
DDIF3	Isolated find, PAD	Alluvial terrace	[redacted]		A large smoky quartz flake (3.5 cm (l) x 2.5 cm (w) x 0.5 cm (t)) on an alluvial terrace on the eastern side of Dungowan Creek. The artefact was visible on an erosion scald near a paddock gate. RAP participants identified the material as not local to the area, and considered it likely to have come from Maules Creek over 150 km west. No other artefacts were identified in the immediate area, though visibility outside the exposures was very poor. The alluvial terrace, an L shaped level to gently inclined landform, outside the active flood zone and abutting a moderately inclined spur, was identified as retaining subsurface archaeological potential. The artefact was considered to have eroded from surrounding soil profiles.	Valid
DDIF4	Isolated find	Hillslope	[redacted]		A single flake (3 cm (l) x 2 cm (w) x 1.5 cm (t)) identified in the road verge of Dungowan Creek Road, adjacent to a ploughed field. Here, the landscape widens to broad alluvial floodplain between steep hills to the north and south. Proximity and context suggest that the artefact may be related to DDOS12, located ~350 m south east. The raw material is possibly what has been referred to as “cherty argillite”, which is poorly described in local literature.	Valid
DDIF5	Isolated find	Hillcrest	[redacted]		A light pink quartzite flake (4 cm (l) x 2.5 cm (w) x 1.5 cm (t)) near outcropping rock (schist) on spurcrest on the eastern side of Dungowan Creek. No substantial soil profile was identified in the area, where visibility was poor aside from exposures associated with outcropping rock, severely limiting the archaeological potential of the site.	Valid

Table 7.3 Aboriginal sites identified during the field survey.

Site name	Site type	Landform	Easting	Northing	Description	Site status
DDIF6	Isolated find	Steep slope	[redacted]		A large flake (4 cm (l) x 3 cm (w) x 1 cm (t)) identified on an erosion scar located on a steep slope of spurcrest. The erosion scar was likely a result of recent bushfires, which had burnt away much of the leaf litter in the area, resulting in high visibility. No additional artefacts were identified at this locale. The soil profile was restricted to a thin topsoil over heavily weathered schist bedrock, and as such it is unlikely the artefact had eroded from more extensive deposits; more likely the artefact has eroded from an uphill locale (outside the project area), and rolled down. The raw material, dark navy with fine silica, is possibly what has been referred to as "cherty argillite", which is poorly described in local literature.	Valid
DDIF7	Isolated find	Hillslope	[redacted]		A small dark red flake (2 cm (l) x 2.5 cm (w) x 0.5 cm (t)) identified on a large (approximately 20 m (l) x 15 m (w) m, 300 m^2) erosion scald on a level terrace on a hillslope. The erosion in this locale has likely been caused by vehicle movement, as it was used as an informal parking area at the time of survey. It is unclear if the hillslope has been artificially terraced; the abandoned dwelling nearby (~70 m south-west) suggests that the general area has been modified at some point in time for habitation. No additional artefacts were identified at this locale, and the exposed soil comprises a compacted hard-setting clay, suggesting the A horizon might be absent. As a result, it is considered unlikely that the isolated find is representative of a more extensive subsurface deposit. The raw material is likely locally sourced jasper, which is considered common in the region.	Valid
DDIF8	Isolated find	Hillslope	[redacted]		A light pink quartzite flake (2 cm (l) x 3 cm (w) x 0.5 cm (t)) identified on hillslope between two narrow, but relatively long, terraces on the eastern side of Dungowan Creek. The artefact was identified on a small (2 m^2) erosion scald, near a chain-link fence. It is possible the erosion scald is associated with the construction of the fence. No other artefacts were identified in the immediate area, though visibility outside the exposures was very poor. The archaeological potential of the area is unclear, but likely low given context; it is likely that higher archaeological potential is associated with the adjoining terraces and the artefact observed here is more incidental.	Valid

Table 7.3 Aboriginal sites identified during the field survey.

Site name	Site type	Landform	Easting	Northing	Description	Site status
DDIF9	Isolated find	Hillslope	[redacted]		A large flake (5 cm (l) x 4 cm (w) x 2 cm (t)) identified on a small (9 m^2) erosion scar on hillslope. The erosion is likely associated with downslope erosional processes. The soil profile in this locale was restricted to a thin topsoil over heavily weathered schist bedrock, and as such it is unlikely the artefact had eroded from more extensive deposits on the hillslope. Proximity and context suggest that the artefact may be related to DDOS11, which is located uphill on the hillcrest (~70 m north). The raw material is white silcrete, with red discolouration towards the cortex.	Valid
DDIF10	Isolated find	Hillslope	[redacted]		A large flake (5.5 cm(l) x 4.5 cm (w) x 1 (t) cm) identified on an animal track leading up a hillslope. Visibility in this locale was extremely poor due to dense leaf litter coverage, including along the track, with little to no soil exposure. The raw material, dark navy with fine silica, is possibly what has been referred to as “cherty argillite”, which is poorly described in local literature. Alternatively, it may represent a darker variety of serpentine, a green microcrystalline material that RAPs identified as regionally sourced.	Valid
DDIF11	Isolated find, PAD	Hillslope	[redacted]		A single flake (4 cm (l) x 3 cm (w) x 0.5 cm (t)) on a patchy erosion scar (9 m^2) beside sealed road near the gate to a machinery shed. The erosion in this locale is likely associated with vehicle movement near the gate, and visibility was considered moderate to poor due to patchy grass coverage. Soil exposures suggested a soil profile comprising an alluvial silty clay of indeterminate depth, and as a result the area is considered to retain an indeterminate level archaeological potential. However, the area is likely been disturbed to an unknown degree from the construction of a house and sheds nearby.	Valid

Table 7.3 Aboriginal sites identified during the field survey.

Site name	Site type	Landform	Easting	Northing	Description	Site status
DDOS1	Artefact scatter, PAD	Alluvial terrace	[redacted]		Two artefacts identified on a broad alluvial terrace on the western side of Dungowan Creek. The artefact was identified on a narrow geotechnical scald (10 m (l) x 2 m (w)). Here, the alluvial terrace is a level to gently inclined landform, outside the active flood zone and abutting a moderately inclined spur – modified and terraced for a now disused house and outbuildings – was identified as retaining subsurface archaeological potential. The artefact was considered to have been exposed during the geotechnical works associated with the project (and monitored by an archaeologist and RAP), which supports the potential for further subsurface artefactual materials. The artefacts comprised a single dark red jasper flake (3 cm (l) x 2 cm (w) x 1 cm (t)) and a hoof core (4 cm (l) x 3.5 cm (w) x 2 cm (t)). Regarding the hoof core, the raw material is navy in colour with fine silica, and is possibly "cherty argillite" as identified in the locale literature. The site is on the same landform as DDOS2, within ~70 m, and the two sites are likely to be two expressions of the same subsurface archaeological deposit.	Valid
DDOS2	Artefact scatter, PAD	Alluvial terrace	[redacted]		Two artefacts, likely one artefact that has been snapped during post deposition, identified on a broad alluvial terrace on the western side of Dungowan Creek. The artefact was identified on a narrow geotechnical scald (7 m (l) x 3 m (w)). The artefact was considered to have been exposed during the geotechnical works, and as such the alluvial terrace was identified as retaining subsurface archaeological potential. The artefacts comprise two mottled grey and pale red chalcedony flakes (4 cm (l) x 2 cm (w) x 1 cm (t); and 1 cm (l) x 0.5 cm (w) x <0.5 cm (t)). Due to the distinctive raw material comprising both artefacts and potential refit observed on site, it is likely that the artefacts represent one broken artefact. The site is on the same landform as DDOS1, within ~70 m, and the two sites are likely to be two surface expressions of the same subsurface archaeological deposit.	Valid

Table 7.3 Aboriginal sites identified during the field survey.

Site name	Site type	Landform	Easting	Northing	Description	Site status
DDOS3	Artefact scatter, PAD	Alluvial terrace	[redacted]		Five artefacts identified on an alluvial terrace on the western side of Dungowan Creek, adjacent to a steep spurline to the south. The artefacts were identified in an area of patchy grass growth (15 m^2); visibility in the exposure was considered moderate. The alluvial terrace, an L shaped level to gently inclined landform abutting a moderately inclined localised hill, was identified as retaining subsurface archaeological potential. The artefacts were considered to have eroded from surrounding soil profiles. Four flakes (maximum length 4 cm, 4 cm, 2 cm, and 1.5 cm) and one possible core (maximum length 16 cm) were identified. Four raw material types were identified, namely dark red jasper (n=2), a mottled grey and pale red chalcedony (n=1), pale green serpentine (n=1), and a navy material with fine silica (n=1; possibly "cherty argillite" as identified in the locale literature). An isolated artefact (DDIF1) and an artefact scatter (DDOS4) were identified in the immediate area, on a (disused) access track and a geotechnical scald, respectively. Visibility outside the exposures was very poor, and it is considered that the sites are likely one site with a number of surface expressions.	Valid
DDOS4	Artefact scatter, PAD	Alluvial terrace	[redacted]		Three artefacts identified on an alluvial terrace on the western side of Dungowan Creek, adjacent to a steep spurline to the south. The artefacts were identified on a geotechnical scald (7 m (l) x 4 m (w)). The artefact was considered to have been exposed during the geotechnical works, and as such the alluvial terrace was identified as PAD. A core (maximum length 4.5 cm) and two flakes (maximum length 6 cm and 2 cm) were identified. Two raw material types were identified, namely pale green serpentine (n=1), and a navy material with fine silica (n=2; possibly "cherty argillite" as identified in the locale literature). An isolated artefact (DDIF1) and an artefact scatter (DDOS3) were identified In the immediate area, on a (disused) access track and an erosion scald, respectively. Visibility outside the exposures was very poor, and it is considered that the sites are likely one site with a number of surface expressions.	Valid

Table 7.3 Aboriginal sites identified during the field survey.

Site name	Site type	Landform	Easting	Northing	Description	Site status
DDOS5	Artefact scatter	Hillslope / Disturbed	[redacted]		Three flakes identified by RAP participants on dam spoil. The dam located on gentle slope moving away from Dungowan Creek, abutting a steep spurline to the north. The artefacts are considered to have been exposed during the construction of the dam, and were identified in a small area (2 m (l) x 2 m (w)) on the edge of the dam. Two artefacts were a navy material with fine silica (maximum length 4 cm and 3 cm), possibly identified in local literature as "cherty argillite". The raw material of the remaining flake (maximum length 5 cm) could not be positively identified in the field. Subsequent analysis and comparison with other artefacts across the site would suggest the material is either a pale green serpentine, or a pale colour variant of "cherty argillite". Of note, this locale is considered highly disturbed due to the construction of the dam, and the "artefacts" identified may constitute local raw material that has shattered during construction of the dam. If cultural, given the proximity to DDOS6 (~80 m south-east) it is likely these two sites are related; however, general disturbance associated with pastoral activities and water management in this area has reduced the perceived archaeological potential.	Valid
DDOS6	Artefact scatter	Hillslope	[redacted]		Three artefacts identified on geotechnical scar. Here, the landscape forms a gentle slope that moves away from Dungowan Creek, abutting a steep spurline to the north. The artefacts were identified on a geotechnical scald (7 m (l) x 4 m (w)); visibility outside the scald was extremely poor. Three flakes were identified, namely a pale green serpentine flake (maximum length 2 cm), a banded dark red jasper flake (maximum length 2.5 cm), and a blue grey chert flake (maximum length 3 cm). Given the proximity to DDOS5 (~80 m north-west), it is likely these two sites are related. The artefacts were considered to have been exposed during the geotechnical works; however, general disturbance associated with pastoral activities and water management in this area has reduced the perceived archaeological potential.	Valid

Table 7.3 Aboriginal sites identified during the field survey.

Site name	Site type	Landform	Easting	Northing	Description	Site status
DDOS7	Artefact scatter, PAD	Hillslope	[redacted]		Four artefacts identified on an erosion scald below a tree, on a moderate slope abutting a broad alluvial terrace on the northern side of where Terrible Billy Creek meets Dungowan Creek. The artefact scatter comprises three banded dark red jasper flakes (maximum length 6 cm, 3 cm, and 2 cm) and a white fine grained silcrete proximal blade (maximum length 3 cm). The artefacts were identified over a patchy exposure (20 m (l) x 4 m (w)) on either side of a mature tree. The soil profile in this locale was restricted to a thin topsoil over heavily weathered schist bedrock, and as such the subsurface potential on the slope is considered low. However, the adjacent alluvial terrace, a broad S shaped level to gently inclined landform, above the active flood zone and abutting the moderately inclined spur on which the artefacts were identified, was identified as retaining subsurface archaeological potential.	Valid
DDOS8	Artefact scatter	Hillslope	[redacted]		Four artefacts identified across a long but narrow area (20 m (l) x 2 m (w)) on a hillslope and vehicle track. The hillslope and track are located on the southern edge of a narrow, but relatively long, alluvial terrace on the eastern side of Dungowan Creek. The artefacts were visible in an area of patchy exposure likely associated with downslope erosion. Four flakes (maximum length 5 cm, 5 cm, 2 cm, and 1.5 cm) comprise the artefact scatter. Raw materials include blue grey chert (n=2), mottled grey and red chalcedony (n=1), and dark red jasper (n=1). The soil profile in this locale was restricted to a thin topsoil over heavily weathered schist bedrock, and as such the subsurface potential on the slope is considered low.	Valid
DDOS9	Artefact scatter	Hillslope	[redacted]		Two flakes identified on vehicle track that runs along a hillslope abutting Dungowan Creek on the eastern side. The artefacts were identified in a small, exposed area (4m^2), where visibility was considered low-moderate due to leaf litter. The access track is informal and not cut into the hillslope; it is likely the artefacts eroded due to vehicle movement or are associated with downslope erosional processes. The artefacts comprise one green serpentine flake (maximum length 1 cm) and one mottled grey and red chalcedony flake (maximum length 2 cm).	Valid

Table 7.3 Aboriginal sites identified during the field survey.

Site name	Site type	Landform	Easting	Northing	Description	Site status
DDOS10	Artefact scatter	Hillslope	[redacted]		Four artefacts identified on a natural erosion scar on hillslope south of Terrible Billy Creek. The eroded area is moderately sized (8 m x 8 m), and likely a result of natural downslope erosion. The soil profile in this locale is likely restricted to a thin clayey topsoil over weathered schist bedrock; outcropping bedrock was observed on other areas of the hillslope. The artefacts identified comprise three flaked pieces (maximum length 3 cm, 3 cm, and 2.5 cm) and one possible core (maximum length 6 cm), of unidentified volcanic (n=3) and dark red jasper (n=1). This site is likely related to DDOS11, which is located on the crest of the hill (~90 m south-east); that is, DDOS10 could represent an eroded portion of DDOS11.	Valid
DDOS11	Artefact scatter, PAD	Hillslope	[redacted]		A large open artefact scatter identified on the crest of localised hill just south of Terrible Billy Creek. The artefacts were identified within a large (16 m x 20 m) natural erosion scar; outside the eroded areas, visibility was considered very poor due to thick grass cover. The artefacts appeared to be eroding from the thin clayey topsoil present on the crest of the hill; outcropping bedrock, a weathered schist, was observed at various points on the hill and hillslope indicating a shallow soil profile, and reducing the archaeological potential of the locale. Some 50 artefacts, largely flakes of various sizes, were identified during the survey. No tools were identified in the assemblage at the time of survey. Raw materials identified include (but are not limited to) dark red and brown jasper, pale green serpentine, and mottled red and white chalcedony. This site was highlighted by RAP participants as an area of high cultural significance, and site officers present considered it a knapping floor. Aaron Talbott (AT Gomilaroi Cultural Consultancy) hypothesized that this locale, an elevated area with panoramic views of the creek valley, was holding area for young male initiates, as they waited for male elders to call for them for ceremony further upstream of Terrible Billy Creek.	Valid
DDOS12	Artefact scatter	Hillslope	[redacted]		Three artefacts identified in a ploughed field, on a gently inclined alluvial plain. The artefacts were considered to have been brought to the surface as a result of (recent and/or historic) ploughing; the extensive disturbance in this area has severely reduced the archaeological potential of the site. The artefacts identified include one flake (maximum length 2.5 cm) and two potential cores (maximum length 9 cm and 8 cm); specific raw material type could not be positively identified in the field, outside a general siliceous class.	Valid

Table 7.3 Aboriginal sites identified during the field survey.

Site name	Site type	Landform	Easting	Northing	Description	Site status
DDOS13	Artefact scatter	Alluvial terrace	[redacted]		A low-density artefact scatter identified on a ploughed floodplain on the western side of Dungowan Creek. The artefacts were considered to have been brought to the surface as a result of (recent) ploughing; the extensive disturbance in this area has severely reduced the archaeological potential of the site. Thirty-six artefacts were identified across an area approximately 300 x100 m; visibility was generally good in this locale, as the paddock had been recently turned. Raw material types identified include jasper, dark chert, and red mudstone. It is likely that the artefact scatter extends beyond the area identified during the survey, and have moved over time as the area has been worked over, however these areas lay outside the project footprint and were not thoroughly inspected.	Valid
DDOS14	Artefact scatter	Alluvial terrace	[redacted]		A low-density artefact scatter identified on a ploughed floodplain south of Dungowan Dam Road. The artefacts were considered to have been brought to the surface as a result of (recent) ploughing; the extensive disturbance in this area has severely reduced the archaeological potential of the site. Thirteen artefacts were identified across an area approximately 150 x 30 m, and comprised a number of jasper, dark chert, and pale green serpentine flakes. It is likely that the artefact scatter extends beyond the area identified during the survey, and have moved over time as the area has been worked over, however these areas lay outside the project footprint and were not thoroughly inspected.	Valid
DDSA1	Stone arrangement	Hillcrest	[redacted]		A stone arrangement consisting of a loosely arranged pile of stones (approximately 1.3 m (l) x 1.2 m (w) x 0.3 m (h)) on saddle between two hillcrests. The elevation of the site offers good views of the Dungowan Creek valley, particularly when facing north west. Donny Fermor (TLALC) speculated this site to be a potential burial, however a lack of material evidence and disagreement of the identification by other Aboriginal participants resulted in its tentative classification as a stone arrangement. Further recommendations are made in the ACHA to further resolve the site's uncertain characteristics, and any potential burials.	Tentative
DDSA2	Stone arrangement, culturally modified tree	Hillcrest	[redacted]		A stone arrangement consisting of a pile of stones (approximately 1.4 m (l) x 1.2 m (w) x 0.3 m (h)) on top of a hillcrest overlooking Dungowan Creek. A slight rise in soil height was noted underneath the stone arrangement. This locale offers a good 180° view of the creek valley. A potential scar tree was also identified 30 m east of the stone arrangement. The scar tree features a single scar (90 cm (l) x 25 cm (w) x <10 cm (d)) on a living mature *Eucalyptus sp.* tree, on the east-facing side of tree. As the scar extends to the base of the tree, this scar may be reflective of natural limb tear.	Tentative

Table 7.3 Aboriginal sites identified during the field survey.

Site name	Site type	Landform	Easting	Northing	Description	Site status
DDST1	Culturally modified tree	Alluvial terrace	[redacted]		A potential culturally modified tree, ~5 m on the south side of Dungowan Dam Road along the alignment for the pipeline. The tree features a single scar (178 cm (l) x 20 cm (w) x 24 cm (d)), situated ~40 cm from the base of the living mature *Eucalyptus sp.* tree, on the east-facing side. Significant regrowth was observed around the scar. During discussions on site, RAP participants believed the bark was possibly removed for a burial shroud, a coolamon (container) or even a canoe.	Valid as cultural site
DDST2	Culturally modified tree	Alluvial terrace	[redacted]		A potential culturally modified tree, ~25 m on the south side of Ogunbil Road along the alignment for the pipeline, near an established fenceline. The tree features a single scar (103 cm (l) x 65 cm (w) x 7 cm (d)) situated 89 cm from the base of a mature but dead *Eucalyptus sp.* tree, and has been damaged by steel axe at some point in the post-colonial period. Observations indicate some regrowth occurred around the cultural scar prior to the death of the tree.	Valid as cultural site
DDST3	Culturally modified tree	Alluvial terrace	[redacted]		A potential culturally modified tree identified by a RAP participant, on south bank of Terrible Billy Creek. The tree features a single scar (20 cm (l) x 6 cm (w) x <1 cm (d)) situated ~10 cm from the base of a living mature *Casuarina sp.* tree. The scar is unusually small, and on a very low position. Aaron Talbott (AT Gomilaroi Cultural Consultancy) believed scar was a result of crafting a bullroarer, a musical instrument used during initiation ceremonies and other rituals to ward off evil spirits. In this cultural context, Aaron considered the site linked with DDOS11, DDB3 and DDCS1.	Tentative
DDST4	Culturally modified tree	Hillslope	[redacted]		A potential culturally modified tree identified by a RAP participant in the road easement of Weabonga Road, as part of the power easement investigations. The tree features a single scar (20 cm (l) x 20 cm (w) x <10 cm (d)) situated ~1 m from the base of a living mature *Eucalyptus sp.* tree.	Tentative

Notes: All coordinates are presented in MGA Area 56 and reflect the centroid point of the site in question.

Plate 7.9 Example of artefacts identified on a geotechnical scar (DDOS6), view north west.

Plate 7.10 Possible historic (early 20th century) burial of Aboriginal boy (DDB1), view north.

Plate 7.11 RAP site officers at Terrible Billy Creek (DDCS1), view north east.

Plate 7.12 White silcrete flake identified on erosion scald (DDIF3).

Plate 7.13 Chalcedony flakes identified on geotechnical scar (DDOS2).

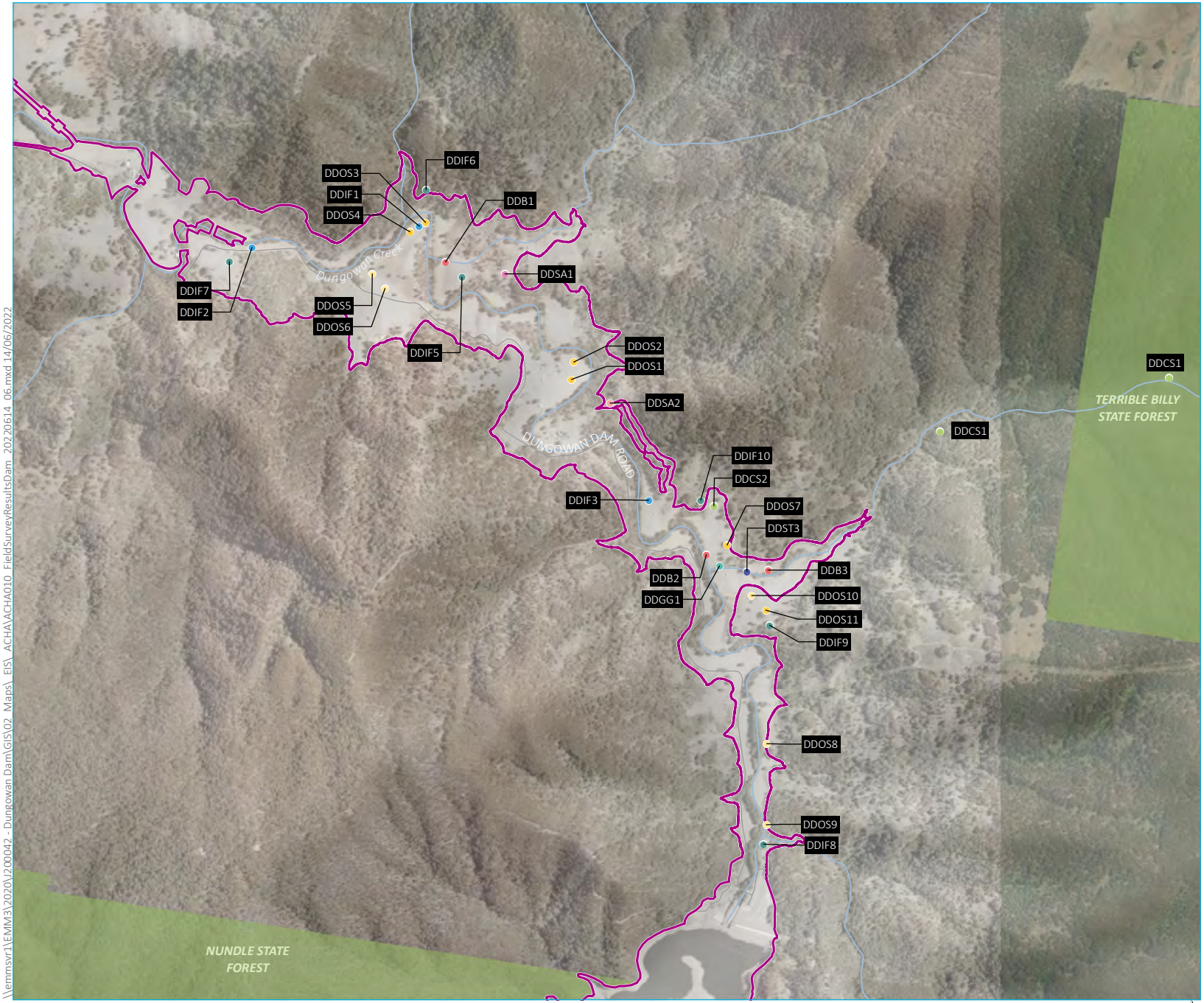
Plate 7.14 Sample of flakes identified on erosion scald near Terrible Billy Creek (DDOS11).

Plate 7.15 Extent of erosion scald at DDOS11, view south east.

Plate 7.16 Stone arrangement (DDSA1), view north west.

Plate 7.17 Potential scar tree on Dungowan Dam Road verge (DDST1).

Plate 7.18 Potential scar tree at DDSA2, view west.



KEY

- Project footprint

Identified Aboriginal sites

- Artefact scatter
- Artefact scatter, PAD
- Cultural site
- Grinding grooves
- Isolated find
- Isolated find, PAD
- Modified tree
- Stone arrangement
- Stone arrangement, modified tree
- Stone arrangement, possible burial

Existing environment

- Minor road
- Named watercourse
- State forest

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Source: EMM (2022); WaterNSW (2021); Esri (2019); Metromap (2019); DFSI (2017); GA (2013)

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GDA 1994 MGA Zone 56

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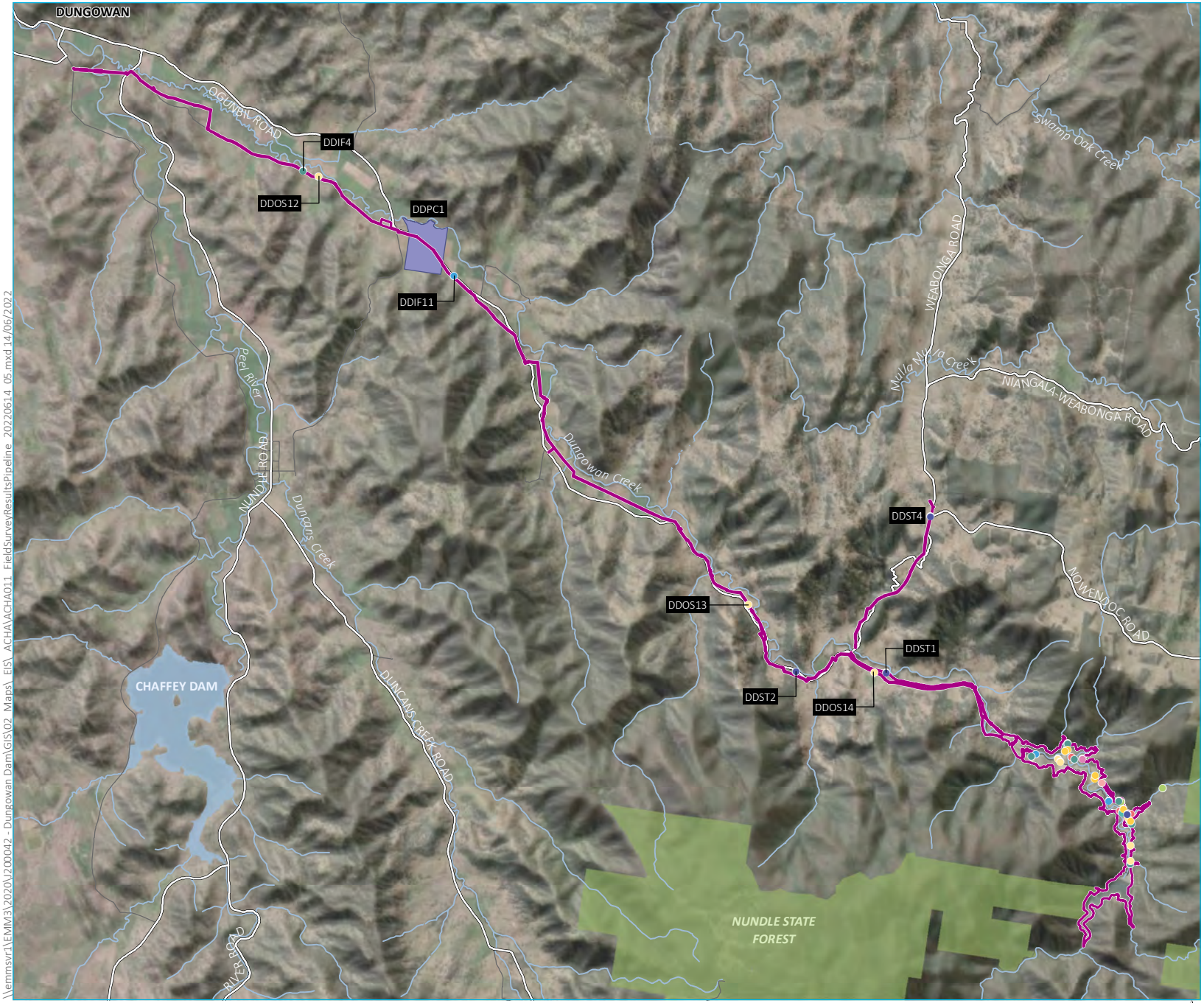
Identified Aboriginal sites - dam

Dungowan Dam and pipeline project
Aboriginal cultural heritage assessment
Figure 7.2a

EMM creating opportunities



KEY

- Project footprint

Identified Aboriginal sites

- Artefact scatter
- Artefact scatter, PAD
- Cultural site
- Grinding grooves
- Isolated find
- Isolated find, PAD
- Modified tree
- Stone arrangement
- Stone arrangement, modified tree
- Stone arrangement, possible burial
- Post contact site

Existing environment

- Major road
- Minor road
- Named watercourse
- Named waterbody
- State forest

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Source: EMM (2022); WaterNSW (2021); Esri (2019); DFSI (2017); GA (2013)

Identified Aboriginal sites - pipeline

Dungowan Dam and pipeline project
Aboriginal cultural heritage assessment
Figure 7.2b

EMM creating opportunities

7.3 Test excavations

7.3.1 Approach and methods

EMM conducted an archaeological test excavation of the project footprint, with the assistance of RAPs over a six-week period (14 August to 11 September 2020). These works were undertaken in accordance with the *Code of Practice for the Archaeological Investigation of Aboriginal Objects in NSW* (DECCW 2010), and consisted of small manually dug test pits in transects across the project area. The excavation was directed by Georgia Burnett (EMM archaeologist), with the archaeological team consisting of Taylar Reid, Morgan Wilcox, Bonnie Jo Clark, Callan Douchkov, Kyle Mercer and Neenah Gray (EMM archaeologists). Field support was provided by Brady Porter (Indigeco). A number of stakeholder groups were represented throughout the course of the excavation program; a list of groups present during the test excavations is presented in Table 7.4.

The primary aims of the excavations were to:

- Identify, map and characterise the nature, age, extent, integrity and significance of the Aboriginal cultural material within the project area.
- Collect data to answer the following research questions:
    - What are the environmental characteristics associated with the distribution of Aboriginal cultural heritage within the project area?
    - Can the formative processes of the stratigraphic profile provide information on the nature and/or survivability of the archaeological resources?
    - Are there other key factors in the distribution and extent of the material culture within the project area (eg how the dam has affected these deposits)?
    - What are the cultural, social and public values associated with the Aboriginal archaeological resource within the project area?
    - How should the Aboriginal sites in the region be conserved and managed in future?
- Better assess the significance and historical meaning of the cultural materials that exist within the project area so that future archaeological investigation can advance our understanding of past Aboriginal cultural behaviour and environmental adaptation.
- Direct future heritage activities and mitigation measures (if required) for the project footprint.

To achieve these aims, a systematic grid of test pits was proposed to extend across the project footprint. These works focussed on the dam footprint and inundation area. These initially encompassed all landform types and areas within the project footprint, but following the field survey, input from Heritage NSW, and subsequent access issues (associated primarily with an inability to get to the east side of Dungowan Creek following rain; and cultural sensitivities around Terrible Billy Creek), the grid was modified (Figure 7.3); and ultimately focussed primarily on the second terrace unit on the western side of the creek. The modifications to the test excavation program occurred throughout April to August 2020, and were undertaken in discussion with the RAPs and Heritage NSW. Ultimately, the excavations consisted of a series of regularly spaced transects (typically 30-60 m) across the project footprint.

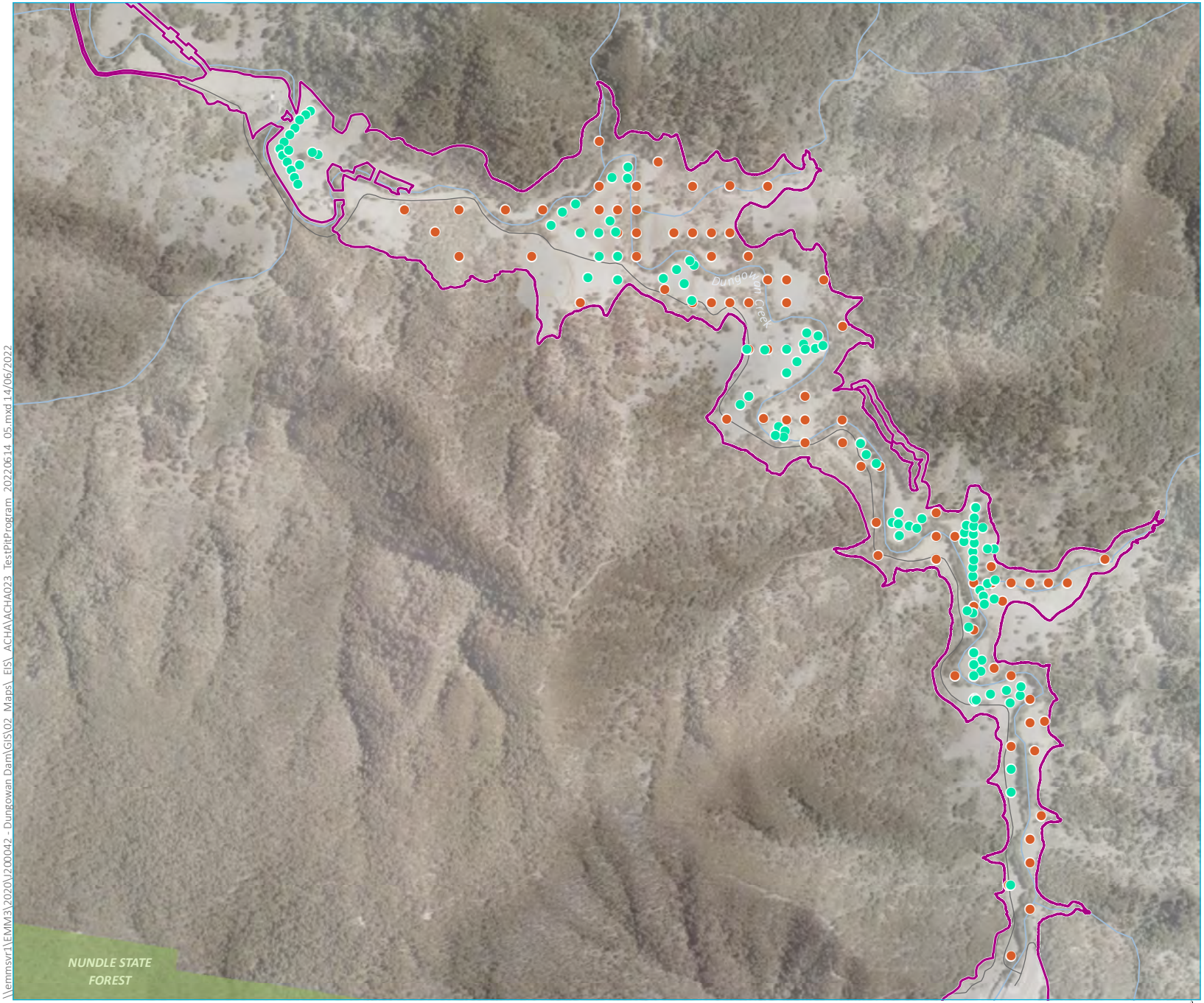
Archaeological test excavations were implemented in accordance with Requirements 16 and 17 of the *Code of Practice for the Investigation of Aboriginal Objects in NSW* (DECCW 2010). In summary, the following methods were adopted for the excavation:

- all test excavation pits were spatially located using a differential GPS device;

- manual excavation of 1 m² test pits (dug as four contiguous 0.25 m^2 quadrants) in a systematic grid across areas of archaeological interest within the impact footprint;
- additional test pits were excavated in areas where dense concentrations of artefacts were recovered, in order to identify the extent of high density deposits;
- all excavation used hand tools, such as shovels, mattocks and trowels;
- excavation of the first unit was in 5 cm spits, with subsequent excavation in 10 cm spits;
- manual excavation continued to either: i) the base of the cultural deposits; ii) to the depth of the underlying geology; or iii) to the maximum depth possible via hand excavation (~1-1.5 m);
- wet sieving of all manually excavated material through a 5 mm sieve;
- soil profiles were recorded in accordance with the Code of Practice, including scaled drawings, photographs, and written descriptions; and
- soil samples were collected for description, sedimentological and chronological analysis where such analysis was considered likely to contribute significant information.

Table 7.4 Aboriginal representatives involved in the test excavation.

Organisation	Representative
AT Gomilaroi Cultural Consultancy	Aaron Talbott Josh Talbott
Corroboree Aboriginal Corporation	Paul Boyd Steve Johnson
DFTV Enterprises	Sue Cutmore
Galamaay Cultural Consultants	Robert Slater Emily Slater
Huckada Dreamin Heritage Group	Richard Slater Michelle Fermor
Hunters and Collectors	Brodie Matthews
Nunawanna Aboriginal Corporation	Colin Ahoy Josh Talbott
Tamworth Local Aboriginal Land Council	Christopher 'Donny' Fermor Michelle Fermor Edward Fermor
The Gomeroi People	Steve Talbott Alan Talbott
Wattaka Cultural Service	Alan Talbott
Wurrumay Pty Ltd	Brianna Slater



KEY

- Project footprint
- Initial test pit grid (proposed May 2020)
- Altered test pit transects (altered in the field, Aug - Sept 2020)

Existing environment

- Minor road
- Named watercourse
- State forest

Source: EMM (2022); WaterNSW (2021); Metromap (2019); DFSI (2017); GA (2013)

0 250 500 m

GDA 1994 MGA Zone 56

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Test pit program

Dungowan Dam and pipeline project
Aboriginal cultural heritage assessment
Figure 7.3

EMM
creating opportunities

7.3.2 Results

This section provides a summary of the excavations and subsequent analysis (Table 7.5; Figure 7.4 – Figure 8.1), with further detail provided in Annexure F. This includes a full photographic catalogue of the excavated test pits (Annexure F.3), section drawings (Annexure F.4), sedimentological analysis (Annexure F.5), optically-stimulated luminescence (OSL) dating and analysis (Annexure F.6), and detailed lithic catalogue and analysis (Annexure F.7 and F.8). A summary of the stratigraphy, chronology, sedimentology and artefact information from the excavations is provided below.

Overall, some 105 1 m^2 test pits (Table 7.5 – equivalent to 420 0.25 m^2 test pits) were excavated across the terraces and slopes surrounding Dungowan Creek (Figure 7.4; Annexure F). These averaged depths of ~45 cm, but with several extending to 1 m below the surface. When excluding test pits on shallow slope profiles, the average depth within the alluvial landforms was ~56 cm. A total of 446 spits were excavated, from which 40.08 m^3 of sediment was recovered and wet-sieved. Spatially, these test pits were predominantly on alluvial terraces (n=71, 68%), with some exploration of hill slopes (n=21, 20%) and crests (n=13, 12%).

The excavations and subsequent analysis confirmed that the terraces probably formed through alluvial processes, and that they began forming ~10 ka. This was a period of climatic amelioration when increased water down the creek system would have resulted in flooding and the formation of a floodplain, now represented by the second terrace. The soil profile continued to form through either subsequent flooding events and/or pedogenesis of the alluvium, with numerous ages found between ~3.5 ka and 6 ka in the upper soil profile. The upper part of the second terrace could not be directly dated, but interpolation with available ages suggests an age ~2 ka for the current surface. Following this period, Dungowan Creek appears to have begun incising into this former floodplain, and resulted in the current creek alignment and associated lower (or first) terrace. This similarly could be associated with major climatic events such as the Medieval Climatic Anomaly and/or Little Ice Age, but could also relate to changing hydrological conditions with the establishment of the existing Dungowan Dam in the 1950s.

Eighty-two of the test pits (78%) contained artefacts, and overall an average density of 15.8/m^2 was found across the project footprint. This value can be considered to reflect a background scatter indicative of the base-line levels for the past ephemeral use of the valley system over the last 6 ka or so years. This value is slightly elevated by a handful of test pits with significant cultural material, and a value <10/m^2 may be more accurate for much of the project footprint. A number of test pits (n=12, 11%) were found to contain >30 artefacts/m^2, a density that is considered to reflect specific activity zones or past foci of activity in contrast to the broader background scatter. These high densities of artefacts were found entirely within 69 m of the creek's edge- and commonly <50 m – with few cultural materials found greater distances than this. These foci are frequently small, <2,800 m^2 (<60 m x 60 m), based on their distribution across the test pit grid, but in some areas can extend 350 m in length along the river's edge. Of note, was the presence of extremely high densities of artefacts (272/m^2) at test pit 12, and which was associated with a former residence of one of the key knowledge-holders nearby – perhaps suggesting a continuation of Aboriginal occupation in this area well before, and through the post-contact period (Section 5.3).

Cultural material was recovered from all excavated depths, but significantly dropped below 60 cm. The majority of the assemblage was recovered between 10 cm and 60 cm below surface, with peaks at both 10-20 cm and 40-50 cm below surface. Analysis of the cultural assemblage suggests that these may reflect two main phases of use in the past dating to between ~3.5-5 ka (and potentially slightly earlier), and <3 ka. Characteristics of the assemblage suggest the focus was on the exploitation and initial preparation of the local jasper raw material extracted from the Dungowan Creek. This was initially collected as part of brief foraging activities into the valley, and then as part of longer residence times along the creek in the most recent period.

Table 7.5 Summary of excavated test pits.

Test pit #	Easting	Northing	Distance from Dungowan Creek (m)	Depth of test pit (cm below surface)	Number of artefacts (n)
TP3	343896.116	6526199.876	80	30	0
TP7	343898.236	6526533	61	50	2
TP8	343897.248	6526616.304	56	50	3
TP12	343767.5517	6526865.992	54	70	272
TP12A	343767.5711	6526870.413	50	70	22
TP12B	343763.5422	6526865.592	56	70	15
TP12C	343767.5311	6526861.655	58	50	8
TP12D	343771.5715	6526865.711	53	70	15
TP13	343929.4044	6526882.563	37	25	18
TP14	343822.8568	6526886.64	34	50	31
TP15	343763.201	6526951.619	28	50	0
TP17	343880.4396	6526899.58	37	70	0
TP18	343763.43	6527035.167	24	50	6
TP19	343745.5772	6527125.875	54	50	14
TP20	343740.7058	6527186.275	36	50	0
TP22	343786.1787	6527260.624	33	50	3
TP23	343840.108	6527295.076	94	20	0
TP29	343763.103	6527369.25	42	50	3
TP32	343495.701	6527456.142	48	50	5
TP34	343728.4721	6527434.981	40	30	1
TP35	343494.257	6527537.1	57	50	26
TP38	343412.6478	6527713.746	16	40	2
TP41	343357.815	6527786.813	31	50	41
TP45	342956.641	6527955.791	53	50	0
TP47	343090.987	6528039.794	53	40	16
TP48	342949.264	6528123.152	137	20	0
TP49	343013.886	6528121.497	106	20	0
TP50	343091.081	6528123.502	103	30	12
TP51	343158.534	6528123.354	74	40	7
TP54	342751.33	6528299.24	119	10	0
TP55	342649.003	6528379.505	47	50	10

Table 7.5 Summary of excavated test pits.

Test pit #	Easting	Northing	Distance from Dungowan Creek (m)	Depth of test pit (cm below surface)	Number of artefacts (n)
TP56	342697.6665	6528411.214	51	100	20
TP57	342743.6959	6528441.624	23	50	23
TP59	342485.704	6528374.511	92	20	1
TP63	342418.475	6528458.196	121	50	39
TP64	342485.836	6528458.267	56	25	27
TP67	342351.286	6528541.956	131	20	3
TP68	342418.286	6528541.932	117	30	0
TP69	342478.6517	6528545.153	56	10	0
TP77	342520.129	6528738.111	15	30	33
TP78	342457.7585	6528586.499	76	20	0
TP80	342522.8644	6528778.821	16	55	30
TP90	342246.8459	6528569.203	41	40	68
TP93	342758.9547	6528427.568	18	20	13
TP94	343770.482	6527557.067	145	40	1
TP97	342925.6463	6527926.447	71	20	16
TP100	342378.402	6528381.16	183	40	5
TP101	342464.3982	6528739.808	39	100	28
TP102	342286.5403	6528618.62	42	50	1
TP103	342334.5352	6528647.003	26	50	0
TP104	342723.5664	6528358.829	88	20	4
TP105	343152.4011	6528142.556	87	100	73
TP106	343164.8895	6528182.32	55	50	18
TP107	343205.8573	6528172.848	33	50	0
TP108	343194.0799	6528129.652	44	50	6
TP109	343222.7392	6528137.887	19	50	5
TP110	343128.4876	6528080.447	66	50	36
TP111	343377.2434	6527746.165	41	50	1
TP112	343063.218	6527845.89	57	30	13
TP113	343087.3157	6527831.705	62	30	5
TP114	343081.5414	6527808.73	38	50	5
TP115	343050.8662	6527815.093	28	50	3

Table 7.5 Summary of excavated test pits.

Test pit #	Easting	Northing	Distance from Dungowan Creek (m)	Depth of test pit (cm below surface)	Number of artefacts (n)
TP116	343933.559	6526913.511	48	50	0
TP117	343893.6205	6526855.551	40	20	19
TP118	343761.0609	6527178.401	24	50	10
TP119	343470.823	6527502.07	36	50	6
TP120	343492.7089	6527498.603	58	50	39
TP121	343531.7783	6527489.65	55	30	6
TP122	343558.3955	6527482.621	32	30	2
TP123	343577.627	6527515.395	45	20	0
TP124	343737.0591	6527492.217	75	25	11
TP125	343729.4393	6527465.002	54	40	12
TP126	343761.1571	6527398	53	35	18
TP127	343765.9501	6527427.089	70	35	30
TP128	343761.7573	6527459.344	81	40	11
TP129	343763.4048	6527489.188	95	30	28
TP130	343765.3073	6527518.83	114	35	29
TP131	343796.243	6527483.997	123	20	0
TP132	343837.1832	6527407.507	125	15	1
TP133	343813.7339	6527406.728	104	20	1
TP134	343760.0749	6527340.517	27	50	8
TP135	343759.9804	6527311.165	20	20	0
TP136	343812.3853	6527284.082	64	50	1
TP137	343797.1316	6527238.632	38	50	0
TP138	343801.3774	6527209.956	27	80	160
TP140	343836.7154	6527227.089	66	20	0
TP141	343763.7912	6526993.269	49	50	0
TP142	343792.9788	6527008.628	64	40	7
TP143	343790.0554	6526968.331	51	50	42
TP144	341383.5953	6528980.914	64	30	2
TP145	341365.5855	6528967.829	48	40	5
TP146	341343.9282	6528948.165	39	30	0
TP147	341327.0119	6528917.63	50	50	6

Table 7.5 Summary of excavated test pits.

Test pit #	Easting	Northing	Distance from Dungowan Creek (m)	Depth of test pit (cm below surface)	Number of artefacts (n)
TP148	341308.987	6528895.907	61	50	10
TP149	341287.5018	6528867.693	63	40	14
TP150	341272.7984	6528842.72	58	50	16
TP151	341282.3101	6528821.484	56	40	5
TP152	341299.1635	6528795.659	53	60	22
TP153	341313.3219	6528768.524	52	60	46
TP154	341325.9132	6528741.583	56	50	15
TP155	341337.5111	6528716.651	48	50	26
TP156	341305.6962	6528837.917	85	50	16
TP157	341390.0174	6528831.474	115	10	5
TP158	341409.1176	6528822.88	95	10	4
TP159	341343.1751	6528787.631	88	50	5
Average			*60.73*	*42.19*	*16*
Total					**1,662**

Note: 1. All co-ordinates are presented in MGA Area 56.

2. All test pits consisted of four contiguous 0.25m^2 quadrants, but are presented here as their overall 1m^2 test pits to allow easier comparison with other regional projects.

i Stratigraphy and geochemistry

The soil profiles across the 105 test pits were generally consistent, and can be described as one of two different types. These included:

- on hillslopes, crests and steep slopes:
  - at the surface, a thin brown silty clay topsoil (<5 cm) with frequent roots, rootlets and gravels overlying a heavily weathered schist bedrock. Occasionally, especially on crests, this bedrock was already exposed prior to excavation. Generally, test pits in these locales did not exceed 30 cm below ground surface.
- on alluvial terraces:
  - within active river course, a very coarse, dark brown loamy sand with frequent inclusions predominantly in the form of loose river cobbles. Generally excavation in these areas ceased when densities of these cobbles became prolific (typically <40 cm), and which was interpreted as a former river bed.
  - on elevated terraces, a deeper soil profile was encountered (which may in part be due to the saturated nature of the ground at the time of excavation). The following three units were observed:

- at the surface, a dark brown silty clay loam with frequent roots, rootlets and gravels (A1 horizon), averaging a ~30 cm deposit;
- underlying (i), a medium orange brown silty clay, generally featuring medium to course schist gravels and some charcoal flecking and averaging ~50 cm deposit in thickness (A/B or upper B2 horizon); and
- underlying (ii), a dark medium orange brown clay, frequently with very fine gravels, but occasionally larger river cobbles, and encountered at ≥80 cm below ground surface (A/B or upper B2 horizon).

The first soil profile is consistent with residual skeletal soils commonly found on steep slopes, where the lack of vegetation and high erodibility inhibits more extensive formation. Given the volume of waters historically in this valley, these soils are likely to be relatively recent in formation, with erosion likely seeing their movement downslope into the river systems periodically. The second soil profile is consistent with a relatively old alluvium that has been deposited by Dungowan Creek, and has undergone initial stages of pedogenesis to form distinct stratigraphic units. This is supported by the chronology (Section 7.3.2ii), which suggest the soil profile has been in place for at least 10,000 years.

Importantly, despite the apparent previous disturbance evident during the field survey, few of the test pits revealed any indication of heavy impacts. Only 16 test pits had any evidence of surface impacts, and generally not exceeding 20 cm.

A vertical soil column sample was also taken at TP12A. These were subjected to ITRAX analysis at ANTSO, which resulted in sub-centimetre information of major trace elements and magnetic susceptibility, as well as providing an archival record of the soil profile (Plate 7.19). In addition, particle size analysis (5 cm resolution) was undertaken at TP101 to similarly provide a full record down the entire 1 m soil profile. The use of ITRAX data in archaeology is still fairly new (Theden-Ringl and Gadd 2017), and the interpretation of the specific trace elements and their relationship to human activity is not always well understood. While the chemical analysis does not appear to offer any obvious correlations with occupation of the area, there appears to be some positive correlation of the magnetic susceptibility to the number of artefacts recovered. Commonly, magnetic susceptibility is considered to reflect increasing fire within the landscape, which affects the iron composition in the soil (eg Lowe et al. 2015). However, few of the magnetic susceptibility peaks loosely correlates with the charcoal flecking observations made during excavation – a proxy for fire activity. It is not inconceivable that the data is reflecting small hearth fires, that may not have been captured in the more regional signal often recovered from palynological and palaeo-fire studies. However, it is equally possible that the magnetic susceptibility is responding to broader anthropogenic landscape disturbance (eg Jiménez-Moreno et al. 2013; Huang 2002; Huang et al. 2006; Rosendahl et al. 2014). These activities may include localised fires, but may reflect other forms of site disturbance, such as vegetation and tree removal and/or repeated trampling of the same area, resulting in soil erosion/degradation.

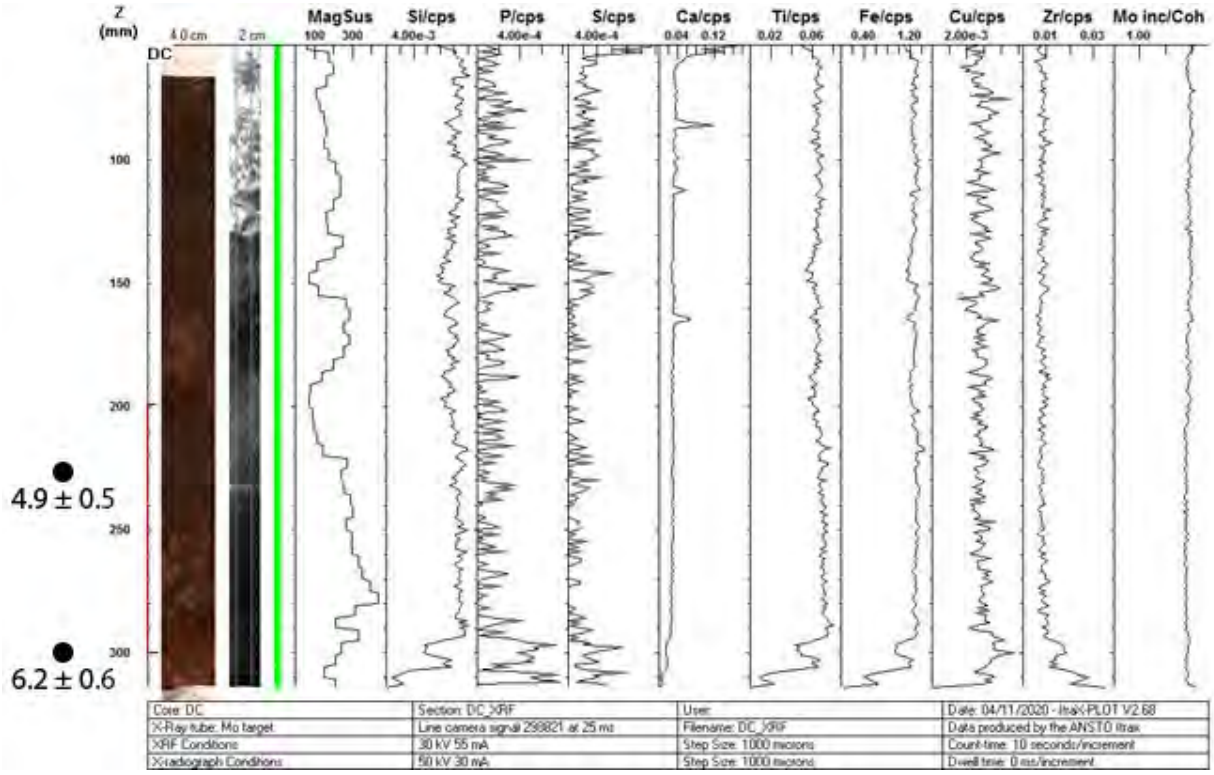


Plate 7.19 **ITRAX analysis of a vertical core sampled at TP12A. On the left of the image are OSL results from TP12 (~5m south), scaled to the approximate level below surface where the sample was taken. The red bracket indicates where high densities of artefactual material were recovered. From left to right, the elements analysed include magnetic susceptibility, silicon, phosphorus, sulphur, calcium, titanium, iron, copper, and zirconium.**

ii Chronology

To provide a chronology of the deposits, a number of samples were collected for Optically Stimulated Luminescence (OSL) dating. Thirteen samples were collected from test pits containing dense cultural materials and/or where the deepest deposits were reached; of these, eight samples were analysed (Plate 7.20). These samples were selected to provide an initial understanding of the formation history of the terrace landform extending along the Dungowan Creek corridor and the age of significant cultural material. All samples were processed by Dr Phil Toms at the University of Gloucestershire (UK), and are reported upon in detail in Annexure F.6. The samples were processed using the multi-aliquot method in which the age is calculated from a large number of quartz grains grouped onto small discs, and measured as a single bulk sample. This is the most common approach to OSL dating, and provides an average (or central) age for all sand grains measured. However, since it is an averaging technique, it can attenuate or subdue variations amongst the sand grains that may affect the eventual age produced.

The results of all OSL ages taken from the site are presented in Table 7.6. Overall, the OSL ages recovered from across the project footprint all provide a broadly similar chronology for the formation of the second terrace (Plate 7.21 and Plate 7.22), and which can indirectly suggest the ages of other parts of the site. This is despite the test pits being a considerable distance apart.

TP101 provides the most extensive series of ages and provides a master sequence for the investigations (Plate 7.22). The other test pits largely align with this sequence with some minor vertical variation – the other two sampling locations appear slightly younger at comparable depths to TP101. Specifically, there is about a 15-20 cm disparity between TP101, TP12 and TP138, whereby spit 3 in the former correlates better with spit 5 of the latter two test pits. Given the significant distance between the test pits in an alluvial landscape, such variation of 20 cm or so is not unsurprising. Overall, however, all the samples suggest a Holocene (<10 ka) age of the soil profile, with much of the upper deposits <6ka in age.

The ages show that the lowest most deposits, ~70-100 m below surface, began forming around 10 ka. This aligns well with major climatic amelioration in the terminal Pleistocene and early Holocene (10-15 ka) that would have resulted in increasing water flow and flooding of the Dungowan Creek catchment. The flooding of the valley would have resulted in the deposition of the alluvium as a floodplain, the remnants of which are now identified as the second terrace.

The upper ages suggest that much of the rest of the soil profile formed in the mid-to-late Holocene (4-6 ka) via either further flooding events and/or pedogensis of the original alluvium. Depths of between 30 – 60 cm in all three test pits reveal ages ranging from ~3.5 ka (in test pit 138) to ~6.2ka (in test pit 12); test pit 101 is slightly earlier in age at these depths (~8.7 ka), but similarly encompasses an age of ~5 ka at a slightly shallower depth. These depths are primarily where the cultural assemblage was recovered and aligns well with the characteristics of the materials that appear of a late Holocene (<5 ka) age. Due to OSL methodological issues, the uppermost part of the soil profile was only dated in TP 12 (Plate 7.21), and showed an age of about 280 years for the near surface soil profile, while interpolation of the surface of TP101 returns an age of ~2ka (Plate 7.22). This suggests that the upper soil profile may have been relatively stable despite having been subject to recent development and pastoral activities. It is also worth noting that this age range is comparable with the characteristics of the stone assemblage recovered.

At this stage, the age of the lowest alluvial terrace and current river's edge cannot be robustly determined. However, given the ages of the second terrace within which the river has incised, it would seem likely that the current alignment occurred after 3.4 ka and probably after 0.28 ka (reflecting the two youngest samples recovered). The late Holocene (<5 ka) was characterised by increasingly dry and extreme climatic conditions, including El Nino Southern Oscillation (ENSO) intensification (2-4 ka), the Medieval Climatic Anomaly (0.9-1.1 ka), and the Little Ice Age (0.1-0. 4ka), all of which may have affected the water balance of the river system leading to incision. Alternatively, incisions may have been a result of the creation of the existing dam in the 1950s, which would have reduced the sediment loads within the river system and resulted in incision, rather than deposition.

Table 7.6 **Summary of OSL ages recovered from the test excavations. All uncertainties in age are quoted at 1σ confidence and reflect combined systematic and experimental variability. Further details of this technique are presented in Notes below and Annexure F.6.**

Test Pit	Spit	Depth (cm below surface)	Lab Code	Age (ka)	Comments
12	2	15	GL20069	0.28 ± 0.03	In TP12, the artefactual assemblage from these depths is characteristic of a mid-late Holocene which would lend support to these ages.
12	5	45	GL20058	4.9 ± 0.5	
12	6	60	GL20055	6.2 ± 0.6	

Table 7.6 **Summary of OSL ages recovered from the test excavations. All uncertainties in age are quoted at 1σ confidence and reflect combined systematic and experimental variability. Further details of this technique are presented in Notes below and Annexure F.6.**

Test Pit	Spit	Depth (cm below surface)	Lab Code	Age (ka)	Comments
101	3	30	GL20059	5.0 ± 0.4	In TP101, no diagnostic artefactual material was recovered at depths below Spit 3.
101	5	50	GL20060	8.7 ± 0.7	
101	7	70	GL20061	9.7 ± 0.9	
101	9	90	GL20056	9.7 ± 0.8	
138	5	50	GL20054	3.4 ± 0.3	In TP138, the artefactual assemblage from these depths is characteristic of a mid-late Holocene which would lend support to these ages.
138	7	70	GL20057	6.4 ± 0.6	

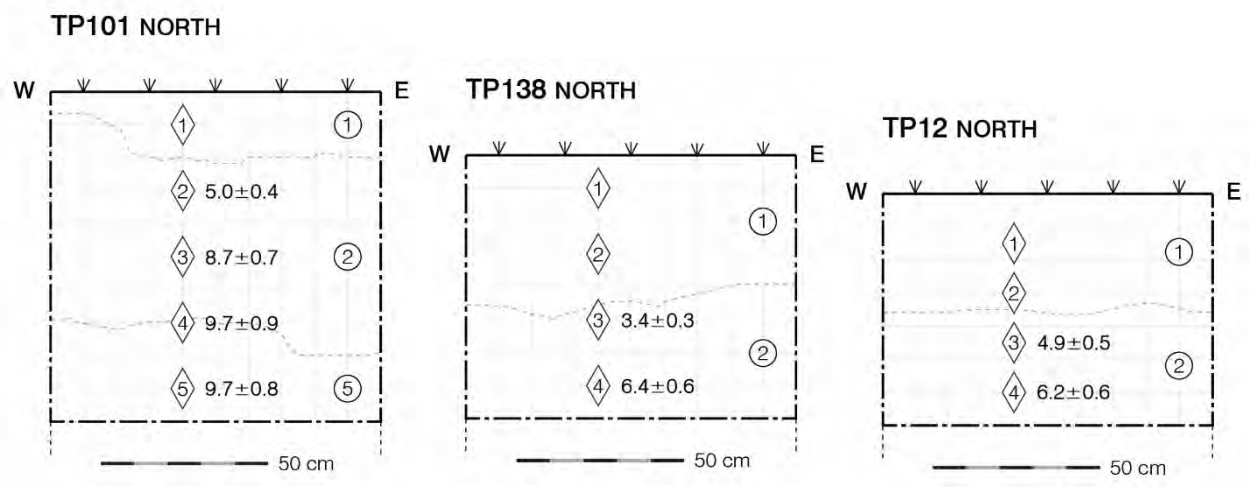


Plate 7.20 **OSL samples recovered from TP12, TP101, and TP138.**

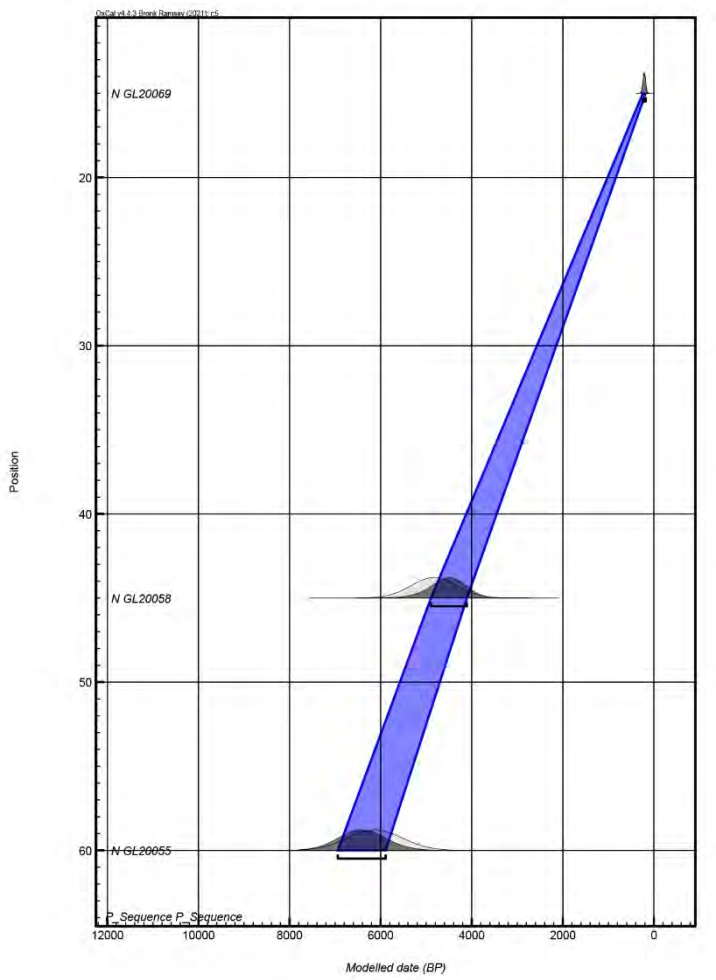


Plate 7.21 **Age-depth model developed for test pit 12 using Oxcal (v.4.2) and P-Sequence deposition model (Bronk Ramsey, 2008, 2009a, 2009b; Bronk Ramsey and Lee, 2013).**

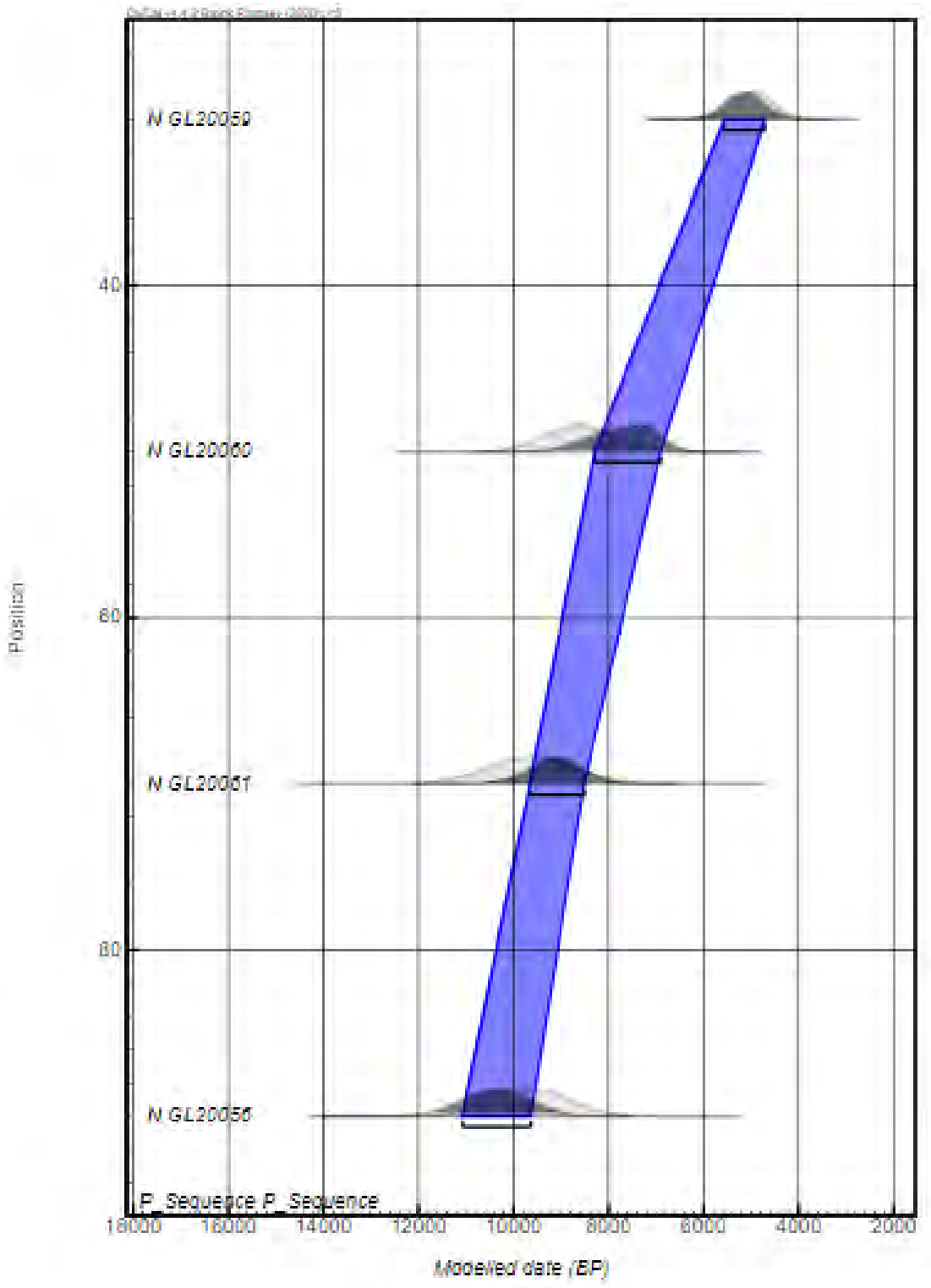


Plate 7.22 **Age-depth model developed for test pit 101 using Oxcal (v.4.2) and P-Sequence deposition model (Bronk Ramsey, 2008, 2009a, 2009b; Bronk Ramsey and Lee, 2013).**

iii Lithics

Analysis of the stone artefacts recovered by the test excavations was undertaken by Dr Trudy Doelman, University of Sydney, and her full report is presented in Annexure F.7. A summary is provided below.

Overall, 1,662 lithics were recovered during archaeological excavations, representing an average artefact density of 15.8 lithics/m^2 (Figure 7.4). The highest number of artefacts was recovered from TP12 (n=272, 16% of the total excavated assemblage); additional test pits were undertaken to the north, west, south, and east of TP12 (TP12A, TP12B, TP12C and TP12D, respectively), and a further 68 artefacts were recovered. When combined, the total comprises one fifth of the total artefacts (n=340, 21%) with an artefact density of 68 lithics/m^2 in this locale. The second highest number of artefacts was recovered from TP138 (n=160, 10%), followed by TP105 (n= 73, 4%) and TP90 (n=68, 4%). Of the remaining test pits, 8 test pits (8%) recovered between 31 to 60 artefacts, 31 test pits (30%) recovered between 11 to 30 artefacts, and 40 test pits (38%) recovered ≤10 artefacts. A total of 22 test pits (21%) contained no artefacts. Given this, a value of 10 artefacts/m^2 may be more accurate when considering the background scatter levels associated with ephemeral or transient use of the area. These findings ultimately identify six main locales within the project footprint where dense cultural material was present, and these are discussed further in Chapter 8.

Across the project footprint, the highest concentration of artefacts occurred at 10-20 cm (n=316, 19%) and 40-50 cm below ground surface (n=364, 22%). This distribution of artefacts strongly suggests two different phases of major use across the region, aligning with these depths. Chronologically, these depths are shown to be ~6-8 ka and ~0.5 ka (Section 7.3.2ii). Artefact densities began to diminish below these depths, with few artefacts recovered below 60 cm (n=36, 2%).

The lithic assemblage is dominated by jasper (n=1,011, 61%) with smaller counts of chalcedony (n=304, 18%), milky quartz (n=141, 8%), plagioglase (n=82, 5%), and serpentine (n=50, 3%) (Plate 7.23). Several of these raw material sources are considered to have been extracted from the adjacent Dungowan Creek, exhibiting both primary and water-rolled cortexes – indicative of an upper catchment river system. Although several, such as serpentine may have come from further afield, being found at Mt Pleasant (14.6 km) and at Hanging Rock (18.4 km) (see also Section 5.4). The local availability of these materials may account for the relatively high artefact background scatter densities, which are above the broader regional values expected (commonly <5 lithics/m^2).

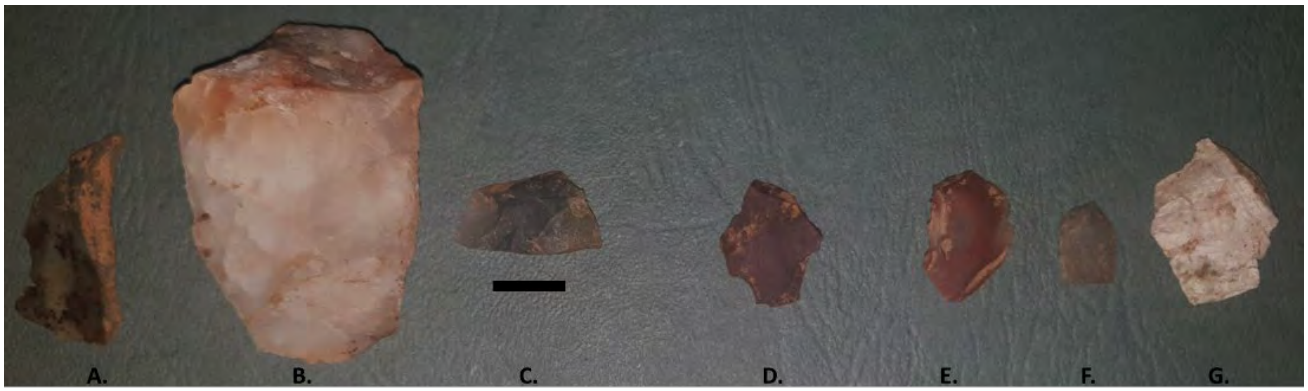


Plate 7.23 **Examples of raw material types in the recovered assemblage. A. Serpentine, B. white chalcedony, C. grey/clear chalcedony, D. red jasper, E. brown jasper, F. light grey chalcedony, G. brecciated-plagioclase.**

Compositionally, the assemblage is comprised of 471 (28%) complete flakes, 803 (48%) broken flakes, 118 (7%) tools, 37 (2%) cores, and various other angular fragments, core fragments, heat shatter and spall, etc. The characteristics of the cores, flakes and tools in the assemblage indicate that cores were procured and initial core preparation (ie the removal of cortex) occurred in the project footprint prior to cores and tools being transported away. A focus particularly appears to have been on large outcrops of jasper along the Dungowan Creek. Block fragments (obtained from primary outcrops) and water-rolled cobbles, from secondary sources, were used as cores to manufacture a range of tool types, including burin-blade, atypical burin-blade, alternate-blade and prismatic cores (Plate 7.24 and Plate 7.25). Many elongated flakes and blades were firstly snapped, the platforms removed, and then fashioned into backed, Bondi points or geometric microliths. It is likely that once jasper cores were prepared they were sometimes worked until exhausted, but often were removed from the project footprint before this for later use. The low frequency of other tools types (eg usewear, notched and scraper) suggests that this location was a primarily used to “gear-up”, specifically an area used for the manufacture of particular tool types (eg backed artefacts), as well as for procuring a key raw material for use elsewhere.

There is, however, some change in use of the site over time, and spatial variation of these activities across the project footprint. Chronological difference in the assemblage is represented by the procurement of different amounts of raw material through time, as well as more disparate spatial variability with the lower units rather than concentrated places of longer-term occupation found in the upper spits. In the upper spits different raw materials are found coupled with a higher frequency of processing tools. These results indicate a transition from brief visitation and acquisition of raw materials to increasing occupation of the project footprint, and potentially a decrease in mobility.

The composition of the assemblage, both the lower and upper levels, are all suggestive of a late Holocene (<5 ka) age. Artefact types, such as backed blades and Bondi points, are primarily found during this timeframe, with their increasing proliferation in the most recent period. The upper assemblage in 10-30 cm below surface aligns well with the OSL ages, and is consistent with an age of ~0.5 ka for the use of the region. Depending on the chronological samples, the lower assemblage similarly aligns well with the OSL ages, with several suggesting 50-70 cm reflects a period between 3.5-5 ka. However, in the case of TP101, where these lower depths are considered to be >6 ka, the assemblage is too young compositionally. In these scenarios, it is considered probable that the lower assemblage has been bioturbated down the soil profile to account for the disparately – such movement is likely to have been relatively minimal given the lack of size-sorting and conjoins present within the assemblage.

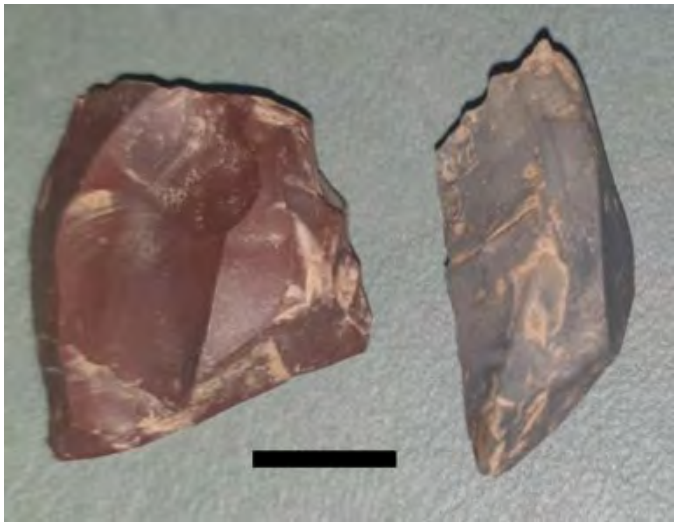


Plate 7.24 Examples of atypical burin-blade Cores (on a flake body) found in the assemblage.

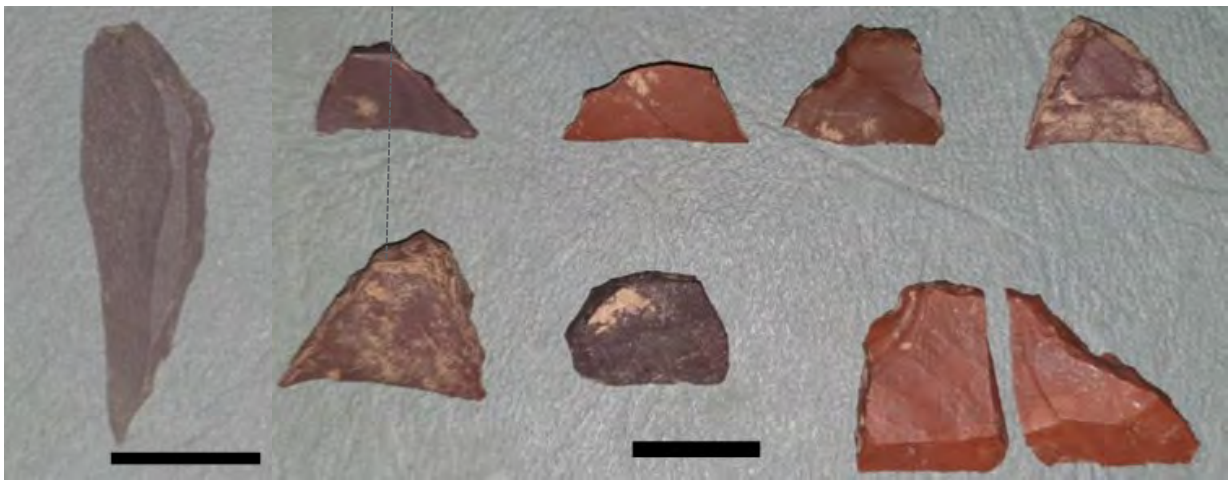


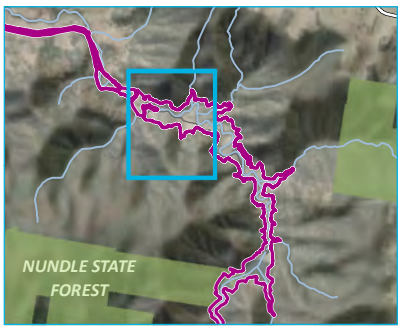
Plate 7.25 **Examples of backed artefacts in the assemblage. Left – Bondi point; Right – geometric microliths.**

Source: EMM (2022); WaterNSW (2021); Metromap (2019); DFSI (2017); GA (2013)

0 100 200 m

GDA 1994 MGA Zone 56

N



KEY

- Project footprint
- Minor road
- Named watercourse
- State forest

Total artefacts

- No artefacts
- < 10
- 11 to 30
- 31 to 60
- > 60

Test excavation results - northern project area

Dungowan Dam and pipeline project
Aboriginal cultural heritage assessment
Figure 7.4a

EMM creating opportunities

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Source: EMM (2022); WaterNSW (2021); Metromap (2019); DFSI (2017); GA (2013)

0 100 200 m

GDA 1994 MGA Zone 56

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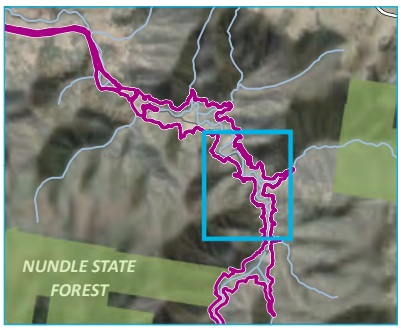


KEY

- Project footprint
- Minor road
- Named watercourse
- State forest

Total artefacts

- No artefacts
- < 10
- 11 to 30
- 31 to 60
- > 60

Test excavation results - southern project area

Dungowan Dam and pipeline project
Aboriginal cultural heritage assessment
Figure 7.4b

EMM creating opportunities

8 The archaeological resource

8.1 Key Findings

- The assessment undertook cultural mapping, archaeological field survey and test excavations to explore and document the Aboriginal objects, site and places within the project footprint, and to align them within the regional context. Overall, the findings were found to largely conform with the regional models, although an increasing focus on intangible and cultural values was undertaken to supplement the observed archaeological record. Additional refinement of the regional model was also undertaken for the project footprint, which allowed the data-driven reduction of 200 m buffers around creeklines within which cultural material may occur down to ~69 m.

- These various site validation activities undertaken over a four month period resulted in duplication and overlap of results presented in Sections 5.3.2, 7.2.2 and 7.3.2. When combining and ratifying these findings, there are some 17 identified sites and places along with a continuous and complex distribution of surface and shallowly buried stone artefacts distributed across the project footprint. These can be broken down as:

    - Six cultural sites, including a gender-specific site (DDCS1) encompassing parts of Terrible Billy Creek, a stone arrangement associated with a Creation Ancestor story (DDSA3), two culturally modified trees (DDST1, DDST2), a grinding groove (DDGG1), and the former Dungowan Station where post-contact activities are believed to have occurred (DDPC1).

    - Three social history places, reflecting locales of importance to the specific Aboriginal participants, and including a former residence (DDCS3), an environmental reserve (DDCS4) and a former school site (DDCS5).

    - Three purported cultural sites that were identified by Aboriginal participants, but which cannot be robustly validated, and including a natural ambush site (DDCS2), and two stone arrangements that were considered to reflect burials (DDB1, DDB3).

    - Five archaeological sites, including three stone arrangements (DDB2, DDSA1, DDSA2) and two potentially culturally modified trees (DDST3, DDST4), all of which are assigned a 'tentative' classification with further research recommended.

    - A stone artefact background scatter across the entire project footprint and extending beyond its limits within which artefact densities of 10-15/m^2 may be expected (DDBAS1). This site includes identified isolated Aboriginal objects (DDIF2-11 inclusive) and low density artefact scatters (DDOS3, 8-14 inclusive;). These sites are typically of low significance and reflect the long-term use of the entire landscape by Aboriginal people in the past.

    - Eight areas of past foci and activity (DDFA A-H inclusive) within the proposed dam footprint and inundation area, characterised by high densities of primarily sub-surface artefacts ranging from 30->272/m^2, and which reflect long term and/or repeat visitation and occupation by people over at least the last 5 ka. Several sites identified during the field survey are also encompassed within the curtilage of these sites (DDIF1, DDOS1, 2, 4-7 inclusive). These foci are generally small, <2,800 m^2 (<60 x 60 m), but in some areas extended 350 m in length along the river's edge.

    - A zone of 69 m either side of major creeks and tributaries (>3rd order) within which higher densities of stone artefacts and/or other areas of past foci may be expected to be present (DDPAD1).

8.2 Results and synthesis

Past studies and previously documented Aboriginal heritage show that cultural materials within the regional context is generally dominated by artefactual sites, most frequently isolated stone artefacts or low density (<20) artefact scatters. There is reference to a site on Timbumburi Creek (#29-2-0052) where Wilson and McAdam (2000:166) reported close to 10,000 artefacts; and which likely reflects a key node of occupation and/or visitation in the past. (This site provides a useful guide as to what may be considered a site of higher significance for the region.) However, no other site in the region has reported close to these numbers, and other large sites generally reflect only ephemeral use of the landscape, perhaps <300 artefacts. Indeed, up until the early 1990s, it was argued that the Northern Tablelands were mainly used only ephemerally and intermittently for ceremonial purposes, as evidenced by the rich archaeological record of Bora rings (used for initiation ceremonies), art sites, stone arrangements and carved trees, along with Aboriginal knowledge of intangible sites (Flood 2010). Although more recent academic research (eg Godwin 1990) and community archaeology is beginning to dispute this model, arguing for year-round occupation, and supported by increasing documentation of sites commonly associated with utilitarian and domestic activities (eg open camp sites, grinding grooves) (EMM 2018). While there is some evidence of visitation to the region as early as 18,000 years ago (eg Crazy Man rockshelter at Coonabarabran), more commonly the archaeological sites documented, and their cultural materials, almost exclusively exhibit Holocene characteristics (<5,000 years ago), and have been shown to extend into the contact period.

These Aboriginal sites – notably artefactual sites – are observed in all contexts, disturbed and undisturbed in the region, but are usually focussed on areas of elevation (particularly highlighting lower slopes) with a low gradient, near creeks (<200 m) but above inundation, and occasionally on hilly relief. Much of the project footprint is situated on the floodplains, terraces and lower slopes surrounding Dungowan Creek, Peel River, and their tributaries, and as such encompasses various landforms that align with this regional model. These environments would have been a valuable resource for past Aboriginal activity and occupation, and the presence of cultural material would be expected. Both desktop analysis and ground-truthing did, however, indicate that past disturbance can have a significant impact to cultural materials. Both natural processes, such as river meandering and/or flooding, and human activities including agricultural and pastoral industries, are likely to see the loss or movement of cultural materials. This is aggravated by the relatively shallow soil profiles present across much of the project area, where even minor excavation is likely to remove the topsoil unit that usually retains cultural materials. Observations along the project footprint indicate that the creation of access tracks, water modifications (eg dam construction, creek re-alignment), fence-lines, various earthworks, and a range of other ancillary activities and structures have all likely impacted, removed or destroyed any cultural materials (if present) in these locales.

An extensive program of ground-truthing was undertaken as part of this assessment, including cultural mapping, archaeological field survey and test excavations of the project footprint. The aim of these works was to both validate the regional models specific to the project footprint and identify any previously undocumented cultural sites, places and/or material.

The cultural mapping undertaken with key knowledge-holders identified 11 sites and places that held cultural importance to the Aboriginal community (Table 5.1; Figure 8.1). These included numerous stone arrangements, culturally modified trees, a grinding groove site and a number of locales relevant to the individuals involved (eg a former residence of one of the participants). These sites were assessed by the anthropologist to reflect either cultural sites, social history places and/or purported cultural sites, each aligning with the level of robustness that could be assigned to these locales based on regional and contextual information. Overall, of the 11 sites, five were considered as cultural sites, three as social history places and three as purported sites that lacked validity. Through other consultation, a further site – former Dungowan Station (DDPC1) – was identified as having post-contact Aboriginal heritage.

Of note was the identification of a gender-specific (men's) site along Terribly Billy Creek. While not within the project footprint, the site had a relatively large exclusion zone, and the creek itself was considered to hold importance. In addition, one of the stone arrangements (DDSA3) on the banks of Jones Oakey Creek was found to be associated with a Creation Ancestor story (Catfish) of the region and as such is considered of high cultural value. The study also provided a wealth of information on flora, fauna, totems and other aspects of Gomeroi culture, which will be extremely valuable to the Aboriginal community in general; and in any post-approval activities associated with the project (eg informing heritage interpretation, etc).

The field survey identified some 37 Aboriginal sites, places and/or objects across the project footprint (Table 7.3; Figure 8.1). Eight of these sites had previously been documented as part of the cultural mapping, including several of the stone arrangements, culturally modified trees, and grinding groove. The remaining 29 sites were dominated by stone artefactual material of various densities, and included: 14 artefact scatters; 11 isolated artefacts These sites were predominantly found on the alluvial terraces and lower slopes associated with Dungowan Creek; and have subsequently been integrated into the broader background scatter considered present across the project footprint (see below). Of these, only one was specifically highlighted by the Aboriginal participants, consisting of an artefact scatter on a small crest adjacent to Terrible Billy Creek (DDOS11) – and which again reflected the importance of that creek corridor to the Aboriginal community. The remaining sites included three stone arrangements, and two potential culturally modified trees. The sites were similarly assessed for robustness, and either considered 'valid' or 'tentative' dependent on the archaeological features that were observed in the field. Ultimately, 24 of the 29 identified sites and objects were considered valid, with five labelled as tentative requiring further investigation. These latter sites were predominantly stone arrangements that in large part resembled the surrounding natural geology and/or rock picking associated with past agricultural activities; and culturally modified trees in which natural and/or post-European pastoral activities may have played a role in their creation. Both site types are recommended for further investigation to clarify their status. The potential grinding groove (DDGG1) was also considered tentative given they usually occur in sandstone geology that is not present in the project footprint, but has been listed as a cultural site by the Aboriginal participants.

The archaeological test excavations were undertaken to explore the subsurface potential for cultural material. These focussed on alluvial terraces and lower slopes surrounding Dungowan Creek and its tributaries, many of which had been identified during the field survey through the presence of surface cultural material (Table 7.5; Figure 8.1). These excavations revealed that cultural material was primarily found within ~60 m of Dungowan Creek and associated tributaries, with significantly less cultural material found beyond this limit. This is substantially less than the 200 m buffer proposed from regional models. It is considered that this revised ~60 m buffer could also apply to nearby parts of Peel River given its similarity with the geomorphology of Dungowan Creek. The excavations recovered 1,662 stone artefacts, and demonstrated that a background scatter of ~10-15 artefacts/m^2 could be expected within the project footprint (Figure 8.1). This is a relatively high base-line value for the region, and may reflect the heavy exploitation of jasper (a raw material for stone tools) in the creek over the last 6 ka. Higher values of >30/m^2, and up to 272/m^2 in at least one location, are considered to reflect more intense and/or repeated use of a particular area or locale. Six of these foci were identified within the project footprint, and were generally small, <2,800 m^2 (<60 x 60 m), but in some areas extended 350 m in length along the creek's edge. The cultural material was generally recovered from the upper 60 cm of the soil profile, with the highest densities between 10 cm and 50 cm below surface.

An analysis of both the sediments and the assemblage recovered from the excavations reveals that the major terraces along Dungowan Creek began forming about 10 ka. This was shortly after major sea-level change and climatic amelioration in the terminal Pleistocene and early Holocene that would have resulted in increasing hydrological flows through the system (Williams et al. 2018); and resulting in the deposition of sediment across the valley floor. Formation of the floodplain through additional flooding and/or pedogenesis continued throughout the Holocene, with a suite of ages recovered between 0.5-6 ka. The current river and adjacent alluvium formed through incision of the earlier floodplain after ~2 ka and has remained relatively unchanged since that time. The use of the valley by Aboriginal people appeared to focus on two main periods of activity – brief, but repeat visitation between ~3.5-5 ka (and potentially slightly earlier), and more extended residence/occupation of the valley in the last few hundred years. The assemblage suggests that a focus was on the recovery and use of locally derived jasper from Dungowan Creek, as well as the production of certain tool types (notably backed artefacts, Bondi points, etc) for 'gearing up' in the later period. A range of other raw materials from sources all within ~20 km of the project footprint were also documented, and perhaps gives a typical ranging territory for the people that inhabited Dungowan Creek.

While numerous pastoral, agricultural, residential and other infrastructure disturbances were observed across the project footprint, the findings indicate that substantial cultural material still remains. These past activities have had largely localised impacts, with the most noticeable being the de-vegetation of significant parts of the project footprint and adversely affecting the potential for culturally modified trees to have survived. Other impacts include the deep ploughing of many areas along Peel River, as well as roads, pipes and other linear infrastructure found across the project footprint. The largest impact as predicted in Section 4.6 was the establishment of the existing Dungowan Dam, which has significantly affected the southern portion of the project footprint. Importantly, areas within 69 m of the major tributaries within which the majority of cultural sites and materials were observed has been the least affected by these past activities.

When combining and ratifying the information above, the project footprint can be considered to encompass the following Aboriginal sites, places and/or objects (Figure 8.2):

- Six cultural sites, including a gender-specific site (DDCS1) encompassing parts of Terrible Billy Creek, a stone arrangement associated with a Creation Ancestor story (DDSA3), two culturally modified trees (DDST1, DDST2), a grinding groove (DDGG1), and the former Dungowan Station where post-contact activities are believed to have occurred (DDPC1). Note: several of these include sites that would typically be considered archaeological, but do not currently have the characteristics for identification as such.

- Three social history places, reflecting locales of importance to the specific Aboriginal participants, and including a former residence (DDCS3), an environmental reserve (DDCS4) and a former school site (DDCS5).

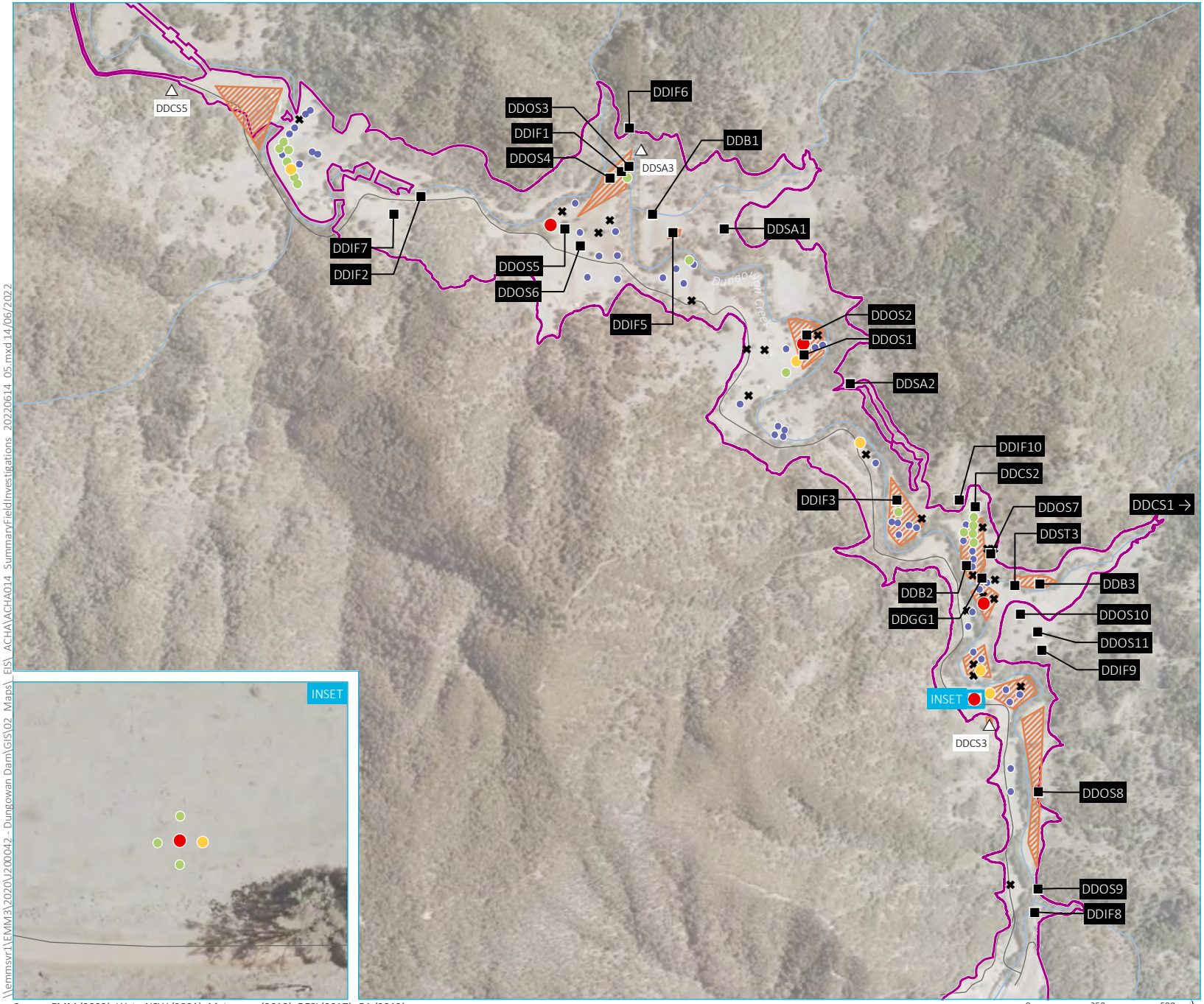
- Three purported cultural sites that were identified by Aboriginal participants, but which cannot be robustly validated based on the anthropologist's experience nor regional and contextual information, and including a natural ambush site (DDCS2), and two stone arrangements that were considered to reflect burials (DDB1, DDB3).

- Five archaeological sites, including three stone arrangements (DDB2, DDSA1, DDSA2) and two potentially culturally modified trees (DDST3, DDST4). All of these sites were assigned a tentative classification given a lack of archaeological characteristics; and all are recommended for further specialist investigation.

- A stone artefact background scatter across the entire project footprint and extending beyond its limits within which artefact densities of 10-15/m^2 may be expected (DDBAS1), which includes identified isolated Aboriginal objects (DDIF2-11 inclusive) and low-density artefact scatters (DDOS3, 8-14 inclusive). These sites are typically of low significance and reflect the long-term use of the entire landscape by Aboriginal people in the past. It is highlighted, however, that DDOS11 has been identified as of high cultural value by Aboriginal participants due to its proximity to Terrible Billy Creek.

- Eight areas of past foci and activity (DDFA A-H inclusive) characterised by high densities of primarily sub-surface artefacts ranging from 30-272/m^2, and which reflect long term and/or repeat visitation and occupation by people over at least the last 5ka. Several of the field observations are also encompassed within these site's curtilage (DDIF1, DDOS1, 2, 4-7 inclusive). These foci are generally small, <2,800 m^2 (<60 m x 60 m), but in some areas extended 350 m in length along the river's edge.

- A zone of 69 m either side of major creeks and tributaries (>3rd order) within which higher densities of stone artefacts and/or other areas of past foci may be expected to be present (DDPAD1). In some parts of the project footprint, where data is available, this zone can be further divided into more probable areas encompassing alluvial terraces and lower slopes near creeks and less probable areas characterised by steeper slopes and crests within the buffer curtilage.



KEY

- Project footprint
- Cultural site
- Surveyed Aboriginal site
- PAD area

Total artefacts

- No artefacts
- < 10
- 11 to 30
- 31 to 60
- > 60

Existing environment

- Minor road
- Named watercourse

Source: EMM (2022); WaterNSW (2021); Metromap (2019); DFSI (2017); GA (2013)

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Summary of field investigations - dam

Dungowan Dam and pipeline project
Aboriginal cultural heritage assessment
Figure 8.1a

EMM creating opportunities

KEY

- Project footprint
- Surveyed Aboriginal site
- PAD area
- Cultural site
- Post contact site

Total artefacts

- No artefacts
- < 10
- 11 to 30
- 31 to 60

Existing environment

- Major road
- Minor road
- Named watercourse
- Named waterbody

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Source: EMM (2022); WaterNSW (2021); Esri (2019); DFSI (2017); GA (2013)

0 2.5 5 km

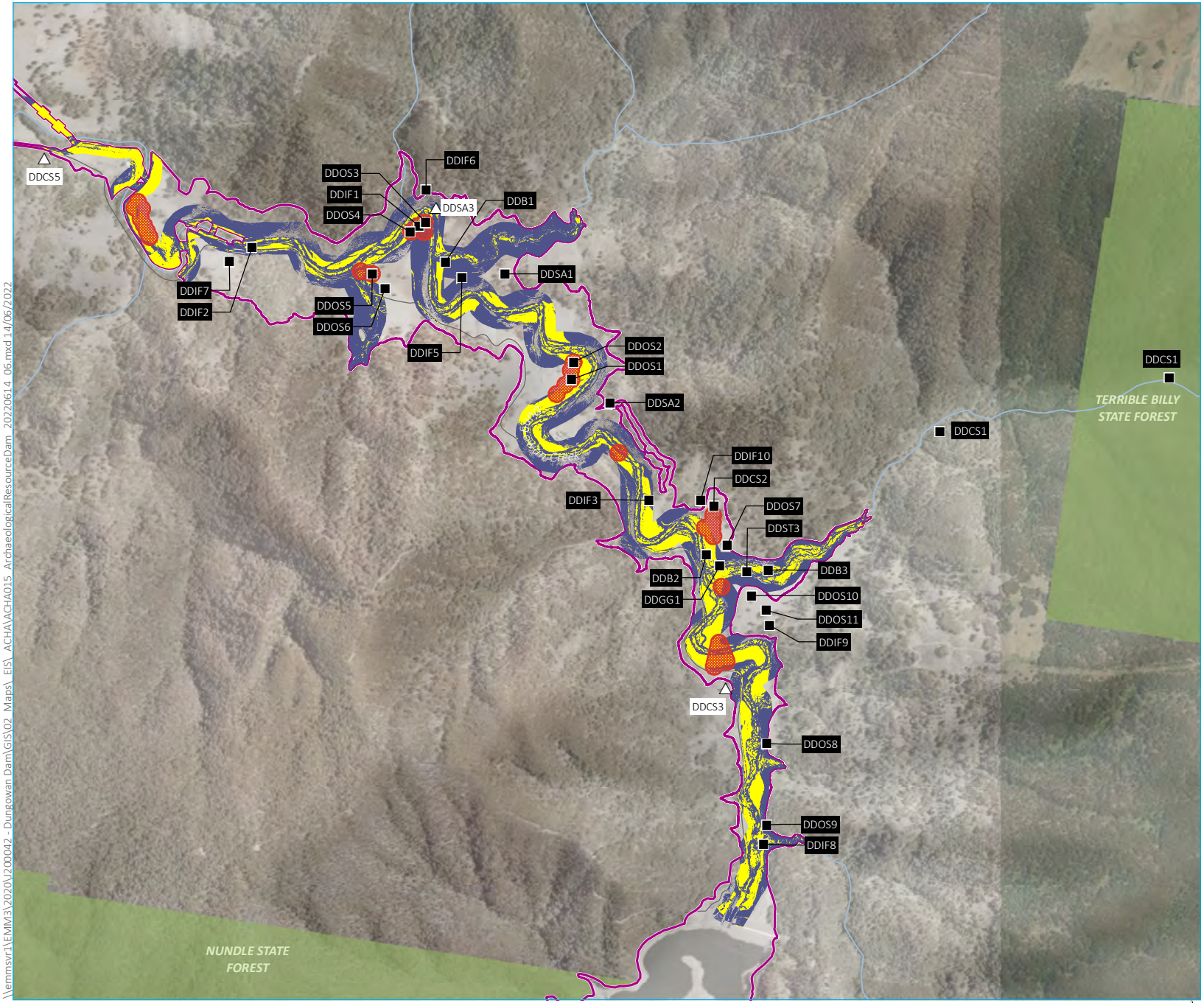
GDA 1994 MGA Zone 56

N

Summary of field investigations - pipeline

Dungowan Dam and pipeline project
Aboriginal cultural heritage assessment
Figure 8.1b

EMM creating opportunities



KEY

- Project footprint
- Cultural site
- Surveyed Aboriginal site
- Key heritage areas

Areas of probable cultural material

- More sensitive terrace
- Less sensitive lower slopes

Existing environment

- Minor road
- Named watercourse
- State forest

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Source: EMM (2022); WaterNSW (2021); Esri (2019); Metromap (2019); DFSI (2017); GA (2013)

0 0.5 1 km

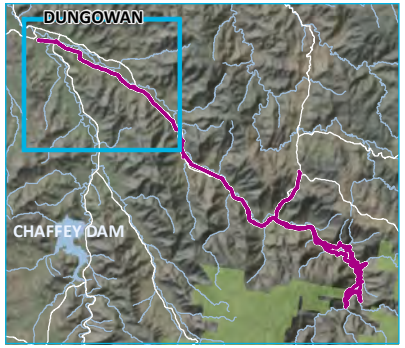
GDA 1994 MGA Zone 56

N

The archaeological resource - dam

Dungowan Dam and pipeline project
Aboriginal cultural heritage assessment
Figure 8.2a

EMM creating opportunities



KEY

- Project footprint
- Surveyed Aboriginal site
- Cultural site
- Post contact site
- Areas of probable cultural material

Existing environment

- Major road
- Minor road
- Named watercourse

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Source: EMM (2022); WaterNSW (2021); Esri (2019); DFSI (2017); GA (2013)

0 1 2 km

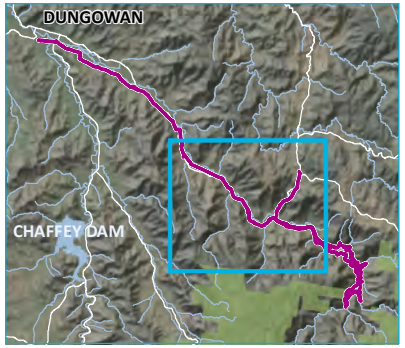
GDA 1994 MGA Zone 56

N

The archaeological resource - pipeline

Dungowan Dam and pipeline project
Aboriginal cultural heritage assessment
Figure 8.2b - i

EMM creating opportunities



KEY

- Project footprint
- Surveyed Aboriginal site
- Cultural site
- Post contact site
- Areas of probable cultural material
- Key heritage areas

Existing environment

- Major road
- Minor road
- Named watercourse
- State forest

The archaeological resource - pipeline

Dungowan Dam and pipeline project
Aboriginal cultural heritage assessment
Figure 8.2b - ii

Source: EMM (2022); WaterNSW (2021); Esri (2019); DFSI (2017); GA (2013)

0 1 2 km

GDA 1994 MGA Zone 56

N

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EMM creating opportunities

9 Significance assessment

9.1 General

All Aboriginal objects in NSW are protected under the *National Parks and Wildlife Act 1974. It is* recognised that the destruction of sites may be necessary to allow other activities or developments to occur if they cannot be avoided. For the consent authority to make informed decisions on such matters, an important element of cultural heritage management is determining the significance of cultural heritage places to understand what may be lost and how best it can be mitigated.

Cultural significance is outlined in Article 1.2 of the *Burra Charter* – the best practise document for managing cultural heritage – as 'aesthetic, historic, scientific, social or spiritual value for past, present or future generations' (Australia ICOMOS 2013). These values are reiterated in the NSW guidelines, which determines that cultural significance of a place can be assessed by identifying the values that are present across the subject area and assessing what is important and why (OEH 2011). In assessing the scientific significance of sites, aspects such as rarity and representativeness and the integrity must be considered. Generally speaking, a site or object that is rare will have a heightened significance, although a site that is suitable of conservation as 'representative' of its type will also be significant. Conversely an extremely rare site may no longer be significant if its integrity has been sufficiently compromised.

The criteria adopted for this report are defined in Table 9.1. The management implications of these sites' significance are discussed in subsequent sections.

Table 9.1 A summary of criteria used to assess the cultural significance (OEH 2011, 8–10).

Criterion	Definition
Social value—Does the place have a strong or special association with a particular community or cultural group for social, cultural or spiritual reasons?	Social (or cultural) value refers to the spiritual, traditional, historical or contemporary associations and attachments the place or area has for Aboriginal people. Social or cultural value is how people express their connection with a place and the meaning that place has for them. Social or cultural value can only be identified through consultation with Aboriginal people.
Historic value—Is the place important to the cultural or natural history of the local area and/or region and/or state?	Historic value refers to the association of a place with a historically important person, event, phase or activity. Historic places do not always have physical evidence of their historical importance (such as structures, planted vegetation or landscape modifications). They may have 'shared' historic values with other (non-Aboriginal) communities.
Scientific (archaeological) value—Does the place have potential to yield information that will contribute to an understanding of the cultural or natural history of the local area and/or region and/or state?	Scientific (archaeological) value refers to the importance of a landscape, area, place or object because of its rarity, representativeness and the extent to which it may contribute to further understanding and information. Information about scientific values is gathered through archaeological investigation undertaken in this report.
Aesthetic value—Is the place important in demonstrating aesthetic characteristics in the local, regional, and/or State environment?	Aesthetic value refers to the sensory, scenic, architectural and creative aspects of the place. It is often linked with social value, and can consider form, scale, colour, texture and material of the fabric or landscape, and the smell and sounds associated with the place and its use. This value is only relevant to archaeological sites on only rare occasions, such as rockshelters that contain art, or culturally modified trees in prominent positions, etc.

9.2 Statement of significance

The assessment identified 17 discrete Aboriginal sites and places sites within, or near the project footprint (Table 9.2; Figure 8.2). In addition, the entire project footprint was characterised by a low density background artefact scatter interspersed with occasional areas of denser material associated with past foci and/or repeat occupation (DDFA A-H inclusive) (Chapter 8; Table 9.2). These continuous buried deposits were documented throughout the field investigations as part of the field survey and test excavations, and were variously documented as DDIF1-11 inclusive and DDOS1-14 inclusive. (These locales and sites have now all been integrated into the broader background scatter identification for management purposes – see Table 9.2). The results align well with the broader regional archaeological picture, which is dominated by stone artefact sites, or their potential to occur; and highlights the importance of major water courses to Aboriginal visitation and occupation in the past. The integration of strong Aboriginal engagement and participation has further identified a range of less common and/or intangible sites providing a more comprehensive picture of the significance of the project area in the past.

For the purposes of significance assessment, all sites and places have been assigned a classification, even where they are only identified as of tentative identification to allow the ACHA to be completed. It must be highlighted, however, that validation of these sites – some of which are ranked as moderate or high (ie regional) importance – may require their significance to be re-classified in the future. A range of recommendations to further clarify the classification of these sites is proposed in Chapter 11 to resolve this uncertainty where required.

When considering the scientific significance, a number of the sites and zones can be considered to have moderate (local) or high (regional) significance with the ability to provide information on the past activities of the area (research potential). These sites can primarily be divided into two main categories, stone arrangements and high-density artefact zones. In the case of stone arrangements, they are unfortunately hard to discern from natural phenomena and/or creation from farming activities (where rocks are piled manually to clear fields), and hence most are given tentative classification. However, should these prove to be of cultural origin, in combination with Aboriginal oral history, they would provide a valuable window into the purpose and age of these structures, and how they fit into the broader cultural landscape of the region – notably a site type that is not common in the region. In addition, the Aboriginal participants suggest that they may reflect burial locations, which if correct would allow further facets of research on the methods, timing, and behaviour around human burials.

Several areas of past foci and/or repeated occupation have been found along the Dungowan Creek corridor in the form of dense stone artefacts. The limited investigations undertaken as part of this ACHA, has demonstrated the exploitation of jasper raw materials of the creek and other sources from >20 km away over a 6,000 year period, as well as hinting at different phases and type of use through this time. Such information is more substantive than many of the studies reviewed for the region (Chapter 6), which has been subjected to limited research driven investigation since McBryde's (1974) seminal works *Aboriginal Prehistory of New England*. It is considered that further investigation of these high-density zones, and more detailed analysis of the assemblages recovered, has high potential to yield more information on the past economic and social behaviour of people in this region.

In addition to these two main categories of stone arrangements and high-density artefact scatters, several of the cultural sites have also been identified as having some research potential. Given the primarily natural expression of many of these sites, research would be primarily anthropological in nature, but would be important in further understanding how Aboriginal people perceive the formation and evolution of the cultural landscape. This is especially the case in understanding the religious activities associated with Terrible Billy Creek (DDCS1) and the creation ancestor stone arrangement (DDSA3) – two types of activities that are poorly documented in the region (see McBryde 1974 for some discussion).

A number of the sites can also be considered to have some rarity and/or representativeness, which forms a part of the significance criterion. While the high-density artefact scatters identified are relatively common at a regional level, there are few documented in the Tamworth/Dungowan area, and certainly rarely with the number of artefacts recovered from some of the test pits (eg TP#12 that recovered over 250 lithics) – and is broadly comparable with the findings at Timbumburi Creek (#29-2-0052). As such, these can certainly be considered to have a local rarity. Given their undisturbed and stratified context compared with many other previously documented sites, they can also be considered to provide a good representative sample of these types of sites in the general region. Several of the cultural sites identified are similarly rare in both the local and regional context, most noticeably the identification of a creation ancestor site that has little anthropogenic features or existing analogues elsewhere. The potentially culturally modified trees and stone arrangement sites, albeit tentatively identified at this stage, are also rare in the regional landscape (Section 6.4).

The remaining identified sites, including the broader background artefact scatter, are considered to have limited, if any research potential (Table 9.2). While important in demonstrating the longevity and continued use of the region by Aboriginal people in the past, it is considered that little further information can be obtained from additional investigation of these sites, places and objects.

A handful of the sites have some tangible historical significance (Table 9.2). Many of these relate to the social history places that have been identified specifically for their relationship with our key Aboriginal knowledge-holders and their families; and as such have local historical values. The potential for Aboriginal people having lived and worked on Dungowan Station in the last 200 years also lends support to meeting thresholds for this criterion. If accurate, the site would likely be of high significance being able to provide information on the contact period, and be of scientific, historical and cultural importance. With these exceptions, no specific historical significance can be assigned to the remaining objects, sites or places.

All the sites have some level of aesthetic significance, but only few can consider it an intrinsic part of their significance. These include, DDCS1, a site of undefined ceremonial activities, was importantly located in the upper reaches of a narrow valley, presumably limited views from surrounding areas. Similarly, the high-density artefact scatter zones and areas adjacent the river were likely selected by people in the past, at least in part, due to their aesthetic appeal adjacent Dungowan Creek and/or Peel River. A similar argument can be made for Gun Reserve (DDCS4), which reflects a contemporary campsite also adjacent the river's edge.

While all the sites form part of a cultural landscape encompassing the region, there is no clear evidence that they reflect contemporary use or are directly related. Many of the sites reflect multiple, potentially discrete, periods of use in the past by Aboriginal people. The buried cultural material suggests two major periods of past use, while many of the sites reflect post-contact or even contemporary activity. During liaison with the RAPs, there was little indication that these sites were interconnected or that maintaining connections between them played a role in their significance. However, numerous discussions with the RAPs (Chapter 3 and Section 5.3) did suggest that the creek corridors did have an importance to the Aboriginal community, and especially one of the key knowledge-holders who used to live in the project footprint. It can be considered that these systems, and especially Terrible Billy Creek within which several sites are documented, have some cultural value to the RAPs. Cultural flows associated with the river were identified at a general level, and indicated the ongoing importance of the river system to the environment, and its need to be maintained into the future.

Table 9.2 provides a summary of the significance values for each Aboriginal object and/or site identified.

Table 9.2 Significance of Aboriginal objects and/or sites identified. Those in red reflect a potential significance where the site in question is validated.

Site	AHIMS #	Site type	Brief description	Site status	Significance				
					Scientific	Aesthetic	Historical	Cultural	Overall
DDB1	29-3-0115	Purported cultural site	A stone arrangement identified as possible burials by Aboriginal participants. However, lacks any archaeological features and was not supported by anthropological analysis.	Tentative	-	-	-	Moderate	Moderate
DDB2	29-3-0116	Stone arrangement, possible burial	Several stone arrangements from natural river cobbles considered by Aboriginal participants to reflect potential burials. Individual stone arrangements comparable in size, shape and composition to DDB1 and 3.	Tentative	High	-	-	High	High
DDB3	29-3-0118	Purported cultural site	A stone arrangement identified as possible burials by Aboriginal participants. However, lacks any archaeological features and was not supported by anthropological analysis.	Tentative	-	-	-	Moderate	Moderate
DDCS1	25-3-0182	Cultural site	Gender-specific (male) ceremonial activities in the vicinity of Terrible Billy Creek.	Valid	High	Low	-	High	High
DDCS2	29-3-0114	Purported cultural site	Natural depression in the landform proposed as an ambush site for hunting.	Tentative	-	Low	-	Low	Low
DDCS3	29-3-0113	Social history place	Former residence of a key knowledge-holder in the project.	Valid	-	-	Low	Low	Low
DDCS4	29-3-0112	Social history place	Gun reserve – reported as a contemporary Aboriginal campsite of the 20th Century.	Valid	-	Low	Low	Low	Low
DDCS5	29-3-0111	Social history place	Former Dungowan school site within which Aboriginal people were known to attend in the contemporary period.	Valid	-	-	Low	Low	Low

Table 9.2 Significance of Aboriginal objects and/or sites identified. Those in red reflect a potential significance where the site in question is validated.

Site	AHIMS #	Site type	Brief description	Site status	Significance				
					Scientific	Aesthetic	Historical	Cultural	Overall
DDFA A-H inclusive	29-3-0123 29-3-0124 29-3-0125 29-3-0126 29-3-0127 29-3-0128 29-3-0129 29-3-0130	Artefact scatter	Six areas of past foci and activity characterised by high densities of primarily sub-surface artefacts ranging from 30-272/m^2, and which reflect long term and/or repeat visitation and occupation by people over at least the last 5 ka.	Valid	High	Low	-	High	High
DDGG1	29-3-0117	Cultural site	A grinding groove that does not encompass archaeological features expected of this site, but identified by Aboriginal participants.	Valid	-	-	-	Low	Low
DDOS11	29-3-0110	Artefact scatter	A low-density artefact scatter on an elevated hill crest overlooking Terrible Billy Creek. The site is comparable with the broader background artefact scatter, but has been repeatedly highlighted by Aboriginal participants as significant.	Valid	Low	Low	-	Moderate	Moderate
DDPC1	29-3-0105	Purported cultural site	Dungowan Station – former station where Aboriginal people were known to work in the post-contact period.	Tentative	Moderate	-	Low	Moderate	Moderate
DDSA1	29-3-0104	Stone arrangement	A stone arrangement found in a saddle of two hills. No other cultural features were observed in its vicinity.	Tentative	Moderate	-	-	Low	Moderate
DDSA2	29-3-0120	Stone arrangement, potential culturally modified tree	A stone arrangement found in association with a potential culturally modified tree.	Tentative	Moderate	-	-	Low	Moderate
DDSA3	29-3-0109	Cultural site	A stone arrangement associated with a Creation Ancestor story (Catfish) of the region.	Valid	High	-	-	High	High

Table 9.2 Significance of Aboriginal objects and/or sites identified. Those in red reflect a potential significance where the site in question is validated.

Site	AHIMS #	Site type	Brief description	Site status	Significance				
					Scientific	Aesthetic	Historical	Cultural	Overall
DDST1	29-3-0108	Cultural site	A potential culturally modified tree that does not encompass archaeological features expected of this site, but identified by Aboriginal participants.	Valid	-	-	-	Low	Low
DDST2	29-3-0122	Cultural site	A potential culturally modified tree that does not encompass archaeological features expected of this site, but identified by Aboriginal participants.	Valid	-	-	-	Low	Low
DDST3	29-3-0122	Potential culturally modified tree	A potential culturally modified tree situated near Terrible Billy Creek.	Tentative	Moderate	Low	-	Moderate	Moderate
DDST4	29-3-0119	Potential culturally modified tree	A potential culturally modified tree situated near Weabonga Road.	Tentative	Moderate	Low	-	Moderate	Moderate
Low density (background) artefact scatter, including DDIF1-11 inclusive and DDOS1-10 and 12-14 inclusive (DDBAS1)	29-3-0107	Artefact scatter	A stone artefact background scatter across the entire project footprint within which artefact densities of 10-15/m^2 may be expected, and reflecting ephemeral and/or transient use of the region for at least 6 ka.	Valid	Low	Low	-	Low	Low
Major tributaries 3rd+ order creek edge's (69 m) (DDPAD1)	29-3-0106	Potential archaeological deposit	A zone of 69 m either side of major creeks and tributaries (>2nd order) within which higher densities of stone artefacts and/or other areas of past foci may be expected to be present.	Valid	Moderate	Low	-	Moderate	Moderate

Notes:
1. Values are only assigned where the site fulfils that specific criterion.
2. In the case of the cultural criterion, it is ranked in relation to whether the site is important to one individual (low), a mixed view from the Aboriginal participants (moderate) or broad-scale support from all stakeholders (high). Further details are presented in Section 5.3 and **Error! Reference source not found.**.
3. Cultural sites rankings are based on the cultural mapping report presented in Annexure D. While all sites identified were of value to the Aboriginal participants, some were clearly of more significance than others. Greater significance was also given to those that had broader regional analogues.

4. Potential sites, with the exception of potential archaeological deposits, are tentatively ranked based on the assumption the site proves valid. However, their significance should be revisited when further analysis and classification of them occurs. These values are presented in red to demonstrate their tentative status.
5. The overall significance is comparable with the highest ranking achieved in any of the four main criteria.
6. AHIMS sites 29-3-0107 and 29-3-0106 have been designated site names DDBAS1 and DDPAD1, respectively, however EMM has refrained from using these site names to avoid the misconception that these are small or location specific sites when they reflect substantive parts of the project area

10 Impact assessment

10.1 Key findings

- The project would consist of the establishment of a new dam, the resulting inundation, decommissioning of the existing Dungowan Dam and a new 32 km pipeline running to Dungowan Showground, along with ancillary activities such as road upgrades, quarrying pits and a power easement. The project would result in the impact of some 315 ha, of which 158 ha would be solely affected by inundation.

- Of the 17 discrete Aboriginal sites and places sites within, or near the project footprint, between 4 and 6 would be subject to direct impacts resulting in their complete or partial loss; five would be unaffected, including several of high cultural value; and six would be inundated by the eventual reservoir created. In addition, the project would directly impact some 2.2 ha of identified areas of high artefact densities and ~42 ha where such cultural material is more likely to be present based on predictive models; and inundate a further ~96 ha of these deposits. Academic studies demonstrate that submerged soil profiles within dams experience limited modification, and as such these sites and cultural deposits can be considered largely unaffected by the project. A low-density stone artefact background scatter is considered present across the entire project footprint and would also be adversely affected.

- While the project would result in some intergenerational/cumulative loss to material culture, it is considered that there would be numerous cultural heritage benefits. These include the long-term preservation of substantive inundated cultural material that would be inaccessible from future harm, a greater understanding of the past and contemporary values in the region, new 'created' Aboriginal spaces and opportunities for heritage interpretation and public outreach.

10.2 Project impacts

As outlined in Chapter 2, the proposed activity involves the establishment of a new dam, the resulting inundation, decommissioning of the existing Dungowan Dam and a new 32 km pipeline running to Dungowan Showground (Table 2.1; Figure 1.2). In addition to these main components is the requirement of road upgrades, borrow/quarry pits for material for the dam (and which are within the current inundation footprint), the establishment of a construction and accommodation camp, and installation of a power easement. These activities would result in impacts of 190 ha from the construction activities, and which includes ~70 ha associated with proposed pipeline; and a further 158 ha from inundation.

While specific design details remain conceptual, it is considered probable that the construction activities would impact >1 m of the upper soil profile. The foundations of the dam would be required to extend to bedrock, and thereby remove the upper soil profile, and the borrow/quarry pits are seeking to extract clay components of the lower soil profile, thereby removing the upper strata. The pipeline is proposed to be installed to ~2.2 m below surface and require a trench some 1.5-4 m in width, and similarly require the impact to the upper soil profile. The ancillary activities would require less disturbance, but even the installation of roads and temporary camps would typically undertake the removal of topsoil and compaction prior to establishment, and therefore impacts to the upper soil profile of at least 50 cm would be expected. All of these activities would require removal of trees and other surface debris (eg loose stones, etc) prior to establishment.

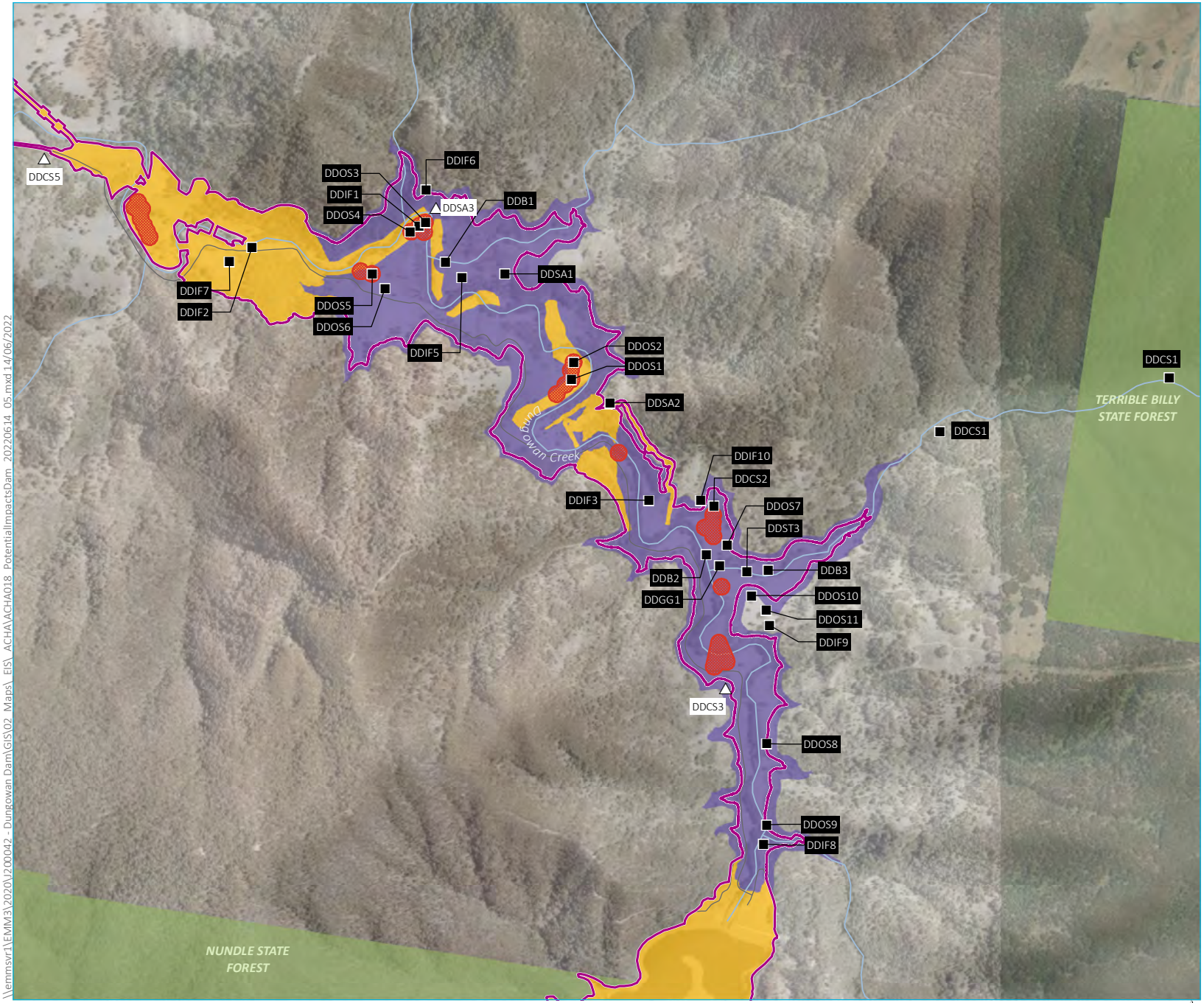
In the case of the inundation footprint, initial impacts would include the large-scale removal of vegetation and increased erosion to the upper reaches of the catchment (in the vicinity of the existing Dungowan Dam) as the valley fills – common to an alluvial fan – and this may impact upper soil profiles in these locales. However, numerous academic studies of existing dams internationally have demonstrated that the drowned soil profile elsewhere is relatively unaffected by inundation, with only discolouration and the loss of the organic surface (O horizon) being evident (eg Félix-Faure et al. 2019). Rather, the greatest impact from inundation is increased erosion along the reservoir's edge (the FSL and PMF levels) from wave action (eg Fagherazzi and Wiberg 2009; Vilhena et al. 2019). Specifically, Félix-Faure et al. (2019) states:

> In the annual drawdown zone [comparable to a fluctuating FSL in this report], upper horizons of submerged soils are eroded, especially near the upper shore and on slopes. In the permanently drowned area, silty sediments cover drowned soils. Compared to reference soils, forest soils drowned for 84 years maintain their original morphological differentiation, but colors are dull, and the humus (O horizons) have virtually disappeared.

Based on these studies, it can be considered that areas that are permanently drowned by the inundation would have little impact on the soil profile and any associated buried cultural materials; nor would surface finds be affected, albeit potentially buried in silt. Areas along the edge of the eventual reservoir would be subject to increased erosion and the soil profile adversely affected. Erosion protection materials such as rock armour may also be placed around sections of the inundation area shoreline to reduce such erosion. Some vegetation clearing up to 2 m above the FSL is also proposed, for which erosion controls will be required.

Consideration has also been given to the potential for impacts to occur as a result of flooding beyond the FSL+2 m level. Impacts from the disturbance activities up to the FSL+2 m level would result in impacts to a level comparable to the 1 in 50 year average exceedance probability (AEP) flood event. Rare events such as the 1 in 1000 AEP flood event would result in flooding of only 1 m above the FSL+2 m disturbance area, with the probable maximum flood (PMF) (a very rare event with an AEP of 1 in >5,750,000 years) extending approximately 9 m above the FSL+2 m disturbance area. Given the steep edges of the proposed inundation footprint, and the prevalence of cultural materials in close proximity to Dungowan Creek, it is considered that there would be little to no further Aboriginal heritage impacts beyond the FSL+2 m level. It is noted that key identified areas of cultural value (notably along Terrible Billy Creek) are outside the PMF level, with the possible exception of DDCS3.

The decommissioning of the existing Dungowan Dam would also result in additional impacts to the surrounding environment through construction activities. However, this area has already been subjected to substantive impact from the establishment of the original dam, and as such any impacts are likely to have limited adverse effect on unmodified soil profiles. As per the paragraph above, the existing inundation area for this dam would have encapsulated any buried cultural material if present, and the proposed retention of a small body of water would likely leave these deposits unaffected. Similarly, the greatest impacts would relate to wave erosion at the FSL level (and any associated engineering solution), although such impacts may have already occurred given its operation over the last several decades. It must, however, be highlighted that the existing dam's inundation zone may be used for spoil emplacement (Chapter 2), the deposition of which may have adverse effects on any surface or shallowly buried cultural deposits surviving within this locale. Additional recommendations to ensure the investigation of the existing Dungowan Dam footprint when access is possible is proposed to ensure Aboriginal heritage is suitably investigated and managed before any spoil emplacement.



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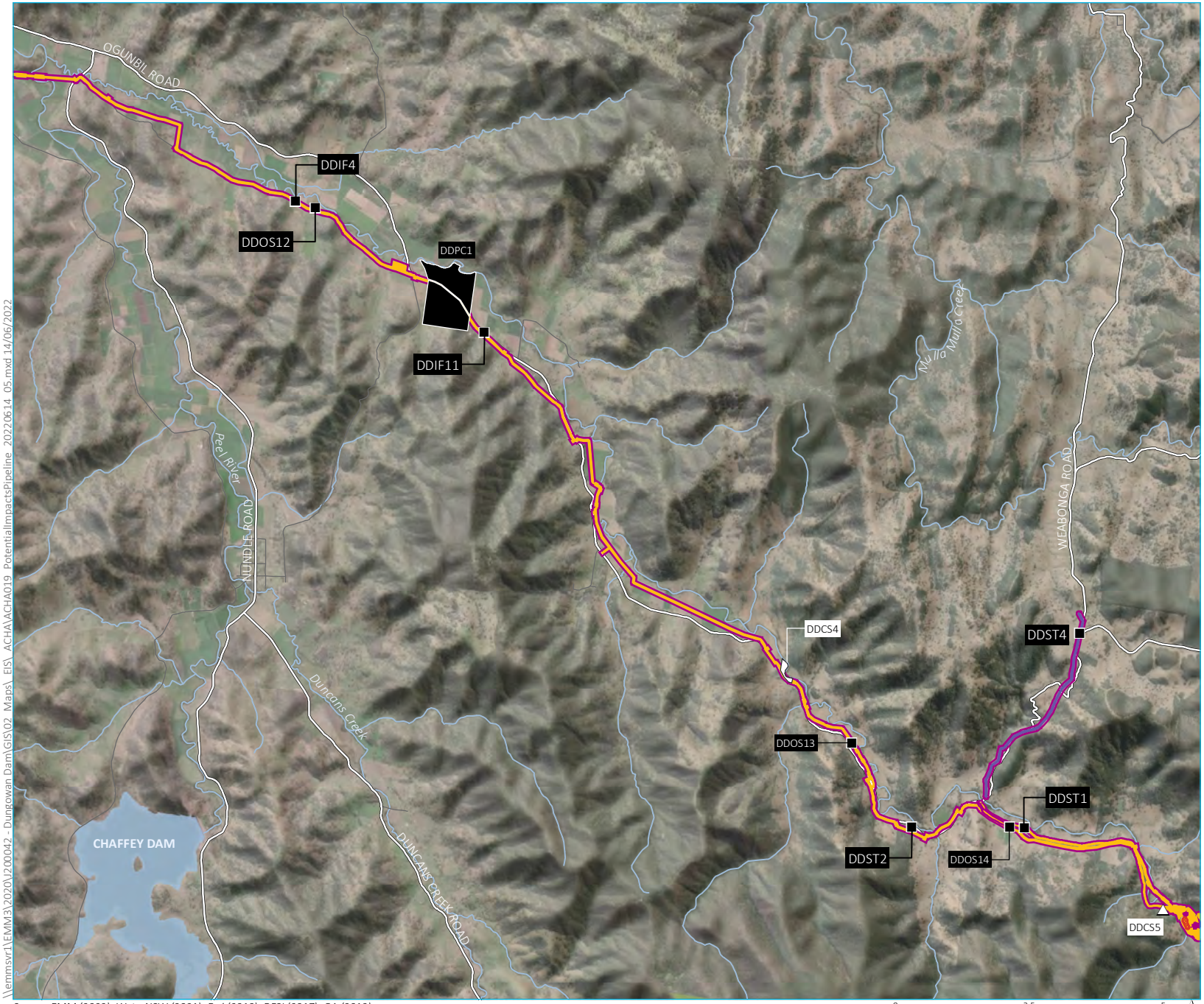
Source: EMM (2022); WaterNSW (2021); Metromap (2019); DFSI (2017); GA (2013)

Potential impacts - dam

Dungowan Dam and pipeline project
Aboriginal cultural heritage assessment
Figure 10.1a

EMM
creating opportunities



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Source: EMM (2022); WaterNSW (2021); Esri (2019); DFSI (2017); GA (2013)

Potential impacts - pipeline

Dungowan Dam and pipeline project
Aboriginal cultural heritage assessment
Figure 10.1b

EMM
creating opportunities

The operation of the New Dungowan Dam would result in changes to the streamflow regime in Dungowan Creek downstream of the proposed new Dungowan Dam and within the Peel River downstream of Chaffey Dam. Whilst the current streamflow regime is already affected by the operations of the existing Dungowan Dam and Chaffey Dam, streamflow has the potential to be incrementally different to the current streamflow regime. The potential effects of the project on streamflow was modelled by Hunter H2O on behalf of the New South Wales Department of Planning and Environment – Water (DPE-Water) and are described in detail in the Surface Water Assessment (EMM 2022a). Modelled changes to flow immediately downstream of the new Dungowan Dam, at Dungowan and immediately downstream of Chaffey Dam are shown in Figure 10.2, Figure 10.3 and Figure 10.4 respectively.

The modelling indicates that during dry periods, the new Dungowan Dam is able to capture some small flow events, which may otherwise have spilled to Dungowan Creek and releases from Chaffey may decrease slightly, presumably due to less run-of-river transfers to Calala and increased use of Dungowan pipeline. During wet periods, the new Dungowan Dam is able to capture some small flow events, which may otherwise have spilled to Dungowan Creek, with negligible effect on large events. Small reductions to flows in the 0 – 200 ML band in the Peel River upstream of Tamworth to Chaffey Dam are also expected. No change to flows are expected downstream of Tamworth.

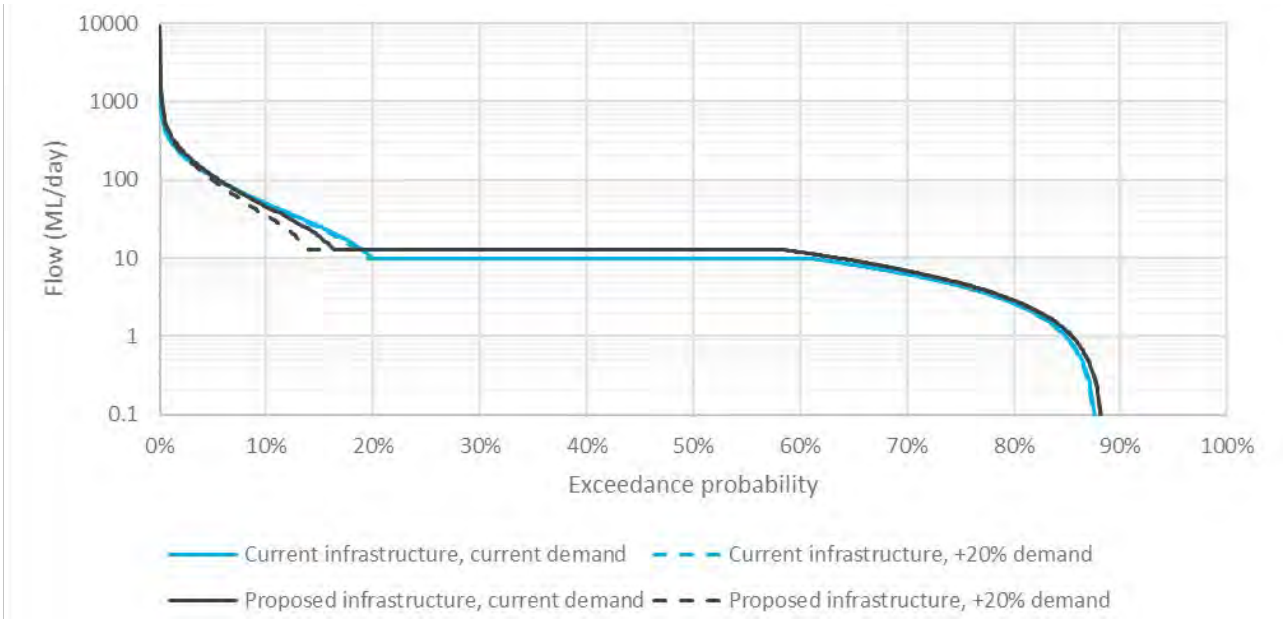

Figure 10.2 Flow duration curve immediately downstream of Dungowan Dam, current climate

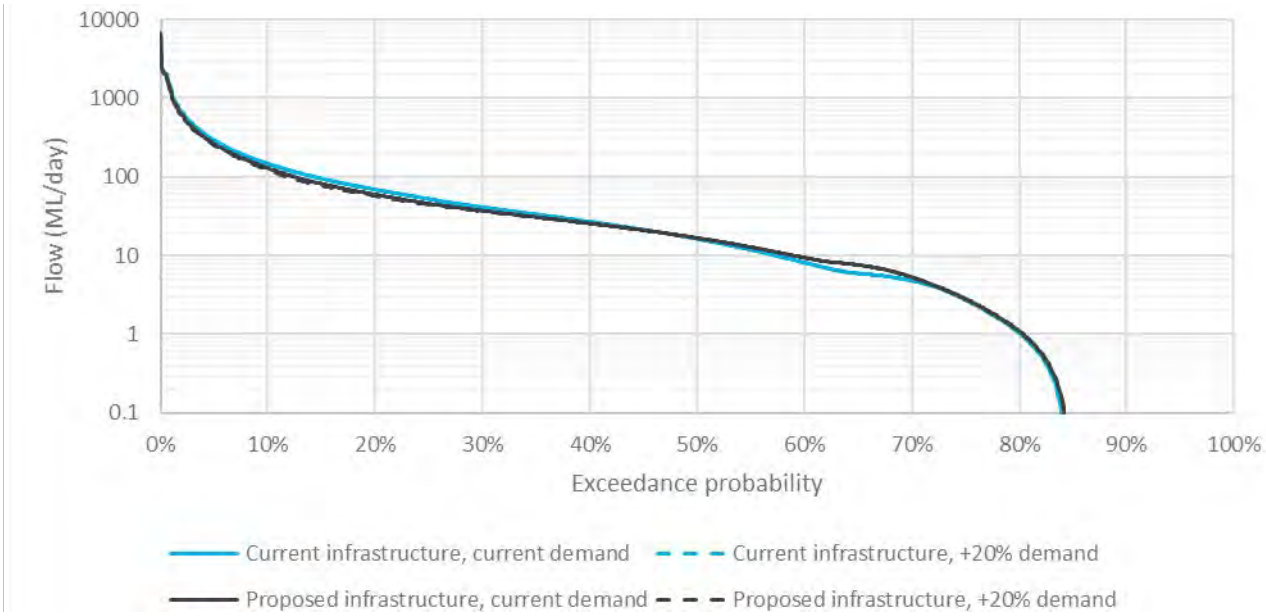

Figure 10.3 Flow duration curve at Dungowan (419103), current climate

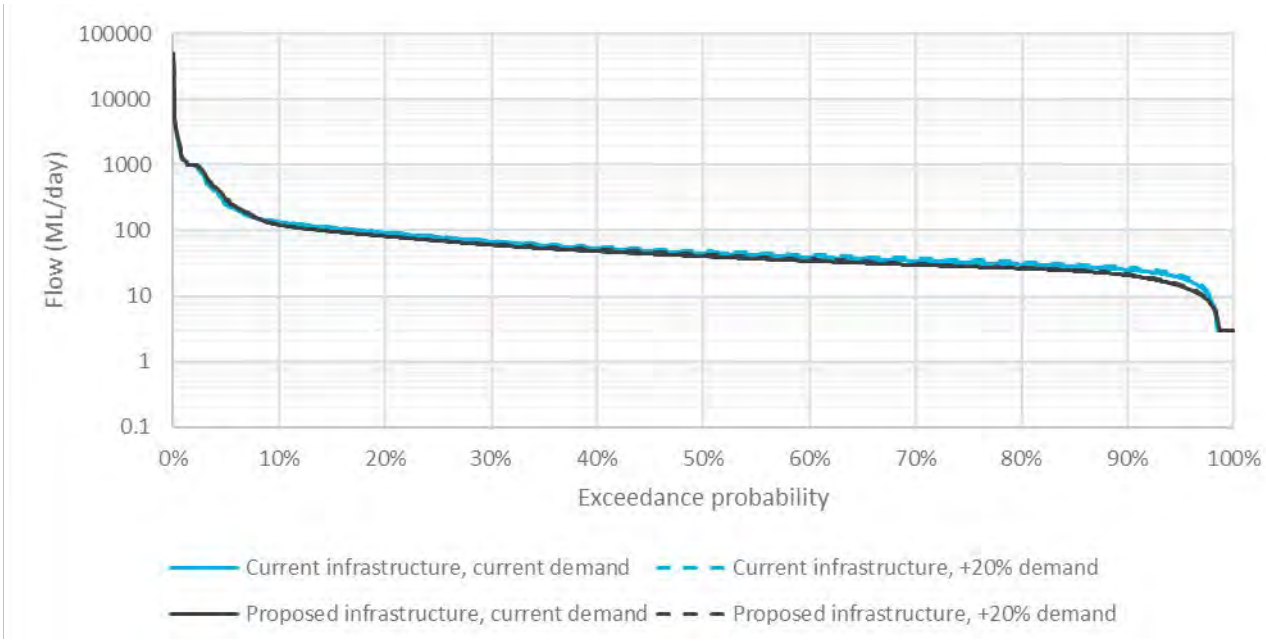

Figure 10.4 Flow duration curve at Chaffey Dam outlet (419045), current climate

The modelled changes to flow were also analysed to consider changes to the depth regime. Predicted changes in daily depth effects are presented at locations immediately downstream of the new Dungowan Dam, at Dungowan and immediately downstream of Chaffey Dam in Figure 10.5, Figure 10.6 and Figure 10.7 respectively.

Looking at the changes in depth immediately downstream of Dungowan Dam, Figure 10.5 shows there is predicted to be a general 1 cm increase in creek depth, due to the increase in transparent flow threshold from 10 ML/d to 13 ML/day. Figure 10.5 also indicates that 5% of the time, the new Dungowan Dam will cause depth to be more than 5 cm less than current, but also 5% of the time will cause depth to be more than 5 cm greater than current.

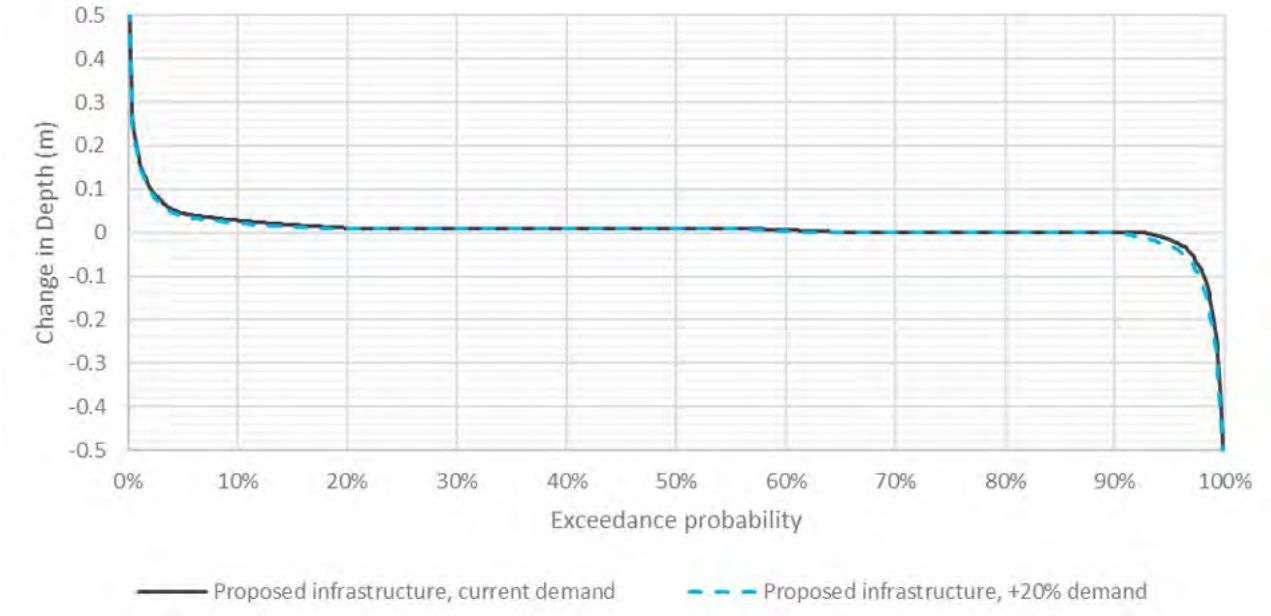

Figure 10.5 Daily depth effects immediately downstream of Dungowan Dam, current climate

At Dungowan (gauge 419103), Figure 10.6 shows no change to daily water depths through most of the plot and that for around 5% of the time the project may cause the depth to reduce by more than 5 cm. This is likely to be when the new Dungowan Dam is capturing inflows that would otherwise have gone down Dungowan Creek.

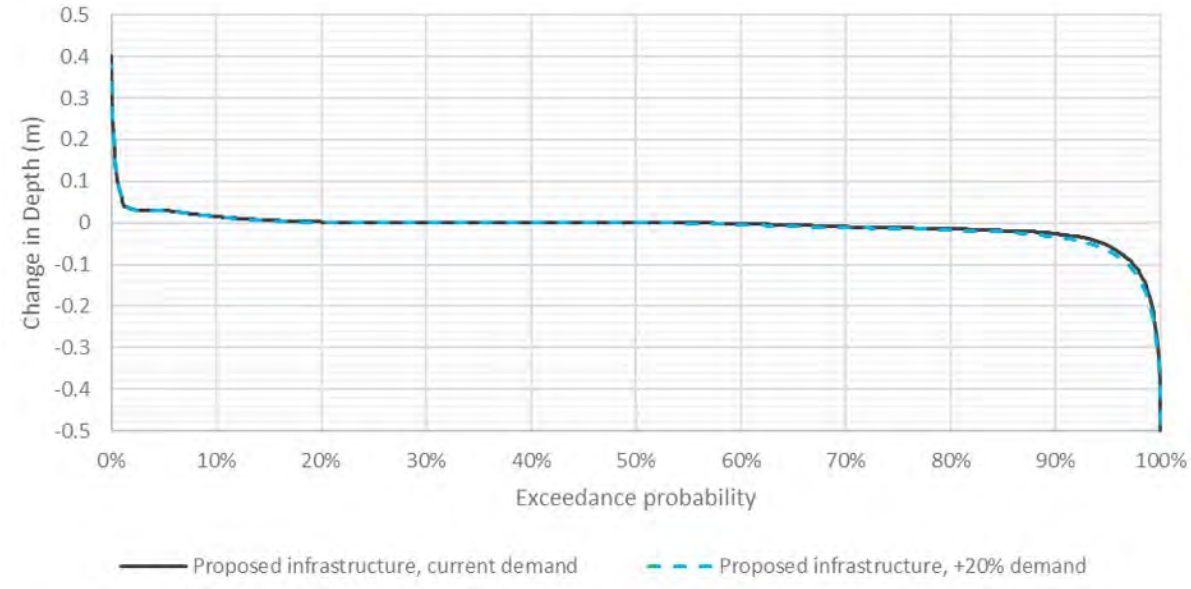

Figure 10.6 Daily depth effects at Dungowan (419103), current climate

At the Chaffey Dam outlet, Figure 10.7 shows that there is no predicted change in depth for about half of the time, a predicted reduction in depth of 0 - 4 cm for about 30% of the time, a predicted reduction in depth of 4 - 6 cm for about 10% of the time, and a predicted reduction in depth of over 6 cm for about 10% of the time. This is the effect of not releasing water from Chaffey Dam for run of river water supply transfers because water supply from the new Dungowan Dam would be prioritised over Chaffey Dam.

2% of the time the depth is predicted to be greater. This is likely due to increased chance of the dam spilling because it would supply less water to Tamworth and so would be allowed to fill more often.

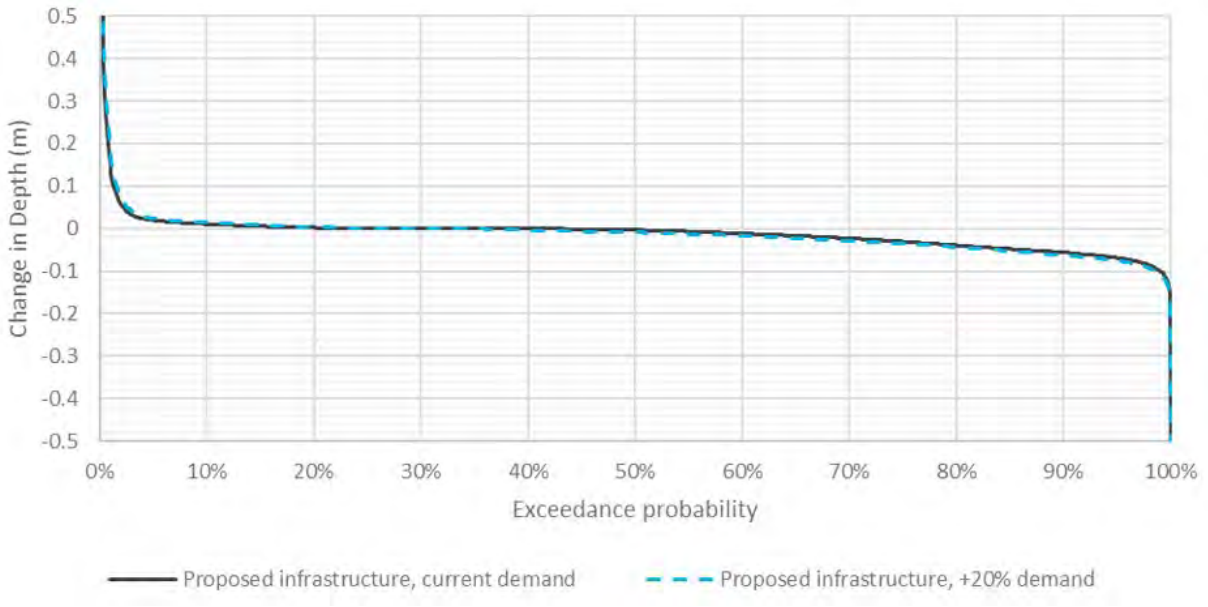

Figure 10.7 Daily depth effects at Chaffey Dam outlet (419045), current climate

Analysis of the overall depth regime at all locations considered indicates that that the minor changes to stream flow would result in negligible changes to stream depth.

10.3 Aboriginal heritage impact

Two types of potential impact are considered, direct and indirect. Direct impacts relate to the construction activities and their removal, truncation and/or disturbance of the ground surface. This would include the removal of vegetation, removal or modification of geological outcropping and the removal or disturbance of the upper soil profile. Indirect impacts are the result of both construction and post-construction activities that may result in environmental changes that would affect cultural material within, or near the project activities. General examples of indirect impact may include the burial of a soil profile resulting in its compression and indirectly damaging buried cultural material, or an increase in dust being blown into a rockshelter and negatively affecting art motifs should they be present.

All cultural material identified within the project footprint was either identified on the current land surface (eg stone arrangements, culturally modified trees) and/or buried within the upper ~1 m of the soil profile. As outlined in Section 10.2, several of the project activities would result in direct impacts to these sites and deposits.

Specifically, four of the identified sites (DDPC1, DDST1, DDST 3 and DDST 4) would be subject to direct impacts that would result in partial (DDPC1) or complete loss of value (DDST 1, DDST 3 and DDST 4); and a further two (DDSA1 and DDSA2) may be subject to direct and complete impact being in the vicinity of the FSL and predicted zone of wave erosion (Figure 10.1). Several of these only have a tentative classification at this stage. Six sites (DDCS2, DDGG1, DDSA3, DB1-3 inclusive) would be inundated and subject to indirect impacts, although based on details in Section 10.2 are not considered to result in their destruction, albeit being inaccessible in the future. Importantly, five sites (DDCS1, 2-4 inclusive, DDST 2) – and one of the low-density artefact scatters considered of

importance by Aboriginal participants (DDOS11) – are currently outside of the project footprint and would remain unaffected by the development activities. Several of these unaffected sites are considered of high scientific and/or cultural value (Figure 10.1).

In relation to the significant buried cultural deposits, of the 81,209 m^2 (~8 ha) encompassed within the seven discrete foci zones, some 45,411 m^2 (~4.5 ha, 56%) would be directly affected primarily by the new Dungowan Dam construction and borrow/quarrying pits (Table 10.1). These encompass DDFA A in its entirety, and parts of B-E inclusive. A further 842 m^2 of DDFA H and 1,165m^2 of DDFA F may also be directly impacted through being in close proximity to the FSL (within 30 m), where wave erosion may be expected. The remaining 42% of these deposits would ultimately be subjected to inundation (including parts of DDFA B-H inclusive), but while submerged would be unaffected by the project. It is however noted that the removal of vegetation on the surface of these sites may result in some adverse impacts to these deposits, and this needs to be considered as part of the management plans recommended for development in Chapter 11. When considering areas within 69 m of the major creek lines, and where cultural material of significance may be more prevalent, some 474,215 m^2 (~47 ha) would be directly affected and 720,141 m^2 (~72 ha) would be indirectly affected (ie inundated). The majority of these direct impacts would be associated with the proposed pipe alignment between the dam and Dungowan Showground. Based on these values, it is considered that a substantial portion (>60%) of these cultural deposits would remain unaffected and/or would be only submerged by the proposed activities, and therefore have no harm or resultant loss. However, access to these deposits would be lost, and this is discussed further in Section 10.4.

As demonstrated in Chapter 8, the entire project footprint is considered to encompass a low-density stone artefact background scatter of between 10-15 artefacts/m^2. Stone artefacts were either found as isolated objects and/or low-density artefact scatters as part of the field survey and/or as part of the test excavations in which few test pits were culturally sterile. The latter allowing extrapolation of these values across much of the project footprint. These findings reflect the long use of the Dungowan Creek valley over several millennia, but are considered to have limited archaeological significance. It would be expected that this background scatter would be encountered across much of the 190 ha disturbance zone, as well as within the broader inundation zone.

In relation to the existing Dungowan Dam, no specific cultural materials have been documented to date. However, it is expected that the current inundation zone would contain comparable cultural materials to those outlined above, especially buried stone artefact densities along the former Dungowan Creek. As with above, those deposits only subject to inundation would likely be unaffected by the project. However, those areas where spoil emplacement is proposed may be indirectly affected by the weight of such sediments being situated above them. Further recommendations including investigation, characterisation and management of these deposits (if present) are proposed in Chapter 11.

10.4 Intergenerational loss/equity

Intergenerational equity is the principle whereby the current generation should maintain the health, diversity and longevity of the environment for the benefit of future society. For Aboriginal heritage management, intergenerational equity can be considered primarily in terms of the cumulative impacts to Aboriginal objects, sites and/or places in a region. If few Aboriginal objects and places remain in a region (eg due to development impacts), there are fewer opportunities for future generations of Aboriginal people and the broader community to enjoy the cultural benefits. Information about the integrity, rarity and representativeness of the Aboriginal objects, sites and places that may be impacted, and how they inform the past visitation and occupation of land by Aboriginal people, are relevant to the consideration of intergenerational equity and the understanding of the cumulative impacts of a project. While not directly related to the ACHA process, such (future) impacts are also a critical issue for consideration under the *Native Title Act 1993* (see Appendix A for brief discussion).

Overall, the project would potentially result in the destruction of 3-5 identified Aboriginal sites, objects and/or places, as well as various amounts of buried stone artefactual material (Table 10.1). These consist of two potentially culturally modified trees, and the former Dungowan Station that would only be subject to partial impacts from a narrow pipeline easement (reflecting ~4% of the property), and two stone arrangements within the potential wave zone. In the case of the stone artefactual material, a single area of significant buried cultural material (DDFA A) would be lost, with several further past foci being partially affected. This amounts to some ~4.5 ha of known areas of past foci/occupation and considered of high scientific and cultural value, and a further ~47 ha of land where similar deposits may be present. There is also potential for the spoil emplacement area within the existing dam to adversely impact cultural materials that are currently inundated in these areas.

In contrast, the majority of the cultural material documented and/or predicted to be present within the project footprint would only be minimally affected by the project. This includes several of the sites identified as of *high* cultural value by Aboriginal participants that are entirely outside the project footprint. Many of the sites and deposits would be submerged following the completion of the dam and establishment of the reservoir. Evidence of other dam sites suggests that impact to these sites and deposits would be minimal, and constrained to minor burial by silts and sands, but no other substantial modification to the surface or soil profile would be expected. As such, these identified sites (n=6), places and deposits, many of moderate to high significance, and reflecting some ~72 ha spatially, would be unaffected by the proposed activities. Further, their resulting submergence in the new Dungowan Dam would result in their long-term conservation and survival into the future. Although it is acknowledged that while these cultural materials would be preserved for future generations, they would be largely inaccessible to the Aboriginal community while the dam remains – and as such may be considered an inter-generational loss by some individuals.

It must however be acknowledged that increasingly, engagement on this topic is seeking to move beyond the material culture to a more holistic consideration of heritage. Holtorf (2015:412) states:

> The acts of changing, destroying or replacing a heritage object in the landscape can all be seen as forms of interpreting, using and transforming this heritage…..The core values of heritage are increasingly deemed to reside in the meanings and values humans invest in heritage objects, not in their physical substance.

And (Holtorf 2015:408):

> …maintenance of the status quo of cultural heritage is widely perceived as being superior to any loss or possible substitution of that cultural heritage. But is it really justified in the interest of present or future generations to prioritise the conservation of existing cultural heritage over the prospect of gaining new cultural heritage [or knowledge of, and engagement with, that cultural heritage]?

Holtorf is not alone in his views, with DeSilvey and Harrison (2020:3-5) similarly stating:

> These kinds of statements about the future appear to normalise and lend moral weight to the mission of conservation practice, whilst detracting from a consideration of how the salvage paradigm in heritage is fundamentally premised on a system which is equally implicated in the sacrifice and loss of certain less valued cultural and natural formations alongside the preservation or conservation of more valued ones…
>
> Increasingly, heritage scholars are adopting integrated approaches to examine the politics of loss in both cultural and natural heritage contexts. A recent study of the effects of sea level rise on Kiribati, a low-lying island nation in the Pacific Ocean, for example, engages with questions about the extent to which an indigenous, largely oral culture can be 'preserved' outside its 'natural' and dynamic setting.
>
> …point to both the inevitability and the creative potential of loss and change. Such observations seem inescapable for heritage in light of the current recognition of the Anthropocene… it is clear that the more sophisticated ways of understanding, anticipating and engaging forms of heritage loss outlined here point not only to challenging new ways of 'doing' and practising natural and cultural heritage preservation,

conservation and management but also map out important new lines of enquiry for heritage studies in the future.

When considering the potential impacts from this perspective, the current and proposed impacts of the project and associated material culture loss, can be considered to have significant benefits. In the first instance, the investigations of the project footprint have significantly improved our archaeological and scientific understanding of a previously poorly understood region. Information on the past peopling and their activities within the footprint have now come to light, as well as an improved understanding of contemporary sites and values. Such information will only be added to and further refined through future stages of the project (see Chapter 11). This project also provides the Aboriginal community with opportunities to undertake heritage interpretation, development of narratives and visual representation of Aboriginal values, stories and places for the project footprint – something that is currently lacking from the Dungowan and Tamworth region. This would improve understanding and public outreach of cultural heritage to the broader community into the future. The RAPs have also expressed a desire to focus any relocated material culture from the project footprint to a specific locale (the former school site, DDCS5, has been frequently mentioned), and thereby provide a specific locale for future use by Aboriginal participants and the general community. Assuming such a locale eventuates through the project, the relationship of this 'created' Aboriginal place to the new Dungowan Dam would be in place for many decades to come, and this site too would form an important continuation and re-imagining of cultural heritage of the region for future generations.

Table 10.1 Summary of potential impacts to Aboriginal objects and/or sites.

Site	AHIMS #	Status	Significance	Type of harm	Location and/or activity causing harm	Degree of harm	Consequence of harm	Notes
DDCS1	25-3-0182	Valid	High	-	-	N/A	N/A	This site is situated in the upper catchment of Terrible Billy Creek, and is situated beyond the proposed inundation extent. Although the exclusion zone around the site as defined by the Aboriginal participants does extend into the project footprint.
DDCS2	29-3-0114	Tentative	Low	Indirect	Within inundation extent	None	No loss of value	
DDCS3	29-3-0113	Valid	Low	-	Within PMF zone	Potentially whole	Potentially complete loss of value	This site is situated on a spur that is situated above the FSL inundation extent, but within the PMF zone. While considered a rare event, if flooding occurred in this zone, fluctuating water levels would potentially result in direct impact and complete loss of this site.
DDCS4	29-3-0112	Valid	Low	-	-	N/A	N/A	This site is situated in close proximity, but outside the current alignment, of the proposed pipeline easement.
DDCS5	29-3-0111	Valid	Low	-	-	N/A	N/A	This site is situated in close proximity, but outside the current alignment, of proposed road upgrades.
DDPC1	29-3-0105	Tentative	Moderate	Direct	Pipe alignment	Partial	Partial loss of value	This is a poorly defined site and encompasses a significant area. The proposed works are not in the vicinity of the historical homestead, but may affect parts of the station through installation where post-contact activity has occurred.
DDGG1	29-3-0117	Valid	Low	Indirect	Within inundation extent	None	No loss of value	
DDSA3	29-3-0109	Valid	High	Indirect	Within inundation extent	None	No loss of value	
DDST1	29-3-0108	Valid	Low	Direct	Road infrastructure	Whole	Complete loss of value	This site is situated on the edge of an existing road verge. Should the road be expanded, it would require the removal of the tree.

Table 10.1 Summary of potential impacts to Aboriginal objects and/or sites.

Site	AHIMS #	Status	Significance	Type of harm	Location and/or activity causing harm	Degree of harm	Consequence of harm	Notes
DDST2	29-3-0122	Valid	Low	-	-	N/A	N/A	This site is situated in close proximity, but outside the current alignment, of the proposed pipeline easement.
DDB1	29-3-0115	Tentative	Moderate	Indirect	Within inundation extent	None	No loss of value	A nearby borrow/quarry pit has been redesigned to provide a minimum of 50 m from this site.
DDB2	29-3-0116	Tentative	High	Indirect	Within inundation extent	None	No loss of value	
DDB3	29-3-0118	Tentative	Moderate	Indirect	Within inundation extent	None	No loss of value	
DDSA1	29-3-0104	Tentative	Moderate	Potentially direct	Within inundation zone, within 30 m of the FSL	Potentially whole	Potentially complete loss of value	This site is within the inundation area and would not be subject to direct impacts from flooding. However, the site is close to the FSL and probable fluctuating water levels would potentially result in direct impact and complete loss of this site.
DDSA2	29-3-0120	Tentative	Moderate	Potentially direct	Borrow/quarrying activities	Potentially whole	Potentially complete loss of value	This site is currently outside proposed borrow/quarry pit activities. However, it is within 20 m of some of these activities and may be affected.
DDST3	29-3-0121	Tentative	Moderate	Direct	Within inundation extent	Whole	Complete loss of value	While within the inundation extent, removal of vegetation within this zone, and as such would result in the removal of this site.
DDST4	29-3-0119	Tentative	Moderate	Direct	Within power easement	Whole	Complete loss of value	The site is currently within the power easement and would likely require removal prior to installation.

Table 10.1 Summary of potential impacts to Aboriginal objects and/or sites.

Site	AHIMS #	Status	Significance	Type of harm	Location and/or activity causing harm	Degree of harm	Consequence of harm	Notes
Low density (background) artefact scatter, including DDIF1-11 inclusive and DDOS1-10 and 12-14 inclusive (DDBAS1)	29-3-0107	Valid	Low	Direct/indirect	All activities listed in Section 10.2	Partial	Partial loss of value	This site is considered to extend across the entire project footprint and extend beyond it. Several discrete observations of this site, including DDOS10, DDIF9, DDOS8, DDOS9, DDIF6, DDIF9, DDIF11 are also outside the proposed activities. Overall, the direct development activities would impact some 190 ha of this site (ie the entire project footprint).
DDOS11	29-3-0110	Valid	Moderate	-	-	N/A	N/A	This site is situated on a spur that is situated above the FSL inundation extent, and will be unaffected by the proposed activities.
DDFA A	29-3-0124	Valid	High	Direct	Construction and accommodation activities	Whole	Complete loss of value	This site is entirely within the proposed dam wall footprint.
DDFA B	29-3-0123	Valid	High	Direct/indirect	Borrow/quarrying activities; within inundation extent	Partial	Partial loss of value	Some 1,664 m^2 (24%) of the site would be directly impacted by borrow/quarrying activities, with the remaining 5,190 m^2 being subjected to inundation.
DDFA C	29-3-0130	Valid	High	Direct/indirect	Borrow/quarrying activities; within inundation extent	Partial	Partial loss of value	Some 6,171 m^2 (61%) of the site would be directly impacted by borrow/quarrying activities, with the remaining 4,019 m^2 being subjected to inundation.
DDFA D	29-3-0129	Valid	High	Direct/indirect	Borrow/quarrying activities; within inundation extent	Partial	Partial loss of value	Some 12,040 m^2 (84%) of the site would be directly impacted by borrow/quarrying activities, with the remaining 2,273 m^2 being subjected to inundation.
DDFA E	29-3-0128	Valid	High	Indirect	Within inundation extent	None	No loss of value	A very small portion (50 $m^{2;}$ 1%) of the site would be directly impacted by borrow/quarrying activities, with the remaining 3,674 m^2 being subjected to inundation.

Table 10.1 Summary of potential impacts to Aboriginal objects and/or sites.

Site	AHIMS #	Status	Significance	Type of harm	Location and/or activity causing harm	Degree of harm	Consequence of harm	Notes
DDFA F	29-3-0127	Valid	High	Potentially direct/indirect	Within inundation zone, but in close proximity to the FSL	Potentially partial	Potentially partial loss of value	This site is largely inundated, but 1,165 m^2 (8%) are within 30 m of the FSL and may be subject to impacts from wave action.
DDFA G	29-3-0126	Valid	High	Indirect	Within inundation extent	None	No loss of value	
DDFA H	29-3-0125	Valid	High	Potentially direct/indirect	Within inundation zone, but in close proximity to the FSL	Potentially partial	Potentially partial loss of value	This site is largely inundated, but 842 m^2 (8%) are within 30 m of the FSL and may be subject to impacts from wave action.
Major tributaries 3rd+ order creek edge's (69m) (DDPAD1)	29-3-0106	Valid	Moderate	Direct/indirect	All activities listed in Section 10.2	Partial	Partial loss of value	Some 474,215 m^2 of this zone would be directly impacted by the project activities, with a further 720,141 m^2 being subjected to inundation. Of this, some 261,726 m^2 (21%) of the direct impacts would be to the more sensitive terraces where higher amounts of cultural material may be expected.

Notes: The type, degree and consequence of harm definitions are based on DECCW's Code of Practise for the Archaeological Investigation of Aboriginal objects in NSW.

11 Management strategy and recommendations

11.1 Key findings

- The ACHA concludes that 17 Aboriginal objects and/or sites are within or near the project footprint, along with a complex landscape of buried stone artefactual material (Chapter 8). Of the identified sites, up to 12 would be either directly (n=4-6) or indirectly (n=6) affected by the project. Some 4.5 ha of identified areas of high artefact densities and ~47 ha of zones where they may be expected to occur would be directly affected; and a further ~72 ha would be indirectly impacted.

- A series of investigative actions are proposed to validate the identification of several of the sites that cannot be robustly identified as cultural heritage without specialist input and/or further archaeological research (Section 11.2). General discussion on the methods and approaches to some of the mitigation measures is also undertaken (eg the scale and scope of future archaeological excavations).

- Recommendations are proposed for inclusion in the project approval to guide post-approval requirements for Aboriginal heritage (Section 11.3). These include the development of an Aboriginal Cultural Heritage Management Plan (ACHMP) to provide a framework for such activities, as well as direction on its content; the development of an Interpretation Strategy and Plan to provide acknowledgement and other visual/educational opportunities for the Aboriginal and broader local community; and the application of a Cultural Flow Management Plan to further explore and manage hydrological regimes downstream if affected by the project and their impact on places of cultural value.

11.2 Management strategy

The assessment outlined in the preceding sections, and including Aboriginal consultation with 17 organisations, included cultural mapping, field survey and test excavations. Each of these activities identified various areas and locales of archaeological and/or cultural value.

Ultimately, on ratifying this data, some 17 Aboriginal objects and/or potential sites were identified within or near the project footprint, as well as a complex pattern of surface and buried stone artefactual material along the banks of Dungowan Creek and other major tributaries. The identified sites consisted of several places of cultural value to specific RAPs (eg the former residence of a key knowledge-holder) and/or the broader Aboriginal community (eg ceremonial activities and a Creation Ancestor stone arrangement), and a number of archaeological sites dominated by culturally modified trees and stone arrangements. As well as these identified sites, a substantial number of stone artefacts both on the surface and buried within the upper 1 m of the soil profile were documented. These were divided into three main zones:

1. seven identified locales of high-density cultural material considered of high research potential (DDFA A-G inclusive);

2. areas within 69 m of major tributaries (3rd order and above) where dense cultural materials are more likely to be present; and

3. the remainder of the project footprint where a background scatter of artefacts between ~10-15/m^2 would be expected, and considered to reflect the ephemeral use of the region for >6 ka. During the field survey, a number of isolated objects and/or low density artefact scatters were documented separately (Section 7.2.2), but these were ultimately integrated into one of these three classifications.[8]

Of the identified sites, up to 12 would be either directly (n=4-6) or indirectly (n=6) affected by the project. Some 4.5 ha of identified areas of high artefact densities and ~47 ha of zones where they may be expected to occur would be directly affected; and a further ~72 ha would be indirectly impacted. The indirect impact reflects the inundation of these sites and deposits following the construction of the new Dungowan Dam, removal of vegetation, and establishment of a reservoir. However, numerous academic studies demonstrate that, with the exception of the edge of the reservoir, inundated areas would be relatively unaffected by their submergence. Hence, these sites and deposits are considered to be *conserved* through this process, and would be protected from future impacts through their submergence. It can therefore be concluded that the project would result in the conservation (through inundation) of six of the identified sites and ~72 ha of cultural deposits of high research value or the potential for them to be present. It is acknowledged that the submergence of these sites would limit their access to current and future Aboriginal people, and as such may be considered a form of intergenerational loss. Given this loss of access, several of the Aboriginal participants have sought the need for some mitigation activities of these inundated sites, and these are incorporated into the recommendations below.

Several of the sites have, however, been identified only tentatively, lacking archaeological features or regional comparisons that would allow their classification as an Aboriginal object or site. These are primarily either culturally modified trees or stone arrangements – the latter also considered to be potential burial markers by Aboriginal participants – both of which can be the result of natural, farming and/or pastoral activities. Given the uncertainty in relation to these sites, it is recommended that additional specialist investigations are undertaken prior to the project commencement to clarify their status, and ultimately the management of these sites. Such analysis should include, but not be limited to:

- Culturally modified trees – these trees should be subject to inspection by an arboricultural consultant to provide further advice. Typically, an arborculturist would provide advice on the age of the tree – having to be at least 130 years old to intersect with known traditional tree scarring practises – and identify whether natural mechanisms may explain the scar in question. Where a natural explanation can be identified, the site can be discounted as an Aboriginal site and would no longer form a constraint to the project. Where the arborculturist cannot provide a natural explanation, it provides increasing evidence that the site is of cultural origin, and should be treated as an Aboriginal site with suitable management and mitigation measures.

- Stone arrangements – determining stone arrangements, which are often dominated by local unmodified raw materials, can be highly problematic. Two methods to further interrogate these sites may include: 1) a comparative analysis with other documented Aboriginal stone arrangements in the local and broader region to identify similar characteristics and composition to validate an anthropogenic origin; and 2) analytical field investigations of the site, which should include the detailed measurement of stone raw materials – larger and consistent sizing being more likely of Aboriginal origin, in contrast to pastoral activities, which more commonly bulldoze or plough all stone material encountered; and the partial deconstruction of the stone arrangement to identify any indications of an Aboriginal origin through the nature of the construction and any other cultural material that may be within the site. In the event that these sites prove to be of Aboriginal origin, further consideration of their identification as potential burial

[8] A single small artefact scatter, DDOS11, has been considered separately in some parts of the report, since it was given a greater level of cultural significance by an Aboriginal participant due to its proximity on Terrible Billy Creek. However, from an archaeological perspective, it can be considered part of the continuous background scatter within the project footprint.

markers should be considered, which may include Ground Penetrating Radar (GPR) or other methods for identifying such site types.

In NSW, Aboriginal objects are provided with statutory protection by the *National Parks and Wildlife Act 1974*. In general, where a proposed activity will result in harm to an Aboriginal object, an application must be made and an Aboriginal Heritage Impact Permit (AHIP) must be granted before any harm may occur. If granted, the AHIP will contain conditions intended to manage and mitigate the identified impact, and allowing harm to proceed. As the project is a CSSI project, an AHIP is not required. The identified harm and any mitigation measures will instead be assessed through the EIS and, if consent to harm is granted, included within the project's conditions of approval. The conditions of approval of a CSSI project generally incorporate Aboriginal heritage management requirements based on advice from Heritage NSW, and the recommendations of this assessment (Section 11.3). For the purposes of this project, recommendations below include the further validation of the tentative site listings (Table 5.1 and Table 7.3), and the development of an Aboriginal Cultural Heritage Management Plan (ACHMP) to provide the post-approval management framework for all future Aboriginal heritage requirements for the project. The recommendations also outline the further specific mitigation measures to be included in the ACHMP that should be implemented prior to, during and after the project construction. These include measures to further investigate and salvage (conservation ex situ) areas of high research potential (DDFA A-H inclusive) and zones within 69 m of major water tributaries, archival recording of all identified sites subject to impact, further investigate the existing Dungowan Dam inundation areas when accessible, any other recovery and/or collection procedures, implementing suitable monitoring and management of lesser impacts, completing any post-excavation analyses and reporting, and lodging the various documentation with appropriate public repositories.

Given the potential destruction and/or future inaccessibility from inundation of the eight zones of high artefact densities (DDFA A-H inclusive), it is recommended that these are subject to additional excavations and recovery (conservation ex situ). Given some of these foci will be relatively unaffected, albeit inundated, these works should focus on DDFA A-D inclusive and F that are all subject to direct impacts. However, DDFA E, G and H should also be considered for proportionate excavation given their inaccessibility into the future. The additional excavations at these sites have the full support of the Aboriginal participants in the project. While the specific methodologies and quantum of these excavations would be developed as part of the ACHMP in consultation with the project team and Aboriginal participants, a number of guiding principles should be adopted, including:

- investigative phase – the excavations undertaken as part of the ACHA were disparate and widely spaced to maximise investigation of the project footprint. As such, an additional stage of investigative test pits across the areas of high artefact density is needed to identify places within its curtilage that contain the most significant parts of the deposit. Such works should use a high-resolution systematic grid of test pits spaced 20-30 m across the site. Excavations should be undertaken manually in discrete test pits (1 m^2), use 10 cm spits for recovery, wet-sieve all sediment through a 5 mm mesh, recover suitable palaeo environmental and chronological sampling, and undertake appropriate recording;

- salvage phase – once the test pits containing the highest significance are identified, archaeological salvage excavation (conservation ex situ) of the area/s should be undertaken. Depending on the number of high value locales and the nature of the impacts, salvage excavation may focus on some or all of these test pits. In accordance with current best practice, all salvage works should consist of initially 25 m^2 of contiguous open area excavation centred on the test pit/s of interest, and expanding up to 100 m^2 where suitable thresholds are met (eg continuing high density of artefact numbers, unique characteristics, etc). Excavations should be undertaken manually in discrete test pits (0.25-1 m^2), use 5 cm spits for recovery, wet sieve all sediment through a 3mm mesh, recover suitable palaeo environmental and chronological sampling, and undertake appropriate recording; and

- post-excavation analysis and reporting – a suitable program of analysis of the recovered samples and assemblage should be undertaken and reported upon to provide 'preservation by record'. Analysis should include processing of chronological samples (eg optically stimulated luminescence, radiocarbon), palaeo environmental samples (eg particle size, geochemistry, pollen analysis, etc), and stone tool analysis. The potentially long construction timeframes of this project significant increase the risk of cultural materials being lost or misplaced, and as such as part of the post-excavation analysis of any works, the short and long term curation of any cultural materials needs to be suitably discussed and documented.

The same principles outlined above can also be adopted for those areas within 69 m of major tributaries that may be directly impacted by the proposed activity. This is primarily proposed along the pipe alignment, which has received only limited ground-truthing as part of the ACHA. Management of these areas may include either minor redesign or re-alignment of the route to areas >60 m from creeklines, and/or adopting an investigative/salvage approach outlined above for these zones. Given the large spatial area of zones within 69 m of Dungowan Creek and tributaries within the inundation footprint (~72 ha), these guiding principles would need to consider a more limited targeted and/or sub-sampling approach to make them practical for the project.

In the case of the background artefact scatter, no further mitigation measures are recommended. It has been demonstrated that between 10-15 artefacts/m^2 would be expected across the project footprint, which reflects the ephemeral use of the region by Aboriginal people for several millennia. It is considered that further investigation of these areas would not alter the significance or understanding of these cultural deposits.

In addition to the tangible cultural materials within the project footprint, a wide range of intangible and cultural values were identified, which the RAPs frequently had more interest and concern about. This included some discussion over cultural flows of Dungowan Creek. Given this focus during the consultation process, and the potential impact to cultural sites and social history places, two further mitigation activities are included in the recommendations:

1. The development of an interpretation strategy, interpretation plan, and their implementation to explore, develop and present Aboriginal heritage values of the site. These documents should focus on three main areas of Aboriginal heritage: (i) the ethnographic and historical record, which includes post-contact and contemporary associations with the site and immediate environs; (ii) consultation and input from the RAPs (with feedback to date indicating a desire for visual acknowledgement of country ownership and education opportunities for the local school community (DDCS5 has frequently been identified as a possible location for this), endemic plants to form part of any landscaping, and for consideration of other contemporary connections to the region); and (iii) information obtained from the archaeological excavations and findings undertaken for the project on the cultural and environmental landscape within which past Aboriginal people interacted with in the past; and,

2. Given the potential hydrological changes downstream, albeit negligible as discussed in Section 10.2, the development and implementation of a cultural flow management plan to outline objectives for cultural flows of Dungowan Creek, Peel River and any other identified major tributaries, should be undertaken. The plan should include the compilation of cultural and environmental information about the major river systems, determine the specific cultural values and places affected by water flows, determine the requirements to maintain their cultural integrity, identify the sources of the water flows and their management to maintain their flows following the development of the dam, and outline monitoring requirements to support the plan. Water Infrastructure NSW should consider synergies of this plan with other downstream adaptive management requirements, such as biodiversity values.

Towards the end of the ACHA process, the RAPs expressed increasing focus on the long term curation of any recovered cultural assemblage from the project footprint. The details of such curation is proposed for inclusion in the ACHMP recommended in Section 11.3. However, it is further highlighted that the RAPs have a strong interest in: 1) ensuring the assemblage remains on Country, either in close proximity to the project footprint or Tamworth; and 2) the assemblage remains accessible to allow education and cultural tours (or equivalent), so scattering on a

surface rather than re-burial for example. Close consultation with the RAPs in determining the final curation approach and methods is recommended.

11.3 Recommendations

Where feasible, Water Infrastructure NSW should consider modifying the project design and construction footprint to avoid identified Aboriginal objects and/or sites identified and areas of significant buried cultural material (or where they have a high likelihood of being present) within the project footprint.

Where altering the design proves unfeasible, the following recommendations should be integrated into the management for the project:

- Prior to ground disturbance, an Aboriginal Cultural Heritage Management Plan (ACHMP) must be developed by a heritage specialist in consultation with the Registered Aboriginal Parties (RAPs) and consent authority to provide the post-approval framework for managing Aboriginal heritage within the project area. The ACHMP should include the following issues:
  - processes, timing, communication methods and project involvement (eg on-site activities) for maintaining Aboriginal community consultation and participation through the remainder of the project. This should include a grievance mechanism that is readily available and designed for use by the local Aboriginal community;
  - if not previously completed, provide descriptions and methods for undertaking further investigation and assessment of the sites currently assigned a tentative classification (DDBB1-4 inclusive, DDSA1 and 2, DDST3) to gain a comprehensive understanding of these sites for subsequent management through the project;
  - if not previously completed, provide descriptions, methods and timing for undertaking further investigation, assessment and management of the existing Dungowan Dam inundation zones following de-watering, to gain a comprehensive understanding of any cultural materials for subsequent management through the project (and with specific reference to impacts from any spoil emplacement);
  - detail descriptions and methods of any additional investigative and/or mitigative archaeological actions that may be required prior to works commencing or during the project. These should include, but not limited to, archival recording of all identified Aboriginal objects, sites and places; archaeological excavation of areas of significant buried cultural material (DDFA A-H inclusive) and where direct impacts are proposed within 69 m of 3rdorder or higher creeks (including Dungowan Creek and Peel River); targeted archaeological excavation of areas where indirect impacts (eg inundation, vegetation removal) are proposed within 69 m of 3rd order or higher creeks (including Dungowan Creek and Peel River); and/or cultural monitoring for any areas identified by Aboriginal community as having cultural value. Further details of these activities are presented in Section 11.2. For these activities, details of location/s, methods, personnel, and timing should be included;
  - description and methods of actions to minimise any inadvertent impacts to identified Aboriginal objects and/or sites and areas of archaeological sensitivity outside of the construction footprint. This should include, but not be limited to, cultural inductions for all personnel and subcontractors outlining their location and significance, fencing and clear marking of heritage sites and zones of interest in close proximity to proposed works, appropriate screening for sensitive and gender-specific areas, and any additional requirements identified by the Aboriginal community. A suitable regime of monitoring these activities should also be outlined, including locations, methods, personnel and timing;

- description and methods for undertaking further Aboriginal heritage assessment, investigation and mitigation of any areas of the project footprint that have changed following completion of the ACHA and/or during the final design and construction phases of the project;

- description and methods of post-excavation analysis and reporting of the archaeological investigations and activities implemented as part of the ACHMP. For excavations, these should include suitable collection and processing of stone artefacts, and chronological, soil, and environmental samples;

- procedures following current Water Infrastructure guidelines for managing the unexpected discovery of Aboriginal objects, sites and/or human remains during the project;

- procedures for the curation and long-term management of cultural materials recovered as part of the works outlined in the ACHMP and any preceding stages associated with the project. Discussions with RAPs indicate that any curation should remain on Country and remain accessible to the local Aboriginal community into the future; and

- processes for reviewing, monitoring, and updating the ACHMP as the project progresses.

- A heritage-interpretation strategy must be developed by a heritage specialist to identify the interpretive values of the project footprint, and specifically Aboriginal heritage values across the project footprint, and to provide direction for potential interpretive installations and devices. This strategy should be made available for consultation and feedback with the RAPs. Following consultation and feedback on the strategy, a heritage interpretation plan would refine the strategy with content (visual and textual) and design details in order to allow the implementation stage. The interpretation strategy and interpretation plan must include consideration of three main components identified though the ACHA process:

  - input and feedback from the RAPs, which to date include a number of cultural sites and social history places from both traditional and contemporary connection of the project footprint with the Aboriginal community; and a range of flora and fauna that have totemic, medicinal and/or economic association with the Aboriginal community;

  - the historical record of the study and its immediate environs, which has documented associations with Aboriginal people, dating to the post-contact period; and

  - the past cultural and environmental landscape informed by current archaeological investigations and analysis of the ACHA, and any future activities that may result from the project (eg archaeological salvage of key locales).

- Whilst impacts to streamflow within Dungowan Creek and the Peel River are anticipated to be negligible, as discussed in Section 10.2, some change to the existing streamflow regime will occur as a result of the project. To ensure potential impacts to Aboriginal sites, objects and/or places are considered in the development of environmental water release plans and other mitigation strategies for the project, a cultural flow management plan (CFMP) must be developed by heritage and water specialists in consultation with the RAPs and consent authority to provide the post approval framework for management and monitoring of water regimes in the vicinity of key Aboriginal sites, objects and/or places within the project area. The CFMP should include the following issues:

  - processes, timing, and communication methods for maintaining Aboriginal community consultation and participation through the development and operation of the document;

- a background description of the Aboriginal sites, objects, places and values, and their significance; and information on how water influences their significance and integrity. This may require additional investigations of affected areas to identify Aboriginal sites, objects, places and values that are not addressed in the ACHA;
- an overview of the catchment or river systems, including hydrological information from prior to, and following establishment of the dam;
- clear objectives for the cultural flow in maintaining the significance of the Aboriginal sites, objects, places and values;
- description of how water will be managed into the future to maintain necessary water regimes; and any constraints/limitations. This should include information on key personnel to manage and monitor these regimes;
- a risk assessment, with a description of how they would be minimised, and any management requirements if they eventuate; and
- how the water regime associated with the Aboriginal sites, objects, places and values would be monitored, including methods and timing.

- The Construction Environment Management Plan (CEMP), or equivalent, should reinforce how the cultural landscape is considered throughout the project and detail the rehabilitation of the project area. In discussion with the Aboriginal community, rehabilitation of areas where infrastructure is not remaining after the project should be undertaken to determine suitable ecological communities and other factors in returning the cultural landscape as close to its current state as feasible.
- Consultation should be maintained with the RAPs during the finalisation of the assessment process and throughout the project.
- A copy of the ACHAR should be lodged with AHIMS and provided to each of the RAPs.
- AHIMS Site Recording Forms for the newly identified Aboriginal objects and/or sites within the project area and areas of archaeological sensitivity should be submitted to the AHIMS database once their validation has been completed.
- Where the heritage consultant changes through the project, suitable hand over should be undertaken to minimise loss or mistranslation of the intent of the information, findings and future steps in heritage management occur.

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Abbreviations

Abbreviations

AHD	Australian Height Datum
ACHA/ACHAR	Aboriginal cultural heritage assessment report
AHIMS	Aboriginal Heritage Information Management System
ACHMP	Aboriginal Cultural Heritage Management Plan
BP	Years before present
c.	circa
cm	centimetres
DEC	Department of Environment and Conservation, now Heritage NSW
DECCW	Department of Environment Climate Change and Water, now Heritage NSW
DPC	Department of Premier and Cabinet
DPE	Department of Planning and Environment, now DPIE
DPIE	Department of Planning, Industry and Environment
EIS	Environmental Impact Statement
EMM	EMM Consulting Pty Ltd
EP&A Act	*Environmental Planning and Assessment Act 1979*
ESD	Ecologically sustainable development
FGS	Fine grained siliceous
g	grams
GIS	geographical information system
GPS	global positioning system
ha	hectare
ICOMOS	International Council on Monuments and Sites
IMTC	Indurated mudstone/tuff/chert
km	kilometres
LALC	Local Aboriginal Land Council
LEP	Local Environmental Plan
LGA	Local Government Area
m	metres
m^2	square metres
mm	millimetres
n	Number

Abbreviations

NSW	New South Wales
OEH	Office of Environment and Heritage, now Heritage NSW
PAD	Potential archaeological deposit
RAP	Registered Aboriginal Party
SEARs	Secretary's Environmental Assessment Requirements
t	Tonne
TP	Test pit

Glossary

Many of these definitions have been taken from the *Code of Practice for archaeological investigation of Aboriginal objects in NSW* (DECCW 2010).

Aboriginal object: A physical manifestation of past Aboriginal activity. The legal term is defined in the *National Parks and Wildlife Act 1974* section 5 as: any deposit, object or material evidence (not being a handicraft made for sale) relating to the Aboriginal habitation of the area that comprises New South Wales, being habitation before or concurrent with (or both) the occupation of that area by persons of non-Aboriginal extraction, and includes Aboriginal remains.

Typical examples include stone artefacts, grinding grooves, Aboriginal rock shelters which by definition include physical evidence of occupation, midden shell, hearths, stone arrangements and other landscape features which derive from past Aboriginal activity.

Archaeological survey: A method of data collection for Aboriginal heritage assessment. It involved a survey team walking over the land in a systematic way, recording information. Activities are not invasive or destructive.

Aboriginal culturally modified tree: A tree of sufficient age to have been mature at the time of traditional Aboriginal hunter-gatherer life and therefore generally of more than 220 years ago with evidence of bark or cambium wood removal for the purpose of implement manufacture, footholds, bark sheet removal for shelter, or extraction of animals or other food. Care must be taken to distinguish Aboriginal scars from the much more common natural causes of branch tear, insect attack, animal impact, lightning strike and dieback. Culturally modified tree recognition guidelines exist to distinguish these features. Naturally scarred trees are often misidentified as Aboriginal culturally modified trees.

Aboriginal site: The location where a person in the present day can observe one or more Aboriginal objects. The boundaries of a site are limited to the extent of the observed evidence. In the context of this report a 'site' does not include the assumed extent of unobserved Aboriginal objects (such as archaeological deposit). Different archaeologists can have varying definitions of a 'site' and may use the term to reflect the assumed extent of past Aboriginal activity beyond visible Aboriginal objects. Such use of the term risks defining all of Australia as a single 'site'.

Aboriginal stone artefact: A stone object with morphological features derived from past Aboriginal activity such as intentional fracture, abrasion or impact. Artefacts are distinguished by morphology and context. Typically flaked stone artefacts are distinguished from naturally broken stone by recognition of clear marginal fracture initiation (typically herzian/conchoidal or wedging initiation) on highly siliceous stone types which can often be exotic to the area. Care must be taken to distinguish modern broken stone in machine impacted contexts and therefore context must be carefully considered as well as morphology.

Aggradation: a term used in geology for the increase in land elevation, typically in a river system, due to the deposition of sediment.

AHIMS: Aboriginal Heritage Information Management System — a computer software system employed by the Office of Environment and Heritage to manage many aspects of Aboriginal site recording and permitting. AHIMS includes an Aboriginal sites database which can be accessed via an internet portal.

Archaeological deposit: Aboriginal objects occurring in one or more soil strata. The most common form of archaeological deposit relates to the presence of a single conflated layer of Aboriginal stone artefacts worked into the topsoil through **bioturbation**.

Backed artefact: A thin flake or blade-flake that has been shaped by secondary flaking (**retouch**) along one lateral margin. The retouched margin is typically steep and bipolar to form a blunt 'back' in the manner of a modern scalpel blade. Distinctive symmetrical and asymmetrical forms are typically found called geometric **microliths** and Bondi points respectively. A thick symmetrical form, called an Elouera, is typically the size of a mandarin segment.

Bioturbation: is the reworking of soils and sediments by animals or plants. Its effects include changing texture of sediments (diagenetic), bioirrigation and displacement of microorganisms and non-living particles.

Bipolar flaking: Where the stone to be worked is rested on an anvil or other stone before being hit by the hammerstone. This results in the presence of negative flake scars on both ends of the core.

Bondi point: See backed artefact definition.

Brown podosols: Topsoils have loamy textures. A2 horizons are common, there is a clear boundary onto the B horizon. They have a sandy clay to heavy clay texture (typically occur on upper and mid-slopes).

Chocolate Soils: Soils that are typically formed in a basaltic parent material where slope or bedrock strata influence drainage. Surface horizons comprise loam, clay loam or silty clay loam. There is a gradual boundary to a brown or brownish black B horizon. There is no A2 horizons.

Conchoidal: A term used in relation to fracture surfaces on Aboriginal stone artefacts - bulb-like in the manner of a bulbous protrusion on a bivalve shell.

Elouera: See backed artefact definition.

Eraillure scar: The small flake scar on the dorsal side of a flake next to the platform. It is the result of rebounding force during percussion flaking.

Exposure: estimates the area with a likelihood of revealing buried artefacts or deposits, not just an observation of the amount of bare ground.

Geometric microlith: See backed artefact definition.

Grinding grooves: Grinding grooves typically derive from the sharpening of stone hatchet heads on sandstone rock. Grooves appear as elliptical depressions of around 25 cm length with smooth bases. Although mostly occurring in association with water to wash the abraded stone dust away from the groove, such sites have been recorded away from water. Narrow grooves or broad abraded areas may occur less commonly and may be derived from spear sharpening or other grinding activities.

Haematite: a pigment featured in ochre used for tinting with a permanent colour.

Holocene: A period of time generally 10,000 years, which marks the end of the last ice age, to the present.

Igneous: relating to or involving volcanic or plutonic processes.

Indurated mudstone/tuff (IMT): the fine textured, very hard, yellowish, orange, reddish-brown or grey rocks from which stone artefacts are made.

Isotropic: Having a physical property that has the same value when measured in different directions. In relation to stone used for stone tools a fracture path is not hindered by layer boundaries or other favoured plane of cleavage.

Keeping place: A room or facility with the express and exclusive purpose of storing Aboriginal cultural heritage materials with accompanying documentation in a secure and accessible manner which protects their cultural heritage values.

Knapping: This term is used in reference to stone tool production. Specifically it relates to the production and shaping of a block of stone (eg a cobble) into a stone tool. The process is called knapping, while the individual undertaking the task is often called a knapper. A knapping floor or event often referenced in the literature relates to an archaeological deposit, usually of high densities of stone artefacts, where researcher's believe this process has occurred in a given locale.

Krasnozems: Mainly loams, clay loams and silty clay loams with a clear or gradual boundary to a dark reddish brown B horizon. Clays are typically light to medium and occasionally heavy.

Lithosols: Soils that have little or no profile development. They occur on steep slopes and are usually shallow and are left mainly as uncleared native bushland.

Microlith: Very small fragments of flakes retouched into geometric shapes and usually present on tools like barbed spears, arrows and sickles.

Midden: A collection of shells and associated economic remains resulting from Aboriginal food gathering and processing activity. Middens comprise shellfish remains of consistent size in a rich dark earth matrix commonly associated with stone artefacts, fish bone and animal bone although shells are commonly the most obtrusive element.

Open stone artefact site/stone artefact site: An unenclosed area where Aboriginal stone artefacts occur – typically exposed from a topsoil archaeological deposit by erosion. Typically the term is used to refer to two or more artefacts although this is an arbitrary distinction. A general 'rule of thumb' boundary definition employed by archaeologists is that artefacts or features more than 50 m apart are regarded as separate sites, however there is no theoretical imperative dictating such as rule. (The 50 m separation rule is used for the most part in EMM's work).

Pirri point: A leaf-shaped stone implement with unifacial retouch extending from the lateral margins to a central keel running the length of the dorsal surface.

Pleistocene: A period of time 2.6 million years ago to 10,000 years ago. Reference to 'Pleistocene sites' generally means reference to sites older than 10,000 years.

Podosols: Soils with accumulations of organic matter, iron and aluminium. They are usually sand textured to depth. Yellow and red podosols are generally acid neutral. Yellow podosols have coarse to medium textured A horizons.

Point cluster: A group of GPS points used to identify the locations of individual artefacts in the field.

Potential Archaeological Deposit (PAD): An area where there is an inferred presence of Aboriginal objects in the soil based on the environmental context which is typically associated with discovery of Aboriginal objects in analogous areas. This is not strictly a 'site' type, although AHIMS records it as such for the purpose of associating Aboriginal heritage Impact Permits with geographical areas.

Red podosols: Podosols with a pronounced texture contrast and clear to abrupt boundaries between A and B horizons. A2 is often massive and gravelly.

Retouch: The modification of the edges of a flake or tool by the removal of a series of small flakes.

Siliceous Sands: Sands that are usually found on coarse-grained sandstones and in sandstone colluvium. They are often sandstone outcrops present in the landscape. The topsoil has a loamy sand to light sandy clay.

Scarp: a steep slope characterised by outcropping bedrock. In this report, scarp refers to a combination of landform elements including scarp foot slopes, scarps, and cliff lines where outcropping sandstone is present in the landscape 10% and above.

Spit/s: This term reflects an arbitrary unit of depth that archaeologists excavate when lacking evidence of a stratigraphy within the soil profile. Commonly, archaeologists remove vertical intervals of 5, 10 or 20cm, each representing a spit, down the soil profile. Through this process, archaeologists can determine the depth at which archaeological materials are found, even in soil profiles with no clear divisions or boundaries.

Spur: the lateral crests of land that descend from the summit of hills or ridges. Spurs typically extend, with decreasing elevation, closer to streams and valley floors than the main crest of a hill.

Taphonomic: the events and processes, such as burial in sediment, leading to the degradation, decomposition or preservation of objects.

Thumbnail scraper: A thumbnail sized thin flake with steep unidirectional retouch or use-wear around a convex working edge.

Transect: A sample unit which is walking line or corridor across the study area.

Upsidence: phenomena that occurs when mining approaches and undermines river valleys. It can result in cracking and buckling of river beds and rock bars and localised loss of water flow.

Visibility: The amount of bare ground on exposures which might reveal artefacts or other archaeological materials.

Yellow earths: predominantly sandy-textured soils with earthy porous fabric, weak profile differentiation and gradual or diffuse boundaries except for the darker A1 horizon.

Yellow podosols: Podosols which typically occur on the upper slopes of steep landscapes and on the mid to lower slopes of others. The A2 soil horizon is present in most profiles and the boundary change to the B horizon is generally clear. The B horizon is typically sandy clay to heavy clay.

Annexure A
Legislative context

EMM
creating opportunities

A.1 Commonwealth

Aboriginal and Torres Strait Islander Heritage Protection Act 1984

The *Aboriginal and Torres Strait Islander Heritage Protection Act 1984* preserves and protects areas (especially sacred or intangible sites) and places of particular significance to Aboriginal people from damage or destruction. Steps necessary for the protection of a threatened place are outlined in a gazetted Ministerial Declaration (Sections 9 and 10); and which can result in a cessation of any development activity.
In addition, the Act also protects objects by Declaration, notably Aboriginal skeletal remains (Section 12). This can be applied at a State level where a State is unwilling or unable to provide such protection.

Environment Protection and Biodiversity Conservation Act 1999

The *Environment Protection and Biodiversity Conservation Act 1999* provides for protection of natural and cultural heritage places. The Act establishes a National Heritage List (NHL) and a Commonwealth Heritage List (CHL) upon which places of natural or cultural significance can be listed. Sites at a national level and can be in public or private ownership. The CHL is limited to places owned by the Commonwealth, and most frequently encompass Department of Defence sites. Sites and places listed on the NHL are considered to be of State and local heritage value, even if they are not listed or documented as such at a State level.
The values of sites and places on the NHL/ CHL are protected under the EPBC Act. The Act requires that the Minister administering the Act assess any action which has, will have, or is likely to have, a significant impact on the heritage values. Where relevant, a referral is made to the relevant Commonwealth Department, and either approval, approval with controls, or rejection of the proposed action is determined.

Native Title Act 1993

The *Native Title Act 1993* provides recognition and protection for native title. The Act establishes the managing body, National Native Title Tribunal, who administers native title claims to rights and interests over lands and waters by Aboriginal people. It also administers the future act processes that allow proponents to identify and manage potential native title issues for a given activity on a site where a claim has yet to be made or finalised.
In addition, the Act provides for Indigenous Land Use Agreements (ILUA), which is an agreement between a native title group and others about the use and management of land and waters. ILUAs were introduced as a result of amendments to the Act in 1998. They allow people to negotiate flexible and bipartisan agreements to suit their particular circumstances often circumventing lengthy timeframes associated with the native title process. An ILUA can be negotiated over areas where native title has, or has not yet, been determined. They can be part of a broader determination or settled separately.

A.2 State

Environmental Planning and Assessment Act 1979

The *Environmental Planning and Assessment Act 1979* (EP&A Act) is the over-arching Act that dictates the nature of assessment and management of the environment during a development project, and within which heritage forms a component. It requires that environmental and heritage impacts are considered by consent authorities prior to granting development approvals.

The Act has two main approval pathways within which heritage needs to be considered. Generally for smaller scale (either financially or spatially), Parts 4 (Division 4.1) and 5 (Division 5.1) of the Act are implemented. Part 4 requires that a proponent submits a Development Application (DA) to local council for a given development, and within this document a consideration of Aboriginal and historical heritage is required. The specific nature of the assessment is usually determined at a pre-DA meeting with the council, and in relation to the relevant heritage Acts. Where Aboriginal heritage is identified as an issue, the DA may become Integrated Development, whereby the State government is also required to review and provide comments on the DA prior to its issue. Part 5 of the Act is a similar process, but only relates to approvals developed and issued by State government departments. Each State government department has their own internal approach to considering environmental issues, but

ultimately must develop a Review of Environmental Factors (REF), which is comparable to a DA, and which requires consideration and management of heritage. Similarly where heritage is identified as an issue, liaison with relevant State consent authorities and approvals under other Acts may still be required.

The other approval pathway relates to State Significant Development and/or Infrastructure (Parts 4.7 and 5.2, respectively). These processes require an Environmental Impact Statement (EIS) to be developed for a project and assessed currently by the Heritage NSW (formerly the Department of Planning, Industry and Environment). Importantly, the SSD and SSI processes turns off a number of pieces of other legislation, including parts of the *National Parks and Wildlife Act 1974*. In the case of Aboriginal heritage, both the assessment and approval for harm are dictated by the Secretary's Environmental Assessment Requirements (SEARs) outlining the contents and scope of the EIS, and the Project Approval that dictates controls on how a development should proceed.

National Parks and Wildlife Act 1974

The National Parks and Wildlife Act 1974 (NPW Act) provides protection for Aboriginal objects and places across NSW:

- An Aboriginal object is defined as: *Any deposit, object or material evidence (not being a handicraft made for sale) relating to the Aboriginal habitation of the area that comprises New South Wales, being habitation before or concurrent with (or both) the occupation of that area by persons of non-Aboriginal extraction, and includes Aboriginal remains.*

- An Aboriginal place is: any place declared to be an Aboriginal place under section 84. This is a very specific piece of legislation that provides process and management of Aboriginal sites of cultural, but not necessarily scientific, values. They are commonly, but not always associated with intangible values.

- any place declared to be an Aboriginal place by the Minister for the Environment, under Section 84 of the Act.

It is an offence to disturb Aboriginal objects or places without an Aboriginal Heritage Impact Permit (AHIP), which is outlined in Section 90 of the Act. Currently, such permits can be sought from Heritage NSW.

To obtain an AHIP, certain assessment and documentation (outlined in this report) must be provided to Heritage NSW for their consideration. Once satisfied, they may endorse an AHIP to harm cultural heritage either conditionally or unconditionally. They can also refuse an application as outlined in Section 90C of the Act, and which can be appealed in accordance with Section 90L.

Aboriginal Land Rights Act 1983

The *Aboriginal Land Rights Act 1983* provides process and protocols for the transfer of vacant Crown land ownership to a Local Aboriginal Land Council, where the land is not for an essential purpose or for residential land. These lands are then managed and maintained by the Local Aboriginal Land Council.

For the purposes of this report, the Act is primarily important to inform relevant Aboriginal communities for consultation; and where Crown land forms part of the development area may require additional liaison with the LALC as a potential, or existing, landowner.

Annexure B

Aboriginal community consultation

EMM
creating opportunities

B.1 Consultation log and communications record

Aboriginal Consultation Requirements for Proponents* (DECCW 2010)

ABORIGINAL COMMUNICATIONS LOG

Project Name: Proposed Dungowan Dam | **Project #:** J200042

DATE	OUTGOING / INCOMING	ORGANISATION	CONTACT MADE BY	CONTACT TO	CONTACT TYPE	COMMENTS
9 April 2020	Outgoing	Department of Planning, Industry and Environment	Georgia Burnett (EMM)	Phil Purcell	Email	Requested details of any Aboriginal organisations or individuals who may be interested in the project.
9 April 2020	Outgoing	Tamworth Local Aboriginal Land Council	Georgia Burnett (EMM)	Fiona Snape	Email	Requested details of any Aboriginal organisations or individuals who may be interested in the project.
9 April 2020	Outgoing	The Office of the Registrar, Aboriginal Land Rights Act 1983	Georgia Burnett (EMM)	-	Email	Requested details of any Aboriginal organisations or individuals who may be interested in the project.
9 April 2020	Outgoing	National Native Title Tribunal	Georgia Burnett (EMM)	-	Email	Requested details of any Aboriginal organisations or individuals who may be interested in the project.
9 April 2020	Outgoing	Native Title Services NTSCORP	Georgia Burnett (EMM)	-	Email	Requested details of any Aboriginal organisations or individuals who may be interested in the project.
9 April 2020	Outgoing	Tamworth Regional Council	Georgia Burnett (EMM)	Andrea Bruno (TRC)	Email	Requested details of any Aboriginal organisations or individuals who may be interested in the project.
9 April 2020	Outgoing	North West Local Land Service	Georgia Burnett (EMM)	-	Email	Requested details of any Aboriginal organisations or individuals who may be interested in the project.
14 April 2020	Incoming	National Native Title Tribunal	Madeline ?	Georgia Burnett (EMM)	Email	Advised the NNTT was not an appropriate contact regarding Aboriginal cultural heritage.
14 April 2020	Incoming	NNTT Geospatial Search Requests	-	Georgia Burnett (EMM)	Email	Advised that the following land parcels were subject of a native title claim by the Gomeroi People: Lot 7001 DP 1058567, Lot 7001 DP 1058567, Lot 7002 DP 1058567, Lot 7002 DP 1058567, Lot 7016 DP 1058548, and Lot 7016 DP 1058548.
15 April 2020	Outgoing	Native Title Services NTSCORP	Georgia Burnett (EMM)	-	Email	Followed up regarding native title claim identified by NNTT.
15 April 2020	Incoming	Native Title Services NTSCORP	Maeve Rose Parker	Georgia Burnett (EMM)	Email	Advised contact had been made with Gomeroi Applicant to nominate stakeholders.
17 April 2020	Incoming	Tamworth Local Aboriginal Land Council	Fiona Snape	Georgia Burnett (EMM)	Email/phone	Emailed requesting that two site officers be included in fieldwork. Called to confirm. GB advised that fieldwork would not be for a few months, but would keep the request in mind. Advised we would add TLALC to the RAP list.
17 April 2020	Outgoing	Northern Daily Leader	-	-	Advertisement	Advertised the project, response requested by 1 May 2020.
17 April 2020	Outgoing	Department of Planning, Industry and Environment	Georgia Burnett (EMM)	Phil Purcell	Phone	Called to confirm contact with DPIE. DPIE advised reciept of request for information, indicated they would follow up soon.
17 April 2020	Outgoing	Tamworth Local Aboriginal Land Council	Georgia Burnett (EMM)	Fiona Snape	Email/post	Notification of project commencement, enquiry of interest. Noted this was a formality, and TLALC was already noted as a registered party.
17 April 2020	Outgoing	-	Georgia Burnett (EMM)	Alison Simpson	Post	Notification of project commencement, enquiry of interest.
17 April 2020	Outgoing	AT Gomilaroi Cultural Consultancy	Georgia Burnett (EMM)	Aaron Talbott	Post	Notification of project commencement, enquiry of interest.
17 April 2020	Outgoing	-	Georgia Burnett (EMM)	Brent Mathews	Post	Notification of project commencement, enquiry of interest.
17 April 2020	Outgoing	Cacatua General Services/Cacatua Culture Consultants	Georgia Burnett (EMM)	Donna ?	Post	Notification of project commencement, enquiry of interest.
17 April 2020	Outgoing	-	Georgia Burnett (EMM)	Christine Archbold	Post	Notification of project commencement, enquiry of interest.
17 April 2020	Outgoing	-	Georgia Burnett (EMM)	Clifford Matthews	Post	Notification of project commencement, enquiry of interest.
17 April 2020	Outgoing	Coonabarabran Local Aboriginal Land Council	Georgia Burnett (EMM)	-	Post	Notification of project commencement, enquiry of interest.
17 April 2020	Outgoing	Corroboree Aboriginal Corporation	Georgia Burnett (EMM)	Marilyn Carroll-Johnson	Post	Notification of project commencement, enquiry of interest.
17 April 2020	Outgoing	D F V T Enterprises	Georgia Burnett (EMM)	Derrick Vale	Post	Notification of project commencement, enquiry of interest.
17 April 2020	Outgoing	-	Georgia Burnett (EMM)	Darrell Matthews	Post	Notification of project commencement, enquiry of interest.
17 April 2020	Outgoing	Gomeroi Murri Ganuurr Yuuray Wadi Palinka	Georgia Burnett (EMM)	Greg Griffith	Post	Notification of project commencement, enquiry of interest.
17 April 2020	Outgoing	-	Georgia Burnett (EMM)	Hazel Collins	Post	Notification of project commencement, enquiry of interest.
17 April 2020	Outgoing	-	Georgia Burnett (EMM)	Jeff Matthews	Post	Notification of project commencement, enquiry of interest.
17 April 2020	Outgoing	-	Georgia Burnett (EMM)	John Matthews	Post	Notification of project commencement, enquiry of interest.
17 April 2020	Outgoing	-	Georgia Burnett (EMM)	Joshua Matthews	Post	Notification of project commencement, enquiry of interest.
17 April 2020	Outgoing	-	Georgia Burnett (EMM)	Justin Matthews	Post	Notification of project commencement, enquiry of interest.
17 April 2020	Outgoing	Kawul Cultural Services	Georgia Burnett (EMM)	Vicky Slater	Post	Notification of project commencement, enquiry of interest.
17 April 2020	Outgoing	Bawurra Consultants	Georgia Burnett (EMM)	Kevin Sampson	Post	Notification of project commencement, enquiry of interest.
17 April 2020	Outgoing	-	Georgia Burnett (EMM)	Len Waters	Post	Notification of project commencement, enquiry of interest.
17 April 2020	Outgoing	-	Georgia Burnett (EMM)	Lloyd Matthews	Post	Notification of project commencement, enquiry of interest.
17 April 2020	Outgoing	Luke Cameron Cultural Management	Georgia Burnett (EMM)	Luke Cameron	Post	Notification of project commencement, enquiry of interest.
17 April 2020	Outgoing	-	Georgia Burnett (EMM)	Mavonia Welsh	Post	Notification of project commencement, enquiry of interest.
17 April 2020	Outgoing	ME Griffiths Cultural Management	Georgia Burnett (EMM)	Marie-Ellen Griffiths	Post	Notification of project commencement, enquiry of interest.
17 April 2020	Outgoing	Mooki Plans Management	Georgia Burnett (EMM)	-	Post	Notification of project commencement, enquiry of interest.
17 April 2020	Outgoing	Mooki River Consultants	Georgia Burnett (EMM)	Wayne Mathews	Post	Notification of project commencement, enquiry of interest.
17 April 2020	Outgoing	Muswellbrook Cultural Consultants	Georgia Burnett (EMM)	Brian Hort	Post	Notification of project commencement, enquiry of interest.
17 April 2020	Outgoing	Nyakka Aboriginal Cultural Heritage Corporation	Georgia Burnett (EMM)	Rhonda Kitckener	Email/post	Notification of project commencement, enquiry of interest.
17 April 2020	Outgoing	-	Georgia Burnett (EMM)	Paul Moodie	Post	Notification of project commencement, enquiry of interest.
17 April 2020	Outgoing	-	Georgia Burnett (EMM)	Richard Slater	Post	Notification of project commencement, enquiry of interest.
17 April 2020	Outgoing	-	Georgia Burnett (EMM)	Rick Slater	Post	Notification of project commencement, enquiry of interest.
17 April 2020	Outgoing	-	Georgia Burnett (EMM)	Rodney Matthews	Post	Notification of project commencement, enquiry of interest.
17 April 2020	Outgoing	-	Georgia Burnett (EMM)	Ron Smith	Post	Notification of project commencement, enquiry of interest.
17 April 2020	Outgoing	-	Georgia Burnett (EMM)	Rona Slater	Post	Notification of project commencement, enquiry of interest.
17 April 2020	Outgoing	-	Georgia Burnett (EMM)	Roslyn Smith	Post	Notification of project commencement, enquiry of interest.
17 April 2020	Outgoing	-	Georgia Burnett (EMM)	Scott Smith	Post	Notification of project commencement, enquiry of interest.
17 April 2020	Outgoing	T&G Culture Consultants	Georgia Burnett (EMM)	Tony Griffiths	Post	Notification of project commencement, enquiry of interest.
17 April 2020	Outgoing	-	Georgia Burnett (EMM)	Tracey Woltey	Post	Notification of project commencement, enquiry of interest.
17 April 2020	Outgoing	Wattaka Cultural Consultancy Service	Georgia Burnett (EMM)	Des Hickey	Post	Notification of project commencement, enquiry of interest.
17 April 2020	Outgoing	Nunawanna Aboriginal Corporation	Georgia Burnett (EMM)	Colin Ahoy	Email/post	Notification of project commencement, enquiry of interest.
17 April 2020	Outgoing	-	Georgia Burnett (EMM)	Les Townsend	Post	Notification of project commencement, enquiry of interest.
17 April 2020	Outgoing	Steven Ahoy Consultants	Georgia Burnett (EMM)	Steven Ahoy	Email/post	Notification of project commencement, enquiry of interest.
17 April 2020	Outgoing	Armidale and New England Gumbaynggirr Descendants	Georgia Burnett (EMM)	Hazel Green	Email/post	Notification of project commencement, enquiry of interest.
17 April 2020	Outgoing	Bunda Consultants	Georgia Burnett (EMM)	Tommy Knox	Email/post	Notification of project commencement, enquiry of interest.
17 April 2020	Outgoing	-	Georgia Burnett (EMM)	Tommy Taylor	Post	Notification of project commencement, enquiry of interest.
17 April 2020	Outgoing	Wunda Cultural Consultants	Georgia Burnett (EMM)	Travis Matthews	Email/post	Notification of project commencement, enquiry of interest.
17 April 2020	Outgoing	-	Georgia Burnett (EMM)	Cheryl Kitchener	Email	Notification of project commencement, enquiry of interest.
17 April 2020	Incoming	Nunawanna Aboriginal Corporation	Colin Ahoy	Georgia Burnett (EMM)	Email	Requested to be listed as a RAP for the project. Acknowledge reciept 20 April 2020.
17 April 2020	Incoming	Email delivery failed to: - bundaconsultants[redacted]	NA	Georgia Burnett (EMM)	Email	Undeliverable email error message.
19 April 2020	Incoming	-	Steven Ahoy	Georgia Burnett (EMM)	Email	Declined participation in the project, as it is ouside his Country. Noted it is inappropriate for outsiders to register interest in the project if not from Country. Acknowledge reciept 20 April 2020.
20 April 2020	Incoming	-	Cheryl Kitchener	Georgia Burnett (EMM)	Email	Declined participation in the project, as it is ouside her Country. Noted it is inappropriate for outsiders to register interest in the project if not from Country. Noted knowledge of Aboriginal sites in the area, but advised that it was not appropriate for her to speak for them. Acknowledge reciept 20 April 2020.
21 April 2020	Incoming	The Gomeroi People	Steve Talbott	Georgia Burnett (EMM)	Email/phone	Steve called to confirm interest in the project on behalf of the Gomeroi People's as native title applications for the area. Highlighted importance that the project meet the Aboriginal involvement thresholds published by the Australian Government's Indigenous Procurement Policy (IPP). Georgia followed up phone call with email confirming contact details and provided a copy of the notification letter.
21 April 2020	Incoming	Biodiversity and Conservantion Division, Department of Planning, Industry and Environment	Helen Knight	Georgia Burnett (EMM)	Email	Provided stakeholder lists for the North West branch.
21 April 2020	Incoming	North West Local Land Service	Luke Ravenaeu	Georgia Burnett (EMM)	Email	Advised contact with the Tamworth LALC and provided contact details.
21 April 2020	Incoming	Corroboree Aboriginal Corporation	Marilyn Carroll-Johnson	Georgia Burnett (EMM)	Email	Requested to be listed as a RAP for the project. Requested that all contact details not be shared with the LALC and correspondence not be published. Acknowledged that use of corporation name to confirm regsiteration was okay. Acknowledge reciept 23 April 2020.
23 April 2020	Incoming	AT Gomilaroi Cultural Consultancy	Aaron Talbott	Georgia Burnett (EMM)	Email	Requested to be listed as a RAP for the project. Acknowledge reciept 23 April 2020.

24 April 2020	Incoming	-	Hazel Green & Cyril Green	Georgia Burnett (EMM)	Phone	Hazel called to advise the Dungowan Dam project was outside her cultural area but others would be able to advise on the cultural background of the project area. Georgia enquired about any contacts Hazel knew that would be appropriate for the project. Hazel offered to ask her husband, Cyril, who provided two contacts but only had the phone number for one.
27 April 2020	Incoming	Return to sender: - Vicky Slater – Kawul Cultural Services PO Box 817 Singleton NSW 2330 - Des Hickey – Wattaka Cultural Service – PO Box 479 Tamworth NSW 2340 - Steven Ahoy – Steven Ahoy Consultants – 26 Simmons Street Armidale NSW 2350	NA	Georgia Burnett (EMM)	Post	Undeliverable post. No additional contact details provided for these stakeholders.
30 April 2020	Incoming	Galamaay Cultural Consultants	Robert Slater	Georgia Burnett (EMM)	Email	Requested to be listed as a RAP for the project. Acknowledge reciept 1 May 2020.
1 May 2020	Incoming	Tamworth Regional Council	Michael McGuffickle	Georgia Burnett (EMM)	Email	Advised contact with the Tamworth LALC and provided contact details.
7 May 2020	Outgoing	Tamworth Local Aboriginal Land Council	Georgia Burnett (EMM)	Fiona Snape	Email	Provided further project infomation and assessment method letter as part of Stage 2/3 of the consultation process. Requested feedback by 4 June 2020.
7 May 2020	Outgoing	Nunawanna Aboriginal Corporation	Georgia Burnett (EMM)	Colin Ahoy	Email	Provided further project infomation and assessment method letter as part of Stage 2/3 of the consultation process. Requested feedback by 4 June 2020.
7 May 2020	Outgoing	The Gomeroi People	Georgia Burnett (EMM)	Steve Talbott	Email	Provided further project infomation and assessment method letter as part of Stage 2/3 of the consultation process. Requested feedback by 4 June 2020.
7 May 2020	Outgoing	DFTV Enterprises	Georgia Burnett (EMM)	Derrick Vale	Email	Provided further project infomation and assessment method letter as part of Stage 2/3 of the consultation process. Requested feedback by 4 June 2020.
7 May 2020	Outgoing	Corroboree Aboriginal Corporation	Georgia Burnett (EMM)	Marilyn Carroll-Johnson	Email	Provided further project infomation and assessment method letter as part of Stage 2/3 of the consultation process. Requested feedback by 4 June 2020.
7 May 2020	Outgoing	AT Gomilaroi Cultural Consultancy	Georgia Burnett (EMM)	Aaron Talbott	Email	Provided further project infomation and assessment method letter as part of Stage 2/3 of the consultation process. Requested feedback by 4 June 2020.
7 May 2020	Outgoing	Galamaay Cultural Consultants	Georgia Burnett (EMM)	Robert Slater	Email	Provided further project infomation and assessment method letter as part of Stage 2/3 of the consultation process. Requested feedback by 4 June 2020.
9 May 2020	Incoming	Galamaay Cultural Consultants	Robert Slater	Georgia Burnett (EMM)	Email	Responded in support of the assessment method. Acknowledged reciept 11 May 2020 (see 11 May 2020 entry).
11 May 2020	Outgoing	Tamworth Local Aboriginal Land Council	Georgia Burnett (EMM)	Fiona Snape	Email	Provided an updated figure showing several possible routes for the Dungowan pipeline (discussed in Section 4 of the assessment letter). As new information was being provided, extended the review period till 8 June 2020.
11 May 2020	Outgoing	Nunawanna Aboriginal Corporation	Georgia Burnett (EMM)	Colin Ahoy	Email	Provided an updated figure showing several possible routes for the Dungowan pipeline (discussed in Section 4 of the assessment letter). As new information was being provided, extended the review period till 8 June 2020.
11 May 2020	Outgoing	The Gomeroi People	Georgia Burnett (EMM)	Steve Talbott	Email	Provided an updated figure showing several possible routes for the Dungowan pipeline (discussed in Section 4 of the assessment letter). As new information was being provided, extended the review period till 8 June 2020.
11 May 2020	Outgoing	DFTV Enterprises	Georgia Burnett (EMM)	Derrick Vale	Email	Provided an updated figure showing several possible routes for the Dungowan pipeline (discussed in Section 4 of the assessment letter). As new information was being provided, extended the review period till 8 June 2020.
11 May 2020	Outgoing	Corroboree Aboriginal Corporation	Georgia Burnett (EMM)	Marilyn Carroll-Johnson	Email	Provided an updated figure showing several possible routes for the Dungowan pipeline (discussed in Section 4 of the assessment letter). As new information was being provided, extended the review period till 8 June 2020.
11 May 2020	Outgoing	AT Gomilaroi Cultural Consultancy	Georgia Burnett (EMM)	Aaron Talbott	Email	Provided an updated figure showing several possible routes for the Dungowan pipeline (discussed in Section 4 of the assessment letter). As new information was being provided, extended the review period till 8 June 2020.
11 May 2020	Outgoing	Galamaay Cultural Consultants	Georgia Burnett (EMM)	Robert Slater	Email	Provided an updated figure showing several possible routes for the Dungowan pipeline (discussed in Section 4 of the assessment letter). As new information was being provided, extended the review period till 8 June 2020.
11 May 2020	Incoming	DFTV Enterprises	Derrick Vale	Georgia Burnett (EMM)	Phone	Derrick called to discuss the project. The following was discussed: - Requested further details regarding the survey of the Dungowan pipeline. GB provided more informatoin and a clear understanding of the ammendments was communicated. - Expressed concern that the COVID-19 pandemic would negatively impact the ability of EMM to consult with stakeholders on the project. Assured that EMM and WaterNSW have carefully considered the ramifications and would ensure the COVID-19 restrictions would be taken into account and the strategy ammended where possible. Noted that where face-to-face contact was unavoidable, all necessary precautions would be taken. - Noted that the topography of the study area, in particular the high points in the landscape, were ideal for navigation and would have been likely used as tracks for Aboriginal people in the past. Noted the good availibility of water in the area, noting this would have been desirable resource. - Wanted to ensure that where stories and information was provided, this be credited to the individual or elder where possible and/or social protocols be adhered to. - Requested that all RAPs be provided the opportunity to be involved in the fieldwork. Noted that the budget for this was not currently finalised, but more details would be provided shortly. - Requested methodology letter be resent so to access it easier. GB complied, resent email with methodology and pipeline update after the phone call.
11 May 2020	Incoming	Corroboree Aboriginal Corporation	Marilyn Carroll-Johnson	Georgia Burnett (EMM)	Email	Responded in support of the assessment method. Acknowledged reciept 12 May 2020.
13 May 2020	Outgoing	Tamworth Local Aboriginal Land Council	Georgia Burnett (EMM)	Fiona Snape	Email	Provided stakeholder list for the Dungowan Dam project.
13 May 2020	Outgoing	Biodiversity and Conservantion Division, Department of Planning, Industry and Environment	Georgia Burnett (EMM)	Helen Knight	Email	Provided stakeholder list for the Dungowan Dam project. Out of office email returned indicating Helen was on leave to return 27 May 2020.
12 May 2020	Incoming	Tamworth Local Aboriginal Land Council	Fiona Snape	Georgia Burnett (EMM)	Email	Emailed informing that a sites officer would review the material disturbuted regarding the assessment methdology later in the week. Followed up on 14 May 2020 that sites officer has reviewed the material and had no comments at this stage. Acknowledged reciept 14 May 2020.
14 May 2020	Outgoing	Kawul Cultural Services	Georgia Burnett (EMM)	Vicky Slater	Email	Followed up invitation to register interest in the project, requested reply as soon as possible.
14 May 2020	Outgoing	Wattaka Cultural Consultancy Service	Georgia Burnett (EMM)	Des Hickey	Email	Followed up invitation to register interest in the project, requested reply as soon as possible.
14 May 2020	Incoming	Huckada Dreamin Heritage Group	Richard Slater	Georgia Burnett (EMM)	Email	Responded in support of the methdology and to register interest in the project. Acknowledged reciept 15 May 2020 and requested current contact information.
15 May 2020	Outgoing	Tamworth Local Aboriginal Land Council Nunawanna Aboriginal Corporation The Gomeroi People DFTV Enterprises Corroboree Aboriginal Corporation AT Gomilaroi Cultural Consultancy Galamaay Cultural Consultants Huckada Dreamin Heritage Group	Various	Alan Williams (EMM)	Email	Provided copy of consultation strategy for Dungowan Dam project. Requested feedback on availability for monthly meetings and feedback on prefered meeting format in light of social distancing.
15 May 2020	Incoming	Wattaka Cultural Service	Des Hickey	Georgia Burnett (EMM)	Email	Registered interest in the project. Acknowledged reciept 15 May 2020, provided assessment method letter, consultation strategy and associated email, and updated pipeline map. Requested feedback ASAP.
15 May 2020	Incoming	DFTV Enterprises	Derrick Vale	Alan Williams (EMM)	Phone	Discussed recent e-mail on consultation. Indicated he was happy for meeting in Tamworth, was interested in working on site and monitoring. Asked about travel costs, since based in Maitland.
15 May 2020	Incoming	AT Gomilaroi Cultural Consultancy	Aaron Talbott	Alan Williams (EMM)	Email	Acknowledged reciept of consultation strategy, noted preference for in person meetings but willing to take part in online forum if COVID does not allow for this.
15 May 2020	Incoming	Tamworth Local Aboriginal Land Coucil	Fiona Snape	Alan Williams (EMM)	Email	Acknowledged receipt of consultation strategy.
15 May 2020	Incoming	Tamworth Local Aboriginal Land Council	Fiona Snape	Alan Williams (EMM)	Email	Acknowledged receipt of consultation strategy, and interest in meeting to discuss.
20 May 2020	Incoming	Galamaay Cultural Consultants	Richard Slater	Alan Williams (EMM)	Email	Acknowledged receipt of consultation strategy, and interest in meeting to discuss.

20 May 2020	Outgoing	Tamworth Local Aboriginal Land Council Nunawanna Aboriginal Corporation The Gomeroi People DFTV Enterprises Corroboree Aboriginal Corporation AT Gomilaroi Cultural Consultancy Galamaay Cultural Consultants Huckada Dreamin Heritage Group Wattaka Cultural Service	Various	Alan Williams (EMM)	Email	Provided information on upcoming geotechincal investigations and sought interest in monitoring.
20 May 2020	Incoming	Corroboree Aboriginal Corporation	Marilyn Carroll-Johnson	Alan Williams (EMM)	Email	Indicated an interest in montoring the geotechincal works.
20 May 2020	Incoming	Galamaay Cultural Consultants	Robert Slater	Alan Williams (EMM)	Email	Indicated an interest in montoring the geotechincal works.
20 May 2020	Incoming	AT Gomilaroi Cultural Consultancy	Aaron Talbott	Alan Williams (EMM)	Email	Indicated an interest in montoring the geotechincal works.
20 May 2020	Incoming	DFTV Enterprises	Derrick Vale	Alan Williams (EMM)	Email	Indicated an interest in montoring the geotechincal works.
20 May 2020	Incoming	Nunawanna Aboriginal Corporation	Colin Ahoy	Alan Williams (EMM)	Email	Indicated an interest in montoring the geotechincal works.
21 May 2020	Incoming	AT Gomilaroi Cultural Consultancy	Aaron Talbott	Alan Williams (EMM)	Phone	Rang to discuss geotechnical works, and generally around the imminent work proposed for the project.
22 May 2020	Outgoing	Nunawanna Aboriginal Corporation	Georgia Burnett (EMM)	Colin Ahoy	Phone	Rang to confirm interest in meeting, noting provisional date and time on 28 May 2020. Confirmed availiability and willingness to attend.
22 May 2020	Outgoing	The Gomeroi People	Georgia Burnett (EMM)	Steve Talbott	Phone	Rang to confirm interest in meeting, noting provisional date and time on 28 May 2020. Could not attend due to prior commitments. Offered to schedule phone/online chat, no date set.
22 May 2020	Outgoing	Galamaay Cultural Consultants	Georgia Burnett (EMM)	Robert Slater	Phone/email	Rang to confirm interest in meeting, noting provisional date and time on 28 May 2020, no answer, followed up with email. Confirmed availiability and willingness to attend.
22 May 2020	Outgoing	AT Gomilaroi Cultural Consultancy	Georgia Burnett (EMM)	Aaron Talbott	Phone	Rang to confirm interest in meeting, noting provisional date and time on 28 May 2020. Confirmed availiability and willingness to attend.
22 May 2020	Outgoing	Galamaay Cultural Consultants	Georgia Burnett (EMM)	Richard Slater	Phone	Rang to confirm interest in meeting, noting provisional date and time on 28 May 2020. Confirmed availiability and willingness to attend.
22 May 2020	Outgoing	Wattaka Cultural Service	Georgia Burnett (EMM)	Des Hickey	Phone	Rang to confirm interest in meeting, noting provisional date and time on 28 May 2020. Noted his daughter lived in Tamworth and would likely be availabile and willing to attend.
22 May 2020	Outgoing	Tamworth Local Aboriginal Land Council Nunawanna Aboriginal Corporation The Gomeroi People DFTV Enterprises Corroboree Aboriginal Corporation AT Gomilaroi Cultural Consultancy Galamaay Cultural Consultants Huckada Dreamin Heritage Group Wattaka Cultural Service	Various	Alan Williams (EMM)	Email	Invited all RAPs to meeting on Thursday 28 May 2020 at Tamworth LALC offices. Option to meet another day one-on-one via phone or online chat also provided.
25 May 2020	Incoming	Corroboree Aboriginal Corporation	Marilyn Carroll-Johnson	Alan Williams (EMM)	Email	Requested one-on-one online meeting. Arranged for 27 May 2020.
25 May 2020	Incoming	AT Gomilaroi Cultural Consultancy	Aaron Talbott	Alan Williams (EMM) Georgia Burnett (EMM)	Email	Confirmed attendance to meeting. Requested email address be updated. Acknowledge reciept 25 May 2020.
25 May 2020	Outgoing	Nunawanna Aboriginal Corporation	Colin Ahoy	Alan Williams (EMM) Meredith Abrahams (WaterNSW)	Online meeting	Aw provided a detailed briefing of the consultation strategy and the proposed assessment methodology. This included key people, messages and nominal timeframes. It included references to the imminent geotechnical investigations. Colin was happy with the strategy and had no further inputs. He indicated that he believed the river was likely used for hunting and fishing in the past. He had no issues with the use of mechanical investigations, as long as these were carefully considered and discussed where in the vicinity of mechanical excavations.
25 May 2020	Outgoing	All RAPs	Various	Alan Williams (EMM)	Email	Distributed COVID questionnaire to identify any risks for the meeting.
26 May 2020	Imcoming/Outgoing	All RAPs	Various	Alan Williams (EMM)	Phone/email	Various dicsusions and e-mails about the location of the meeting and in relation to the COVID paperwork.
27 May 2020	Outgoing	Corroboree Aboriginal Corporation	Marilyn Carroll-Johnson	Alan Williams (EMM) Meredith Abrahams (WaterNSW)	Online meeting	Aw provided a detailed briefing of the consultation strategy and the proposed assessment methodology. This included key people, messages and nominal timeframes. It included references to the imminent geotechnical investigations and the upcoming works. Marilyn was happy with the strategy and proposed works, and had no further inputs. Advised she would review in detail and respond, but on face value was supportive of the documentation and approach
28 May 2020	Outgoing	Tamworth Local Aboriginal Land Council DFTV Enterprises AT Gomilaroi Cultural Consultancy Galamaay Cultural Consultants Huckada Dreamin Heritage Group Wattaka Cultural Service	Donny Femor; Derrick Vale; Rick Slater; Rob Slater; Aaron Talbott, Sam Smith, Rosalyn Sampson,	Alan Williams (EMM) Meredith Abrahams (WaterNSW)	Meeting	Aw provided a detailed briefing of the consultation strategy and the proposed assessment methodology. This included key people, messages and nominal timeframes. It included references to the proposed investigations, their timing and RAP involvement in these works. A number of conversations about the level of participation, some concern about the brief timeframes of the project, the need to re-connect with country; and how we would manage sensitive sites in subsequent reporting
1 June 2020	Outgoing	All RAPs		Alan Williams (EMM)	Email	Distributed sub-contractor and confidentiality agreement documents for review and signing.
1 June 2020	Outgoing	All RAPs		Alan Williams (EMM)	Email	Distributed minutes of the meeting on 28 May 2020 for review, comment and implementation
1 June 2020	Incoming	Wurrumay Pty Ltd	Vicky Slater	Georgia Burnett (EMM)	Email	Emailed to regsiter interest in project. Replied with information to date on project on 10 June 2020, delayed due to being out of office.
4 June 2020	Outgoing	All RAPs		Alan Williams (EMM)	Email	Sought interest in upcoming fieldwork, including geotechnical investigations and field survey. Also provided information on rates and commercial arrangements.
4 June 2020	Incoming	AT Gomilaroi Cultural consultatncy	Aaron Talbott	Alan Williams (EMM)	Email	Indicated interest in participating in the early works investigations
4 June 2020	Incoming	Huckada Dreamin Heritage Group	Rick Slater	Alan Williams (EMM)	Email	Provided subcontractor agreement, etc, and indicated interest in being involved in the fieldwork
4 June 2020	Incoming	Galamaay Cultural Consultants	Rob Slater	Alan Williams (EMM)	Email	Provided subcontractor agreement, etc, and indicated interest in being involved in the fieldwork
10 - 12 June 2020	Incoming/Outgoing	DFTV Enterprises Galamaay Cultural Consultants Huckada Dreamin Heritage Group	Various	Georgia Burnett (EMM)	Email/phone	Various comms to organise early work survey fieldwork.
11 June 2020	Incoming	The Gomeroi People	Steve Talbott	Alan Williams (EMM)	Email	Provided subcontractor agreement, etc, and indicated interest in being involved in the fieldwork
10-17 June 2020	Outgoing	AT Gomilaroi Cultural consultatncy	Aaron Talbott	Kerrny Armstrong (EMM)	Fieldwork	Undertook archaeological monitoring of geotechnical investigations in areas of concern
12 June 2020	Outgoing	All RAPs		Alan Williams (EMM)	Email	Advised all RAPs of next monthly meeting, and sought their availability.
12 June 2020	Incoming	Nunawanna Aboriginal Corporation	Colin Ahoy	Alan Williams (EMM)	Email	Sought a zoom meeting. AW organised for 19 June 2020
12 June 2020	Incoming	Corroboree Aboriginal Corporation	Marilyn Carroll-Johnson	Alan Williams (EMM)	Email	Sought a zoom meeting. AW organised for 19 June 2020
13 June 2020	Incoming	Tamworth LALC	Fiona Snape	Alan Williams (EMM)	Email	Confirmed attendance to meeting.
13 June 2020	Incoming	AT Gomilaroi Cultural consultatncy	Aaron Talbott	Alan Williams (EMM)	Email	Confirmed attendance to meeting.
16-17 June 2020	Outgoing	DFTV Enterprises Galamaay Cultural Consultants Huckada Dreamin Heritage Group	Various	Georgia Burnett (EMM)	Fieldwork	Undertook field survey of the early works pipeline.
16 June 2020	Outgoing	All RAPs		Alan Williams (EMM)	Email	Advised all RAPS of location of the monthly meeting
16 June 2020	Incoming	DFTV Enterprises	Derrick Vale	Alan Williams (EMM)	Phone	Rang to confirm attendance at the meeting
16 June 2020	Incoming	Wurrumay Pty Ltd	Vicky Slater	Alan Williams (EMM)	Email	Asked whether Aaron Slater was involved. Advised he had not registered.
18 June 2020	Incoming	Wattaka Cultural Service	Des Hickey	Alan Williams (EMM)	Email	Confirmed attendance at the meeting
19 June 2020	Outgoing	Nunawanna Aboriginal Corporation	Colin Ahoy	Alan Williams (EMM) Meredith Abrahams (WaterNSW)	Online meeting	AW outlined the previous few weeks worth of work, and upcoming activities. These included outlining the activities of the geotechnical monitoring, and the early works field survey (including participants, findings, potential directions). Outlined the upcoming main works field components. Also outlined the revisions to the proposed excavation program (test pit locations). Colin identified no issues with the works to date.
19 June 2020	Outgoing	Corroboree Aboriginal Corporation	Marilyn Carroll-Johnson	Alan Williams (EMM) Meredith Abrahams (WaterNSW)	Online meeting	AW outlined the previous few weeks worth of work, and upcoming activities. These included outlining the activities of the geotechnical monitoring, and the early works field survey (including participants, findings, potential directions). Outlined the upcoming main works field components. Also outlined the revisions to the proposed excavation program (test pit locations). Maryilyn identified no issues with the works to date.

19 June 2020	Outgoing	The Gomeroi People	Steve Talbott	Alan Williams (EMM)	Phone	Discussions around the project, and attending on Monday
21 June 2020	Outgoing	All RAPs		Alan Williams (EMM)	Email	Distributing the COVID questionnaire and asking people to review it before the meeting tomorrow.
22 June 2020	Outgoing	Tamworth Local Aboriginal Land Council DFTV Enterprises Galamaay Cultural Consultants Huckada Dreamin Heritage Group	Donny Femor; Fiona Snape; Derrick Vale; Rick Slater; Rob Slater	Alan Williams (EMM) Meredith Abrahams (WaterNSW)	Meeting	On-site meeting to familarise people with the study area. AW outlined the previous works including intial findings of the geotechincal and early works (pipeline) survey, as well as some thoughts on possible report recommendations for the latter. Also provided an indication of the upcoming works in the next few weeks. Only notable comments were made by Tamworth LALC who requested being involved in all future activities, with Donny being ancestrally from the area; and by DFTV Entreprises who sought clarification on whether test pits would be expanded in the event of cutural material being found - AW indicated such resolution would probably be a post-approval phase task due to project timeframes, but that it could be explored once the program is underway.
22 June 2020	Outgoing	All RAPs	Various	Alan Williams (EMM)	Email	Advising of upcoming field survey and seeking availability and interest in participating.
22 June 2020	Incoming	The Gomeroi People	Steve Talbott	Alan Williams (EMM)	Email	Wished to be involved in the field survey
22 June 2020	Outgoing	All RAPs	Various	Alan Williams (EMM)	Email	Advised all RAPS of proposed roster for field program
25 June 2020	Outgoing	All RAPs	Various	Alan Williams (EMM)	Email	Provided a summary of the minutes from our recent meeting.
26 June 2020	Outgoing	Tamworth LALC; DFTV Enterprises; The Gomeroi People; Corroboree Aboriginal Corporation, Wattaka	Various	Taylar Reid	Email	Provided information on the field survey proposed for the subsequent week
30 June - 3 July 2020	Outgoing	Tamworth LALC; DFTV Enterprises; The Gomeroi People; Corroboree Aboriginal Corporation, Wattaka	Various	Taylar Reid	Fieldwork	Undertook field survey of the main dam works
6 July 2020	Outgoing	Tamworth LALC, The Gomeroi People, Galamaay Cultural Consultants, Huckada Dremin Heritage Group, AT Gomilaroi Cultural Consultancy	Various	Taylar Reid	Email	Provided information on the field survey proposed for the subsequent week
6 July 2020	Incoming	The Gomeroi People	Steve Talbott	Alan Williams (EMM)	Phone	Highly supportive of Indigeco interns participating. Raised concerns over non-Aboriginal people being involved by other organisations.
6 July 2020	Outgoing	DFTV Enterprises	Derrick Vale	Alan Williams (EMM)	Phone	Discussed rain days and how they are being managed; and invoicing aroudn the project
6 July 2020	Outgoing		Tanya Matthews	Alan Williams (EMM)	Phone	Returning missed call from previous week. No answer, message left.
7-10 July 2020	Outgoing	Tamworth LALC, The Gomeroi People, Galamaay Cultural Consultants, Huckada Dremin Heritage Group, AT Gomilaroi Cultural Consultancy	Various	Taylar Reid	Fieldwork	Undertook field survey of the main dam works
10 July 2020	Outgoing	Tamworth LALC; DFTV Enterprises; The Gomeroi People; Corroboree Aboriginal Corporation, Wattaka	Various	Alan Williams (EMM)	Email	Reminder e-mail confirming fieldwork the following week.
14-15 July 2020	Outgoing	Tamworth LALC; DFTV Enterprises; The Gomeroi People; Corroboree Aboriginal Corporation, Wattaka	Various	Taylar Reid	Fieldwork	Undertook field survey of the main dam works
16 July 2020	Outgoing	All RAPs	Various	Alan Williams (EMM)	Email	Project update, and proposing next AFG meeting
17 July 2020	Incoming	Galamaay Cultural Consultants	Rob Slater	Alan Williams (EMM)	Email	Confirming date of next AFG
21 July 2020	Outgoing	All RAPs		Alan Williams (EMM)	Email	Provided revised test excavation methodology for review and comment
22 July 2020	Incoming	Galamaay Cultural Consultants	Rob Slater	Alan Williams (EMM)	Email	Approved revised methodology
22 July 2020	Outgoing	Tamworth LALC	Fiona Snape	Alan Williams (EMM)	Phone	Discussed field program and advised that the LALC would be involved in each day of upcoming fieldwork.
22 July 2020	Outgoing	All RAPs		Alan Williams (EMM)	Email	Provided COVID questionnarie for review prior to meeting next week
22 July 2020	Outgoing	Corroboree Aboriginal Corporation; Nunawanna Aboriginal Corporation		Alan Williams (EMM)	Email	Sought to identify whether they required online meetings as they had done at previous AFG meetings.
24 July 2020	Incoming	Hunter and Collectors	Tanya Matthews	Alan Williams (EMM)	Email	Registered an interest in the project. AW provided information pack on the proposed assessment, consultation strategy, subcontractor agreement and information on next AFG meeting
24 July 2020	Incoming	Wattaka	Des Hickey	Alan Williams (EMM)	Email	Apologised for his sites officers not turning up on previous fieldwork
28 July 2020	Incoming	AT Gomilaroi Cultural Consultancy	Aaron Talbott	Alan Williams (EMM)	Email	Indicated that they had to cancel attendence due to health and/or poor weather
28 July 2020	Incoming	Wurrumay Pty Ltd	Vicky Slater	Alan Williams (EMM)	Email	Indicated that they had to cancel attendence due to health and/or poor weather
28 July 2020	Outgoing	Tamworth Local Aboriginal Land Council; The Gomeroi People; DFTV Enterprises; Galamaay Cultural Consultants, Huckada Dremin Heritage Group,	Donny and Michelle Fermor, Rob and Rick Slater, Derrick Vale, Steve Talbott,	Alan Williams (EMM) Meredith Abrahams (WaterNSW)	Meeting	Aboriginal focus group meeting - July. Provided information on revisions to test excavation methodology, outlined the findings of the main works field survey and began discussions on mitigation measures, and outlined the findings and recommendations of the early works ACHA, including potential test excavations and what they may look like. See minutes for further details
28 July 2020	Outgoing	All RAPs	-	Alan Williams (EMM)	Email	Advised of upcoming fieldwork and seeking interest of those who want to be involved.
28 July 2020	Incoming	Wattaka	Des Hickey	Alan Williams (EMM)	Email	Confirmed interest in fieldwork
28 July 2020	Incoming	Huckada Dreamin Heritage Group	Rick Slater	Alan Williams (EMM)	Email	Confirmed interest in fieldwork
28 July 2020	Incoming	Nunawanna Aboriginal Corporation	Colin Ahoy	Alan Williams (EMM)	Email	Confirmed interest in fieldwork
28 July 2020	Incoming	DFTV Enterprises	Derrick Vale	Alan Williams (EMM)	Email	Confirmed interest in fieldwork
28 July 2020	Incoming	AT Gomilaroi Cultural Consultancy	Aaron Talbott	Alan Williams (EMM)	Email	Confirmed interest in fieldwork
28 July 2020	Incoming	Galamaay Cultural Consultants	Rob Slater	Alan Williams (EMM)	Email	Confirmed interest in fieldwork
29 July 2020	Incoming	Corroboree Aboriginal Corporation	Marilyn Carroll-Johnson	Alan Williams (EMM)	Email	Confirmed interest in fieldwork and sought to have two RAPS undertake less time.
29 July 2020	Incoming	Wurrumay Pty Ltd	Vicky Slater	Alan Williams (EMM)	Email	Confirmed interest in fieldwork
29 July 2020	Incoming	Gomeroi People	Steve Talbott	Alan Williams (EMM)	Email	Confirmed interest in fieldwork
31 July 2020	Outgoing	All RAPs		Alan Williams (EMM)	Email	Provided roster for everyone interested to be involved in the test excavations
3 August 2020	Incoming	Tamworth LALC	Fiona Snape	Alan Williams (EMM)	Email	2020
3 August 2020	Incoming	AT Gomilaroi Cultural Consultancy	Aaron Talbott	Alan Williams (EMM) Meredith Abrahams (WaterNSW)	Phone meeting	AW ran Aaron through key components of the AFG meeting the previous week. See minutes for further details
3 August 2020	Incoming	Huckada Dreamin Heritage Group	Rick Slater	Alan Williams (EMM)	Phone	Raised concerns over Sydneysiders with COVID working on the project. AW advised WHS was in place to minimise this rick, but would re-assess it prior to any fieldwork occurring. Also followed up on some invoicing issues
3 August 2020	Outgoing	All RAPs		Alan Williams (EMM)	Email	Distributed minutes of the meeting on 28 July 2020 for review, comment and implementation
3 August 2020	Incoming	Hunter and Collectors	Tanya Matthews	Georgia Burnett (EMM)	Email	Sought involvement in the test excavations; email filtered to junk mail.
4 August 2020	Incoming	Hunter and Collectors	Tanya Matthews	Alan Williams (EMM)	Phone	Sought involvement in the test excavations
5 August 2020	Outgoing	All RAPs		Alan Williams (EMM)	Email	Distributed draft ACHA early works for review and comment
6 August 2020	Outgoing	Huckada Dreamin Heritage Group; Galamaay Cultural Consultants		Alan Williams (EMM)	Email	Sought interest in assisting with a small portion of geotechical monitoring next week.
10-14/08/2020	Outgoing	Tamworth LALC, The Gomeroi People, Nunawanna, DFTV Enterprises , AT Gomilaroi, Wattaka		Georgia Burnett (EMM)	Fieldwork	Test excavation week 1 . AW attended on 13 and 14 August 2020 to discuss project, including the finalisation fo the early works ACHA, and the process once the findings of the excavations were known (ie management and mitigation processes).
12 August 2020	Outgoing	All RAPs		Alan Williams (EMM)	Email	Provided monthly project update.
12 August 2020	Incoming	Nunawanna Aboriginal Corporation	Colin Ahoy	Alan Williams (EMM)	Email	Indicated a preference for an online meeting at end of the month
17-21 August 2020	Outgoing	Tamworth LALC, The Gomeroi People, Nunawanna, DFTV Enterprises , AT Gomilaroi, Wattaka		Georgia Burnett (EMM)	Fieldwork	Test excavation week 2
18 August 2020	Outgoing	All RAPs		Alan Williams (EMM)	Email	Sent a reminder out that the comment period for the early works ACHA was nearing completion if anyone wished to provide input.
21 August 2020	Outgoing	All RAPs		Alan Williams (EMM)	Email	Organised AFG meeting
21 August 2020	Incoming	Nunawanna Aboriginal Corporation	Colin Ahoy	Alan Williams (EMM)	Email	Indicated a preference for an online meeting at end of the month
21 August 2020	Outgoing	AT Gomilaroi	Aaron Talbott	Alan Williams (EMM)	Email	Sought interest in undertaking additional survey components over next couple of weeks. AT confirmed interest in being involved
24-28 August 2020	Outgoing	Tamworth LALC, The Gomeroi People, Corroboree Aboriginal Corporation, Huckada Dreamin Heritage Group; Galamaay Cultural Consultants		Georgia Burnett (EMM)	Fieldwork	Test excavation week 3
26 August 2020	Outgoing	All RAPs	-	Alan Williams (EMM)	Email	Distribution of the updated consultation strategy for comment
31 August 2020	Outgoing	Tamworth Local Aboriginal Land Council; The Gomeroi People; DFTV Enterprises; Huckada Dremin Heritage Group,	Donny and Michelle Fermor, Rick Slater, Derrick Vale, Steve Talbott,	Alan Williams (EMM)	Meeting	Aboriginal focus group meeting - August. Provided information on revisions to consultation strategy, discussed the progress and findings of the test excavations and began discussions on mitigation measures, and outlined the findings and recommendations of the early works ACHA, including potential test excavations and what they may look like. See minutes for further details
31 August - 4 September 2020	Outgoing	Tamworth LALC, The Gomeroi People, Huckada Dreamin Heritage Group; Galamaay Cultural Consultants,		Georgia Burnett (EMM)	Fieldwork	Test excavation week 4
31 August 2020	Outgoing	Tamworth LALC, The Gomeroi People, Nunawanna, DFTV Enterprises , AT Gomilaroi, Huckada Dreamin Heritage Group, Wurrumay Pty Ltd, Hunters and Collectors		Alan Williams (EMM)	Email	Sought availability for involvement in week 5 of the test excavation

1 September 2020	Incoming	Wurrumay Pty Ltd	Vicky Slater	Alan Williams (EMM)	Email	Confirmed attendance next week
1 September 2020	Incoming	Huckada Dreamin Heritage Group	Rick Slater	Alan Williams (EMM)	Email	Sought further information on who was on week 5, AW provided a list of proposed organisations
2 September 2020	Outgoing	All RAPs		Alan Williams (EMM)	Email	Distributed meeting minutes for review and comment
2 September 2020	Incoming	Corroboree Aboriginal Corporation	Marilyn Carroll-Johnson	Alan Williams (EMM)	Email	Sought an online meeting having missed the AFG.
2 September 2020	Outgoing	Nunawanna Aboriginal Corporation	Colin Ahoy	Alan Williams (EMM)	Email	Advised that we could not accommodate their participation for week 5
4 September 2020	Incoming	AT Gomilaroi	Aaron Talbott	Alan Williams (EMM)	Email	Indicated a story about a bullroarer and potential burials that may be relevnat to the project. AW asked AT to provide further information to the field team next week
7 September 2020	Outgoing	Corroboree Aboriginal Corporation	Marilyn Carroll-Johnson	Alan Williams (EMM) Meredith Abrahams (WaterNSW)	Phone meeting	Online AFG meeting (August 2020), ran through the minutes and discussions from the on-site meeting the previous week. MCJ provided no additional input or concerns from these discussions
7-11 September 2020	Outgoing	Tamworth LALC, The Gomeroi People, Galamaay Cultural Consultants , DFTV Enterprises , AT Gomilaroi, Huckada Dreamin Heritage Group, Wurrumay Pty Ltd, Hunters and Collectors		Georgia Burnett (EMM)	Fieldwork	Test excavation week 5
7 September 2020	Incoming		Natasha Rodgers	Alan Williams (EMM)	Phone	Registered an interest in the project. Indicated that she was a member
8 September 2020	Outgoing	The Gomeroi People	Yvonne Rodgers	Alan Williams (EMM)	Phone	Registered an interest in the project. Advised she was part of the Gomeroi people claimant group, but felt Steve Talbott was not relaying information and wished to attend meetings. AW provided the information package.
8 September 2020	Incoming	Warrigal Cultural Services	Aaron Slater	Alan Williams (EMM)	Email	Registered an interest in the project. AW provide the information package.
9 September 2020	Outgoing	All RAPs		Alan Williams (EMM)	Email	Distributed final meeting minutes for August AFG
14-18 September 2020	Outgoing	Tamworth LALC, The Gomeroi People, DFTV Enterprises , AT Gomilaroi, Hunters and Collectors, Nunawanna, Wattaka		Georgia Burnett (EMM)	Fieldwork	Test excavation week 6
14 September 2020	Outgoing	All RAPs		Alan Williams (EMM)	Email	Project update, and proposing next AFG meeting
17 September 2020	Incoming	AT Gomilaroi	Aaron Talbott	Alan Williams (EMM)	Email	Invoicing discussions, but indicated satsified with the coverage of the excavations, sought further salvage in the post approval phase, and identified a potential ceremonial/cultural story that requires documentation through the cultural mapping process
21 September 2020	Outgoing	All RAPs		Alan Williams (EMM)	Email	Organised AFG meeting
21 September 2020	Outgoing	Tamworth LALC	Fiona Snape	Alan Williams (EMM)	Email	Asked whether we could undertake analysis of the cultural materials recovered at the LALC to provide RAPs with opportunity to participate.
22 September 2020	Incoming	Warrigal Cultural Services	Aaron Slater	Alan Williams (EMM)	Email	Indicated he could not attend the AFG, but sought an online meeting. AW to organise.
29 September 2020	Incoming	Wattaka	Des Hickey	Alan Williams (EMM)	Email	Indicated he could not attend the AFG, but sought minutes of the meeting when avaiable
30 September 2020	Incoming	Galamaay Cultural Consultants	Robert Slater	Alan Williams (EMM)	Email	Indicated he could not attend the AFG, but sought an online meeting. AW to organise.
30 September 2020	Incoming	Huckada Dreamin Heritage Group	Rick Slater	Alan Williams (EMM)	Email	Indicated he could not attend the AFG, but sought an online meeting. AW to organise.
30 September 2020	Incoming	The Gomeroi People	Steve Talbott	Alan Williams (EMM)	Phone	Indicated he could not attend the AFG, but sought minutes of the meeting when avaiable
30 September 2020	Incoming		Natasha Rodgers	Alan Williams (EMM)	Email	Indicated he could not attend the AFG, but sought minutes of the meeting when avaiable
30 September 2020	Outgoing	Tamworth LALC, DFTV Enterprises, AT Gomilaroi,	Aaron Talbott, Derrick Vale, Donn	Alan Williams (EMM) Meredith Abrahams (WaterNSW)	Meeting	AFG Meeting - September. Discussions included cutlural mapping, reporting on the field program, and shifting focus on potential mitigation measures to the sites identified. See minutes for further detail.
30 September 2020	Outgoing	Galmaay Cultural Consultants; Huckada Dreamin Heritage Group	Robert Slater ; Rick Slater	Alan Williams (EMM)	Email	Provided an online meeting option for Friday 2 October
1 October 2020	Outgoing	All RAPs		Alan Williams (EMM)	Email	Sought input into identifying cultural values mapping interest and knowledge holders.
2 October 2020	Outgoing	All RAPs		Alan Williams (EMM)	Email	Distributed draft minutes of the AFG meeting for review and comment
2 October 2020	Incoming	Galamaay Cultural Consultants	Robert Slater	Alan Williams (EMM)	Email	Indicated that they had technical difficulties in accessing the meeting. AW offered to re-schedule and organise a phone hook up as an alternative.
2 October 2020	Incoming		Yvonne Rodgers	Alan Williams (EMM)	Phone	Discussions around the cultural mapping, and the attendance at the meeting. Yvonne is QLD based, so unable to attend the cultural mapping, but AW indicated that he would have the anthropologist phone to discuss the site with her.
6 October 2020	Outgoing	Galmaay Cultural Consultants; Huckada Dreamin Heritage Group	Robert Slater ; Rick Slater	Alan Williams (EMM)	Email	Organised phone hook up for next week
6 October 2020	Outgoing	Tamworth LALC, AT Gomilaroi	Fiona Snape; Aaron Talbott	Alan Williams (EMM)	Email	Organised cultural mapping investigations for next week
9 October 2020	Incoming	The Gomeroi People	Steve Talbott	Alan Williams (EMM)	Phone	Steve requested information on how the meeting went and outcomes. AW ran Steve through the meeting minute key findings and next steps.
12 October 2020	Outgoing	Galmaay Cultural Consultants; Huckada Dreamin Heritage Group	Robert Slater ; Rick Slater	Alan Williams (EMM)	Phone	Ran Rob and Rick through the discussions and outcomes of the AFG meeting held a week ago. Rick and Rob agreed with most of the discussion, and raised additional questions around a new access track further upslope; and sought information on future on-site activities.
12 October 2020	Outgoing	All RAPs		Alan Williams (EMM)	Email	Distributed final minutes of the AFG meeting
12-15 October 2020	Outgoing	Tamworth LALC, AT Gomilaroi	Donny Fermor; Aaron Talbott	Philip Clarke	Fieldwork	Cultural mapping of the project area
13 October 2020	Incoming		Yvonne Rodgers	Alan Williams (EMM)	Phone	Disputes the identification of a men's site at Dungowan. AW indicated he would have the cultural mapping team get in touch and discuss further
15 October 2020	Outgoing	All RAPs		Alan Williams (EMM)	Email	Provide a project update and advised of the timing of the next AFG meeting.
15 October 2020	Incoming	Warrigal Cultural Services	Aaron Slater	Alan Williams (EMM)	Email	Sought a online meeting following missing out on previous AFG meeting and subsequent attempts to catch up.
20 October 2020	Outgoing	All RAPs		Alan Williams (EMM)	Email	Provided information on the time and venue of the next AFG meeting
20 October 2020	Incoming	Warrigal Cultural Services	Aaron Slater	Alan Williams (EMM)	Email	Confirmed attendance at AFG meeting
20 October 2020	Incoming	DFTV Enterprises	Derrick Vale	Alan Williams (EMM)	Email	Confirmed attendance at AFG meeting
20 October 2020	Incoming	Galamaay Cultural Consultants	Robert Slater	Alan Williams (EMM)	Email	Confirmed attendance at AFG meeting
20 October 2020	Incoming	AT Gomilaroi	Aaron Talbott	Alan Williams (EMM)	Email	Confirmed attendance at AFG meeting
26 October 2020	Incoming	AT Gomilaroi	Aaron Talbott	Alan Williams (EMM)	Email	Indicated he would be unable to attend the AFG due to health. Has sought an online catchup, AW to organise
26 October 2020	Incoming	The Gomeroi People	Steve Talbott	Alan Williams (EMM)	Phone	Steve apologised for missing the meeting, and asked for a brief rundown. AW indicated he would organise an online meeting later in the week, along with the meeting minute key findings and next steps.
26 October 2020	Outgoing	Tamworth LALC, DFTV Enterprises, Galamaay Cultural Consultants, Huckada Dreamin Heritage Group	Derrick Vale, Donny Fermor, Rick Slater, Rob Slater	Alan Williams (EMM) Meredith Abrahams (WaterNSW)	Meeting	AFG Meeting - October. Discussions included cutlural mapping findings, reporting on the compilation of the field data into a predictive model across the remaining pipeline, and shifting focus on potential mitigation measures to the sites identified. See minutes for further detail.
29 October 2020	Outgoing	Warrigal Cultural Services, Gomeroi People	Aaron Slater; Yvonne Rodgers, Na	Alan Williams (EMM)	Email	AW sought completion of the subcontractor agreement to allow the provision of project documents.
30 October 2020	Outgoing	All RAPs		Alan Williams (EMM)	Email	Distributed an updated methodology and figure outlining the next phase of archaeological test excavation for the replacement pipeline between Calala and Dungowan Village. For those that had not signed a confidentiality agreement, a note that the works were imminent was provided, but no documentation.
30 October 2020	Incoming	AT Gomilaroi	Aaron Talbott	Alan Williams (EMM)	Email	Confirmed interest in upcoming test excavations
30 October 2020	Incoming	Wattaka	Des Hickey	Alan Williams (EMM)	Email	Confirmed interest in upcoming test excavations
2 November 2020	Incoming	DFTV Enterprises	Derrick Vale	Alan Williams (EMM)	Email	Identified no issues with methodology and indicated interest in being involved in proposed excavations
2 November 2020	Outgoing			Alan Williams (EMM) Meredith Abrahams (WaterNSW)	Online meeting	Hosted a meeting for those that missed the AFG last week. No Aborginal participants attended.
2 November 2020	Outgoing	All RAPs		Alan Williams (EMM)	Email	Distributed draft AFG meeting minutes for review and comment
2 November 2020	Incoming	AT Gomilaroi	Aaron Talbott	Alan Williams (EMM)	Email	Supported methodology and indicated an interest in the field program
4 November 2020	Outgoing	All RAPs		Alan Williams (EMM)	Email	Provide information on the upcoming test excavation, including a roster of participants based on responses received, and involvement in the project to date.
4 November 2020	Incoming		Natasha Rodgers	Alan Williams (EMM)	Phone	Sought to be involved in the field program. AW asked to re-send information that had not been received; and advised that her late registration meant that her involvement in the fieldwork was unlikely to be possible.
4 November 2020	Incoming		Natasha Rodgers	Alan Williams (EMM)	Email	Provided subcontractor agreement
5 November 2020	Incoming	AT Gomilaroi	Aaron Talbott	Alan Williams (EMM)	Phone	Sought a briefing from the meeting earlier in the week; and discussions around the upcoming field program.
5 November 2020	Incoming	Nunawanna Aboriginal Corporation	Colin Ahoy	Alan Williams (EMM)	Email	Indicated an interest in the upcoming archaeological excavations.
14 November 2020	Incoming	Wurrumay Pty Ltd	Vicky Slater	Alan Williams (EMM)	Email	Sought information on whether the organisation was selected for fieldwork. AW indicated that they were not, with preference being given to those that were actively involved in the project.
16 November 2020	Outgoing	All RAPs		Alan Williams (EMM)	Email	Distributed project update.
19 November 2020	Outgoing	All RAPs		Alan Williams (EMM)	Email	Provided information on the next AFG meeting

21 November 2020	Incoming	Corroboree Aboriginal Corporation	Marilyn Carroll-Johnson	Alan Williams (EMM)	Email	Sought an online meeting
24 November 2020	Incoming	Wurrumay Pty Ltd	Vicky Slater	Alan Williams (EMM)	Email	Expressed concerns about the level of involvement of the Slater family, and especially Rick Slater (Elder), in the project and cultural mapping. AW advised that several members of the Slater family had been extensively invovled in the project to date, and opportunity remained during upcoming AFG meetings. AW further advised that depsite repeated efforts to identify knowledge-holders for cultural mapping that Rick never responded (or was identified by others) and as such this activity has now been completed.
25 November 2020	Outgoing	Tamworth LALC, The Gomeroi People, Galamaay Cultural Consultants , DFTV Enterprises , Huckada Dreamin Heritage Group	-	Taylar Reid (EMM)	Email	Fieldwork logistics for early works test excavation
26 November 2020	Outgoing	Tamworth LALC, The Gomeroi People, Galamaay Cultural Consultants , DFTV Enterprises , Huckada Dreamin Heritage Group		Alan Williams (EMM)	Email	Advised of postponment of fieldwork due to extreme weather conditions.
26 November 2020	Incoming		Natasha Rodgers	Alan Williams (EMM)	Email	Asked if she was involved in the upcoming fieldwork. AW indicated that the field program had already been assigned.
27 November 2020	Outgoing	Tamworth LALC, The Gomeroi People, Galamaay Cultural Consultants , DFTV Enterprises , Huckada Dreamin Heritage Group	-	Georgia Burnett (EMM)	Text	Follow up text regarding fieldwork postponement.
26 November 2020	Incoming		Natasha Rodgers	Alan Williams (EMM)	Email	Indicated that she disagreed with some of the findings of the cultural mapping about 'men's areas' as briefly mentioned to date. Advised she'd be keen to discuss alternate views at the next AFG meeting
1 December 2020	Outgoing	All RAPs	-	Alan Williams (EMM)	Email	Distributed an interim report summarising all the field survey and test excavation activities to date, as well as future actions and steps in the project.
7-11 December 2020	Outgoing	Tamworth LALC, The Gomeroi People, Galamaay Cultural Consultants , DFTV Enterprises , Huckada Dreamin Heritage Group	-	Taylar Reid (EMM)	Fieldwork	Test excavation (early works) - week 1
8 December 2020	Outgoing	All RAPs	-	Alan Williams (EMM)	Email	Provided details of upcoming AFG meeting
11 December 2020	Outgoing	Tamworth LALC, The Gomeroi People, AT Gomilaroi Cultural Consultancy, DFTV Enterprises , Huckada Dreamin Heritage Group	-	Georgia Burnett (EMM)	Email	Emailing providing details for week 2 test excavation (early works).
11 December 2020	Outgoing	Tamworth LALC, AT Gomilaroi	Donny Femour; Aaron Talbott	Alan Williams (EMM)	Email	Emailed cultural mapping report to them for review and comment prior to its broader release to the Aboriginal community
13-14 December 2020	Outgoing	Tamworth LALC, The Gomeroi People, Galamaay Cultural Consultants , DFTV Enterprises , Huckada Dreamin Heritage Group	-	Taylar Reid (EMM)	Fieldwork	Test excavation (early works) - week 2
15 December 2020	Outgoing	Tamworth LALC, The Gomeroi People, Galamaay Cultural Consultants , DFTV Enterprises , Huckada Dreamin Heritage Group, Corroboree Aboriginal Corporation, The Gomeroi People	-	Alan Williams (EMM) Meredith Abrahams (WaterNSW)	Meeting	AFG Meeting - December. Discussions included cutlural mapping findings, reporting on the compilation of the field data into a predictive model across the remaining pipeline, and shifting focus on potential mitigation measures to the sites identified. See minutes for further detail.
15 December 2020	Incoming		Natasha Rodgers	Alan Williams (EMM)	Phone	Apologised for missing meeting. Brief discussion indicated a preference for cultural material in impact zones to be recovered and reburied on country elsewhere. AW indicated he would provide minutes of meeting for futher consideration of these issues.
15 December 2020	Incoming	AT Gomilaroi	Aaron Talbott	Alan Williams (EMM)	SMS	Sought to undertake an online catch up to discuss AFG and cultural mapping. AW indicated he would organise it in early January 2021.
16 December 2020	Outgoing	All RAPs		Alan Williams (EMM)	Email	Distributed draft AFG meeting minutes for review and comment
5 January 2021	Outgoing	All RAPs		Alan Williams (EMM)	Email	Distributed final AFG meeting minutes for review and comment
5 January 2021	Incoming	The Gomeroi People	Steven Talbott	Alan Williams (EMM)	Email	Acknowledged receipt of the minutes
5 January 2021	Outgoing	Tamworth LALC, AT Gomilaroi	Donny Fermour; Aaron Talbott	Alan Williams (EMM)	Email	Followed up on the cultural mapping and whether they had any comments before a wider release.
6 January 2021	Incoming	AT Gomilaroi	Aaron Talbott	Alan Williams (EMM)	Email	Advised he would review the cultural mapping report shortly and respond with comments.
11 January 2021	Incoming/Outgoing	Wonn 1 Consulting	Arthur Fletcher	Alan Williams (EMM)	Phone/email	Asked to register an interest following a request form Suzie Cutmore (member of DFTV Enterprises) to get involved. AW sent information package following phone conversation outlining where the project was up to.
19 January 2021	Outgoing	All RAPs		Alan Williams (EMM)	Email	Distribution of updated consultation strategy for review.
19 January 2021	Incoming	AT Gomilaroi	Aaron Talbott	Alan Williams (EMM)	Email	Indicated he would prefer his cultural mapping information be redacted. Also indicated that he would prefer no new RAPs allowed into the project. AW advised that this was not possible due to established guidelines, but their involvement in fieldwork would be limited.
20-21 January 2021	Incoming/Outgoing	Tamworth LALC	Donny Fermor	Georgia Burnett (EMM)	Phone/SMS	Discussions regarding cultural mapping review. Indicated need to redact some information, Donny to check with LALC about scanning notes for redacted sections.
21 January 2021	Incoming	Tamworth LALC	Donny Fermor	Alan Williams (EMM)	Email	Provided feedback on the cultural mapping report.
21 January 2021	Incoming	Huckada Dreamin Heritage Group	Rick Slater	Alan Williams (EMM)	Email	Sought a further meeting to discuss new RAPs registered for the project.
28 January 2021	Outgoing	All RAPs		Alan Williams (EMM)	Email	Provided a monthly project update following the Xmas break.
1 February 2021	Incoming	Wonn 1 Consulting	Arthur Fletcher	Alan Williams (EMM)	Phone/email	Sought clarifications on the confidentiality and contract requirements.
2 February 2021	Outgoing	Heritage NSW	Phil Purcell; Sam Higgs	Alan Williams (EMM)	Email	Invited Heritage NSW for a briefing on the works to date and the contents of the ACHA.
5 February 2021	Outgoing	Tamworth LALC, The Gomeroi People, Hucka Dreamin Heritage Group, Galamaay Cultural Consultants	-	Alan Williams (EMM)	Email	Organising field investigation for power line easement now access has been organised.
10 February 2021	Outgoing	Tamworth LALC, The Gomeroi People, Hucka Dreamin Heritage Group, Galamaay Cultural Consultants	-	Alan Williams (EMM)	Email	Organising field investigation for power line easement.
12 February 2021	Incoming	AT Gomilaroi	Aaron Talbott	Alan Williams (EMM)	Phone	Ringing up to enquire about fieldwork next week. Advised he was not rostered, but additional excavation was proposed shortly, and EMM would be in touch
12 February 2021	Outgoing	Heritage NSW	Phil Purcell	Alan Williams (EMM)	Phone	Sought to reschedule meeting next week
15 February 2021	Incoming	AT Gomilaroi	Aaron Talbott	Alan Williams (EMM)	SMS/Email	Continued to raise concerns about not being involved in fieldwork this week. Indicated he would raise it at the next AFG meeting
16 February 2021	Outgoing	Heritage NSW	Phil Purcell	Alan Williams (EMM)	Email	Distributed information pack on the ACHA in advance of a meeting tomorrow.
17 February 2021	Outgoing	All RAPs	-	Alan Williams (EMM)	Email	Provided a monthly project update.
17 February 2021	Outgoing	Heritage NSW	Phil Purcell	Alan Williams (EMM)	Online meeting	Briefing Heritage NSW on the draft ACHA findings, contents and recommendations
19 February 2021	Outgoing	All RAPs (except Wonn 1)	-	Alan Williams (EMM)	Email	Distributed the cultural mapping report.
19 February 2021	Outgoing	Wonn 1 Consulting	Arthur Fletcher	Alan Williams (EMM)	Email	Advised Wonn1 that the cultural mapping report would be distributed to them once contractural requirements had been resolved.
19 February 2021	Incoming	Corroborre Aboriginal Corporation	Marilyn Carroll-Johnson	Alan Williams (EMM)	Email	Sought an online meeting, and expressed interest in the upcoming fieldwork.
19 February 2021	Incoming	Didge Ngunawal Clan	Paul Boyd	Alan Williams (EMM)	Phone	Rang to register an interest in the project after hearing from other RAPs of upcoming work. AW advised he'd sent out an information package.
19 February 2021	Incoming	Nunawanna Aboriginal Corporation	Colin Ahoy	Alan Williams (EMM)	Email	Provided some additional information following the cultural mapping report. Notably that an Echidna is also a totemic species, and that the Aniawan nation encompasses five language groups.
20 February 2021	Outgoing	All RAPs	-	Alan Williams (EMM)	Email	Provided details and invitation to AFG meeting next week
20 February 2021	Incoming	DFTV Enterprises	Derrick Vale	Alan Williams (EMM)	Phone	Confirmed attendance next week
25 February 2021	Incoming	DFTV Enterprises	Derrick Vale	Alan Williams (EMM)	Email	Advised he could not attend next week and sought online option. AW to organise.
25 February 2021	Outgoing	Tamworth LALC, The Gomeroi People, Hucka Dreamin Heritage Group, Galamaay Cultural Consultants, AT Gamilaroi, DFTV Enterprises	-	Georgia Burnett (EMM)	Email	Organising early works test excavation
25 February 2021	Incoming	AT Gomilaroi	Aaron Talbott	Alan Williams (EMM)	Email	Indicated dissatisifaction with level of involvement in fieldwork and sought more days in the field.
28 February 2021	Incoming	AT Gomilaroi	Aaron Talbott	Alan Williams (EMM)	Email	Confirmed attendance to AFG
28 February 2021	Incoming	AT Gomilaroi	Aaron Talbott	Georgia Burnett (EMM)	Email	Emphasied dissatisifaction with level of involvement in fieldwork and sought more days in the field.
1 March 2021	Outgoing	AT Gomilaroi	Aaron Talbott	Alan Williams (EMM)	Phone	Advised he would not be attending AFG. Discussed involvement in fieldwork, remains disappointed however accepts roster for upcoming fieldwork.
1 March 2021	Incoming	Wonn 1 Consulting	Sue Cutmore	Alan Williams (EMM)	Phone	Advised she would be unable to attend the meeting, sought an online meeting.
2 March 2021	Outgoing	Tamworth LALC, Galamaay Cultural Consultants, Huckada Dreamin Heritage Group	Donny Fermor, Rick Slater, Brianna Slater	Alan Williams (EMM) Meredith Abrahams (WaterNSW)	Meeting	AFG Meeting - March. Discussions included the presentation of the findings, significance, potential impacts and management sections of the draft ACHA. See minutes for further detail.
5 March 2021	Outgoing	AT Gomilaroi, Corroboree Aboriginal Corporation, DFTV Enterprises	Aaron Talbott, Derrick Vale, Mari	Alan Williams (EMM) Meredith Abrahams (WaterNSW)	Meeting	AFG Meeting (online) - March. Discussions included the presentation of the findings, significance, potential impacts and management sections of the draft ACHA. See minutes for further detail.
5 March 2021	Outgoing	All RAPs	-	Alan Williams (EMM)	Email	Distributed meeting minutes for review and comment

10 March 2021	Outgoing	Tamworth LALC, The Gomeroi People, Hucka Dreamin Heritage Group, Galamaay Cultural Consultants, AT Gamilaroi, DFTV Enterprises	Georgia Burnett (EMM)	-	Email	Follow up regarding early works test excavation (week 1).
15-17 March 2021	-	Tamworth LALC, The Gomeroi People, Hucka Dreamin Heritage Group, Galamaay Cultural Consultants, DFTV Enterprises	-	Georgia Burnett (EMM)	Fieldwork	Early works fieldwork; 1 day on site, 2 days stood down, ongoing issues with land access resulted in early demobilisation.
17 March 2021	Outgoing	Tamworth LALC, The Gomeroi People, Hucka Dreamin Heritage Group, Galamaay Cultural Consultants, AT Gamilaroi, DFTV Enterprises	Georgia Burnett (EMM)	-	Email	Follow up email regarding fieldwork cancellation and postponement.
18 March 2021	Incoming	AT Gomilaroi	Aaron Talbott	Alan Williams (EMM) Georgia Burnett (EMM)	Email	Requested direction on what would happen next regarding the test exacavation, and how safety of the team would be ensured. AW indicated issues would be explored and RAPs would be advised when more information would be available.
19 March 2021	Incoming	Wonn 1 Consulting	Arthur Fletcher	Alan Williams	Phone	Asked for clarification on why Wonn 1 was not involved in the current fieldwork. AW indicated that the fieldwork was limited to RAPs that registered within the notification period (ie prior to July). AF was satsified with this response, and asked to communicate this to Sue Cutmore.
22 March 2021	Outgoing	Wonn 1 Consulting	Sue Cutmore	Alan Williams	Phone	Advised Sue that fieldwork was constrained to the RAPs that registered in mid-2020, and Wonn 1 was only eligible for paid involvement in the meetings. Also advised that the fieldwork had been cancelled due to land access.
9 April 2021	Outgoing	All RAPs	-	Alan Williams	Email	Provided a project update.
15 April 2021	Outgoing	Heritage NSW	Phil Purcell, Sam Higgs	Alan Williams	Email	Briefed Heritage NSW in relation to the proposed detailed design geotechnical works.
29 April 2021	Incoming	Huckada Dreamin Group	Rick Slater	Alan Williams	Email	Sought information on upcoming activities. AW indicated a project update would be shortly delivered on the project.
30 April 2021	Outgoing	All RAPs	-	Alan Williams	Email	Provided a project update.
11 May 2021	Incoming	Gomeroi People	Steve Talbott	Alan Williams	Email	Acknowledged receipt of project update
9 June 2021	Incoming	Gomeroi People	Steve Talbott	Georgia Burnett (EMM)	Phone	Called regarding another project, chatted briefly and generally about upcoming works.
30 June 2021	Outgoing	All RAPs	-	Alan Williams	Email	Provided a project update.
30 June 2021	Incoming	Hucka Dreamin Heritage Group	Richard Slater	Alan Williams	Email	Confirmed receipt
30 June 2021	Incoming	AT Gamilaroi	Aaron Talbott	Alan Williams	Email	Confirmed receipt
1 July 2021	Outgoing	AT Gamilaroi	Aaron Talbott	Alan Williams	Email	Organised participation in some geotechnical works next week
6/7 July 2021	Outgoing	AT Gamilaroi	Aaron Talbott	Morgan Wilcox	Fieldwork	Investigated proposed seismic lines for any potential cultural heritage issues prior to implementation
12 July 2021	Outgoing	All RAPs		Alan Williams	Email	Distributed an updated methodology outlining revisions to the early work pipeline and addition of water connection points for review and comment. A period of 28 days was provided for comments
12 July 2021	Incoming	Didge Ngunawal Clan	Paul Boyd	Alan Williams	Email	Indicated support for the methodology and requested to be involved in the works
15 July 2021	Outgoing	All RAPs		Alan Williams	Email	Distributed the draft ACHA report for their review and comment. Provided 28 days for comment, and advised of an AFG meeting before finalisation to discuss.
15 July 2021	Outgoing	All RAPs		Alan Williams	Email	Distributed the draft ARD report for their review and comment. Provided 28 days for comment, and advised of an AFG meeting before finalisation to discuss.
19 July 2021	Outgoing	Gomeroi People	Steve Talbott	Taylar Reid	Fieldwork	Investigated proposed geotechnical holes for any potential cultural heritage issues prior to implementation
20 July 2021	Outgoing	AT Gamilaroi	Aaron Talbott	Taylar Reid	Fieldwork	Investigated proposed geotechnical holes for any potential cultural heritage issues prior to implementation
20 July 2021	Incoming	Gomeroi People	Steve Talbott	Alan Williams	Phone	Spoke about invoicing, and also touched on the recent delivery of the report
23 July 2021	Incoming	Tamworth LALC	Fiona Snape	Alan Williams	Email	Provided a detailed response to the proposed ARD for the geotechnical works, including agreement of the methodology, but requesting additional cultural monitoring in other areas not proposed for mitigation actions.
4 August 2021	Outgoing	All RAPs	-	Alan Williams	Email	Provided a project update advising of the near finalisation of the ACHA and ARD, and outlining a proposed meeting to discuss the two documents, and outline upcoming fieldwork
4 August 2021	Incoming	Didge Ngunawal Clan	Paul Boyd	Alan Williams	Email	Requested to be involved in the works
4 August 2021	Incoming	Corroboree Aboriginal Corporation,	Marilyn Carroll-Johnson	Alan Williams	Email	Requested an online meeting
6 August 2021	Outgoing	Heritage NSW	Phil Purcell; Sam Higgs	Alan Williams	Email	Advised Heritage NSW of upcoming archaeological excavations
6 August 2021	Outgoing	Tamworth LALC, DFTV Enterprises, AT Gomilaroi, Gomeroi People, Hucka Dreaming Heritage Group, Galamaay Cultural Consultants	-	Alan Williams	Email	Outlined a roster and provision requirements for the upcoming excavation works, as well as COVID requirements.
6 August 2021	Incoming	AT Gamilaroi	Aaron Talbott	Alan Williams	Email	Acknowledged receipt of field request. Sought slightly revised schedule
6 August 2021	Incoming	Galamaay Cultural Consultants	Robert Slater	Alan Williams	Email	Acknowledged receipt of field request.
10 August 2021	Outgoing	All RAPs	-	Alan Williams	Email	Outlined modifications to the upcoming AFG meeting due to COVID situation in Tamworth
10 August 2021	Incoming	Didge Ngunawal Clan	Paul Boyd	Alan Williams	Email	Requested to be involved in the works. AW advised that only those that registered by mid-2020 were eligible, but would follow up with the proponent
12 August 2021	Outgoing	Tamworth LALC, DFTV Enterprises, Gomeroi People, Hucka Dreaming Heritage Group, Galamaay Cultural Consultants, Corroborre Aboriginal Corporation, Didge Ngunawal Clan	-	Alan Williams (EMM) Meredith Abrahams (WaterNSW)	Meeting	AFG Meeting (online) -August. Discussions included the presentation of the findings, significance, potential impacts and management sections of the draft ACHA and the proposed AHIP and ARD for the geotechnical investigations. See minutes for further detail.
12 August 2021	Outgoing	Didge Ngunawal Clan	Paul Boyd	Alan Williams	Email	Confirming meeting went well and seeking if anything further was needed.
13 August 2021	Outgoing	Tamworth LALC, DFTV Enterprises, AT Gomilaroi, Gomeroi People, Hucka Dreaming Heritage Group, Galamaay Cultural Consultants	-	Alan Williams	Email	Confirmed that the fieldwork was still proceeding in the coming weeks with strict COVID requirements
18 August 2021	Incoming	The Gomeroi People	Steve Talbott	Alan Williams	Email	Provided written support of the ACHA and ARD with minor modifications around the management of recovred cultural mateiral, and for any artefact analysis to include artefact participation.
18 August 2021	Outgoing	All RAPs		Alan Williams	Email	Distributed AFG meeting minutes (August) for review and comment
18 August 2021	Incoming	The Gomeroi People	Steve Talbott	Alan Williams	Email	Confirmed receipt of the minutes and agreed with their contents.
18 August 2021	Incoming	Hunter and Collectors	Tanya Matthews	Alan Williams	Email	Confirmed receipt of minutes
24 August 2021	Outgoing	All RAPs		Alan Williams	Email	Distributed final AFG meeting minutes (August)
25 August 2021	Incoming	AT Gamilaroi	Aaron Talbott	Alan Williams	Email	Apologised for missing a re-organised meeting and raised a number of minor concerns around the project. These included the suitable management of Terrible Billy, further investigation of culutrally modified trees and ensuring artefacts stayed on Country. A massarce was also mentioned for the first time in some 16 months of consultation. AW advised that all of these concerns were captured in the ACHA and/or ARD, with further works, etc, proposed as part of post-approval requirements. AW sought further information on the masscare.
7 September 2021	Outgoing	All RAPs	-	Alan Williams	Email	Distributed monthly project update, including the final ACHA and ARD.
8 October 2021	Outgoing	All RAPs	-	Alan Williams	Email	Distributed monthly project update.
3 November 2021	Outgoing	All RAPs	-	Alan Williams	Email	Advised of upcoming field survey for the revised pipeline in late November, and would be in touch with organisations once a roster had been developed.
3 November 2021	Incoming	AT Gamilaroi	Aaron Talbott	Alan Williams	Email	Confirmed interest in fieldwork and demonstrated evidence of double-vaccination
3 November 2021	Incoming	DFTV Enterprises	Derrick Vale	Alan Williams	Email	Confirmed interest in fieldwork and demonstrated evidence of double-vaccination
3 November 2021	Incoming	Hunter and Collectors	Tanya Matthews	Alan Williams	Email	Confirmed interest in fieldwork and demonstrated evidence of double-vaccination
3 November 2021	Incoming	Didge Ngunawal Clan	Paul Boyd	Alan Williams	Email	Confirmed interest in the fieldwork.
3 November 2021	Incoming	Galmaay Cultural Consultants	Rob Slater	Alan Williams	Email	Confirmed interest in the fieldwork.
3 November 2021	Incoming	Hucka Dreamin Heritage Group	Rick Slater	Alan Williams	Email	Confirmed interest in the fieldwork.
4 November 2021	Incoming		Natasha Rodgers	Alan Williams	Email	Confirmed interest in fieldwork and demonstrated evidence of double-vaccination
4 November 2021	Incoming	Wurrumay Pty Ltd	Vicky Slater	Alan Williams	Email	Confirmed interest in fieldwork and demonstrated evidence of double-vaccination
4 November 2021	Incoming	The Gomeroi People	Steve Talbott	Alan Williams	Phone	Confirmed interest in fieldwork and advised he was double-vaccinated
4 November 2021	Incoming	Corroboree Aboriginal Corporation	Marilyn Carroll-Johnson	Alan Williams	Email	Confirmed interest in fieldwork and demonstrated evidence of double-vaccination
4 November 2021	Incoming		Natasha Rodgers	Alan Williams	Email	Advised that Yvonne Rodgers would also be interested and indicated that they were double-vaccintated.
5 November 2021	Incoming	Wurrumay Pty Ltd	Vicky Slater	Alan Williams	Email	Sought the inclusion of Aaron Slater (Warragil) as well.
11 November 2021	Incoming	Hunter and Collectors	Tanya Matthews	Alan Williams	Email	Provided vaccination record.
11 November 2021	Incoming	Hunter and Collectors	Tanya Matthews	Alan Williams	Email	Sought to ensure traditional owners were involved in the site inspection, since Hunters and Collectors were not asked for this current phase of fieldwork. AW advised that opportunity was being provided for as many of the registered Aboriginal parties as feasible during the current phase of work, and would continue to maximise opportunity wherever possible.
12 November 2021	Incoming	Didge Ngunawal Clan	Lily Carroll	Alan Williams	Email	Asked whether they were to be involved in the upcoming works. AW advised that only individuals and/or organisations that registered prior to July 2020 were eligible for fieldwork on the project. As such Didge Ngunwal was not eligible for inclusion

12 November 2021	Incoming		Natasha Rodgers	Alan Williams	Email	Asked whether they were to be involved in the upcoming works. AW advised that only individuals and/or organisations that registered prior to July 2020 were eligible for fieldwork on the project. As such NR was not eligible for inclusion. NR subsequently re-iterated that she had been moving, and did not receive the notification until some time after the expiry date. AW indicated he would follow up with Water Infrastructure to discuss
17-19 November 2021	Outgoing	Tamworth LALC, DFTV Enterprises, Gomeroi People, Hucka Dreaming Heritage Group, Galamaay Cultural Consultants	-	Georgia Burnett (EMM)	Fieldwork	Undertook survey of the replacement pipeline and connection points
19 November 2021	Outgoing	Tamworth LALC, DFTV Enterprises, AT Gomilaroi, Gomeroi People, Hucka Dreaming Heritage Group, Galamaay Cultural Consultants	-	Cameron Neal	Email	Indicated test excavation program has been given approval to go ahead from 6-18 December 2021, and sought interest and availability to provide a site officer for dates outlined in a draft fieldwork roster.
19 November 2021	Incoming	AT Gomilaroi	Aaron Talbott	Cameron Neal	Email	Aaron confirmed his availability to participate in the test excavation on the dates proposed. Acknowledged receipt.
19 November 2021	Incoming	Galamaay Cultural Consultants	Robert Slater	Cameron Neal	Email	Robert confirmed his availability to participate in the test excavation on the dates proposed. Acknowledged receipt.
19 November 2021	Incoming	Huckada Dreamin Heritage Group	Rick Slater	Cameron Neal	Email	Rick confirmed his availability to participate in the test excavation on the dates proposed. Acknowledged receipt.
20-22 November 2021	Outgoing	Tamworth LALC, DFTV Enterprises, Gomeroi People, Hucka Dreaming Heritage Group, Galamaay Cultural Consultants	-	Georgia Burnett (EMM)	Fieldwork	Undertook survey of the main works pipleine revisions.
23 November 2021	Outgoing	Tamworth LALC, DFTV Enterprises, Gomeroi People	-	Cameron Neal	Email	Followed up with RAPs who had not yet confirmed proposed dates to seek interest and availability for the upcoming test excavation.
23 November 2021	Incoming	DFTV Enterprises	Derrick Vale	Cameron Neal	Email	Derrick confirmed his availability to participate in the test excavation on the dates proposed. Acknowledged receipt.
24 November 2021	Incoming	Wurrumay	Vicky Slater	Alan Williams	Email	Asking why they were not involved in current field survey. AW advised that those that were engaged in other aspects of the project (such as attending meetings) were prioritised, but that Wurrumay would be rostered onto future stages.
25 November 2021	Outgoing	Tamworth LALC, DFTV Enterprises, AT Gomilaroi, Gomeroi People, Hucka Dreaming Heritage Group, Galamaay Cultural Consultants	-	Cameron Neal	Email	Advised RAPs that due to wet weather and landowner/access issues, the test excavation program scheduled for 6-18 December had been cancelled. Advised that there was no formal postponement date but works may proceed early in 2022.
25 November 2021	Incoming	Tamworth LALC	Fiona Snape	Cameron Neal	Email	Fiona asked for clarification on which project had been cancelled. CN confirmed it was the test excavation program at Dungowan scheduled for 6-18 December. Fiona stated TLALC's Christmas closure extended to 10 January. Confirmed we would keep that in mind when scheduling new dates.
3 December 2021	Outgoing	All RAPs		Alan Williams	Email	Distributed the draft ACHA of the replacement pipeline (early works) for input and comment. A period of seven weeks was provided for comment to ensure adequate time either side of the Xmas break.
13 December 2021	Outgoing	All RAPs		Alan Williams	Email	Distributed a copy of the geotechnical AHIP to all RAPs as a requirement of the permit.
11 January 2022	Outgoing	Tamworth LALC, DFTV Enterprises, AT Gomilaroi, Gomeroi People, Hucka Dreaming Heritage Group, Galamaay Cultural Consultants	-	Cameron Neal (EMM)	Email	Notified RAPs of the rescheduled excavation dates, asking if a site officer would be avaliable to attend the days they have been rostered for. A draft roster was also attatched to the email. Questions and queries about Covid saftey and contracts were welcomed.
11 January 2022	Incoming	DFTV Enterprises	Cameron Neal (EMM)	Derrick Vale	Email	Notified that a site officer would be avaliable on the rostered dates.
11 January 2022	Outgoing	DFTV Enterprises	Derrick Vale	Cameron Neal (EMM)	Email	Acknowledged response and notified that communications about Covid-19 saftey requirements will be communicated shortly.
11 January 2022	Incoming	Gomeroi People	Steve Talbott	Cameron Neal (EMM)	Email	Notified that he is avaliable to attend the rostered dates. Asked to be given an update on the Covid-19 saftey requirements when avaliable.
11 January 2022	Outgoing	Gomeroi People	Cameron Neal (EMM)	Steve Talbott	Email	Informed that current Covid requirements are being reviewed by WINSW due to the spread of Omicron but outlined some of the presumed requirements of a covid-safe workplace. Notified that we will provide more concrete plans once we recieve clear directives from WINNSW.
12 January 2022	Incoming	Tamworth LALC	Fiona Snape	Cameron Neal (EMM)	Email	Notified that staff would be avaliable for the two week excavation. Requested to receive information regarding meeting times and locations.
12 January 2022	Outgoing	Tamworth LALC	Cameron Neal (EMM)	Fiona Snape	Email	Acknowledged response and notified that updates about Covid-19 saftey requirements will be communicated shortly.
12 January 2022	Incoming	Galamaay Cultural Consultants	Rob Slater	Cameron Neal (EMM)	Email	Notified that a site officer would be avaliable on the rostered dates.
12 January 2022	Outgoing	Galamaay Cultural Consultants	Cameron Neal (EMM)	Rob Slater	Email	Acknowledged response and notified that updates about Covid-19 saftey requirements will be communicated shortly.
12 January 2022	Incoming	AT Gomilaroi	Aaron Talbott	Cameron Neal (EMM)	Email	Notified that a site officer would be avaliable during the second week of fieldwork on the rostered dates.
12 January 2022	Outgoing	AT Gomilaroi	Cameron Neal (EMM)	Aaron Talbott	Email	Acknowledged response and notified that updates about Covid-19 saftey requirements will be communicated shortly.
18 January 2022	Outgoing	All RAPs	Georgia Burnett (EMM)	-	Email	Reminder that comment period for early works ACHA closes Friday 21 Jan 22.
21 January 2022	Incoming	Gomeroi People	Steve Talbott	Georgia Burnett (EMM)	Email	Short response in support of early works ACHA. GB acknowledged reciept.
21 January 2022	Incoming	Wurrumay	Vicky Slater	Georgia Burnett (EMM)	Email	Short response in support of early works ACHA. GB acknowledged reciept.
28 January 2022	Outgoing	Gomeroi People	Cameron Neal (EMM)	Steve Talbott	Phone	Phoned to notify Steve that due to a clerical error by EMM, a second fieldwork slot had been appointed to the Gomeroi People (specifically Yvonne Rodgers, who is listed in EMM records as belonging to Gomeroi People). When asked his preference, Steve stated he did not wish Yvonne to attend site and that the second fieldwork slot should be given to another local Aboriginal group. Thanked Steve and advised the issue would be resolved.
28 January 2022	Outgoing		Cameron Neal (EMM)	Yvonne Rodgers	Phone	Phoned Yvonne to apologise and inform her that due to a clerical error made by EMM, a second fieldwork slot had been provided by Gomeroi People, and Steve Talbott wished for the second slot to be given to a different local Aboriginal group. Yvonne expressed her extreme dissatisfaction with this and stated she does not recognise Steve Talbott's authority in determining whether Yvonne attends site. CN apologised but noted that EMM records indicate she registered interest in the project as a member of the Gomeroi People Native Title claimant group, and as such Steve has the right to appoint site officers. When asked, Yvonne refused to discuss the matter directly with Steve.
28 January 2022	Outgoing		Alan Williams (EMM)	Yvonne Rodgers	Email	Apologised to Yvonne and informed her that, as outlined in previous correspondence, it was determined early in the project that only those Aboriginal groups/individuals who formally registered interest by mid-2020 could be considered for participation in fieldwork. Reminded Yvonne that all groups/individuals who registered after this date had been invited to attend all meetings and review all documents. Recommended liaison with Steve Talbott to discuss the possibility of swapping or sharing fieldwork roles, and advised that further excavations will be happening and that discussions with WINSW regarding the possibility of expanding fieldwork opportunities to more groups are underway.
31 January 2022	Incoming	Yvonne Rodgers	Yvonne Rodgers	Cameron Neal (EMM)	Phone	Yvonne phoned to express her extreme dissatisfaction at being excluded from the fieldwork program. It was her belief that she registered interest in the project in time to be considered for fieldwork. CN informed Yvonne that EMM records indicate she registered interest too late to be considered for fieldwork (8 September 2020) as per WINSW requirements. Noted that she is free to attend meetings and review documents. Yvonne did not acknowledge this and stated the Native Tribunal had been contacted, that her husband possesses a good business acumen and that she has the power to sack lawyers. Yvonne expressed suspicion that EMM was treating her as an unintelligent person because she is an Aboriginal woman. CN sincerely apologised that she felt this way but stated that is not the case. Yvonne did not acknowledge or agree with this. After CN confirmed Steve Talbott was on site, Yvonne expressed her dislike of him. CN stated he was sorry she felt this way but was not able to entertain Yvonne's personal opinions of the field team. Asked if Yvonne could resolve her issues with Steve directly as it was felt he did not have the capacity (nor would it be appropriate) to do so on her behalf. Yvonne refused. CN advised that the best course of conflict resolution would be to discuss any issues with WINSW.
9 February 2022	Incoming	DFTV Enterprises	Derrick Vale	Cameron Neal, Alan Williams (EMM)	Email	Derrick wrote to complain about a member of the field team on behalf of his site officer. EMM implemented a formal WHS review of the issue, and undertook its prompt resolution. This information was relayed back to DFTV Enterprises who seemed satisfied that the issue was resolved.
31 January - 11 February 2022	Outgoing	Tamworth LALC, DFTV Enterprises, AT Gomilaroi, Gomeroi People, Hucka Dreaming Heritage Group, Galamaay Cultural Consultants	-	Cameron Neal (EMM)	Fieldwork	Undertook the archaeological excavations of PADs 1-3 inclusive on the replacement pipeline component of the project.
15 February 2022	Outgoing	All RAPs	-	Alan Williams (EMM)	Email	Provided a project update including on the progression and findings of the early works test excavation, the upcoming geotechnical activities, and the identifcation and future management of the human burial found at the site.
15 February 2022	Outgoing		Yvonne Rodgers	Alan Williams (EMM)	Phone	Missed a call, returned but no answer. Message left
15 February 2022	Outgoing	Tamworth LALC, DFTV Enterprises, AT Gomilaroi, Gomeroi People, Hucka Dreaming Heritage Group, Galamaay Cultural Consultants, Donny Fermor	-	Alan Williams (EMM)	Email	Proposed an on-site meeting to discuss the human remains discovered on site, and next steps.
16 February 2022	Incoming		Donny Fermor	Alan Williams (EMM)	Phone	Spoke about the burial, and his willingness to lead the smoking ceremony. Suggested we consider a priest for the individual during exhumation (not part of the current works) and re-burial near Paradise House. AW indicated that these were all discussions to be undertaken on site on Friday to work out a way forward.
18 February 2022	Outgoing	Tamworth LALC, AT Gomilaroi, Hucka Dreaming Heritage Group, Donny Fermor	-	Alan Williams (EMM)	Onsite meeting	Investigated the human remains identified as part of the historical investigations, and the discussed the way forward. See detailed project update on this issue.

22 February 2022	Outgoing	Tamworth LALC, DFTV Enterprises, AT Gomilaroi, Gomeroi People, Huckada Dreaming Heritage Group, Galamaay Cultural Consultants, Donny Fermor	-	Alan Williams (EMM)	Email	Provided a summary of the human remain activities, including the next steps proposed.
9 March 2022	Outgoing	All RAPs	-	Alan Williams (EMM)	Email	Advised all stakeholders of the imminent implementation of the archaeological program for the geotechnical works
9 March 2022	Outgoing	Tamworth LALC, DFTV Enterprises, AT Gomilaroi, Gomeroi People, Huckada Dreaming Heritage Group, Galamaay Cultural Consultants	-	Alan Williams (EMM)	Email	Sought their involvement in the first phase of the excavations
9 March 2022	Incoming	Galamaay Cultural Consultants	Robert Slater	Alan Williams (EMM)	Email	RS confirmed he and HDHG were locked in for fieldwork.
9 March 2022	Outgoing	Hunters and Collectors, Wurrumay	-	Alan Williams (EMM)	Email	Sought their involvement in a portion of the first phase of the excavations
9 March 2022	Incoming	Hunters and Collectors	Tanya Matthews	Alan Williams (EMM)	Email	Confirmed she would have a sites officer available for next week.
14 March 2022	Outgoing	DFTV Enterprises, Gomeroi People	Georgia Burnett (EMM)	-	Phone/Email	Called to confirm reciept of invitation to fieldwork. No answer, left messages (where available) and also emailed.
14 March 2022	Outgoing	AT Gomilaroi	Georgia Burnett (EMM)	Aaron Talbott	Phone	Called to confirm AT is across details for next week, AT confirmed.
14 March 2022	Outgoing	Wurrumay	Georgia Burnett (EMM)	Vicky Slater	Phone/Email	Called to confirm VS was locked in for next week. VS confirmed, GB resent logistics email.
14 March 2022	Outgoing	DFTV Enterprises	Georgia Burnett (EMM)	Sue Cutmore	Phone	Called to check if DFTV was aware of works commencing next week. Sue confirmed she/Derrick were across the details.
14 March 2022	Incoming	DFTV Enterprises	Derrick Vale	Georgia Burnett (EMM)	Phone	Confirmed fieldwork participation.
14 March 2022	Incoming	The Gomeroi People	Steve Talbott	Georgia Burnett (EMM)	Phone	Confirmed fieldwork participation.
15 March 2022	Incoming	Huckada Dreaming Heritage Group	Richard Slater	Alan Williams (EMM)	Email	Expressed concerns about engagement of Sydney based groups and sought involvement of original RAPs in fieldwork. GB confirmed all original stakeholders were involved in the work, but due to large numbers of personnel needed for the work, two additional groups who WINSW deemed eligable had been engaged (a member of the Slater family, and a Gunnedah based group).
15 March 2022	Outgoing	Huckada Dreaming Heritage Group; Galamaay Cultural Consultants; Wurrumay	Various	Georgia Burnett (EMM)	Phone/Email	VS called to check if HDHG and GCC were engaged for the upcoming works. GB confirmed. VS requested email be resent to both, GB actioned.
15 March 2022	Incoming	Corroboree Aboriginal Corporation	Marilyn Carroll-Johnson	Alan Williams (EMM)	Email	Asked whether Corroboree was involved in fieldwork, AW advised no since works were focussed on those locally based and/or heavily engaged in the project.
16 March 2022	Incoming	Wurrumay	Vicky Slater	Georgia Burnett (EMM)	Phone/Email	Withdrew from proposed fieldwork roster.
17 March 2022	Outgoing	All RAPs	Georgia Burnett (EMM)	Various	Email	Distributed update early works ACHA. Requested feedback by 15 April 2022.
18 March 2022	Incoming		Natasha Rodgers	Alan Williams (EMM)	Email	Made a complaint about Yvonne and herself not being involved in the fieldwork. AW advised that only those registered prior to July 2020 could participate in the fieldwork, and suggested they contact the Gomeroi People (that they were representatives of) to discuss further. Also added that other involvement and opportunites remained available to them.
21-25 March 2022	-	Tamworth LALC; DFTV Enterprises; The Gomeroi People; Huckada Dreaming Heritage Group; Galamaay Cultural Consultants; AT Gomilaroi; Hunters and Collectors	Georgia Burnett (EMM)	Various	Fieldwork	Excavations preceeding geotechnical work - Week 1
28 March - 1 April 2022	-	Tamworth LALC; DFTV Enterprises; The Gomeroi People; Huckada Dreaming Heritage Group; Galamaay Cultural Consultants; AT Gomilaroi; Hunters and Collectors	Georgia Burnett (EMM)	Various	Fieldwork	Excavations preceeding geotechnical work - Week 2
29 March 2022	Outgoing	Tamworth LALC; DFTV Enterprises; The Gomeroi People; Huckada Dreaming Heritage Group; Galamaay Cultural Consultants; AT Gomilaroi; Hunters and Collectors	Georgia Burnett (EMM) Cam Neal (EMM)	Various	Phone/email	Cancelled work on Wednesday 30 March due to poor weather.
31 March 2022	Incoming		Cindy Foley	Alan Williams	Phone	Introduced herself as a stakeholder from Gunnedah and sought information on why she had not been notified of the project, wished to register and sought information on current field activities and who was participating. AW advised that her name had not been on the initial information provided from government bodies on the project, and would discuss with Water NSW her inclusion at such a late stage in the project. Registered her interest in the project, and AW provided an information package.
31 March 2022	Incoming	AT Gomeroi	Aaron Talbott	Alan Williams	Email	Advised that he had received work of additional people wishing to register and opposed the introduction of any new Aboriginal stakeholders into the project at such a late stage. AW advised he would pass his concerns onto Water NSW
4-8 April 2022	-	Tamworth LALC; DFTV Enterprises; The Gomeroi People; Huckada Dreaming Heritage Group; Galamaay Cultural Consultants; AT Gomilaroi; Hunters and Collectors	Georgia Burnett (EMM)	Various	Fieldwork	Excavations preceeding geotechnical work - Week 3
4 April 2022	Outgoing	Heritage NSW	Alan Williams (EMM)		Email	Sought a meeting to discuss downstream impacts and the ongoing geotechnical mitigation program and need for minor changes.
6 April 2022	Outgoing	Heritage NSW	Alan Williams (EMM)		Email	Provided a letter outlining minor amendments to the archaeological excavations being undertaken for the geotechnical program for review and comment
6 April 2022	Outgoing	All RAPs	Alan Williams (EMM)		Email	Provided a letter outlining minor amendments to the archaeological excavations being undertaken for the geotechnical program for review and comment
6 April 2022	Incoming		Donny Fermor	Alan Williams (EMM)	Phone	Rang to discus methdology changes. No issues ultimately with proposed revisions, but indicated a desire to be part of the decision making process for any subsequent salvage excavations; and highlighted a surface artefact scatter near the geotechnical program. AW advised this would be documented by the field team.
7 April - 1 May 2022	Outgoing/Incoming	Tamworth LALC; DFTV Enterprises; The Gomeroi People; Huckada Dreaming Heritage Group; Galamaay Cultural Consultants; AT Gomilaroi; Hunters and Collectors	Various		Email/phone	Numerous discussions seeking to re-organise the geotechnical archaeological excavations that were cancelled prior to Easter, and proposed for re-initiation in early May.
2 May 2022	Outgoing	All RAPs	Alan Williams (EMM)		Email	Sought permission for Water Infrastructure NSW to use photographs from the ACHA in the broader public engagement material
2 May 2022	Incoming	Tamworth LALC	Fiona Snape	Alan Williams (EMM)	Email	Provided permission to uses the photographs
2 May 2022	Incoming	AT Gomilaroi	Aaron Talbott	Alan Williams (EMM)	Email	Provided permission to uses the photographs
4 May 2022	Outgoing	Heritage NSW	Alan Williams (EMM)	Nicole Davis, Sam Higgs, Tin	Meeting	Discussed inclusion of the impacts to the river system near Chaffey and its inclusion in the ACHA; discussions over modification of the geotechnical excavation methodology, and the management of the human remains.
6 May 2022	Outgoing	Tamworth LALC; DFTV Enterprises; The Gomeroi People; Huckada Dreaming Heritage Group; Galamaay Cultural Consultants; AT Gomilaroi; Hunters and Collectors	Various	Cameron Neal (EMM)	Email/phone	Informed RAPs that excavations are planned to re-mobilise for Monday 16 May, and will continue to mid-late June. Stated that further details will follow early next week.
6 May 2022	Outgoing	Heritage NSW	Alan Williams (EMM)	Nicole Davis	Email	Provision of follow up information after the meeting earlier in the week
6 May 2022	Outgoing	Tamworth LALC; DFTV Enterprises; The Gomeroi People; Huckada Dreaming Heritage Group; Galamaay Cultural Consultants; AT Gomilaroi; Hunters and Collectors	Alan Williams (EMM)		Email	Advised all of demobilisation fees that would be offered following the short cancellation of work around Easter.
8 May 2022	Incoming	Gomeroi People	Steven Talbott	Alan Williams	Email	Provided complaint about the management of the WHS delays over the last four weeks, and sought the excavation program to be removed from the broader geotechnical works that had resulted in the issues.
16-20 May 2022	Outgoing	Tamworth LALC; DFTV Enterprises; The Gomeroi People; Huckada Dreaming Heritage Group; Galamaay Cultural Consultants; AT Gomilaroi; Hunters and Collectors	Cameron Neal (EMM) Ryan Desic (EMM)		Fieldwork	Continuation of the geotechnical field program
19 May 2022	Outgoing	Tamworth LALC; DFTV Enterprises; The Gomeroi People; Huckada Dreaming Heritage Group; Galamaay Cultural Consultants; AT Gomilaroi; Hunters and Collectors	Alan Williams (EMM)		Email	Advised participating RAPs that we would pay for a nine hour day following the necessary changes to the program for WHS reasons
19 May 2022	Outgoing	All RAPs	Alan Williams (EMM)		Email	Provided a copy of AHIP 4899 for their records.
23-27 May 2022	Outgoing	Tamworth LALC; DFTV Enterprises; The Gomeroi People; Huckada Dreaming Heritage Group; Galamaay Cultural Consultants; AT Gomilaroi; Hunters and Collectors	Megan Sheppard Brennard (EMM) Cameron Neal (EMM)		Fieldwork	Continuation of the geotechnical field program.
30 May - 3 June 2022	Outgoing	Tamworth LALC; DFTV Enterprises; The Gomeroi People; Huckada Dreaming Heritage Group; Galamaay Cultural Consultants; AT Gomilaroi; Hunters and Collectors	Morgan Wilcox (EMM)		Fieldwork	Continuation of the geotechnical field program.
1 June 2022	Outgoing	All RAPs	Alan Williams (EMM)		Email	Provided an update on the archaeological excavation program for the geotechnical investigation. These included areas proposed for release for development and those for archaeological salvage.
6-10 June 2022	Outgoing	Tamworth LALC; DFTV Enterprises; The Gomeroi People; Huckada Dreaming Heritage Group; Galamaay Cultural Consultants; AT Gomilaroi; Hunters and Collectors	Alan Williams (EMM) Courtney Culley (EMM)		Fieldwork	Continuation of the geotechnical field program. Aborted on 10 June due to ongoing access issues.
17 June 2022	Incoming	Gomeroi People	Steve Talbott	Georgia Burnett (EMM)	Phone	Phoned to discuss the timing when work would restart. Advised EMM was liasing safe access with SMEC and it may take a week or so to resolved. Discussed monitoring SMEC's activities while the excavation team was not on site. GB advised this was best to be discussed with Warren Myers, WINSW's Aboriginal liason officer.
20 June 2022	Incoming	Gomeroi People	Steve Talbott	Georgia Burnett (EMM)	Phone	Followed up discussion from Friday. GB advised no changes.
20 June 2022	Incoming	DFTV Enterprises	Sue Cutmore	Georgia Burnett (EMM)	Phone	Phoned to discuss the timing when work would restart. Advised EMM was liasing safe access with SMEC and it may take a week or so to resolved.
22 June 2022	Incoming	DFTV Enterprises	Sue Cutmore	Georgia Burnett (EMM)	Phone	Followed up discussion from Monday. GB advised no changes.
22 June 2022	Incoming	Gomeroi People	Steve Talbott	Georgia Burnett (EMM)	Phone	Phoned to discuss monitoring of SMEC's activities. GB advised that as far as EMM was aware, Donny Fermor (TLALC) was in attendance on site (unknown duration). Steve expressed frustation at EMM's lack of involvement in the selection of RAPs for this activity, and resolved to bring his concerns to the attention of Warren Myers (WINSW Aboriginal liason officer).

23 June 2022	Incoming	Gomeroi People	Steve Talbott	Georgia Burnett (EMM)	Phone	Phoned to follow up conversation from yesterday. Expressed disatisfaction in the processes for RAP selection being undertaken by SMEC/Water Infrastructure NSW.
23 June 2022	Outgoing	All RAPs	Georgia Burnett (EMM)		Email	Provided revised draft ACHA (EIS) for review. Requested feedback by COB 21 July 2022.
6 July 2022	Outgoing	Tamworth LALC; DFTV Enterprises; The Gomeroi People; Huckada Dreaming Heritage Group; Galamaay Cultural Consultants; AT Gomilaroi; Hunters and Collectors; Donny Fermor	Cameron Neal (EMM)		Email	Emailed to inform RAPs involved with fieldwork that excavations will be pushed back to start on Wednesday 13 July due to an EMM team member contracting COVID-19.
13-15 July 2022	Outgoing	Tamworth LALC; DFTV Enterprises; The Gomeroi People; Huckada Dreaming Heritage Group; Galamaay Cultural Consultants; AT Gomilaroi; Hunters and Collectors	Georgia Burnett (EMM) Cameron Neal (EMM)		Fieldwork	Continuation of the geotechnical field program.
18-21 July 2022	Outgoing	Tamworth LALC; DFTV Enterprises; The Gomeroi People; Huckada Dreaming Heritage Group; Galamaay Cultural Consultants; AT Gomilaroi; Hunters and Collectors	Megan Sheppard Brennard (EMM) Cameron Neal (EMM)		Fieldwork	Continuation of the geotechnical field program.
25-29 July 2022	Outgoing	Tamworth LALC; DFTV Enterprises; The Gomeroi People; Huckada Dreaming Heritage Group; Galamaay Cultural Consultants; AT Gomilaroi; Hunters and Collectors	Luke Kirkwood (EMM)		Fieldwork	Continuation of the geotechnical field program.

B.2 Stage 1 – Notification and registration

This section contains the following documents:

- Government agency requests and responses;
- Public media notifications;
- Aboriginal party invitation to register for the project;
- Aboriginal party registrations of interest; and
- Notification to Heritage NSW (formerly DPIE) and the Tamworth LALC of registered parties.

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9 April 2020

Department of Planning, Industry and Environment
Level 1, 48-52 Wingewarra Street
Dubbo NSW 2830

Re: Request for information on Aboriginal stakeholders for an Aboriginal cultural heritage assessment of Dungowan Dam, NSW

Dear Sir/Madam,

EMM Consulting Pty Ltd (EMM) has been commissioned by WaterNSW to undertake an Aboriginal Cultural Heritage Assessment (ACHA) for the proposed development of the new Dungowan Dam, approximately 30km south east of Tamworth NSW (Figure 1 & Figure 2). The project includes: a new dam downstream of the existing Dungowan Dam with an expected capacity of 22.5 gigalitres (GL); partial or full decommissioning of the existing Dungowan Dam and rehabilDubbo NSW 2830itation of the storage area of the dam; a new water delivery pipeline from the new dam to the junction with the pipeline from Chaffey Dam; and ancillary facilities including construction compounds, quarry and other supporting infrastructure. The aim of this assessment is to adopt best practice approaches to identify Aboriginal cultural heritage within the impact footprint, and to identify mitigation measures to allow the works to proceed.

The project has been declared as Critical State Significant Infrastructure (CSSI) under the provisions of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act). CSSI projects require approval from the NSW Minister for Planning and Public Spaces, and require an Environmental Impact Statement (EIS) to be prepared in accordance with environmental assessment requirements issued by the Secretary of the NSW Department of Planning, Industry and Environment (DPIE); referred to as SEARs (Secretary's Environmental Assessment Requirements). Aboriginal heritage assessment requirements will be outlined in the SEARs.

The proponent is WaterNSW, and the project contact is:

Meredith Abrams,
WaterNSW Community Engagement Officer,
P: 1300 662 077, E: meredith.abrams@waternsw.com.au

In accordance with DPIE's *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010*, I am writing to you to seek information on relevant Aboriginal individuals and/or communities that you are aware of, who may hold cultural knowledge for the area relevant to determining the significance of Aboriginal objects and/or places. It would be appreciated if you could provide this information to the undersigned at the Sydney address above or by email below.

Please don't hesitate to contact me on (02) 9493 9500 if you have any queries or concerns.

Yours sincerely,

Georgia Burnett
Archaeologist
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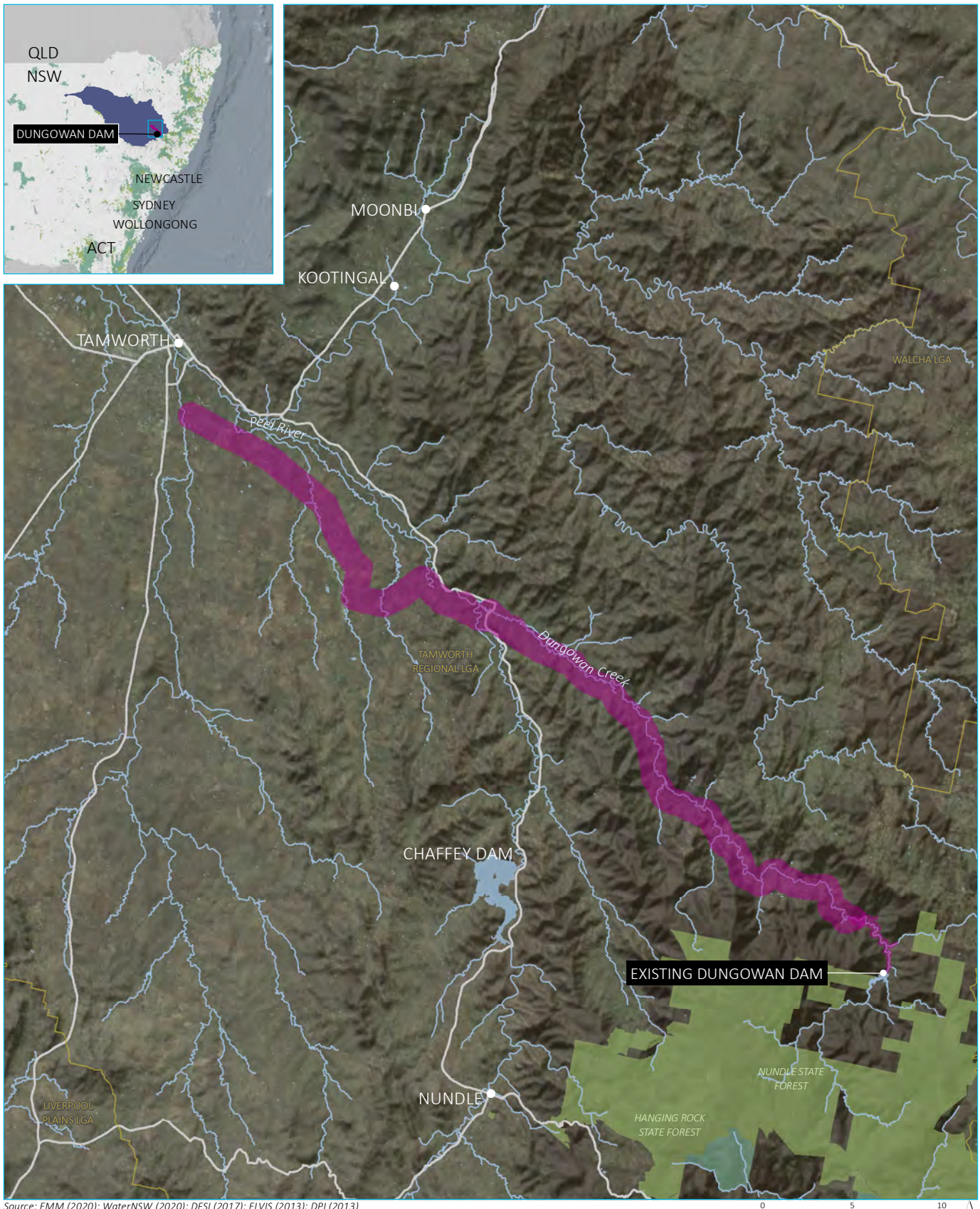

Source: EMM (2020); WaterNSW (2020); DFSI (2017); ELVIS (2013); DPI (2013)

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GDA 1994 NSW Lambert

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KEY

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- Major road
- Named watercourse
- Waterbody
- Local government area
- NPWS reserve
- State forest
- Namoi River catchment (inset)

Regional context

Dungowan Dam
Aboriginal consultation
Figure 1

EMM creating opportunities

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9 April 2020

National Native Title Tribunal
Level 5, Harry Gibbs Commonwealth Law Courts,
119 North Quay Brisbane QLD 4001

Re: Request for information on Aboriginal stakeholders for an Aboriginal cultural heritage assessment of Dungowan Dam, NSW

Dear Sir/Madam,

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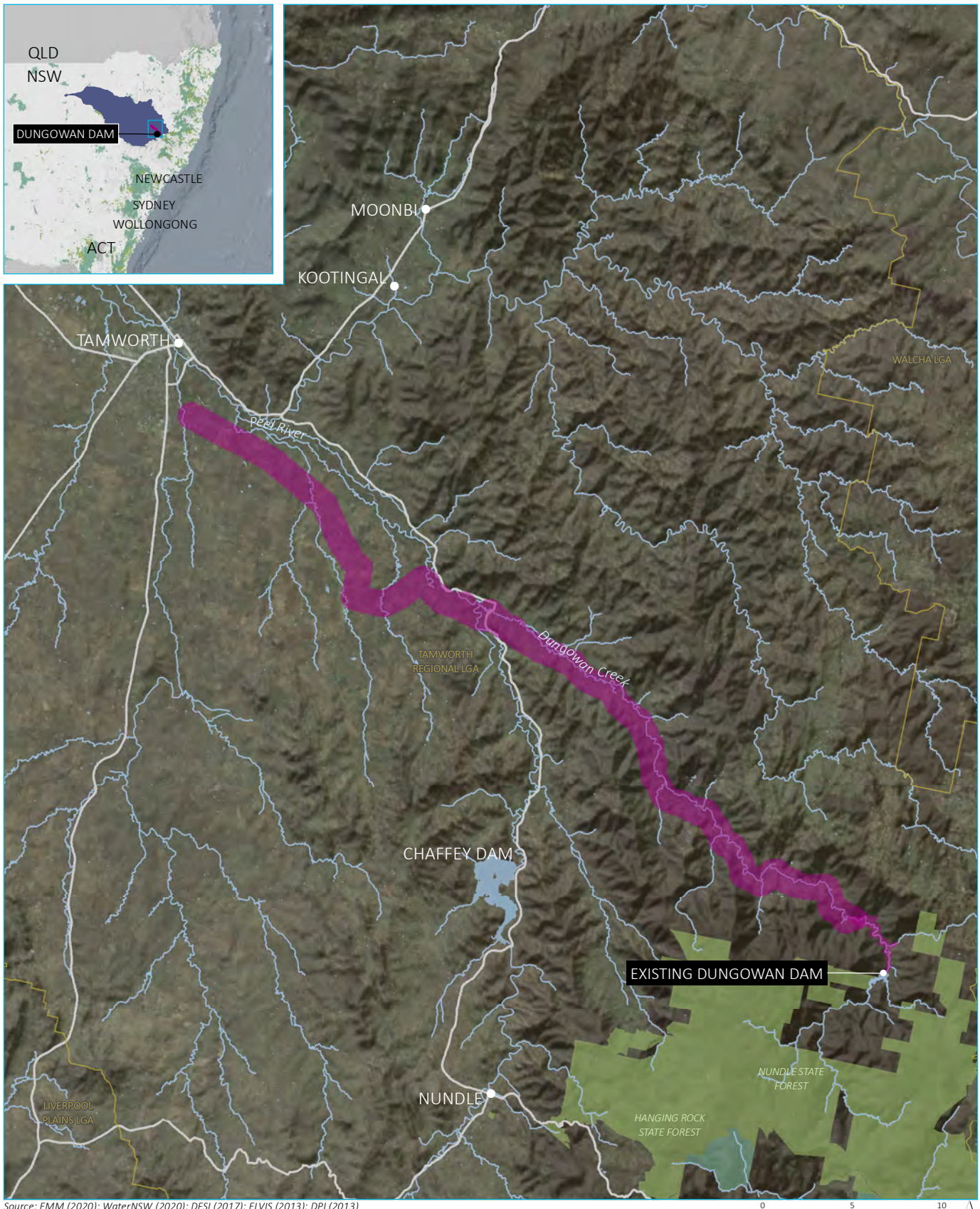

Source: EMM (2020); WaterNSW (2020); DFSI (2017); ELVIS (2013); DPI (2013)

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GDA 1994 NSW Lambert

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KEY

- Indicative project area
- Major road
- Named watercourse
- Waterbody
- Local government area
- NPWS reserve
- State forest
- Namoi River catchment (inset)

Regional context

Dungowan Dam
Aboriginal consultation
Figure 1

EMM creating opportunities

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National Native Title Tribunal

Request for Spatial Search of Tribunal Registers

1: Your details

Your name:	*Georgia Burnett*		
Your company:	*EMM Consulting Pty Ltd*		
E-mail address:	*gburnett@emmconsulting.com.au*	Phone:	*0400 472 412*
Your reference:	*J200042*	Your state:	*New South Wales*
☒	*I have read and acknowledge the terms and conditions on the next page.*		

2: Areas to be searched

Jurisdiction to be searched:	*New South Wales*	Tenure to be searched:	*Non freehold parcel*

Non freehold parcel or tenement identifiers (add up to 20 separate identifiers)

Parcel 1:	*Lot 7001 DP 1058567*	Parcel 2:	*Lot 7002 DP 1058568*
Parcel 3:	*Lot 7016 DP 1058548*	Parcel 4:	*Click or tap here to enter text.*
Parcel 5:	*Click or tap here to enter text.*	Parcel 6:	*Click or tap here to enter text.*
Parcel 7:	*Click or tap here to enter text.*	Parcel 8:	*Click or tap here to enter text.*
Parcel 9:	*Click or tap here to enter text.*	Parcel 10:	*Click or tap here to enter text.*
Parcel 11:	*Click or tap here to enter text.*	Parcel 12:	*Click or tap here to enter text.*
Parcel 13:	*Click or tap here to enter text.*	Parcel 14:	*Click or tap here to enter text.*
Parcel 15:	*Click or tap here to enter text.*	Parcel 16:	*Click or tap here to enter text.*
Parcel 17:	*Click or tap here to enter text.*	Parcel 18:	*Click or tap here to enter text.*
Parcel 19:	*Click or tap here to enter text.*	Parcel 20:	*Click or tap here to enter text.*

If your search area is not a non-freehold parcel or mining or petroleum tenement, you can enter other tenure or administrative regions here (e.g. local government area, townsite or county). Please provide as much detail as you can.

Click or tap here to enter text.

E-mail the completed form to GeospatialSearch@NNTT.gov.au

Terms and Conditions

1. Specify only one jurisdiction (e.g. Queensland) and one type of tenure (e.g. mining tenement) per form. You can add up to 20 separate tenements or parcels per search request. For more than 20 parcels or tenements please submit additional search requests or contact GeospatialSearch@NNTT.gov.au to discuss your requirements.

   Note: if your area of interest cannot be clearly identified from the search form, or is not held in NNTT datasets, we may instead provide search results for a surrounding local government area, or other suitable regional area.

2. The NNTT does not conduct searches over freehold land (other than freehold land identified as aboriginal freehold)

   Under the Native Title Act 1993 (Cth), the valid grant of a freehold estate (other than certain types of Aboriginal and Torres Strait Islander land) on or before 23 December 1996 is known as a 'previous exclusive possession act'. This means that native title has been extinguished over the area. Native title claimants are not allowed to include land and waters covered by previous exclusive possession acts in their applications; therefore they would normally exclude freehold areas. A native title application may, however, be made over freehold land on the basis that freehold was invalidly granted, but the chances of this happening are very low.

   The NNTT is not the custodian of the data for freehold estates. To determine whether a particular parcel of land is freehold land, you may wish to seek such information from the relevant state government custodian.

3. Cultural Heritage in NSW.

   The National Native Title Tribunal has undertaken steps to remove itself from the formal list of sources for information about indigenous groups in development areas. The existence or otherwise of native title is quite separate to any matters relating to Aboriginal cultural heritage. Information on native title claims, native title determinations and Indigenous Land Use Agreements is available on the Tribunal's website.

4. Spatial searches rely on data obtained from the relevant custodian. Whilst efforts are taken to update such datasets on a regular basis, the collection and interpretation of such datasets may be influenced by a number of factors that can impact of the completeness and accuracy of your search results.

Disclaimer

While the National Native Title Tribunal (NNTT) and the Native Title Registrar (Registrar) have exercised due care in ensuring the accuracy of the information provided, it is provided for general information only and on the understanding that neither the NNTT, the Registrar nor the Commonwealth of Australia is providing professional advice. Appropriate professional advice relevant to your circumstances should be sought rather than relying on the information provided. In addition, you must exercise your own judgment and carefully evaluate the information provided for accuracy, currency, completeness and relevance for the purpose for which it is to be used.

The information provided is often supplied by, or based on, data and information from external sources, therefore the NNTT and Registrar cannot guarantee that the information is accurate or up-to-date.

The NNTT and Registrar expressly disclaim any liability arising from the use of this information.

This information should not be relied upon in relation to any matters associated with cultural heritage.

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9 April 2020

Native Title Services
PO Box 2105
Strawberry Hills NSW 2012

Re: Request for information on Aboriginal stakeholders for an Aboriginal cultural heritage assessment of Dungowan Dam, NSW

Dear Sir/Madam,

EMM Consulting Pty Ltd (EMM) has been commissioned by WaterNSW to undertake an Aboriginal Cultural Heritage Assessment (ACHA) for the proposed development of the new Dungowan Dam, approximately 30km south east of Tamworth NSW (Figure 1 & Figure 2). The project includes: a new dam downstream of the existing Dungowan Dam with an expected capacity of 22.5 gigalitres (GL); partial or full decommissioning of the existing Dungowan Dam and rehabilStrawberry Hills NSW 2012itation of the storage area of the dam; a new water delivery pipeline from the new dam to the junction with the pipeline from Chaffey Dam; and ancillary facilities including construction compounds, quarry and other supporting infrastructure. The aim of this assessment is to adopt best practice approaches to identify Aboriginal cultural heritage within the impact footprint, and to identify mitigation measures to allow the works to proceed.

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The proponent is WaterNSW, and the project contact is:

Meredith Abrams,
WaterNSW Community Engagement Officer,
P: 1300 662 077, E: meredith.abrams@waternsw.com.au

In accordance with DPIE's *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010*, I am writing to you to seek information on relevant Aboriginal individuals and/or communities that you are aware of, who may hold cultural knowledge for the area relevant to determining the significance of Aboriginal objects and/or places. It would be appreciated if you could provide this information to the undersigned at the Sydney address above or by email below.

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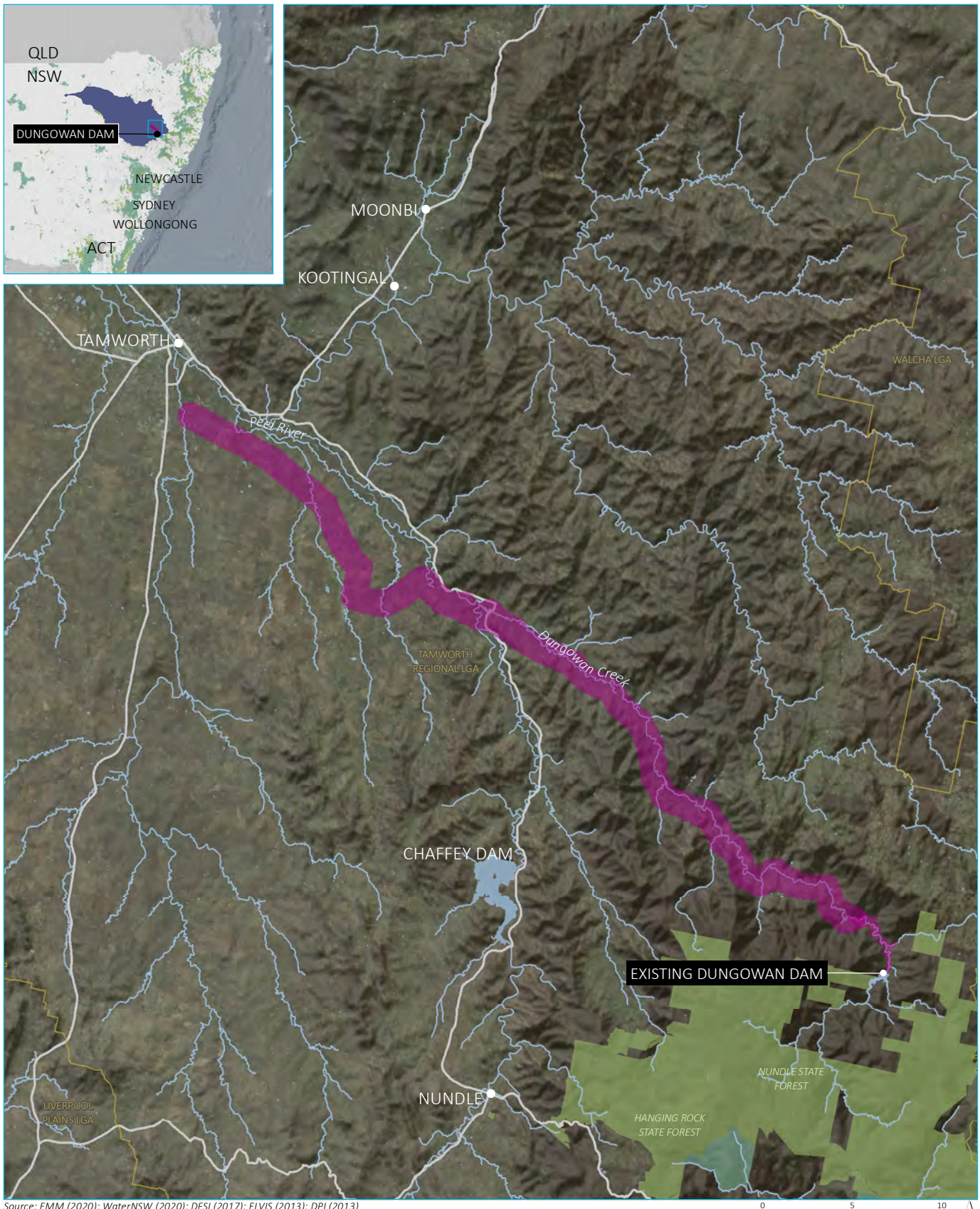

Source: EMM (2020); WaterNSW (2020); DFSI (2017); ELVIS (2013); DPI (2013)

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GDA 1994 NSW Lambert

N

KEY

- Indicative project area
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- Namoi River catchment (inset)

Regional context

Dungowan Dam
Aboriginal consultation
Figure 1

EMM creating opportunities

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9 April 2020

North West Local Land Service
Tamworth Agricultural Institute, 4 Marsden Park Road
Calala NSW 2340

Re: Request for information on Aboriginal stakeholders for an Aboriginal cultural heritage assessment of Dungowan Dam, NSW

Dear Sir/Madam,

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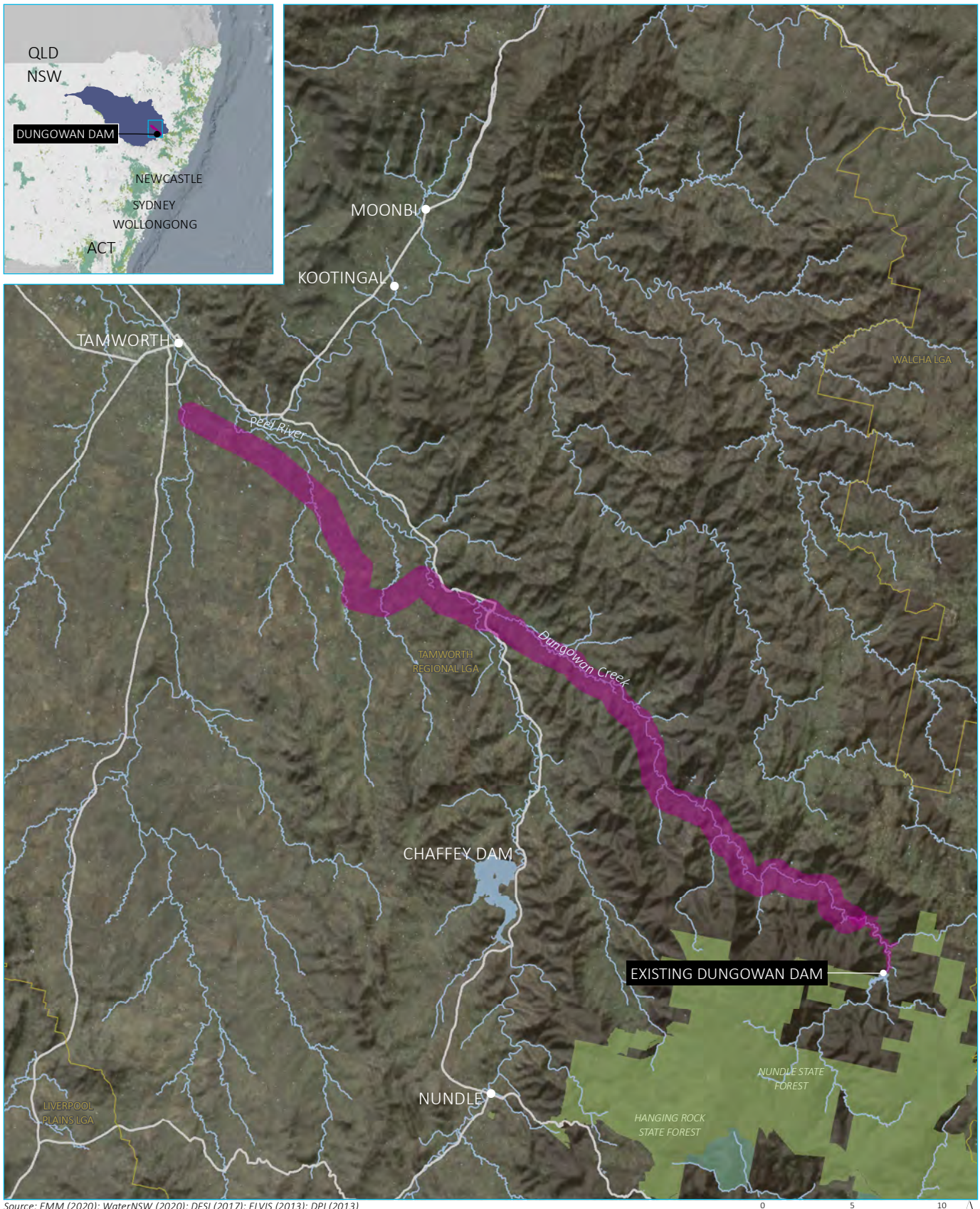

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EMM creating opportunities

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www.emmconsulting.com.au

9 April 2020

The Office of the Registrar, Aboriginal Land Rights Act 1983
Level 3, 2-10 Wentworth Street
Parramatta NSW 2150

Re: Request for information on Aboriginal stakeholders for an Aboriginal cultural heritage assessment of Dungowan Dam, NSW

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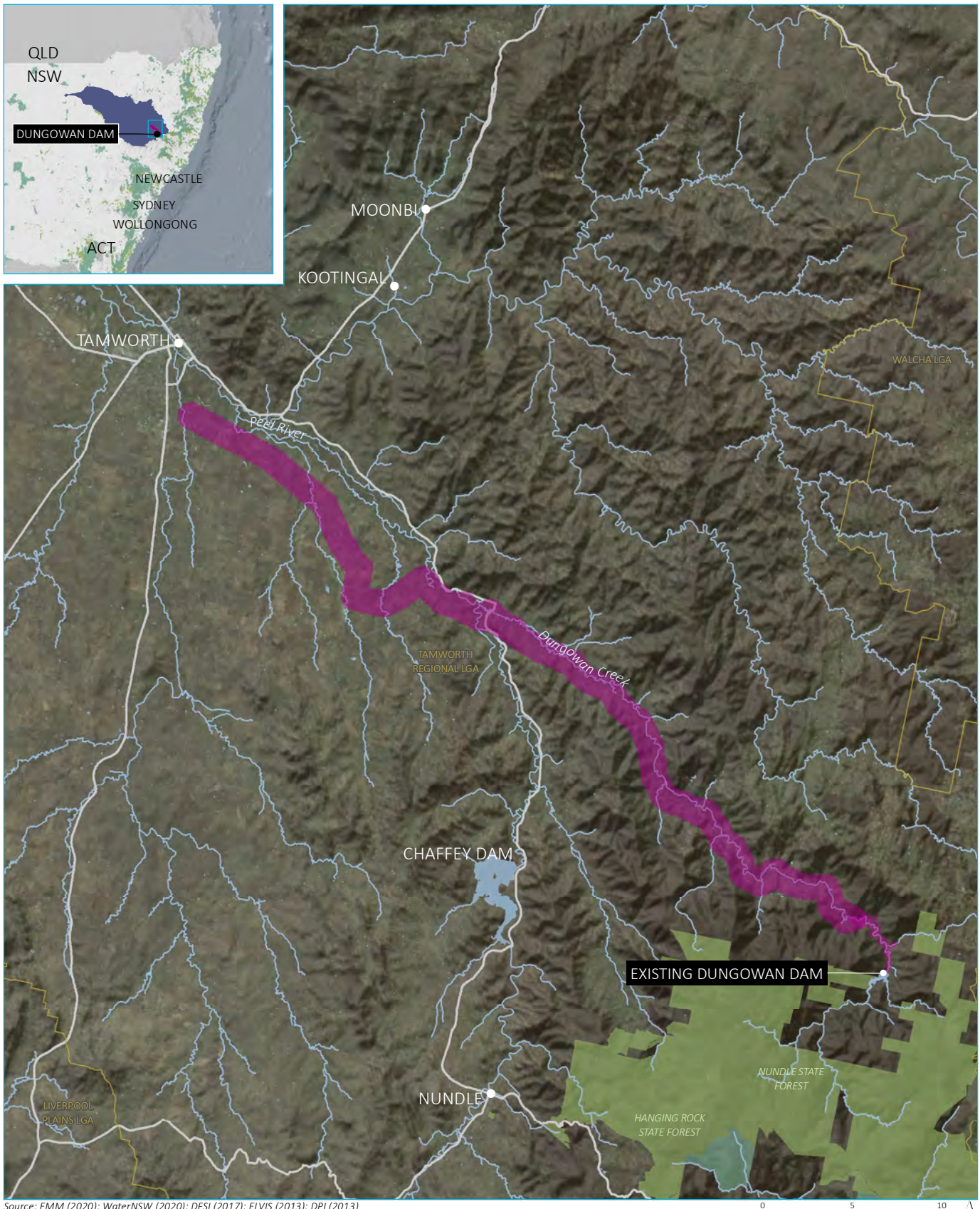

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9 April 2020

Tamworth Local Aboriginal Lands Council
123 Marius Street
Tamworth NSW 2340

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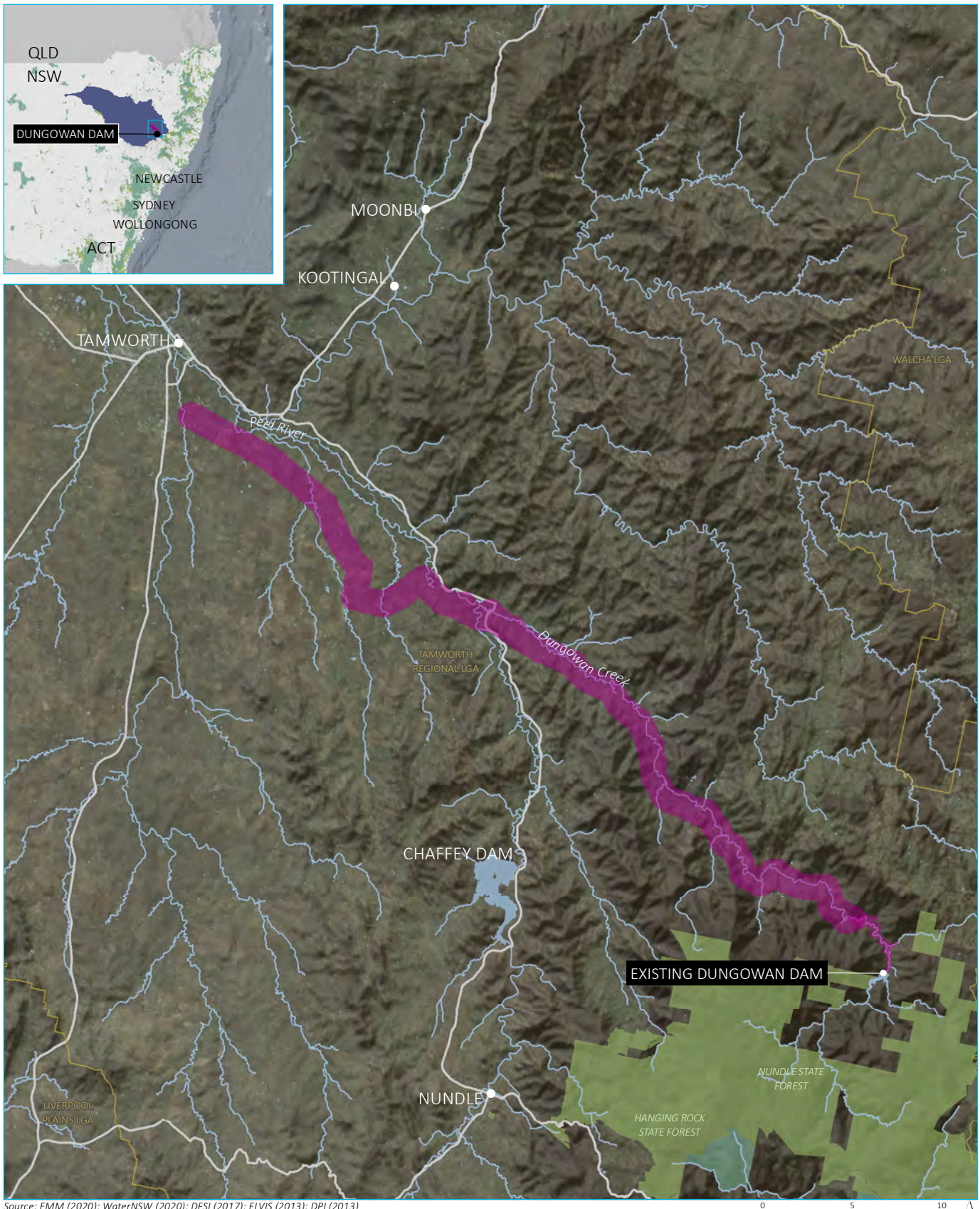
P: 1300 662 077, E: meredith.abrams@waternsw.com.au

In accordance with DPIE's *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010*, I am writing to you to seek information on relevant Aboriginal individuals and/or communities that you are aware of, who may hold cultural knowledge for the area relevant to determining the significance of Aboriginal objects and/or places. It would be appreciated if you could provide this information to the undersigned at the Sydney address above or by email below.

Please don't hesitate to contact me on (02) 9493 9500 if you have any queries or concerns.

Yours sincerely,

Georgia Burnett
Archaeologist
gburnett@emmconsulting.com.au



Source: EMM (2020); WaterNSW (2020); DFSI (2017); ELVIS (2013); DPI (2013)

**Inundation area should be considered approximate only. It is based on current limited available spatial data and is subject to future verification.*

0 5 10 km

GDA 1994 NSW Lambert

N

KEY

- Indicative project area
- Major road
- Named watercourse
- Waterbody
- Local government area
- NPWS reserve
- State forest
- Namoi River catchment (inset)

Regional context

Dungowan Dam
Aboriginal consultation
Figure 1

EMM creating opportunities

\\emmsvr1\emm\Jobs\2020\J200042 - Dungowan Dam\GIS\07_Working\20200301_AboriginalConsultation\DD_ECA001_RegionalContext_20200409_03.mxd 9/04/2020

Ground floor, 20 Chandos Street
St Leonards NSW 2065
PO Box 21
St Leonards NSW 1590

T 02 9493 9500
E info@emmconsulting.com.au

www.emmconsulting.com.au

1 April 2020

Tamworth Regional Council
Ray Walsh House, 437 Peel Street
Tamworth NSW 2340

Re: Request for information on Aboriginal stakeholders for an Aboriginal cultural heritage assessment of Dungowan Dam, NSW

Dear Sir/Madam,

EMM Consulting Pty Ltd (EMM) has been commissioned by WaterNSW to undertake an Aboriginal Cultural Heritage Assessment (ACHA) for the proposed development of the new Dungowan Dam, approximately 30km south east of Tamworth NSW (Figure 1 & Figure 2). The project includes: a new dam downstream of the existing Dungowan Dam with an expected capacity of 22.5 gigalitres (GL); partial or full decommissioning of the existing Dungowan Dam and rehabilTamworth NSW 2340itation of the storage area of the dam; a new water delivery pipeline from the new dam to the junction with the pipeline from Chaffey Dam; and ancillary facilities including construction compounds, quarry and other supporting infrastructure. The aim of this assessment is to adopt best practice approaches to identify Aboriginal cultural heritage within the impact footprint, and to identify mitigation measures to allow the works to proceed.

The project has been declared as Critical State Significant Infrastructure (CSSI) under the provisions of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act). CSSI projects require approval from the NSW Minister for Planning and Public Spaces, and require an Environmental Impact Statement (EIS) to be prepared in accordance with environmental assessment requirements issued by the Secretary of the NSW Department of Planning, Industry and Environment (DPIE); referred to as SEARs (Secretary's Environmental Assessment Requirements). Aboriginal heritage assessment requirements will be outlined in the SEARs.

The proponent is WaterNSW, and the project contact is:

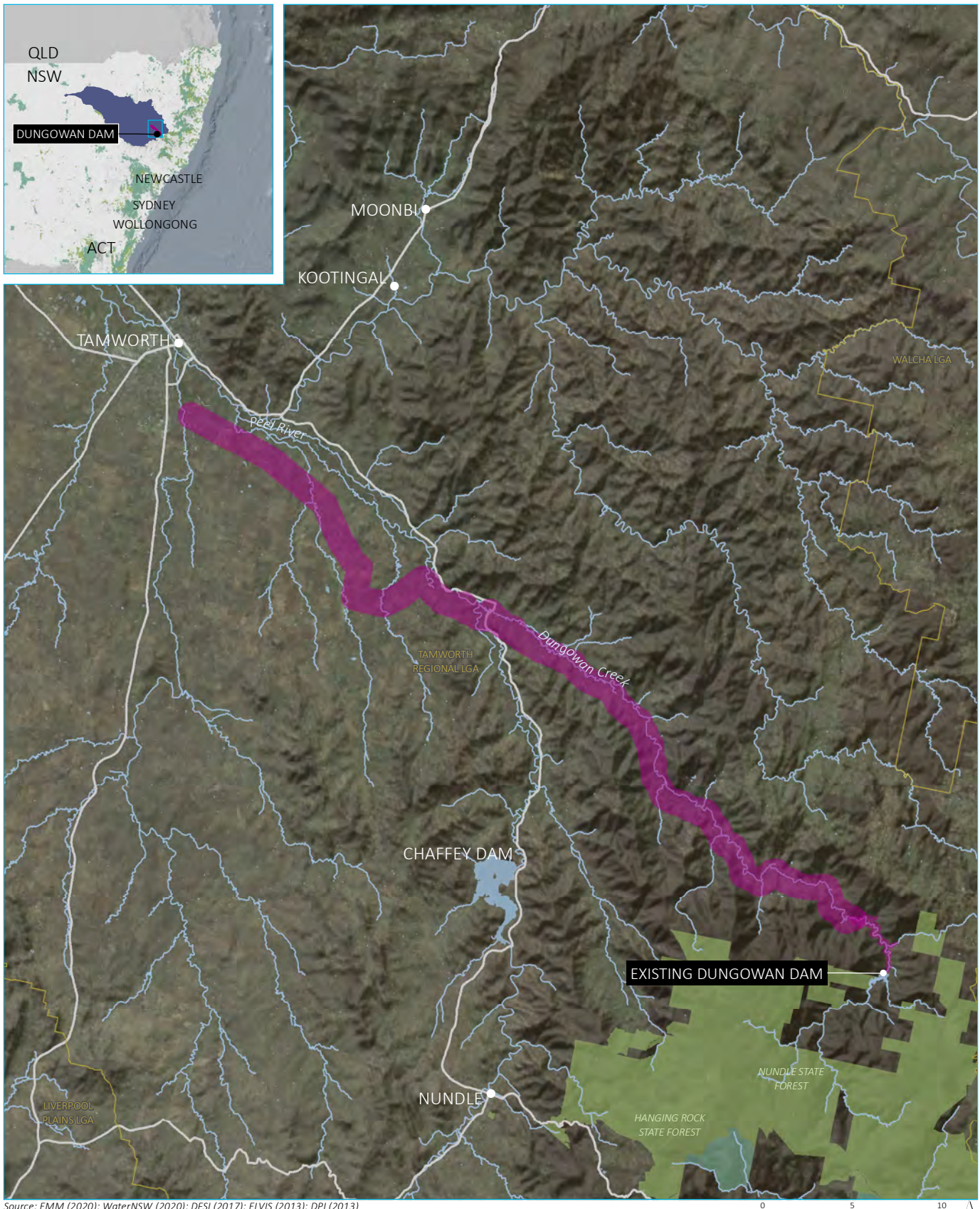
Meredith Abrams,
WaterNSW Community Engagement Officer,
P: 1300 662 077, E: meredith.abrams@waternsw.com.au

In accordance with DPIE's *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010*, I am writing to you to seek information on relevant Aboriginal individuals and/or communities that you are aware of, who may hold cultural knowledge for the area relevant to determining the significance of Aboriginal objects and/or places. It would be appreciated if you could provide this information to the undersigned at the Sydney address above or by email below.

Please don't hesitate to contact me on (02) 9493 9500 if you have any queries or concerns.

Yours sincerely,

Georgia Burnett
Archaeologist
gburnett@emmconsulting.com.au



Source: EMM (2020); WaterNSW (2020); DFSI (2017); ELVIS (2013); DPI (2013)

**Inundation area should be considered approximate only. It is based on current limited available spatial data and is subject to future verification.*

0 5 10 km

GDA 1994 NSW Lambert

N

KEY

- Indicative project area
- Major road
- Named watercourse
- Waterbody
- Local government area
- NPWS reserve
- State forest
- Namoi River catchment (inset)

Regional context

Dungowan Dam
Aboriginal consultation
Figure 1

EMM creating opportunities

\\emmsvr1\emm\Jobs\2020\J200042 - Dungowan Dam\GIS\07_Working\20200301_AboriginalConsultation\DD_ECA001_RegionalContext_20200409_03.mxd 9/04/2020

Georgia Burnett

From: Enquiries <Enquiries@nntt.gov.au>
Sent: Tuesday, 14 April 2020 10:25 AM
To: Georgia Burnett
Cc: Alan Williams
Subject: RE: Dungowan Dam, NSW - Request for information

UNCLASSIFIED

Good Morning Georgia,

Thank you for your email and associated letters requesting details of Aboriginal persons or groups who may hold cultural heritage knowledge relevant to your project
area.

Unfortunately your enquiry relates to Cultural Heritage, and not Native Title.

You can obtain the information you're after from the public registers we have available on our website however, www.nntt.gov.au.

We also have maps and our Geospatial Mapping Tool *'Native Title Vision'* available to use, which will assist you in finding the details required for your project.

I hope this helps. Please do not hesitate to contact us again though if you have any further questions.

Thanks

Kind Regards
Madeline

Enquiries
Public enquiry hours are 8.30am to 4.30pm
National Native Title Tribunal
Email enquiries@nntt.gov.au
Freecall 1800 640 501 | www.nntt.gov.au

From: Georgia Burnett <gburnett@emmconsulting.com.au>
Sent: Thursday, 9 April 2020 5:22 PM
To: Enquiries <Enquiries@nntt.gov.au>
Cc: Alan Williams <awilliams@emmconsulting.com.au>
Subject: Dungowan Dam, NSW - Request for information

Caution: This is an external email. DO NOT click links or open attachments unless you recognise the sender and know the content is safe.

To whom it may concern,

WaterNSW is undertaking the upgrade of Dungowan Dam, southeast of Tamworth, NSW. EMM has been engaged to undertake the environmental impact statement for the project, a component of which is the investigation and assessment of Aboriginal heritage. As such, please find attached a request for Aboriginal stakeholder information in accordance with DPIE's Aboriginal Consultation Requirements for Proponents. At this stage, the project is being divided between an EIS for the dam upgrade, ancillary activities and part of a new pipe that runs to the Calala water treatment works; and a component of the new pipeline towards the water treatment works that is being assessed under Part 5 of the Environmental Planning and Assessment Act 1979. Given these potentially different approval pathways and different timing of the assessments, we attach two requests, one for each of the components. Please note Appendix A is relevant for both letters.

Please note earlier aspects of the project at the beginning of 2020 included exploration of Aboriginal consultation, and a formal consultation strategy for the project is under development. We apologise where this request is seeking duplication of these earlier discussions and/or documentation provided, but wish to ensure the formal process is adopted moving into the EIS/REF stages of the project.

If you have any questions or enquiries, please don't hesitate to contact me.

Kind regards,

Georgia Burnett
Archaeologist
EMM creating opportunities
T 02 9493 9500
M 0400 472 412
Connect with us
SYDNEY | Ground floor, 20 Chandos Street, St Leonards NSW 2065

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Georgia Burnett

From: Geospatial Search Requests <GeospatialSearch@NNTT.gov.au>
Sent: Tuesday, 14 April 2020 6:04 PM
To: Georgia Burnett
Subject: RE: SR20/295 - Dungowan Dam, NSW - Geospatial search request - SR20/295

UNCLASSIFIED

Native title search – *NSW Parcels – Lot 7001 in DP1058567, Lot 7002 in DP1058568 and Lot 7016 in DP1058548*
Your ref: *J200042* - **Our ref:** *SR20/295*

Dear Georgia Burnett,

Thank you for your search request received on 14 April 2020 in relation to the above area, please find your results below.

Please note: The following parcel listed in your correspondence was not found on the National Native Title Tribunal's records as at 14 April 2020: *Lot 7002 in DP1058568.* However, results have been provided for Lot 7002 in DP1058567.

Search Results
The results provided are based on the information you supplied and are derived from a search of the following Tribunal databases:

- Schedule of Native Title Determination Applications
- Register of Native Title Claims
- Native Title Determinations
- Register of Indigenous Land Use Agreements
- Notified Indigenous Land Use Agreements

For more information about the Tribunal's registers or to search the registers yourself and obtain copies of relevant register extracts, please visit our website.

Parcel ID	Alt ID	Feature Area SqKm	NNTT file number	Name	Category	O Are
7001//D1058567	R47286	0.0273	NC2011/006	Gomeroi People	Applications (Schedule)	
7001//D1058567	R47286	0.0273	NC2011/006	Gomeroi People	Applications (RNTC)	
7002//D1058567	R1487	0.0399	NC2011/006	Gomeroi People	Applications (Schedule)	

7002//D1058567	R1487	0.0399	NC2011/006	Gomeroi People	Applications (RNTC)	
7016//D1058548	R1487	0.0277	NC2011/006	Gomeroi People	Applications (Schedule)	
7016//D1058548	R1487	0.0277	NC2011/006	Gomeroi People	Applications (RNTC)	

Please note: There may be a delay between a native title determination application being lodged in the Federal Court and its transfer to the Tribunal. As a result, some native title determination applications recently filed with the Federal Court may not appear on the Tribunal's databases.

The search results are based on analysis against external boundaries of applications only. Native title applications commonly contain exclusions clauses which remove areas from within the external boundary. To determine whether the areas described are in fact subject to claim, you need to refer to the "Area covered by claim" section of the relevant Register Extract or Schedule Extract and any maps attached.

Search results and the existence of native title
Please note that the enclosed information from the Register of Native Title Claims and/or the Schedule of Applications is **not** confirmation of the existence of native title in this area. This cannot be confirmed until the Federal Court makes a determination that native title does or does not exist in relation to the area. Such determinations are registered on the National Native Title Register.

The Tribunal accepts no liability for reliance placed on enclosed information
The enclosed information has been provided in good faith. Use of this information is at your sole risk. The National Native Title Tribunal makes no representation, either express or implied, as to the accuracy or suitability of the information enclosed for any particular purpose and accepts no liability for use of the information or reliance placed on it.

If you have any further queries, please do not hesitate to contact us on the free call number 1800 640 501.

Regards,

Geospatial Searches
National Native Title Tribunal | Perth
Email: GeospatialSearch@nntt.gov.au **| www.nntt.gov.au**

From: Georgia Burnett <gburnett@emmconsulting.com.au>
Sent: Monday, 13 April 2020 10:58 AM
To: Geospatial Search Requests <GeospatialSearch@NNTT.gov.au>
Subject: SR20/295 - RE: Dungowan Dam, NSW - Geospatial search request

Caution: This is an external email. DO NOT click links or open attachments unless you recognise the sender and know the content is safe.

Hi,

Thank you for attending to my request so quickly – please find attached the form, which has the non-freehold parcels listed. This has reduced the list considerably, so you may not need the excel sheet (I've attached it for reference, though).

Please let me know if you need anything else. Thanks again for your help!

Cheers,
Georgia

Georgia Burnett
Archaeologist

T 02 9493 9500
M 0400 472 412
www.emmconsulting.com.au

From: Geospatial Search Requests <GeospatialSearch@NNTT.gov.au>
Sent: Friday, 10 April 2020 11:06 AM
To: Georgia Burnett <gburnett@emmconsulting.com.au>
Cc: Alan Williams <awilliams@emmconsulting.com.au>
Subject: RE: Dungowan Dam, NSW - Geospatial search request

UNCLASSIFIED

Native title search – *NSW*
Your ref: *Dungowan Dam* - **Our ref:** *N/A*

Dear Georgia Burnett,

Thank you for your search request received on 09 April 2020. To enable us to complete the search appropriately and adequately, please fill out the attached search form and return to us via GeospatialSearch@NNTT.gov.au

Could you please also reattach the Excel spreadsheet with the lot on plan details in the following format; **Lot//Deposited Plan #** as this will enable us to attend to your search quicker.

If you have any further queries, please do not hesitate to contact us on the free call number 1800 640 501.

Regards,

Geospatial Searches
National Native Title Tribunal | Perth
Email: GeospatialSearch@nntt.gov.au | **www.nntt.gov.au**

From: Georgia Burnett <gburnett@emmconsulting.com.au>
Sent: Thursday, 9 April 2020 3:22 PM
To: Geospatial Search Requests <GeospatialSearch@NNTT.gov.au>
Cc: Alan Williams <awilliams@emmconsulting.com.au>
Subject: Dungowan Dam, NSW - Geospatial search request

Caution: This is an external email. DO NOT click links or open attachments unless you recognise the sender and know the content is safe.

To whom it may concern,

WaterNSW is undertaking the upgrade of Dungowan Dam, southeast of Tamworth, NSW. EMM has been engaged to undertake the environmental impact statement and review of environmental factors for the project, which a component of both is the investigation and assessment of Aboriginal heritage.

I am looking to undertake a spatial searches of the Tribunal Register – as the study area exceeds 20 land parcels, I have attached a excel sheet with the parcels to be searched.

As per the geospatial search form, my contact details are as follows:

Georgia Burnett
EMM Consulting Pty Ltd
E: gburnett@emmconsulting.com.au
P: 0400 472 412
My reference: J200042
State: NSW

Please note earlier aspects of the project at the beginning of 2020 included exploration of Aboriginal consultation, and a formal consultation strategy for the project is under development. We apologise where this request is seeking duplication of these earlier discussions and/or documentation provided, but wish to ensure the formal process is adopted moving into the EIS stage of the project.

If you have any questions or enquiries, please don't hesitate to contact me.

Kind regards,

Georgia Burnett
Archaeologist
EMM
creating opportunities
T 02 9493 9500
M 0400 472 412
Connect with us
SYDNEY | Ground floor, 20 Chandos Street, St Leonards NSW 2065

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Georgia Burnett

From: Maeve Parker <mparker@ntscorp.com.au>
Sent: Thursday, 16 April 2020 9:56 AM
To: Georgia Burnett
Cc: Dylan Orsborn
Subject: RE: Dungowan Dam, NSW - Request for information

Hi Georgia,

Following on from your initial email below, I contacted the Gomeroi Applicant earlier this week requesting nominations of people to participate.

I will get back to you in due course when they respond.

Very best,

Maeve Rose Parker | Solicitor

ntscorp

NTSCORP proudly acknowledge that our office is situated on the country of the Gadigal People of the Dharug Nation.
We also acknowledge and pay our respect to their Elders past and present.

I'm working from home. The best way to contact me is on my mobile or by email.

t 02 9310 3188 | **m** 0457 855 690 | **f** 02 9310 4177 | Free call: 1800 111 844
e mparker@ntscorp.com.au | **w** www.ntscorp.com.au
Level 1, 44-70 Rosehill Street, Redfern, NSW 2016 Australia

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From: Georgia Burnett <gburnett@emmconsulting.com.au>
Sent: Wednesday, 15 April 2020 10:59 AM
To: info <information@ntscorp.com.au>
Cc: Alan Williams <awilliams@emmconsulting.com.au>
Subject: RE: Dungowan Dam, NSW - Request for information

Hi,

Following on from the request below, I am looking for contact details for a representative for the Gomeroi People (Tribunal No NC2011/006) for consultation regarding the proposed upgrade of Dungowan Dam, southeast of Tamworth

NSW. As your organisation is listed as the representative of this group, I was hoping you could provide these contact details and/or the process by which a representative could be nominated.

Thank you for any information you can provide.

Cheers,
Georgia

Georgia Burnett
Archaeologist

T 02 9493 9500
M 0400 472 412
www.emmconsulting.com.au

From: Georgia Burnett
Sent: Thursday, 9 April 2020 5:21 PM
To: information@ntscorp.com.au
Cc: Alan Williams <awilliams@emmconsulting.com.au>
Subject: Dungowan Dam, NSW - Request for information

To whom it may concern,

WaterNSW is undertaking the upgrade of Dungowan Dam, southeast of Tamworth, NSW. EMM has been engaged to undertake the environmental impact statement for the project, a component of which is the investigation and assessment of Aboriginal heritage. As such, please find attached a request for Aboriginal stakeholder information in accordance with DPIE's Aboriginal Consultation Requirements for Proponents. At this stage, the project is being divided between an EIS for the dam upgrade, ancillary activities and part of a new pipe that runs to the Calala water treatment works; and a component of the new pipeline towards the water treatment works that is being assessed under Part 5 of the Environmental Planning and Assessment Act 1979. Given these potentially different approval pathways and different timing of the assessments, we attach two requests, one for each of the components. Please note Appendix A is relevant for both letters.

Please note earlier aspects of the project at the beginning of 2020 included exploration of Aboriginal consultation, and a formal consultation strategy for the project is under development. We apologise where this request is seeking duplication of these earlier discussions and/or documentation provided, but wish to ensure the formal process is adopted moving into the EIS/REF stages of the project.

If you have any questions or enquiries, please don't hesitate to contact me.

Kind regards,

Georgia Burnett
Archaeologist

EMM
creating opportunities

T 02 9493 9500
M 0400 472 412
Connect with us

SYDNEY | Ground floor, 20 Chandos Street, St Leonards NSW 2065

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Georgia Burnett

From: Helen Knight <Helen.Knight@environment.nsw.gov.au>
Sent: Monday, 20 April 2020 3:46 PM
To: Georgia Burnett
Subject: Registered Aboriginal Parties that may have an interest in your project - Dungowan Dam
Attachments: Response - RAPs list for the New Dam downstream Dungowan Dam.pdf; Response - RAPs list Pipeline to Dungowan Dam .pdf

Hi Georgina,
Please find attached BCD's response to your request for the list of Aboriginal Parties that may have an interest in your projects
Dungowan Dam pipeline and the new dam downstream from Dungowan Dam
Kind regards, Helen

Helen Knight
Conservation Planning & GIS Data Officer, Planning North West

Biodiversity and Conservation Division| Department of Planning, Industry and Environment
T 02 6883 5327 | **E** helen.knight@environment.nsw.gov.au
Level 1, 48-52 Wingewarra Street, Dubbo NSW 2830
PO Box 2111, Dubbo NSW 2830
www.dpie.nsw.gov.au

The Department of Planning, Industry and Environment acknowledges that it stands on Aboriginal land. We acknowledge the traditional custodians of the land and we show our respect for elders past, present and emerging through thoughtful and collaborative approaches to our work, seeking to demonstrate our ongoing commitment to providing places in which Aboriginal people are included socially, culturally and economically.

This email is intended for the addressee(s) named and may contain confidential and/or privileged information.
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Any views expressed in this email are those of the individual sender except where the sender expressly and with authority states them to be the views of the NSW Office of Environment and Heritage.

PLEASE CONSIDER THE ENVIRONMENT BEFORE PRINTING THIS EMAIL

Our ref: DOC20/305492-4

Ms Georgina Burnett
Archaeologist
EMM Consulting
PO Box 21
St Leonards NSW 1590
gburnett@emmconsulting.com.au

Dear Georgina,

Subject: Written notification as required under the former Office of Environment and Heritage (OEH) now Biodiversity and Conservation Division (BCD) of the Department of Planning Industry and Environment (DPIE) Aboriginal cultural heritage requirements for proponents 2010 – New dam downstream of the existing Dungowan Dam, Tamworth Regional LGA NSW proposal

Thank you for your email dated 9 April 2020 to the Biodiversity Conservation Division (BCD) regarding the above matter.

A list of known Aboriginal parties that BCD considers is likely to have an interest in this development is attached as Attachment 1 (overleaf). Please note this list is not necessarily an exhaustive list of all interested Aboriginal parties and receipt of this list does not remove the requirement of a proponent/consultant to advertise in local print media and contact other bodies seeking interested Aboriginal parties, in accordance with the requirements of Section 80C of the National Parks and Wildlife Regulation 2009.

Should you require further information regarding issues that are the responsibility of the BCD please contact Helen Knight, Senior Conservation Planning Officer on (02) 6883 5327

Yours sincerely,

Samantha Wynn

Samantha Wynn

Senior Team Leader Planning – North West

Biodiversity and Conservation Division

20/04/2020

ATTACHMENT 1

Table 1: List of Aboriginal stakeholder groups within the Tamworth Regional Government Area - that may have an interest in the project; provided as per the "OEH Aboriginal cultural heritage requirement for proponents 2010".

Organisation/Affiliation	Name /Title	Name/Title	Email	Phone
Alison Sampson		36 Hill Street, Caroona NSW 2343		[redacted]
AT Gomilaroi Cultural Consultancy	Aaron Talbott	13 Hunter Street, Gunnedah NSW 2380	atgomilaroi[redacted]	[redacted]
Brent Mathews		21 Bando Street , Gunnedah NSW 2380		
Cacatua General Service (Cacatua Culture Consultants)	Donna	Main Office: 260 Hidden Valley ROW, Wybong NSW 2333 2nd location: 22 Ibis Parade, Woodberry NSW 2322 3rd Location: 49 Herbert Street, Gunnedah NSW 2380		Donna [redacted] George [redacted] Land Line: 02 65479274
Christine Archbold		40 Humphies St, Muswellbrook NSW 2333		
Clifford Matthews		16/A Mahogany Ave, Muswellbrook NSW 2333		
Coonabarabran LALC	Chairperson	PO Box 110, Coonabarabran NSW 2357		
Corroboree Aboriginal Corporation	Marilyn Carroll-Johnson, Director	PO Box 3340, ROUSE HILL NSW 2155	[redacted]	[redacted]
D F T V Enterprises	Derrick Vale	5 Mountbatten Close, Rutherford NSW 2320		
Darrell Mathews		17 Edinglassie Drive, Muswellbrook NSW 2333		
Gomeroi Murri Ganuurr Yuuray Wadi Palinka	Greg Griffith	4 Wattle Street, Gunnedah NSW 2380		[redacted]
Hazel Collins		3 Carroll Street, Gunnedah NSW 2380		
Jeff Matthews		6 Eucalypt Avenue, Muswellbrook NSW 2333		
John Matthews		16/A Mahogany Avenue,		

		Muswellbrook NSW 2333		
Joshua Matthews		21 Bando Street, Gunnedah NSW 2380		
Justin Matthews		16/B Mahogany Avenue, Muswellbrook NSW 2333		[redacted]
Kawul Cultural Services	Vicky Slater	PO Box 817, Singleton NSW 2330		
Kevin Sampson		1 Martyn Street, Breeza NSW 2381		
Len Waters		47 Waters Park Drive, Moore Creek NSW 2340		
LLoyd Matthews		16/A Mahogany Avenue, Muswellbrook NSW 2333		
Lorraine Towney		32 Dewhurst Street, Quirindi NSW 2343		
Luke Cameron Cultural Management		28 Herbert St, Gunnedah NSW 2380		[redacted]
Mavonia Welsh		1 Yabsley Avenue, Marrickville NSW 2204		[redacted]
ME Griffiths Cultural Management	Marie- Ellen Griffiths	10 herbert Street, Gunnedah NSW 2380		[redacted]
Mooki Plains Management		28 Herbert Street, Gunnedah NSW 2380		
Mooki River Consultants	Wayne Mathews	Lot 5 Martyn Street, Breeza NSW 2381		
Muswellbrook Cultural Consultants	Brian Horton	10 Scott Street, Muswellbrook NSW 2333		
Nyakka Aboriginal Corporation	Rhonda Kitckener	265 Rusden Street, Armidale NSW 2350		[redacted]
Paul Moodie		15 Schwager Street, Gunnedah NSW 2380		
Richard Slater		121 Roberts Street, Tamworth NSW 2340		
Rick Slater		121 Roberts Street, Tamworth NSW 2340		
Rodney Mathews		8 Fitzgerald Avenue, Muswellbrook NSW 2333		
Ron Smith		Flat 8, 6 Hasting River Drive, Port Macquarie NSW 2444		

Rona Slater		71 Roberts Street, Tamworth NSW 2304		
Roslyn Smith		Unit 4, 122 Upper Street, Tamworth NSW 2340		
Scott Smith		Unit 4, 122 Upper Street, Tamworth NSW 2340		
T&G Culture Consultants	Tony Griffiths	4 Wattle Street, Gunnedah NSW 2380		
Tamworth LALC	Chairperson	PO Box 57, Tamworth NSW 2340		
Tracy Woltley		75 High Street, Gunnedah NSW 2380		[redacted]
Wattaka Cultural Consultancy Service	Des Hickey	PO Box 749, Tamworth NSW 2340		[redacted]

Georgia Burnett

From: Luke Raveneau <[redacted]
Sent: Tuesday, 21 April 2020 3:39 PM
To: Admin NorthWest; Georgia Burnett
Subject: Re: Dungowan Dam, NSW - Request for information

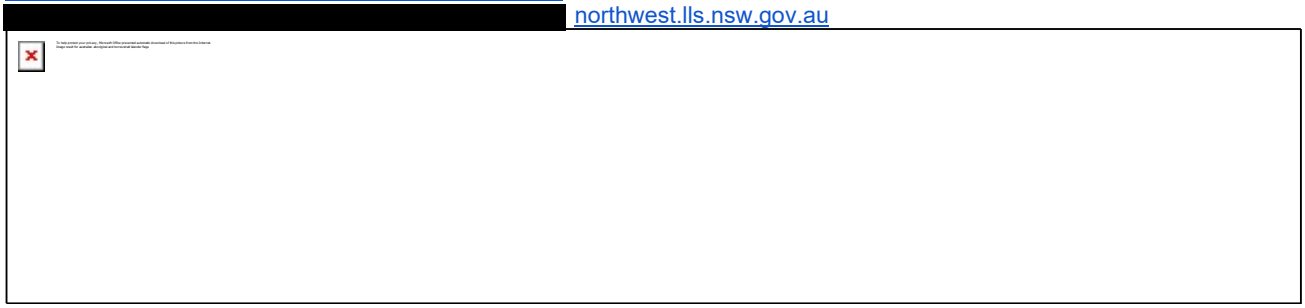
Hi Georgia,

I'd suggest you contact Tamworth Local Aboriginal Land Council for a Cultural Heritage assessment.

CEO Fiona Snape
[redacted]

Regards,

Luke Raveneau | North West Local Land Services
Senior Lands Service Officer – Aboriginal Communities
4 Marsden Park Road Calala, Tamworth NSW 2340. PO Box 500
[redacted] northwest.lls.nsw.gov.au



I acknowledge the traditional custodians of the land on which I live and work, and pay my respect to the Elders both past & present.

Please rate our service
Local Land Services is committed to providing excellent customer service. Feedback is welcomed and anonymous.
Should you wish to provide feedback to help us improve, please click here: Rateitnow.com/northwestllsregion

---

From: [redacted] on behalf of Admin NorthWest <admin.northwest@lls.nsw.gov.au>
Sent: Tuesday, 21 April 2020 2:12 PM
To: Luke Raveneau [redacted]
Subject: Fwd: Dungowan Dam, NSW - Request for information

Hi Luke

Are you able to assist/advise Georgia with her enquiry?

Many thanks

Emma Budge

Customer Service Officer

North West Local Land Services
101 Barwon Street | PO Box 466 | Narrabri NSW 2390
p: 02 6790 7600 | f: 02 6792 1738
e: admin.northwest@lls.nsw.gov.au | w: www.lls.nsw.gov.au

Click here to sign up to the LLS e-newsletter & see how your rates can work for you & your region

Provide feedback on the service you received today via Rateitnow.com/northwestllsregion

Important changes:
Our offices will be operating differently due to COVID-19.
The best way you can get in touch with us is through our online enquiry form or by calling 1300 795 299.

---------- Forwarded message ---------
From: **Georgia Burnett** <gburnett@emmconsulting.com.au>
Date: Thu, 9 Apr 2020 at 17:21
Subject: Dungowan Dam, NSW - Request for information
To: admin.northwest@lls.nsw.gov.au <admin.northwest@lls.nsw.gov.au>
Cc: Alan Williams <awilliams@emmconsulting.com.au>

To whom it may concern,

WaterNSW is undertaking the upgrade of Dungowan Dam, southeast of Tamworth, NSW. EMM has been engaged to undertake the environmental impact statement for the project, a component of which is the investigation and assessment of Aboriginal heritage. As such, please find attached a request for Aboriginal stakeholder information in accordance with DPIE's Aboriginal Consultation Requirements for Proponents. At this stage, the project is being divided between an EIS for the dam upgrade, ancillary activities and part of a new pipe that runs to the Calala water treatment works; and a component of the new pipeline towards the water treatment works that is being assessed under Part 5 of the Environmental Planning and Assessment Act 1979. Given these potentially different approval pathways and different timing of the assessments, we attach two requests, one for each of the components. Please note Appendix A is relevant for both letters.

Please note earlier aspects of the project at the beginning of 2020 included exploration of Aboriginal consultation, and a formal consultation strategy for the project is under development. We apologise where this request is seeking duplication of these earlier discussions and/or documentation provided, but wish to ensure the formal process is adopted moving into the EIS/REF stages of the project.

If you have any questions or enquiries, please don't hesitate to contact me.

Kind regards,

Georgia Burnett
Archaeologist

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T 02 9493 9500
M 0400 472 412
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Georgia Burnett

From: McGufficke, Michael [redacted]
Sent: Friday, 1 May 2020 4:31 PM
To: Georgia Burnett
Subject: RE: Dungowan Dam, NSW - Request for information

Hi Georgia,

With regard to your enquiry below, Tamworth Regional Council advises that the Tamworth Local Aboriginal Land Council (TLALC) is likely to be interested party in the proposed project, and is known to have been involved as an Aboriginal Stakeholder on numerous infrastructure projects in the Tamworth Region.

TLALC has an office in Tamworth, details provided below:

Tamworth Local Aboriginal Land Council

123 Marius Street (PO Box 57)

Tamworth NSW 2340

Telephone: (02) 6766 9028

Opening Hours - Monday to Friday 9.00am to 4.30pm

Regards,

Michael McGufficke
Manager Projects & Services
Water & Waste Enterprises
Tamworth Regional Council
[redacted]

~ Toyota Country Music Festival Tamworth 2020 - Friday 17 January to Sunday 26 January 2020 ~ ***www.tcmf.com.au***

From: Georgia Burnett [mailto:gburnett@emmconsulting.com.au]
Sent: Thursday, 9 April 2020 5:21 PM
To: Council External Email
Cc: Alan Williams
Subject: Dungowan Dam, NSW - Request for information

Dear Andrea,

WaterNSW is undertaking the upgrade of Dungowan Dam, southeast of Tamworth, NSW. EMM has been engaged to undertake the environmental impact statement for the project, a component of which is the investigation and

assessment of Aboriginal heritage. As such, please find attached a request for Aboriginal stakeholder information in accordance with DPIE's Aboriginal Consultation Requirements for Proponents. At this stage, the project is being divided between an EIS for the dam upgrade, ancillary activities and part of a new pipe that runs to the Calala water treatment works; and a component of the new pipeline towards the water treatment works that is being assessed under Part 5 of the Environmental Planning and Assessment Act 1979. Given these potentially different approval pathways and different timing of the assessments, we attach two requests, one for each of the components. Please note Appendix A is relevant for both letters.

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Georgia Burnett
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13 May 2020

Helen Knight
Conservation Planning & GIS Data Officer, Planning North West
Biodiversity and Conservation Division
Department of Planning, Industry and Environment
Level 1, 48-52 Wingewarra Street
Dubbo NSW 2830

Re: Notification of registered Aboriginal parties - CSSI Dams - Dungowan Dam, NSW

Dear Helen,

WaterNSW is proposing to undertake the planning and delivery of three new or augmented dams in NSW, which includes upgrading Dungowan Dam. EMM Consulting Pty Ltd (EMM) has been commissioned by WaterNSW to undertake an Aboriginal Cultural Heritage Assessment (ACHA) for the proposed development of the new Dungowan Dam, south east of Tamworth NSW. This development will also incorporate associated infrastructure including a new water delivery pipeline from the new dam to the Calala water treatment plant.

We are implementing the *Aboriginal cultural heritage consultation for requirements for proponents 2010.* In accordance with 4.1.6 of those requirements, we are providing a list of the 7 Aboriginal parties who have registered for consultation on the project; one group has requested their information be withheld and therefore their information has been redacted.

As per the consultation requirements, the Registered Aboriginal Parties can be found in Table 1 and the forms of notification are attached to this letter.

Table 1 List of Registered Aboriginal Parties for Dungowan Dam, NSW.

Organisation	Contact
Tamworth Local Aboriginal Land Council	Fiona Snape
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The Gomeroi People	Steve Talbott
DFTV Enterprises	Derrick Vale
[redacted]	[redacted]
AT Gomilaroi Cultural Consultancy	Aaron Talbott
Galamaay Cultural Consultants	Robert Slater

If you require further information, please do not hesitate to contact me.

Yours sincerely

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gburnett@emmconsulting.com.au

WaterNSW

Invitation for Registrations of Interest

Aboriginal Cultural Heritage Assessments
Dungowan Dam upgrade, Tamworth LGA

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The proponent is WaterNSW, and the project contact is:
Meredith Abrams, WaterNSW Community Engagement Officer,
T: 1300 662 077
E: meredith.abrams@waternsw.com.au

Registrations are invited from Aboriginal individuals and organisations who hold cultural knowledge relevant to determining the significance of Aboriginal objects, sites and/or places in the area, and who wish to be involved in the consultation process.

Information will be used in the development of any assessment, and may be used in the preparation and application of subsequent approvals (including Aboriginal Heritage Impact Permits where necessary), as well as to assist the consent authority in its assessment.

Registrations of interest should be provided by no later than 1 May 2020 to Georgia Burnett (Archaeologist), EMM Consulting,
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T: 02 9493 9500
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17 April 2020

Re: Aboriginal cultural heritage assessment - Dungowan Dam, NSW - notification of project

Dear Sir/Madam

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The project is identified as Critical State Significant Infrastructure (CSSI) under the provisions of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act). A CSSI project requires approval from the NSW Minister for Planning and Public Spaces, and are accompanied by an Environmental Impact Statement (EIS). The ACHA would be one of several assessments included in the EIS. Additionally, some early works activities associated with the pipeline will be subject to assessment under a Review of Environment Factors under Part 5 of the EP&A Act.

The project contact for WaterNSW is: Meredith Abrams, Community Engagement Officer, P: 1300 662 077, E: meredith.abrams@waternsw.com.au

In accordance with the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010*, I am writing to notify you of the project and seeking expressions of interest from you and/or your organisation in being registered for subsequent consultation and involvement. We are interested in Aboriginal individuals and/or organisations who may hold relevant cultural knowledge to inform the Aboriginal cultural heritage assessment of the area, and who wish to be involved in the project. If so, please provide a response by **1 May 2020** to:

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- the level of project involvement you or your organisation wishes, including attendance of meetings, fieldwork participation and/or simply reviewing documentation;
- identification of any procedures, protocols or requirements for the use and reproduction of any cultural information or materials you or your organisation provides EMM as part of this project; and
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Of particular note, WaterNSW and EMM are highly aware of the COVID-19 pandemic and of its risk to Aboriginal communities; and that this may affect consultation in person for the immediate future. We intend to use approaches and protocols to minimise any risk, and will provide this information to those interested in being consulted in the project.

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Archaeologist
gburnett@emmconsulting.com.au

Table 1 Lot and DP listing for the study area.

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35	DP755322	FREEHOLD
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38	DP755322	FREEHOLD
40	DP755322	FREEHOLD
51	DP755322	FREEHOLD
54	DP755322	FREEHOLD
94	DP755322	FREEHOLD
10	DP755351	FREEHOLD
20	DP755351	FREEHOLD
21	DP755351	FREEHOLD
22	DP755351	FREEHOLD
48	DP755351	FREEHOLD
49	DP755351	FREEHOLD
1	DP1123076	FREEHOLD
1319	DP1240866	FREEHOLD
5	DP755339	FREEHOLD
63	DP618784	FREEHOLD
61	DP234569	FREEHOLD
1	DP723520	FREEHOLD
11	DP755339	FREEHOLD
29	DP755339	FREEHOLD
3	DP607266	FREEHOLD
2	DP581286	FREEHOLD
2	DP1211619	FREEHOLD
601	DP818933	FREEHOLD
602	DP818933	FREEHOLD
32	DP816506	FREEHOLD
57	DP755329	FREEHOLD
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22	DP755329	FREEHOLD
5	DP1040043	FREEHOLD
4	DP591992	FREEHOLD
131	DP1214855	FREEHOLD

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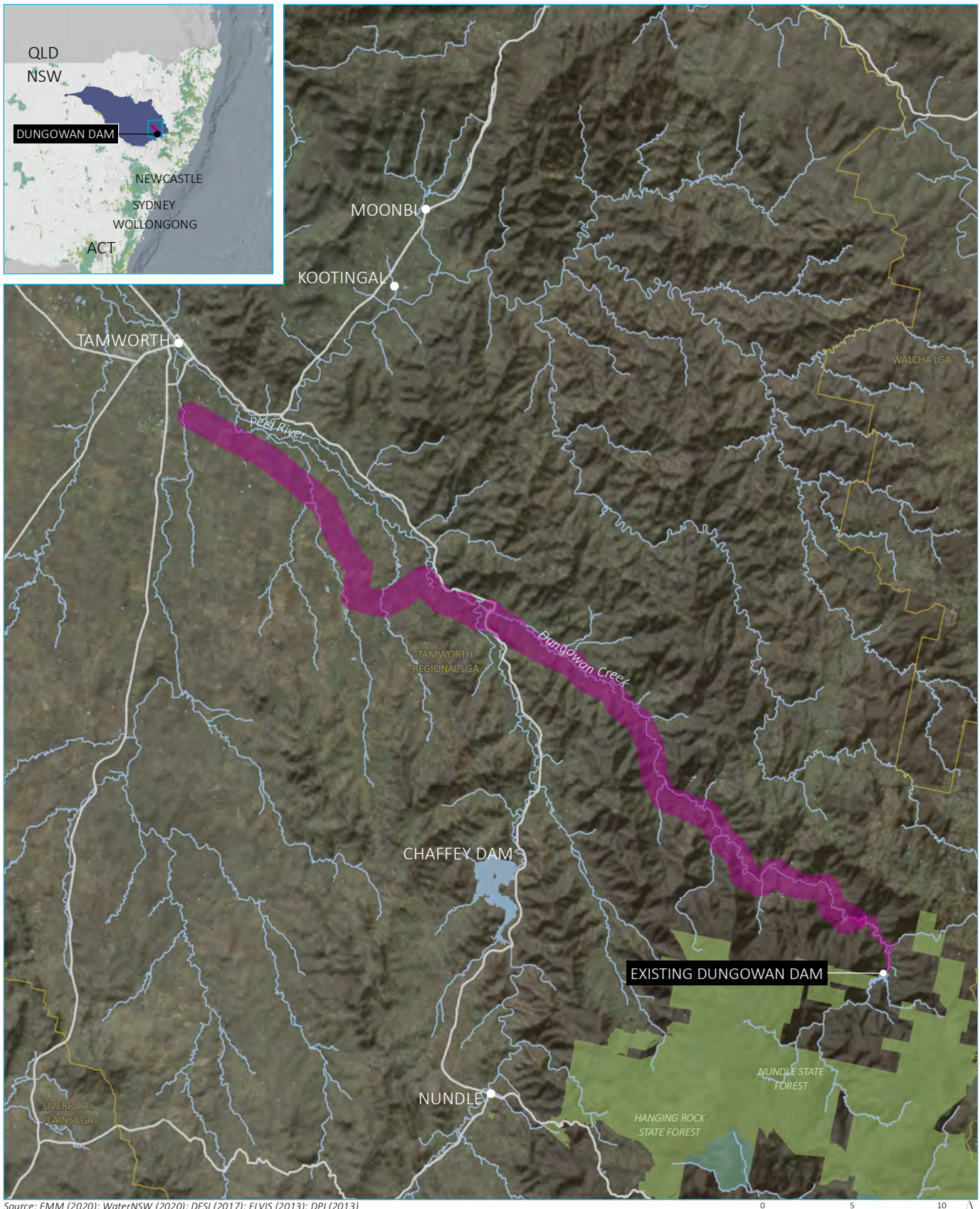
54	DP755350	FREEHOLD
43	DP537896	FREEHOLD
1	DP807846	FREEHOLD
234	DP755350	FREEHOLD
1	DP212610	FREEHOLD



Source: EMM (2020); WaterNSW (2020); DFSI (2017); ELVIS (2013); DPI (2013)

**Inundation area should be considered approximate only. It is based on current limited available spatial data and is subject to future verification.*

0 5 10 km

GDA 1994 NSW Lambert

N

KEY

- Indicative project area
- Major road
- Named watercourse
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- Local government area
- NPWS reserve
- State forest
- Namoi River catchment (inset)

Regional context

Dungowan Dam
Aboriginal consultation
Figure 1

EMM creating opportunities

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13 May 2020

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Biodiversity and Conservation Division
Department of Planning, Industry and Environment
Level 1, 48-52 Wingewarra Street
Dubbo NSW 2830

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WaterNSW

Invitation for Registrations of Interest

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Dungowan Dam upgrade, Tamworth LGA

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17 April 2020

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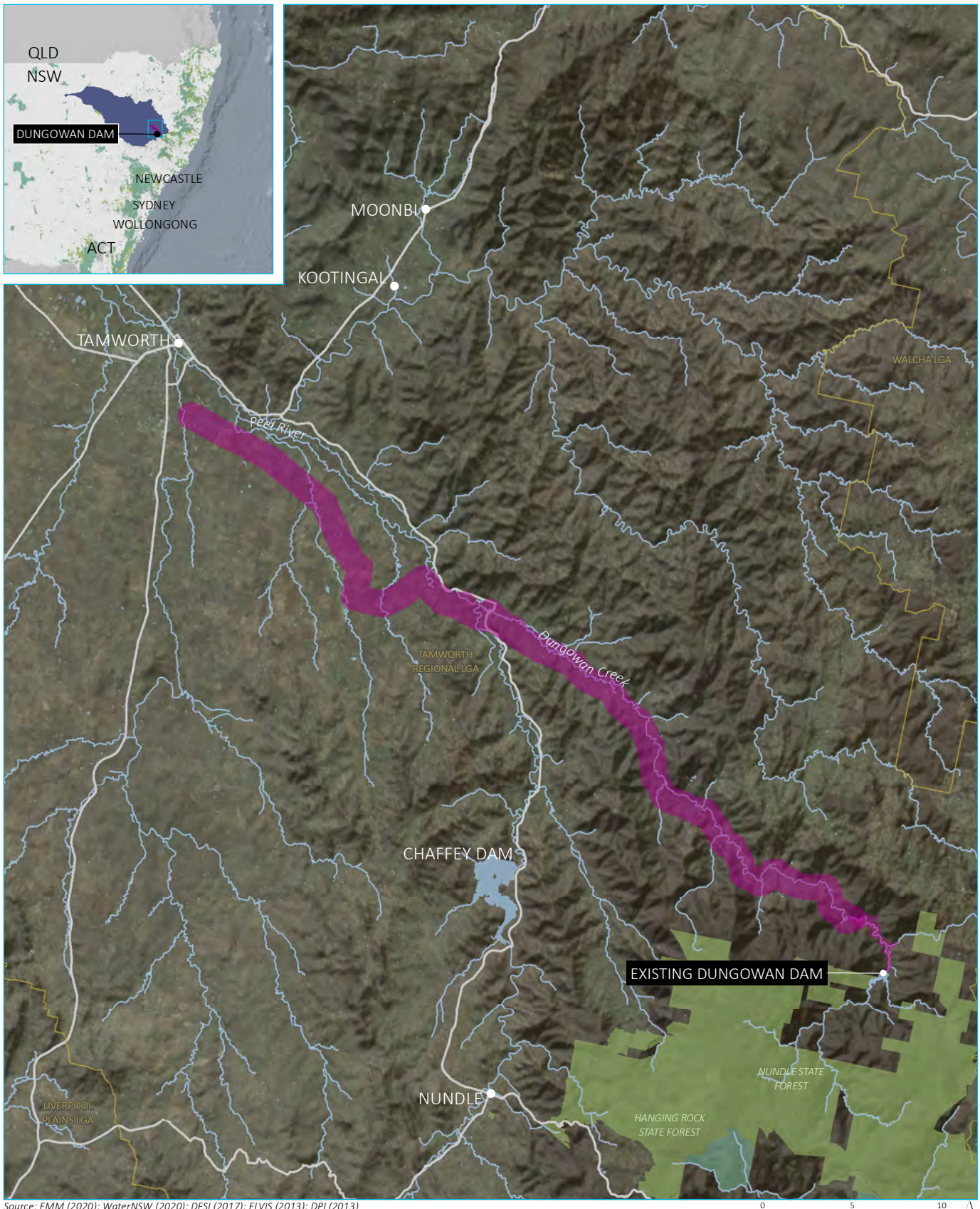

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Figure 1

EMM creating opportunities

\\emmsvr1\emm\Jobs\2020\J200042 - Dungowan Dam\GIS\07_Working\20200301_AboriginalConsultation\DD_ECA001_RegionalContext_20200409_03.mxd 9/04/2020

Georgia Burnett

From: Georgia Burnett
Sent: Wednesday, 13 May 2020 3:38 PM
To: fiona@tamworthlalc.com.au
Subject: Dungowan Dam, NSW - Notification of Registered Aboriginal Parties
Attachments: J200042_Agency notification letter_TLALC_Redacted.pdf

Dear Fiona,

Please find attached a letter notifying the Biodiversity and Conservation Division of the Aboriginal parties who have registered for consultation on the Dungowan Dam project.

Kind regards,
Georgia

Georgia Burnett
Archaeologist
EMM creating opportunities
T 02 9493 9500
M 0400 472 412
Connect with us
SYDNEY | Ground floor, 20 Chandos Street, St Leonards NSW 2065

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13 May 2020

Fiona Snape
Tamworth Local Aboriginal Land Council
123 Marius Street (PO Box 57)
Tamworth NSW 2340

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20 Chandos Street, St Leonards, NSW 2065;
T: 02 9493 9500
E: gburnett@emmconsulting.com.au

Plate 1 **Newspaper advertisement placed in the *Northern Daily Leader* on 17 April 2020.**

Ground floor, 20 Chandos Street
St Leonards NSW 2065
PO Box 21
St Leonards NSW 1590

T 02 9493 9500
E info@emmconsulting.com.au

www.emmconsulting.com.au

17 April 2020

Re: Aboriginal cultural heritage assessment - Dungowan Dam, NSW - notification of project

Dear Sir/Madam

WaterNSW is proposing to undertake the planning and delivery of three new or augmented dams in NSW, which includes upgrading Dungowan Dam. EMM Consulting Pty Ltd (EMM) has been commissioned by WaterNSW to undertake an Aboriginal Cultural Heritage Assessment (ACHA) for the proposed development of the new Dungowan Dam, approximately 30km south east of Tamworth NSW (Figure 1). The project includes: a new dam downstream of the existing Dungowan Dam with an expected capacity of 22.5 gigalitres (GL); partial or full decommissioning of the existing Dungowan Dam and rehabilitation of the storage area of the dam; a new water delivery pipeline from the new dam to the Calala water treatment plant; and ancillary facilities including construction compounds, quarry and other supporting infrastructure. The aim of this assessment is to adopt best practice approaches to identify Aboriginal cultural heritage within the impact footprint, and to identify mitigation measures to allow the works to proceed.

The project is identified as Critical State Significant Infrastructure (CSSI) under the provisions of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act). A CSSI project requires approval from the NSW Minister for Planning and Public Spaces, and are accompanied by an Environmental Impact Statement (EIS). The ACHA would be one of several assessments included in the EIS. Additionally, some early works activities associated with the pipeline will be subject to assessment under a Review of Environment Factors under Part 5 of the EP&A Act.

The project contact for WaterNSW is: Meredith Abrams, Community Engagement Officer, P: 1300 662 077, E: meredith.abrams@waternsw.com.au

In accordance with the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010*, I am writing to notify you of the project and seeking expressions of interest from you and/or your organisation in being registered for subsequent consultation and involvement. We are interested in Aboriginal individuals and/or organisations who may hold relevant cultural knowledge to inform the Aboriginal cultural heritage assessment of the area, and who wish to be involved in the project. If so, please provide a response by **1 May 2020** to:

- Georgia Burnett (Archaeologist), EMM Consulting Pty Ltd, 20 Chandos Street, St Leonards, NSW 2065; T: 02 9493 9500; E: gburnett@emmconsulting.com.au

In your response, please ensure the following information is provided:

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Georgia Burnett
Archaeologist
gburnett@emmconsulting.com.au

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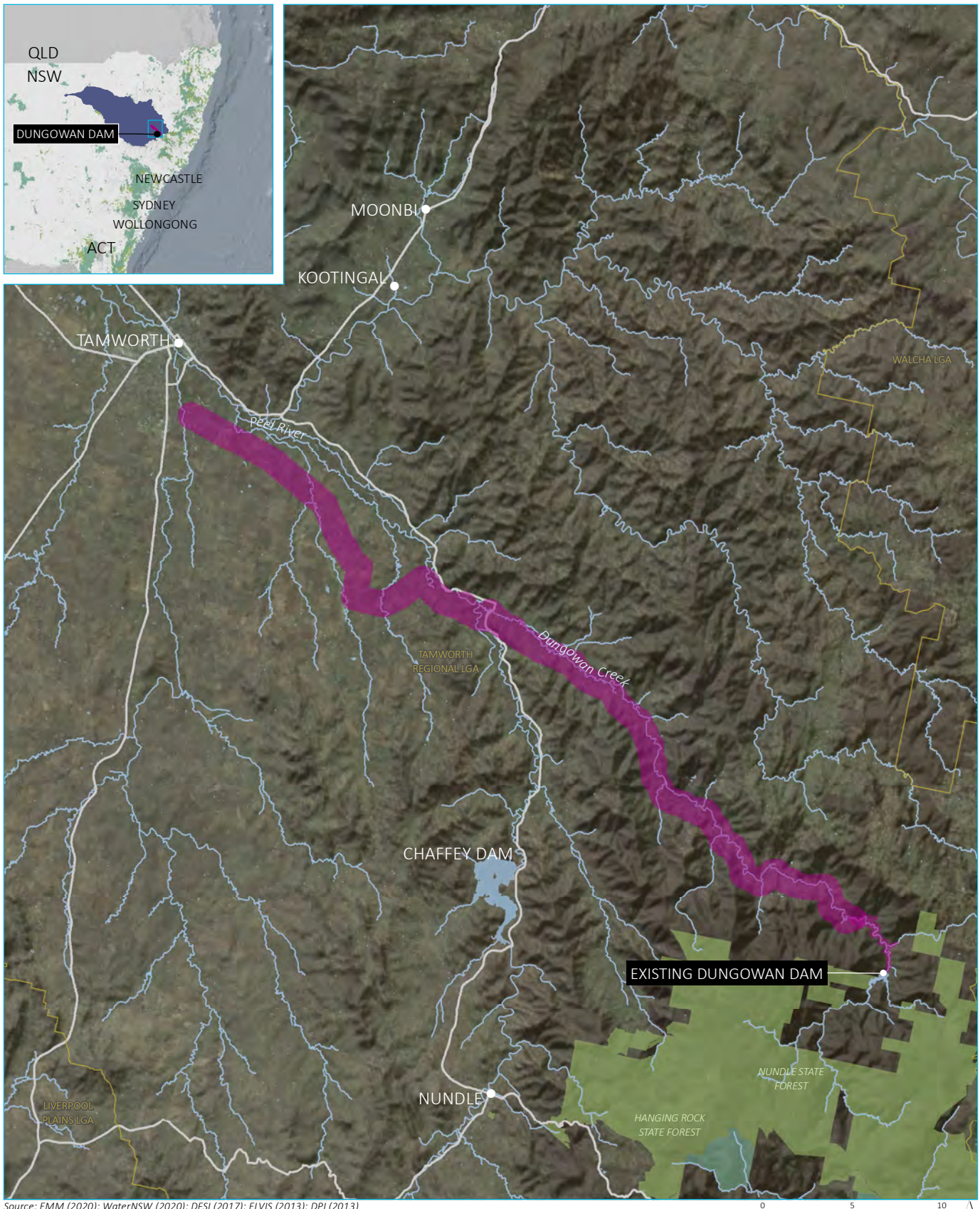

Source: EMM (2020); WaterNSW (2020); DFSI (2017); ELVIS (2013); DPI (2013)

**Inundation area should be considered approximate only. It is based on current limited available spatial data and is subject to future verification.*

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GDA 1994 NSW Lambert

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Regional context

Dungowan Dam
Aboriginal consultation
Figure 1

EMM creating opportunities

\\emmsvr1\emm\Jobs\2020\J200042 - Dungowan Dam\GIS\07_Working\20200301_AboriginalConsultation\DD_ECA001_RegionalContext_20200409_03.mxd 9/04/2020

B.3 Stages 2 and 3 – presentation of information and gathering cultural information

This section contains the following documents:

- project information and assessment methodology letter;
- if provided, responses and additional communications regarding the project methodology.

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Email: classifieds@northerndailyleader.com.au

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In Memoriam

Mark Philip CRAIG

03.07.1979 ~ 17.04.2011

We think about you always,
We talk about you still,
You have never been forgotten.
And you never will.
We hold you close within our hearts
And there you will remain,
To walk and guide us through our lives,
Until we meet again.

Love always and forever,
Karina, Taylor and Travis and family xoxo

Announce the birth of your child or grandchild with our

BIRTH NOTICE ANNOUNCEMENTS

Let everyone know that a new baby has been welcomed to the world.

For only $50, place the birth notice in the paper and you'll receive a copy of that days paper and Little Bandit the Northern Daily Leader mascot.

AW37691804

*This is for a Print ad only, there will be an added cost for online upload. For more information, please contact the Northern Daily Leader classifieds team.

Remember! You can also spread the news to any of our papers in the New England area

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or email: **classifieds@northerndailyleader.com.au**

Motor Vehicles

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Top cash / 7 Days
100% Free towing

CALL STEVE NOW
0404 714 714
We are local!

AW37746885

Lost & Found

LOST Ginger Tabby Cat Named **"ZEUS"**, m'chipped, 1yo. Lost in Edward St area, could be anywhere. Pretty friendly. If found please call Joan 6765 6074 or 0414 942 901

Livestock

WATER BORES
Stock & Domestic, Competitive rates.
Dave 0400 362 942

Public Notices

COMPETITION TERMS AND CONDITIONS
THE NORTHERN DAILY LEADER

Employees of the promoter and agencies associated with this promotion are ineligible to enter the competition, as are their immediate families. To enter, fill in the coupon that appears in Northern Daily Leader and place in the entry boxes listed in the competition advertisement. No photocopies will be accepted. Entry is only open to Australian residents of NSW. The judges decision is final and binding on each person who enters. The promoter reserves the right to withdraw or amend the competition as necessary due to circumstances outside its control. The prize is non-transferable and non-redeemable for cash. Any attempt to resell or auction this prize will result in an immediate cancellation of the prize. The promoter shall not be liable for any loss or damage whatsoever which is suffered (including, but not limited to, indirect or consequential loss) or for personal injury which is suffered or sustained, in connection with the prize, except for any liability which cannot be excluded by laws. Entry close date is printed on the coupon. By entering these competitions, all entrants will be deemed to have accepted and agreed to be bound by these rules. The information you are asked to provide to the promoter is personal information and is protected by the Privacy Act 1988. All entries become the property of the promoter. The promoter may use the entrant's names and literary pieces for any commercial purpose, including future promotional marketing and publicity purposes. Entries will be drawn at the Northern Daily Leader office, Suite 2, 27 Bourke Street, Tamworth NSW and the winners names will be published in said newspaper within three days. The prize winners will be personally notified by the phone number on the entry. If the winner's phone is unanswered after 3 attempts and no return call within one hour, the prize will be redrawn. The promoter is Regional Publishers Pty Ltd, ABN 20 000 014 700, head office 27A Bourke Street, Tamworth NSW 2340. NSW Permit No. LTPM/20/05348

Public Notices

WaterNSW

Invitation for Registrations of Interest

Aboriginal Cultural Heritage Assessments
Dungowan Dam upgrade, Tamworth LGA

WaterNSW is proposing to develop a new dam downstream of the existing Dungowan Dam and to upgrade the Dungowan Dam pipeline, southeast of Tamworth. EMM Consulting Pty Ltd has been engaged to undertake the environmental assessment requirements for the project, which include the investigation and assessment of Aboriginal heritage.

The proponent is WaterNSW, and the project contact is:
Meredith Abrams, WaterNSW Community Engagement Officer,
T: 1300 662 077
E: meredith.abrams@waternsw.com.au

Registrations are invited from Aboriginal individuals and organisations who hold cultural knowledge relevant to determining the significance of Aboriginal objects, sites and/or places in the area, and who wish to be involved in the consultation process.

Information will be used in the development of any assessment, and may be used in the preparation and application of subsequent approvals (including Aboriginal Heritage Impact Permits where necessary), as well as to assist the consent authority in its assessment.

Registrations of interest should be provided by no later than 1 May 2020 to Georgia Burnett (Archaeologist), EMM Consulting,
20 Chandos Street, St Leonards, NSW 2065;
T: 02 9493 9500
E: gburnett@emmconsulting.com.au

Public Notices

GunnedahShire

2017-2021 Delivery Program and 2020/21 Operational Plan

The 2017-2021 Delivery Program and 2020/21 Operational Plan for Gunnedah Shire Council is officially placed on public exhibition and Council will receive submissions in relation to the documents up until 5:00pm Thursday 14 May 2020.

The Delivery Program and Operational Plan will be available for viewing on Council's website at www.infogunnedah.com.au.

This is an opportunity for members of the public to lodge submissions in relation to the items considered and strategies applied in the Draft Delivery Program and Operational Plan. Council will meet again on Wednesday 20 May 2020 to consider all submissions, formally adopt the Delivery Program and Operational Plan and set the rates for the ensuing 12 month period.

Should you have any enquiries,
please contact Council on 02 6740 2100.

Eric Groth
GENERAL MANAGER

Public Notices

TAMWORTH CABS Home delivery. For details 02 6766 1221

Trade Services

SMITH'S Excavator & Bobcat 0419 411 434

Adult Services

NICOLE, breathtakingly beautiful country lady, (35 yo), in/out calls, TODAY ONLY. 0488 482 897

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2 VOUCHERS TO BE WON!

To enter our competition fill out the competition entry and drop it into the Northern Daily Leader office

Keep an eye out for the **Place My Face** page, just before the classifieds section on Saturday 18th April for details on how to win a $50 voucher from Kays Meats or The Northern Daily Leader

KAY'S

The Northern Daily LEADER

AW38646633

$50 Gift Voucher - UP FOR GRABS!

Enter for your chance to win a $50 gift voucher to Kays Meats or The Northern Daily Leader by simply matching the employees face to the correct business in our Place My Face program page that prints Saturday 18.04.20
Post or drop entries into: The Northern Daily Leader Place My Face Suite 2, 27 Bourke St, Tamworth, NSW 2340

Employees faces matched:
Where does face 1 work? .....
Where does face 2 work? .....

Your Details
Name: .....
Phone: .....

The Northern Daily Leader at 27 Bourke Street Tamworth are running the Place My Face competition starting on 18.04.20 & ending 01.05.20. The two prizes are a $50 gift voucher from Kays Meats or The Northern Daily Leader There will be one draw at 27 Bourke St at 3.00pm 01.05.20. The winner will be announced via classified ad the following day and also phoned. Full T&C's can be found in the classifieds section. NSW Permit No. LTPM/20/05348

Ground floor, 20 Chandos Street
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PO Box 21
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T 02 9493 9500
E info@emmconsulting.com.au

www.emmconsulting.com.au

17 April 2020

Fiona Snape
Tamworth Local Aboriginal Land Council
PO Box 57
Tamworth NSW 2340
fiona@tamworthlalc.com.au

Re: Aboriginal cultural heritage assessment - Dungowan Dam, NSW - notification of project

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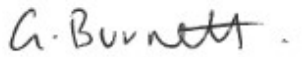

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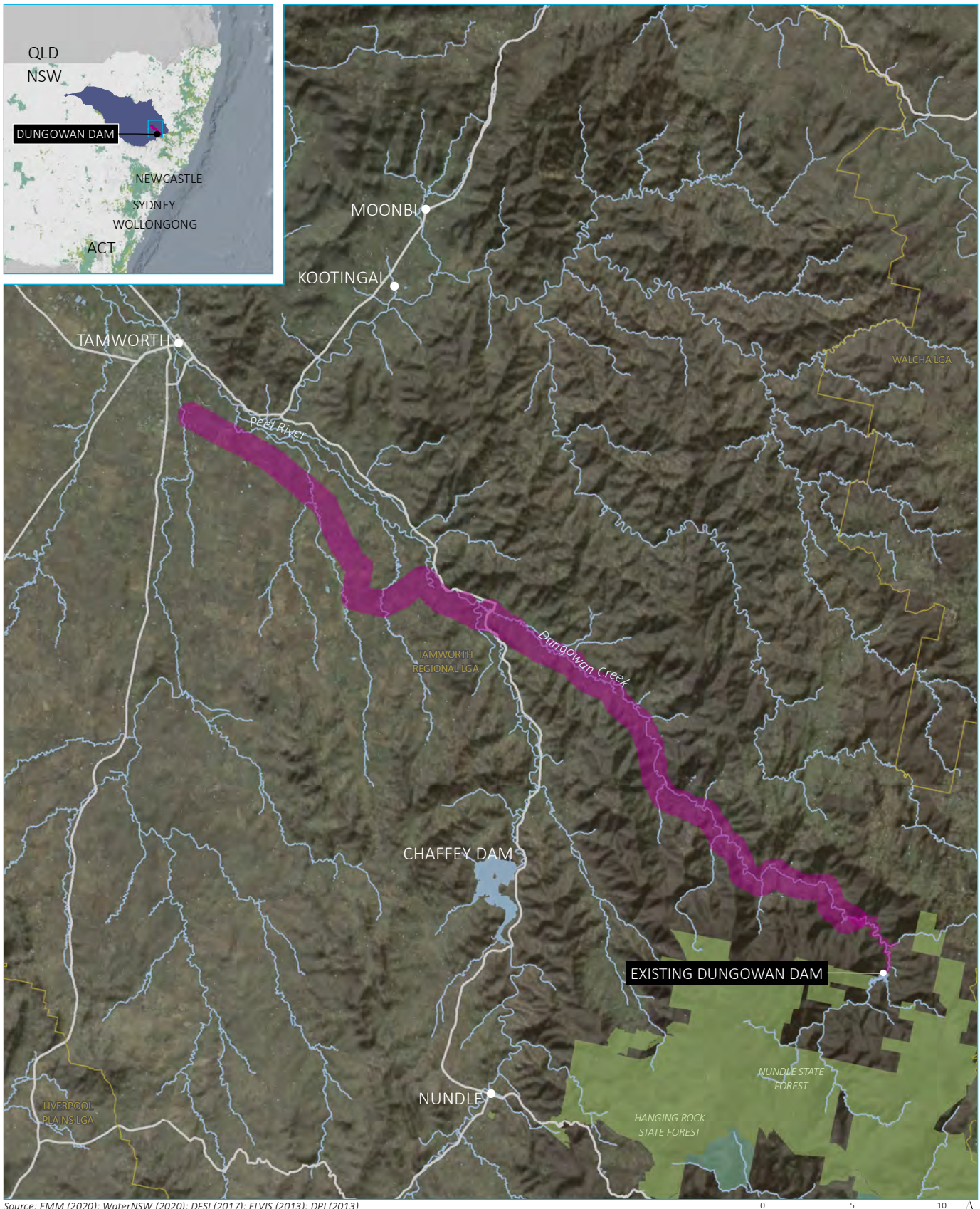

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Alison Simpson
36 Hill Street
Caroona NSW 2343

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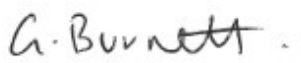

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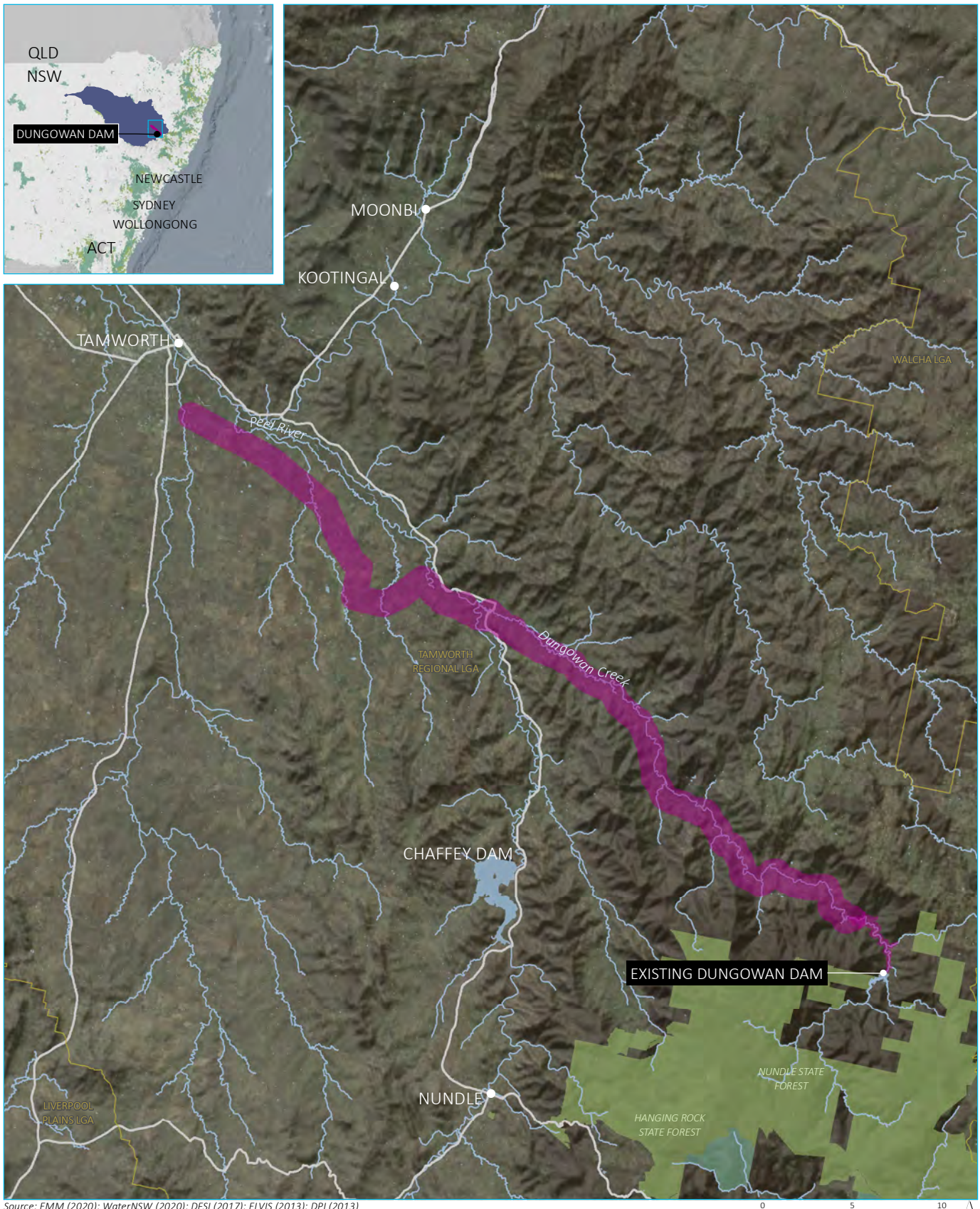

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Dungowan Dam
Aboriginal consultation
Figure 1

EMM creating opportunities

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17 April 2020

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www.emmconsulting.com.au

Aaron Talbott
AT Gomilaroi Cultural Consultancy
13 Hunter Street
Gunnedah NSW 2380

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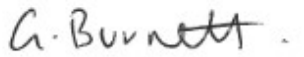

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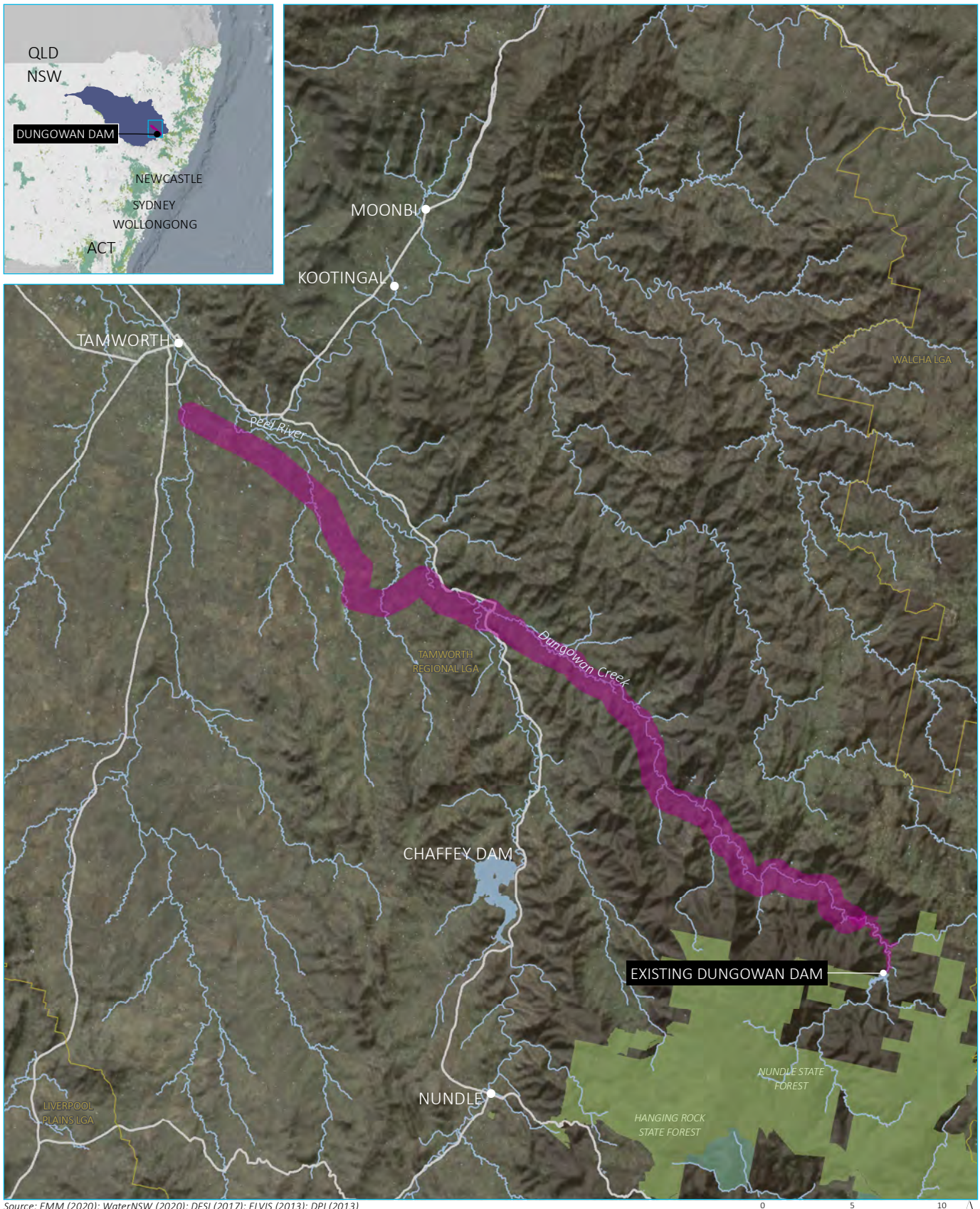

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21 Bando Street
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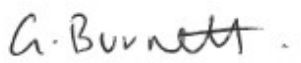

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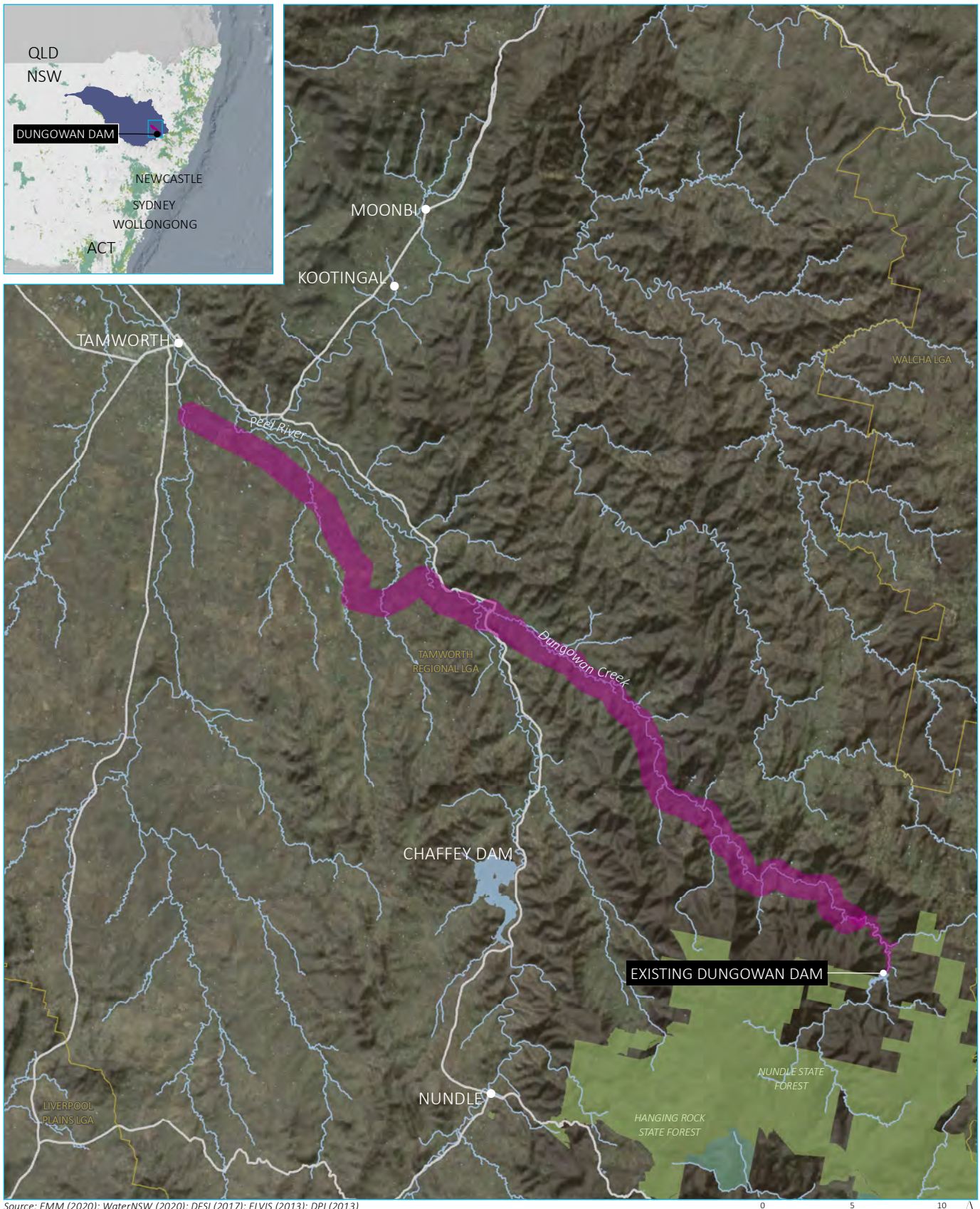

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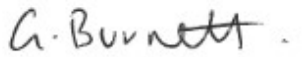

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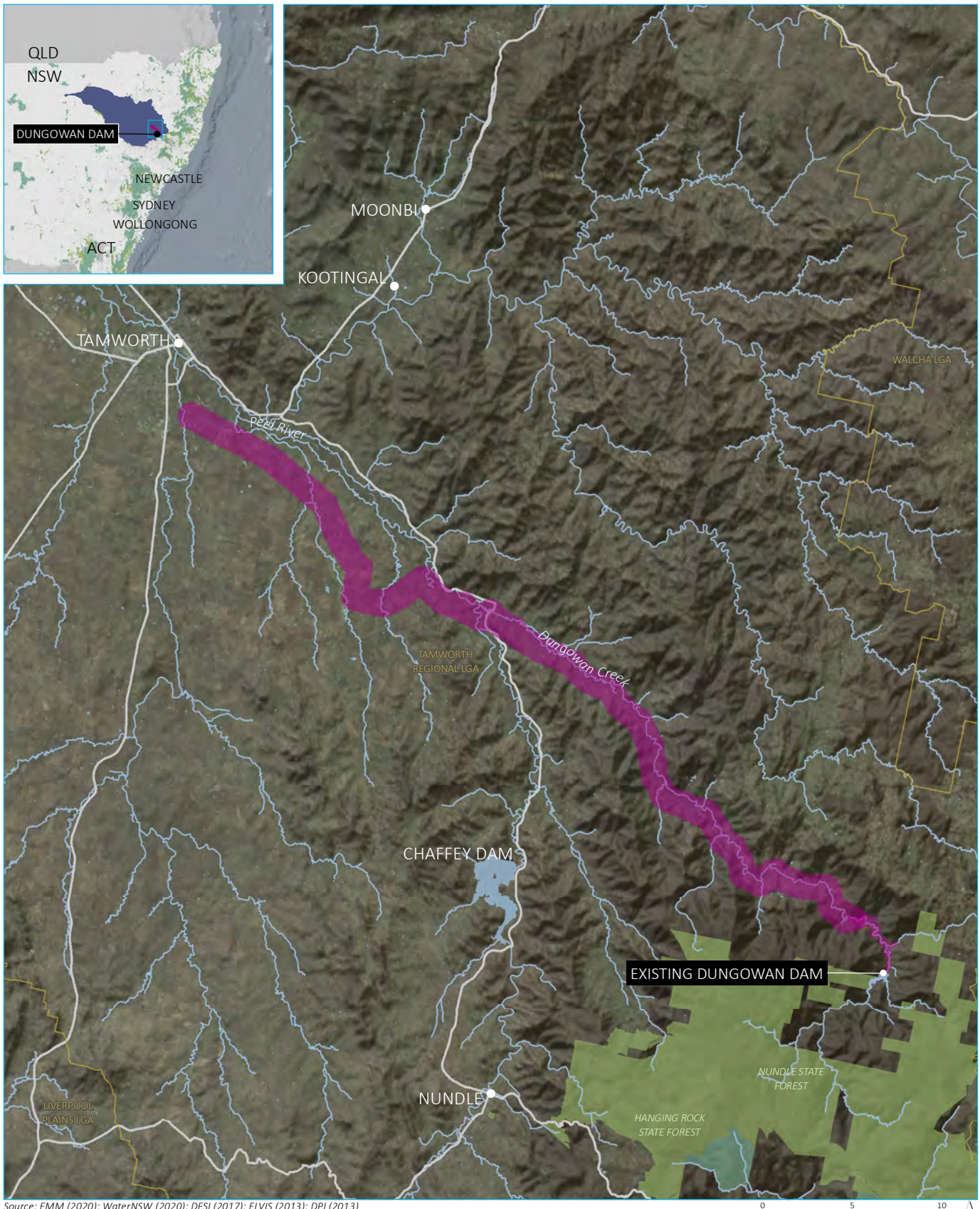

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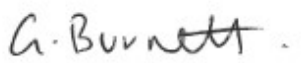

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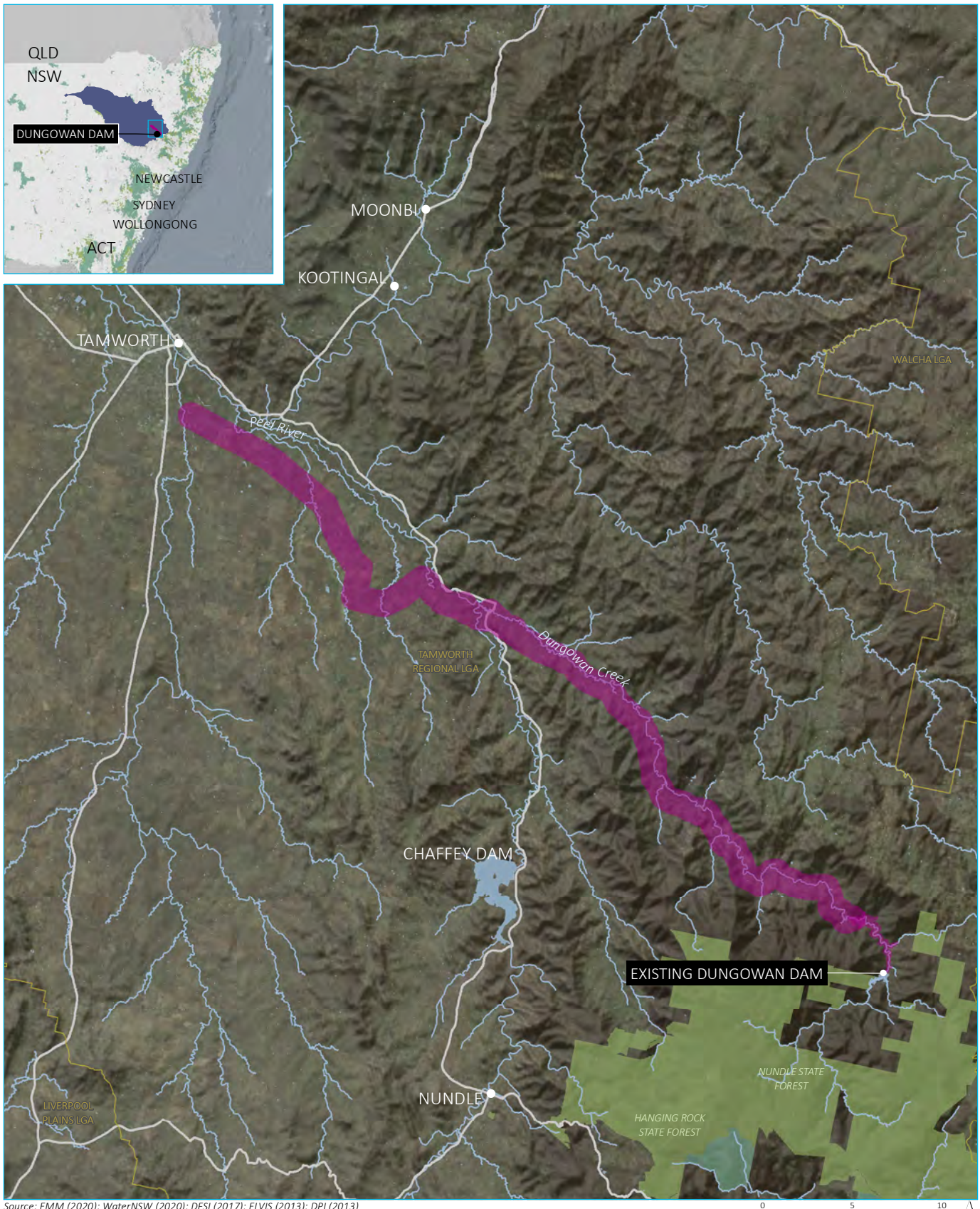

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0 5 10 km

GDA 1994 NSW Lambert

N

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- Indicative project area
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Dungowan Dam
Aboriginal consultation
Figure 1

EMM creating opportunities

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17 April 2020

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www.emmconsulting.com.au

Clifford Matthews
16/A Mahogany Ave
Muswellbrook NSW 2333

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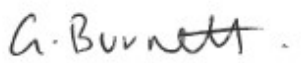

Georgia Burnett
Archaeologist
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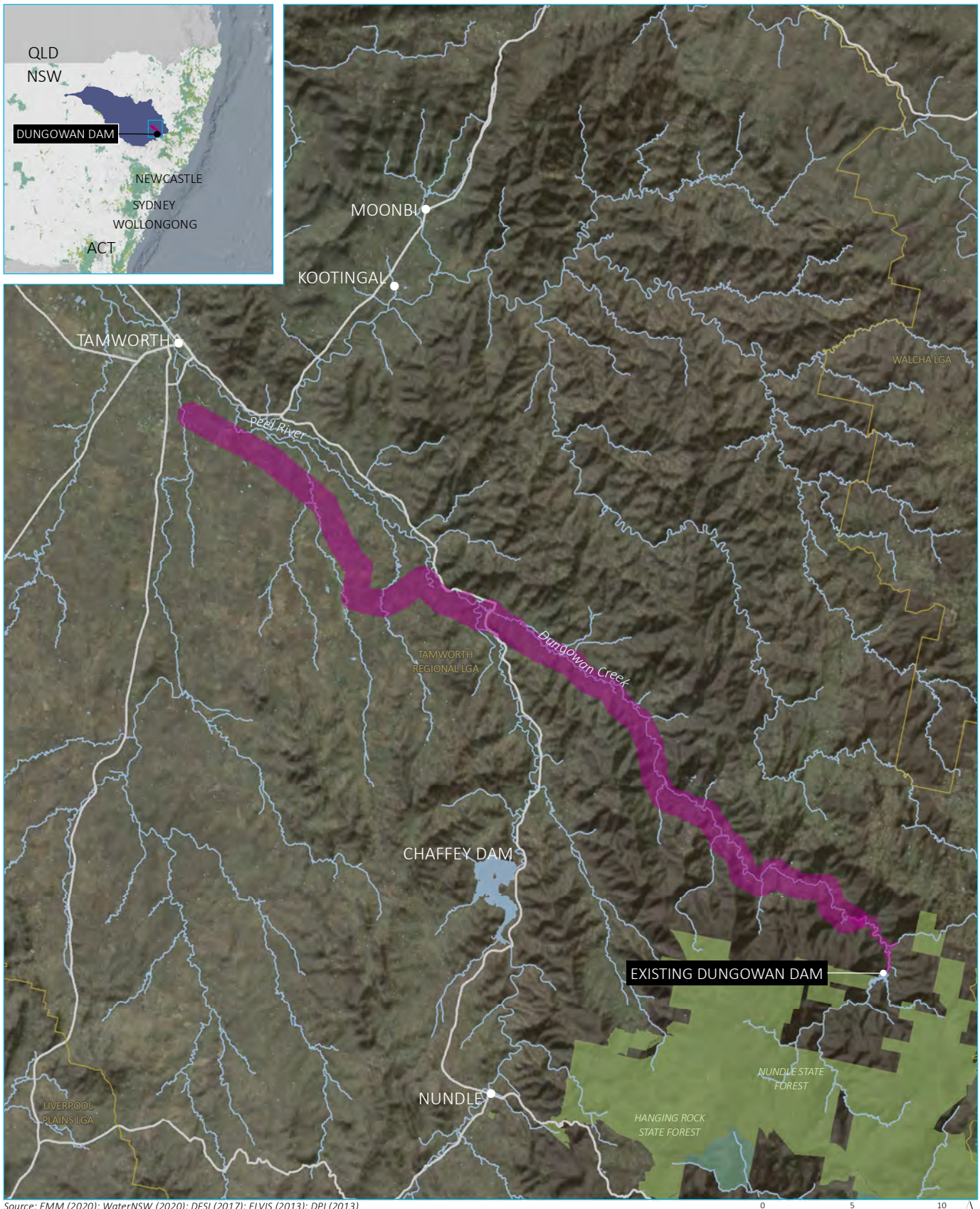

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Coonabarabran LALC
PO Box 110
Coonabarabran NSW 2357

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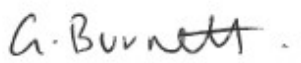

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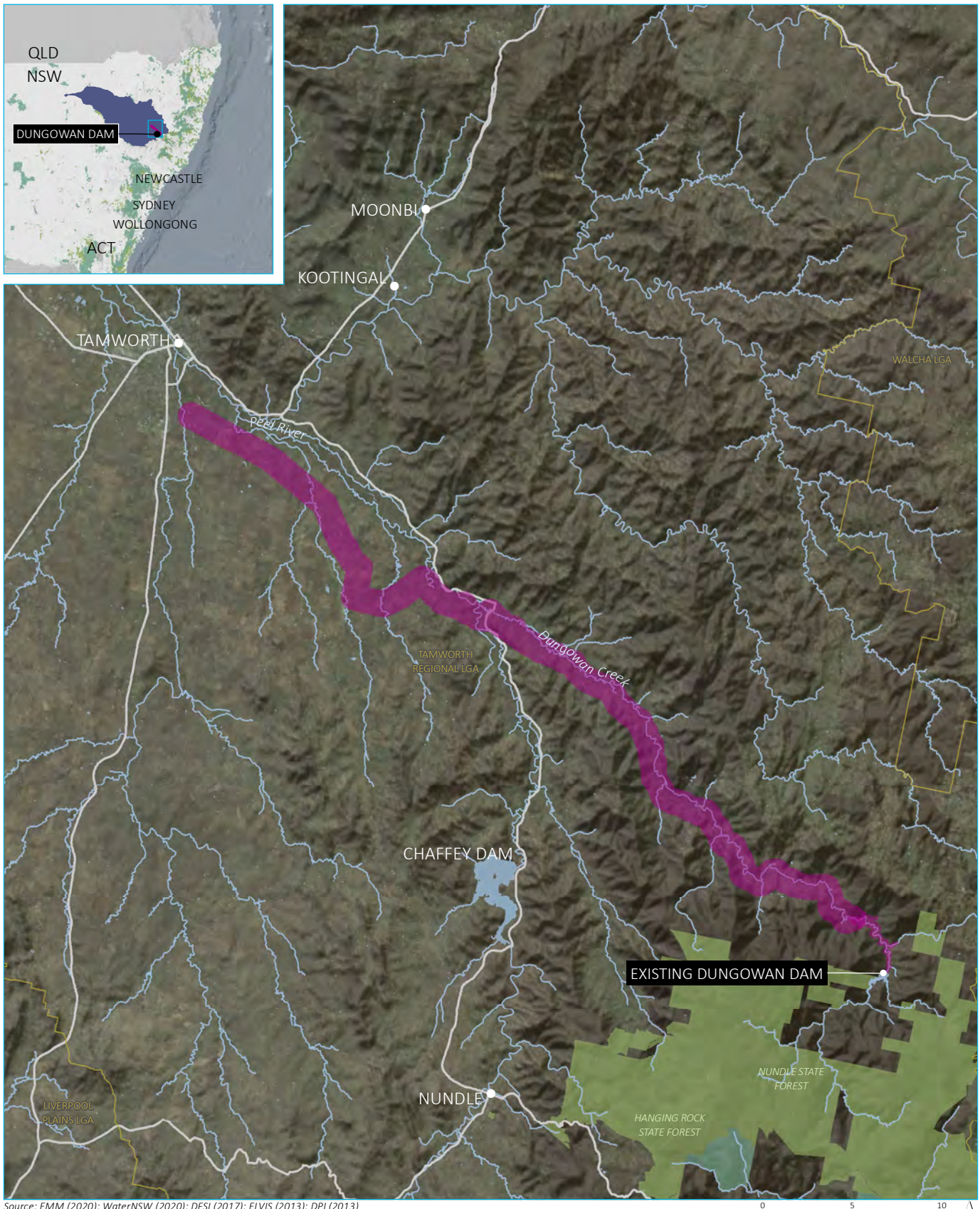

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Marilyn Carroll-Johnson
Corroboree Aboriginal Corporation
PO Box 3340
Rouse Hill NSW 2155

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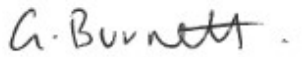

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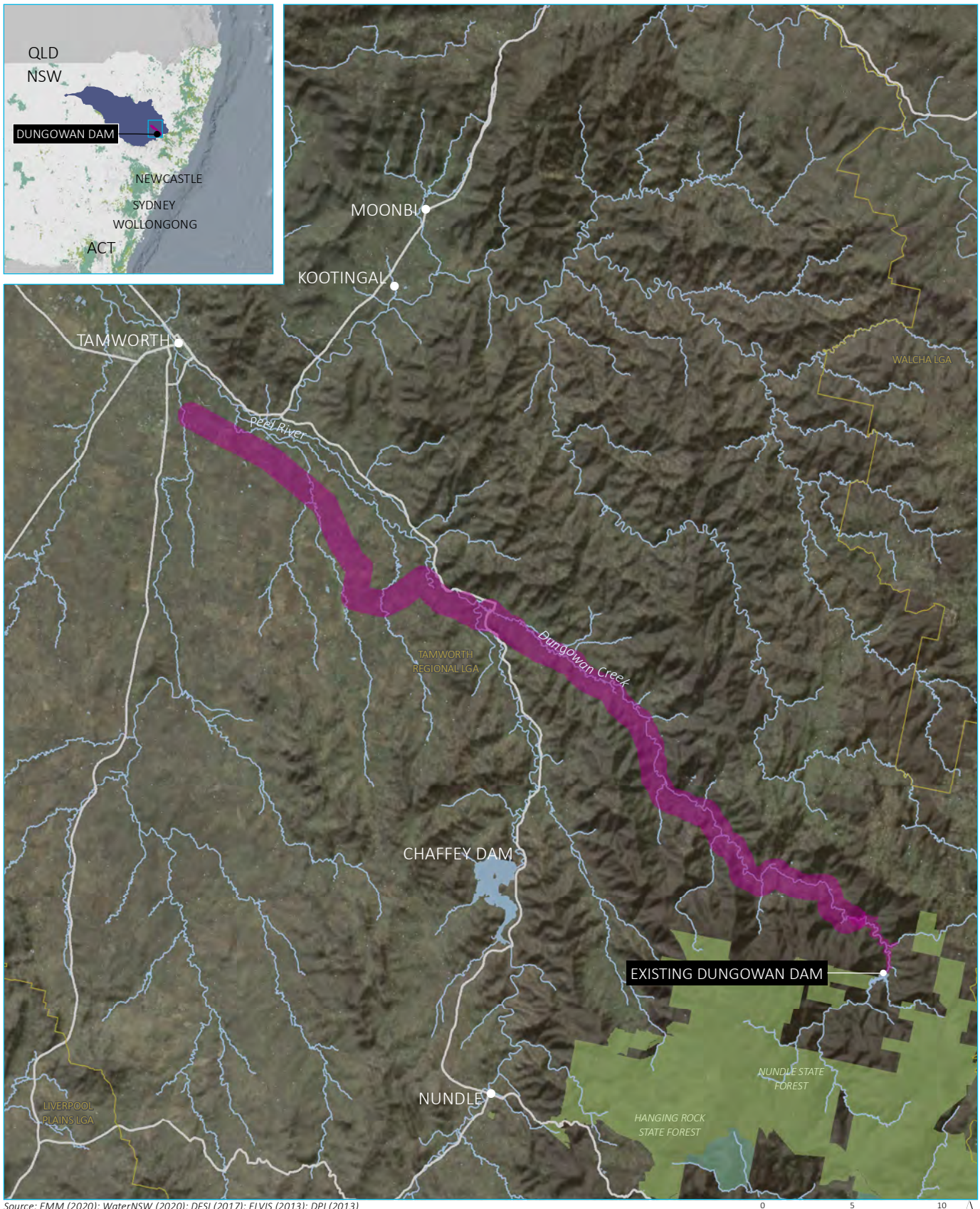

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D F V T Enterprises
5 Mountbatten Close
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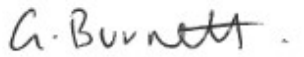

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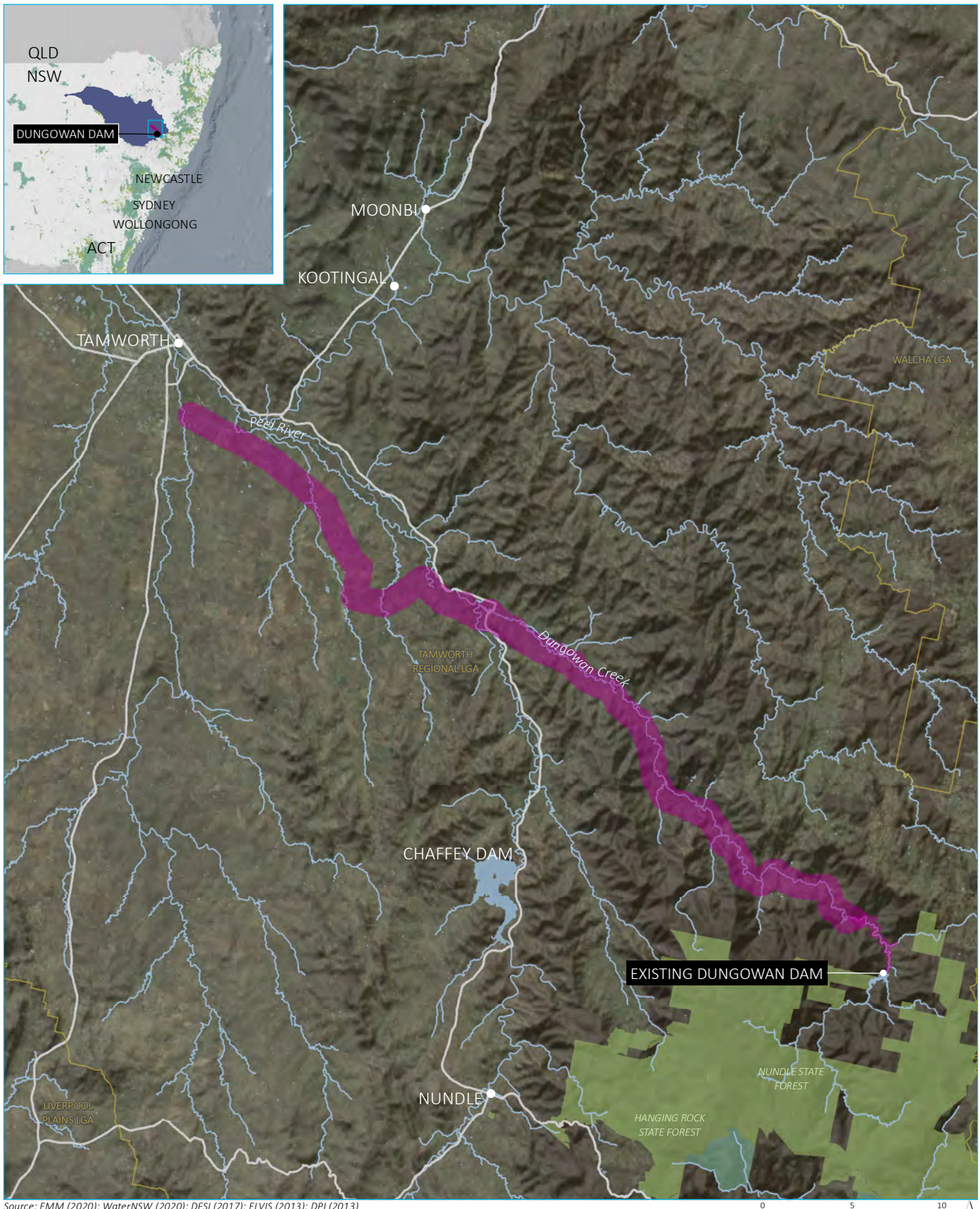

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GDA 1994 NSW Lambert

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Dungowan Dam
Aboriginal consultation
Figure 1

EMM creating opportunities

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Darrell Matthews
17 Edinglassie Drive
Muswellbrook NSW 2333

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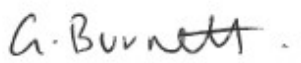

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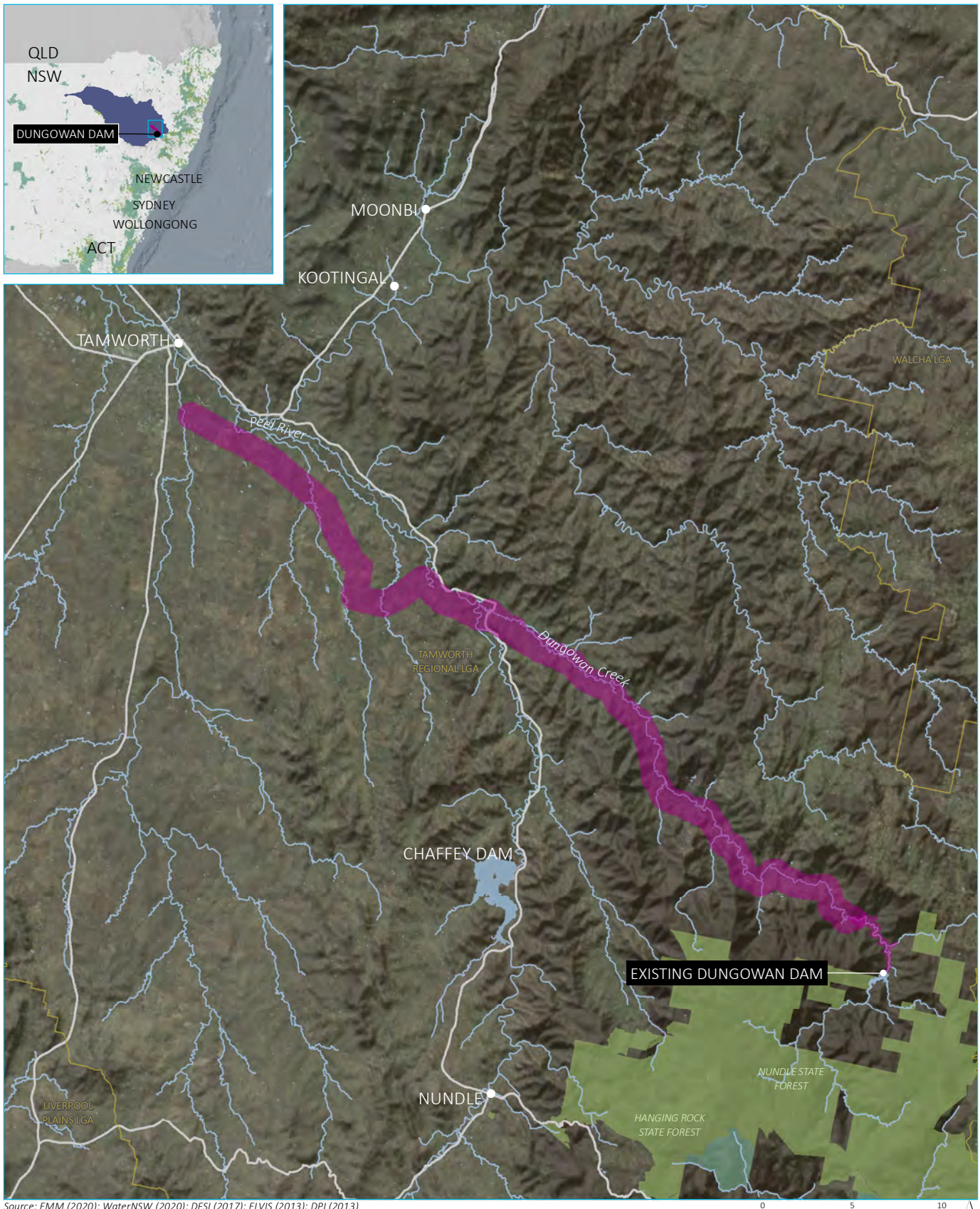

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Greg Griffith
Gomeroi Murri Ganuurr Yuuray Wadi Palinka
4 Wattle Street
Gunnedah NSW 2380

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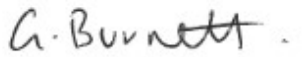

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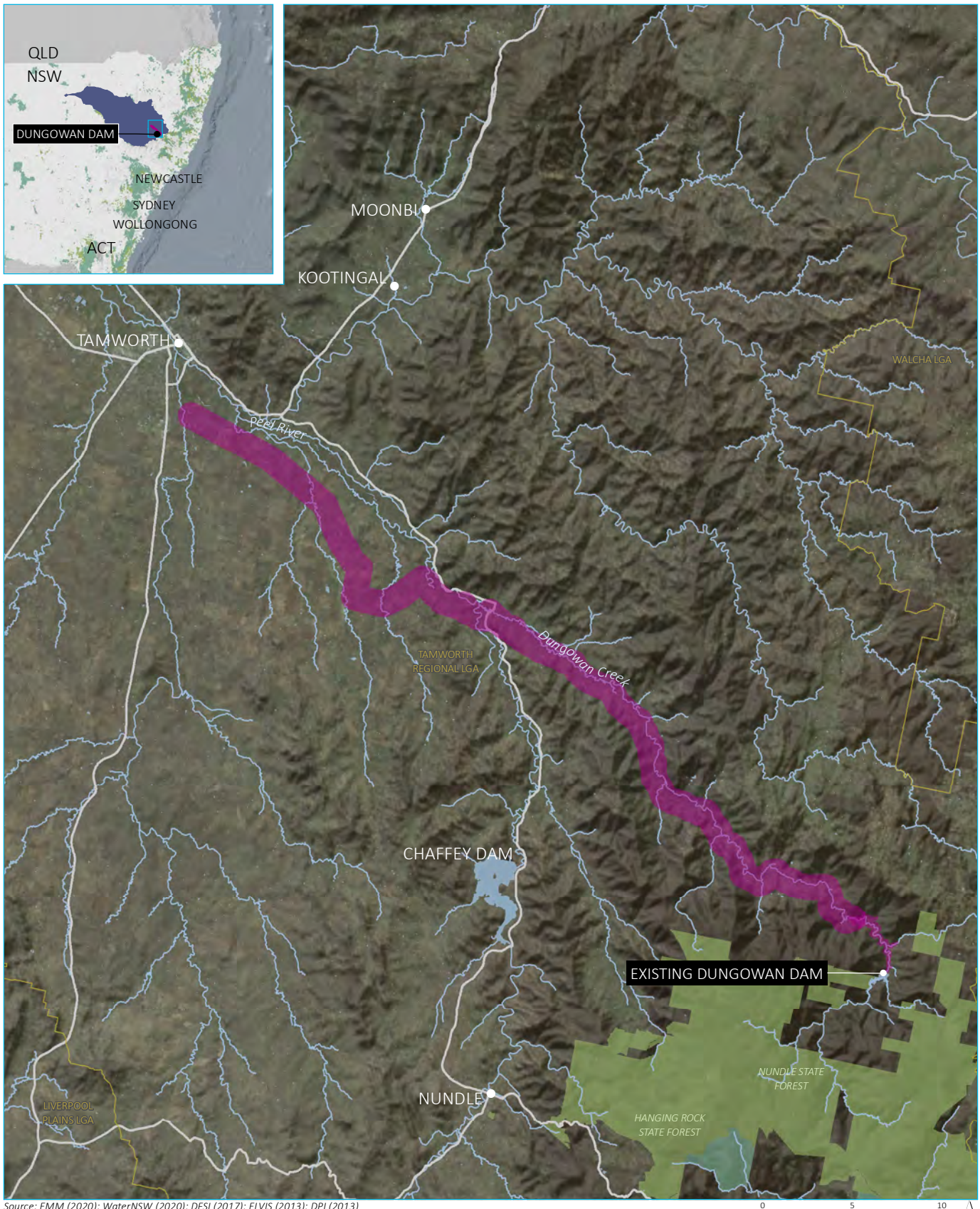

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3 Carroll Street
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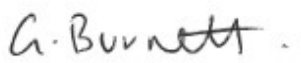

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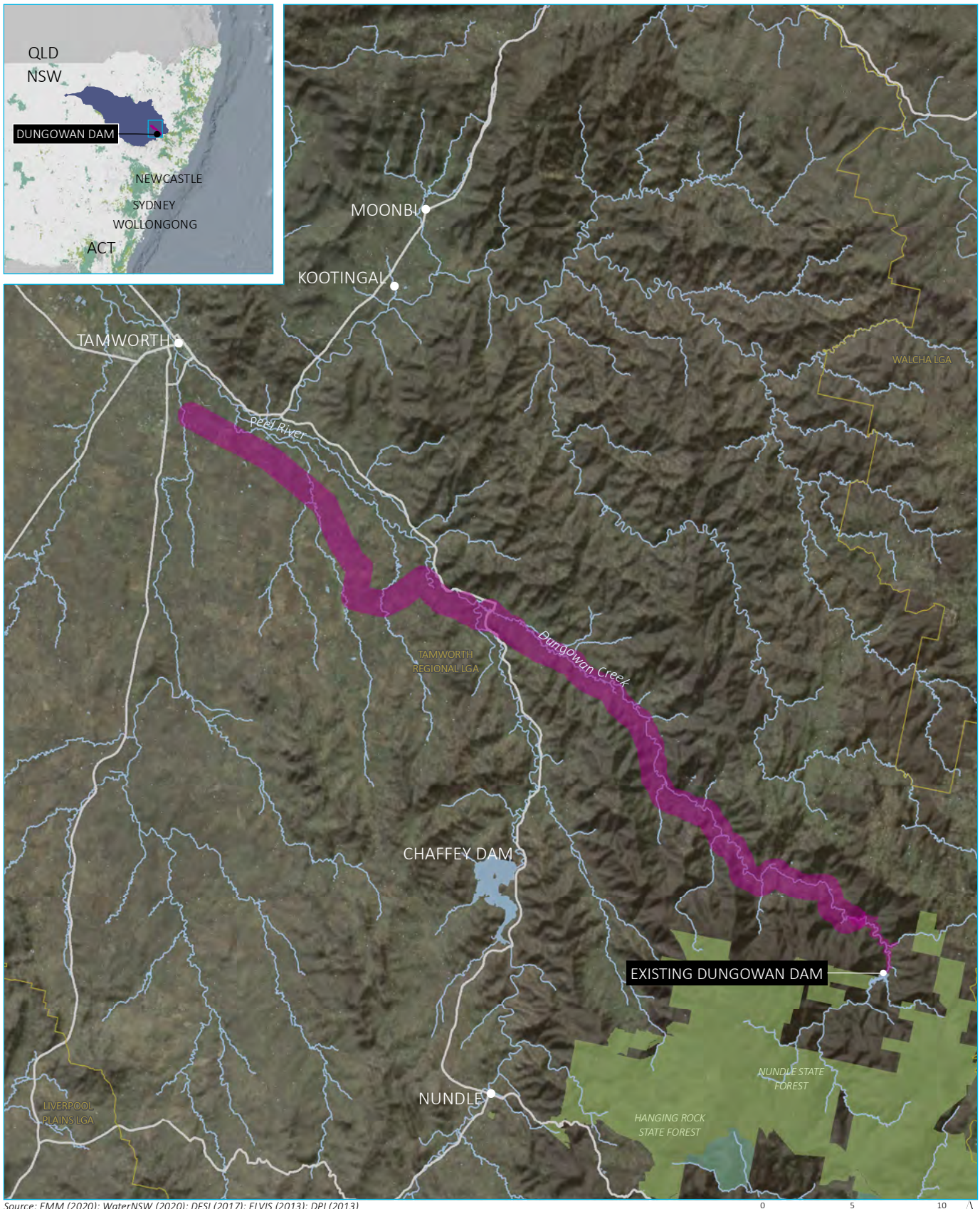

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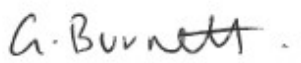

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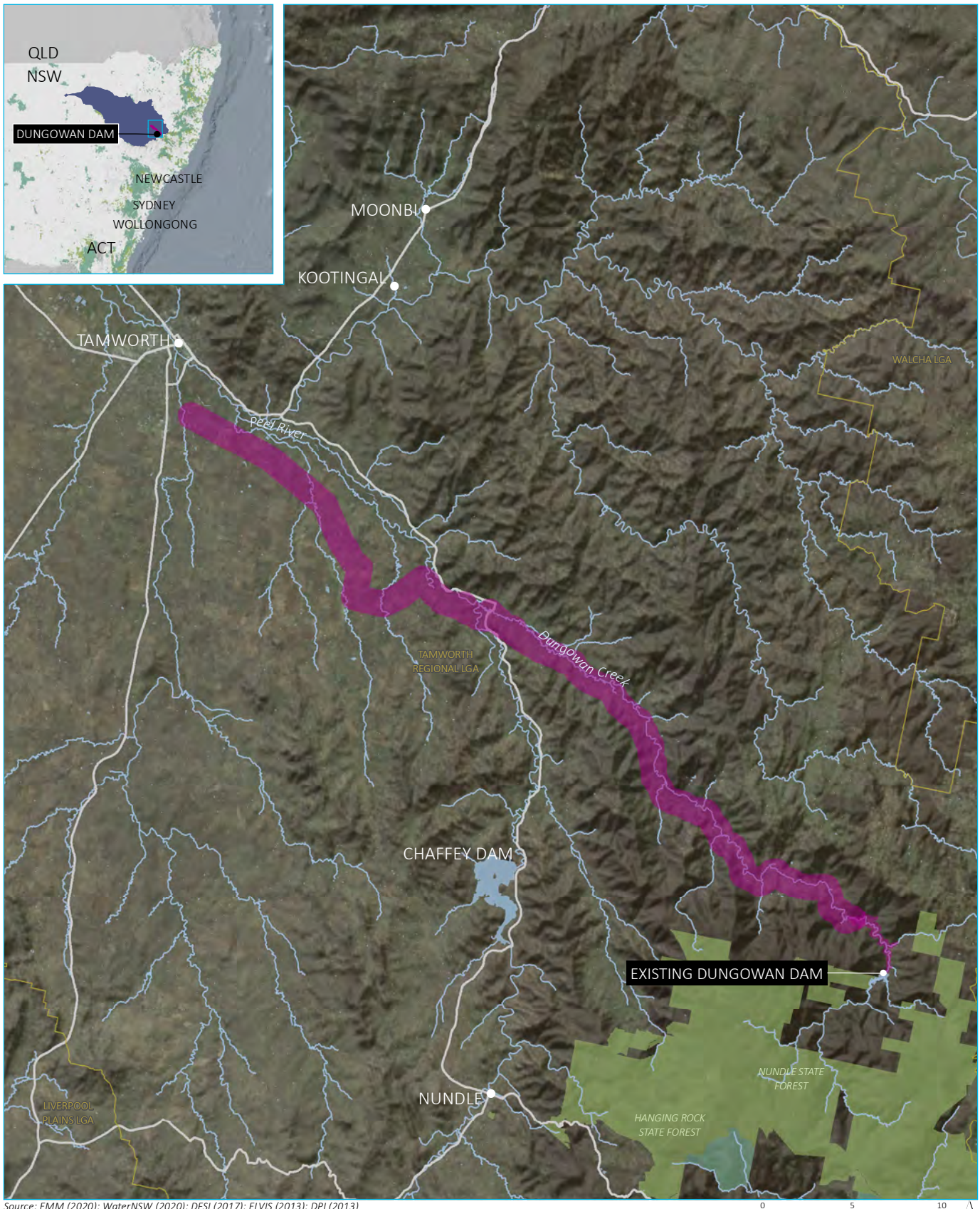

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GDA 1994 NSW Lambert

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Dungowan Dam
Aboriginal consultation
Figure 1

EMM creating opportunities

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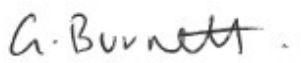

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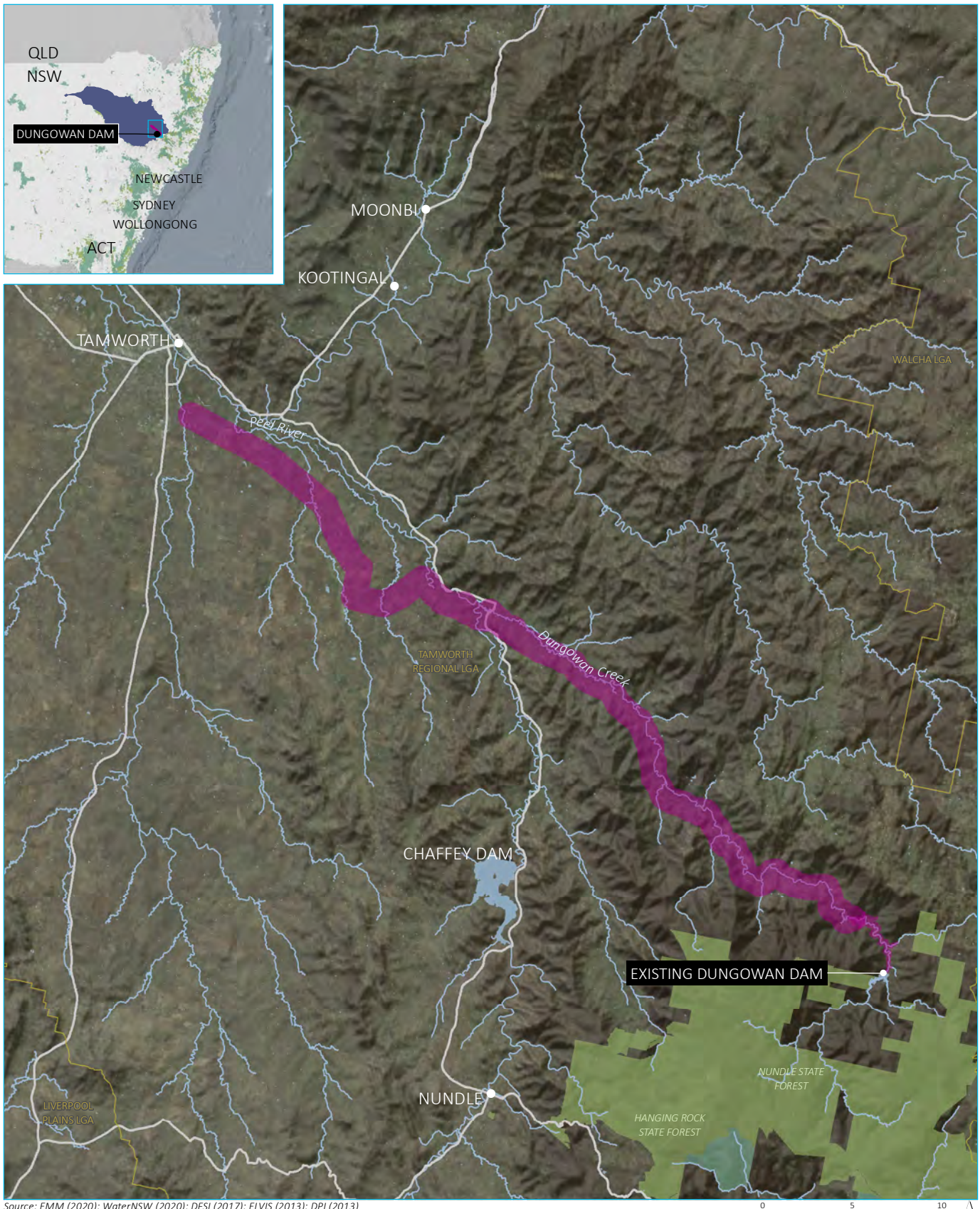

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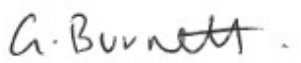

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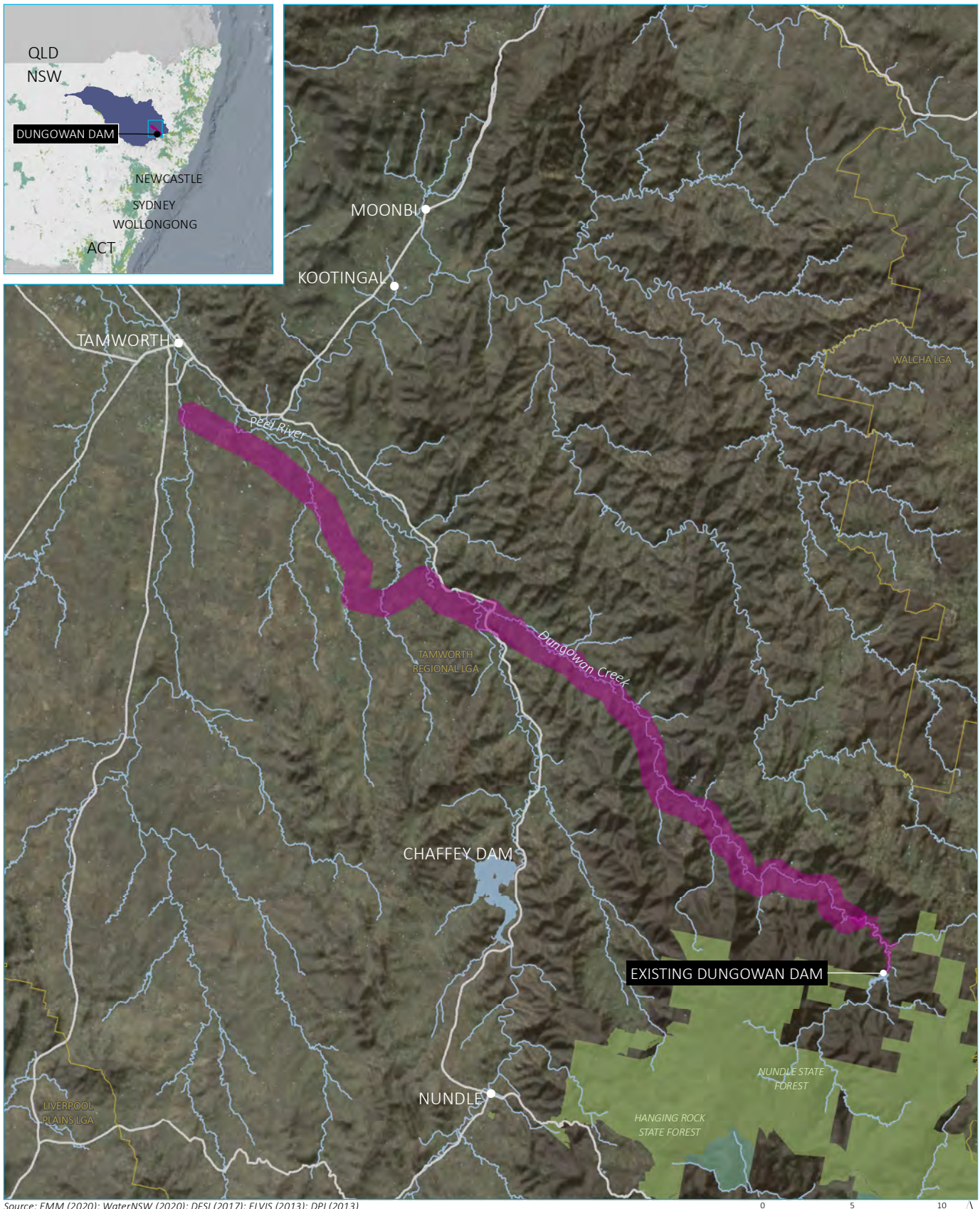

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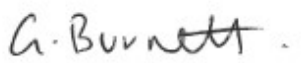

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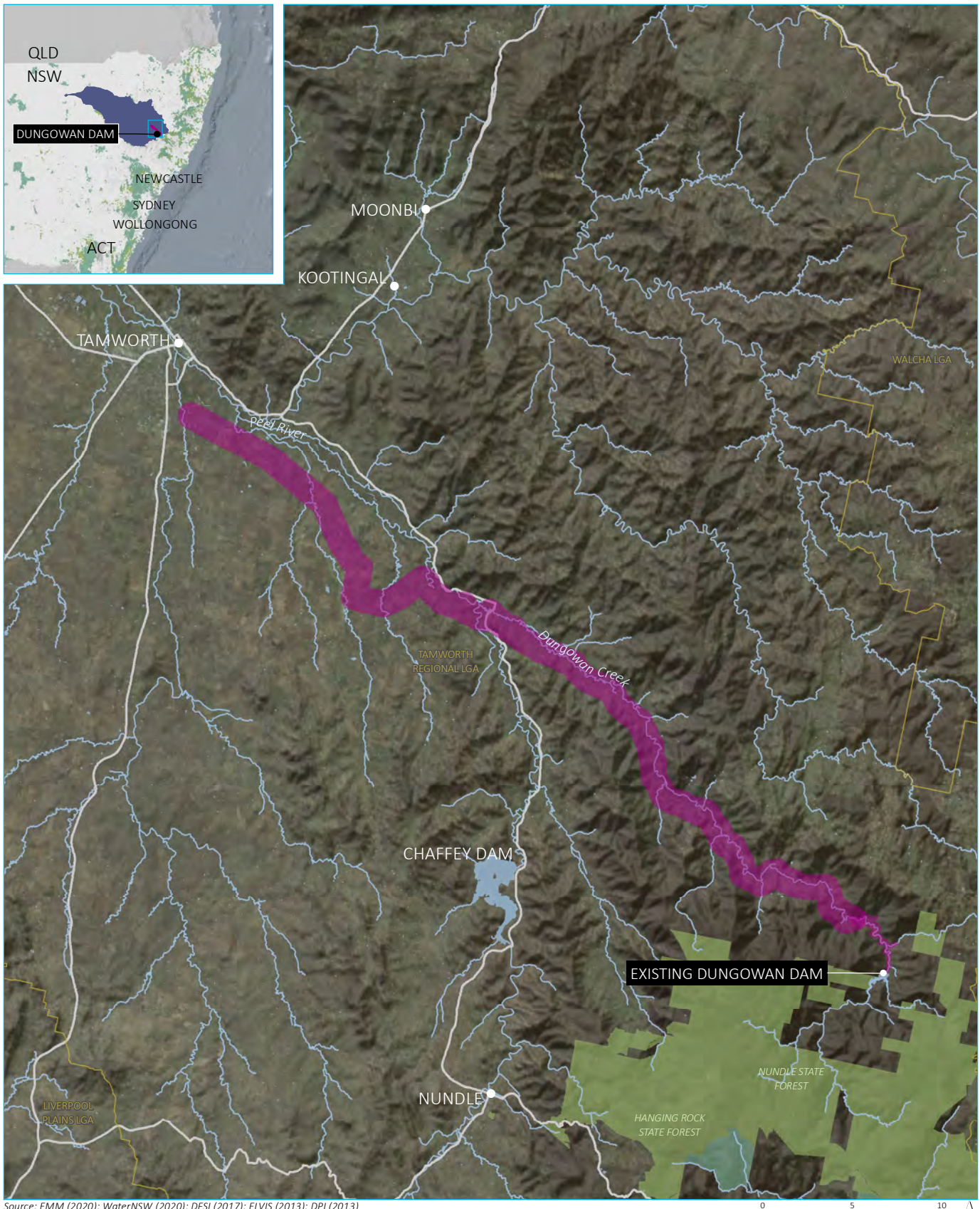

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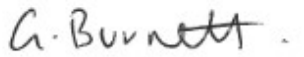

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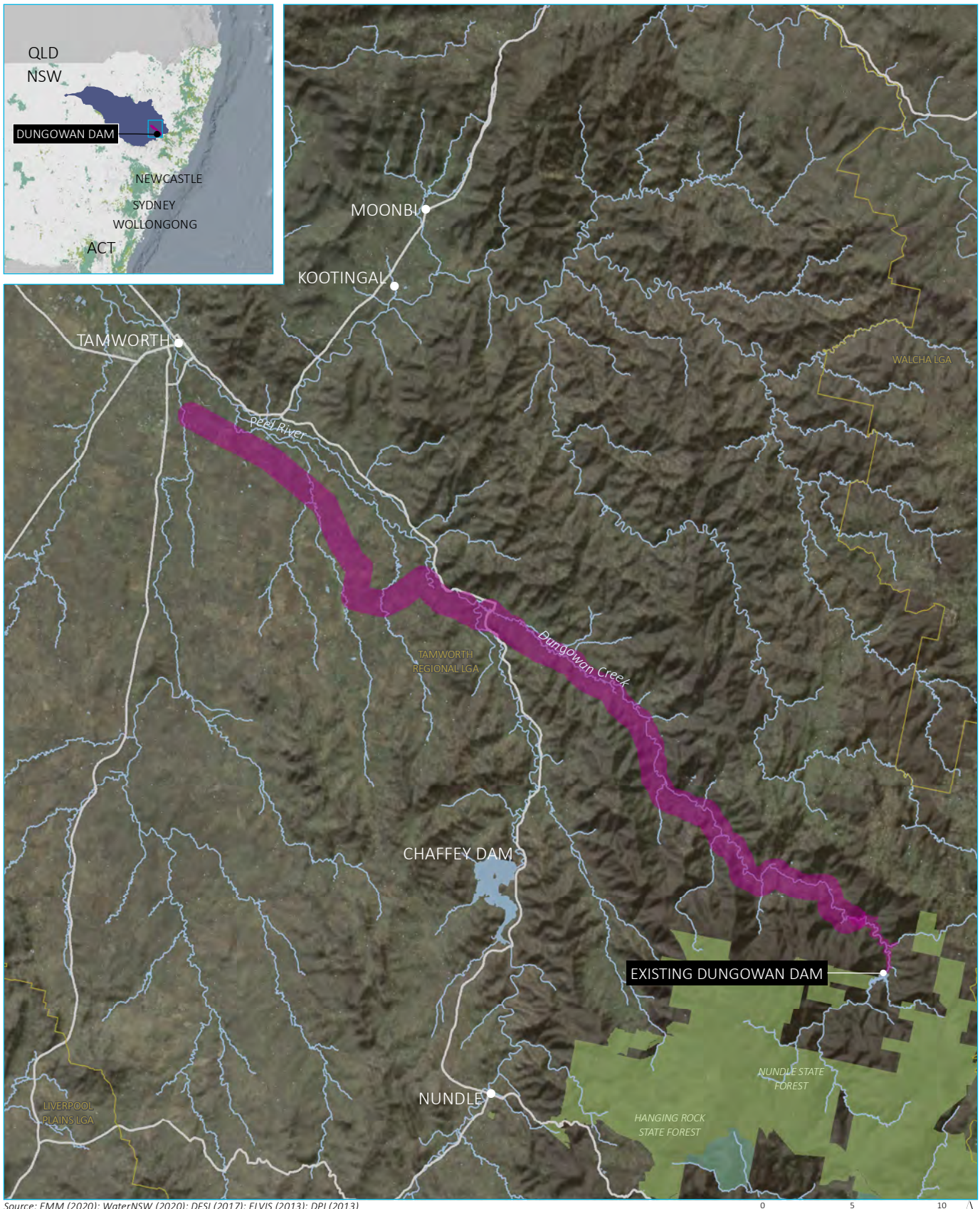

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GDA 1994 NSW Lambert

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Dungowan Dam
Aboriginal consultation
Figure 1

EMM creating opportunities

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Kevin Sampson
Bawurra Consultants
1 Martyn Street
Breeza NSW 2381

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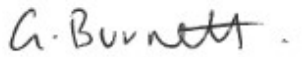

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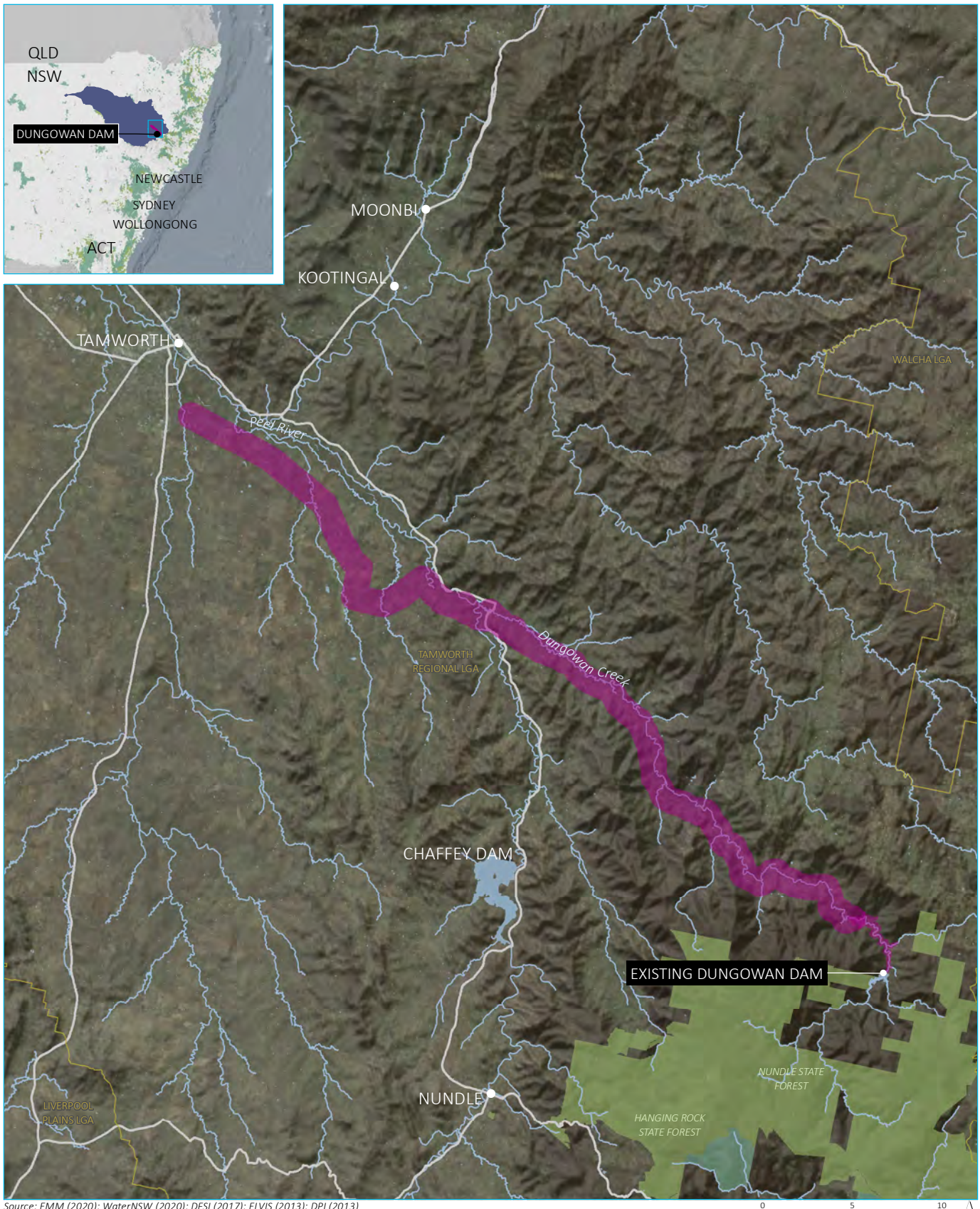

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Len Waters
47 Waters Park Drive
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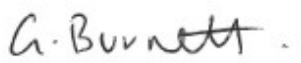

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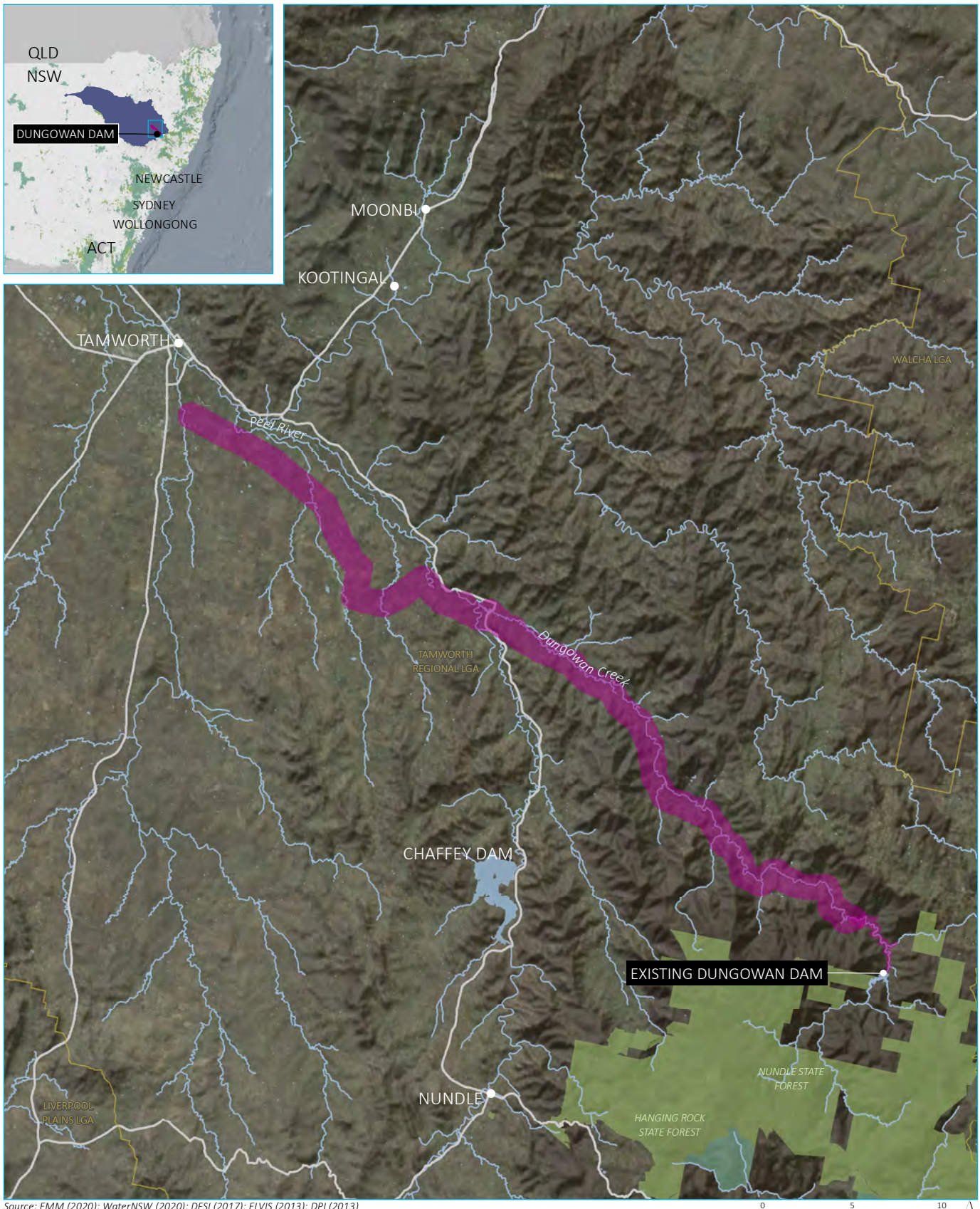

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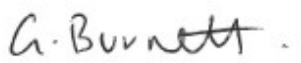

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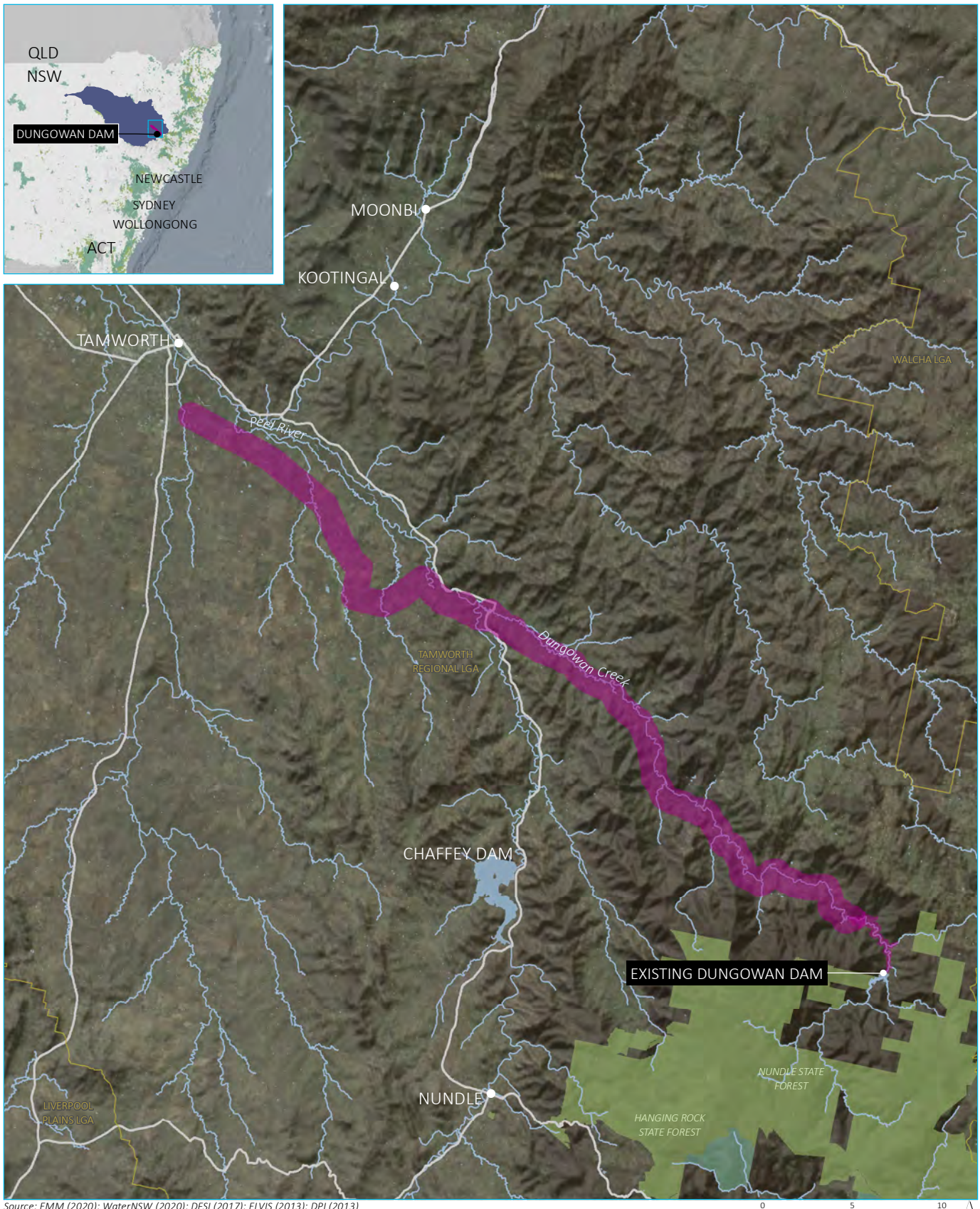

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28 Herbert Street
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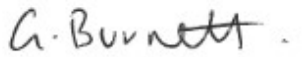

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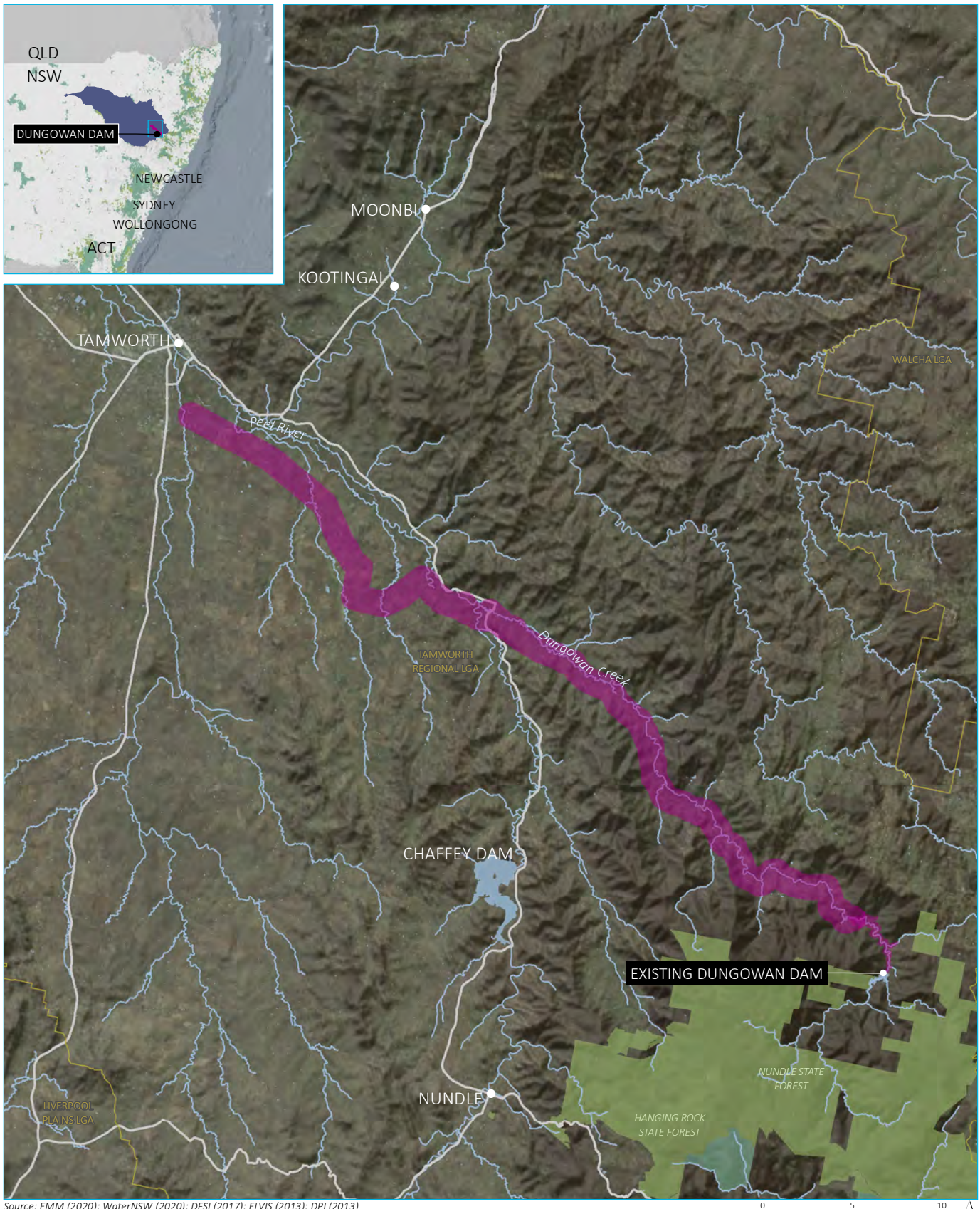

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Dungowan Dam
Aboriginal consultation
Figure 1

EMM creating opportunities

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Mavonia Welsh
1 Yabsley Avenue
Marrickville NSW 2204

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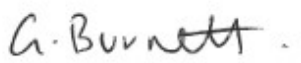

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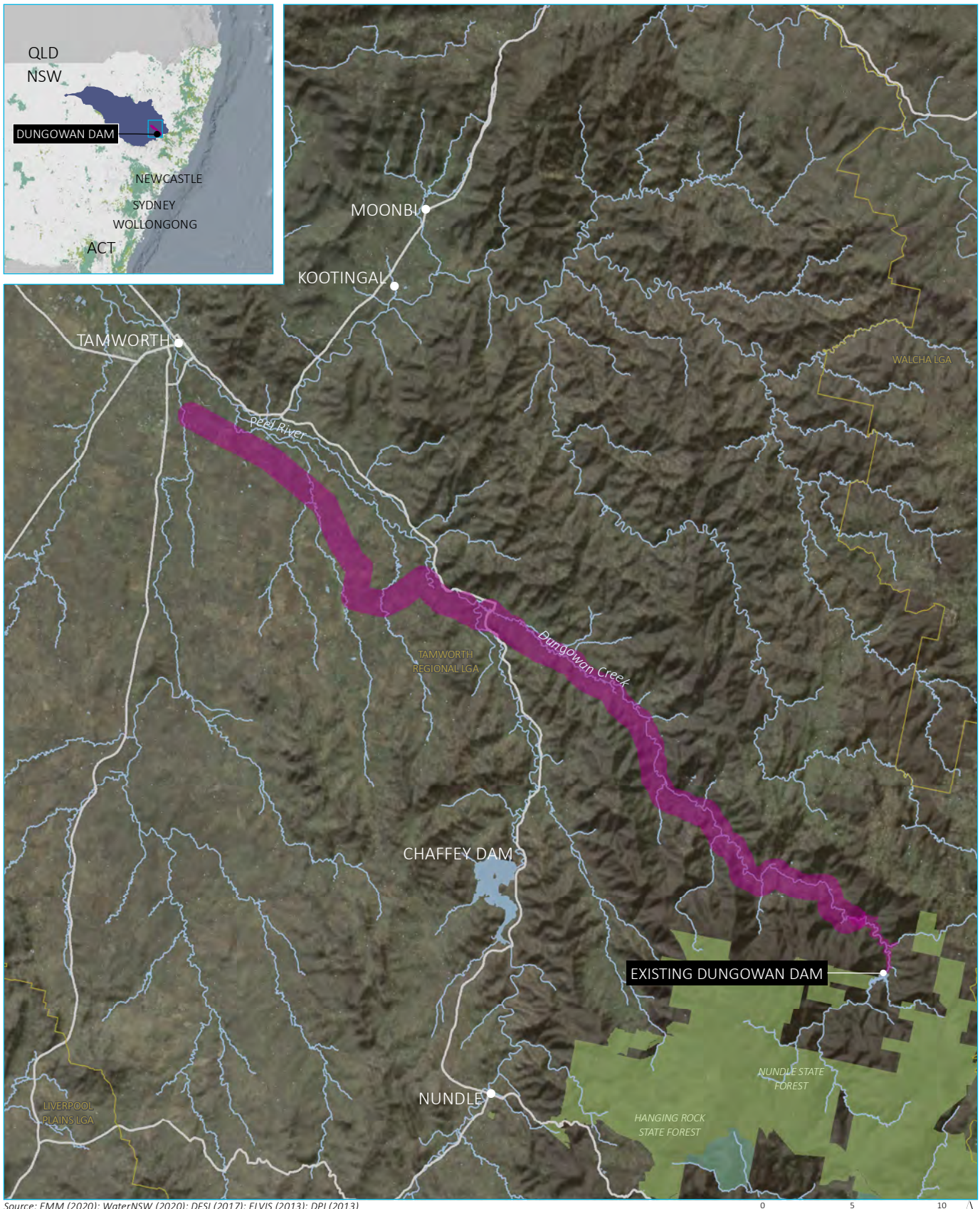

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ME Griffiths Cultural Management
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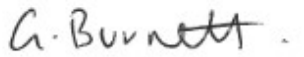

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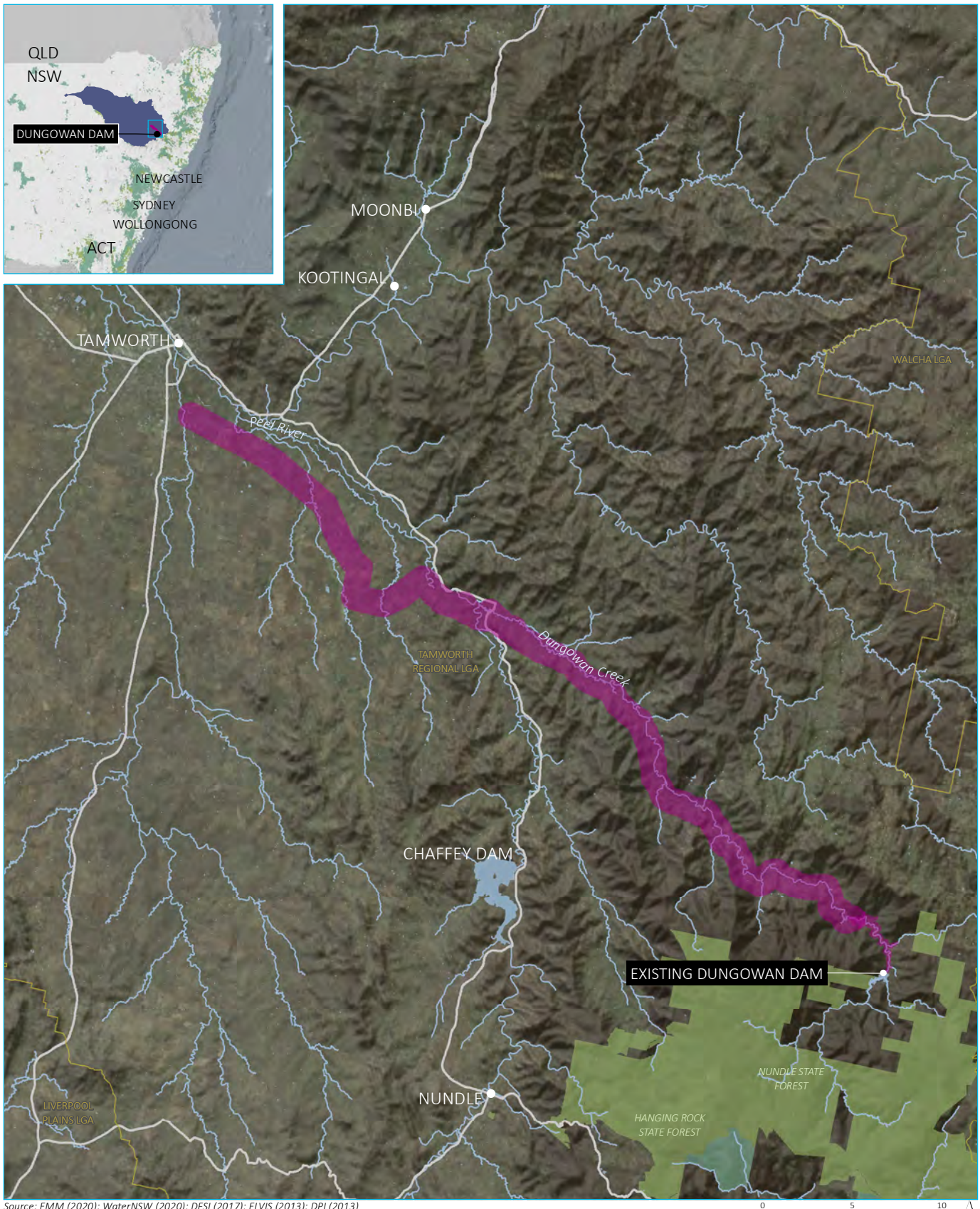

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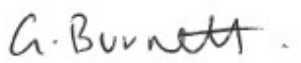

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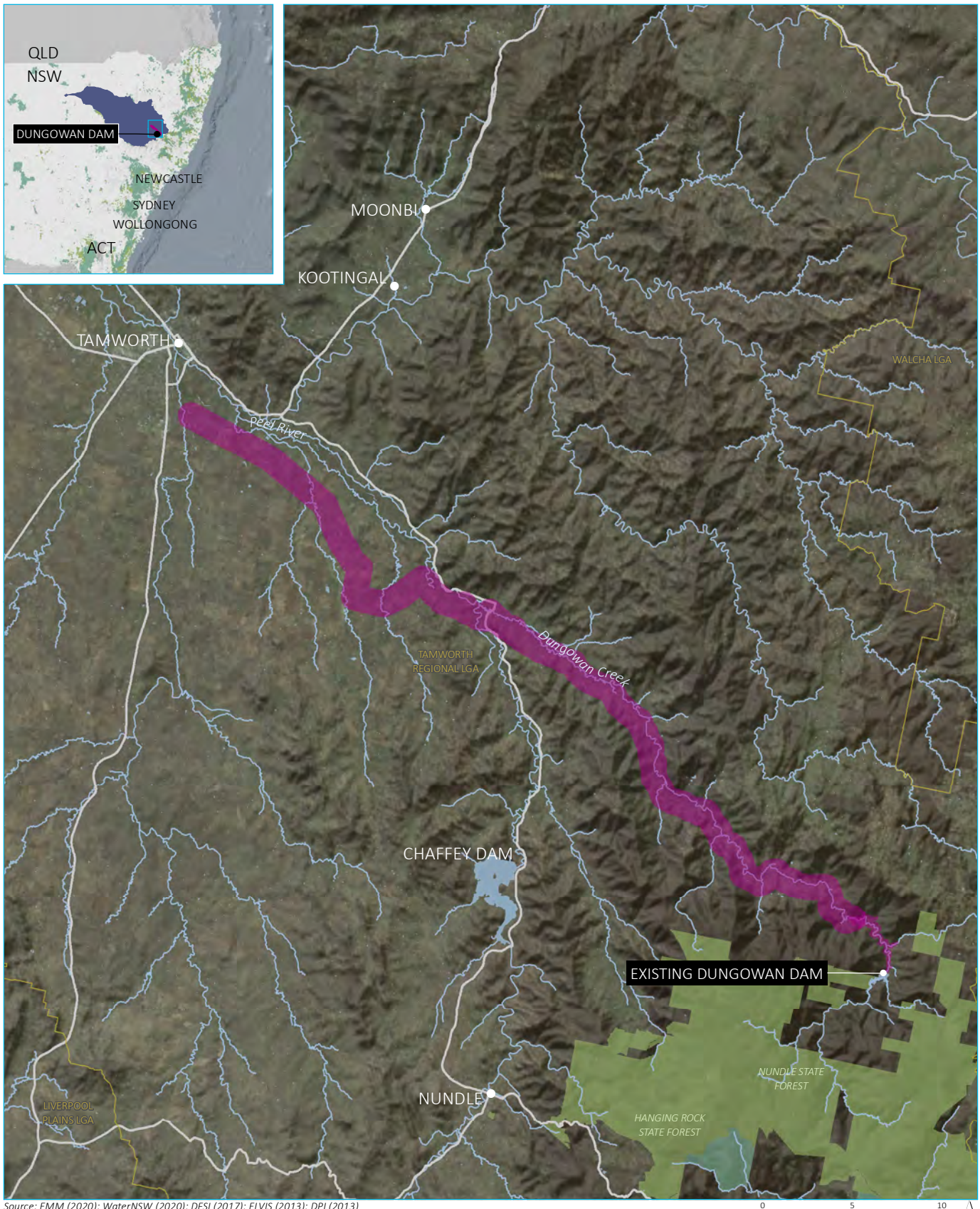

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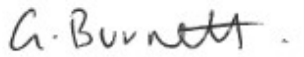

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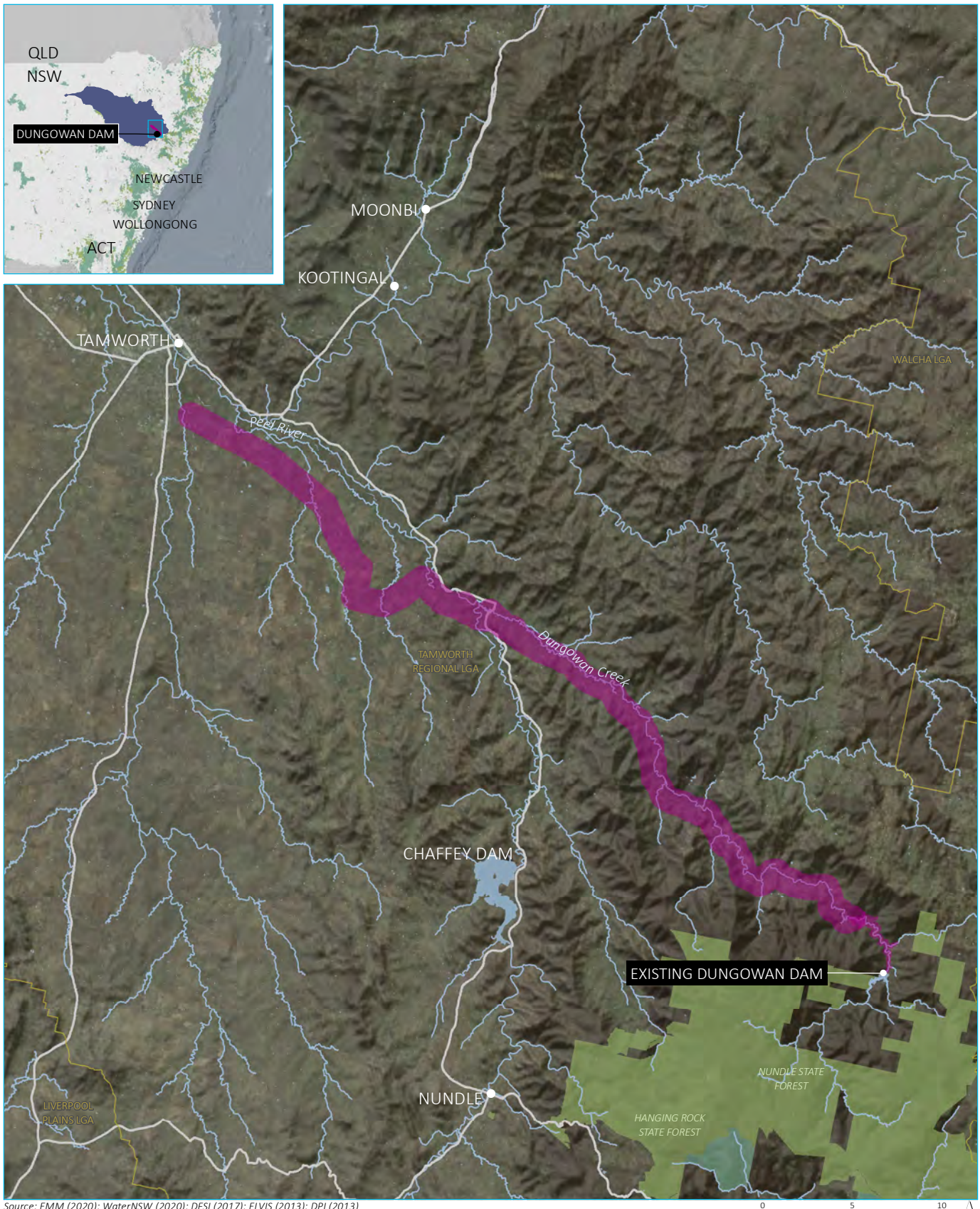

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GDA 1994 NSW Lambert

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Aboriginal consultation
Figure 1

EMM creating opportunities

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17 April 2020

Brian Hort
Muswellbrook Cultural Consultants
10 Scott Street
Muswellbrook NSW 2333

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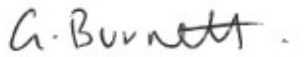

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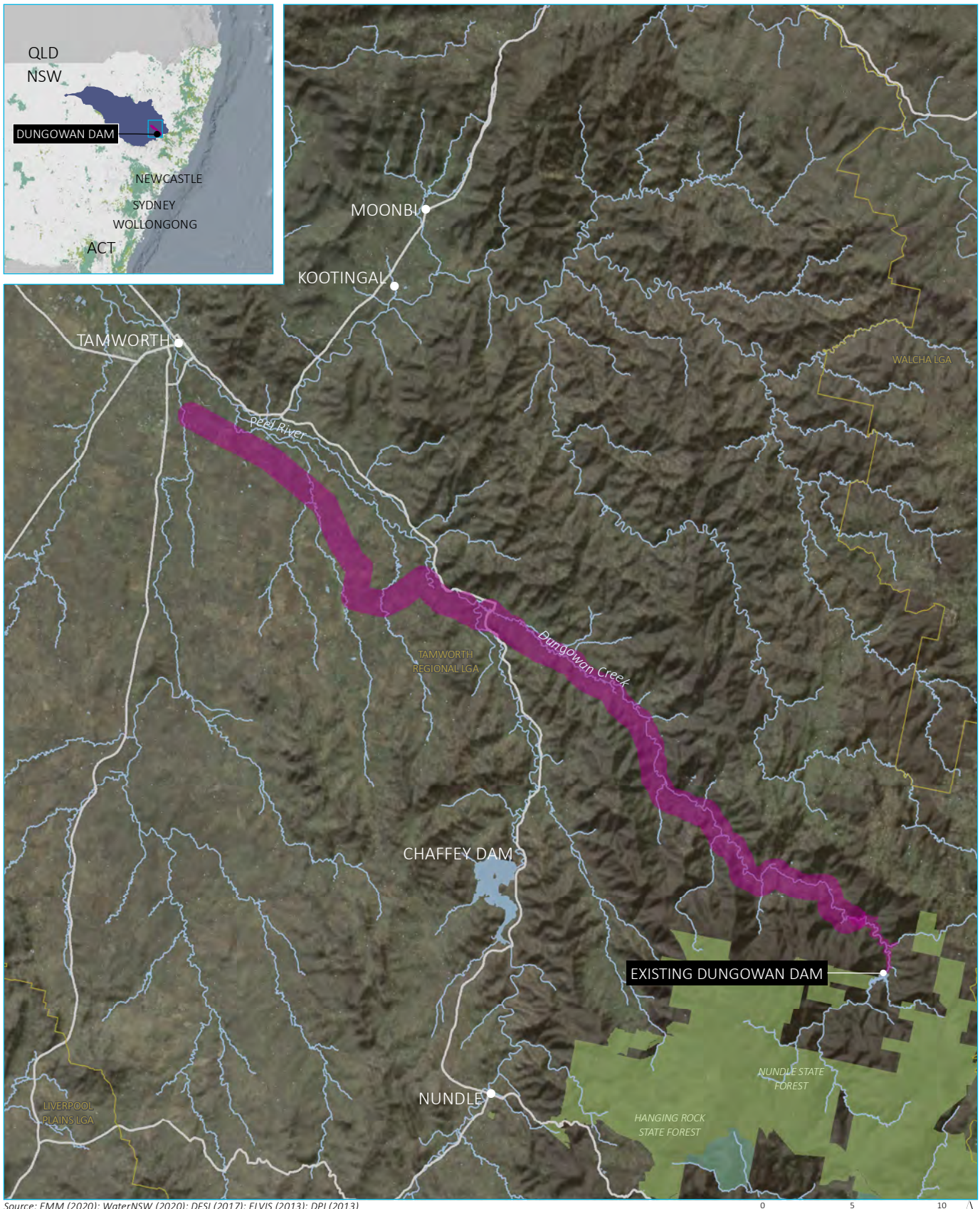

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Rhonda Kitckener
Nyakka Aboriginal Cultural Heritage Corporation
265 Rusden Street
Armidale NSW 2350
rhondakitchener[redacted]

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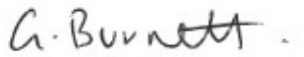

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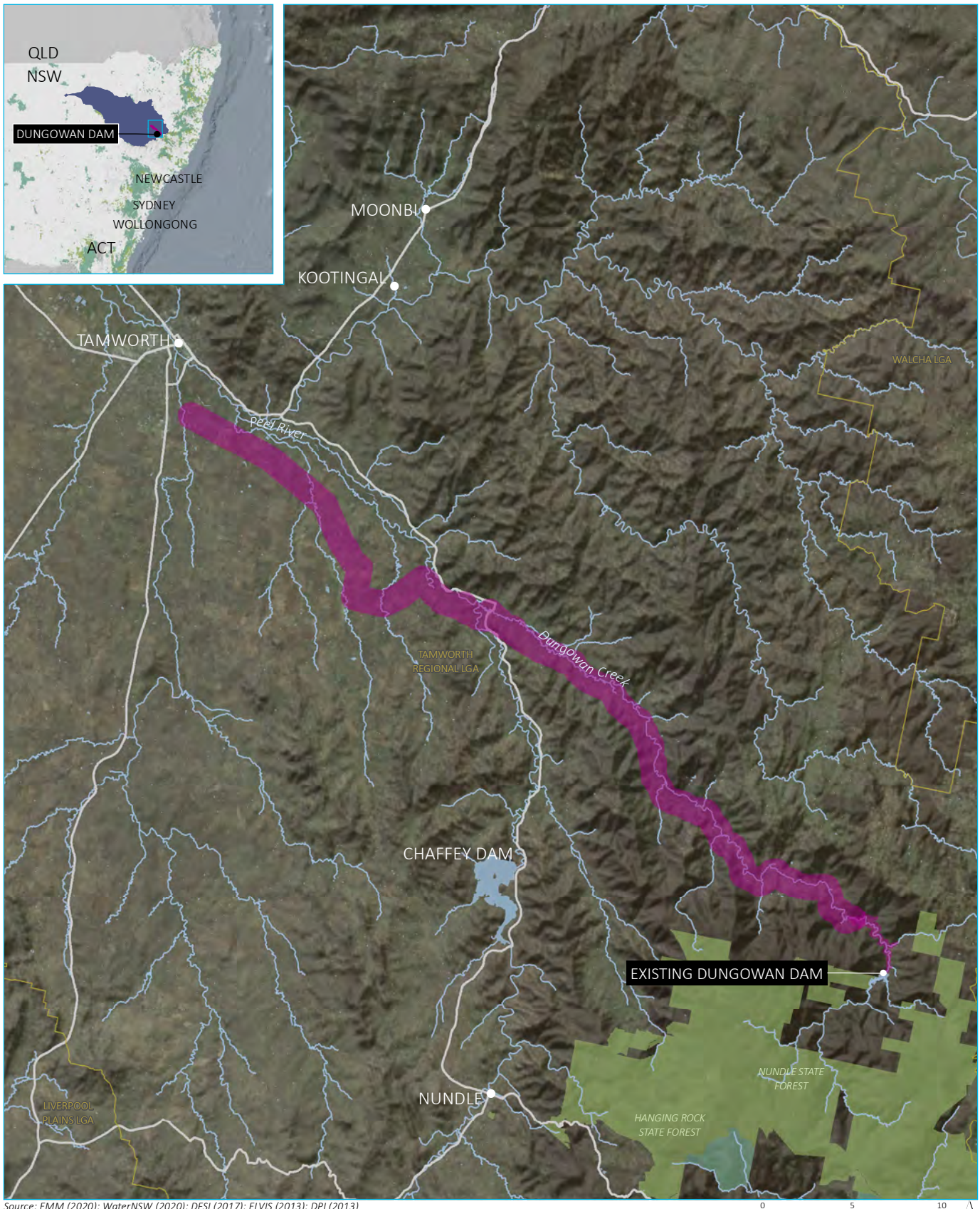

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Paul Moodie
15 Schwager Street
Gunnedah NSW 2380

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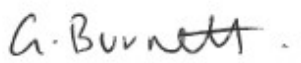

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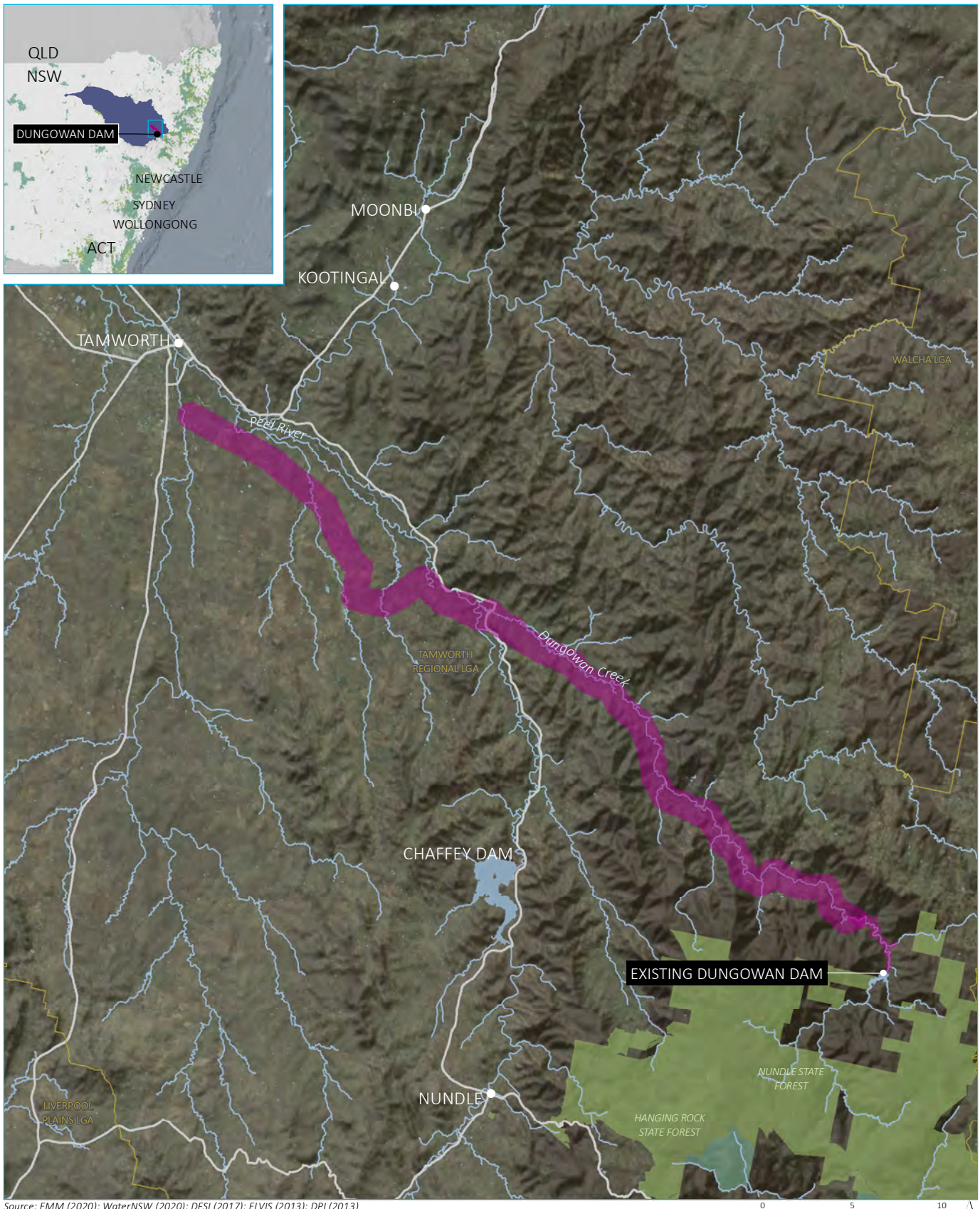

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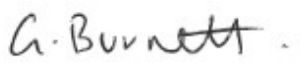

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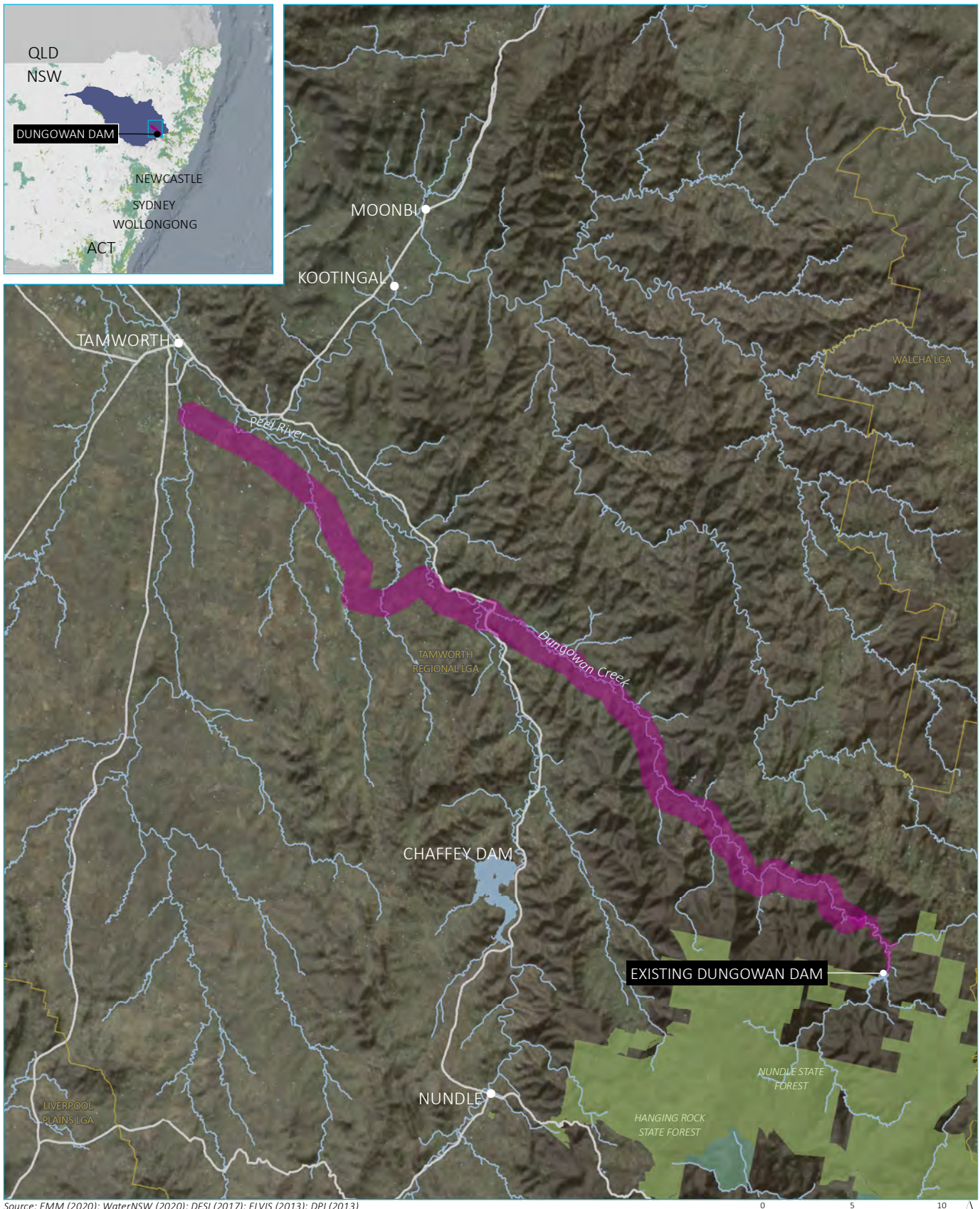

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Dungowan Dam
Aboriginal consultation
Figure 1

EMM creating opportunities

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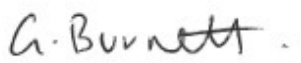

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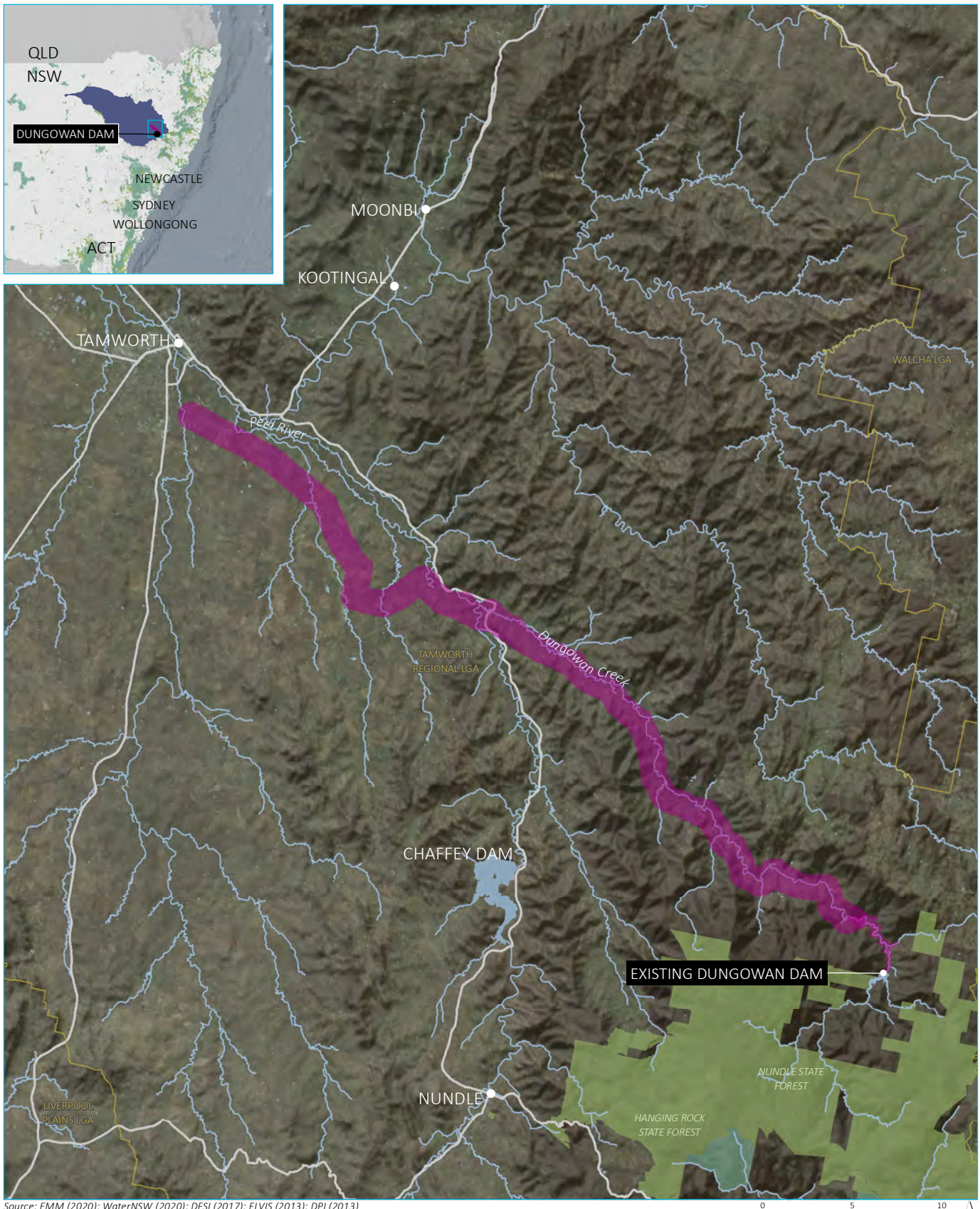

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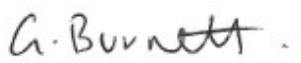

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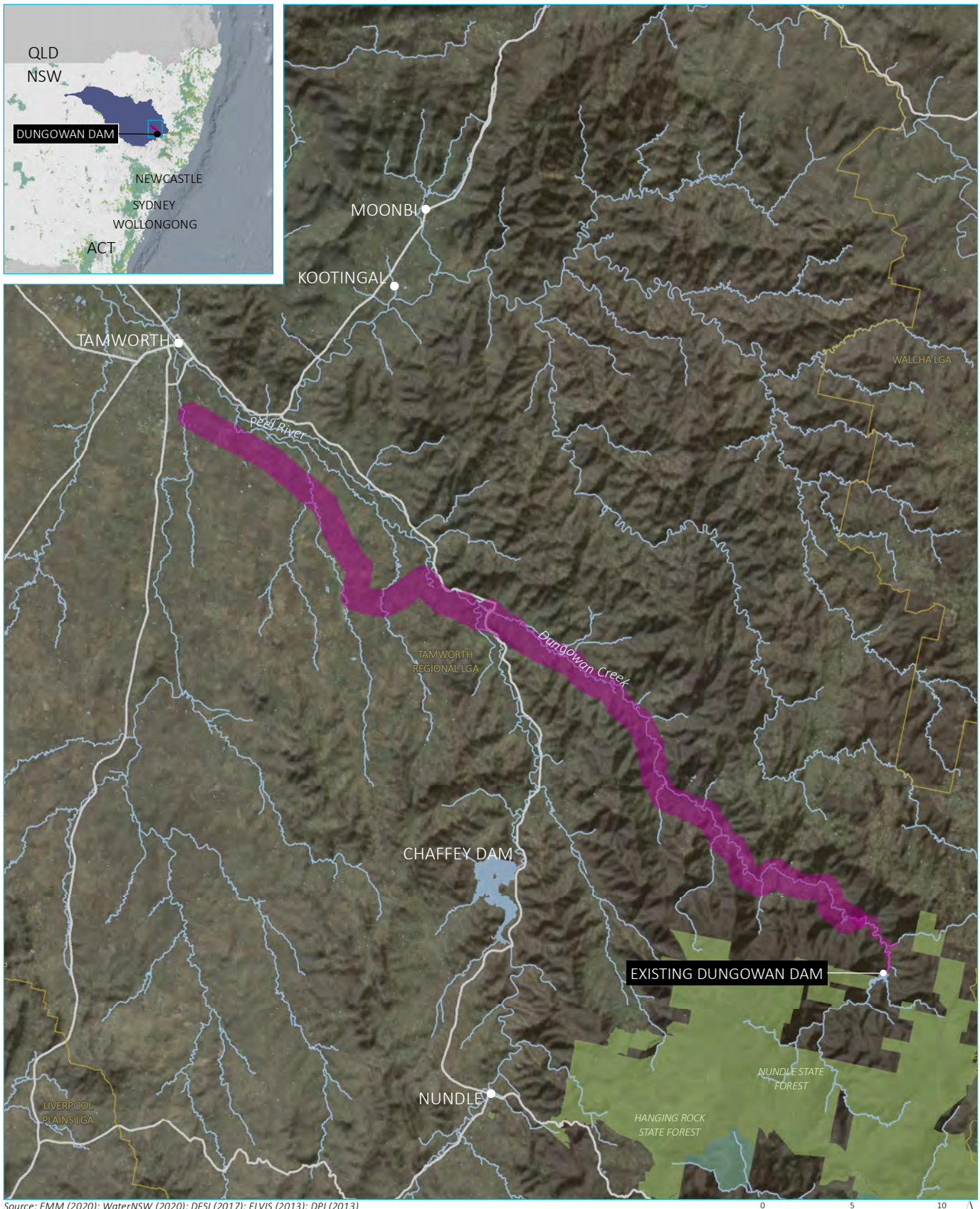

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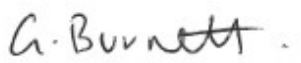

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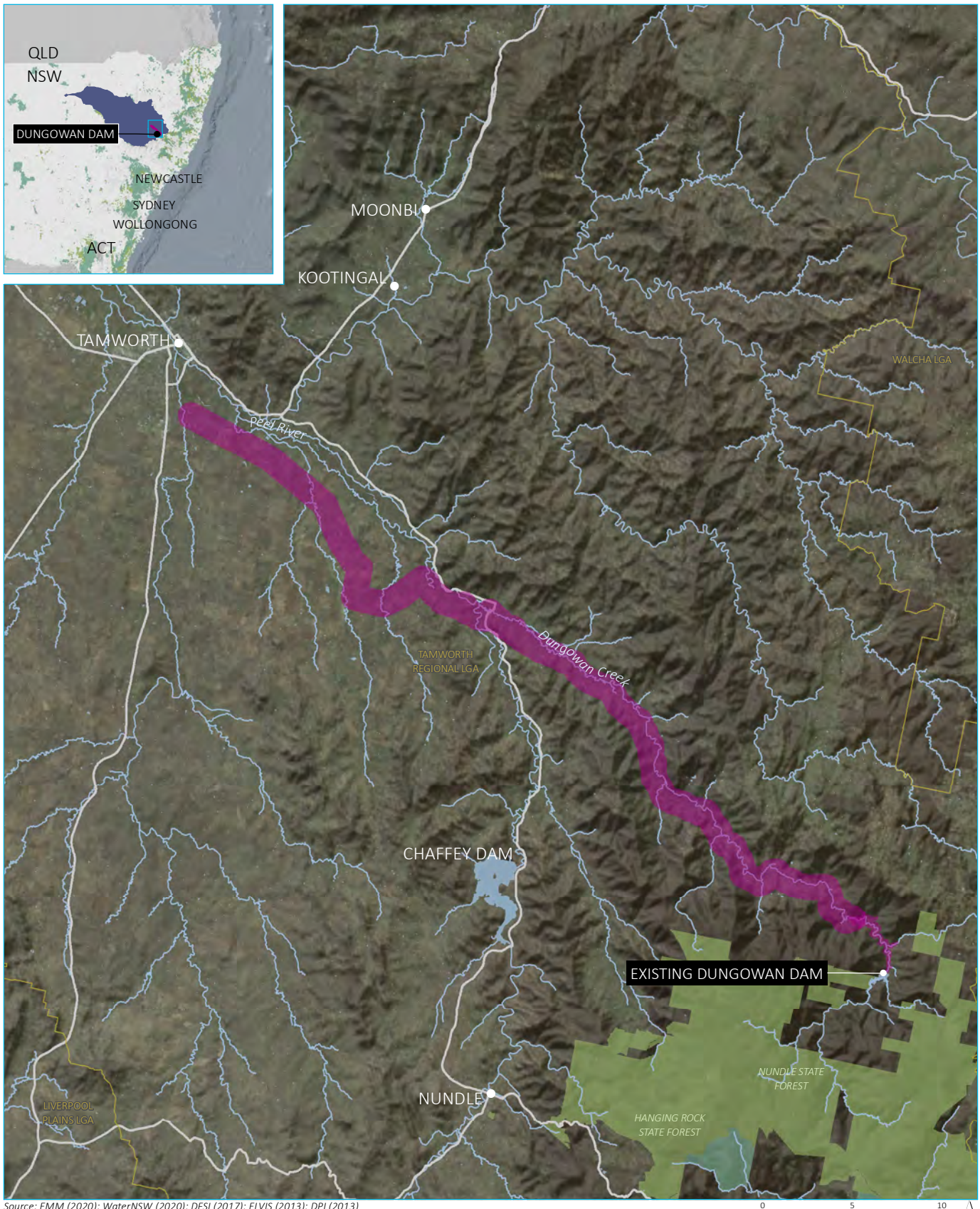

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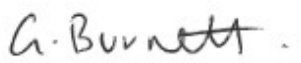

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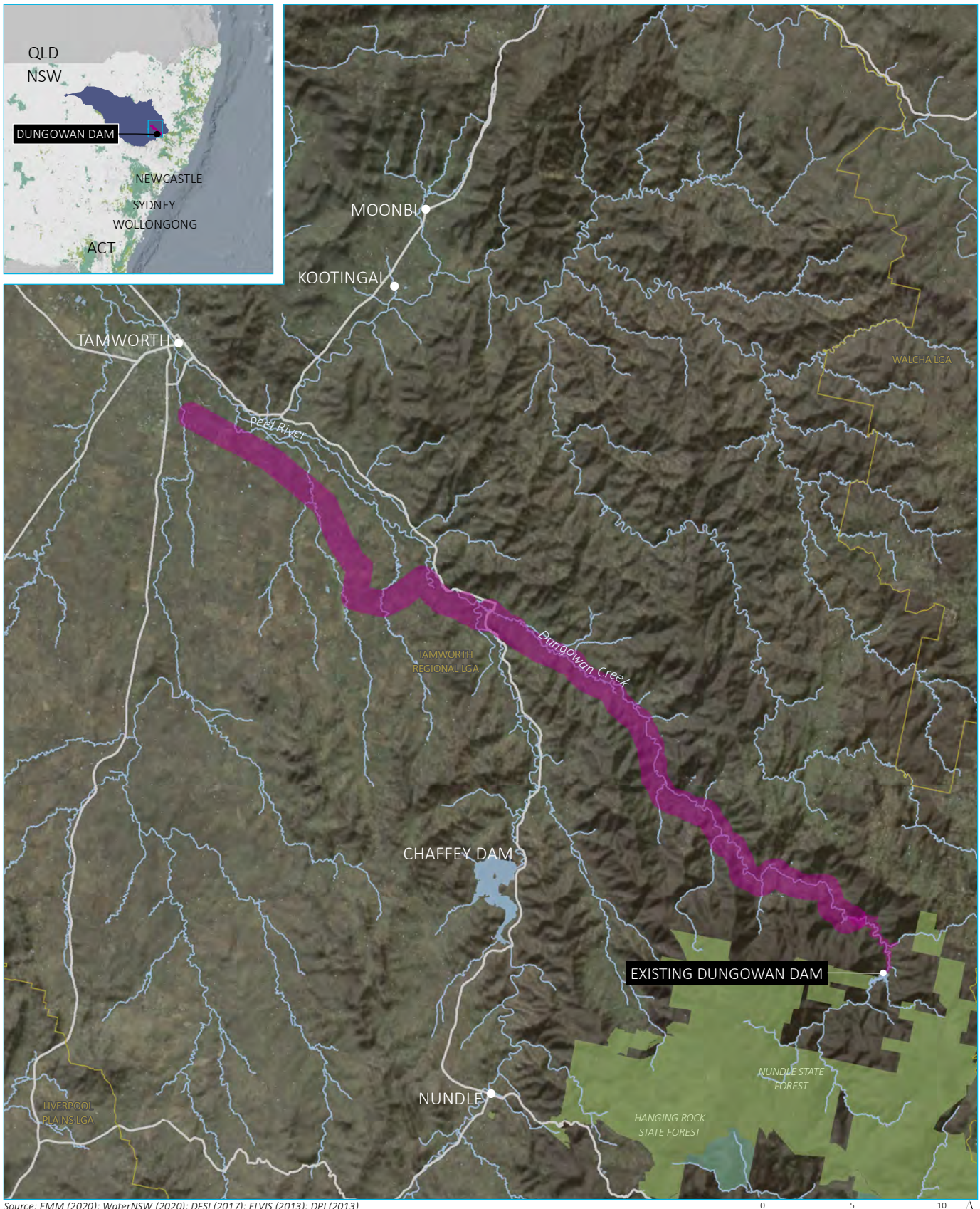

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Regional context

Dungowan Dam
Aboriginal consultation
Figure 1

EMM creating opportunities

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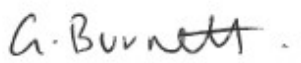

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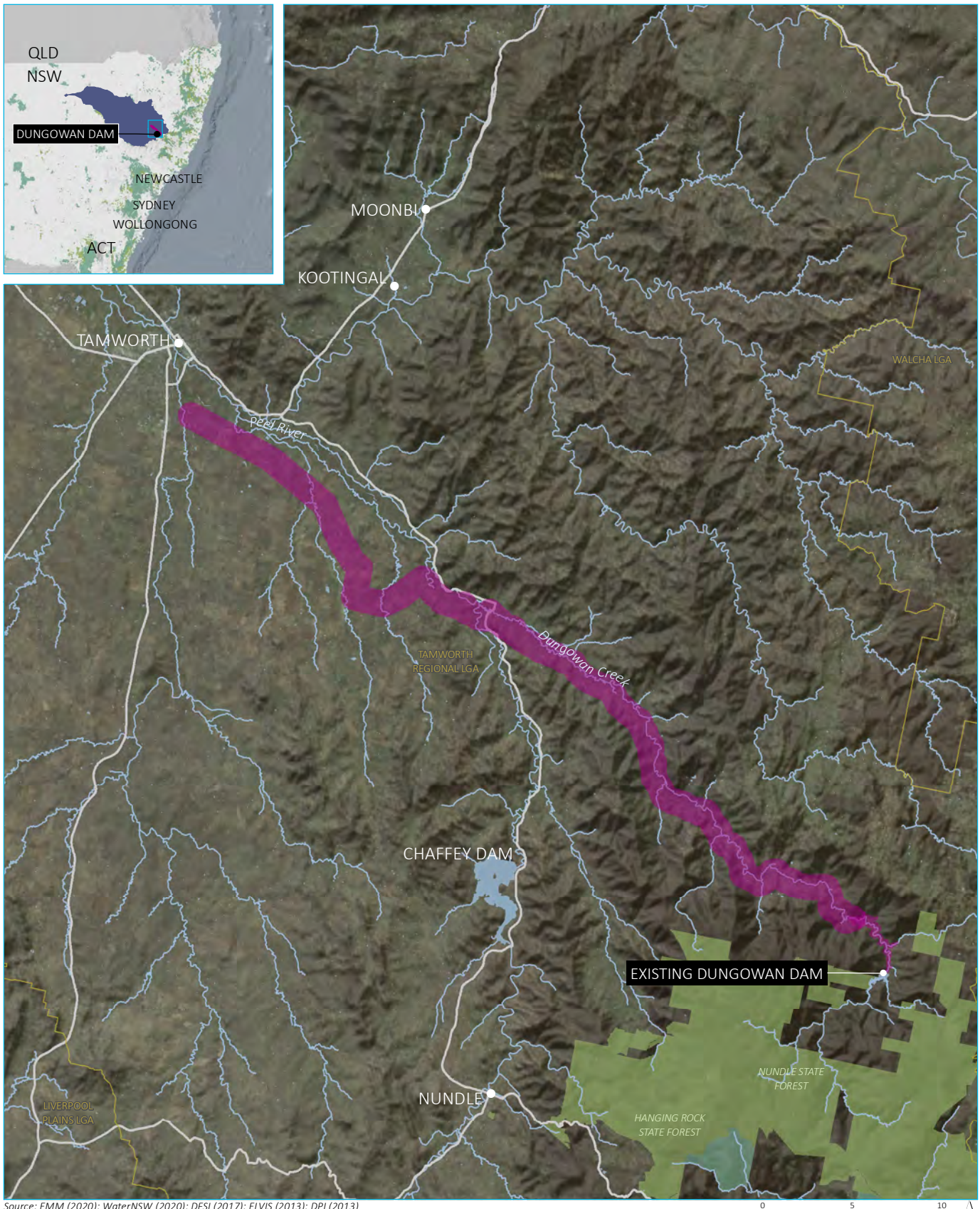

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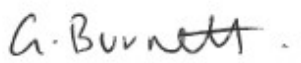

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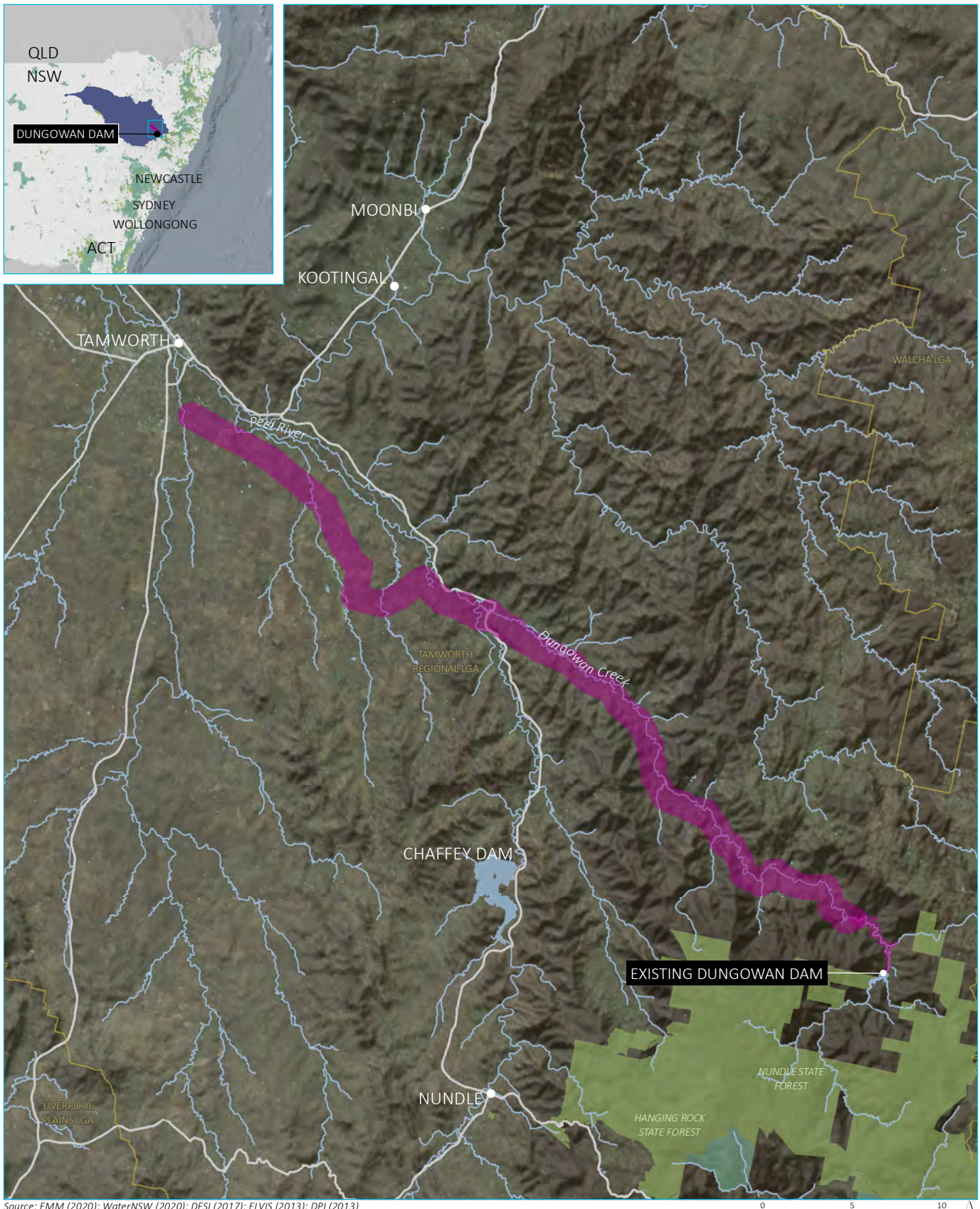

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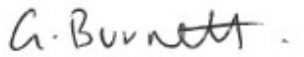

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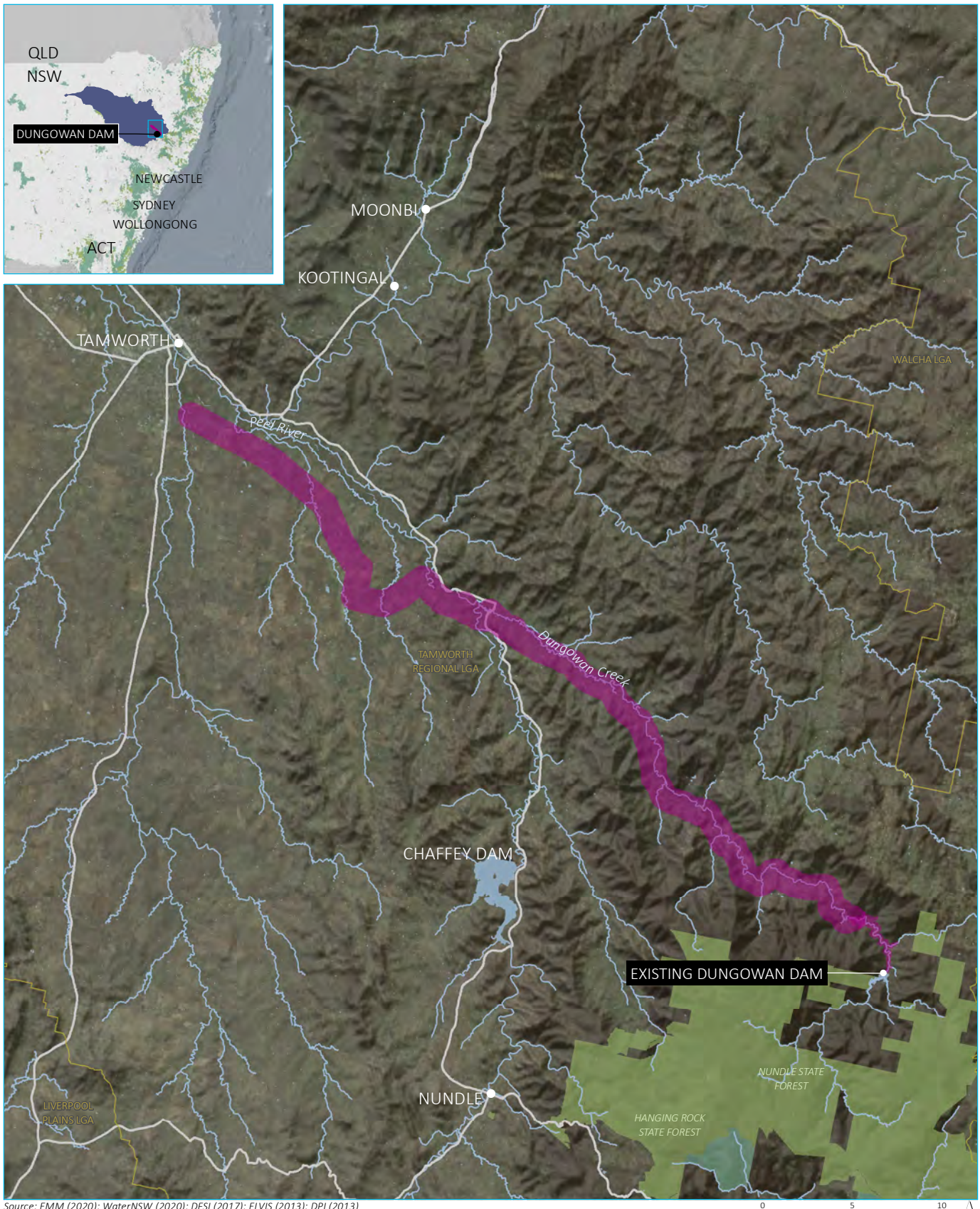

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EMM creating opportunities

\\emmsvr1\emm\Jobs\2020\J200042 - Dungowan Dam\GIS\07_Working\20200301_AboriginalConsultation\DD_ECA001_RegionalContext_20200409_03.mxd 9/04/2020

17 April 2020

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St Leonards NSW 2065
PO Box 21
St Leonards NSW 1590

T 02 9493 9500
E info@emmconsulting.com.au

www.emmconsulting.com.au

Tracey Woltey
75 High Street
Gunnedah NSW 2380

Re: Aboriginal cultural heritage assessment - Dungowan Dam, NSW - notification of project

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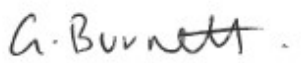

Georgia Burnett
Archaeologist
gburnett@emmconsulting.com.au

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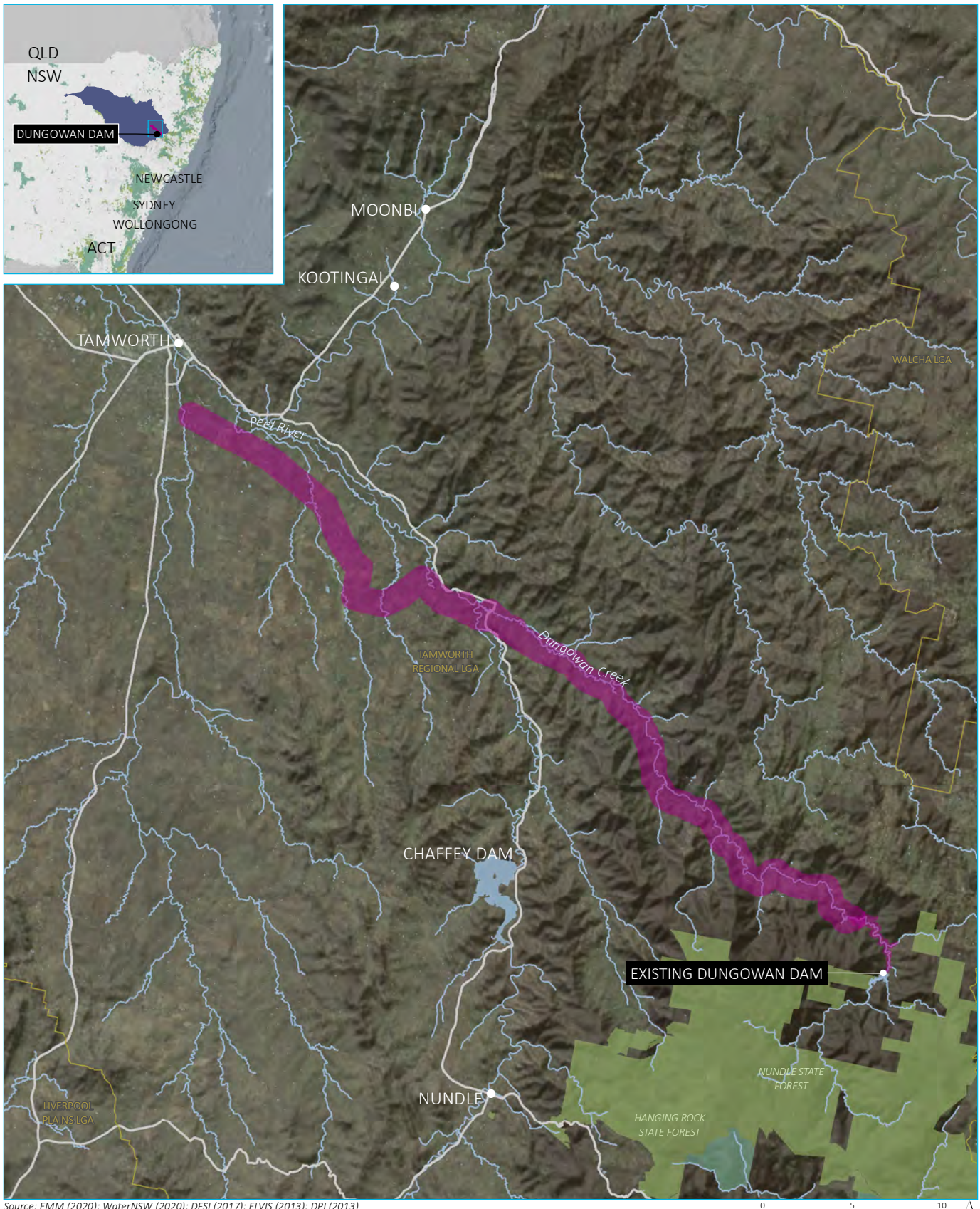

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GDA 1994 NSW Lambert

N

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Dungowan Dam
Aboriginal consultation
Figure 1

EMM creating opportunities

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Des Hickey
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PO Box 479
Tamworth NSW 2340

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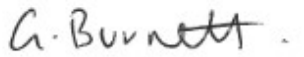

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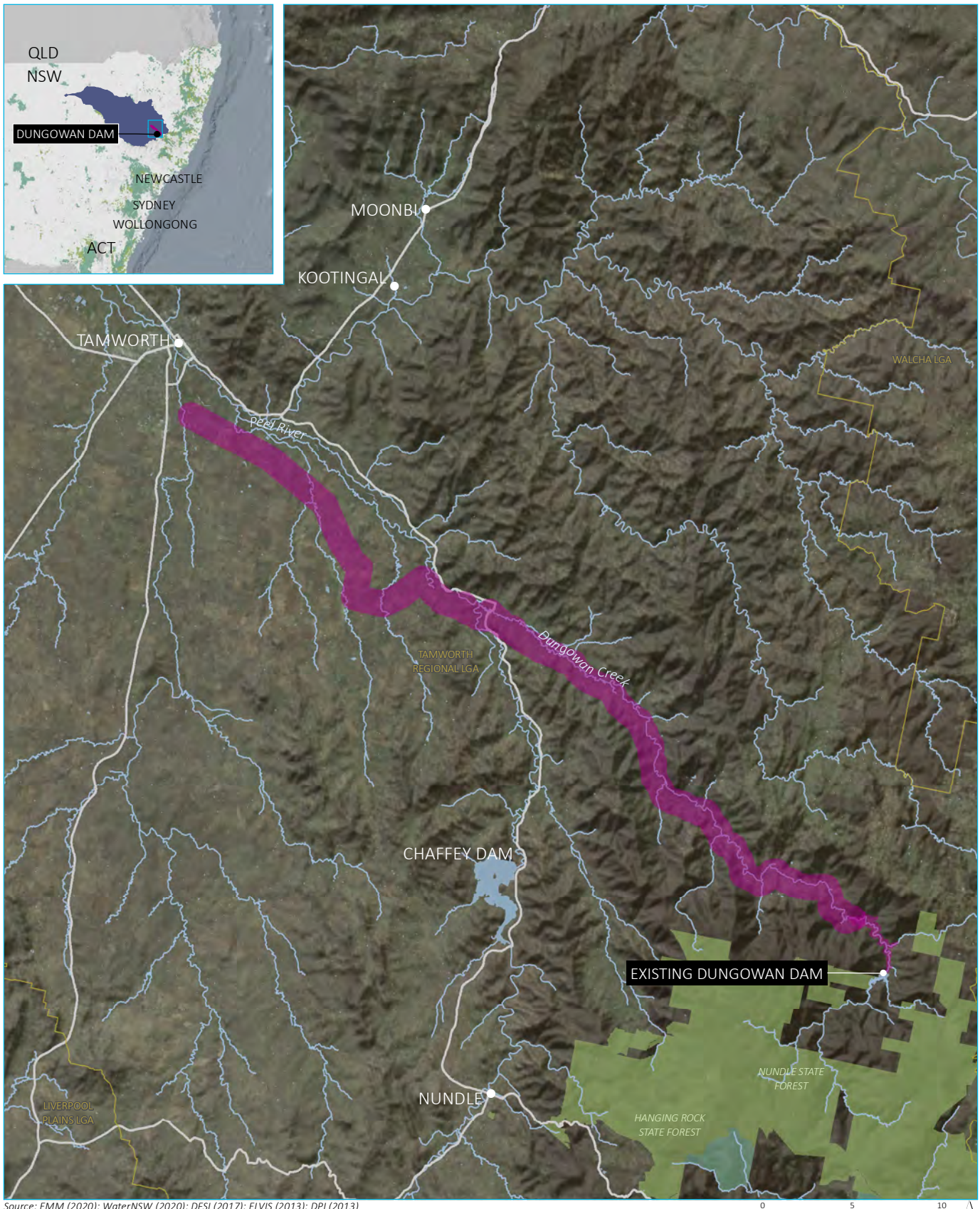

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17 April 2020

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4 Archibald Street
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cahoy4@une.edu.au

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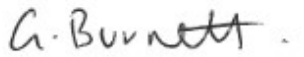

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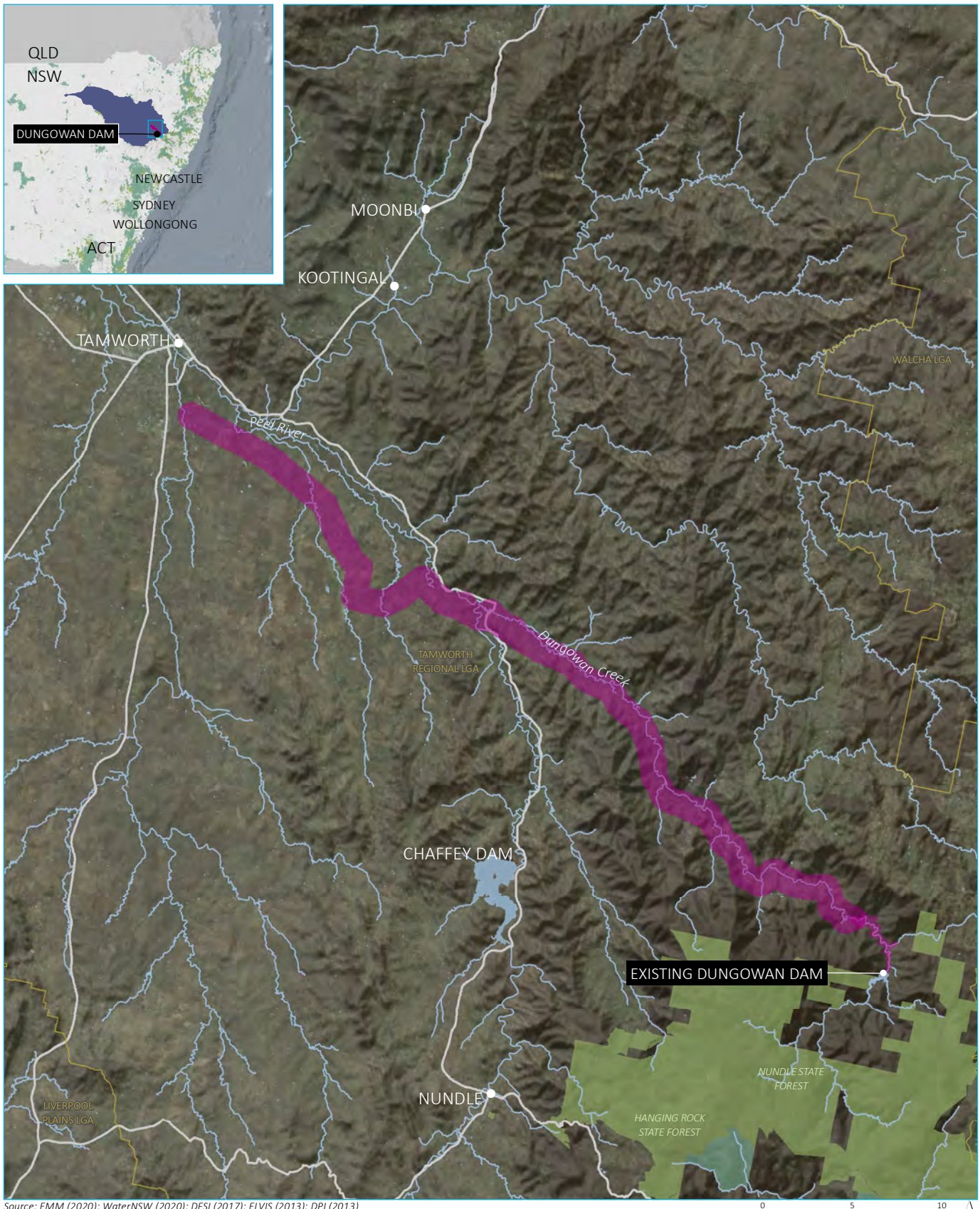

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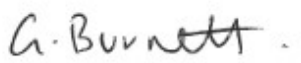

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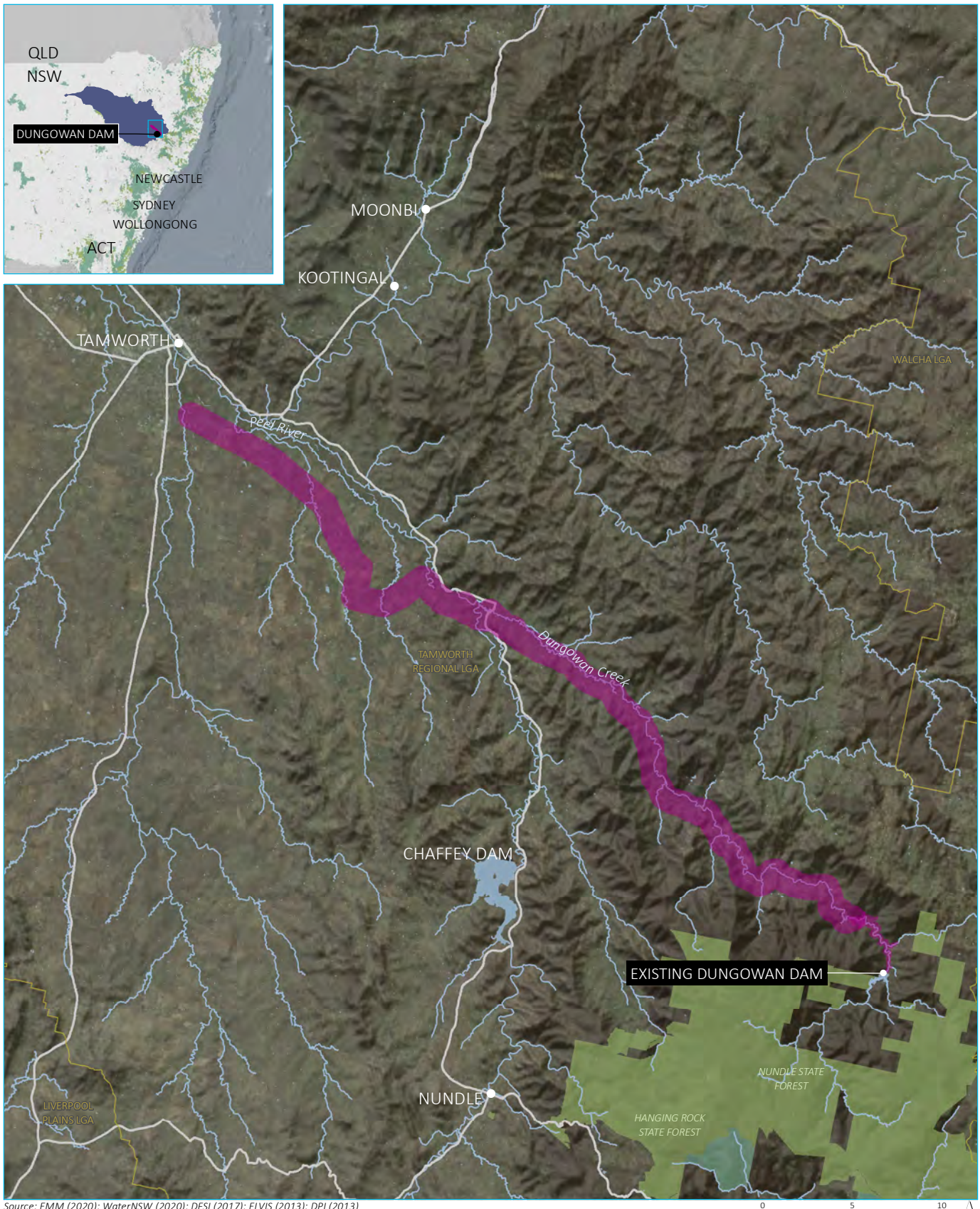

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GDA 1994 NSW Lambert

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Dungowan Dam
Aboriginal consultation
Figure 1

EMM creating opportunities

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17 April 2020

Steven Ahoy
Steven Ahoy Consultants
26 Simmons Street
Armidale NSW 2350
steven1ahoy[redacted]

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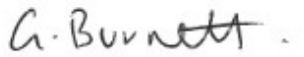

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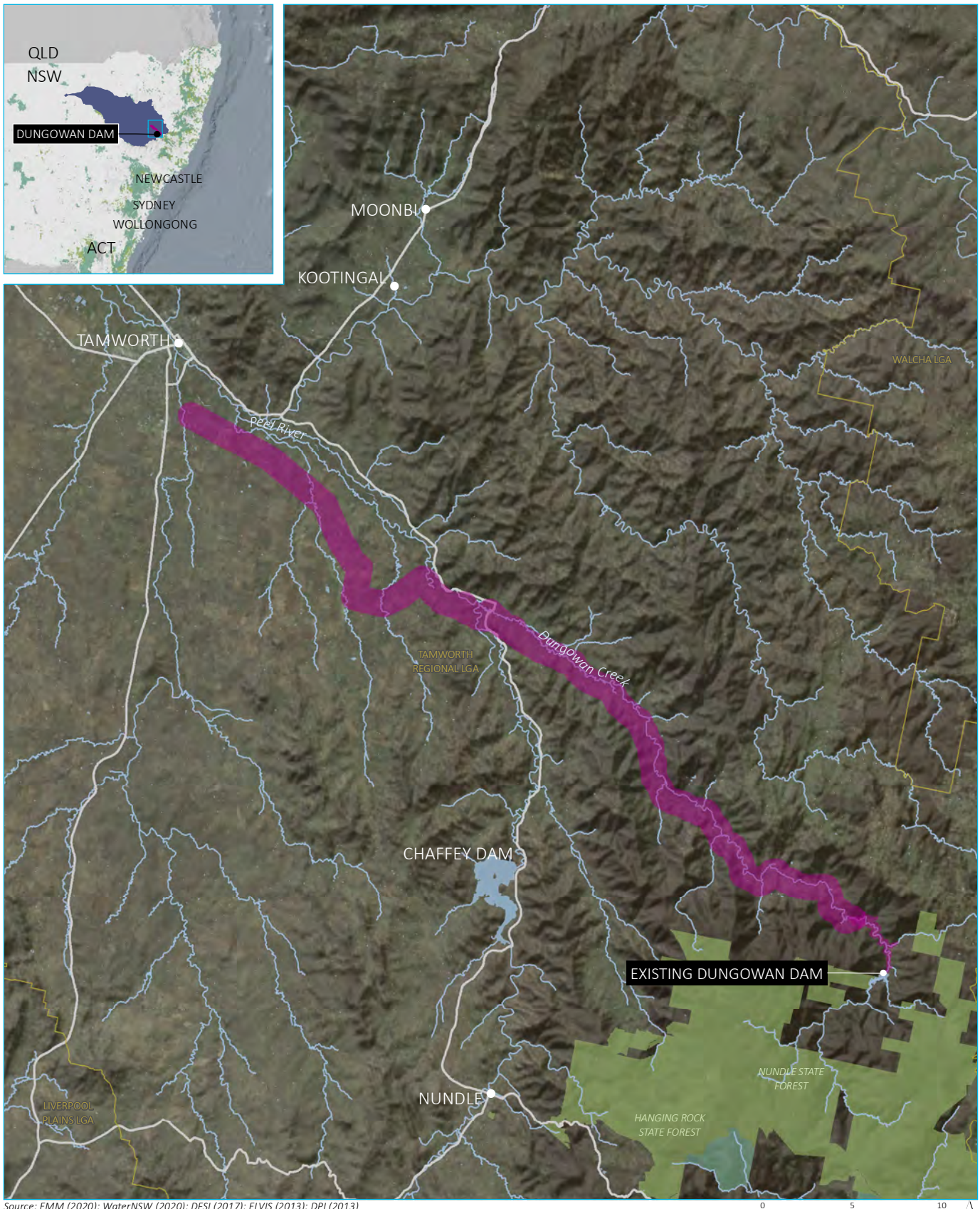

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Hazel Green
Armidale and New England Gumbaynggirr Descendants
20 Eleanor Close
Armidale NSW 2350
kevin.green@alsnswact.org.au

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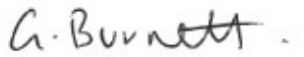

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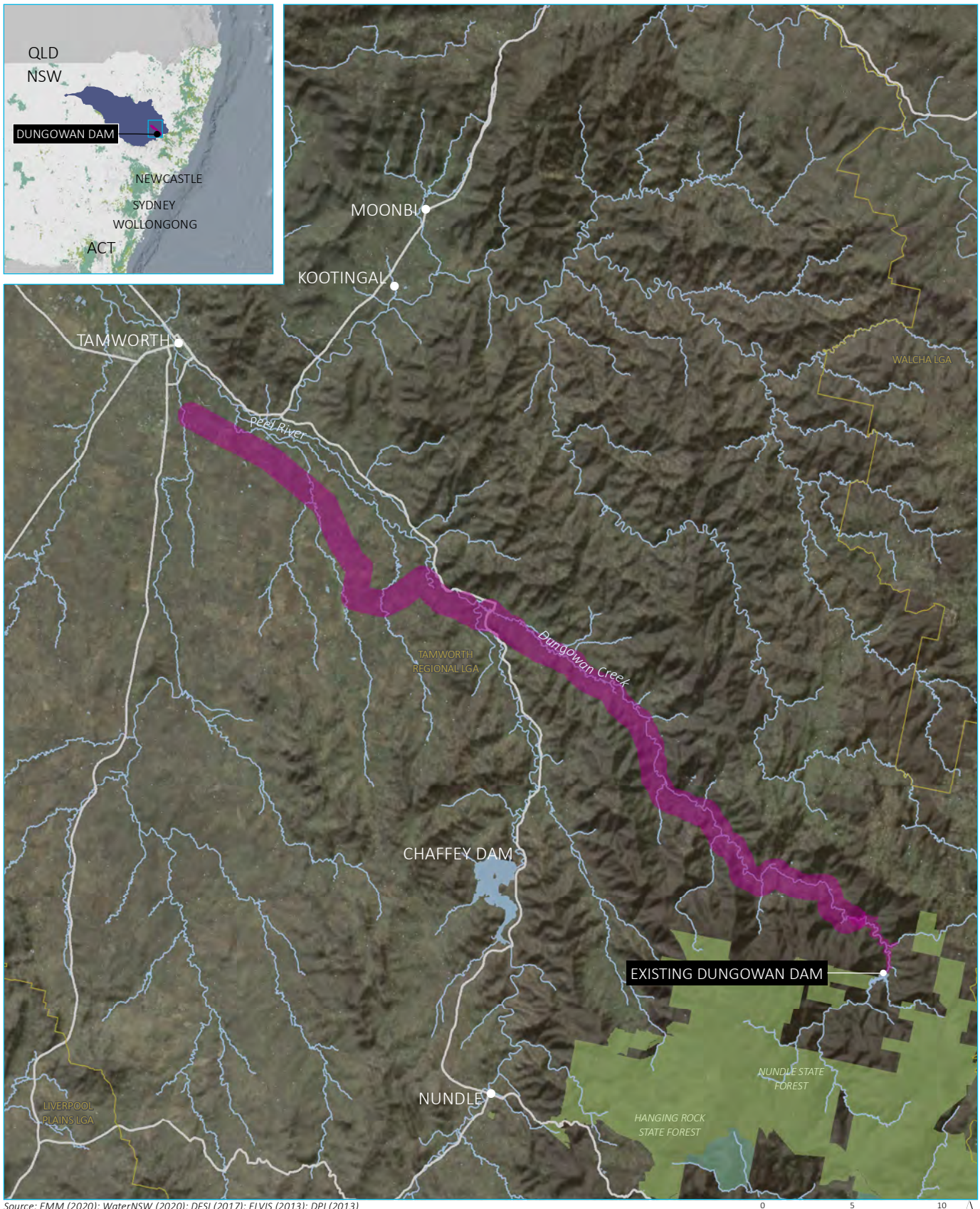

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Tommy Knox
Bunda Consultants
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bundaconsultants[redacted]

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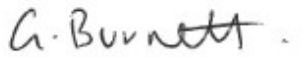

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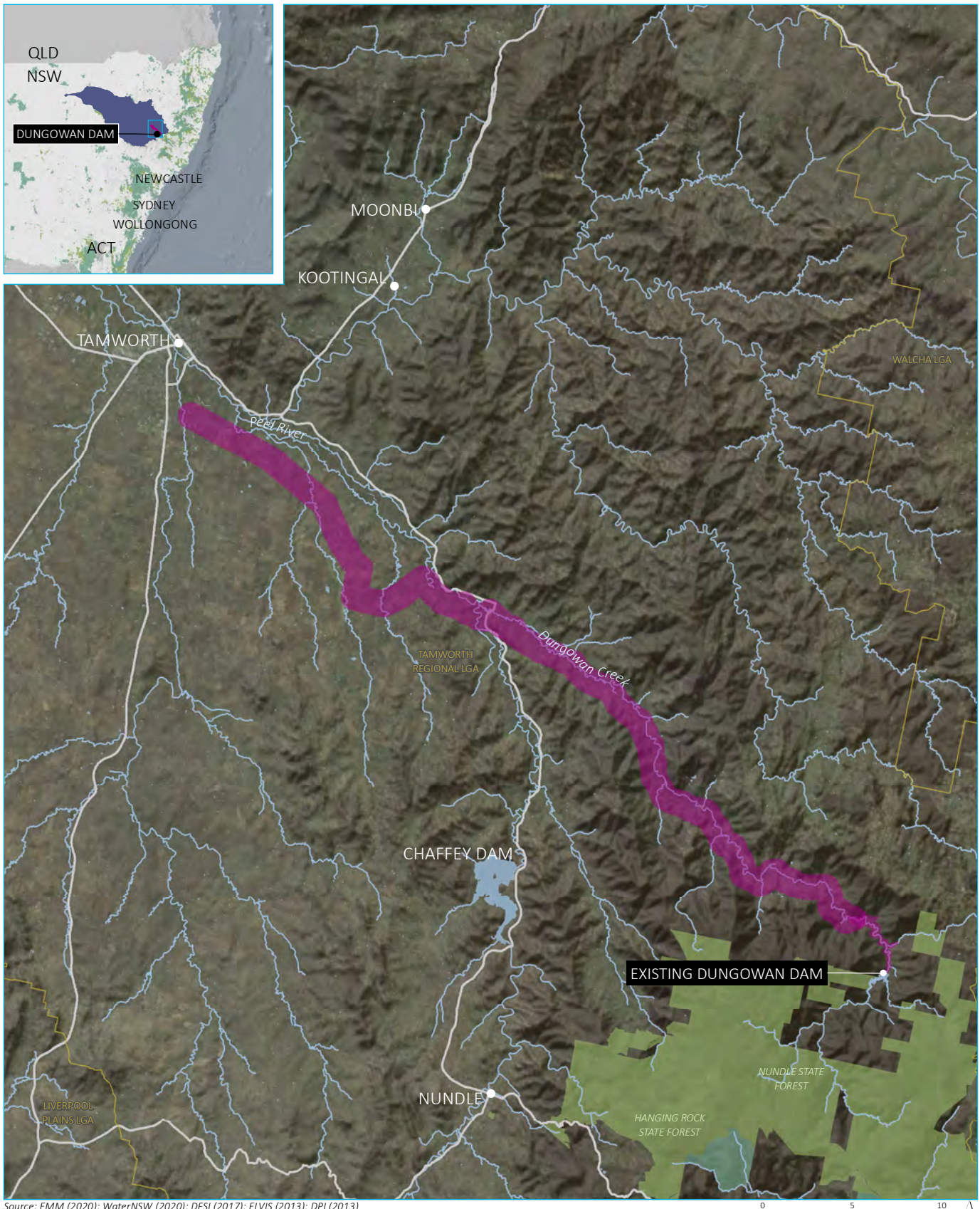

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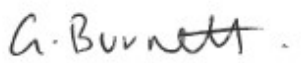

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131	DP1214855	FREEHOLD

Table 1 Lot and DP listing for the study area.

Lot	DP	Control
2	DP591992	FREEHOLD
52	DP755329	FREEHOLD
53	DP755329	FREEHOLD
71	DP705087	FREEHOLD
72	DP705087	FREEHOLD
70	DP755329	FREEHOLD
502	DP835591	FREEHOLD
49	DP755329	FREEHOLD
57	DP755350	FREEHOLD
58	DP755350	FREEHOLD
1	DP128000	FREEHOLD
591	DP512652	FREEHOLD
87	DP755350	FREEHOLD
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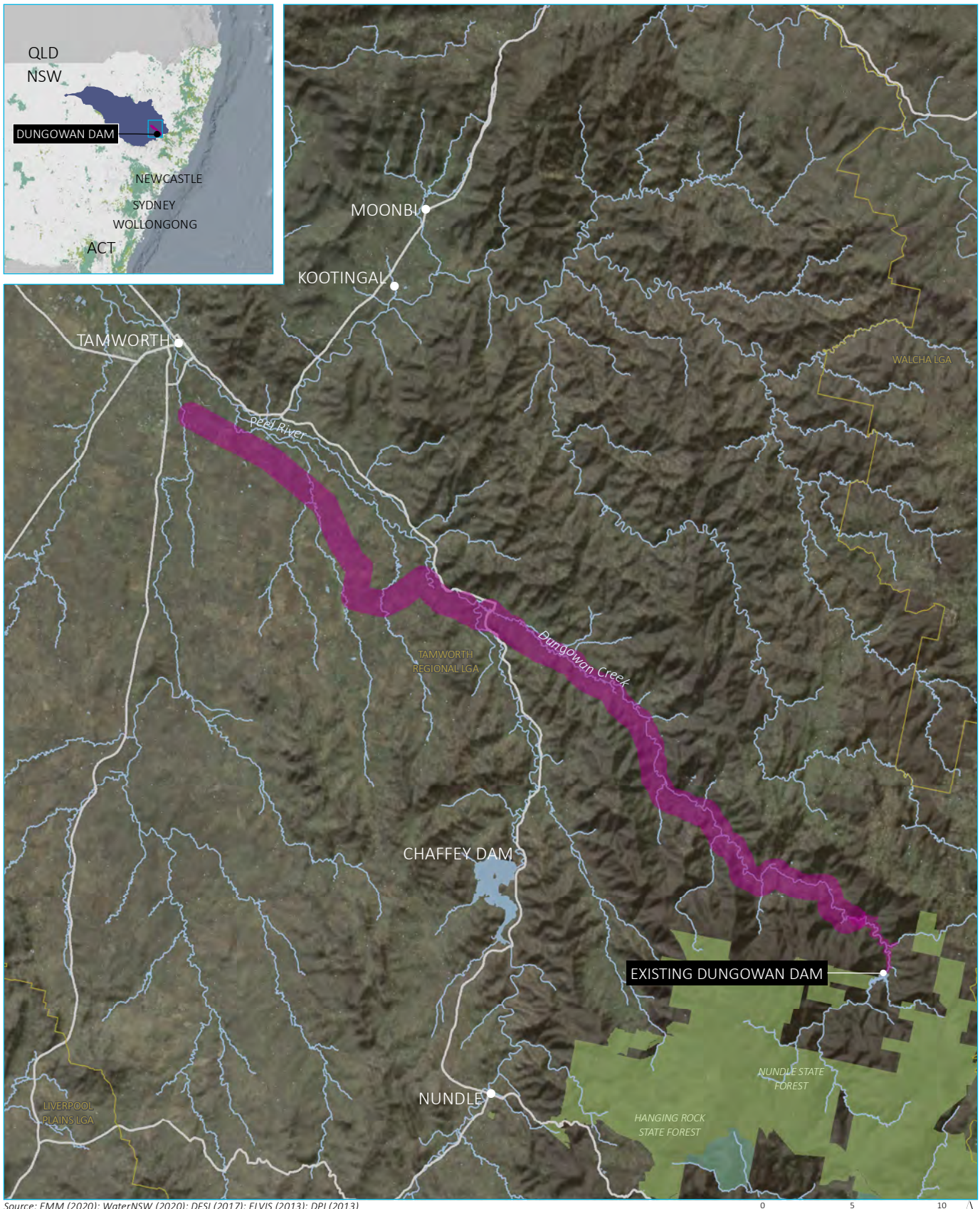
43	DP537896	FREEHOLD
1	DP807846	FREEHOLD
234	DP755350	FREEHOLD
1	DP212610	FREEHOLD



Source: EMM (2020); WaterNSW (2020); DFSI (2017); ELVIS (2013); DPI (2013)

**Inundation area should be considered approximate only. It is based on current limited available spatial data and is subject to future verification.*

0 5 10 km

GDA 1994 NSW Lambert

N

KEY

- Indicative project area
- Major road
- Named watercourse
- Waterbody
- Local government area
- NPWS reserve
- State forest
- Namoi River catchment (inset)

Regional context

Dungowan Dam
Aboriginal consultation
Figure 1

EMM creating opportunities

\\emmsvr1\emm\Jobs\2020\J200042 - Dungowan Dam\GIS\07_Working\20200301_AboriginalConsultation\DD_ECA001_RegionalContext_20200409_03.mxd 9/04/2020

Ground floor, 20 Chandos Street
St Leonards NSW 2065
PO Box 21
St Leonards NSW 1590

T 02 9493 9500
E info@emmconsulting.com.au

www.emmconsulting.com.au

17 April 2020

Travis Matthews
Wunda Cultural Consultants
Penryne, Carol Road
Breeza NSW 2381
travis_wunda[redacted]

Re: Aboriginal cultural heritage assessment - Dungowan Dam, NSW - notification of project

Dear Sir/Madam

WaterNSW is proposing to undertake the planning and delivery of three new or augmented dams in NSW, which includes upgrading Dungowan Dam. EMM Consulting Pty Ltd (EMM) has been commissioned by WaterNSW to undertake an Aboriginal Cultural Heritage Assessment (ACHA) for the proposed development of the new Dungowan Dam, approximately 30km south east of Tamworth NSW (Figure 1). The project includes: a new dam downstream of the existing Dungowan Dam with an expected capacity of 22.5 gigalitres (GL); partial or full decommissioning of the existing Dungowan Dam and rehabilitation of the storage area of the dam; a new water delivery pipeline from the new dam to the Calala water treatment plant; and ancillary facilities including construction compounds, quarry and other supporting infrastructure. The aim of this assessment is to adopt best practice approaches to identify Aboriginal cultural heritage within the impact footprint, and to identify mitigation measures to allow the works to proceed.

The project is identified as Critical State Significant Infrastructure (CSSI) under the provisions of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act). A CSSI project requires approval from the NSW Minister for Planning and Public Spaces, and are accompanied by an Environmental Impact Statement (EIS). The ACHA would be one of several assessments included in the EIS. Additionally, some early works activities associated with the pipeline will be subject to assessment under a Review of Environment Factors under Part 5 of the EP&A Act.

The project contact for WaterNSW is: Meredith Abrams, Community Engagement Officer, P: 1300 662 077, E: meredith.abrams@waternsw.com.au

In accordance with the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010*, I am writing to notify you of the project and seeking expressions of interest from you and/or your organisation in being registered for subsequent consultation and involvement. We are interested in Aboriginal individuals and/or organisations who may hold relevant cultural knowledge to inform the Aboriginal cultural heritage assessment of the area, and who wish to be involved in the project. If so, please provide a response by **1 May 2020** to:

- Georgia Burnett (Archaeologist), EMM Consulting Pty Ltd, 20 Chandos Street, St Leonards, NSW 2065; T: 02 9493 9500; E: gburnett@emmconsulting.com.au

In your response, please ensure the following information is provided:

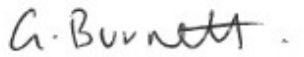
- clear identification of the individual and/or organisation expressing an interest. Please provide all contact details including postal address, phone and e-mail;

- preferred communication method (e.g. e-mail) to be used during consultation;
- the level of project involvement you or your organisation wishes, including attendance of meetings, fieldwork participation and/or simply reviewing documentation;
- identification of any procedures, protocols or requirements for the use and reproduction of any cultural information or materials you or your organisation provides EMM as part of this project; and
- identification of any Aboriginal objects, sites and/or areas of cultural value that you are aware of in, or near, the project area.

Of particular note, WaterNSW and EMM are highly aware of the COVID-19 pandemic and of its risk to Aboriginal communities; and that this may affect consultation in person for the immediate future. We intend to use approaches and protocols to minimise any risk, and will provide this information to those interested in being consulted in the project.

If you have any questions or enquiries, please do not hesitate to contact us.

Yours sincerely



Georgia Burnett
Archaeologist
gburnett@emmconsulting.com.au

Table 1 Lot and DP listing for the study area.

Lot	DP	Control
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7002	DP1058567	CROWN
7016	DP1058548	CROWN
35	DP755322	FREEHOLD
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54	DP755322	FREEHOLD
94	DP755322	FREEHOLD
10	DP755351	FREEHOLD
20	DP755351	FREEHOLD
21	DP755351	FREEHOLD
22	DP755351	FREEHOLD
48	DP755351	FREEHOLD
49	DP755351	FREEHOLD
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5	DP755339	FREEHOLD
63	DP618784	FREEHOLD
61	DP234569	FREEHOLD
1	DP723520	FREEHOLD
11	DP755339	FREEHOLD
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3	DP607266	FREEHOLD
2	DP581286	FREEHOLD
2	DP1211619	FREEHOLD
601	DP818933	FREEHOLD
602	DP818933	FREEHOLD
32	DP816506	FREEHOLD
57	DP755329	FREEHOLD
11	DP814983	FREEHOLD
22	DP755329	FREEHOLD
5	DP1040043	FREEHOLD
4	DP591992	FREEHOLD
131	DP1214855	FREEHOLD

Table 1 Lot and DP listing for the study area.

Lot	DP	Control
2	DP591992	FREEHOLD
52	DP755329	FREEHOLD
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71	DP705087	FREEHOLD
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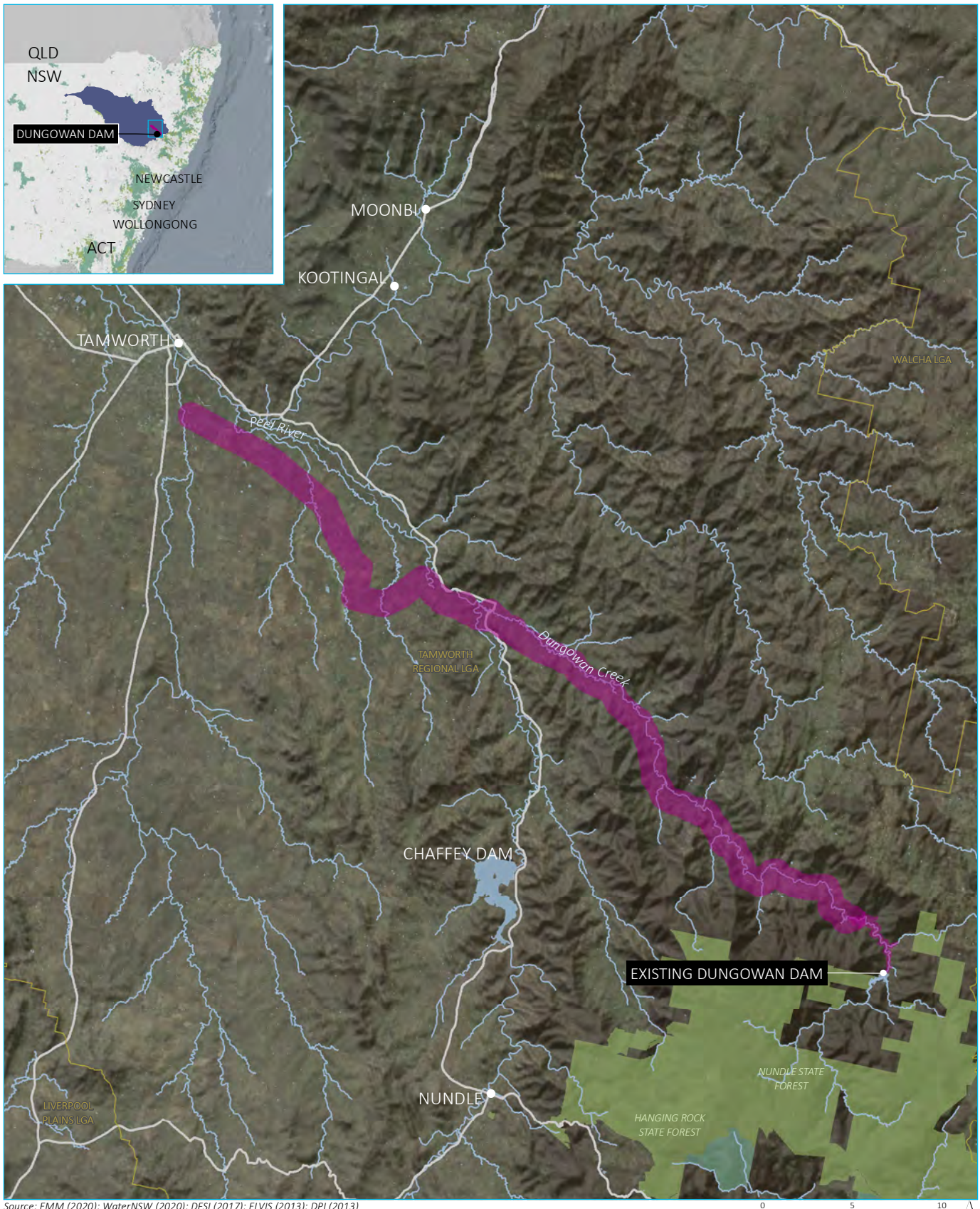
1	DP807846	FREEHOLD
234	DP755350	FREEHOLD
1	DP212610	FREEHOLD



Source: EMM (2020); WaterNSW (2020); DFSI (2017); ELVIS (2013); DPI (2013)

**Inundation area should be considered approximate only. It is based on current limited available spatial data and is subject to future verification.*

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N

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- Named watercourse
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- NPWS reserve
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Regional context

Dungowan Dam
Aboriginal consultation
Figure 1

EMM creating opportunities

\\emmsvr1\emm\Jobs\2020\J200042 - Dungowan Dam\GIS\07_Working\20200301_AboriginalConsultation\DD_ECA001_RegionalContext_20200409_03.mxd 9/04/2020

Georgia Burnett

From: Georgia Burnett
Sent: Friday, 17 April 2020 4:35 PM
To: fiona@tamworthlalc.com.au
Subject: Dungowan Dam, NSW - Invitation to register
Attachments: 20200401_Dungowan Dam_Notification_TLALC.pdf

Dear Fiona,

Thank you for your call today – please find attached a letter inviting you to register your interest in Aboriginal Cultural Heritage Assessments for the proposed Dungowan Dam upgrades and pipeline. Based on our conversation today, I have already put you down as a registered party but please let me know if your contact information needs updating, or anything else that might assist as we go forward.

Also, feel free to contact me with any further questions. I'll be in touch as the project progresses.

Kind regards,
Georgia

Georgia Burnett
Archaeologist
EMM creating opportunities
T 02 9493 9500
M 0400 472 412
Connect with us
SYDNEY | Ground floor, 20 Chandos Street, St Leonards NSW 2065

Please consider the environment before printing my email.
This email and any files transmitted with it are confidential and are only to be read or used by the intended recipient as it may contain confidential information. Confidentiality or privilege is not waived or lost by erroneous transmission. If you have received this email in error, or are not the intended recipient, please notify the sender immediately and delete this email from your computer. You must not disclose, distribute, copy or use the information herein if you are not the intended recipient.

Nunawanna Aboriginal Corporation
10 Dale Crescent
Armidale NSW 2350
Email: [redacted]
Mob: [redacted]

17 of April 2020

Dear Georgia,

I am writing to you in response of the Water NSW proposal to upgrade Dungowan Dam and the delivery of three new augmented dams.

I would kindly ask if you would put my organisations name Nunawanna Aboriginal Corporation to your list as an Aboriginal stake holder in the proposed work area.

As an Aboriginal stake holder, we would appreciate if our organisation be involved in the Aboriginal cultural and heritage assessment for the proposed Upgrade to the Dungowan dam and the three new proposed dams.

I have a long association with the country where the proposed work will take place. having lived in this community for many years, I have a strong connection to land and waterways.

I have worked with many archeologists in the tablelands Area and beyond over the years and I have the trust and respect from those Archeologists.

Please feel free to contact me by the email provided.

Archeologist

Wendy Beck Associate professor at the University of New England 0402 213 257

Roger Mehr Department of Environmental industry and Planning 0459 075 354

John Appleton consultant 0428 651 789

Regards

Colin Ahoy

Georgia Burnett

From: postmaster@outlook.com
To: bundaconsultants[redacted]
Sent: Friday, 17 April 2020 5:11 PM
Subject: Undeliverable: Dungowan Dam, NSW - Invitation to register

Delivery has failed to these recipients or groups:

bundaconsultants@[redacted] this message. Please try to resend the message later. If the problem continues, contact your email admin.

Diagnostic information for administrators:

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Original message headers:

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Georgia Burnett

From: Colin Ahoy [redacted] >
Sent: Friday, 17 April 2020 5:51 PM
To: Georgia Burnett
Subject: Re:

Hello Georgia,

Please find attached a copy of my expression of interest in the email I previously sent.
Regards

Get Outlook for iOS

From: Colin Ahoy [redacted]
Sent: Friday, April 17, 2020 5:49:54 PM
To: gburnett@emmconsulting.com.au <gburnett@emmconsulting.com.au>
Subject: Fwd:

Get Outlook for iOS

From: col A'hoy [redacted]
Sent: Friday, April 17, 2020 5:49:18 PM
To: Colin Ahoy [redacted]
Subject: Fwd:

Get Outlook for iOS

From: Colin Ahoy [redacted]
Sent: Friday, April 17, 2020 5:42:51 PM
To: [redacted]
Subject:

Get Outlook for iOS

Georgia Burnett

From: Steven Ahoy [redacted]
Sent: Sunday, 19 April 2020 1:40 PM
To: Georgia Burnett
Subject: Re: Dungowan Dam, NSW - Invitation to register

Hello Georgia,
I appreciate your offer to register involvement with the Dungowan Dam ACHA, but I would like to respectfully decline as the project is not within the Anaiwan traditional boundaries.
As an Anaiwan TO, it would be culturally inappropriate for any of our members to be involved without the permission of the local Gamilarray people's.
If you have any questions please contact me.

Thank you
Steven Ahoy
[redacted]

On Apr 17, 2020, at 5:05 PM, Georgia Burnett <gburnett@emmconsulting.com.au> wrote:

> Dear Steven,
>
> On behalf of WaterNSW, EMM is beginning work on an Aboriginal cultural heritage assessment as part of a Critical State Significant Infrastructure project to deliver three new or augmented dams in NSW, which includes upgrading Dungowan Dam and its facilities. The project location is outlined in the attached letter, but is generally centred around Dungowan Creek and up to Calala water treatment plant. As part of the process, we are following the DPIE community consultation requirements.
>
> At this stage, I am enquiring to see if you would like to be involved in the project. Please see the attached letter for more detail. I would appreciate a response by COB **Friday 1 May 2020**.
>
> In your response, to help us with management and communication, please provide all contact details including postal address, phone and e-mail. In additional, any information regarding the following is appreciated:
>
> - preferred communication method (e.g. e-mail) to be used during consultation;
> - the level of project involvement you or your organisation wishes, including attendance of meetings, fieldwork participation and/or simply reviewing documentation;
> - identification of any procedures, protocols or requirements for the use and reproduction of any cultural information or materials you or your organisation provides EMM as part of this project; and
> - identification of any Aboriginal objects, sites and/or areas of cultural value that you are aware of in, or near, the project area.
>
> If you have any queries or concerns, please don't hesitate to contact me on (02) 9493 9500.
>
> Kind regards,
> Georgia

Georgia Burnett
Archaeologist

T 02 9493 9500
M 0400 472 412
 Connect with us

SYDNEY | Ground floor, 20 Chandos Street, St Leonards NSW 2065

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<20200401_Dungowan Dam_Notification_SAC.pdf>

Georgia Burnett

From: Cheryl Kitchener [redacted]
Sent: Monday, 20 April 2020 9:25 AM
To: Georgia Burnett
Subject: Re: Dungowan Dam NSW - Invitation to register

Good Morning Georgia,

Thank you for your email re Dungowan Dam project.

I would like to state that this project is outside of the Anaiwan Nation and as a cultural advisor and register Aboriginal Owner of the Anaiwan People I will not be registering for this project.

I would like to state for future reference, that I believe it is totally disrespectful for people of another Nation group to register for projects off Country. Therefore, I will not be registering for any projects outside of Anaiwan Country. I would like to add, that I have worked in the area before as a Archaeologist and know of cultural sites in the area, but it's not my place to speak about these.

Again, thank you for your consideration.

Regards

Cheryl Kitchener
[redacted]

On Fri, Apr 17, 2020 at 4:53 PM Georgia Burnett <gburnett@emmconsulting.com.au> wrote:

> Dear Cheryl,
>
> -
>
> On behalf of WaterNSW, EMM is beginning work on an Aboriginal cultural heritage assessment as part of a Critical State Significant Infrastructure project to deliver three new or augmented dams in NSW, which includes upgrading Dungowan Dam and its facilities. The project location is outlined in the attached letter, but is generally centred around Dungowan Creek and up to Calala water treatment plant. As part of the process, we are following the DPIE community consultation requirements.
>
> -
>
> At this stage, I am enquiring to see if you would like to be involved in the project. Please see the attached letter for more detail. I would appreciate a response by COB **Friday 1 May 2020**.
>
> -
>
> In your response, to help us with management and communication, please provide all contact details including postal address, phone and e-mail. In additional, any information regarding the following is appreciated:

- preferred communication method (e.g. e-mail) to be used during consultation;
- the level of project involvement you or your organisation wishes, including attendance of meetings, fieldwork participation and/or simply reviewing documentation;

- identification of any procedures, protocols or requirements for the use and reproduction of any cultural information or materials you or your organisation provides EMM as part of this project; and
- identification of any Aboriginal objects, sites and/or areas of cultural value that you are aware of in, or near, the project area.

If you have any queries or concerns, please don't hesitate to contact me on (02) 9493 9500.

Kind regards,

Georgia

Georgia Burnett
Archaeologist

creating opportunities

T 02 9493 9500

M 0400 472 412
Connect with us

SYDNEY | Ground floor, 20 Chandos Street, St Leonards NSW 2065

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Georgia Burnett

From: Decka Vale [redacted]
Sent: Monday, 20 April 2020 8:41 PM
To: Georgia Burnett
Subject: RAP- Dungowan Dam, NSW

G'day Georgia

Please accept DFTV ENTERPRISES as a Registered Aboriginal Party for the Aboriginal Cultural Heritage Assessment- Dungowan Dam Project.

Would prefer email correspondence instead of post and we would like to be involved in all aspects of this project, i.e. meetings, fieldwork participation & review documentation reviewing.

I shall call you throughout this week to discuss this project, if that's ok with you.

Kind Regards

Derrick Vale

Georgia Burnett

From: Corroboree Aboringinal Corporation [redacted]
Sent: Tuesday, 21 April 2020 8:44 PM
To: Georgia Burnett
Cc: Marilyn Carroll-Johnson
Subject: Re: Expression of Interest Dungowan Dam

EMM
PO Box 2065
ST LEONARDS NSW 1590

Dear Georgia

Re: Expression of Interest for Dungowan Dam

Please register Corroboree Aboriginal Corporation expression of interest in the project. We are registering in a full capacity. We are aboriginal people who are culturally aware. We have the necessary ability, awareness, experience, skills, insight and the knowledge to identify artefacts on field work. And as Aboriginal People we connect thru the land, thru our ancestors and our heritage. Therefore we are able participate on all levels. We have worked with many archaeologists across a broad landscape. We have consulted with your company on previous projects. We have all the relevant insurances and safety gear. We are all fit and adapt to a vast landscape.
Contact is preferred via email: ***corroboreecorp*** [redacted] ***The*** contact number, email and contact person is also listed in the signature.
Please do not disclose any of our details to LALC nor publish our correspondence for LALC to peruse. Please only note our corporation details i.e. our name and only for registration purposes. As note our details are not to be passed on/disclosed to LALC. We understand your need for confirmation of our corporations name and contact details on your project lists for registered stakeholders, in that we have responded for inclusion, to participate on all levels. However, please do not display/disclose our actual correspondence. Our actual correspondence is only for the proponent and yourself. Just our name as registered stakeholders for the recordings paperwork. Thanks

Kind regards
Marilyn Carroll-Johnson
Director
Corroboree Aboriginal Corporation
[redacted]
Address: PO Box 3340
ROUSE HILL NSW 2155

Georgia Burnett

From: Jamie Wharemate
Sent: Thursday, 23 April 2020 3:58 PM
To: Georgia Burnett; Kerryn Armstrong
Subject: FW: ACHA-Dungowan Dam

Hi,

Sorry not sure who needs to know this from your team.

Thank you,

Jamie Wharemate
Business Services Manager

T 02 9493 9544
M 0434 224 114
www.emmconsulting.com.au

From: Aaron Talbott [redacted]
Sent: Thursday, 23 April 2020 2:57 PM
To: Info <Info@emmconsulting.com.au>
Subject: ACHA-Dungowan Dam

Yaama George

Reply to the accept invitation for AT Gomilaroi Cultural Consultancy to participate in the ACHA for Dungowan Dam Project. My details are as follows.

Aaron Talbott
AT Gomilaroi Cultural Consultancy
13 Hunter St, Gunnedah NSW 2380, Australia.
M [redacted]

Yalu

Aaron Talbott

Georgia Burnett

From: Robert Slater [redacted]
Sent: Thursday, 30 April 2020 6:20 PM
To: Georgia Burnett
Subject: ACHA: Dungowan Dam

Dear Georgia

Galamaay Cultural Consultants would like to register our interest for this project.

We live locally and hold cultural knowledge relevant to the project area.

Thanks
Robert Slater
121 Robert Street
Tamworth NSW 2340

Ground floor, 20 Chandos Street
St Leonards NSW 2065
PO Box 21
St Leonards NSW 1590

T 02 9493 9500
E info@emmconsulting.com.au

www.emmconsulting.com.au

7 May 2020

Aaron Talbott
AT Gomilaroi Cultural Consultancy
13 Hunter St
Gunnedah NSW 2380

Re: Dungowan Dam and associated infrastructure - Project information and assessment methodology

Dear Aaron,

1 Introduction

Thank you for registering your interest in the Dungowan Dam project, southeast of Tamworth, NSW (Figures 1 and 2). WaterNSW has engaged EMM Consulting Pty Ltd (EMM) to prepare the Aboriginal Cultural Heritage Assessment (ACHA) to investigate and understand the cultural heritage values of the project area and surrounds. The assessment will consider the potential impacts of the project and how mitigation and management of cultural heritage needs to be integrated into the delivery of the project. The assessment forms part of an Environmental Impact Statement or Review of Environmental Factors currently being prepared.

This document is provided in accordance with sections 4.2 and 4.3 of the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (DECCW 2010), which sets out the Aboriginal consultation requirements for the project. Additional Aboriginal community liaison and participation opportunities will occur in accordance with a project specific consultation strategy.

The aims of this letter are to:

- provide an overview of the project and how it will be assessed;
- provide background on the project and some of the initial investigations to date;
- establish the purpose and aims of the Aboriginal consultation process;
- seek information about any Aboriginal cultural heritage values associated with the project and how they may affect, inform or refine the project and/or assessment methods;
- seek information on any cultural activities (such as fishing and hunting) that has historically and/or is actively being undertaken in the project area;
- identify any culturally appropriate protocols that registered parties wish to be adopted during the information gathering process (eg protocols during field survey, or handling of culturally sensitive information); and
- present a draft of the intended assessment methods for your review and comment.

We welcome your feedback at your earliest convenience, and will be consulting with the registered Aboriginal parties for the duration of the ACHA, currently proposed to extend to the end of 2020. However, for the purposes of this initial stage and in accordance with the Department of Planning, Industry and Environment (DPIE) guidelines, we request any written response on the information and process below by **4 June 2020.**

At this time, we propose to conduct all consultation via teleconferencing, e-mail or phone due to the social distancing rules from the COVID-19 outbreak. However, where feasible, we would meet in person (face-to-face meetings), and would ensure appropriate protocols are in place as per Government health advice at that time. Appendix A of this document provides our proposed methods for social distancing during consultation at this time. We would like to hear from your organisation on this to ensure that you are able to contribute knowledge to the project and have the opportunity to be involved, whilst ensuring we comply with up-to-date social distancing requirements.

For reference, the WaterNSW contact is: Meredith Abrams, Community Engagement Officer, P: 1300 662 077, E: meredith.abrams@waternsw.com.au. EMM is working on the proponent's behalf, and all queries should be directed through EMM. Feedback can be provided to:

Georgia Burnett

Address: PO Box 21, St Leonards, NSW 1590

Phone: 02 9493 9500

Email: gburnett@emmconsulting.com.au

2 Project information

2.1 Project overview and proposed assessment

WaterNSW is proposing to undertake the planning and delivery of three new or augmented dams in NSW, which includes a new Dungowan Dam and supply pipeline. The need to deliver the dams is critical to the State's drought recovery process and needs to be completed to the highest standard in relation to the assessment and delivery. Each dam is to be constructed rapidly to create security for the various town water supplies and associated industries reliant on the delivery of water for viability.

The project includes:

- a new dam downstream of the existing Dungowan Dam, with a nominal capacity of 22.5 gigalitres (GL);
- partial or full decommissioning of the existing Dungowan Dam and rehabilitation of the storage area of the dam; and
- a new delivery pipeline from the proposed dam to the junction with the Chaffey Dam pipeline and a further stage from the junction to the Calala water treatment plant located in Tamworth.

The project is identified as Critical State Significant Infrastructure (CSSI) under the provisions of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act). A CSSI project requires approval from the NSW Minister for Planning and Public Spaces and is accompanied by an EIS. The assessment of Aboriginal cultural heritage would be one of several investigations included in the EIS. The assessment would be developed in response to Secretary Environmental Assessment Requirements (SEARs) issued by DPIE, which will outline the investigative requirements for Aboriginal heritage. These will likely require an assessment that aligns with DPIE guidelines[21] for investigating and assessing Aboriginal heritage and consulting with the Aboriginal community. However, CSSI projects do not require separate approvals under the *National Parks and Wildlife Act 1974* (eg Aboriginal heritage impact permits), rather any subsequent requirements for heritage are managed in accordance with the conditions of approval, provided by the Minister.

The section of the pipeline between its junction with the Chaffey Dam pipeline and extending to the Calala water treatment plant would be delivered as the 'early work' for the project, and will be assessed separately to the EIS, within a Review of Environmental Factors (REF) under Part 5 of the EP&A Act. This component of the project may require approval under the *National Parks and Wildlife Act 1974* if impacts on Aboriginal heritage are identified. This assessment would adopt the process and requirements described within DPIE guidelines.

2.2 Initial Aboriginal heritage investigations

An investigation of Aboriginal heritage and the potential for cultural material to be present in the project area was undertaken as part of the scoping study – the document lodged in March 2020 with DPIE to inform the contents of the EIS. This study was primarily a desktop investigation, including a review of previous investigations and the application of key environmental landforms to identify areas of archaeological interest (Figure 3).[22] The study resulted in the following conclusions:

> …there is currently no information on the Aboriginal heritage of the immediate environment. A search of the surrounding region reveals only a small number of previously documented sites ($\bar{x}$=~1 site per 50 km^2), with the nearest some 9 km from the study area. In comparison with Chaffey Dam, a nearby dam in a similar environmental context, the data suggest that the proposed works would affect primarily stone artefact sites associated with the transient and ephemeral use of the landscape in the past. These would likely be found as surface and/or sub-surface deposits in the vicinity of Dungowan Creek, Terrible Billy Creek and/or Jones Oaky Creek. A site inspection validates these predictions, with a number of elevated terraces and floodplains adjacent the creeks revealing cultural material. Specifically, areas within 100 m either sides of these creeks are considered to have high potential for surface and sub-surface cultural material. The latter quite possible in stratified contexts, and thereby able to provide significant information on the past use of the region by Aboriginal people.
>
> While predictions indicated the potential for rockshelters and associated features (such as art) to be present along the valley edges and where other geological outcropping is found, none were observed. The nature of the geomorphology resulted in more moderate hills and slopes, and the potential for such sites is therefore considered low. Similarly, exposed geologically outcropping in the rivers themselves were not encountered, and as such the presence of grinding grooves may similarly be considered low. However, the site inspection cannot definitively determine the presence or absence of ceremonial activities and/or natural resource sites, that are known in the region. These sites are commonly considered of significance and will likely require more detailed understanding and management through the project.

[21] *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in New South Wales* (OEH 2011)

[22] EMM Consulting Pty Ltd, 2020, Three Dams Project - Dungowan Dam - Aboriginal and Historic heritage constraints assessment report, Report for Water NSW. Available for download here: https://www.planningportal.nsw.gov.au/major-projects/project/30026

In addition to above, the observations along the main creeklines within the project area, suggest that they have the potential to contain complex geomorphology, including a range of alluvial terraces. Some of these appear to be >1m in depth and have potential to be of significant age. The establishment of the existing dam and subsequent regulation of river flow in the 20th century has also potentially modified and/or affected these alluvial deposits and require further investigation.

Following these findings, EMM is now undertaking a more extensive investigation of the Aboriginal heritage values of the project area, including consultation with and participation of Aboriginal stakeholders. For the early works, we will be producing an ACHA in accordance with DPIE guidelines. For the remainder of the works, our investigations will broadly follow DPIE guidelines, but the accelerated timeframe of the overall project requires some modifications to the process detailed in the guidelines. This includes undertaking archaeological test excavation immediately following the field survey (rather than a more extended gap between the two in some projects); and the adoption of mechanically assisted excavations to maximise coverage and depths given the potential for deep alluvial floodplains. These are outlined further below.

3 Aboriginal stakeholders

Following the notification process undertaken between 17 April – 1 May 2020, the following Aboriginal stakeholders have expressed an interest in being involved in the project:

- Tamworth Local Aboriginal Land Council;
- Nunawanna Aboriginal Corporation;
- The Gomeroi People;
- DFVT Enterprises;
- [redacted]
- AT Gomilaroi Cultural Consultancy; and
- Galamaay Cultural Consultants.

4 Dungowan pipeline (early works) – REF assessment methodology

The assessment of the pipeline component between Calala water treatment plant and its junction with the Chaffey Dam pipeline is to be assessed under Part 5 of the EP&A Act (Figure 2). As such, additional approvals required under the *National Parks and Wildlife Act 1974* may apply, and therefore it must conform with the following guidelines:

- *Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW* (OEH 2011);
- *Code of Practice for Archaeological Investigations of Aboriginal Objects in NSW* (the Code of Practice) (DECCW 2010); and
- *Aboriginal Consultation Requirements for Proponents 2010* (DECCW 2010).

4.1 Methods

The purpose of the assessment is to identify and manage the Aboriginal cultural heritage values of all areas that will be affected by the study. In summary, this will involve.

- consultation with the Aboriginal stakeholders to identify socio-cultural values of the project area and places of special significance that should be considered;
- a search of the AHIMS register for records of previously registered Aboriginal sites;
- a review of past Aboriginal heritage reports covering the study area;
- environmental landscape analysis to identify past Aboriginal resources and suitable occupation areas;
- synthesis of background research to develop a predictive model of Aboriginal site location;
- field investigation to validate the findings of the desktop and identify any previously undocumented cultural material. This would include surface inspection and may extend to test excavations of areas of archaeological interest;
- an assessment of significance for Aboriginal cultural heritage values in the project area (with input from the registered Aboriginal stakeholders);
- an impact assessment of how the project will affect Aboriginal cultural heritage values in the project area; and
- development of management recommendations based on the results of the assessment and input from registered Aboriginal stakeholders during the consultation process and particularly from the draft ACHA review period.

4.1.1 Field investigation

Survey of the project area would be undertaken to identify any extant Aboriginal objects or sites. Surface investigation will consist of the survey team evenly spaced (5-10 m apart) walking transects across accessible parts of the study area, with a key focus on targeting areas of low disturbance. The focus of the team will be to both investigate soil exposures for extant Aboriginal objects and identify landforms that have potential for cultural material to be present (either surface or subsurface). It should be acknowledged that the entire ground surface within the project area project boundary is unlikely to be surveyed, but a representative sample of each landform within the project area will be gathered to characterise the archaeology, or its potential, of the project area. All Aboriginal objects and/or landforms of interest would be mapped and documented using hand-held GPS, photographs, sketches and written description.

The survey will be undertaken in accordance with Requirements 5 to 10 of the Code of Practice. In summary, the Code of Practice requires the following general methodology:

- pedestrian survey;
- survey and recording according to survey unit and/or transect;
- recording of beginning and end points of transects or the boundaries of survey units, and the spacing between survey personnel;
- recording of landform, soil information, land surface, vegetation conditions, visibility and exposure, and survey coverage;

- recording of any identified Aboriginal sites identified according to Requirements 6-8, and recording of any identified Aboriginal objects in accordance with Requirements 18-24 of the Code of Practice;

- if any Aboriginal objects and/or sites are identified in the course of the survey, site cards will be completed and submitted to the AHIMS registrar; and

- in the event of Aboriginal heritage being identified within the project footprint, undertake discussions on site as to the potential further investigation and/or management of these finds.

At this stage, no test excavations are proposed for the early works stage, and the aim of the project is to avoid such a program for this phase where possible (due to the shortened assessment timeframes). Rather, it is anticipated that there is enough flexibility in the pipeline route and construction methods to avoid any areas identified as archaeologically sensitive. However, if test excavations are required to further characterise the archaeological resource of an area identified in the survey, they would be implemented shortly following the survey, in accordance with the Code of Practice. Specifically, they would include the following activities:

- all test excavation pits would be spatially located using a differential GPS device, which would also provide elevation data;

- manual excavation of 0.25m² test pits in a systematic grid across areas of archaeological interest within the impact footprint. The spatial resolution of the grid would be dependent on on-ground conditions, but would likely have test pits between 20-50m apart;

- All excavation would use hand tools. Excavation of the first unit would be in 5cm spits, with subsequent excavation allowed in 10cm spits or according to stratigraphy (whichever is smallest) depending on the results of the first unit. Manual excavation would continue to either: i) the base of the cultural deposits; ii) to the depth of the underlying geology; or iii) to the maximum depth possible via hand excavation (likely ~ 80cm).

- sieving of all manually excavated material through a 5mm sieve;

- reduced levels of the top and bottom of the test pit would be documented using a dumpy level against a known elevation. Other levels may be taken as required;

- soil profiles would be recorded in accordance with the Code of Practice, including scaled drawings, photographs, and written descriptions;

- soil samples may be collected for description, sedimentological and chronological analysis where such analysis is considered likely to contribute significant information; and

- excavation procedures and protocols may be modified at the discretion of the Excavation Director, in consultation with the Aboriginal stakeholders and the proponent as the conditions in the field and nature of the excavations develop. This includes the movement of test pits to avoid existing built structures, buried services and disturbances not identified during the desktop phase.

4.2 Timeframes

The following indicative timeframes for the Pipeline REF assessment would apply:

- distribution of this document to the registered Aboriginal stakeholders: May 2020;

- field investigation of the project area: early to mid-June 2020;

- distribution of the draft report: early July 2020;

- input into recommendations and review of draft report: mid July – mid August 2020;
- report finalisation and submission of AHIP application (if required): mid-August 2020;
- determination of the REF: September 2020; and
- construction commencing on the early work section of pipeline: October 2020.

5 Dungowan Dam (main works) – EIS assessment methodology

An EIS will be prepared to assess the dam and associated infrastructure (Figure 1) as a CSSI assessment under Division 5.2 of the EP&A Act. As such, it is required to follow and address Aboriginal heritage requirements as outlined by the SEARs. The assessment will be developed in *broad* accordance with the following guidelines:

- *Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW* (DECCW 2010); and
- *Aboriginal Consultation Requirements for Proponents 2010* (DECCW 2010).

5.1 Methods

The purpose of the assessment is to identify and manage the Aboriginal cultural heritage values of all areas that will be affected by the study. In summary, this will involve:

- consultation with the Aboriginal stakeholders to identify socio-cultural values of the project area, greater understanding of cultural fishing and hunting activities, and places of special significance that should be considered;
- a search of the AHIMS register for records of previously registered Aboriginal sites;
- a review of past Aboriginal heritage reports covering the study area;
- environmental landscape analysis to identify past Aboriginal resources and suitable occupation areas;
- synthesis of background research to develop a predictive model of Aboriginal site location;
- field investigation to validate the findings of the desktop, and identify any previously undocumented cultural material. This would include surface inspection and test excavations of areas of archaeological interest;
- an assessment of significance for Aboriginal cultural heritage values in the project area (with input from the registered Aboriginal stakeholders);
- an impact assessment of how the project will affect Aboriginal cultural heritage values in the project area; and
- development of management recommendations based on the results of the assessment and input from registered Aboriginal stakeholders during the consultation process and particularly from the draft assessment review period.

5.1.1 Field investigation

Survey of the project area would be undertaken to identify any extant Aboriginal objects or sites. Surface investigation will consist of the survey team evenly spaced (5-10 m apart) walking transects across accessible parts of the study area. The focus of the team will be to both investigate soil exposures for extant Aboriginal objects and identify landforms that have potential for cultural material to be present (either surface or subsurface). All Aboriginal objects and/or landforms of interest would be mapped and documented using hand-held GPS, photographs, sketches and written description.

The survey will be undertaken using the following general methodology:

- pedestrian survey;
- survey and recording according to survey unit and/or transect;
- recording of beginning and end points of transects or the boundaries of survey units, and the spacing between survey personnel;
- recording of landform, soil information, land surface, vegetation conditions, visibility and exposure, and survey coverage;
- recording of any identified Aboriginal sites identified according to Requirements 6-8, and recording of any identified Aboriginal objects in accordance with Requirements 18-24 of the Code of Practice;
- if any Aboriginal objects and/or sites are identified in the course of the survey, site cards will be completed and submitted to the AHIMS registrar; and
- in the event of Aboriginal heritage being identified within the project footprint, undertake discussions on site as to the potential further investigation and/or management of these finds.

In addition to the field survey, an archaeological test excavation is proposed for the project area. The investigations will be developed to fulfil the research aims and objectives outlined below. Given the large size of the project area, and the potential for deep deposits – likely to extend below depths that can be easily investigated manually –a grid of mechanically excavated test pits across the site (Figure 4) are proposed. These test pits would be distributed to: i) focus on areas of archaeological interest as determined by the earlier desktop investigations (Section 2.2); ii) to improve our understanding of the area's geomorphological history, and iii) in response to any findings of the field survey undertaken above that may influence areas for future investigation. With respect to the timeframes provided and in anticipation of any obstructions faced on site, we propose up to 40-60 test pits be excavated across the project area. The excavations would adopt the following methods:

- all test excavation pits would be spatially located using a differential GPS device;
- mechanical excavation of some 40-60 ~2m^2 (2x1m) test pits in a systematic grid across the project area;
- all excavation would be undertaken with a flat mud bucket and in controlled 20cm spits, to either: i) the base of the cultural deposits; or ii) to the depth of the underlying geology, or iii) to the full extent of the excavator reach (~3m) where neither (i) or (ii) are met;
- reduced levels of the top and bottom of the test pit would be documented using a dumpy level against a known elevation. Other levels may be taken as required;

- all sediment would be stockpiled in its respective spits, labelled according to its assigned test pit number and recorded and documented. Fifty per cent (50%) of each stockpile – typically ~800kg – would be placed in buckets or bulk soil bags. This sediment would then be wet-sieved through a 5mm wire aperture mesh, and any cultural material recovered, labelled and bagged for subsequent analysis and curation. In the event that Aboriginal objects are recovered, the remaining 50% of the sediment from that spit would be sieved to maximise cultural material recovery. Where no Aboriginal objects are recovered in the initial 50% sub-sample, no further sieving of that spit would occur;

- soil profiles would be recorded in accordance with the Code of Practice, including scaled drawings, photographs, and written descriptions;

- soil samples may be collected for description, sedimentological and chronological analysis where such analysis is considered likely to contribute significant information; and

- excavation procedures and protocols may be modified at the discretion of the Excavation Director, in consultation with the Aboriginal stakeholders and the proponent as the conditions in the field and nature of the excavations develop. This includes the movement of test pits to avoid existing built structures, buried services and disturbances not identified during the desktop phase.

i Research aims and objectives

Our understanding of the cultural materials across the project area is poor, but visual observations suggests that there is a complex and deep fluvial history. It is envisaged that within this complex fluvial history, cultural materials may have been deposited, either through discard by Aboriginal people, or through natural accumulation of materials in these types of deposits. Based on this limited understanding of the project area, a number of overarching aims can be developed for the assessment:

- Identify, map and characterise the nature, age, extent, integrity and significance of the Aboriginal cultural material within the project area.

- Answer research questions including:

    - What are the environmental characteristics associated with the distribution of Aboriginal cultural heritage within the project area?

    - Can the formative processes of the stratigraphic profile provide information on the nature and/or survivability of the archaeological resources?

    - Are there other key factors in the distribution and extent of the material culture within the project area (eg how the dam has affected these deposits)?

    - What are the cultural, social and public values associated with the Aboriginal archaeological resource within the project area?

    - How should the Aboriginal sites in the region be conserved and managed in future?

- Better assess the significance and historical meaning of the cultural materials that exist within the project area so that future archaeological investigation can advance our understanding of past Aboriginal cultural behaviour and environmental adaptation.

- Direct future heritage activities and mitigation measures (if required) for the project area.

ii Analysis, Reporting and Temporary Storage

Post-excavation analysis and reporting will be required to inform the ACHA and subsequent documentation. The post-excavation analysis would be designed to address the research objectives, along with other relevant questions that may arise based on the results of the excavation. Results of the analysis would be presented in relation to comparative site data where possible, and where useful in addressing research questions about the nature, extent, and timing of Aboriginal occupation of the area in the past. These results and discussions would be incorporated into the assessment, which will be provided to the Aboriginal stakeholders for review prior to finalisation.

Once the excavations are completed, all Aboriginal cultural material recovered will be securely stored at the EMM Sydney office for analysis. At the completion of the analysis and reporting, the final location of the assemblage would be discussed with the Aboriginal stakeholders and proponent to determine a suitable long term repository for the cultural materials.

5.2 Timeframes

The following indicative timeframes for the main works EIS assessment would apply:

- distribution of this document to the registered Aboriginal stakeholders: May 2020;
- field investigation of the project area: early June – mid July 2020 (4-6 weeks);
- distribution of the draft report: early October 2020;
- input into recommendations and review of draft report: mid-October – early November 2020;
- finalisation of report for inclusion in EIS: early December 2020; and
- environmental impact assessment development and submission: early December – October 2021
- construction commencing on the main works portion of Dungowan Dam: October 2021. Construction is expected to take four years, dependant on design.

6 What we need from you

In addition to the archaeological evidence described above, Aboriginal heritage incorporates a wide range of values such as stories, traditions and cultural practices. EMM welcomes advice from the Aboriginal community about cultural values (which might include archaeological sites or other types of values) relevant to the project area and its surrounds. EMM is relying on the Aboriginal community for advice on non-archaeological and intangible Aboriginal values for the study area. We are happy to discuss any information which you are willing to share and will respect confidentiality where requested.

EMM would appreciate your feedback on the above methodology proposed for the investigation and assessment of the project area. In responding, please also consider the following questions:

- Are there any other knowledge-holders or traditional owner groups we should be contacting to obtain cultural information on this area?
- Are there any protocols in relation to community interaction and/or cultural heritage that you would like adopted during the project?
- Are you aware of any Aboriginal objects, places, sites or stories of cultural significance and/or importance that you are aware of within the project area? If so, please advise us how you wish them to be dealt with during the project.

- Are you aware of any past or current fishing and hunting activities within the project area? Do you have any views on how these should be managed into the future?

- Is the information you are providing sensitive, gender specific, etc? If so, how would you like the information you provide to EMM to be managed? Noting that some documentation for the ACHA process will be required.

- Do you require any further information prior to EMM proceeding with the project?

In your response, can you please also clearly identify who you would like EMM to talk to within your organisation, and provide contact details for these individuals. Please also ensure your preferred method of communication (eg telephone call, e-mail, letter, etc) is highlighted for subsequent stages of the project.

7 Closing

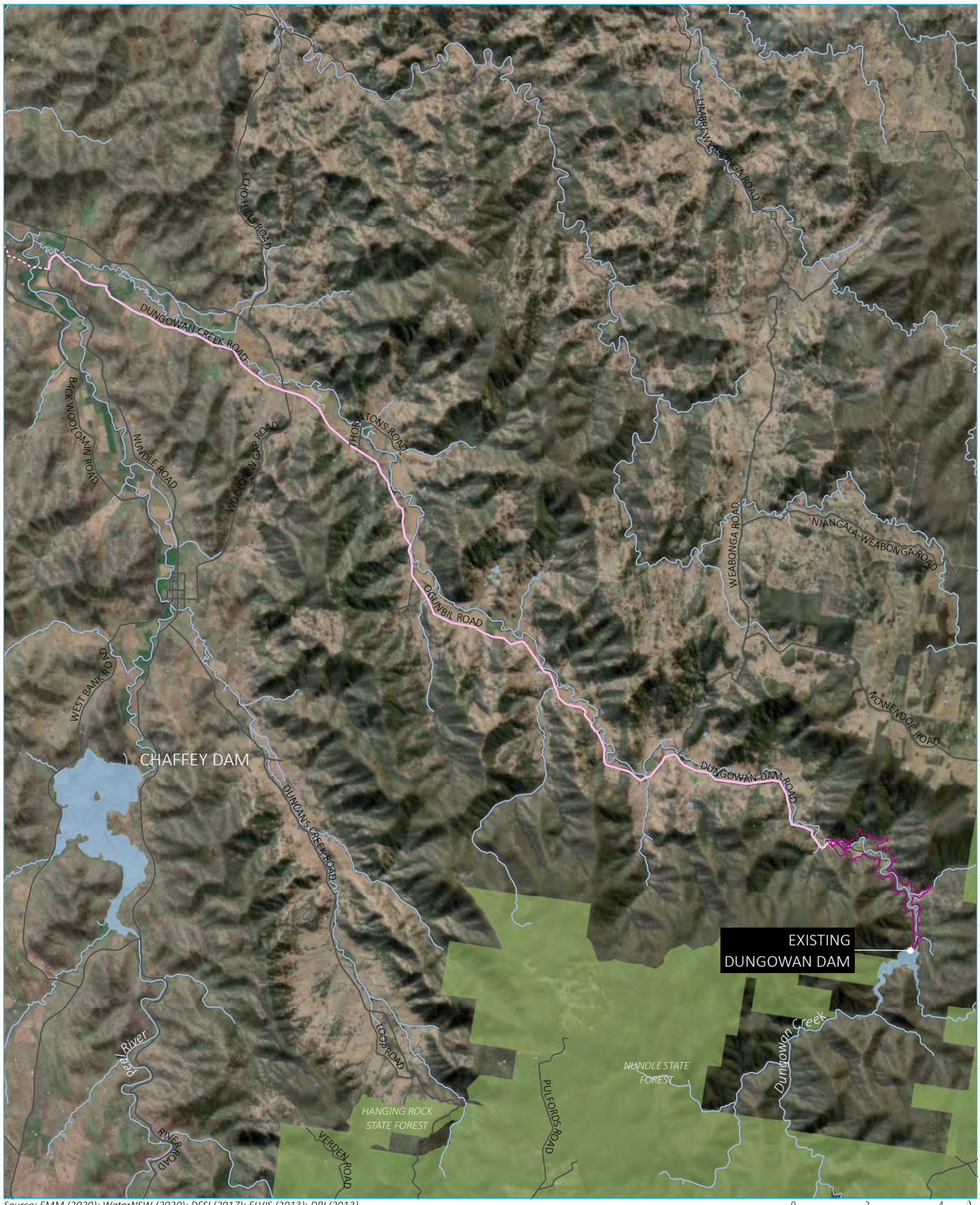
We look forward to receiving any response your organisation wishes to make about the proposed method by **4 June 2020**. Your response will be documented and considered in the assessment. Most importantly, your cultural information is also welcome within this timeframe; but it can also be submitted up until the completion of the draft ACHA.

Please feel free to contact me with any questions.

Yours sincerely

Georgia Burnett
Archaeologist

gburnett@emmconsulting.com.au



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Source: EMM (2020); WaterNSW (2020); DFSI (2017); ELVIS (2013); DPI (2013)

**Inundation area should be considered approximate only. It is based on current limited available spatial data and is subject to future verification.*

0 2 4 km

GDA 1994 MGA Zone 56

N

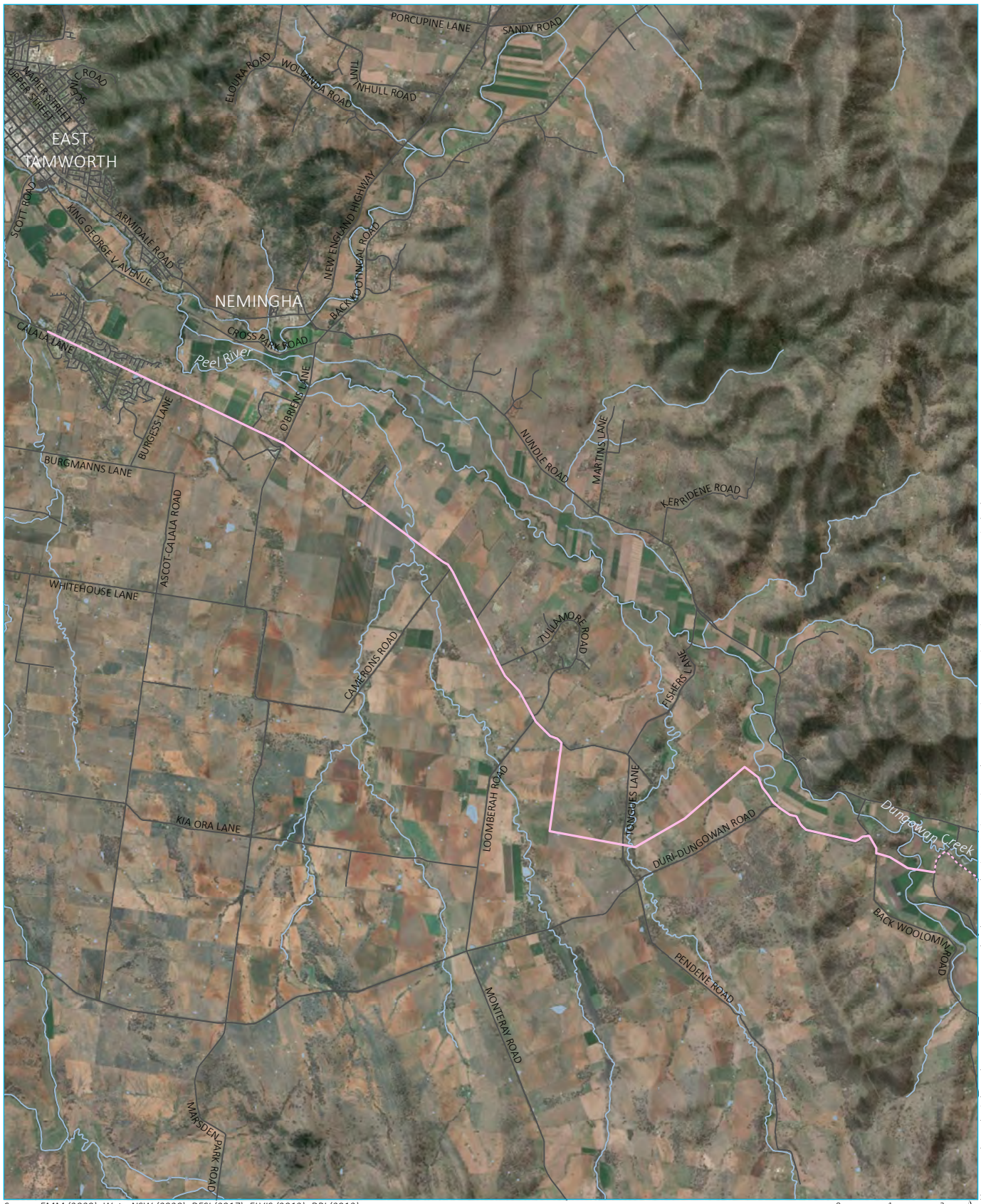
KEY

- Project footprint
- Indicative pipeline alignment (EIS)
- Indicative pipeline alignment (REF)
- Main road
- Named watercourse
- Waterbody
- State forest

The proposed project

Dungowan Dam Project
Aboriginal consultation
Figure 1

EMM
creating opportunities



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Source: EMM (2020); WaterNSW (2020); DFSI (2017); ELVIS (2013); DPI (2013)

**Inundation area should be considered approximate only. It is based on current limited available spatial data and is subject to future verification.*

0 1 2 km

GDA 1994 MGA Zone 56

N

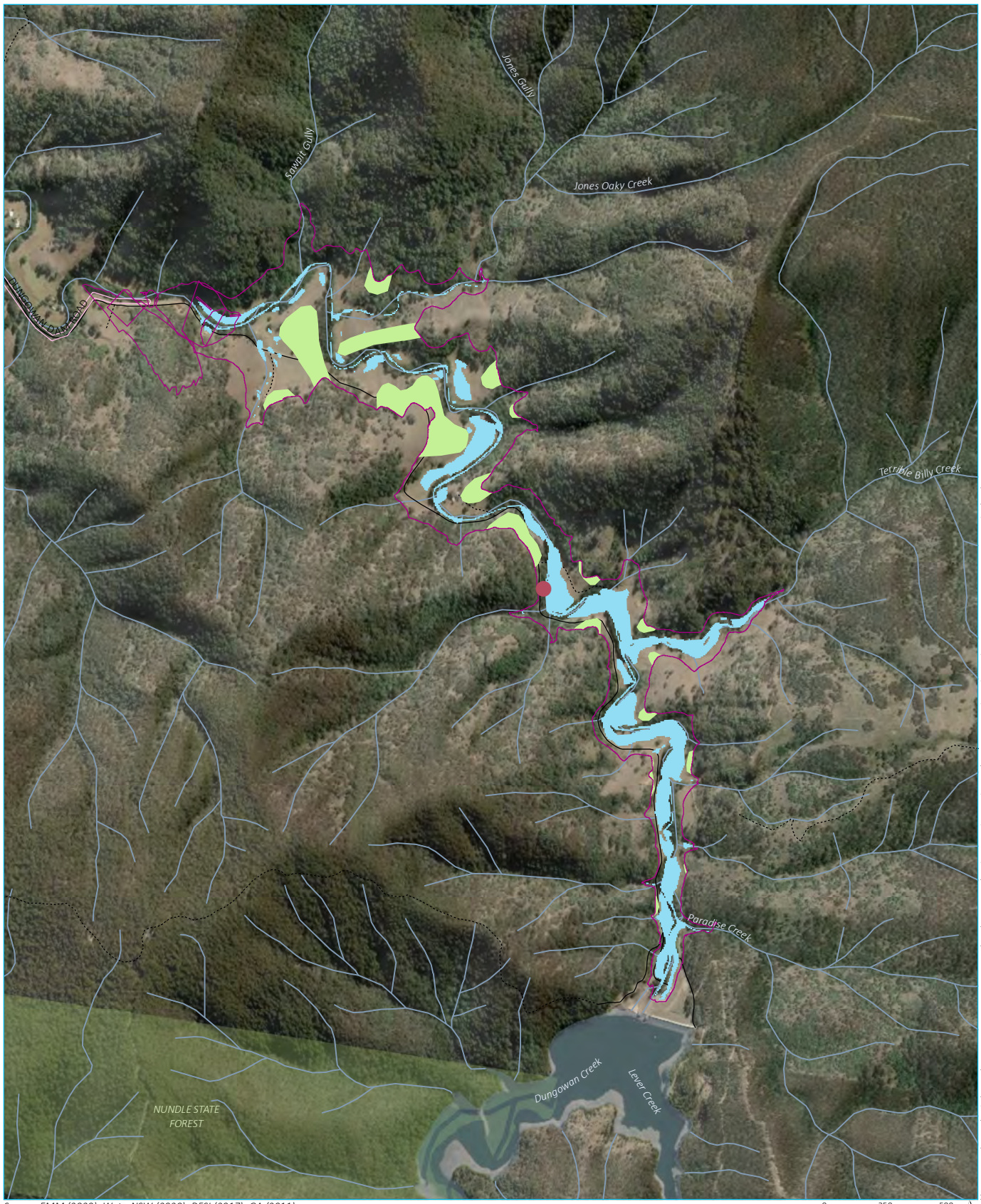
KEY

- Indicative pipeline alignment (REF)
- Indicative pipeline alignment (EIS)
- Main road
- Named watercourse
- Waterbody

The early works study area

Dungowan Dam Project
Aboriginal consultation
Figure 2

EMM
creating opportunities



Source: EMM (2020); WaterNSW (2020); DFSI (2017); GA (2011)

*Inundation area should be considered approximate only. It is based on current limited available spatial data and is subject to future verification.

0 250 500 m

GDA 1994 MGA Zone 56

N

KEY

- Project footprint
- Indicative pipeline alignment (20 m buffer)
- Local road
- Track
- Watercourse
- Waterbody
- State forest

Area of archaeological potential

- Crest landform
- Level to gently inclined landforms within 100 m of primary watercourse
- Very steep to precipitous terrain

Areas of archaeological sensitivity

Dungowan Dam Project
Aboriginal consulation
Figure 3

EMM creating opportunities

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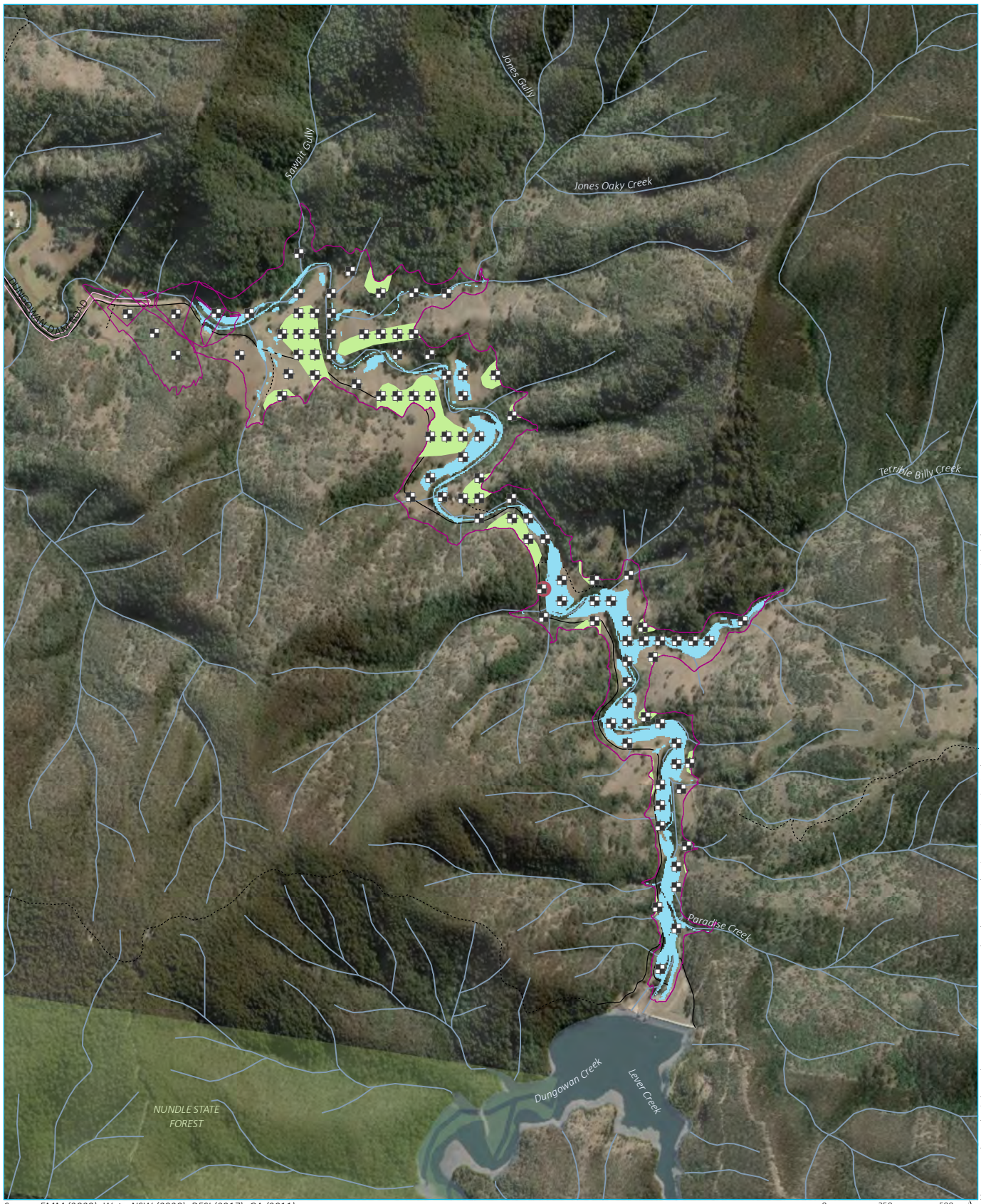

Source: EMM (2020); WaterNSW (2020); DFSI (2017); GA (2011)

*Inundation area should be considered approximate only. It is based on current limited available spatial data and is subject to future verification.

0 250 500 m

GDA 1994 MGA Zone 56

N

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KEY

- Archaeological test location
- Project footprint
- Indicative pipeline alignment (20 m buffer)
- Local road
- Track
- Watercourse
- Waterbody
- State forest

Area of archaeological potential

- Crest landform
- Level to gently inclined landforms within 100 m of primary watercourse
- Very steep to precipitous terrain

Indicative archaeological test excavation program

Dungowan Dam Project
Aboriginal consulation
Figure 4

EMM
creating opportunities

Appendix A

COVID-19 consultation methods

A.1 General

WaterNSW and their consultants are cognisant of the importance of safety to community and stakeholders, clients and staff. Prior to any engagement those with the greatest risk of more serious illness with COVID-19 will be considered:

- Aboriginal and Torres Strait Island people over the age of 50; and
- those aged 60 year and over.

We adhere to the Government requirements regarding COVID-19 and amend our approach as required in this dynamic environment. At the time of writing this document, we note the need to:

- restrict outdoor gatherings to no more than 2 people;
- maintain a 1.5m distance when outside;
- maintain a 4 sqm distance when inside;
- regularly wash hands using soap and water or alcohol-based hand sanitiser;
- surfaces are cleaned prior and after use using alcohol-based sanitiser; and
- observe all travel bans.

The current COVID-19 pandemic and the government requirements to self-isolate and practice social distancing has necessitated a different approach to community and stakeholder engagement. EMM has responded by adopting the practices outlined in Table A1.

Table A.1 Aboriginal community and stakeholder engagement options – COVID-19

Previous approach	COVID-19 methods
Face to face interviews	• Videoconference; • Teleconference; • Where access to hardware and/or software is not available two options could apply: – iPad could be provided to those in remote and isolated locations that is preloaded with: ▪ Prepaid SIM; ▪ Facetime (this is the easiest platform to use for inexperienced users); and ▪ EMM person contact details. – Satellite model where a safe location is provided[23] in negotiation with the client and or participant/s. The location will be set to have: ▪ Person to welcome and direct person to computer station and be available to assist if required (not to be present in the room while interview is being undertaken); ▪ Computer station with videoconference session ready ie person only needs to sit and participate in the face to face interview; ▪ Sanitary wipes to allow the participant to wipe keyboard and mouse before and after participation in the interview. • In the case of satellite model, identify where possible those we have an existing relationship locally who can act as the contact person and/or assist in identifying the appropriate participant/s. There would need to be an agreement up from on: – Who will be responsible locally for facilitating and arranging for participants to attend meetings; – Pre-arranged times and dates (including timeframes eg 3 months) for meetings; and – Pre agreed incentives eg donation of device to the organiser. ***Note: payment for face to face participation would still apply if replaced with videoconferencing/teleconferencing options.***
Group meetings/ workshops	• Videoconference and/or • Online forum/discussions using Social Pinpoint or equivalent • Satellite model where a safe location is provided[24] in negotiation with the client and or participant/s. The location will be set to have: – Person to welcome and direct person to computer station and be available to assist if required; – Computer station with videoconference session ready ie person only needs to sit and participate in the group discussion; – Sanitary wipes to allow the participant to wipe keyboard and mouse before and after participation in the interview.
Community information sessions	• Online forum/discussions using Social Pinpoint
On-line surveys	• On-line surveys integrated with Social Pinpoint • On-line survey via Survey Monkey delivered via email addresses
Newsletters/ Information delivered in person or via letterbox drop	• Provided passively on agreed resident/Council Facebook pages, project websites; • Provided via email; • Where available letterbox drop; and/or • Integrated to the project's Social Pinpoint page.

[23] If inside 4 sqm per person or computer station, if outside 1.5m between each person or computer station.

[24] If inside 4 sqm per person or computer station, if outside 1.5m between each person or computer station.

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7 May 2020

Marilyn Carroll-Johnson
Corroboree Aboriginal Corporation
PO Box 3340
Rouse Hill NSW 2155

Re: Dungowan Dam and associated infrastructure - Project information and assessment methodology

Dear Marilyn,

1 Introduction

Thank you for registering your interest in the Dungowan Dam project, southeast of Tamworth, NSW (Figures 1 and 2). WaterNSW has engaged EMM Consulting Pty Ltd (EMM) to prepare the Aboriginal Cultural Heritage Assessment (ACHA) to investigate and understand the cultural heritage values of the project area and surrounds. The assessment will consider the potential impacts of the project and how mitigation and management of cultural heritage needs to be integrated into the delivery of the project. The assessment forms part of an Environmental Impact Statement or Review of Environmental Factors currently being prepared.

This document is provided in accordance with sections 4.2 and 4.3 of the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (DECCW 2010), which sets out the Aboriginal consultation requirements for the project. Additional Aboriginal community liaison and participation opportunities will occur in accordance with a project specific consultation strategy.

The aims of this letter are to:

- provide an overview of the project and how it will be assessed;
- provide background on the project and some of the initial investigations to date;
- establish the purpose and aims of the Aboriginal consultation process;
- seek information about any Aboriginal cultural heritage values associated with the project and how they may affect, inform or refine the project and/or assessment methods;
- seek information on any cultural activities (such as fishing and hunting) that has historically and/or is actively being undertaken in the project area;
- identify any culturally appropriate protocols that registered parties wish to be adopted during the information gathering process (eg protocols during field survey, or handling of culturally sensitive information); and
- present a draft of the intended assessment methods for your review and comment.

We welcome your feedback at your earliest convenience, and will be consulting with the registered Aboriginal parties for the duration of the ACHA, currently proposed to extend to the end of 2020. However, for the purposes of this initial stage and in accordance with the Department of Planning, Industry and Environment (DPIE) guidelines, we request any written response on the information and process below by **4 June 2020.**

At this time, we propose to conduct all consultation via teleconferencing, e-mail or phone due to the social distancing rules from the COVID-19 outbreak. However, where feasible, we would meet in person (face-to-face meetings), and would ensure appropriate protocols are in place as per Government health advice at that time. Appendix A of this document provides our proposed methods for social distancing during consultation at this time. We would like to hear from your organisation on this to ensure that you are able to contribute knowledge to the project and have the opportunity to be involved, whilst ensuring we comply with up-to-date social distancing requirements.

For reference, the WaterNSW contact is: Meredith Abrams, Community Engagement Officer, P: 1300 662 077, E: meredith.abrams@waternsw.com.au. EMM is working on the proponent's behalf, and all queries should be directed through EMM. Feedback can be provided to:

Georgia Burnett

Address: PO Box 21, St Leonards, NSW 1590

Phone: 02 9493 9500

Email: gburnett@emmconsulting.com.au

2 Project information

2.1 Project overview and proposed assessment

WaterNSW is proposing to undertake the planning and delivery of three new or augmented dams in NSW, which includes a new Dungowan Dam and supply pipeline. The need to deliver the dams is critical to the State's drought recovery process and needs to be completed to the highest standard in relation to the assessment and delivery. Each dam is to be constructed rapidly to create security for the various town water supplies and associated industries reliant on the delivery of water for viability.

The project includes:

- a new dam downstream of the existing Dungowan Dam, with a nominal capacity of 22.5 gigalitres (GL);
- partial or full decommissioning of the existing Dungowan Dam and rehabilitation of the storage area of the dam; and
- a new delivery pipeline from the proposed dam to the junction with the Chaffey Dam pipeline and a further stage from the junction to the Calala water treatment plant located in Tamworth.

The project is identified as Critical State Significant Infrastructure (CSSI) under the provisions of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act). A CSSI project requires approval from the NSW Minister for Planning and Public Spaces and is accompanied by an EIS. The assessment of Aboriginal cultural heritage would be one of several investigations included in the EIS. The assessment would be developed in response to Secretary Environmental Assessment Requirements (SEARs) issued by DPIE, which will outline the investigative requirements for Aboriginal heritage. These will likely require an assessment that aligns with DPIE guidelines[17] for investigating and assessing Aboriginal heritage and consulting with the Aboriginal community. However, CSSI projects do not require separate approvals under the *National Parks and Wildlife Act 1974* (eg Aboriginal heritage impact permits), rather any subsequent requirements for heritage are managed in accordance with the conditions of approval, provided by the Minister.

The section of the pipeline between its junction with the Chaffey Dam pipeline and extending to the Calala water treatment plant would be delivered as the 'early work' for the project, and will be assessed separately to the EIS, within a Review of Environmental Factors (REF) under Part 5 of the EP&A Act. This component of the project may require approval under the *National Parks and Wildlife Act 1974* if impacts on Aboriginal heritage are identified. This assessment would adopt the process and requirements described within DPIE guidelines.

2.2 Initial Aboriginal heritage investigations

An investigation of Aboriginal heritage and the potential for cultural material to be present in the project area was undertaken as part of the scoping study – the document lodged in March 2020 with DPIE to inform the contents of the EIS. This study was primarily a desktop investigation, including a review of previous investigations and the application of key environmental landforms to identify areas of archaeological interest (Figure 3).[18] The study resulted in the following conclusions:

> …there is currently no information on the Aboriginal heritage of the immediate environment. A search of the surrounding region reveals only a small number of previously documented sites ($\bar{x}$=~1 site per 50 km^2), with the nearest some 9 km from the study area. In comparison with Chaffey Dam, a nearby dam in a similar environmental context, the data suggest that the proposed works would affect primarily stone artefact sites associated with the transient and ephemeral use of the landscape in the past. These would likely be found as surface and/or sub-surface deposits in the vicinity of Dungowan Creek, Terrible Billy Creek and/or Jones Oaky Creek. A site inspection validates these predictions, with a number of elevated terraces and floodplains adjacent the creeks revealing cultural material. Specifically, areas within 100 m either sides of these creeks are considered to have high potential for surface and sub-surface cultural material. The latter quite possible in stratified contexts, and thereby able to provide significant information on the past use of the region by Aboriginal people.
>
> While predictions indicated the potential for rockshelters and associated features (such as art) to be present along the valley edges and where other geological outcropping is found, none were observed. The nature of the geomorphology resulted in more moderate hills and slopes, and the potential for such sites is therefore considered low. Similarly, exposed geologically outcropping in the rivers themselves were not encountered, and as such the presence of grinding grooves may similarly be considered low. However, the site inspection cannot definitively determine the presence or absence of ceremonial activities and/or natural resource sites, that are known in the region. These sites are commonly considered of significance and will likely require more detailed understanding and management through the project.

[17] *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in New South Wales* (OEH 2011)

[18] EMM Consulting Pty Ltd, 2020, Three Dams Project - Dungowan Dam - Aboriginal and Historic heritage constraints assessment report, Report for Water NSW. Available for download here: https://www.planningportal.nsw.gov.au/major-projects/project/30026

In addition to above, the observations along the main creeklines within the project area, suggest that they have the potential to contain complex geomorphology, including a range of alluvial terraces. Some of these appear to be >1m in depth and have potential to be of significant age. The establishment of the existing dam and subsequent regulation of river flow in the 20th century has also potentially modified and/or affected these alluvial deposits and require further investigation.

Following these findings, EMM is now undertaking a more extensive investigation of the Aboriginal heritage values of the project area, including consultation with and participation of Aboriginal stakeholders. For the early works, we will be producing an ACHA in accordance with DPIE guidelines. For the remainder of the works, our investigations will broadly follow DPIE guidelines, but the accelerated timeframe of the overall project requires some modifications to the process detailed in the guidelines. This includes undertaking archaeological test excavation immediately following the field survey (rather than a more extended gap between the two in some projects); and the adoption of mechanically assisted excavations to maximise coverage and depths given the potential for deep alluvial floodplains. These are outlined further below.

3 Aboriginal stakeholders

Following the notification process undertaken between 17 April – 1 May 2020, the following Aboriginal stakeholders have expressed an interest in being involved in the project:

- Tamworth Local Aboriginal Land Council;
- Nunawanna Aboriginal Corporation;
- The Gomeroi People;
- DFVT Enterprises;
- [redacted]
- AT Gomilaroi Cultural Consultancy; and
- Galamaay Cultural Consultants.

4 Dungowan pipeline (early works) – REF assessment methodology

The assessment of the pipeline component between Calala water treatment plant and its junction with the Chaffey Dam pipeline is to be assessed under Part 5 of the EP&A Act (Figure 2). As such, additional approvals required under the *National Parks and Wildlife Act 1974* may apply, and therefore it must conform with the following guidelines:

- *Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW* (OEH 2011);
- *Code of Practice for Archaeological Investigations of Aboriginal Objects in NSW* (the Code of Practice) (DECCW 2010); and
- *Aboriginal Consultation Requirements for Proponents 2010* (DECCW 2010).

4.1 Methods

The purpose of the assessment is to identify and manage the Aboriginal cultural heritage values of all areas that will be affected by the study. In summary, this will involve.

- consultation with the Aboriginal stakeholders to identify socio-cultural values of the project area and places of special significance that should be considered;
- a search of the AHIMS register for records of previously registered Aboriginal sites;
- a review of past Aboriginal heritage reports covering the study area;
- environmental landscape analysis to identify past Aboriginal resources and suitable occupation areas;
- synthesis of background research to develop a predictive model of Aboriginal site location;
- field investigation to validate the findings of the desktop and identify any previously undocumented cultural material. This would include surface inspection and may extend to test excavations of areas of archaeological interest;
- an assessment of significance for Aboriginal cultural heritage values in the project area (with input from the registered Aboriginal stakeholders);
- an impact assessment of how the project will affect Aboriginal cultural heritage values in the project area; and
- development of management recommendations based on the results of the assessment and input from registered Aboriginal stakeholders during the consultation process and particularly from the draft ACHA review period.

4.1.1 Field investigation

Survey of the project area would be undertaken to identify any extant Aboriginal objects or sites. Surface investigation will consist of the survey team evenly spaced (5-10 m apart) walking transects across accessible parts of the study area, with a key focus on targeting areas of low disturbance. The focus of the team will be to both investigate soil exposures for extant Aboriginal objects and identify landforms that have potential for cultural material to be present (either surface or subsurface). It should be acknowledged that the entire ground surface within the project area project boundary is unlikely to be surveyed, but a representative sample of each landform within the project area will be gathered to characterise the archaeology, or its potential, of the project area. All Aboriginal objects and/or landforms of interest would be mapped and documented using hand-held GPS, photographs, sketches and written description.

The survey will be undertaken in accordance with Requirements 5 to 10 of the Code of Practice. In summary, the Code of Practice requires the following general methodology:

- pedestrian survey;
- survey and recording according to survey unit and/or transect;
- recording of beginning and end points of transects or the boundaries of survey units, and the spacing between survey personnel;
- recording of landform, soil information, land surface, vegetation conditions, visibility and exposure, and survey coverage;

- recording of any identified Aboriginal sites identified according to Requirements 6-8, and recording of any identified Aboriginal objects in accordance with Requirements 18-24 of the Code of Practice;

- if any Aboriginal objects and/or sites are identified in the course of the survey, site cards will be completed and submitted to the AHIMS registrar; and

- in the event of Aboriginal heritage being identified within the project footprint, undertake discussions on site as to the potential further investigation and/or management of these finds.

At this stage, no test excavations are proposed for the early works stage, and the aim of the project is to avoid such a program for this phase where possible (due to the shortened assessment timeframes). Rather, it is anticipated that there is enough flexibility in the pipeline route and construction methods to avoid any areas identified as archaeologically sensitive. However, if test excavations are required to further characterise the archaeological resource of an area identified in the survey, they would be implemented shortly following the survey, in accordance with the Code of Practice. Specifically, they would include the following activities:

- all test excavation pits would be spatially located using a differential GPS device, which would also provide elevation data;

- manual excavation of 0.25m² test pits in a systematic grid across areas of archaeological interest within the impact footprint. The spatial resolution of the grid would be dependent on on-ground conditions, but would likely have test pits between 20-50m apart;

- All excavation would use hand tools. Excavation of the first unit would be in 5cm spits, with subsequent excavation allowed in 10cm spits or according to stratigraphy (whichever is smallest) depending on the results of the first unit. Manual excavation would continue to either: i) the base of the cultural deposits; ii) to the depth of the underlying geology; or iii) to the maximum depth possible via hand excavation (likely ~ 80cm).

- sieving of all manually excavated material through a 5mm sieve;

- reduced levels of the top and bottom of the test pit would be documented using a dumpy level against a known elevation. Other levels may be taken as required;

- soil profiles would be recorded in accordance with the Code of Practice, including scaled drawings, photographs, and written descriptions;

- soil samples may be collected for description, sedimentological and chronological analysis where such analysis is considered likely to contribute significant information; and

- excavation procedures and protocols may be modified at the discretion of the Excavation Director, in consultation with the Aboriginal stakeholders and the proponent as the conditions in the field and nature of the excavations develop. This includes the movement of test pits to avoid existing built structures, buried services and disturbances not identified during the desktop phase.

4.2 Timeframes

The following indicative timeframes for the Pipeline REF assessment would apply:

- distribution of this document to the registered Aboriginal stakeholders: May 2020;

- field investigation of the project area: early to mid-June 2020;

- distribution of the draft report: early July 2020;

- input into recommendations and review of draft report: mid July – mid August 2020;
- report finalisation and submission of AHIP application (if required): mid-August 2020;
- determination of the REF: September 2020; and
- construction commencing on the early work section of pipeline: October 2020.

5 Dungowan Dam (main works) – EIS assessment methodology

An EIS will be prepared to assess the dam and associated infrastructure (Figure 1) as a CSSI assessment under Division 5.2 of the EP&A Act. As such, it is required to follow and address Aboriginal heritage requirements as outlined by the SEARs. The assessment will be developed in *broad* accordance with the following guidelines:

- *Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW* (DECCW 2010); and
- *Aboriginal Consultation Requirements for Proponents 2010* (DECCW 2010).

5.1 Methods

The purpose of the assessment is to identify and manage the Aboriginal cultural heritage values of all areas that will be affected by the study. In summary, this will involve:

- consultation with the Aboriginal stakeholders to identify socio-cultural values of the project area, greater understanding of cultural fishing and hunting activities, and places of special significance that should be considered;
- a search of the AHIMS register for records of previously registered Aboriginal sites;
- a review of past Aboriginal heritage reports covering the study area;
- environmental landscape analysis to identify past Aboriginal resources and suitable occupation areas;
- synthesis of background research to develop a predictive model of Aboriginal site location;
- field investigation to validate the findings of the desktop, and identify any previously undocumented cultural material. This would include surface inspection and test excavations of areas of archaeological interest;
- an assessment of significance for Aboriginal cultural heritage values in the project area (with input from the registered Aboriginal stakeholders);
- an impact assessment of how the project will affect Aboriginal cultural heritage values in the project area; and
- development of management recommendations based on the results of the assessment and input from registered Aboriginal stakeholders during the consultation process and particularly from the draft assessment review period.

5.1.1 Field investigation

Survey of the project area would be undertaken to identify any extant Aboriginal objects or sites. Surface investigation will consist of the survey team evenly spaced (5-10 m apart) walking transects across accessible parts of the study area. The focus of the team will be to both investigate soil exposures for extant Aboriginal objects and identify landforms that have potential for cultural material to be present (either surface or subsurface). All Aboriginal objects and/or landforms of interest would be mapped and documented using hand-held GPS, photographs, sketches and written description.

The survey will be undertaken using the following general methodology:

- pedestrian survey;
- survey and recording according to survey unit and/or transect;
- recording of beginning and end points of transects or the boundaries of survey units, and the spacing between survey personnel;
- recording of landform, soil information, land surface, vegetation conditions, visibility and exposure, and survey coverage;
- recording of any identified Aboriginal sites identified according to Requirements 6-8, and recording of any identified Aboriginal objects in accordance with Requirements 18-24 of the Code of Practice;
- if any Aboriginal objects and/or sites are identified in the course of the survey, site cards will be completed and submitted to the AHIMS registrar; and
- in the event of Aboriginal heritage being identified within the project footprint, undertake discussions on site as to the potential further investigation and/or management of these finds.

In addition to the field survey, an archaeological test excavation is proposed for the project area. The investigations will be developed to fulfil the research aims and objectives outlined below. Given the large size of the project area, and the potential for deep deposits – likely to extend below depths that can be easily investigated manually –a grid of mechanically excavated test pits across the site (Figure 4) are proposed. These test pits would be distributed to: i) focus on areas of archaeological interest as determined by the earlier desktop investigations (Section 2.2); ii) to improve our understanding of the area's geomorphological history, and iii) in response to any findings of the field survey undertaken above that may influence areas for future investigation. With respect to the timeframes provided and in anticipation of any obstructions faced on site, we propose up to 40-60 test pits be excavated across the project area. The excavations would adopt the following methods:

- all test excavation pits would be spatially located using a differential GPS device;
- mechanical excavation of some 40-60 ~2m^2 (2x1m) test pits in a systematic grid across the project area;
- all excavation would be undertaken with a flat mud bucket and in controlled 20cm spits, to either: i) the base of the cultural deposits; or ii) to the depth of the underlying geology, or iii) to the full extent of the excavator reach (~3m) where neither (i) or (ii) are met;
- reduced levels of the top and bottom of the test pit would be documented using a dumpy level against a known elevation. Other levels may be taken as required;

- all sediment would be stockpiled in its respective spits, labelled according to its assigned test pit number and recorded and documented. Fifty per cent (50%) of each stockpile – typically ~800kg – would be placed in buckets or bulk soil bags. This sediment would then be wet-sieved through a 5mm wire aperture mesh, and any cultural material recovered, labelled and bagged for subsequent analysis and curation. In the event that Aboriginal objects are recovered, the remaining 50% of the sediment from that spit would be sieved to maximise cultural material recovery. Where no Aboriginal objects are recovered in the initial 50% sub-sample, no further sieving of that spit would occur;

- soil profiles would be recorded in accordance with the Code of Practice, including scaled drawings, photographs, and written descriptions;

- soil samples may be collected for description, sedimentological and chronological analysis where such analysis is considered likely to contribute significant information; and

- excavation procedures and protocols may be modified at the discretion of the Excavation Director, in consultation with the Aboriginal stakeholders and the proponent as the conditions in the field and nature of the excavations develop. This includes the movement of test pits to avoid existing built structures, buried services and disturbances not identified during the desktop phase.

i Research aims and objectives

Our understanding of the cultural materials across the project area is poor, but visual observations suggests that there is a complex and deep fluvial history. It is envisaged that within this complex fluvial history, cultural materials may have been deposited, either through discard by Aboriginal people, or through natural accumulation of materials in these types of deposits. Based on this limited understanding of the project area, a number of overarching aims can be developed for the assessment:

- Identify, map and characterise the nature, age, extent, integrity and significance of the Aboriginal cultural material within the project area.

- Answer research questions including:

    - What are the environmental characteristics associated with the distribution of Aboriginal cultural heritage within the project area?

    - Can the formative processes of the stratigraphic profile provide information on the nature and/or survivability of the archaeological resources?

    - Are there other key factors in the distribution and extent of the material culture within the project area (eg how the dam has affected these deposits)?

    - What are the cultural, social and public values associated with the Aboriginal archaeological resource within the project area?

    - How should the Aboriginal sites in the region be conserved and managed in future?

- Better assess the significance and historical meaning of the cultural materials that exist within the project area so that future archaeological investigation can advance our understanding of past Aboriginal cultural behaviour and environmental adaptation.

- Direct future heritage activities and mitigation measures (if required) for the project area.

ii Analysis, Reporting and Temporary Storage

Post-excavation analysis and reporting will be required to inform the ACHA and subsequent documentation. The post-excavation analysis would be designed to address the research objectives, along with other relevant questions that may arise based on the results of the excavation. Results of the analysis would be presented in relation to comparative site data where possible, and where useful in addressing research questions about the nature, extent, and timing of Aboriginal occupation of the area in the past. These results and discussions would be incorporated into the assessment, which will be provided to the Aboriginal stakeholders for review prior to finalisation.

Once the excavations are completed, all Aboriginal cultural material recovered will be securely stored at the EMM Sydney office for analysis. At the completion of the analysis and reporting, the final location of the assemblage would be discussed with the Aboriginal stakeholders and proponent to determine a suitable long term repository for the cultural materials.

5.2 Timeframes

The following indicative timeframes for the main works EIS assessment would apply:

- distribution of this document to the registered Aboriginal stakeholders: May 2020;
- field investigation of the project area: early June – mid July 2020 (4-6 weeks);
- distribution of the draft report: early October 2020;
- input into recommendations and review of draft report: mid-October – early November 2020;
- finalisation of report for inclusion in EIS: early December 2020; and
- environmental impact assessment development and submission: early December – October 2021
- construction commencing on the main works portion of Dungowan Dam: October 2021. Construction is expected to take four years, dependant on design.

6 What we need from you

In addition to the archaeological evidence described above, Aboriginal heritage incorporates a wide range of values such as stories, traditions and cultural practices. EMM welcomes advice from the Aboriginal community about cultural values (which might include archaeological sites or other types of values) relevant to the project area and its surrounds. EMM is relying on the Aboriginal community for advice on non-archaeological and intangible Aboriginal values for the study area. We are happy to discuss any information which you are willing to share and will respect confidentiality where requested.

EMM would appreciate your feedback on the above methodology proposed for the investigation and assessment of the project area. In responding, please also consider the following questions:

- Are there any other knowledge-holders or traditional owner groups we should be contacting to obtain cultural information on this area?
- Are there any protocols in relation to community interaction and/or cultural heritage that you would like adopted during the project?
- Are you aware of any Aboriginal objects, places, sites or stories of cultural significance and/or importance that you are aware of within the project area? If so, please advise us how you wish them to be dealt with during the project.

- Are you aware of any past or current fishing and hunting activities within the project area? Do you have any views on how these should be managed into the future?

- Is the information you are providing sensitive, gender specific, etc? If so, how would you like the information you provide to EMM to be managed? Noting that some documentation for the ACHA process will be required.

- Do you require any further information prior to EMM proceeding with the project?

In your response, can you please also clearly identify who you would like EMM to talk to within your organisation, and provide contact details for these individuals. Please also ensure your preferred method of communication (eg telephone call, e-mail, letter, etc) is highlighted for subsequent stages of the project.

7 Closing

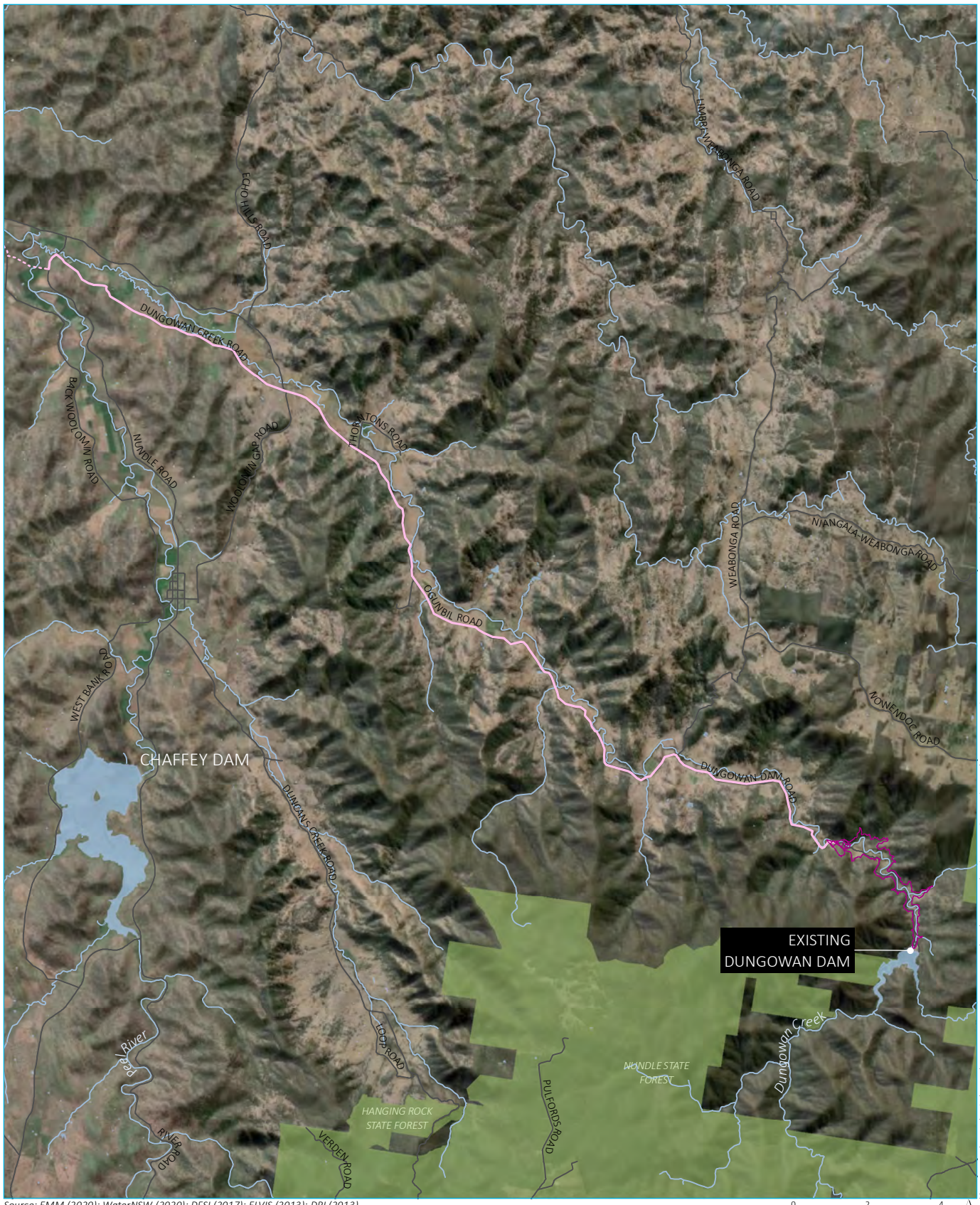
We look forward to receiving any response your organisation wishes to make about the proposed method by **4 June 2020**. Your response will be documented and considered in the assessment. Most importantly, your cultural information is also welcome within this timeframe; but it can also be submitted up until the completion of the draft ACHA.

Please feel free to contact me with any questions.

Yours sincerely

Georgia Burnett
Archaeologist

gburnett@emmconsulting.com.au



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Source: EMM (2020); WaterNSW (2020); DFSI (2017); ELVIS (2013); DPI (2013)

**Inundation area should be considered approximate only. It is based on current limited available spatial data and is subject to future verification.*

0 2 4 km

GDA 1994 MGA Zone 56

N

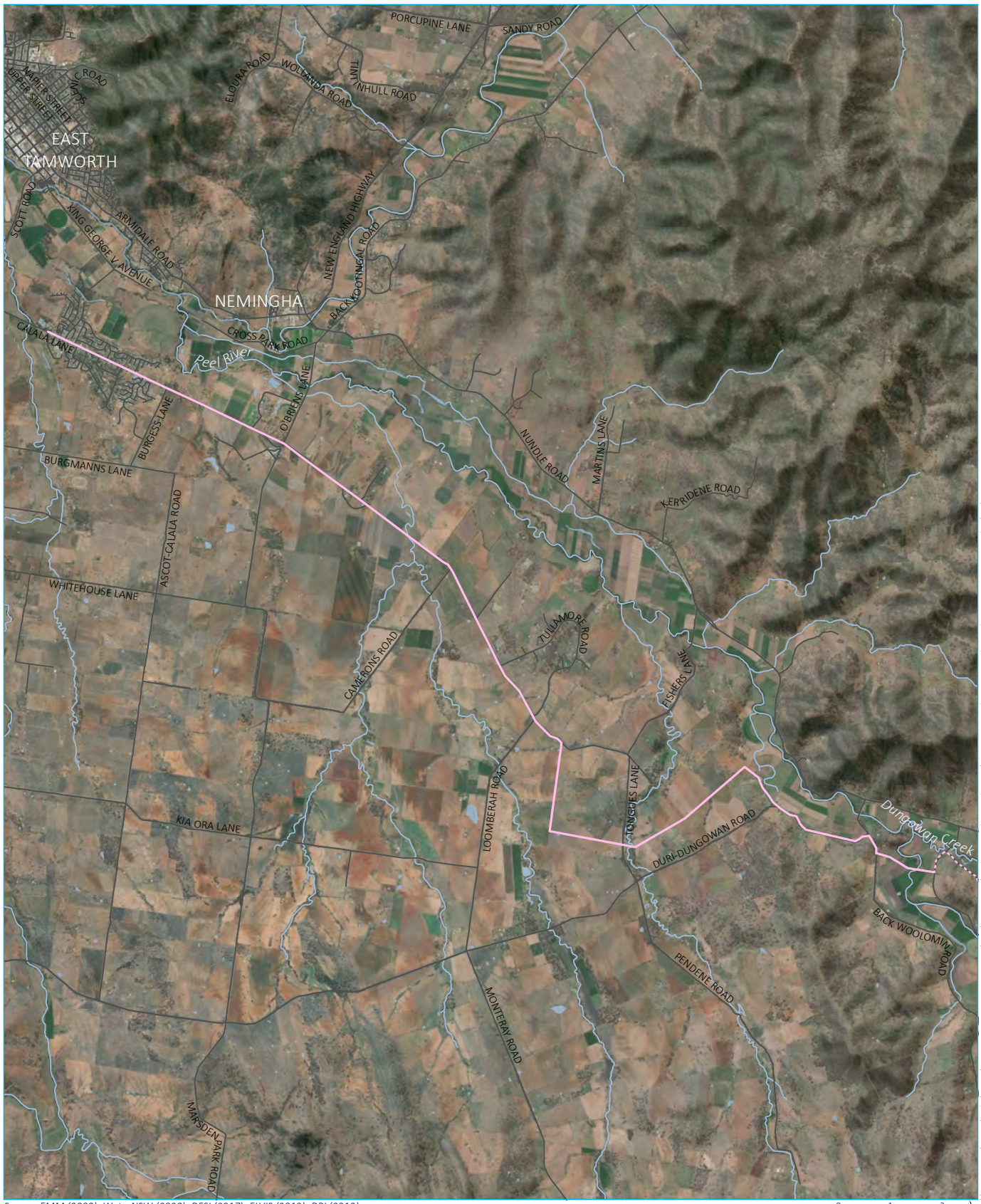
KEY

- Project footprint
- Indicative pipeline alignment (EIS)
- Indicative pipeline alignment (REF)
- Main road
- Named watercourse
- Waterbody
- State forest

The proposed project

Dungowan Dam Project
Aboriginal consultation
Figure 1

EMM
creating opportunities



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Source: EMM (2020); WaterNSW (2020); DFSI (2017); ELVIS (2013); DPI (2013)

**Inundation area should be considered approximate only. It is based on current limited available spatial data and is subject to future verification.*

0 1 2 km

GDA 1994 MGA Zone 56

N

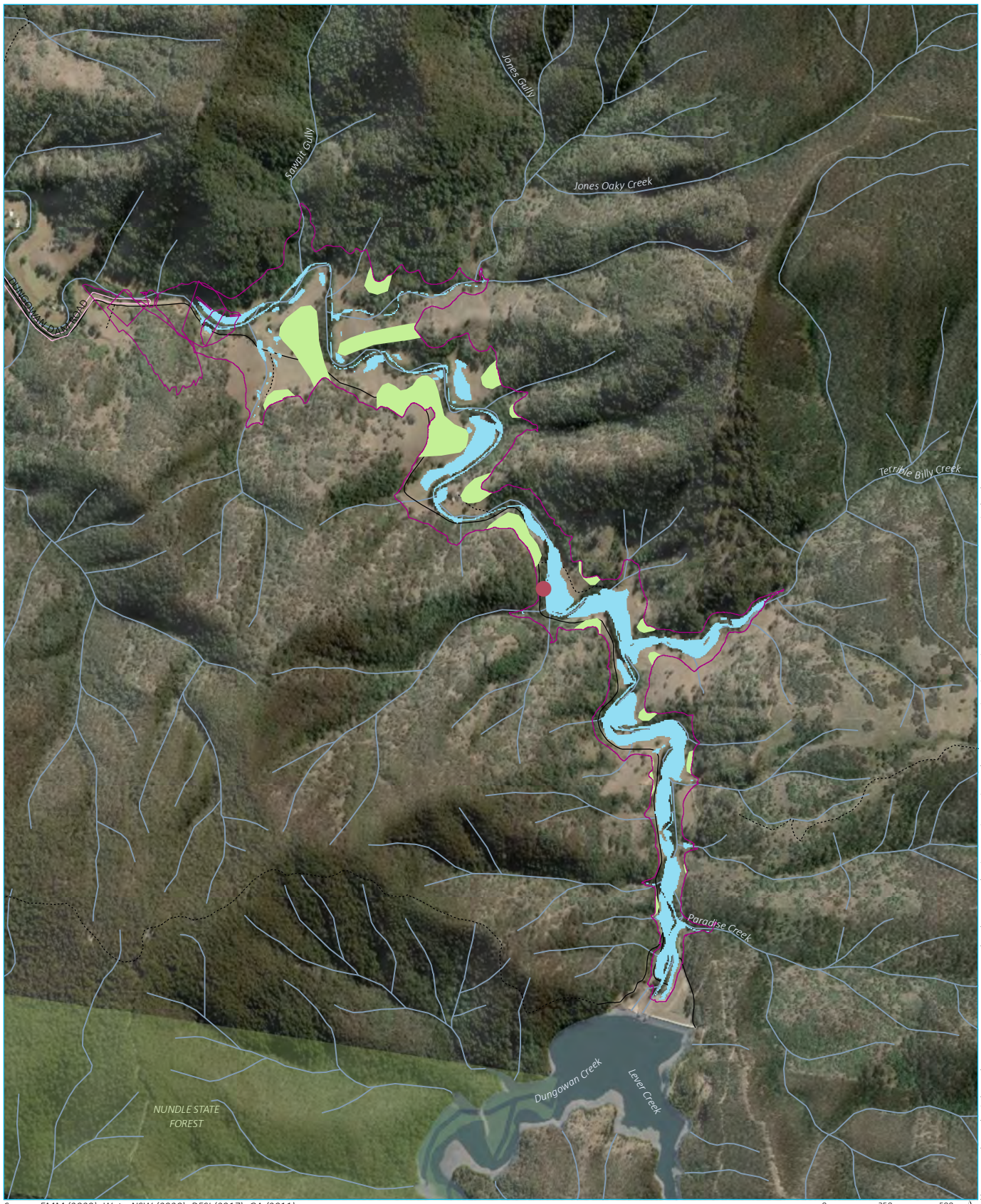
KEY

- Indicative pipeline alignment (REF)
- Indicative pipeline alignment (EIS)
- Main road
- Named watercourse
- Waterbody

The early works study area

Dungowan Dam Project
Aboriginal consultation
Figure 2

EMM
creating opportunities



Source: EMM (2020); WaterNSW (2020); DFSI (2017); GA (2011)

*Inundation area should be considered approximate only. It is based on current limited available spatial data and is subject to future verification.

0 250 500 m

GDA 1994 MGA Zone 56

N

KEY

- Project footprint
- Indicative pipeline alignment (20 m buffer)
- Local road
- Track
- Watercourse
- Waterbody
- State forest

Area of archaeological potential

- Crest landform
- Level to gently inclined landforms within 100 m of primary watercourse
- Very steep to precipitous terrain

Areas of archaeological sensitivity

Dungowan Dam Project
Aboriginal consulation
Figure 3

EMM creating opportunities

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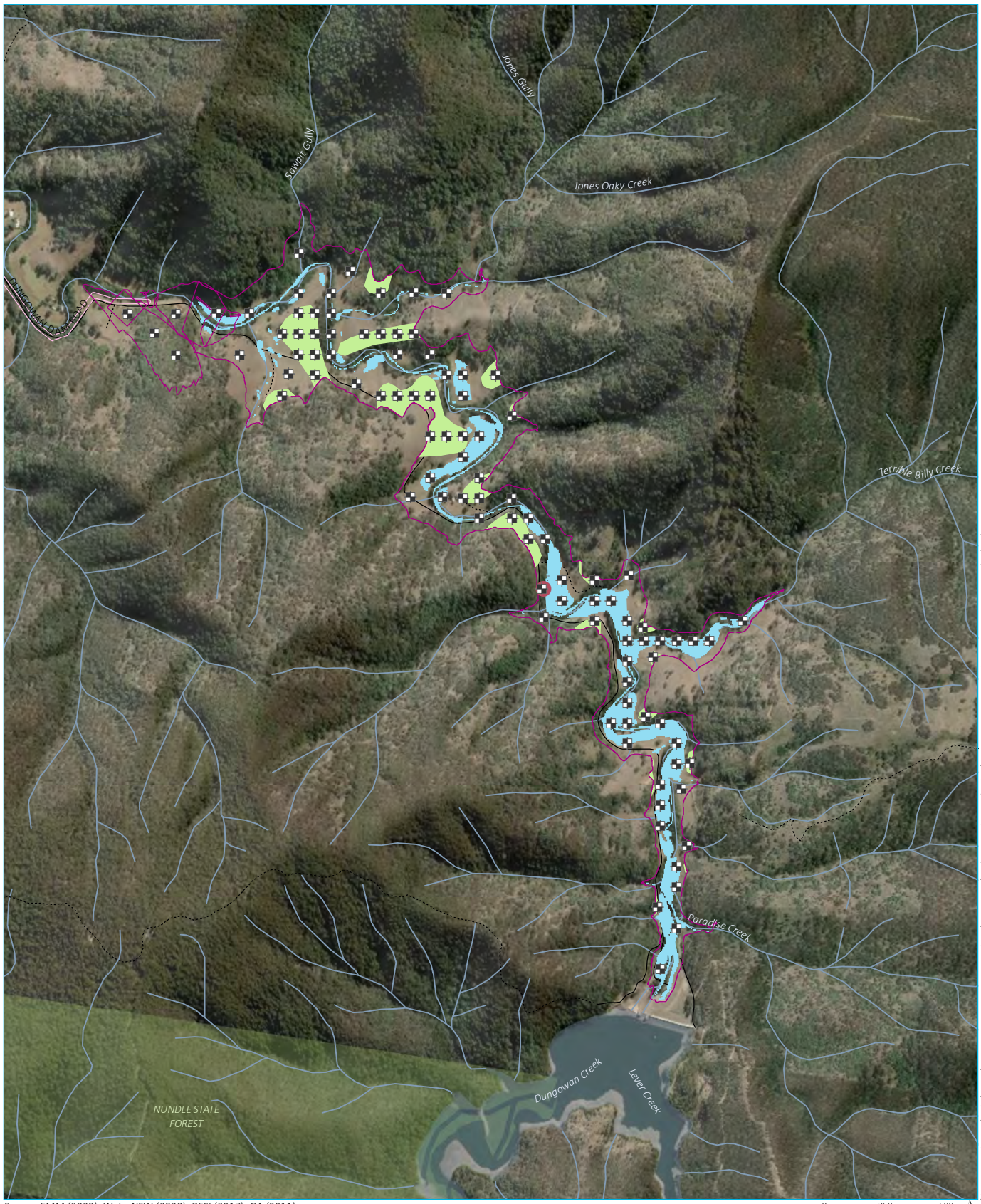

Source: EMM (2020); WaterNSW (2020); DFSI (2017); GA (2011)

*Inundation area should be considered approximate only. It is based on current limited available spatial data and is subject to future verification.

0 250 500 m

GDA 1994 MGA Zone 56

N

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KEY

- Archaeological test location
- Project footprint
- Indicative pipeline alignment (20 m buffer)
- Local road
- Track
- Watercourse
- Waterbody
- State forest

Area of archaeological potential

- Crest landform
- Level to gently inclined landforms within 100 m of primary watercourse
- Very steep to precipitous terrain

Indicative archaeological test excavation program

Dungowan Dam Project
Aboriginal consulation
Figure 4

EMM
creating opportunities

Appendix A

COVID-19 consultation methods

A.1 General

WaterNSW and their consultants are cognisant of the importance of safety to community and stakeholders, clients and staff. Prior to any engagement those with the greatest risk of more serious illness with COVID-19 will be considered:

- Aboriginal and Torres Strait Island people over the age of 50; and
- those aged 60 year and over.

We adhere to the Government requirements regarding COVID-19 and amend our approach as required in this dynamic environment. At the time of writing this document, we note the need to:

- restrict outdoor gatherings to no more than 2 people;
- maintain a 1.5m distance when outside;
- maintain a 4 sqm distance when inside;
- regularly wash hands using soap and water or alcohol-based hand sanitiser;
- surfaces are cleaned prior and after use using alcohol-based sanitiser; and
- observe all travel bans.

The current COVID-19 pandemic and the government requirements to self-isolate and practice social distancing has necessitated a different approach to community and stakeholder engagement. EMM has responded by adopting the practices outlined in Table A1.

Table A.1 Aboriginal community and stakeholder engagement options – COVID-19

Previous approach	COVID-19 methods
Face to face interviews	• Videoconference; • Teleconference; • Where access to hardware and/or software is not available two options could apply: – iPad could be provided to those in remote and isolated locations that is preloaded with: ▪ Prepaid SIM; ▪ Facetime (this is the easiest platform to use for inexperienced users); and ▪ EMM person contact details. – Satellite model where a safe location is provided[19] in negotiation with the client and or participant/s. The location will be set to have: ▪ Person to welcome and direct person to computer station and be available to assist if required (not to be present in the room while interview is being undertaken); ▪ Computer station with videoconference session ready ie person only needs to sit and participate in the face to face interview; ▪ Sanitary wipes to allow the participant to wipe keyboard and mouse before and after participation in the interview. • In the case of satellite model, identify where possible those we have an existing relationship locally who can act as the contact person and/or assist in identifying the appropriate participant/s. There would need to be an agreement up from on: – Who will be responsible locally for facilitating and arranging for participants to attend meetings; – Pre-arranged times and dates (including timeframes eg 3 months) for meetings; and – Pre agreed incentives eg donation of device to the organiser. ***Note: payment for face to face participation would still apply if replaced with videoconferencing/teleconferencing options.***
Group meetings/ workshops	• Videoconference and/or • Online forum/discussions using Social Pinpoint or equivalent • Satellite model where a safe location is provided[20] in negotiation with the client and or participant/s. The location will be set to have: – Person to welcome and direct person to computer station and be available to assist if required; – Computer station with videoconference session ready ie person only needs to sit and participate in the group discussion; – Sanitary wipes to allow the participant to wipe keyboard and mouse before and after participation in the interview.
Community information sessions	• Online forum/discussions using Social Pinpoint
On-line surveys	• On-line surveys integrated with Social Pinpoint • On-line survey via Survey Monkey delivered via email addresses
Newsletters/ Information delivered in person or via letterbox drop	• Provided passively on agreed resident/Council Facebook pages, project websites; • Provided via email; • Where available letterbox drop; and/or • Integrated to the project's Social Pinpoint page.

[19] If inside 4 sqm per person or computer station, if outside 1.5m between each person or computer station.

[20] If inside 4 sqm per person or computer station, if outside 1.5m between each person or computer station.

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7 May 2020

Derrick Vale
DFTV Enterprises
5 Mountbatten Close
Rutherford NSW 2320

Re: Dungowan Dam and associated infrastructure - Project information and assessment methodology

Dear Derrick,

1 Introduction

Thank you for registering your interest in the Dungowan Dam project, southeast of Tamworth, NSW (Figures 1 and 2). WaterNSW has engaged EMM Consulting Pty Ltd (EMM) to prepare the Aboriginal Cultural Heritage Assessment (ACHA) to investigate and understand the cultural heritage values of the project area and surrounds. The assessment will consider the potential impacts of the project and how mitigation and management of cultural heritage needs to be integrated into the delivery of the project. The assessment forms part of an Environmental Impact Statement or Review of Environmental Factors currently being prepared.

This document is provided in accordance with sections 4.2 and 4.3 of the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (DECCW 2010), which sets out the Aboriginal consultation requirements for the project. Additional Aboriginal community liaison and participation opportunities will occur in accordance with a project specific consultation strategy.

The aims of this letter are to:

- provide an overview of the project and how it will be assessed;
- provide background on the project and some of the initial investigations to date;
- establish the purpose and aims of the Aboriginal consultation process;
- seek information about any Aboriginal cultural heritage values associated with the project and how they may affect, inform or refine the project and/or assessment methods;
- seek information on any cultural activities (such as fishing and hunting) that has historically and/or is actively being undertaken in the project area;
- identify any culturally appropriate protocols that registered parties wish to be adopted during the information gathering process (eg protocols during field survey, or handling of culturally sensitive information); and
- present a draft of the intended assessment methods for your review and comment.

We welcome your feedback at your earliest convenience, and will be consulting with the registered Aboriginal parties for the duration of the ACHA, currently proposed to extend to the end of 2020. However, for the purposes of this initial stage and in accordance with the Department of Planning, Industry and Environment (DPIE) guidelines, we request any written response on the information and process below by **4 June 2020.**

At this time, we propose to conduct all consultation via teleconferencing, e-mail or phone due to the social distancing rules from the COVID-19 outbreak. However, where feasible, we would meet in person (face-to-face meetings), and would ensure appropriate protocols are in place as per Government health advice at that time. Appendix A of this document provides our proposed methods for social distancing during consultation at this time. We would like to hear from your organisation on this to ensure that you are able to contribute knowledge to the project and have the opportunity to be involved, whilst ensuring we comply with up-to-date social distancing requirements.

For reference, the WaterNSW contact is: Meredith Abrams, Community Engagement Officer, P: 1300 662 077, E: meredith.abrams@waternsw.com.au. EMM is working on the proponent's behalf, and all queries should be directed through EMM. Feedback can be provided to:

Georgia Burnett

Address: PO Box 21, St Leonards, NSW 1590

Phone: 02 9493 9500

Email: gburnett@emmconsulting.com.au

2 Project information

2.1 Project overview and proposed assessment

WaterNSW is proposing to undertake the planning and delivery of three new or augmented dams in NSW, which includes a new Dungowan Dam and supply pipeline. The need to deliver the dams is critical to the State's drought recovery process and needs to be completed to the highest standard in relation to the assessment and delivery. Each dam is to be constructed rapidly to create security for the various town water supplies and associated industries reliant on the delivery of water for viability.

The project includes:

- a new dam downstream of the existing Dungowan Dam, with a nominal capacity of 22.5 gigalitres (GL);
- partial or full decommissioning of the existing Dungowan Dam and rehabilitation of the storage area of the dam; and
- a new delivery pipeline from the proposed dam to the junction with the Chaffey Dam pipeline and a further stage from the junction to the Calala water treatment plant located in Tamworth.

The project is identified as Critical State Significant Infrastructure (CSSI) under the provisions of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act). A CSSI project requires approval from the NSW Minister for Planning and Public Spaces and is accompanied by an EIS. The assessment of Aboriginal cultural heritage would be one of several investigations included in the EIS. The assessment would be developed in response to Secretary Environmental Assessment Requirements (SEARs) issued by DPIE, which will outline the investigative requirements for Aboriginal heritage. These will likely require an assessment that aligns with DPIE guidelines[13] for investigating and assessing Aboriginal heritage and consulting with the Aboriginal community. However, CSSI projects do not require separate approvals under the *National Parks and Wildlife Act 1974* (eg Aboriginal heritage impact permits), rather any subsequent requirements for heritage are managed in accordance with the conditions of approval, provided by the Minister.

The section of the pipeline between its junction with the Chaffey Dam pipeline and extending to the Calala water treatment plant would be delivered as the 'early work' for the project, and will be assessed separately to the EIS, within a Review of Environmental Factors (REF) under Part 5 of the EP&A Act. This component of the project may require approval under the *National Parks and Wildlife Act 1974* if impacts on Aboriginal heritage are identified. This assessment would adopt the process and requirements described within DPIE guidelines.

2.2 Initial Aboriginal heritage investigations

An investigation of Aboriginal heritage and the potential for cultural material to be present in the project area was undertaken as part of the scoping study – the document lodged in March 2020 with DPIE to inform the contents of the EIS. This study was primarily a desktop investigation, including a review of previous investigations and the application of key environmental landforms to identify areas of archaeological interest (Figure 3).[14] The study resulted in the following conclusions:

> …there is currently no information on the Aboriginal heritage of the immediate environment. A search of the surrounding region reveals only a small number of previously documented sites ($\bar{x}$=~1 site per 50 km^2), with the nearest some 9 km from the study area. In comparison with Chaffey Dam, a nearby dam in a similar environmental context, the data suggest that the proposed works would affect primarily stone artefact sites associated with the transient and ephemeral use of the landscape in the past. These would likely be found as surface and/or sub-surface deposits in the vicinity of Dungowan Creek, Terrible Billy Creek and/or Jones Oaky Creek. A site inspection validates these predictions, with a number of elevated terraces and floodplains adjacent the creeks revealing cultural material. Specifically, areas within 100 m either sides of these creeks are considered to have high potential for surface and sub-surface cultural material. The latter quite possible in stratified contexts, and thereby able to provide significant information on the past use of the region by Aboriginal people.
>
> While predictions indicated the potential for rockshelters and associated features (such as art) to be present along the valley edges and where other geological outcropping is found, none were observed. The nature of the geomorphology resulted in more moderate hills and slopes, and the potential for such sites is therefore considered low. Similarly, exposed geologically outcropping in the rivers themselves were not encountered, and as such the presence of grinding grooves may similarly be considered low. However, the site inspection cannot definitively determine the presence or absence of ceremonial activities and/or natural resource sites, that are known in the region. These sites are commonly considered of significance and will likely require more detailed understanding and management through the project.

[13] *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in New South Wales* (OEH 2011)

[14] EMM Consulting Pty Ltd, 2020, Three Dams Project - Dungowan Dam - Aboriginal and Historic heritage constraints assessment report, Report for Water NSW. Available for download here: https://www.planningportal.nsw.gov.au/major-projects/project/30026

In addition to above, the observations along the main creeklines within the project area, suggest that they have the potential to contain complex geomorphology, including a range of alluvial terraces. Some of these appear to be >1m in depth and have potential to be of significant age. The establishment of the existing dam and subsequent regulation of river flow in the 20th century has also potentially modified and/or affected these alluvial deposits and require further investigation.

Following these findings, EMM is now undertaking a more extensive investigation of the Aboriginal heritage values of the project area, including consultation with and participation of Aboriginal stakeholders. For the early works, we will be producing an ACHA in accordance with DPIE guidelines. For the remainder of the works, our investigations will broadly follow DPIE guidelines, but the accelerated timeframe of the overall project requires some modifications to the process detailed in the guidelines. This includes undertaking archaeological test excavation immediately following the field survey (rather than a more extended gap between the two in some projects); and the adoption of mechanically assisted excavations to maximise coverage and depths given the potential for deep alluvial floodplains. These are outlined further below.

3 Aboriginal stakeholders

Following the notification process undertaken between 17 April – 1 May 2020, the following Aboriginal stakeholders have expressed an interest in being involved in the project:

- Tamworth Local Aboriginal Land Council;
- Nunawanna Aboriginal Corporation;
- The Gomeroi People;
- DFVT Enterprises;
- [redacted]
- AT Gomilaroi Cultural Consultancy; and
- Galamaay Cultural Consultants.

4 Dungowan pipeline (early works) – REF assessment methodology

The assessment of the pipeline component between Calala water treatment plant and its junction with the Chaffey Dam pipeline is to be assessed under Part 5 of the EP&A Act (Figure 2). As such, additional approvals required under the *National Parks and Wildlife Act 1974* may apply, and therefore it must conform with the following guidelines:

- *Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW* (OEH 2011);
- *Code of Practice for Archaeological Investigations of Aboriginal Objects in NSW* (the Code of Practice) (DECCW 2010); and
- *Aboriginal Consultation Requirements for Proponents 2010* (DECCW 2010).

4.1 Methods

The purpose of the assessment is to identify and manage the Aboriginal cultural heritage values of all areas that will be affected by the study. In summary, this will involve.

- consultation with the Aboriginal stakeholders to identify socio-cultural values of the project area and places of special significance that should be considered;
- a search of the AHIMS register for records of previously registered Aboriginal sites;
- a review of past Aboriginal heritage reports covering the study area;
- environmental landscape analysis to identify past Aboriginal resources and suitable occupation areas;
- synthesis of background research to develop a predictive model of Aboriginal site location;
- field investigation to validate the findings of the desktop and identify any previously undocumented cultural material. This would include surface inspection and may extend to test excavations of areas of archaeological interest;
- an assessment of significance for Aboriginal cultural heritage values in the project area (with input from the registered Aboriginal stakeholders);
- an impact assessment of how the project will affect Aboriginal cultural heritage values in the project area; and
- development of management recommendations based on the results of the assessment and input from registered Aboriginal stakeholders during the consultation process and particularly from the draft ACHA review period.

4.1.1 Field investigation

Survey of the project area would be undertaken to identify any extant Aboriginal objects or sites. Surface investigation will consist of the survey team evenly spaced (5-10 m apart) walking transects across accessible parts of the study area, with a key focus on targeting areas of low disturbance. The focus of the team will be to both investigate soil exposures for extant Aboriginal objects and identify landforms that have potential for cultural material to be present (either surface or subsurface). It should be acknowledged that the entire ground surface within the project area project boundary is unlikely to be surveyed, but a representative sample of each landform within the project area will be gathered to characterise the archaeology, or its potential, of the project area. All Aboriginal objects and/or landforms of interest would be mapped and documented using hand-held GPS, photographs, sketches and written description.

The survey will be undertaken in accordance with Requirements 5 to 10 of the Code of Practice. In summary, the Code of Practice requires the following general methodology:

- pedestrian survey;
- survey and recording according to survey unit and/or transect;
- recording of beginning and end points of transects or the boundaries of survey units, and the spacing between survey personnel;
- recording of landform, soil information, land surface, vegetation conditions, visibility and exposure, and survey coverage;

- recording of any identified Aboriginal sites identified according to Requirements 6-8, and recording of any identified Aboriginal objects in accordance with Requirements 18-24 of the Code of Practice;

- if any Aboriginal objects and/or sites are identified in the course of the survey, site cards will be completed and submitted to the AHIMS registrar; and

- in the event of Aboriginal heritage being identified within the project footprint, undertake discussions on site as to the potential further investigation and/or management of these finds.

At this stage, no test excavations are proposed for the early works stage, and the aim of the project is to avoid such a program for this phase where possible (due to the shortened assessment timeframes). Rather, it is anticipated that there is enough flexibility in the pipeline route and construction methods to avoid any areas identified as archaeologically sensitive. However, if test excavations are required to further characterise the archaeological resource of an area identified in the survey, they would be implemented shortly following the survey, in accordance with the Code of Practice. Specifically, they would include the following activities:

- all test excavation pits would be spatially located using a differential GPS device, which would also provide elevation data;

- manual excavation of 0.25m² test pits in a systematic grid across areas of archaeological interest within the impact footprint. The spatial resolution of the grid would be dependent on on-ground conditions, but would likely have test pits between 20-50m apart;

- All excavation would use hand tools. Excavation of the first unit would be in 5cm spits, with subsequent excavation allowed in 10cm spits or according to stratigraphy (whichever is smallest) depending on the results of the first unit. Manual excavation would continue to either: i) the base of the cultural deposits; ii) to the depth of the underlying geology; or iii) to the maximum depth possible via hand excavation (likely ~ 80cm).

- sieving of all manually excavated material through a 5mm sieve;

- reduced levels of the top and bottom of the test pit would be documented using a dumpy level against a known elevation. Other levels may be taken as required;

- soil profiles would be recorded in accordance with the Code of Practice, including scaled drawings, photographs, and written descriptions;

- soil samples may be collected for description, sedimentological and chronological analysis where such analysis is considered likely to contribute significant information; and

- excavation procedures and protocols may be modified at the discretion of the Excavation Director, in consultation with the Aboriginal stakeholders and the proponent as the conditions in the field and nature of the excavations develop. This includes the movement of test pits to avoid existing built structures, buried services and disturbances not identified during the desktop phase.

4.2 Timeframes

The following indicative timeframes for the Pipeline REF assessment would apply:

- distribution of this document to the registered Aboriginal stakeholders: May 2020;

- field investigation of the project area: early to mid-June 2020;

- distribution of the draft report: early July 2020;

- input into recommendations and review of draft report: mid July – mid August 2020;
- report finalisation and submission of AHIP application (if required): mid-August 2020;
- determination of the REF: September 2020; and
- construction commencing on the early work section of pipeline: October 2020.

5 Dungowan Dam (main works) – EIS assessment methodology

An EIS will be prepared to assess the dam and associated infrastructure (Figure 1) as a CSSI assessment under Division 5.2 of the EP&A Act. As such, it is required to follow and address Aboriginal heritage requirements as outlined by the SEARs. The assessment will be developed in *broad* accordance with the following guidelines:

- *Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW* (DECCW 2010); and
- *Aboriginal Consultation Requirements for Proponents 2010* (DECCW 2010).

5.1 Methods

The purpose of the assessment is to identify and manage the Aboriginal cultural heritage values of all areas that will be affected by the study. In summary, this will involve:

- consultation with the Aboriginal stakeholders to identify socio-cultural values of the project area, greater understanding of cultural fishing and hunting activities, and places of special significance that should be considered;
- a search of the AHIMS register for records of previously registered Aboriginal sites;
- a review of past Aboriginal heritage reports covering the study area;
- environmental landscape analysis to identify past Aboriginal resources and suitable occupation areas;
- synthesis of background research to develop a predictive model of Aboriginal site location;
- field investigation to validate the findings of the desktop, and identify any previously undocumented cultural material. This would include surface inspection and test excavations of areas of archaeological interest;
- an assessment of significance for Aboriginal cultural heritage values in the project area (with input from the registered Aboriginal stakeholders);
- an impact assessment of how the project will affect Aboriginal cultural heritage values in the project area; and
- development of management recommendations based on the results of the assessment and input from registered Aboriginal stakeholders during the consultation process and particularly from the draft assessment review period.

5.1.1 Field investigation

Survey of the project area would be undertaken to identify any extant Aboriginal objects or sites. Surface investigation will consist of the survey team evenly spaced (5-10 m apart) walking transects across accessible parts of the study area. The focus of the team will be to both investigate soil exposures for extant Aboriginal objects and identify landforms that have potential for cultural material to be present (either surface or subsurface). All Aboriginal objects and/or landforms of interest would be mapped and documented using hand-held GPS, photographs, sketches and written description.

The survey will be undertaken using the following general methodology:

- pedestrian survey;
- survey and recording according to survey unit and/or transect;
- recording of beginning and end points of transects or the boundaries of survey units, and the spacing between survey personnel;
- recording of landform, soil information, land surface, vegetation conditions, visibility and exposure, and survey coverage;
- recording of any identified Aboriginal sites identified according to Requirements 6-8, and recording of any identified Aboriginal objects in accordance with Requirements 18-24 of the Code of Practice;
- if any Aboriginal objects and/or sites are identified in the course of the survey, site cards will be completed and submitted to the AHIMS registrar; and
- in the event of Aboriginal heritage being identified within the project footprint, undertake discussions on site as to the potential further investigation and/or management of these finds.

In addition to the field survey, an archaeological test excavation is proposed for the project area. The investigations will be developed to fulfil the research aims and objectives outlined below. Given the large size of the project area, and the potential for deep deposits – likely to extend below depths that can be easily investigated manually –a grid of mechanically excavated test pits across the site (Figure 4) are proposed. These test pits would be distributed to: i) focus on areas of archaeological interest as determined by the earlier desktop investigations (Section 2.2); ii) to improve our understanding of the area's geomorphological history, and iii) in response to any findings of the field survey undertaken above that may influence areas for future investigation. With respect to the timeframes provided and in anticipation of any obstructions faced on site, we propose up to 40-60 test pits be excavated across the project area. The excavations would adopt the following methods:

- all test excavation pits would be spatially located using a differential GPS device;
- mechanical excavation of some 40-60 ~2m^2 (2x1m) test pits in a systematic grid across the project area;
- all excavation would be undertaken with a flat mud bucket and in controlled 20cm spits, to either: i) the base of the cultural deposits; or ii) to the depth of the underlying geology, or iii) to the full extent of the excavator reach (~3m) where neither (i) or (ii) are met;
- reduced levels of the top and bottom of the test pit would be documented using a dumpy level against a known elevation. Other levels may be taken as required;

- all sediment would be stockpiled in its respective spits, labelled according to its assigned test pit number and recorded and documented. Fifty per cent (50%) of each stockpile – typically ~800kg – would be placed in buckets or bulk soil bags. This sediment would then be wet-sieved through a 5mm wire aperture mesh, and any cultural material recovered, labelled and bagged for subsequent analysis and curation. In the event that Aboriginal objects are recovered, the remaining 50% of the sediment from that spit would be sieved to maximise cultural material recovery. Where no Aboriginal objects are recovered in the initial 50% sub-sample, no further sieving of that spit would occur;

- soil profiles would be recorded in accordance with the Code of Practice, including scaled drawings, photographs, and written descriptions;

- soil samples may be collected for description, sedimentological and chronological analysis where such analysis is considered likely to contribute significant information; and

- excavation procedures and protocols may be modified at the discretion of the Excavation Director, in consultation with the Aboriginal stakeholders and the proponent as the conditions in the field and nature of the excavations develop. This includes the movement of test pits to avoid existing built structures, buried services and disturbances not identified during the desktop phase.

i Research aims and objectives

Our understanding of the cultural materials across the project area is poor, but visual observations suggests that there is a complex and deep fluvial history. It is envisaged that within this complex fluvial history, cultural materials may have been deposited, either through discard by Aboriginal people, or through natural accumulation of materials in these types of deposits. Based on this limited understanding of the project area, a number of overarching aims can be developed for the assessment:

- Identify, map and characterise the nature, age, extent, integrity and significance of the Aboriginal cultural material within the project area.

- Answer research questions including:

    - What are the environmental characteristics associated with the distribution of Aboriginal cultural heritage within the project area?

    - Can the formative processes of the stratigraphic profile provide information on the nature and/or survivability of the archaeological resources?

    - Are there other key factors in the distribution and extent of the material culture within the project area (eg how the dam has affected these deposits)?

    - What are the cultural, social and public values associated with the Aboriginal archaeological resource within the project area?

    - How should the Aboriginal sites in the region be conserved and managed in future?

- Better assess the significance and historical meaning of the cultural materials that exist within the project area so that future archaeological investigation can advance our understanding of past Aboriginal cultural behaviour and environmental adaptation.

- Direct future heritage activities and mitigation measures (if required) for the project area.

ii Analysis, Reporting and Temporary Storage

Post-excavation analysis and reporting will be required to inform the ACHA and subsequent documentation. The post-excavation analysis would be designed to address the research objectives, along with other relevant questions that may arise based on the results of the excavation. Results of the analysis would be presented in relation to comparative site data where possible, and where useful in addressing research questions about the nature, extent, and timing of Aboriginal occupation of the area in the past. These results and discussions would be incorporated into the assessment, which will be provided to the Aboriginal stakeholders for review prior to finalisation.

Once the excavations are completed, all Aboriginal cultural material recovered will be securely stored at the EMM Sydney office for analysis. At the completion of the analysis and reporting, the final location of the assemblage would be discussed with the Aboriginal stakeholders and proponent to determine a suitable long term repository for the cultural materials.

5.2 Timeframes

The following indicative timeframes for the main works EIS assessment would apply:

- distribution of this document to the registered Aboriginal stakeholders: May 2020;
- field investigation of the project area: early June – mid July 2020 (4-6 weeks);
- distribution of the draft report: early October 2020;
- input into recommendations and review of draft report: mid-October – early November 2020;
- finalisation of report for inclusion in EIS: early December 2020; and
- environmental impact assessment development and submission: early December – October 2021
- construction commencing on the main works portion of Dungowan Dam: October 2021. Construction is expected to take four years, dependant on design.

6 What we need from you

In addition to the archaeological evidence described above, Aboriginal heritage incorporates a wide range of values such as stories, traditions and cultural practices. EMM welcomes advice from the Aboriginal community about cultural values (which might include archaeological sites or other types of values) relevant to the project area and its surrounds. EMM is relying on the Aboriginal community for advice on non-archaeological and intangible Aboriginal values for the study area. We are happy to discuss any information which you are willing to share and will respect confidentiality where requested.

EMM would appreciate your feedback on the above methodology proposed for the investigation and assessment of the project area. In responding, please also consider the following questions:

- Are there any other knowledge-holders or traditional owner groups we should be contacting to obtain cultural information on this area?
- Are there any protocols in relation to community interaction and/or cultural heritage that you would like adopted during the project?
- Are you aware of any Aboriginal objects, places, sites or stories of cultural significance and/or importance that you are aware of within the project area? If so, please advise us how you wish them to be dealt with during the project.

- Are you aware of any past or current fishing and hunting activities within the project area? Do you have any views on how these should be managed into the future?

- Is the information you are providing sensitive, gender specific, etc? If so, how would you like the information you provide to EMM to be managed? Noting that some documentation for the ACHA process will be required.

- Do you require any further information prior to EMM proceeding with the project?

In your response, can you please also clearly identify who you would like EMM to talk to within your organisation, and provide contact details for these individuals. Please also ensure your preferred method of communication (eg telephone call, e-mail, letter, etc) is highlighted for subsequent stages of the project.

7 Closing

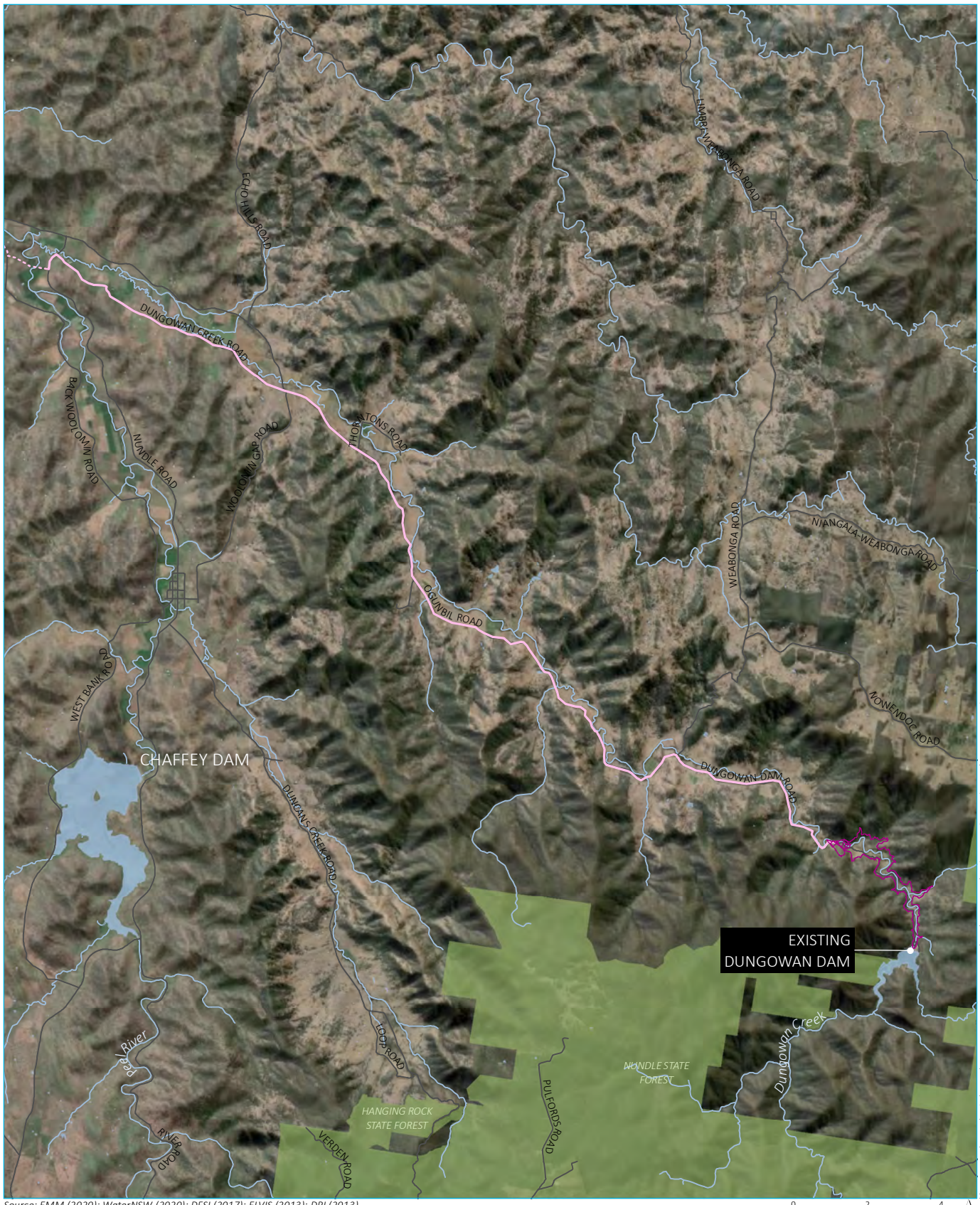
We look forward to receiving any response your organisation wishes to make about the proposed method by **4 June 2020**. Your response will be documented and considered in the assessment. Most importantly, your cultural information is also welcome within this timeframe; but it can also be submitted up until the completion of the draft ACHA.

Please feel free to contact me with any questions.

Yours sincerely

Georgia Burnett
Archaeologist

gburnett@emmconsulting.com.au



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Source: EMM (2020); WaterNSW (2020); DFSI (2017); ELVIS (2013); DPI (2013)

**Inundation area should be considered approximate only. It is based on current limited available spatial data and is subject to future verification.*

0 2 4 km

GDA 1994 MGA Zone 56

N

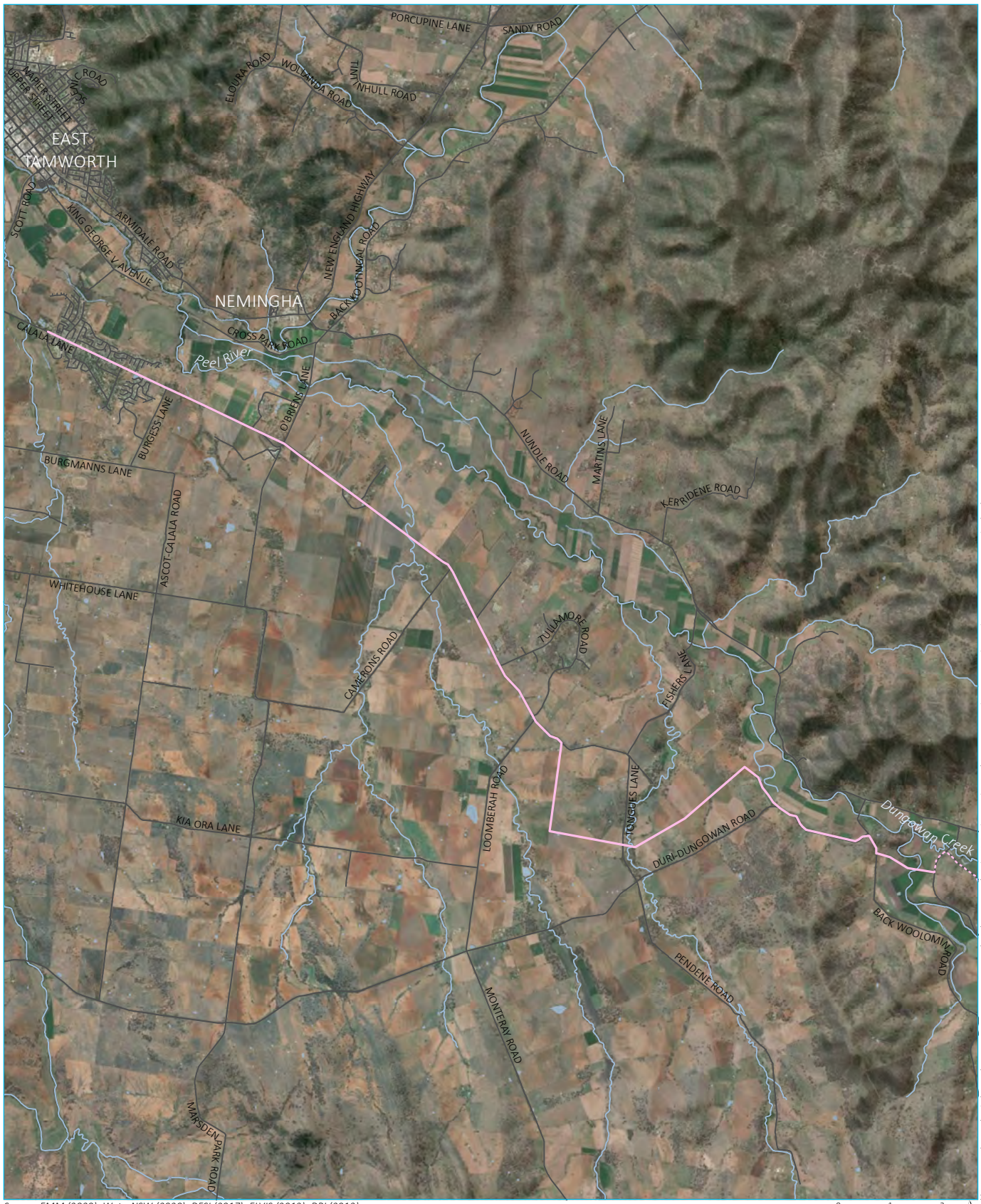
KEY

- Project footprint
- Indicative pipeline alignment (EIS)
- Indicative pipeline alignment (REF)
- Main road
- Named watercourse
- Waterbody
- State forest

The proposed project

Dungowan Dam Project
Aboriginal consultation
Figure 1

EMM
creating opportunities



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Source: EMM (2020); WaterNSW (2020); DFSI (2017); ELVIS (2013); DPI (2013)

**Inundation area should be considered approximate only. It is based on current limited available spatial data and is subject to future verification.*

0 1 2 km

GDA 1994 MGA Zone 56

N

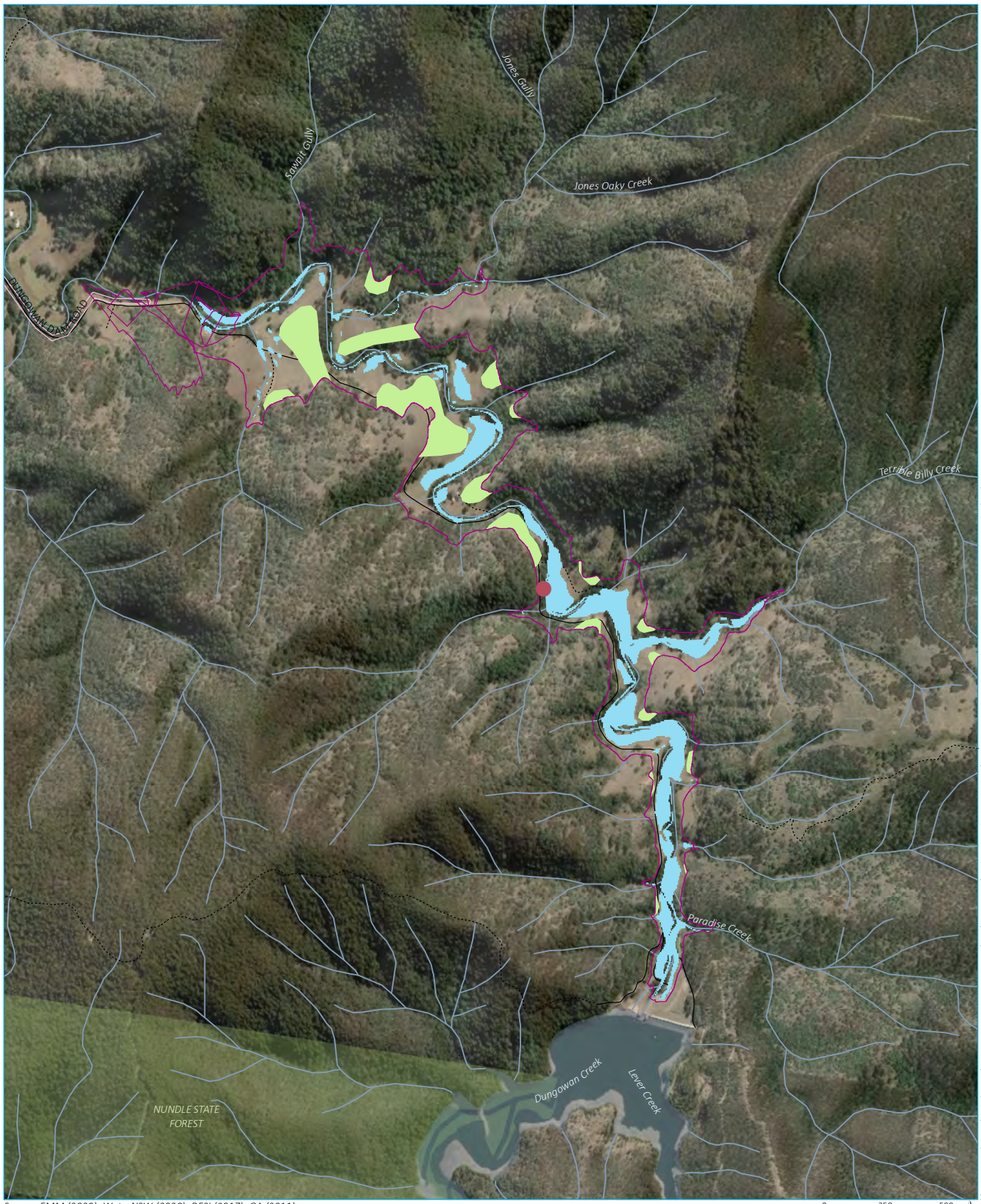
KEY

- Indicative pipeline alignment (REF)
- Indicative pipeline alignment (EIS)
- Main road
- Named watercourse
- Waterbody

The early works study area

Dungowan Dam Project
Aboriginal consultation
Figure 2

EMM
creating opportunities



Source: EMM (2020); WaterNSW (2020); DFSI (2017); GA (2011)

*Inundation area should be considered approximate only. It is based on current limited available spatial data and is subject to future verification.

0 250 500 m

GDA 1994 MGA Zone 56

N

KEY

- Project footprint
- Indicative pipeline alignment (20 m buffer)
- Local road
- Track
- Watercourse
- Waterbody
- State forest

Area of archaeological potential

- Crest landform
- Level to gently inclined landforms within 100 m of primary watercourse
- Very steep to precipitous terrain

Areas of archaeological sensitivity

Dungowan Dam Project
Aboriginal consulation
Figure 3

EMM creating opportunities

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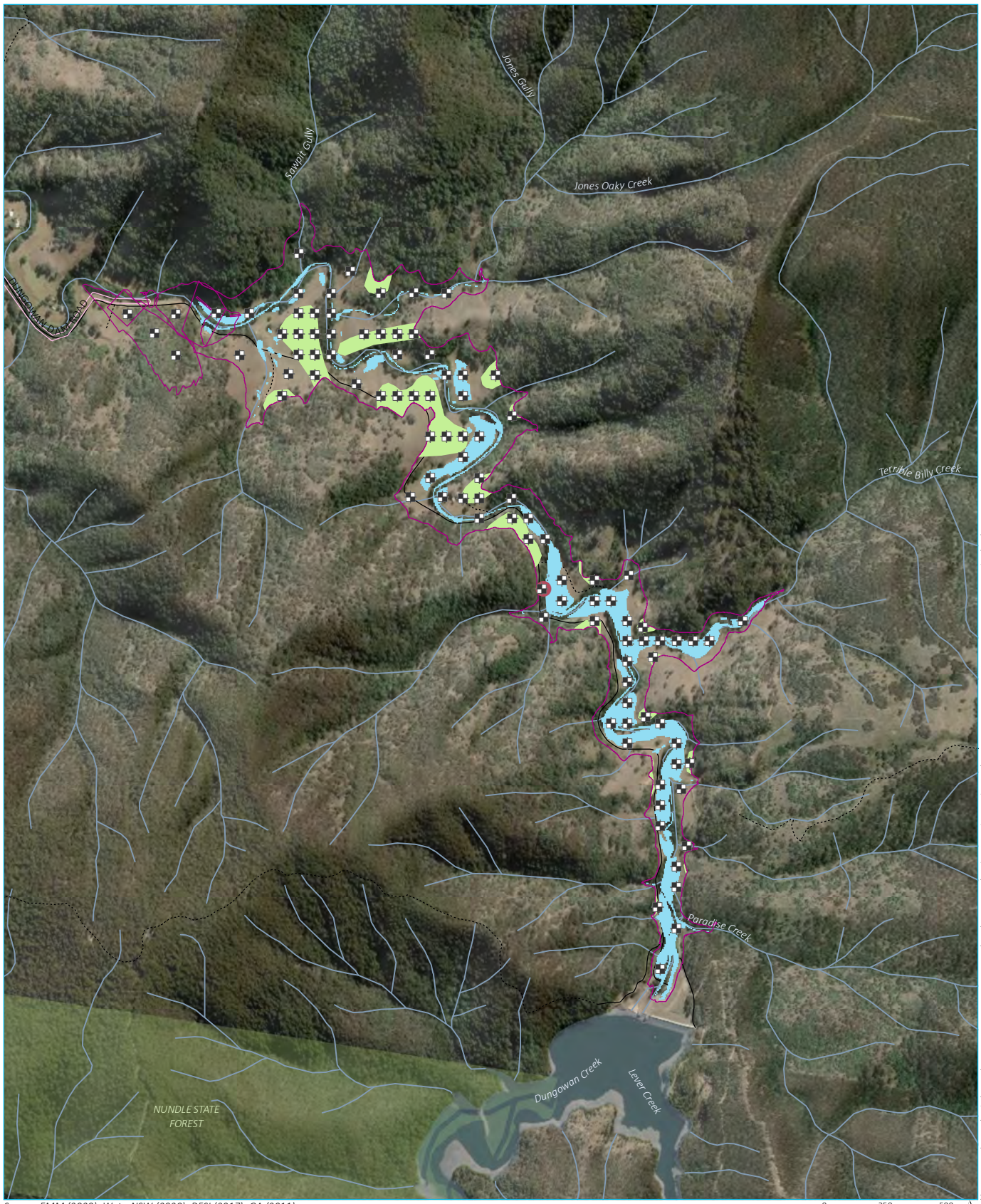

Source: EMM (2020); WaterNSW (2020); DFSI (2017); GA (2011)

*Inundation area should be considered approximate only. It is based on current limited available spatial data and is subject to future verification.

0 250 500 m

GDA 1994 MGA Zone 56

N

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KEY

- Archaeological test location
- Project footprint
- Indicative pipeline alignment (20 m buffer)
- Local road
- Track
- Watercourse
- Waterbody
- State forest

Area of archaeological potential

- Crest landform
- Level to gently inclined landforms within 100 m of primary watercourse
- Very steep to precipitous terrain

Indicative archaeological test excavation program

Dungowan Dam Project
Aboriginal consulation
Figure 4

EMM
creating opportunities

Appendix A

COVID-19 consultation methods

A.1 General

WaterNSW and their consultants are cognisant of the importance of safety to community and stakeholders, clients and staff. Prior to any engagement those with the greatest risk of more serious illness with COVID-19 will be considered:

- Aboriginal and Torres Strait Island people over the age of 50; and
- those aged 60 year and over.

We adhere to the Government requirements regarding COVID-19 and amend our approach as required in this dynamic environment. At the time of writing this document, we note the need to:

- restrict outdoor gatherings to no more than 2 people;
- maintain a 1.5m distance when outside;
- maintain a 4 sqm distance when inside;
- regularly wash hands using soap and water or alcohol-based hand sanitiser;
- surfaces are cleaned prior and after use using alcohol-based sanitiser; and
- observe all travel bans.

The current COVID-19 pandemic and the government requirements to self-isolate and practice social distancing has necessitated a different approach to community and stakeholder engagement. EMM has responded by adopting the practices outlined in Table A1.

Table A.1 Aboriginal community and stakeholder engagement options – COVID-19

Previous approach	COVID-19 methods
Face to face interviews	• Videoconference; • Teleconference; • Where access to hardware and/or software is not available two options could apply: – iPad could be provided to those in remote and isolated locations that is preloaded with: ▪ Prepaid SIM; ▪ Facetime (this is the easiest platform to use for inexperienced users); and ▪ EMM person contact details. – Satellite model where a safe location is provided[15] in negotiation with the client and or participant/s. The location will be set to have: ▪ Person to welcome and direct person to computer station and be available to assist if required (not to be present in the room while interview is being undertaken); ▪ Computer station with videoconference session ready ie person only needs to sit and participate in the face to face interview; ▪ Sanitary wipes to allow the participant to wipe keyboard and mouse before and after participation in the interview. • In the case of satellite model, identify where possible those we have an existing relationship locally who can act as the contact person and/or assist in identifying the appropriate participant/s. There would need to be an agreement up from on: – Who will be responsible locally for facilitating and arranging for participants to attend meetings; – Pre-arranged times and dates (including timeframes eg 3 months) for meetings; and – Pre agreed incentives eg donation of device to the organiser. ***Note: payment for face to face participation would still apply if replaced with videoconferencing/teleconferencing options.***
Group meetings/ workshops	• Videoconference and/or • Online forum/discussions using Social Pinpoint or equivalent • Satellite model where a safe location is provided[16] in negotiation with the client and or participant/s. The location will be set to have: – Person to welcome and direct person to computer station and be available to assist if required; – Computer station with videoconference session ready ie person only needs to sit and participate in the group discussion; – Sanitary wipes to allow the participant to wipe keyboard and mouse before and after participation in the interview.
Community information sessions	• Online forum/discussions using Social Pinpoint
On-line surveys	• On-line surveys integrated with Social Pinpoint • On-line survey via Survey Monkey delivered via email addresses
Newsletters/ Information delivered in person or via letterbox drop	• Provided passively on agreed resident/Council Facebook pages, project websites; • Provided via email; • Where available letterbox drop; and/or • Integrated to the project's Social Pinpoint page.

[15] If inside 4 sqm per person or computer station, if outside 1.5m between each person or computer station.

[16] If inside 4 sqm per person or computer station, if outside 1.5m between each person or computer station.

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7 May 2020

Robert Slater
Galamaay Cultural Consultants
121 Robert Street
Tamworth NSW 2340

Re: Dungowan Dam and associated infrastructure - Project information and assessment methodology

Dear Robert,

1 Introduction

Thank you for registering your interest in the Dungowan Dam project, southeast of Tamworth, NSW (Figures 1 and 2). WaterNSW has engaged EMM Consulting Pty Ltd (EMM) to prepare the Aboriginal Cultural Heritage Assessment (ACHA) to investigate and understand the cultural heritage values of the project area and surrounds. The assessment will consider the potential impacts of the project and how mitigation and management of cultural heritage needs to be integrated into the delivery of the project. The assessment forms part of an Environmental Impact Statement or Review of Environmental Factors currently being prepared.

This document is provided in accordance with sections 4.2 and 4.3 of the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (DECCW 2010), which sets out the Aboriginal consultation requirements for the project. Additional Aboriginal community liaison and participation opportunities will occur in accordance with a project specific consultation strategy.

The aims of this letter are to:

- provide an overview of the project and how it will be assessed;
- provide background on the project and some of the initial investigations to date;
- establish the purpose and aims of the Aboriginal consultation process;
- seek information about any Aboriginal cultural heritage values associated with the project and how they may affect, inform or refine the project and/or assessment methods;
- seek information on any cultural activities (such as fishing and hunting) that has historically and/or is actively being undertaken in the project area;
- identify any culturally appropriate protocols that registered parties wish to be adopted during the information gathering process (eg protocols during field survey, or handling of culturally sensitive information); and
- present a draft of the intended assessment methods for your review and comment.

We welcome your feedback at your earliest convenience, and will be consulting with the registered Aboriginal parties for the duration of the ACHA, currently proposed to extend to the end of 2020. However, for the purposes of this initial stage and in accordance with the Department of Planning, Industry and Environment (DPIE) guidelines, we request any written response on the information and process below by **4 June 2020.**

At this time, we propose to conduct all consultation via teleconferencing, e-mail or phone due to the social distancing rules from the COVID-19 outbreak. However, where feasible, we would meet in person (face-to-face meetings), and would ensure appropriate protocols are in place as per Government health advice at that time. Appendix A of this document provides our proposed methods for social distancing during consultation at this time. We would like to hear from your organisation on this to ensure that you are able to contribute knowledge to the project and have the opportunity to be involved, whilst ensuring we comply with up-to-date social distancing requirements.

For reference, the WaterNSW contact is: Meredith Abrams, Community Engagement Officer, P: 1300 662 077, E: meredith.abrams@waternsw.com.au. EMM is working on the proponent's behalf, and all queries should be directed through EMM. Feedback can be provided to:

Georgia Burnett

Address: PO Box 21, St Leonards, NSW 1590

Phone: 02 9493 9500

Email: gburnett@emmconsulting.com.au

2 Project information

2.1 Project overview and proposed assessment

WaterNSW is proposing to undertake the planning and delivery of three new or augmented dams in NSW, which includes a new Dungowan Dam and supply pipeline. The need to deliver the dams is critical to the State's drought recovery process and needs to be completed to the highest standard in relation to the assessment and delivery. Each dam is to be constructed rapidly to create security for the various town water supplies and associated industries reliant on the delivery of water for viability.

The project includes:

- a new dam downstream of the existing Dungowan Dam, with a nominal capacity of 22.5 gigalitres (GL);
- partial or full decommissioning of the existing Dungowan Dam and rehabilitation of the storage area of the dam; and
- a new delivery pipeline from the proposed dam to the junction with the Chaffey Dam pipeline and a further stage from the junction to the Calala water treatment plant located in Tamworth.

The project is identified as Critical State Significant Infrastructure (CSSI) under the provisions of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act). A CSSI project requires approval from the NSW Minister for Planning and Public Spaces and is accompanied by an EIS. The assessment of Aboriginal cultural heritage would be one of several investigations included in the EIS. The assessment would be developed in response to Secretary Environmental Assessment Requirements (SEARs) issued by DPIE, which will outline the investigative requirements for Aboriginal heritage. These will likely require an assessment that aligns with DPIE guidelines[25] for investigating and assessing Aboriginal heritage and consulting with the Aboriginal community. However, CSSI projects do not require separate approvals under the *National Parks and Wildlife Act 1974* (eg Aboriginal heritage impact permits), rather any subsequent requirements for heritage are managed in accordance with the conditions of approval, provided by the Minister.

The section of the pipeline between its junction with the Chaffey Dam pipeline and extending to the Calala water treatment plant would be delivered as the 'early work' for the project, and will be assessed separately to the EIS, within a Review of Environmental Factors (REF) under Part 5 of the EP&A Act. This component of the project may require approval under the *National Parks and Wildlife Act 1974* if impacts on Aboriginal heritage are identified. This assessment would adopt the process and requirements described within DPIE guidelines.

2.2 Initial Aboriginal heritage investigations

An investigation of Aboriginal heritage and the potential for cultural material to be present in the project area was undertaken as part of the scoping study – the document lodged in March 2020 with DPIE to inform the contents of the EIS. This study was primarily a desktop investigation, including a review of previous investigations and the application of key environmental landforms to identify areas of archaeological interest (Figure 3).[26] The study resulted in the following conclusions:

> …there is currently no information on the Aboriginal heritage of the immediate environment. A search of the surrounding region reveals only a small number of previously documented sites ($\bar{x}$=~1 site per 50 km^2), with the nearest some 9 km from the study area. In comparison with Chaffey Dam, a nearby dam in a similar environmental context, the data suggest that the proposed works would affect primarily stone artefact sites associated with the transient and ephemeral use of the landscape in the past. These would likely be found as surface and/or sub-surface deposits in the vicinity of Dungowan Creek, Terrible Billy Creek and/or Jones Oaky Creek. A site inspection validates these predictions, with a number of elevated terraces and floodplains adjacent the creeks revealing cultural material. Specifically, areas within 100 m either sides of these creeks are considered to have high potential for surface and sub-surface cultural material. The latter quite possible in stratified contexts, and thereby able to provide significant information on the past use of the region by Aboriginal people.
>
> While predictions indicated the potential for rockshelters and associated features (such as art) to be present along the valley edges and where other geological outcropping is found, none were observed. The nature of the geomorphology resulted in more moderate hills and slopes, and the potential for such sites is therefore considered low. Similarly, exposed geologically outcropping in the rivers themselves were not encountered, and as such the presence of grinding grooves may similarly be considered low. However, the site inspection cannot definitively determine the presence or absence of ceremonial activities and/or natural resource sites, that are known in the region. These sites are commonly considered of significance and will likely require more detailed understanding and management through the project.

[25] *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in New South Wales* (OEH 2011)

[26] EMM Consulting Pty Ltd, 2020, Three Dams Project - Dungowan Dam - Aboriginal and Historic heritage constraints assessment report, Report for Water NSW. Available for download here: https://www.planningportal.nsw.gov.au/major-projects/project/30026

In addition to above, the observations along the main creeklines within the project area, suggest that they have the potential to contain complex geomorphology, including a range of alluvial terraces. Some of these appear to be >1m in depth and have potential to be of significant age. The establishment of the existing dam and subsequent regulation of river flow in the 20th century has also potentially modified and/or affected these alluvial deposits and require further investigation.

Following these findings, EMM is now undertaking a more extensive investigation of the Aboriginal heritage values of the project area, including consultation with and participation of Aboriginal stakeholders. For the early works, we will be producing an ACHA in accordance with DPIE guidelines. For the remainder of the works, our investigations will broadly follow DPIE guidelines, but the accelerated timeframe of the overall project requires some modifications to the process detailed in the guidelines. This includes undertaking archaeological test excavation immediately following the field survey (rather than a more extended gap between the two in some projects); and the adoption of mechanically assisted excavations to maximise coverage and depths given the potential for deep alluvial floodplains. These are outlined further below.

3 Aboriginal stakeholders

Following the notification process undertaken between 17 April – 1 May 2020, the following Aboriginal stakeholders have expressed an interest in being involved in the project:

- Tamworth Local Aboriginal Land Council;
- Nunawanna Aboriginal Corporation;
- The Gomeroi People;
- DFVT Enterprises;
- [redacted]
- AT Gomilaroi Cultural Consultancy; and
- Galamaay Cultural Consultants.

4 Dungowan pipeline (early works) – REF assessment methodology

The assessment of the pipeline component between Calala water treatment plant and its junction with the Chaffey Dam pipeline is to be assessed under Part 5 of the EP&A Act (Figure 2). As such, additional approvals required under the *National Parks and Wildlife Act 1974* may apply, and therefore it must conform with the following guidelines:

- *Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW* (OEH 2011);
- *Code of Practice for Archaeological Investigations of Aboriginal Objects in NSW* (the Code of Practice) (DECCW 2010); and
- *Aboriginal Consultation Requirements for Proponents 2010* (DECCW 2010).

4.1 Methods

The purpose of the assessment is to identify and manage the Aboriginal cultural heritage values of all areas that will be affected by the study. In summary, this will involve.

- consultation with the Aboriginal stakeholders to identify socio-cultural values of the project area and places of special significance that should be considered;
- a search of the AHIMS register for records of previously registered Aboriginal sites;
- a review of past Aboriginal heritage reports covering the study area;
- environmental landscape analysis to identify past Aboriginal resources and suitable occupation areas;
- synthesis of background research to develop a predictive model of Aboriginal site location;
- field investigation to validate the findings of the desktop and identify any previously undocumented cultural material. This would include surface inspection and may extend to test excavations of areas of archaeological interest;
- an assessment of significance for Aboriginal cultural heritage values in the project area (with input from the registered Aboriginal stakeholders);
- an impact assessment of how the project will affect Aboriginal cultural heritage values in the project area; and
- development of management recommendations based on the results of the assessment and input from registered Aboriginal stakeholders during the consultation process and particularly from the draft ACHA review period.

4.1.1 Field investigation

Survey of the project area would be undertaken to identify any extant Aboriginal objects or sites. Surface investigation will consist of the survey team evenly spaced (5-10 m apart) walking transects across accessible parts of the study area, with a key focus on targeting areas of low disturbance. The focus of the team will be to both investigate soil exposures for extant Aboriginal objects and identify landforms that have potential for cultural material to be present (either surface or subsurface). It should be acknowledged that the entire ground surface within the project area project boundary is unlikely to be surveyed, but a representative sample of each landform within the project area will be gathered to characterise the archaeology, or its potential, of the project area. All Aboriginal objects and/or landforms of interest would be mapped and documented using hand-held GPS, photographs, sketches and written description.

The survey will be undertaken in accordance with Requirements 5 to 10 of the Code of Practice. In summary, the Code of Practice requires the following general methodology:

- pedestrian survey;
- survey and recording according to survey unit and/or transect;
- recording of beginning and end points of transects or the boundaries of survey units, and the spacing between survey personnel;
- recording of landform, soil information, land surface, vegetation conditions, visibility and exposure, and survey coverage;

- recording of any identified Aboriginal sites identified according to Requirements 6-8, and recording of any identified Aboriginal objects in accordance with Requirements 18-24 of the Code of Practice;

- if any Aboriginal objects and/or sites are identified in the course of the survey, site cards will be completed and submitted to the AHIMS registrar; and

- in the event of Aboriginal heritage being identified within the project footprint, undertake discussions on site as to the potential further investigation and/or management of these finds.

At this stage, no test excavations are proposed for the early works stage, and the aim of the project is to avoid such a program for this phase where possible (due to the shortened assessment timeframes). Rather, it is anticipated that there is enough flexibility in the pipeline route and construction methods to avoid any areas identified as archaeologically sensitive. However, if test excavations are required to further characterise the archaeological resource of an area identified in the survey, they would be implemented shortly following the survey, in accordance with the Code of Practice. Specifically, they would include the following activities:

- all test excavation pits would be spatially located using a differential GPS device, which would also provide elevation data;

- manual excavation of 0.25m² test pits in a systematic grid across areas of archaeological interest within the impact footprint. The spatial resolution of the grid would be dependent on on-ground conditions, but would likely have test pits between 20-50m apart;

- All excavation would use hand tools. Excavation of the first unit would be in 5cm spits, with subsequent excavation allowed in 10cm spits or according to stratigraphy (whichever is smallest) depending on the results of the first unit. Manual excavation would continue to either: i) the base of the cultural deposits; ii) to the depth of the underlying geology; or iii) to the maximum depth possible via hand excavation (likely ~ 80cm).

- sieving of all manually excavated material through a 5mm sieve;

- reduced levels of the top and bottom of the test pit would be documented using a dumpy level against a known elevation. Other levels may be taken as required;

- soil profiles would be recorded in accordance with the Code of Practice, including scaled drawings, photographs, and written descriptions;

- soil samples may be collected for description, sedimentological and chronological analysis where such analysis is considered likely to contribute significant information; and

- excavation procedures and protocols may be modified at the discretion of the Excavation Director, in consultation with the Aboriginal stakeholders and the proponent as the conditions in the field and nature of the excavations develop. This includes the movement of test pits to avoid existing built structures, buried services and disturbances not identified during the desktop phase.

4.2 Timeframes

The following indicative timeframes for the Pipeline REF assessment would apply:

- distribution of this document to the registered Aboriginal stakeholders: May 2020;

- field investigation of the project area: early to mid-June 2020;

- distribution of the draft report: early July 2020;

- input into recommendations and review of draft report: mid July – mid August 2020;
- report finalisation and submission of AHIP application (if required): mid-August 2020;
- determination of the REF: September 2020; and
- construction commencing on the early work section of pipeline: October 2020.

5 Dungowan Dam (main works) – EIS assessment methodology

An EIS will be prepared to assess the dam and associated infrastructure (Figure 1) as a CSSI assessment under Division 5.2 of the EP&A Act. As such, it is required to follow and address Aboriginal heritage requirements as outlined by the SEARs. The assessment will be developed in *broad* accordance with the following guidelines:

- *Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW* (DECCW 2010); and
- *Aboriginal Consultation Requirements for Proponents 2010* (DECCW 2010).

5.1 Methods

The purpose of the assessment is to identify and manage the Aboriginal cultural heritage values of all areas that will be affected by the study. In summary, this will involve:

- consultation with the Aboriginal stakeholders to identify socio-cultural values of the project area, greater understanding of cultural fishing and hunting activities, and places of special significance that should be considered;
- a search of the AHIMS register for records of previously registered Aboriginal sites;
- a review of past Aboriginal heritage reports covering the study area;
- environmental landscape analysis to identify past Aboriginal resources and suitable occupation areas;
- synthesis of background research to develop a predictive model of Aboriginal site location;
- field investigation to validate the findings of the desktop, and identify any previously undocumented cultural material. This would include surface inspection and test excavations of areas of archaeological interest;
- an assessment of significance for Aboriginal cultural heritage values in the project area (with input from the registered Aboriginal stakeholders);
- an impact assessment of how the project will affect Aboriginal cultural heritage values in the project area; and
- development of management recommendations based on the results of the assessment and input from registered Aboriginal stakeholders during the consultation process and particularly from the draft assessment review period.

5.1.1 Field investigation

Survey of the project area would be undertaken to identify any extant Aboriginal objects or sites. Surface investigation will consist of the survey team evenly spaced (5-10 m apart) walking transects across accessible parts of the study area. The focus of the team will be to both investigate soil exposures for extant Aboriginal objects and identify landforms that have potential for cultural material to be present (either surface or subsurface). All Aboriginal objects and/or landforms of interest would be mapped and documented using hand-held GPS, photographs, sketches and written description.

The survey will be undertaken using the following general methodology:

- pedestrian survey;
- survey and recording according to survey unit and/or transect;
- recording of beginning and end points of transects or the boundaries of survey units, and the spacing between survey personnel;
- recording of landform, soil information, land surface, vegetation conditions, visibility and exposure, and survey coverage;
- recording of any identified Aboriginal sites identified according to Requirements 6-8, and recording of any identified Aboriginal objects in accordance with Requirements 18-24 of the Code of Practice;
- if any Aboriginal objects and/or sites are identified in the course of the survey, site cards will be completed and submitted to the AHIMS registrar; and
- in the event of Aboriginal heritage being identified within the project footprint, undertake discussions on site as to the potential further investigation and/or management of these finds.

In addition to the field survey, an archaeological test excavation is proposed for the project area. The investigations will be developed to fulfil the research aims and objectives outlined below. Given the large size of the project area, and the potential for deep deposits – likely to extend below depths that can be easily investigated manually –a grid of mechanically excavated test pits across the site (Figure 4) are proposed. These test pits would be distributed to: i) focus on areas of archaeological interest as determined by the earlier desktop investigations (Section 2.2); ii) to improve our understanding of the area's geomorphological history, and iii) in response to any findings of the field survey undertaken above that may influence areas for future investigation. With respect to the timeframes provided and in anticipation of any obstructions faced on site, we propose up to 40-60 test pits be excavated across the project area. The excavations would adopt the following methods:

- all test excavation pits would be spatially located using a differential GPS device;
- mechanical excavation of some 40-60 ~2m^2 (2x1m) test pits in a systematic grid across the project area;
- all excavation would be undertaken with a flat mud bucket and in controlled 20cm spits, to either: i) the base of the cultural deposits; or ii) to the depth of the underlying geology, or iii) to the full extent of the excavator reach (~3m) where neither (i) or (ii) are met;
- reduced levels of the top and bottom of the test pit would be documented using a dumpy level against a known elevation. Other levels may be taken as required;

- all sediment would be stockpiled in its respective spits, labelled according to its assigned test pit number and recorded and documented. Fifty per cent (50%) of each stockpile – typically ~800kg – would be placed in buckets or bulk soil bags. This sediment would then be wet-sieved through a 5mm wire aperture mesh, and any cultural material recovered, labelled and bagged for subsequent analysis and curation. In the event that Aboriginal objects are recovered, the remaining 50% of the sediment from that spit would be sieved to maximise cultural material recovery. Where no Aboriginal objects are recovered in the initial 50% sub-sample, no further sieving of that spit would occur;

- soil profiles would be recorded in accordance with the Code of Practice, including scaled drawings, photographs, and written descriptions;

- soil samples may be collected for description, sedimentological and chronological analysis where such analysis is considered likely to contribute significant information; and

- excavation procedures and protocols may be modified at the discretion of the Excavation Director, in consultation with the Aboriginal stakeholders and the proponent as the conditions in the field and nature of the excavations develop. This includes the movement of test pits to avoid existing built structures, buried services and disturbances not identified during the desktop phase.

i Research aims and objectives

Our understanding of the cultural materials across the project area is poor, but visual observations suggests that there is a complex and deep fluvial history. It is envisaged that within this complex fluvial history, cultural materials may have been deposited, either through discard by Aboriginal people, or through natural accumulation of materials in these types of deposits. Based on this limited understanding of the project area, a number of overarching aims can be developed for the assessment:

- Identify, map and characterise the nature, age, extent, integrity and significance of the Aboriginal cultural material within the project area.

- Answer research questions including:

    - What are the environmental characteristics associated with the distribution of Aboriginal cultural heritage within the project area?

    - Can the formative processes of the stratigraphic profile provide information on the nature and/or survivability of the archaeological resources?

    - Are there other key factors in the distribution and extent of the material culture within the project area (eg how the dam has affected these deposits)?

    - What are the cultural, social and public values associated with the Aboriginal archaeological resource within the project area?

    - How should the Aboriginal sites in the region be conserved and managed in future?

- Better assess the significance and historical meaning of the cultural materials that exist within the project area so that future archaeological investigation can advance our understanding of past Aboriginal cultural behaviour and environmental adaptation.

- Direct future heritage activities and mitigation measures (if required) for the project area.

ii Analysis, Reporting and Temporary Storage

Post-excavation analysis and reporting will be required to inform the ACHA and subsequent documentation. The post-excavation analysis would be designed to address the research objectives, along with other relevant questions that may arise based on the results of the excavation. Results of the analysis would be presented in relation to comparative site data where possible, and where useful in addressing research questions about the nature, extent, and timing of Aboriginal occupation of the area in the past. These results and discussions would be incorporated into the assessment, which will be provided to the Aboriginal stakeholders for review prior to finalisation.

Once the excavations are completed, all Aboriginal cultural material recovered will be securely stored at the EMM Sydney office for analysis. At the completion of the analysis and reporting, the final location of the assemblage would be discussed with the Aboriginal stakeholders and proponent to determine a suitable long term repository for the cultural materials.

5.2 Timeframes

The following indicative timeframes for the main works EIS assessment would apply:

- distribution of this document to the registered Aboriginal stakeholders: May 2020;
- field investigation of the project area: early June – mid July 2020 (4-6 weeks);
- distribution of the draft report: early October 2020;
- input into recommendations and review of draft report: mid-October – early November 2020;
- finalisation of report for inclusion in EIS: early December 2020; and
- environmental impact assessment development and submission: early December – October 2021
- construction commencing on the main works portion of Dungowan Dam: October 2021. Construction is expected to take four years, dependant on design.

6 What we need from you

In addition to the archaeological evidence described above, Aboriginal heritage incorporates a wide range of values such as stories, traditions and cultural practices. EMM welcomes advice from the Aboriginal community about cultural values (which might include archaeological sites or other types of values) relevant to the project area and its surrounds. EMM is relying on the Aboriginal community for advice on non-archaeological and intangible Aboriginal values for the study area. We are happy to discuss any information which you are willing to share and will respect confidentiality where requested.

EMM would appreciate your feedback on the above methodology proposed for the investigation and assessment of the project area. In responding, please also consider the following questions:

- Are there any other knowledge-holders or traditional owner groups we should be contacting to obtain cultural information on this area?
- Are there any protocols in relation to community interaction and/or cultural heritage that you would like adopted during the project?
- Are you aware of any Aboriginal objects, places, sites or stories of cultural significance and/or importance that you are aware of within the project area? If so, please advise us how you wish them to be dealt with during the project.

- Are you aware of any past or current fishing and hunting activities within the project area? Do you have any views on how these should be managed into the future?

- Is the information you are providing sensitive, gender specific, etc? If so, how would you like the information you provide to EMM to be managed? Noting that some documentation for the ACHA process will be required.

- Do you require any further information prior to EMM proceeding with the project?

In your response, can you please also clearly identify who you would like EMM to talk to within your organisation, and provide contact details for these individuals. Please also ensure your preferred method of communication (eg telephone call, e-mail, letter, etc) is highlighted for subsequent stages of the project.

7 Closing

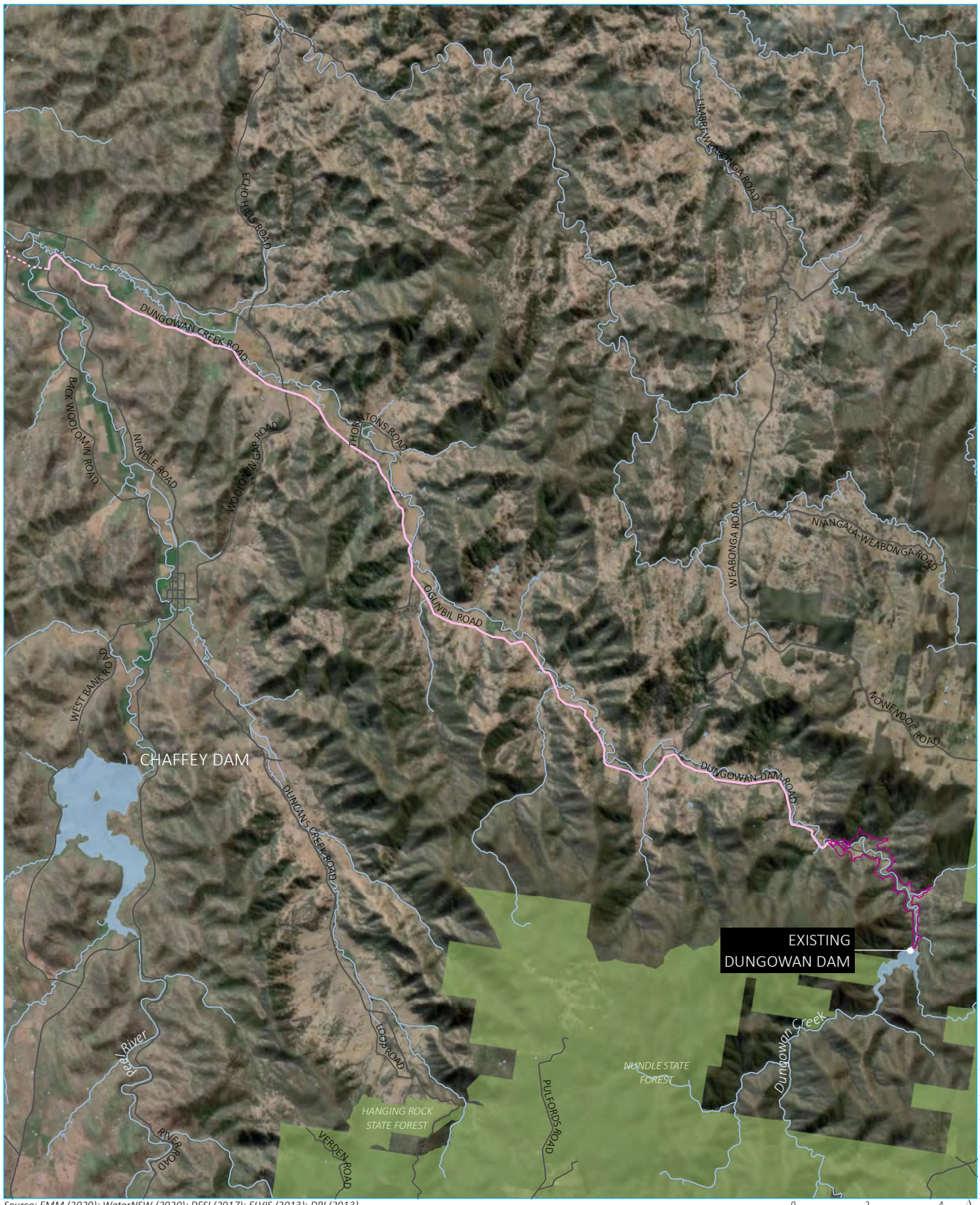
We look forward to receiving any response your organisation wishes to make about the proposed method by **4 June 2020**. Your response will be documented and considered in the assessment. Most importantly, your cultural information is also welcome within this timeframe; but it can also be submitted up until the completion of the draft ACHA.

Please feel free to contact me with any questions.

Yours sincerely

Georgia Burnett
Archaeologist

gburnett@emmconsulting.com.au



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Source: EMM (2020); WaterNSW (2020); DFSI (2017); ELVIS (2013); DPI (2013)

**Inundation area should be considered approximate only. It is based on current limited available spatial data and is subject to future verification.*

0 2 4 km

GDA 1994 MGA Zone 56

N

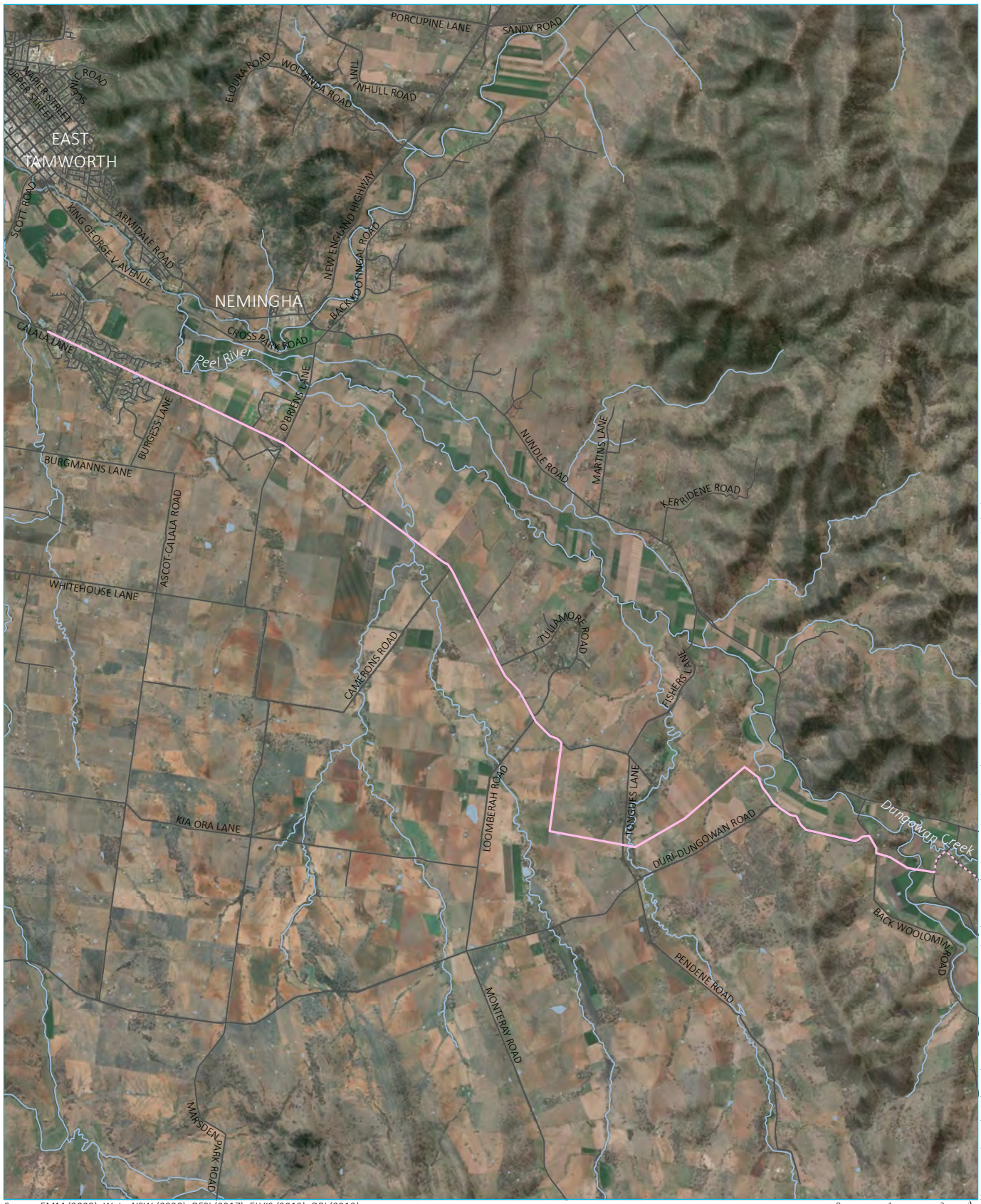
KEY

- Project footprint
- Indicative pipeline alignment (EIS)
- Indicative pipeline alignment (REF)
- Main road
- Named watercourse
- Waterbody
- State forest

The proposed project

Dungowan Dam Project
Aboriginal consultation
Figure 1

EMM
creating opportunities



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Source: EMM (2020); WaterNSW (2020); DFSI (2017); ELVIS (2013); DPI (2013)

**Inundation area should be considered approximate only. It is based on current limited available spatial data and is subject to future verification.*

0 1 2 km

GDA 1994 MGA Zone 56

N

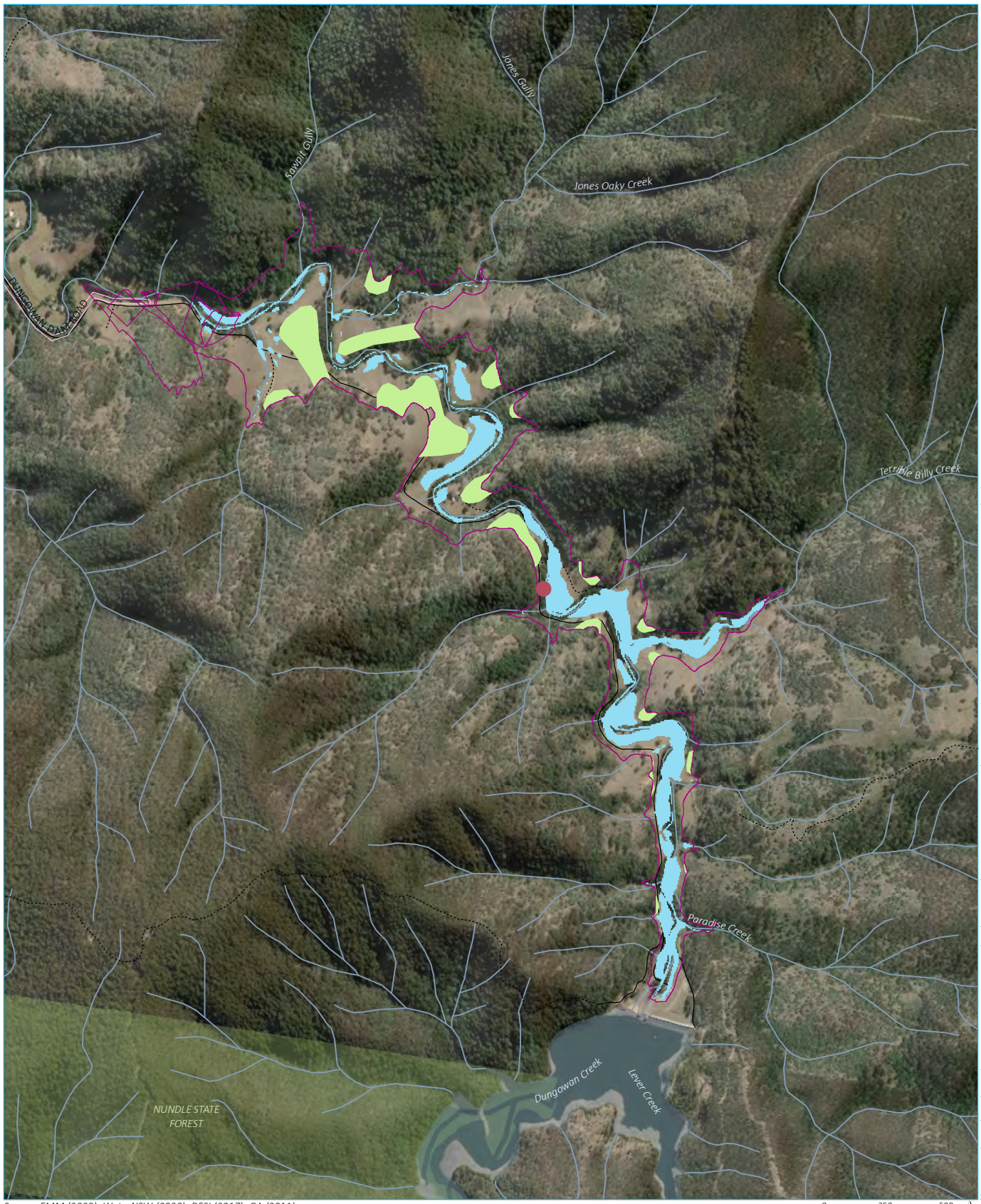
KEY

- Indicative pipeline alignment (REF)
- Indicative pipeline alignment (EIS)
- Main road
- Named watercourse
- Waterbody

The early works study area

Dungowan Dam Project
Aboriginal consultation
Figure 2

EMM
creating opportunities



Source: EMM (2020); WaterNSW (2020); DFSI (2017); GA (2011)

*Inundation area should be considered approximate only. It is based on current limited available spatial data and is subject to future verification.

0 250 500 m

GDA 1994 MGA Zone 56

N

KEY

- Project footprint
- Indicative pipeline alignment (20 m buffer)
- Local road
- Track
- Watercourse
- Waterbody
- State forest

Area of archaeological potential

- Crest landform
- Level to gently inclined landforms within 100 m of primary watercourse
- Very steep to precipitous terrain

Areas of archaeological sensitivity

Dungowan Dam Project
Aboriginal consulation
Figure 3

EMM creating opportunities

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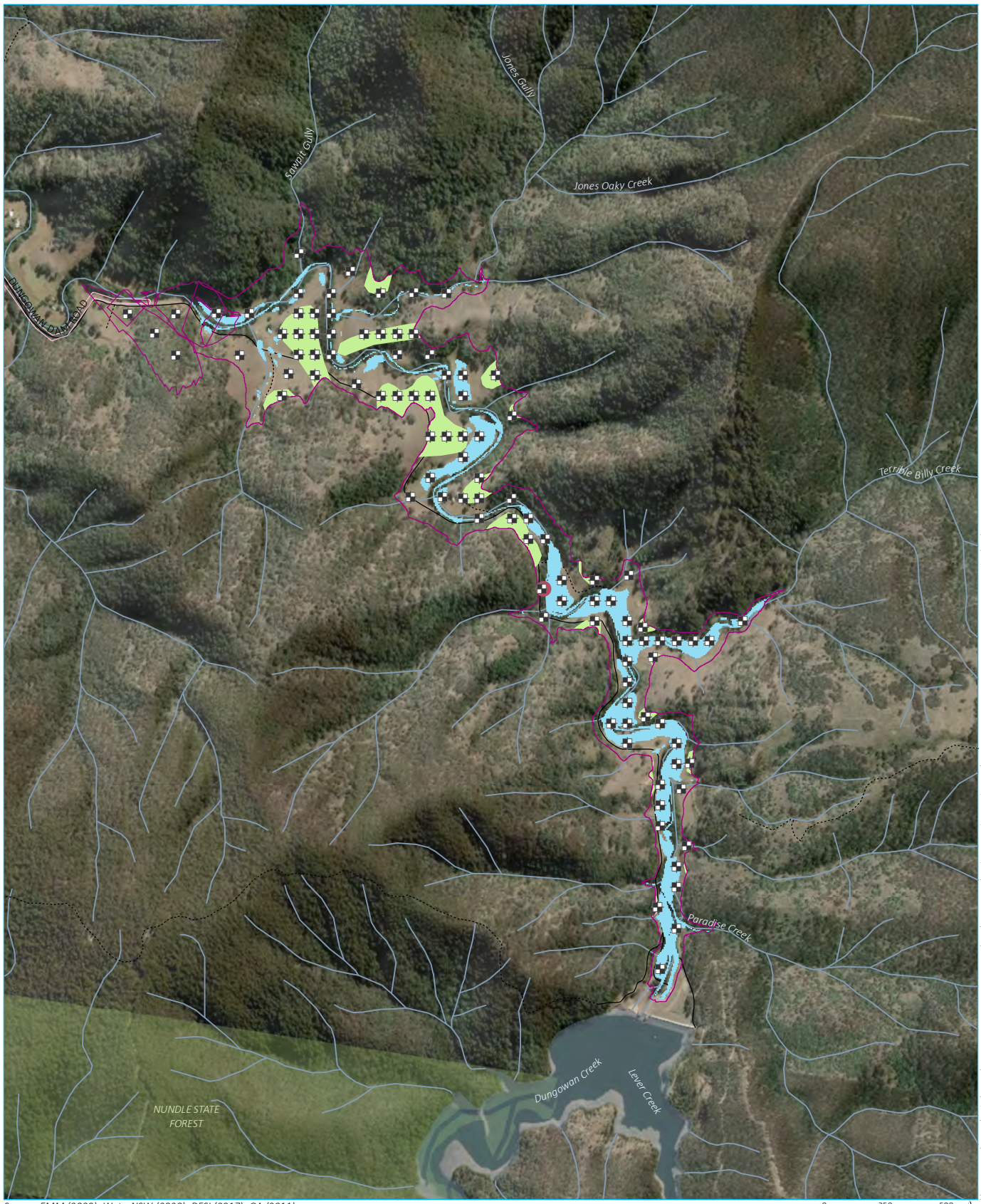

Source: EMM (2020); WaterNSW (2020); DFSI (2017); GA (2011)

*Inundation area should be considered approximate only. It is based on current limited available spatial data and is subject to future verification.

0 250 500 m

GDA 1994 MGA Zone 56

N

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KEY

- Archaeological test location
- Project footprint
- Indicative pipeline alignment (20 m buffer)
- Local road
- Track
- Watercourse
- Waterbody
- State forest

Area of archaeological potential

- Crest landform
- Level to gently inclined landforms within 100 m of primary watercourse
- Very steep to precipitous terrain

Indicative archaeological test excavation program

Dungowan Dam Project
Aboriginal consulation
Figure 4

EMM
creating opportunities

Appendix A

COVID-19 consultation methods

A.1 General

WaterNSW and their consultants are cognisant of the importance of safety to community and stakeholders, clients and staff. Prior to any engagement those with the greatest risk of more serious illness with COVID-19 will be considered:

- Aboriginal and Torres Strait Island people over the age of 50; and
- those aged 60 year and over.

We adhere to the Government requirements regarding COVID-19 and amend our approach as required in this dynamic environment. At the time of writing this document, we note the need to:

- restrict outdoor gatherings to no more than 2 people;
- maintain a 1.5m distance when outside;
- maintain a 4 sqm distance when inside;
- regularly wash hands using soap and water or alcohol-based hand sanitiser;
- surfaces are cleaned prior and after use using alcohol-based sanitiser; and
- observe all travel bans.

The current COVID-19 pandemic and the government requirements to self-isolate and practice social distancing has necessitated a different approach to community and stakeholder engagement. EMM has responded by adopting the practices outlined in Table A1.

Table A.1 Aboriginal community and stakeholder engagement options – COVID-19

Previous approach	COVID-19 methods
Face to face interviews	• Videoconference; • Teleconference; • Where access to hardware and/or software is not available two options could apply: – iPad could be provided to those in remote and isolated locations that is preloaded with: ▪ Prepaid SIM; ▪ Facetime (this is the easiest platform to use for inexperienced users); and ▪ EMM person contact details. – Satellite model where a safe location is provided[27] in negotiation with the client and or participant/s. The location will be set to have: ▪ Person to welcome and direct person to computer station and be available to assist if required (not to be present in the room while interview is being undertaken); ▪ Computer station with videoconference session ready ie person only needs to sit and participate in the face to face interview; ▪ Sanitary wipes to allow the participant to wipe keyboard and mouse before and after participation in the interview. • In the case of satellite model, identify where possible those we have an existing relationship locally who can act as the contact person and/or assist in identifying the appropriate participant/s. There would need to be an agreement up from on: – Who will be responsible locally for facilitating and arranging for participants to attend meetings; – Pre-arranged times and dates (including timeframes eg 3 months) for meetings; and – Pre agreed incentives eg donation of device to the organiser. ***Note: payment for face to face participation would still apply if replaced with videoconferencing/teleconferencing options.***
Group meetings/ workshops	• Videoconference and/or • Online forum/discussions using Social Pinpoint or equivalent • Satellite model where a safe location is provided[28] in negotiation with the client and or participant/s. The location will be set to have: – Person to welcome and direct person to computer station and be available to assist if required; – Computer station with videoconference session ready ie person only needs to sit and participate in the group discussion; – Sanitary wipes to allow the participant to wipe keyboard and mouse before and after participation in the interview.
Community information sessions	• Online forum/discussions using Social Pinpoint
On-line surveys	• On-line surveys integrated with Social Pinpoint • On-line survey via Survey Monkey delivered via email addresses
Newsletters/ Information delivered in person or via letterbox drop	• Provided passively on agreed resident/Council Facebook pages, project websites; • Provided via email; • Where available letterbox drop; and/or • Integrated to the project's Social Pinpoint page.

[27] If inside 4 sqm per person or computer station, if outside 1.5m between each person or computer station.

[28] If inside 4 sqm per person or computer station, if outside 1.5m between each person or computer station.

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7 May 2020

Steve Talbott
Gomeroi Traditional Owners
gomeroito[redacted]

Re: Dungowan Dam and associated infrastructure - Project information and assessment methodology

Dear Steve,

1 Introduction

Thank you for registering your interest in the Dungowan Dam project, southeast of Tamworth, NSW (Figures 1 and 2). WaterNSW has engaged EMM Consulting Pty Ltd (EMM) to prepare the Aboriginal Cultural Heritage Assessment (ACHA) to investigate and understand the cultural heritage values of the project area and surrounds. The assessment will consider the potential impacts of the project and how mitigation and management of cultural heritage needs to be integrated into the delivery of the project. The assessment forms part of an Environmental Impact Statement or Review of Environmental Factors currently being prepared.

This document is provided in accordance with sections 4.2 and 4.3 of the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (DECCW 2010), which sets out the Aboriginal consultation requirements for the project. Additional Aboriginal community liaison and participation opportunities will occur in accordance with a project specific consultation strategy.

The aims of this letter are to:

- provide an overview of the project and how it will be assessed;
- provide background on the project and some of the initial investigations to date;
- establish the purpose and aims of the Aboriginal consultation process;
- seek information about any Aboriginal cultural heritage values associated with the project and how they may affect, inform or refine the project and/or assessment methods;
- seek information on any cultural activities (such as fishing and hunting) that has historically and/or is actively being undertaken in the project area;
- identify any culturally appropriate protocols that registered parties wish to be adopted during the information gathering process (eg protocols during field survey, or handling of culturally sensitive information); and
- present a draft of the intended assessment methods for your review and comment.

We welcome your feedback at your earliest convenience, and will be consulting with the registered Aboriginal parties for the duration of the ACHA, currently proposed to extend to the end of 2020. However, for the purposes of this initial stage and in accordance with the Department of Planning, Industry and Environment (DPIE) guidelines, we request any written response on the information and process below by **4 June 2020.**

At this time, we propose to conduct all consultation via teleconferencing, e-mail or phone due to the social distancing rules from the COVID-19 outbreak. However, where feasible, we would meet in person (face-to-face meetings), and would ensure appropriate protocols are in place as per Government health advice at that time. Appendix A of this document provides our proposed methods for social distancing during consultation at this time. We would like to hear from your organisation on this to ensure that you are able to contribute knowledge to the project and have the opportunity to be involved, whilst ensuring we comply with up-to-date social distancing requirements.

For reference, the WaterNSW contact is: Meredith Abrams, Community Engagement Officer, P: 1300 662 077, E: meredith.abrams@waternsw.com.au. EMM is working on the proponent's behalf, and all queries should be directed through EMM. Feedback can be provided to:

Georgia Burnett

Address: PO Box 21, St Leonards, NSW 1590

Phone: 02 9493 9500

Email: gburnett@emmconsulting.com.au

2 Project information

2.1 Project overview and proposed assessment

WaterNSW is proposing to undertake the planning and delivery of three new or augmented dams in NSW, which includes a new Dungowan Dam and supply pipeline. The need to deliver the dams is critical to the State's drought recovery process and needs to be completed to the highest standard in relation to the assessment and delivery. Each dam is to be constructed rapidly to create security for the various town water supplies and associated industries reliant on the delivery of water for viability.

The project includes:

- a new dam downstream of the existing Dungowan Dam, with a nominal capacity of 22.5 gigalitres (GL);
- partial or full decommissioning of the existing Dungowan Dam and rehabilitation of the storage area of the dam; and
- a new delivery pipeline from the proposed dam to the junction with the Chaffey Dam pipeline and a further stage from the junction to the Calala water treatment plant located in Tamworth.

The project is identified as Critical State Significant Infrastructure (CSSI) under the provisions of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act). A CSSI project requires approval from the NSW Minister for Planning and Public Spaces and is accompanied by an EIS. The assessment of Aboriginal cultural heritage would be one of several investigations included in the EIS. The assessment would be developed in response to Secretary Environmental Assessment Requirements (SEARs) issued by DPIE, which will outline the investigative requirements for Aboriginal heritage. These will likely require an assessment that aligns with DPIE guidelines[9] for investigating and assessing Aboriginal heritage and consulting with the Aboriginal community. However, CSSI projects do not require separate approvals under the *National Parks and Wildlife Act 1974* (eg Aboriginal heritage impact permits), rather any subsequent requirements for heritage are managed in accordance with the conditions of approval, provided by the Minister.

The section of the pipeline between its junction with the Chaffey Dam pipeline and extending to the Calala water treatment plant would be delivered as the 'early work' for the project, and will be assessed separately to the EIS, within a Review of Environmental Factors (REF) under Part 5 of the EP&A Act. This component of the project may require approval under the *National Parks and Wildlife Act 1974* if impacts on Aboriginal heritage are identified. This assessment would adopt the process and requirements described within DPIE guidelines.

2.2 Initial Aboriginal heritage investigations

An investigation of Aboriginal heritage and the potential for cultural material to be present in the project area was undertaken as part of the scoping study – the document lodged in March 2020 with DPIE to inform the contents of the EIS. This study was primarily a desktop investigation, including a review of previous investigations and the application of key environmental landforms to identify areas of archaeological interest (Figure 3).[10] The study resulted in the following conclusions:

> …there is currently no information on the Aboriginal heritage of the immediate environment. A search of the surrounding region reveals only a small number of previously documented sites ($\bar{x}$=~1 site per 50 km^2), with the nearest some 9 km from the study area. In comparison with Chaffey Dam, a nearby dam in a similar environmental context, the data suggest that the proposed works would affect primarily stone artefact sites associated with the transient and ephemeral use of the landscape in the past. These would likely be found as surface and/or sub-surface deposits in the vicinity of Dungowan Creek, Terrible Billy Creek and/or Jones Oaky Creek. A site inspection validates these predictions, with a number of elevated terraces and floodplains adjacent the creeks revealing cultural material. Specifically, areas within 100 m either sides of these creeks are considered to have high potential for surface and sub-surface cultural material. The latter quite possible in stratified contexts, and thereby able to provide significant information on the past use of the region by Aboriginal people.
>
> While predictions indicated the potential for rockshelters and associated features (such as art) to be present along the valley edges and where other geological outcropping is found, none were observed. The nature of the geomorphology resulted in more moderate hills and slopes, and the potential for such sites is therefore considered low. Similarly, exposed geologically outcropping in the rivers themselves were not encountered, and as such the presence of grinding grooves may similarly be considered low. However, the site inspection cannot definitively determine the presence or absence of ceremonial activities and/or natural resource sites, that are known in the region. These sites are commonly considered of significance and will likely require more detailed understanding and management through the project.

[9] *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in New South Wales* (OEH 2011)

[10] EMM Consulting Pty Ltd, 2020, Three Dams Project - Dungowan Dam - Aboriginal and Historic heritage constraints assessment report, Report for Water NSW. Available for download here: https://www.planningportal.nsw.gov.au/major-projects/project/30026

In addition to above, the observations along the main creeklines within the project area, suggest that they have the potential to contain complex geomorphology, including a range of alluvial terraces. Some of these appear to be >1m in depth and have potential to be of significant age. The establishment of the existing dam and subsequent regulation of river flow in the 20th century has also potentially modified and/or affected these alluvial deposits and require further investigation.

Following these findings, EMM is now undertaking a more extensive investigation of the Aboriginal heritage values of the project area, including consultation with and participation of Aboriginal stakeholders. For the early works, we will be producing an ACHA in accordance with DPIE guidelines. For the remainder of the works, our investigations will broadly follow DPIE guidelines, but the accelerated timeframe of the overall project requires some modifications to the process detailed in the guidelines. This includes undertaking archaeological test excavation immediately following the field survey (rather than a more extended gap between the two in some projects); and the adoption of mechanically assisted excavations to maximise coverage and depths given the potential for deep alluvial floodplains. These are outlined further below.

3 Aboriginal stakeholders

Following the notification process undertaken between 17 April – 1 May 2020, the following Aboriginal stakeholders have expressed an interest in being involved in the project:

- Tamworth Local Aboriginal Land Council;
- Nunawanna Aboriginal Corporation;
- The Gomeroi People;
- DFVT Enterprises;
- [redacted]
- AT Gomilaroi Cultural Consultancy; and
- Galamaay Cultural Consultants.

4 Dungowan pipeline (early works) – REF assessment methodology

The assessment of the pipeline component between Calala water treatment plant and its junction with the Chaffey Dam pipeline is to be assessed under Part 5 of the EP&A Act (Figure 2). As such, additional approvals required under the *National Parks and Wildlife Act 1974* may apply, and therefore it must conform with the following guidelines:

- *Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW* (OEH 2011);
- *Code of Practice for Archaeological Investigations of Aboriginal Objects in NSW* (the Code of Practice) (DECCW 2010); and
- *Aboriginal Consultation Requirements for Proponents 2010* (DECCW 2010).

4.1 Methods

The purpose of the assessment is to identify and manage the Aboriginal cultural heritage values of all areas that will be affected by the study. In summary, this will involve.

- consultation with the Aboriginal stakeholders to identify socio-cultural values of the project area and places of special significance that should be considered;
- a search of the AHIMS register for records of previously registered Aboriginal sites;
- a review of past Aboriginal heritage reports covering the study area;
- environmental landscape analysis to identify past Aboriginal resources and suitable occupation areas;
- synthesis of background research to develop a predictive model of Aboriginal site location;
- field investigation to validate the findings of the desktop and identify any previously undocumented cultural material. This would include surface inspection and may extend to test excavations of areas of archaeological interest;
- an assessment of significance for Aboriginal cultural heritage values in the project area (with input from the registered Aboriginal stakeholders);
- an impact assessment of how the project will affect Aboriginal cultural heritage values in the project area; and
- development of management recommendations based on the results of the assessment and input from registered Aboriginal stakeholders during the consultation process and particularly from the draft ACHA review period.

4.1.1 Field investigation

Survey of the project area would be undertaken to identify any extant Aboriginal objects or sites. Surface investigation will consist of the survey team evenly spaced (5-10 m apart) walking transects across accessible parts of the study area, with a key focus on targeting areas of low disturbance. The focus of the team will be to both investigate soil exposures for extant Aboriginal objects and identify landforms that have potential for cultural material to be present (either surface or subsurface). It should be acknowledged that the entire ground surface within the project area project boundary is unlikely to be surveyed, but a representative sample of each landform within the project area will be gathered to characterise the archaeology, or its potential, of the project area. All Aboriginal objects and/or landforms of interest would be mapped and documented using hand-held GPS, photographs, sketches and written description.

The survey will be undertaken in accordance with Requirements 5 to 10 of the Code of Practice. In summary, the Code of Practice requires the following general methodology:

- pedestrian survey;
- survey and recording according to survey unit and/or transect;
- recording of beginning and end points of transects or the boundaries of survey units, and the spacing between survey personnel;
- recording of landform, soil information, land surface, vegetation conditions, visibility and exposure, and survey coverage;

- recording of any identified Aboriginal sites identified according to Requirements 6-8, and recording of any identified Aboriginal objects in accordance with Requirements 18-24 of the Code of Practice;

- if any Aboriginal objects and/or sites are identified in the course of the survey, site cards will be completed and submitted to the AHIMS registrar; and

- in the event of Aboriginal heritage being identified within the project footprint, undertake discussions on site as to the potential further investigation and/or management of these finds.

At this stage, no test excavations are proposed for the early works stage, and the aim of the project is to avoid such a program for this phase where possible (due to the shortened assessment timeframes). Rather, it is anticipated that there is enough flexibility in the pipeline route and construction methods to avoid any areas identified as archaeologically sensitive. However, if test excavations are required to further characterise the archaeological resource of an area identified in the survey, they would be implemented shortly following the survey, in accordance with the Code of Practice. Specifically, they would include the following activities:

- all test excavation pits would be spatially located using a differential GPS device, which would also provide elevation data;

- manual excavation of 0.25m² test pits in a systematic grid across areas of archaeological interest within the impact footprint. The spatial resolution of the grid would be dependent on on-ground conditions, but would likely have test pits between 20-50m apart;

- All excavation would use hand tools. Excavation of the first unit would be in 5cm spits, with subsequent excavation allowed in 10cm spits or according to stratigraphy (whichever is smallest) depending on the results of the first unit. Manual excavation would continue to either: i) the base of the cultural deposits; ii) to the depth of the underlying geology; or iii) to the maximum depth possible via hand excavation (likely ~ 80cm).

- sieving of all manually excavated material through a 5mm sieve;

- reduced levels of the top and bottom of the test pit would be documented using a dumpy level against a known elevation. Other levels may be taken as required;

- soil profiles would be recorded in accordance with the Code of Practice, including scaled drawings, photographs, and written descriptions;

- soil samples may be collected for description, sedimentological and chronological analysis where such analysis is considered likely to contribute significant information; and

- excavation procedures and protocols may be modified at the discretion of the Excavation Director, in consultation with the Aboriginal stakeholders and the proponent as the conditions in the field and nature of the excavations develop. This includes the movement of test pits to avoid existing built structures, buried services and disturbances not identified during the desktop phase.

4.2 Timeframes

The following indicative timeframes for the Pipeline REF assessment would apply:

- distribution of this document to the registered Aboriginal stakeholders: May 2020;

- field investigation of the project area: early to mid-June 2020;

- distribution of the draft report: early July 2020;

- input into recommendations and review of draft report: mid July – mid August 2020;
- report finalisation and submission of AHIP application (if required): mid-August 2020;
- determination of the REF: September 2020; and
- construction commencing on the early work section of pipeline: October 2020.

5 Dungowan Dam (main works) – EIS assessment methodology

An EIS will be prepared to assess the dam and associated infrastructure (Figure 1) as a CSSI assessment under Division 5.2 of the EP&A Act. As such, it is required to follow and address Aboriginal heritage requirements as outlined by the SEARs. The assessment will be developed in *broad* accordance with the following guidelines:

- *Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW* (DECCW 2010); and
- *Aboriginal Consultation Requirements for Proponents 2010* (DECCW 2010).

5.1 Methods

The purpose of the assessment is to identify and manage the Aboriginal cultural heritage values of all areas that will be affected by the study. In summary, this will involve:

- consultation with the Aboriginal stakeholders to identify socio-cultural values of the project area, greater understanding of cultural fishing and hunting activities, and places of special significance that should be considered;
- a search of the AHIMS register for records of previously registered Aboriginal sites;
- a review of past Aboriginal heritage reports covering the study area;
- environmental landscape analysis to identify past Aboriginal resources and suitable occupation areas;
- synthesis of background research to develop a predictive model of Aboriginal site location;
- field investigation to validate the findings of the desktop, and identify any previously undocumented cultural material. This would include surface inspection and test excavations of areas of archaeological interest;
- an assessment of significance for Aboriginal cultural heritage values in the project area (with input from the registered Aboriginal stakeholders);
- an impact assessment of how the project will affect Aboriginal cultural heritage values in the project area; and
- development of management recommendations based on the results of the assessment and input from registered Aboriginal stakeholders during the consultation process and particularly from the draft assessment review period.

5.1.1 Field investigation

Survey of the project area would be undertaken to identify any extant Aboriginal objects or sites. Surface investigation will consist of the survey team evenly spaced (5-10 m apart) walking transects across accessible parts of the study area. The focus of the team will be to both investigate soil exposures for extant Aboriginal objects and identify landforms that have potential for cultural material to be present (either surface or subsurface). All Aboriginal objects and/or landforms of interest would be mapped and documented using hand-held GPS, photographs, sketches and written description.

The survey will be undertaken using the following general methodology:

- pedestrian survey;
- survey and recording according to survey unit and/or transect;
- recording of beginning and end points of transects or the boundaries of survey units, and the spacing between survey personnel;
- recording of landform, soil information, land surface, vegetation conditions, visibility and exposure, and survey coverage;
- recording of any identified Aboriginal sites identified according to Requirements 6-8, and recording of any identified Aboriginal objects in accordance with Requirements 18-24 of the Code of Practice;
- if any Aboriginal objects and/or sites are identified in the course of the survey, site cards will be completed and submitted to the AHIMS registrar; and
- in the event of Aboriginal heritage being identified within the project footprint, undertake discussions on site as to the potential further investigation and/or management of these finds.

In addition to the field survey, an archaeological test excavation is proposed for the project area. The investigations will be developed to fulfil the research aims and objectives outlined below. Given the large size of the project area, and the potential for deep deposits – likely to extend below depths that can be easily investigated manually –a grid of mechanically excavated test pits across the site (Figure 4) are proposed. These test pits would be distributed to: i) focus on areas of archaeological interest as determined by the earlier desktop investigations (Section 2.2); ii) to improve our understanding of the area's geomorphological history, and iii) in response to any findings of the field survey undertaken above that may influence areas for future investigation. With respect to the timeframes provided and in anticipation of any obstructions faced on site, we propose up to 40-60 test pits be excavated across the project area. The excavations would adopt the following methods:

- all test excavation pits would be spatially located using a differential GPS device;
- mechanical excavation of some 40-60 ~2m^2 (2x1m) test pits in a systematic grid across the project area;
- all excavation would be undertaken with a flat mud bucket and in controlled 20cm spits, to either: i) the base of the cultural deposits; or ii) to the depth of the underlying geology, or iii) to the full extent of the excavator reach (~3m) where neither (i) or (ii) are met;
- reduced levels of the top and bottom of the test pit would be documented using a dumpy level against a known elevation. Other levels may be taken as required;

- all sediment would be stockpiled in its respective spits, labelled according to its assigned test pit number and recorded and documented. Fifty per cent (50%) of each stockpile – typically ~800kg – would be placed in buckets or bulk soil bags. This sediment would then be wet-sieved through a 5mm wire aperture mesh, and any cultural material recovered, labelled and bagged for subsequent analysis and curation. In the event that Aboriginal objects are recovered, the remaining 50% of the sediment from that spit would be sieved to maximise cultural material recovery. Where no Aboriginal objects are recovered in the initial 50% sub-sample, no further sieving of that spit would occur;

- soil profiles would be recorded in accordance with the Code of Practice, including scaled drawings, photographs, and written descriptions;

- soil samples may be collected for description, sedimentological and chronological analysis where such analysis is considered likely to contribute significant information; and

- excavation procedures and protocols may be modified at the discretion of the Excavation Director, in consultation with the Aboriginal stakeholders and the proponent as the conditions in the field and nature of the excavations develop. This includes the movement of test pits to avoid existing built structures, buried services and disturbances not identified during the desktop phase.

i Research aims and objectives

Our understanding of the cultural materials across the project area is poor, but visual observations suggests that there is a complex and deep fluvial history. It is envisaged that within this complex fluvial history, cultural materials may have been deposited, either through discard by Aboriginal people, or through natural accumulation of materials in these types of deposits. Based on this limited understanding of the project area, a number of overarching aims can be developed for the assessment:

- Identify, map and characterise the nature, age, extent, integrity and significance of the Aboriginal cultural material within the project area.

- Answer research questions including:

    - What are the environmental characteristics associated with the distribution of Aboriginal cultural heritage within the project area?

    - Can the formative processes of the stratigraphic profile provide information on the nature and/or survivability of the archaeological resources?

    - Are there other key factors in the distribution and extent of the material culture within the project area (eg how the dam has affected these deposits)?

    - What are the cultural, social and public values associated with the Aboriginal archaeological resource within the project area?

    - How should the Aboriginal sites in the region be conserved and managed in future?

- Better assess the significance and historical meaning of the cultural materials that exist within the project area so that future archaeological investigation can advance our understanding of past Aboriginal cultural behaviour and environmental adaptation.

- Direct future heritage activities and mitigation measures (if required) for the project area.

ii Analysis, Reporting and Temporary Storage

Post-excavation analysis and reporting will be required to inform the ACHA and subsequent documentation. The post-excavation analysis would be designed to address the research objectives, along with other relevant questions that may arise based on the results of the excavation. Results of the analysis would be presented in relation to comparative site data where possible, and where useful in addressing research questions about the nature, extent, and timing of Aboriginal occupation of the area in the past. These results and discussions would be incorporated into the assessment, which will be provided to the Aboriginal stakeholders for review prior to finalisation.

Once the excavations are completed, all Aboriginal cultural material recovered will be securely stored at the EMM Sydney office for analysis. At the completion of the analysis and reporting, the final location of the assemblage would be discussed with the Aboriginal stakeholders and proponent to determine a suitable long term repository for the cultural materials.

5.2 Timeframes

The following indicative timeframes for the main works EIS assessment would apply:

- distribution of this document to the registered Aboriginal stakeholders: May 2020;
- field investigation of the project area: early June – mid July 2020 (4-6 weeks);
- distribution of the draft report: early October 2020;
- input into recommendations and review of draft report: mid-October – early November 2020;
- finalisation of report for inclusion in EIS: early December 2020; and
- environmental impact assessment development and submission: early December – October 2021
- construction commencing on the main works portion of Dungowan Dam: October 2021. Construction is expected to take four years, dependant on design.

6 What we need from you

In addition to the archaeological evidence described above, Aboriginal heritage incorporates a wide range of values such as stories, traditions and cultural practices. EMM welcomes advice from the Aboriginal community about cultural values (which might include archaeological sites or other types of values) relevant to the project area and its surrounds. EMM is relying on the Aboriginal community for advice on non-archaeological and intangible Aboriginal values for the study area. We are happy to discuss any information which you are willing to share and will respect confidentiality where requested.

EMM would appreciate your feedback on the above methodology proposed for the investigation and assessment of the project area. In responding, please also consider the following questions:

- Are there any other knowledge-holders or traditional owner groups we should be contacting to obtain cultural information on this area?
- Are there any protocols in relation to community interaction and/or cultural heritage that you would like adopted during the project?
- Are you aware of any Aboriginal objects, places, sites or stories of cultural significance and/or importance that you are aware of within the project area? If so, please advise us how you wish them to be dealt with during the project.

- Are you aware of any past or current fishing and hunting activities within the project area? Do you have any views on how these should be managed into the future?

- Is the information you are providing sensitive, gender specific, etc? If so, how would you like the information you provide to EMM to be managed? Noting that some documentation for the ACHA process will be required.

- Do you require any further information prior to EMM proceeding with the project?

In your response, can you please also clearly identify who you would like EMM to talk to within your organisation, and provide contact details for these individuals. Please also ensure your preferred method of communication (eg telephone call, e-mail, letter, etc) is highlighted for subsequent stages of the project.

7 Closing

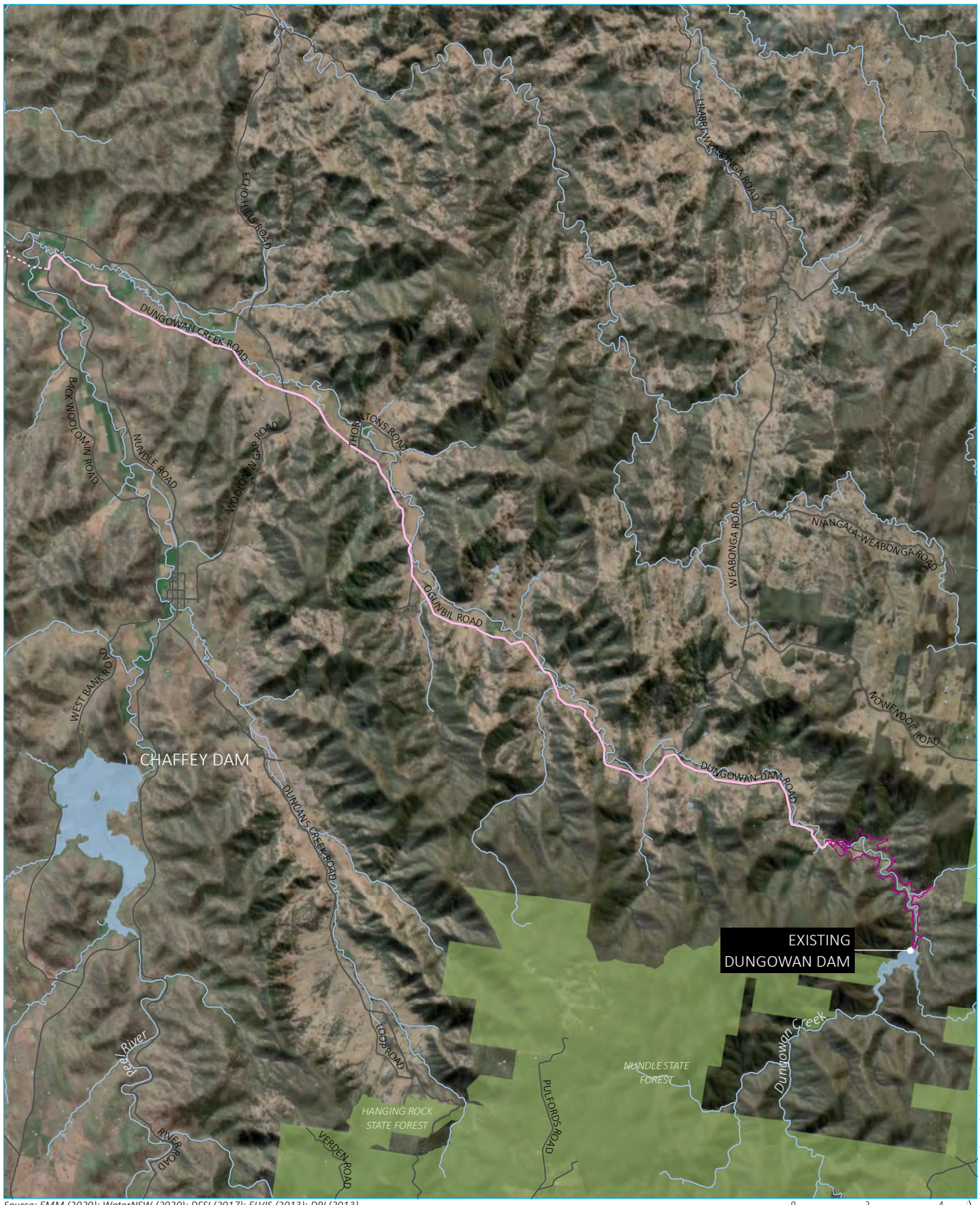
We look forward to receiving any response your organisation wishes to make about the proposed method by **4 June 2020**. Your response will be documented and considered in the assessment. Most importantly, your cultural information is also welcome within this timeframe; but it can also be submitted up until the completion of the draft ACHA.

Please feel free to contact me with any questions.

Yours sincerely

Georgia Burnett
Archaeologist

gburnett@emmconsulting.com.au



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Source: EMM (2020); WaterNSW (2020); DFSI (2017); ELVIS (2013); DPI (2013)

**Inundation area should be considered approximate only. It is based on current limited available spatial data and is subject to future verification.*

0 2 4 km

GDA 1994 MGA Zone 56

N

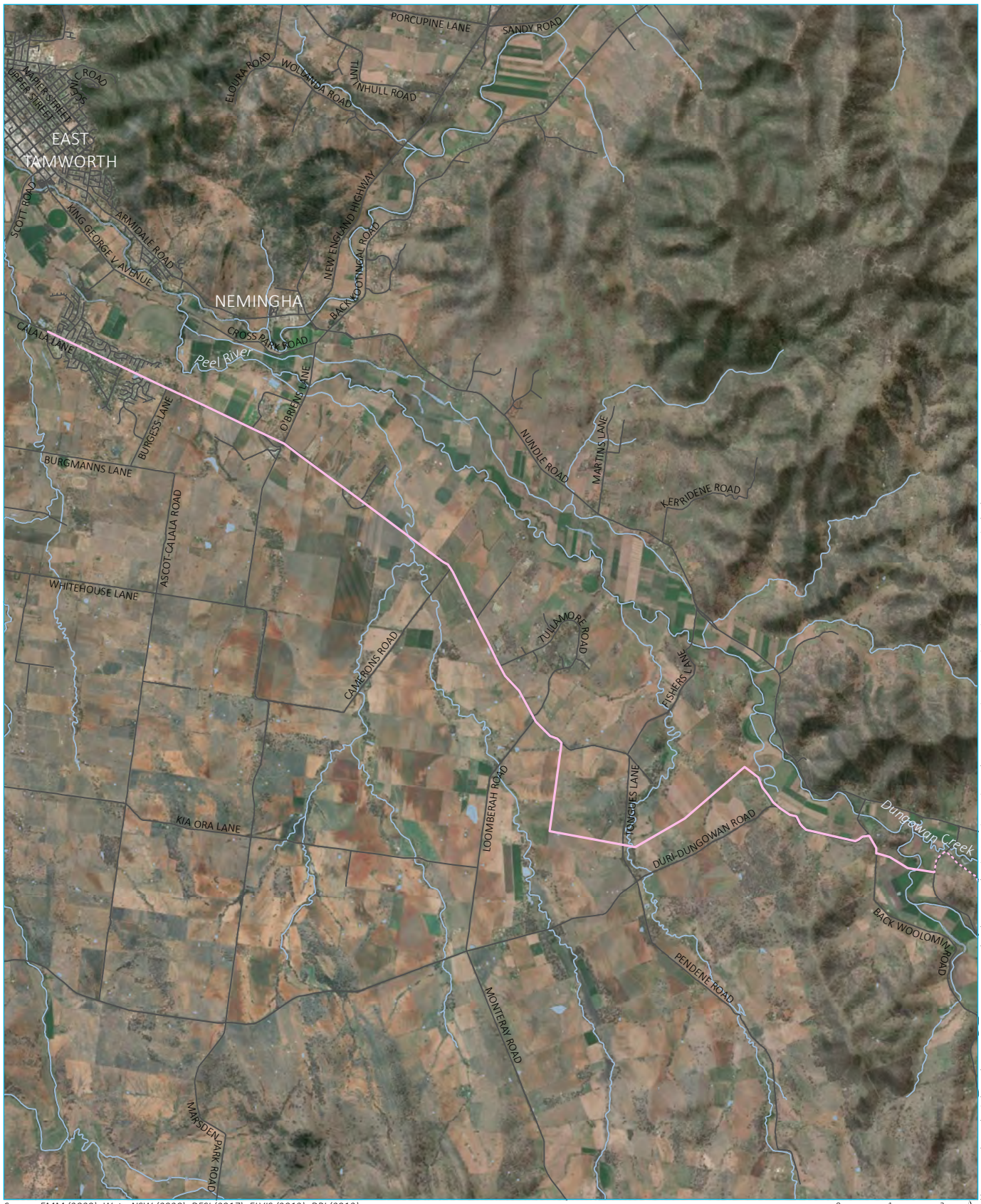
KEY

- Project footprint
- Indicative pipeline alignment (EIS)
- Indicative pipeline alignment (REF)
- Main road
- Named watercourse
- Waterbody
- State forest

The proposed project

Dungowan Dam Project
Aboriginal consultation
Figure 1

EMM
creating opportunities



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Source: EMM (2020); WaterNSW (2020); DFSI (2017); ELVIS (2013); DPI (2013)

**Inundation area should be considered approximate only. It is based on current limited available spatial data and is subject to future verification.*

0 1 2 km

GDA 1994 MGA Zone 56

N

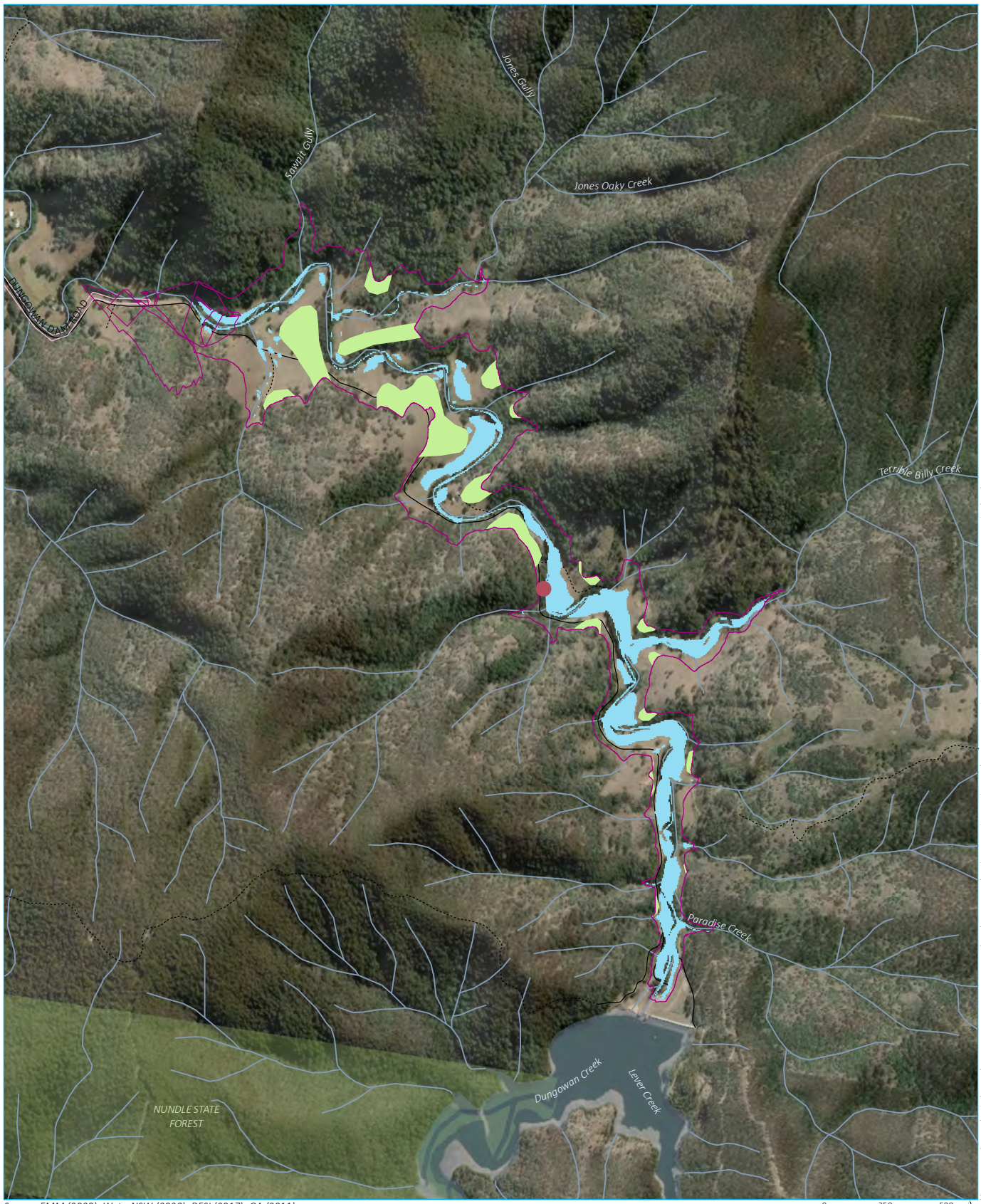
KEY

- Indicative pipeline alignment (REF)
- Indicative pipeline alignment (EIS)
- Main road
- Named watercourse
- Waterbody

The early works study area

Dungowan Dam Project
Aboriginal consultation
Figure 2

EMM
creating opportunities



Source: EMM (2020); WaterNSW (2020); DFSI (2017); GA (2011)

*Inundation area should be considered approximate only. It is based on current limited available spatial data and is subject to future verification.

0 250 500 m

GDA 1994 MGA Zone 56

N

KEY

- Project footprint
- Indicative pipeline alignment (20 m buffer)
- Local road
- Track
- Watercourse
- Waterbody
- State forest

Area of archaeological potential

- Crest landform
- Level to gently inclined landforms within 100 m of primary watercourse
- Very steep to precipitous terrain

Areas of archaeological sensitivity

Dungowan Dam Project
Aboriginal consulation
Figure 3

EMM creating opportunities

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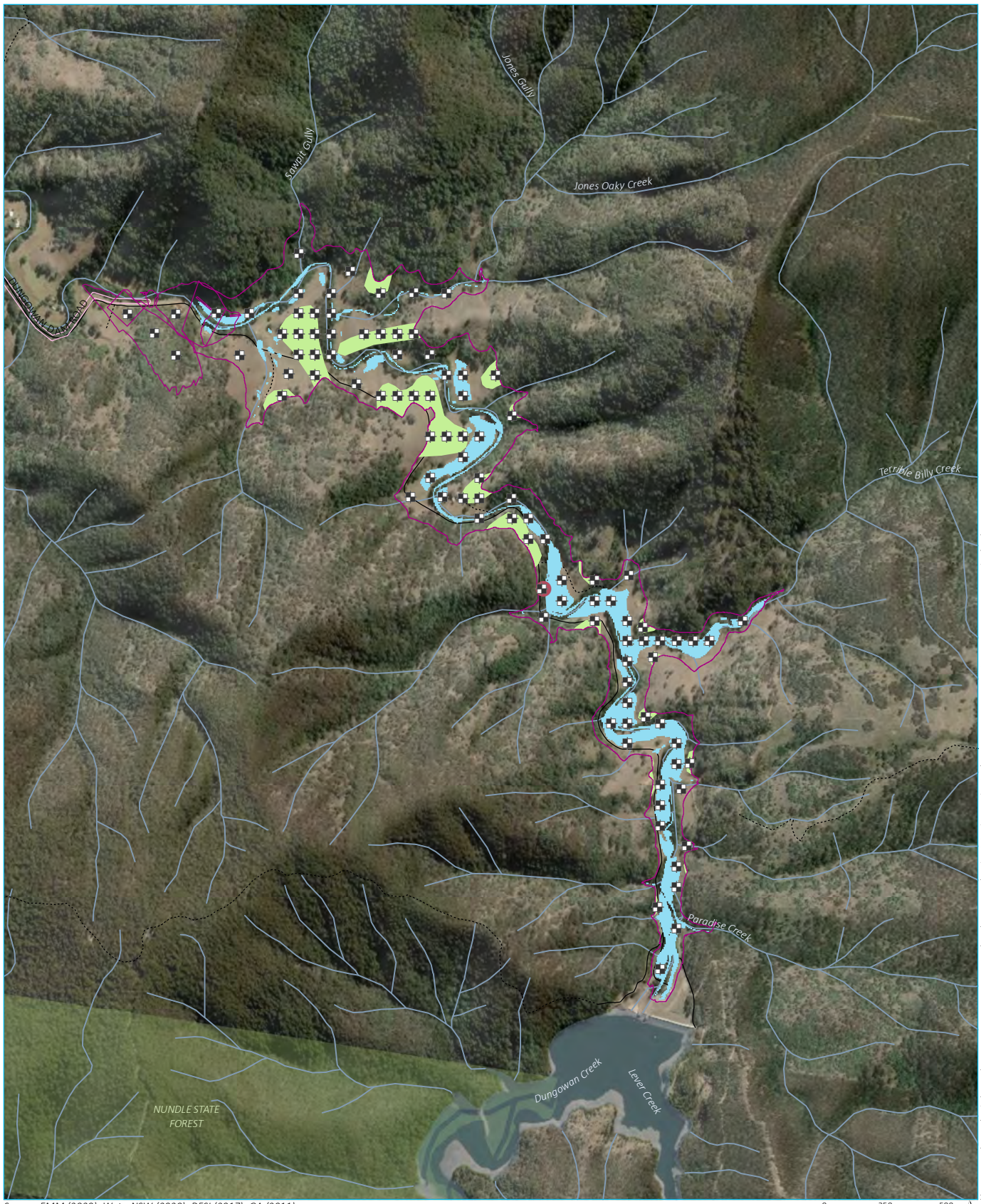

Source: EMM (2020); WaterNSW (2020); DFSI (2017); GA (2011)

*Inundation area should be considered approximate only. It is based on current limited available spatial data and is subject to future verification.

0 250 500 m

GDA 1994 MGA Zone 56

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KEY

- Archaeological test location
- Project footprint
- Indicative pipeline alignment (20 m buffer)
- Local road
- Track
- Watercourse
- Waterbody
- State forest

Area of archaeological potential

- Crest landform
- Level to gently inclined landforms within 100 m of primary watercourse
- Very steep to precipitous terrain

Indicative archaeological test excavation program

Dungowan Dam Project
Aboriginal consulation
Figure 4

EMM
creating opportunities

Appendix A

COVID-19 consultation methods

A.1 General

WaterNSW and their consultants are cognisant of the importance of safety to community and stakeholders, clients and staff. Prior to any engagement those with the greatest risk of more serious illness with COVID-19 will be considered:

- Aboriginal and Torres Strait Island people over the age of 50; and
- those aged 60 year and over.

We adhere to the Government requirements regarding COVID-19 and amend our approach as required in this dynamic environment. At the time of writing this document, we note the need to:

- restrict outdoor gatherings to no more than 2 people;
- maintain a 1.5m distance when outside;
- maintain a 4 sqm distance when inside;
- regularly wash hands using soap and water or alcohol-based hand sanitiser;
- surfaces are cleaned prior and after use using alcohol-based sanitiser; and
- observe all travel bans.

The current COVID-19 pandemic and the government requirements to self-isolate and practice social distancing has necessitated a different approach to community and stakeholder engagement. EMM has responded by adopting the practices outlined in Table A1.

Table A.1 Aboriginal community and stakeholder engagement options – COVID-19

Previous approach	COVID-19 methods
Face to face interviews	• Videoconference; • Teleconference; • Where access to hardware and/or software is not available two options could apply: – iPad could be provided to those in remote and isolated locations that is preloaded with: ▪ Prepaid SIM; ▪ Facetime (this is the easiest platform to use for inexperienced users); and ▪ EMM person contact details. – Satellite model where a safe location is provided[11] in negotiation with the client and or participant/s. The location will be set to have: ▪ Person to welcome and direct person to computer station and be available to assist if required (not to be present in the room while interview is being undertaken); ▪ Computer station with videoconference session ready ie person only needs to sit and participate in the face to face interview; ▪ Sanitary wipes to allow the participant to wipe keyboard and mouse before and after participation in the interview. • In the case of satellite model, identify where possible those we have an existing relationship locally who can act as the contact person and/or assist in identifying the appropriate participant/s. There would need to be an agreement up from on: – Who will be responsible locally for facilitating and arranging for participants to attend meetings; – Pre-arranged times and dates (including timeframes eg 3 months) for meetings; and – Pre agreed incentives eg donation of device to the organiser. ***Note: payment for face to face participation would still apply if replaced with videoconferencing/teleconferencing options.***
Group meetings/ workshops	• Videoconference and/or • Online forum/discussions using Social Pinpoint or equivalent • Satellite model where a safe location is provided[12] in negotiation with the client and or participant/s. The location will be set to have: – Person to welcome and direct person to computer station and be available to assist if required; – Computer station with videoconference session ready ie person only needs to sit and participate in the group discussion; – Sanitary wipes to allow the participant to wipe keyboard and mouse before and after participation in the interview.
Community information sessions	• Online forum/discussions using Social Pinpoint
On-line surveys	• On-line surveys integrated with Social Pinpoint • On-line survey via Survey Monkey delivered via email addresses
Newsletters/ Information delivered in person or via letterbox drop	• Provided passively on agreed resident/Council Facebook pages, project websites; • Provided via email; • Where available letterbox drop; and/or • Integrated to the project's Social Pinpoint page.

[11] If inside 4 sqm per person or computer station, if outside 1.5m between each person or computer station.

[12] If inside 4 sqm per person or computer station, if outside 1.5m between each person or computer station.

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7 May 2020

Colin Ahoy
Nunawanna Aboriginal Corporation
10 Dale Crescent
Armidale NSW 2350

Re: Dungowan Dam and associated infrastructure - Project information and assessment methodology

Dear Colin,

1 Introduction

Thank you for registering your interest in the Dungowan Dam project, southeast of Tamworth, NSW (Figures 1 and 2). WaterNSW has engaged EMM Consulting Pty Ltd (EMM) to prepare the Aboriginal Cultural Heritage Assessment (ACHA) to investigate and understand the cultural heritage values of the project area and surrounds. The assessment will consider the potential impacts of the project and how mitigation and management of cultural heritage needs to be integrated into the delivery of the project. The assessment forms part of an Environmental Impact Statement or Review of Environmental Factors currently being prepared.

This document is provided in accordance with sections 4.2 and 4.3 of the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (DECCW 2010), which sets out the Aboriginal consultation requirements for the project. Additional Aboriginal community liaison and participation opportunities will occur in accordance with a project specific consultation strategy.

The aims of this letter are to:

- provide an overview of the project and how it will be assessed;
- provide background on the project and some of the initial investigations to date;
- establish the purpose and aims of the Aboriginal consultation process;
- seek information about any Aboriginal cultural heritage values associated with the project and how they may affect, inform or refine the project and/or assessment methods;
- seek information on any cultural activities (such as fishing and hunting) that has historically and/or is actively being undertaken in the project area;
- identify any culturally appropriate protocols that registered parties wish to be adopted during the information gathering process (eg protocols during field survey, or handling of culturally sensitive information); and
- present a draft of the intended assessment methods for your review and comment.

We welcome your feedback at your earliest convenience, and will be consulting with the registered Aboriginal parties for the duration of the ACHA, currently proposed to extend to the end of 2020. However, for the purposes of this initial stage and in accordance with the Department of Planning, Industry and Environment (DPIE) guidelines, we request any written response on the information and process below by **4 June 2020.**

At this time, we propose to conduct all consultation via teleconferencing, e-mail or phone due to the social distancing rules from the COVID-19 outbreak. However, where feasible, we would meet in person (face-to-face meetings), and would ensure appropriate protocols are in place as per Government health advice at that time. Appendix A of this document provides our proposed methods for social distancing during consultation at this time. We would like to hear from your organisation on this to ensure that you are able to contribute knowledge to the project and have the opportunity to be involved, whilst ensuring we comply with up-to-date social distancing requirements.

For reference, the WaterNSW contact is: Meredith Abrams, Community Engagement Officer, P: 1300 662 077, E: meredith.abrams@waternsw.com.au. EMM is working on the proponent's behalf, and all queries should be directed through EMM. Feedback can be provided to:

Georgia Burnett

Address: PO Box 21, St Leonards, NSW 1590

Phone: 02 9493 9500

Email: gburnett@emmconsulting.com.au

2 Project information

2.1 Project overview and proposed assessment

WaterNSW is proposing to undertake the planning and delivery of three new or augmented dams in NSW, which includes a new Dungowan Dam and supply pipeline. The need to deliver the dams is critical to the State's drought recovery process and needs to be completed to the highest standard in relation to the assessment and delivery. Each dam is to be constructed rapidly to create security for the various town water supplies and associated industries reliant on the delivery of water for viability.

The project includes:

- a new dam downstream of the existing Dungowan Dam, with a nominal capacity of 22.5 gigalitres (GL);
- partial or full decommissioning of the existing Dungowan Dam and rehabilitation of the storage area of the dam; and
- a new delivery pipeline from the proposed dam to the junction with the Chaffey Dam pipeline and a further stage from the junction to the Calala water treatment plant located in Tamworth.

The project is identified as Critical State Significant Infrastructure (CSSI) under the provisions of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act). A CSSI project requires approval from the NSW Minister for Planning and Public Spaces and is accompanied by an EIS. The assessment of Aboriginal cultural heritage would be one of several investigations included in the EIS. The assessment would be developed in response to Secretary Environmental Assessment Requirements (SEARs) issued by DPIE, which will outline the investigative requirements for Aboriginal heritage. These will likely require an assessment that aligns with DPIE guidelines[5] for investigating and assessing Aboriginal heritage and consulting with the Aboriginal community. However, CSSI projects do not require separate approvals under the *National Parks and Wildlife Act 1974* (eg Aboriginal heritage impact permits), rather any subsequent requirements for heritage are managed in accordance with the conditions of approval, provided by the Minister.

The section of the pipeline between its junction with the Chaffey Dam pipeline and extending to the Calala water treatment plant would be delivered as the 'early work' for the project, and will be assessed separately to the EIS, within a Review of Environmental Factors (REF) under Part 5 of the EP&A Act. This component of the project may require approval under the *National Parks and Wildlife Act 1974* if impacts on Aboriginal heritage are identified. This assessment would adopt the process and requirements described within DPIE guidelines.

2.2 Initial Aboriginal heritage investigations

An investigation of Aboriginal heritage and the potential for cultural material to be present in the project area was undertaken as part of the scoping study – the document lodged in March 2020 with DPIE to inform the contents of the EIS. This study was primarily a desktop investigation, including a review of previous investigations and the application of key environmental landforms to identify areas of archaeological interest (Figure 3).[6] The study resulted in the following conclusions:

> …there is currently no information on the Aboriginal heritage of the immediate environment. A search of the surrounding region reveals only a small number of previously documented sites ($\bar{x}$=~1 site per 50 km^2), with the nearest some 9 km from the study area. In comparison with Chaffey Dam, a nearby dam in a similar environmental context, the data suggest that the proposed works would affect primarily stone artefact sites associated with the transient and ephemeral use of the landscape in the past. These would likely be found as surface and/or sub-surface deposits in the vicinity of Dungowan Creek, Terrible Billy Creek and/or Jones Oaky Creek. A site inspection validates these predictions, with a number of elevated terraces and floodplains adjacent the creeks revealing cultural material. Specifically, areas within 100 m either sides of these creeks are considered to have high potential for surface and sub-surface cultural material. The latter quite possible in stratified contexts, and thereby able to provide significant information on the past use of the region by Aboriginal people.
>
> While predictions indicated the potential for rockshelters and associated features (such as art) to be present along the valley edges and where other geological outcropping is found, none were observed. The nature of the geomorphology resulted in more moderate hills and slopes, and the potential for such sites is therefore considered low. Similarly, exposed geologically outcropping in the rivers themselves were not encountered, and as such the presence of grinding grooves may similarly be considered low. However, the site inspection cannot definitively determine the presence or absence of ceremonial activities and/or natural resource sites, that are known in the region. These sites are commonly considered of significance and will likely require more detailed understanding and management through the project.

[5] *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in New South Wales* (OEH 2011)

[6] EMM Consulting Pty Ltd, 2020, Three Dams Project - Dungowan Dam - Aboriginal and Historic heritage constraints assessment report, Report for Water NSW. Available for download here: https://www.planningportal.nsw.gov.au/major-projects/project/30026

In addition to above, the observations along the main creeklines within the project area, suggest that they have the potential to contain complex geomorphology, including a range of alluvial terraces. Some of these appear to be >1m in depth and have potential to be of significant age. The establishment of the existing dam and subsequent regulation of river flow in the 20th century has also potentially modified and/or affected these alluvial deposits and require further investigation.

Following these findings, EMM is now undertaking a more extensive investigation of the Aboriginal heritage values of the project area, including consultation with and participation of Aboriginal stakeholders. For the early works, we will be producing an ACHA in accordance with DPIE guidelines. For the remainder of the works, our investigations will broadly follow DPIE guidelines, but the accelerated timeframe of the overall project requires some modifications to the process detailed in the guidelines. This includes undertaking archaeological test excavation immediately following the field survey (rather than a more extended gap between the two in some projects); and the adoption of mechanically assisted excavations to maximise coverage and depths given the potential for deep alluvial floodplains. These are outlined further below.

3 Aboriginal stakeholders

Following the notification process undertaken between 17 April – 1 May 2020, the following Aboriginal stakeholders have expressed an interest in being involved in the project:

- Tamworth Local Aboriginal Land Council;
- Nunawanna Aboriginal Corporation;
- The Gomeroi People;
- DFVT Enterprises;
- [redacted]
- AT Gomilaroi Cultural Consultancy; and
- Galamaay Cultural Consultants.

4 Dungowan pipeline (early works) – REF assessment methodology

The assessment of the pipeline component between Calala water treatment plant and its junction with the Chaffey Dam pipeline is to be assessed under Part 5 of the EP&A Act (Figure 2). As such, additional approvals required under the *National Parks and Wildlife Act 1974* may apply, and therefore it must conform with the following guidelines:

- *Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW* (OEH 2011);
- *Code of Practice for Archaeological Investigations of Aboriginal Objects in NSW* (the Code of Practice) (DECCW 2010); and
- *Aboriginal Consultation Requirements for Proponents 2010* (DECCW 2010).

4.1 Methods

The purpose of the assessment is to identify and manage the Aboriginal cultural heritage values of all areas that will be affected by the study. In summary, this will involve.

- consultation with the Aboriginal stakeholders to identify socio-cultural values of the project area and places of special significance that should be considered;
- a search of the AHIMS register for records of previously registered Aboriginal sites;
- a review of past Aboriginal heritage reports covering the study area;
- environmental landscape analysis to identify past Aboriginal resources and suitable occupation areas;
- synthesis of background research to develop a predictive model of Aboriginal site location;
- field investigation to validate the findings of the desktop and identify any previously undocumented cultural material. This would include surface inspection and may extend to test excavations of areas of archaeological interest;
- an assessment of significance for Aboriginal cultural heritage values in the project area (with input from the registered Aboriginal stakeholders);
- an impact assessment of how the project will affect Aboriginal cultural heritage values in the project area; and
- development of management recommendations based on the results of the assessment and input from registered Aboriginal stakeholders during the consultation process and particularly from the draft ACHA review period.

4.1.1 Field investigation

Survey of the project area would be undertaken to identify any extant Aboriginal objects or sites. Surface investigation will consist of the survey team evenly spaced (5-10 m apart) walking transects across accessible parts of the study area, with a key focus on targeting areas of low disturbance. The focus of the team will be to both investigate soil exposures for extant Aboriginal objects and identify landforms that have potential for cultural material to be present (either surface or subsurface). It should be acknowledged that the entire ground surface within the project area project boundary is unlikely to be surveyed, but a representative sample of each landform within the project area will be gathered to characterise the archaeology, or its potential, of the project area. All Aboriginal objects and/or landforms of interest would be mapped and documented using hand-held GPS, photographs, sketches and written description.

The survey will be undertaken in accordance with Requirements 5 to 10 of the Code of Practice. In summary, the Code of Practice requires the following general methodology:

- pedestrian survey;
- survey and recording according to survey unit and/or transect;
- recording of beginning and end points of transects or the boundaries of survey units, and the spacing between survey personnel;
- recording of landform, soil information, land surface, vegetation conditions, visibility and exposure, and survey coverage;

- recording of any identified Aboriginal sites identified according to Requirements 6-8, and recording of any identified Aboriginal objects in accordance with Requirements 18-24 of the Code of Practice;

- if any Aboriginal objects and/or sites are identified in the course of the survey, site cards will be completed and submitted to the AHIMS registrar; and

- in the event of Aboriginal heritage being identified within the project footprint, undertake discussions on site as to the potential further investigation and/or management of these finds.

At this stage, no test excavations are proposed for the early works stage, and the aim of the project is to avoid such a program for this phase where possible (due to the shortened assessment timeframes). Rather, it is anticipated that there is enough flexibility in the pipeline route and construction methods to avoid any areas identified as archaeologically sensitive. However, if test excavations are required to further characterise the archaeological resource of an area identified in the survey, they would be implemented shortly following the survey, in accordance with the Code of Practice. Specifically, they would include the following activities:

- all test excavation pits would be spatially located using a differential GPS device, which would also provide elevation data;

- manual excavation of 0.25m² test pits in a systematic grid across areas of archaeological interest within the impact footprint. The spatial resolution of the grid would be dependent on on-ground conditions, but would likely have test pits between 20-50m apart;

- All excavation would use hand tools. Excavation of the first unit would be in 5cm spits, with subsequent excavation allowed in 10cm spits or according to stratigraphy (whichever is smallest) depending on the results of the first unit. Manual excavation would continue to either: i) the base of the cultural deposits; ii) to the depth of the underlying geology; or iii) to the maximum depth possible via hand excavation (likely ~ 80cm).

- sieving of all manually excavated material through a 5mm sieve;

- reduced levels of the top and bottom of the test pit would be documented using a dumpy level against a known elevation. Other levels may be taken as required;

- soil profiles would be recorded in accordance with the Code of Practice, including scaled drawings, photographs, and written descriptions;

- soil samples may be collected for description, sedimentological and chronological analysis where such analysis is considered likely to contribute significant information; and

- excavation procedures and protocols may be modified at the discretion of the Excavation Director, in consultation with the Aboriginal stakeholders and the proponent as the conditions in the field and nature of the excavations develop. This includes the movement of test pits to avoid existing built structures, buried services and disturbances not identified during the desktop phase.

4.2 Timeframes

The following indicative timeframes for the Pipeline REF assessment would apply:

- distribution of this document to the registered Aboriginal stakeholders: May 2020;

- field investigation of the project area: early to mid-June 2020;

- distribution of the draft report: early July 2020;

- input into recommendations and review of draft report: mid July – mid August 2020;
- report finalisation and submission of AHIP application (if required): mid-August 2020;
- determination of the REF: September 2020; and
- construction commencing on the early work section of pipeline: October 2020.

5 Dungowan Dam (main works) – EIS assessment methodology

An EIS will be prepared to assess the dam and associated infrastructure (Figure 1) as a CSSI assessment under Division 5.2 of the EP&A Act. As such, it is required to follow and address Aboriginal heritage requirements as outlined by the SEARs. The assessment will be developed in *broad* accordance with the following guidelines:

- *Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW* (DECCW 2010); and
- *Aboriginal Consultation Requirements for Proponents 2010* (DECCW 2010).

5.1 Methods

The purpose of the assessment is to identify and manage the Aboriginal cultural heritage values of all areas that will be affected by the study. In summary, this will involve:

- consultation with the Aboriginal stakeholders to identify socio-cultural values of the project area, greater understanding of cultural fishing and hunting activities, and places of special significance that should be considered;
- a search of the AHIMS register for records of previously registered Aboriginal sites;
- a review of past Aboriginal heritage reports covering the study area;
- environmental landscape analysis to identify past Aboriginal resources and suitable occupation areas;
- synthesis of background research to develop a predictive model of Aboriginal site location;
- field investigation to validate the findings of the desktop, and identify any previously undocumented cultural material. This would include surface inspection and test excavations of areas of archaeological interest;
- an assessment of significance for Aboriginal cultural heritage values in the project area (with input from the registered Aboriginal stakeholders);
- an impact assessment of how the project will affect Aboriginal cultural heritage values in the project area; and
- development of management recommendations based on the results of the assessment and input from registered Aboriginal stakeholders during the consultation process and particularly from the draft assessment review period.

5.1.1 Field investigation

Survey of the project area would be undertaken to identify any extant Aboriginal objects or sites. Surface investigation will consist of the survey team evenly spaced (5-10 m apart) walking transects across accessible parts of the study area. The focus of the team will be to both investigate soil exposures for extant Aboriginal objects and identify landforms that have potential for cultural material to be present (either surface or subsurface). All Aboriginal objects and/or landforms of interest would be mapped and documented using hand-held GPS, photographs, sketches and written description.

The survey will be undertaken using the following general methodology:

- pedestrian survey;
- survey and recording according to survey unit and/or transect;
- recording of beginning and end points of transects or the boundaries of survey units, and the spacing between survey personnel;
- recording of landform, soil information, land surface, vegetation conditions, visibility and exposure, and survey coverage;
- recording of any identified Aboriginal sites identified according to Requirements 6-8, and recording of any identified Aboriginal objects in accordance with Requirements 18-24 of the Code of Practice;
- if any Aboriginal objects and/or sites are identified in the course of the survey, site cards will be completed and submitted to the AHIMS registrar; and
- in the event of Aboriginal heritage being identified within the project footprint, undertake discussions on site as to the potential further investigation and/or management of these finds.

In addition to the field survey, an archaeological test excavation is proposed for the project area. The investigations will be developed to fulfil the research aims and objectives outlined below. Given the large size of the project area, and the potential for deep deposits – likely to extend below depths that can be easily investigated manually –a grid of mechanically excavated test pits across the site (Figure 4) are proposed. These test pits would be distributed to: i) focus on areas of archaeological interest as determined by the earlier desktop investigations (Section 2.2); ii) to improve our understanding of the area's geomorphological history, and iii) in response to any findings of the field survey undertaken above that may influence areas for future investigation. With respect to the timeframes provided and in anticipation of any obstructions faced on site, we propose up to 40-60 test pits be excavated across the project area. The excavations would adopt the following methods:

- all test excavation pits would be spatially located using a differential GPS device;
- mechanical excavation of some 40-60 ~2m^2 (2x1m) test pits in a systematic grid across the project area;
- all excavation would be undertaken with a flat mud bucket and in controlled 20cm spits, to either: i) the base of the cultural deposits; or ii) to the depth of the underlying geology, or iii) to the full extent of the excavator reach (~3m) where neither (i) or (ii) are met;
- reduced levels of the top and bottom of the test pit would be documented using a dumpy level against a known elevation. Other levels may be taken as required;

- all sediment would be stockpiled in its respective spits, labelled according to its assigned test pit number and recorded and documented. Fifty per cent (50%) of each stockpile – typically ~800kg – would be placed in buckets or bulk soil bags. This sediment would then be wet-sieved through a 5mm wire aperture mesh, and any cultural material recovered, labelled and bagged for subsequent analysis and curation. In the event that Aboriginal objects are recovered, the remaining 50% of the sediment from that spit would be sieved to maximise cultural material recovery. Where no Aboriginal objects are recovered in the initial 50% sub-sample, no further sieving of that spit would occur;

- soil profiles would be recorded in accordance with the Code of Practice, including scaled drawings, photographs, and written descriptions;

- soil samples may be collected for description, sedimentological and chronological analysis where such analysis is considered likely to contribute significant information; and

- excavation procedures and protocols may be modified at the discretion of the Excavation Director, in consultation with the Aboriginal stakeholders and the proponent as the conditions in the field and nature of the excavations develop. This includes the movement of test pits to avoid existing built structures, buried services and disturbances not identified during the desktop phase.

i Research aims and objectives

Our understanding of the cultural materials across the project area is poor, but visual observations suggests that there is a complex and deep fluvial history. It is envisaged that within this complex fluvial history, cultural materials may have been deposited, either through discard by Aboriginal people, or through natural accumulation of materials in these types of deposits. Based on this limited understanding of the project area, a number of overarching aims can be developed for the assessment:

- Identify, map and characterise the nature, age, extent, integrity and significance of the Aboriginal cultural material within the project area.

- Answer research questions including:

    - What are the environmental characteristics associated with the distribution of Aboriginal cultural heritage within the project area?

    - Can the formative processes of the stratigraphic profile provide information on the nature and/or survivability of the archaeological resources?

    - Are there other key factors in the distribution and extent of the material culture within the project area (eg how the dam has affected these deposits)?

    - What are the cultural, social and public values associated with the Aboriginal archaeological resource within the project area?

    - How should the Aboriginal sites in the region be conserved and managed in future?

- Better assess the significance and historical meaning of the cultural materials that exist within the project area so that future archaeological investigation can advance our understanding of past Aboriginal cultural behaviour and environmental adaptation.

- Direct future heritage activities and mitigation measures (if required) for the project area.

ii Analysis, Reporting and Temporary Storage

Post-excavation analysis and reporting will be required to inform the ACHA and subsequent documentation. The post-excavation analysis would be designed to address the research objectives, along with other relevant questions that may arise based on the results of the excavation. Results of the analysis would be presented in relation to comparative site data where possible, and where useful in addressing research questions about the nature, extent, and timing of Aboriginal occupation of the area in the past. These results and discussions would be incorporated into the assessment, which will be provided to the Aboriginal stakeholders for review prior to finalisation.

Once the excavations are completed, all Aboriginal cultural material recovered will be securely stored at the EMM Sydney office for analysis. At the completion of the analysis and reporting, the final location of the assemblage would be discussed with the Aboriginal stakeholders and proponent to determine a suitable long term repository for the cultural materials.

5.2 Timeframes

The following indicative timeframes for the main works EIS assessment would apply:

- distribution of this document to the registered Aboriginal stakeholders: May 2020;
- field investigation of the project area: early June – mid July 2020 (4-6 weeks);
- distribution of the draft report: early October 2020;
- input into recommendations and review of draft report: mid-October – early November 2020;
- finalisation of report for inclusion in EIS: early December 2020; and
- environmental impact assessment development and submission: early December – October 2021
- construction commencing on the main works portion of Dungowan Dam: October 2021. Construction is expected to take four years, dependant on design.

6 What we need from you

In addition to the archaeological evidence described above, Aboriginal heritage incorporates a wide range of values such as stories, traditions and cultural practices. EMM welcomes advice from the Aboriginal community about cultural values (which might include archaeological sites or other types of values) relevant to the project area and its surrounds. EMM is relying on the Aboriginal community for advice on non-archaeological and intangible Aboriginal values for the study area. We are happy to discuss any information which you are willing to share and will respect confidentiality where requested.

EMM would appreciate your feedback on the above methodology proposed for the investigation and assessment of the project area. In responding, please also consider the following questions:

- Are there any other knowledge-holders or traditional owner groups we should be contacting to obtain cultural information on this area?
- Are there any protocols in relation to community interaction and/or cultural heritage that you would like adopted during the project?
- Are you aware of any Aboriginal objects, places, sites or stories of cultural significance and/or importance that you are aware of within the project area? If so, please advise us how you wish them to be dealt with during the project.

- Are you aware of any past or current fishing and hunting activities within the project area? Do you have any views on how these should be managed into the future?

- Is the information you are providing sensitive, gender specific, etc? If so, how would you like the information you provide to EMM to be managed? Noting that some documentation for the ACHA process will be required.

- Do you require any further information prior to EMM proceeding with the project?

In your response, can you please also clearly identify who you would like EMM to talk to within your organisation, and provide contact details for these individuals. Please also ensure your preferred method of communication (eg telephone call, e-mail, letter, etc) is highlighted for subsequent stages of the project.

7 Closing

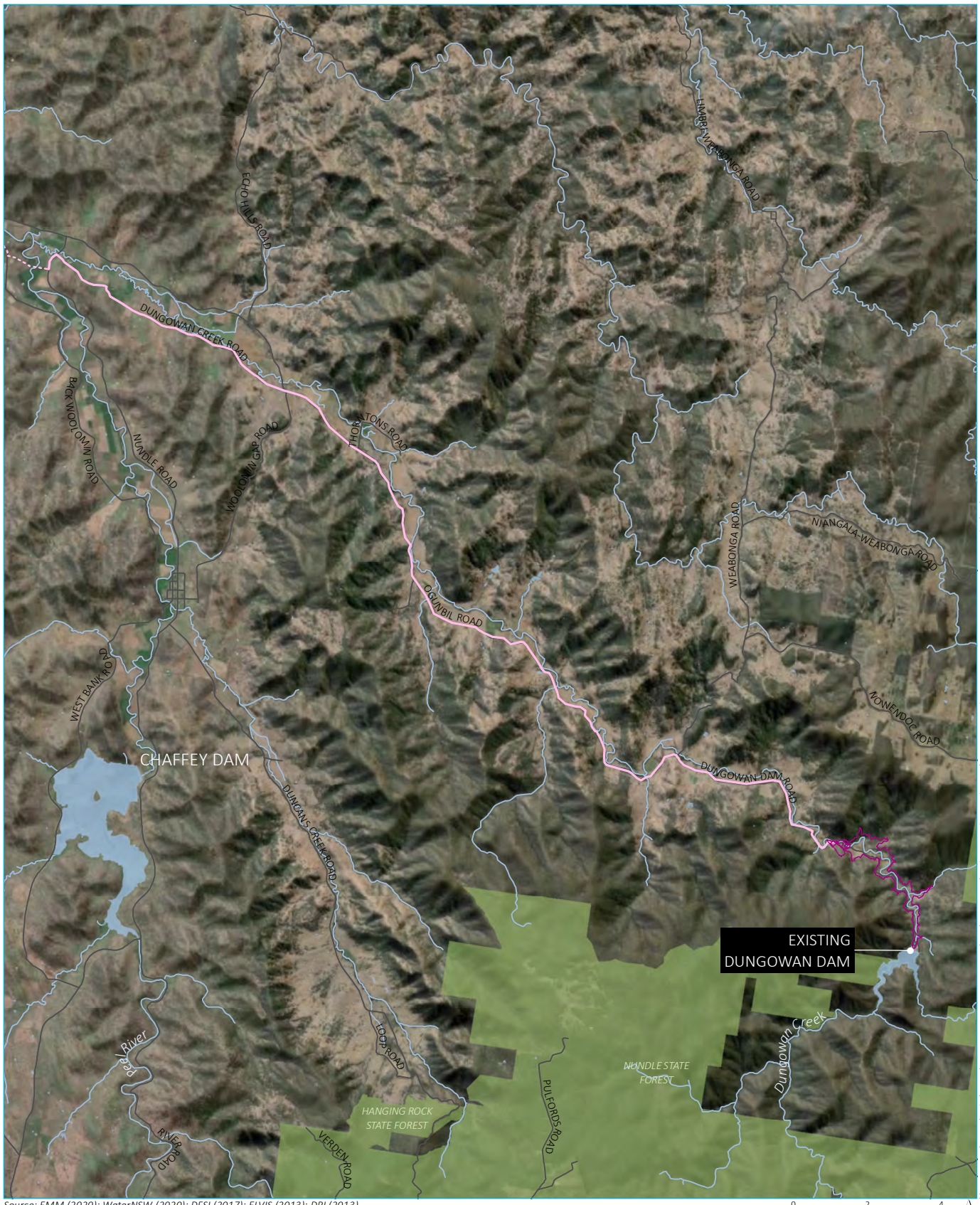
We look forward to receiving any response your organisation wishes to make about the proposed method by **4 June 2020**. Your response will be documented and considered in the assessment. Most importantly, your cultural information is also welcome within this timeframe; but it can also be submitted up until the completion of the draft ACHA.

Please feel free to contact me with any questions.

Yours sincerely

Georgia Burnett
Archaeologist

gburnett@emmconsulting.com.au



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Source: EMM (2020); WaterNSW (2020); DFSI (2017); ELVIS (2013); DPI (2013)

**Inundation area should be considered approximate only. It is based on current limited available spatial data and is subject to future verification.*

0 2 4 km

GDA 1994 MGA Zone 56

N

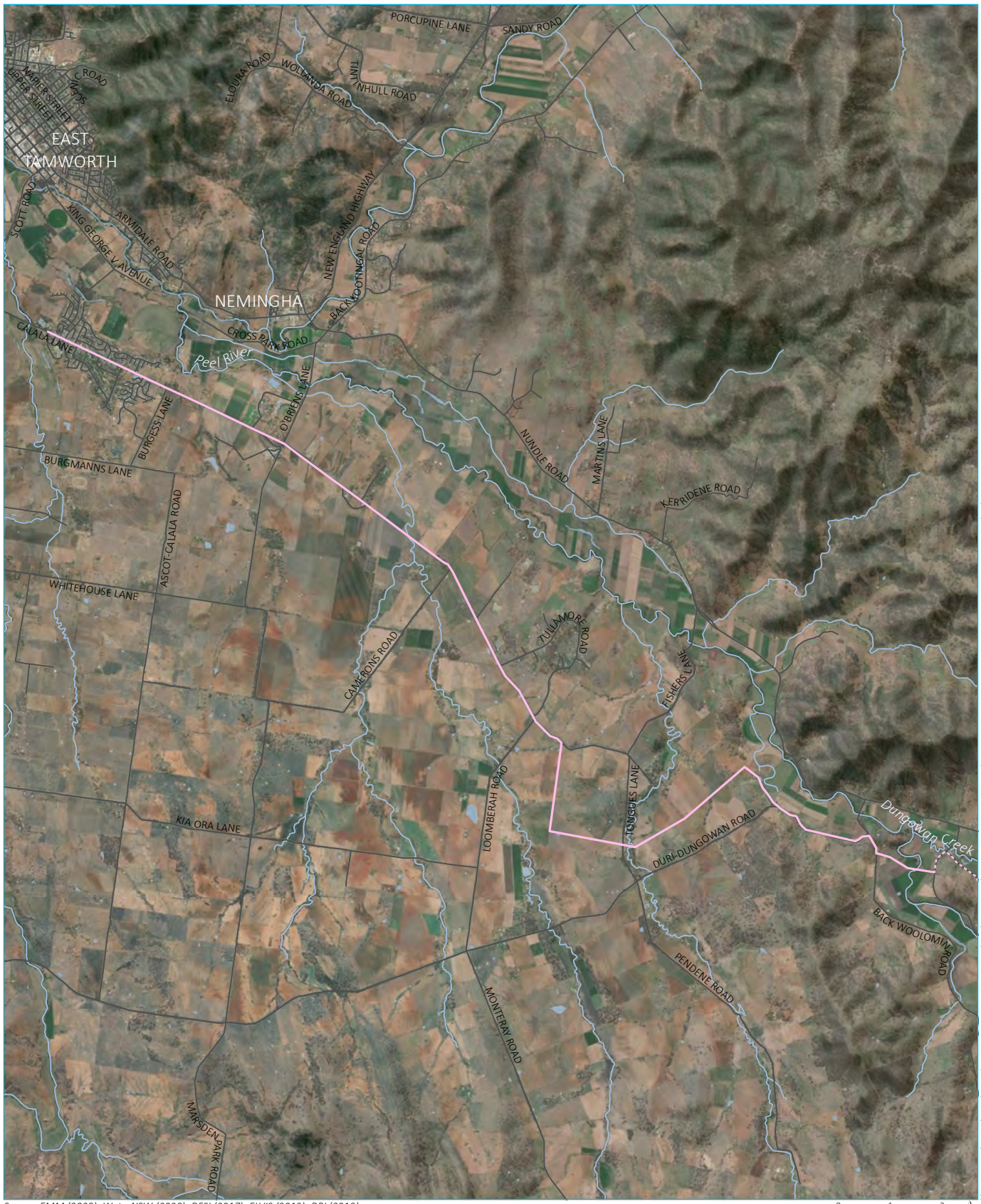
KEY

- Project footprint
- Indicative pipeline alignment (EIS)
- Indicative pipeline alignment (REF)
- Main road
- Named watercourse
- Waterbody
- State forest

The proposed project

Dungowan Dam Project
Aboriginal consultation
Figure 1

EMM
creating opportunities



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Source: EMM (2020); WaterNSW (2020); DFSI (2017); ELVIS (2013); DPI (2013)

**Inundation area should be considered approximate only. It is based on current limited available spatial data and is subject to future verification.*

0 1 2 km

GDA 1994 MGA Zone 56

N

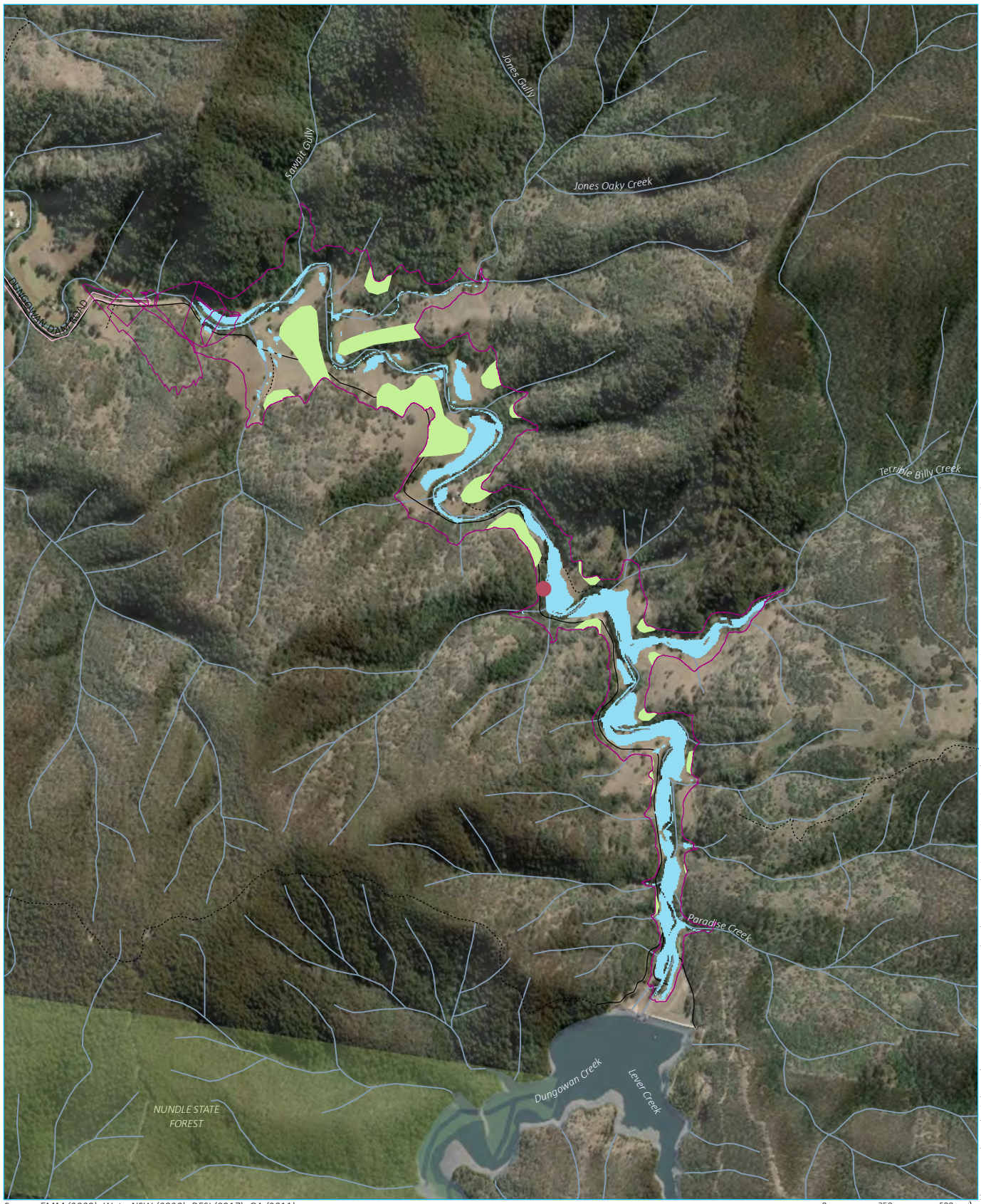
KEY

- Indicative pipeline alignment (REF)
- Indicative pipeline alignment (EIS)
- Main road
- Named watercourse
- Waterbody

The early works study area

Dungowan Dam Project
Aboriginal consultation
Figure 2

EMM
creating opportunities



Source: EMM (2020); WaterNSW (2020); DFSI (2017); GA (2011)

*Inundation area should be considered approximate only. It is based on current limited available spatial data and is subject to future verification.

0 250 500 m

GDA 1994 MGA Zone 56

N

KEY

- Project footprint
- Indicative pipeline alignment (20 m buffer)
- Local road
- Track
- Watercourse
- Waterbody
- State forest

Area of archaeological potential

- Crest landform
- Level to gently inclined landforms within 100 m of primary watercourse
- Very steep to precipitous terrain

Areas of archaeological sensitivity

Dungowan Dam Project
Aboriginal consulation
Figure 3

EMM creating opportunities

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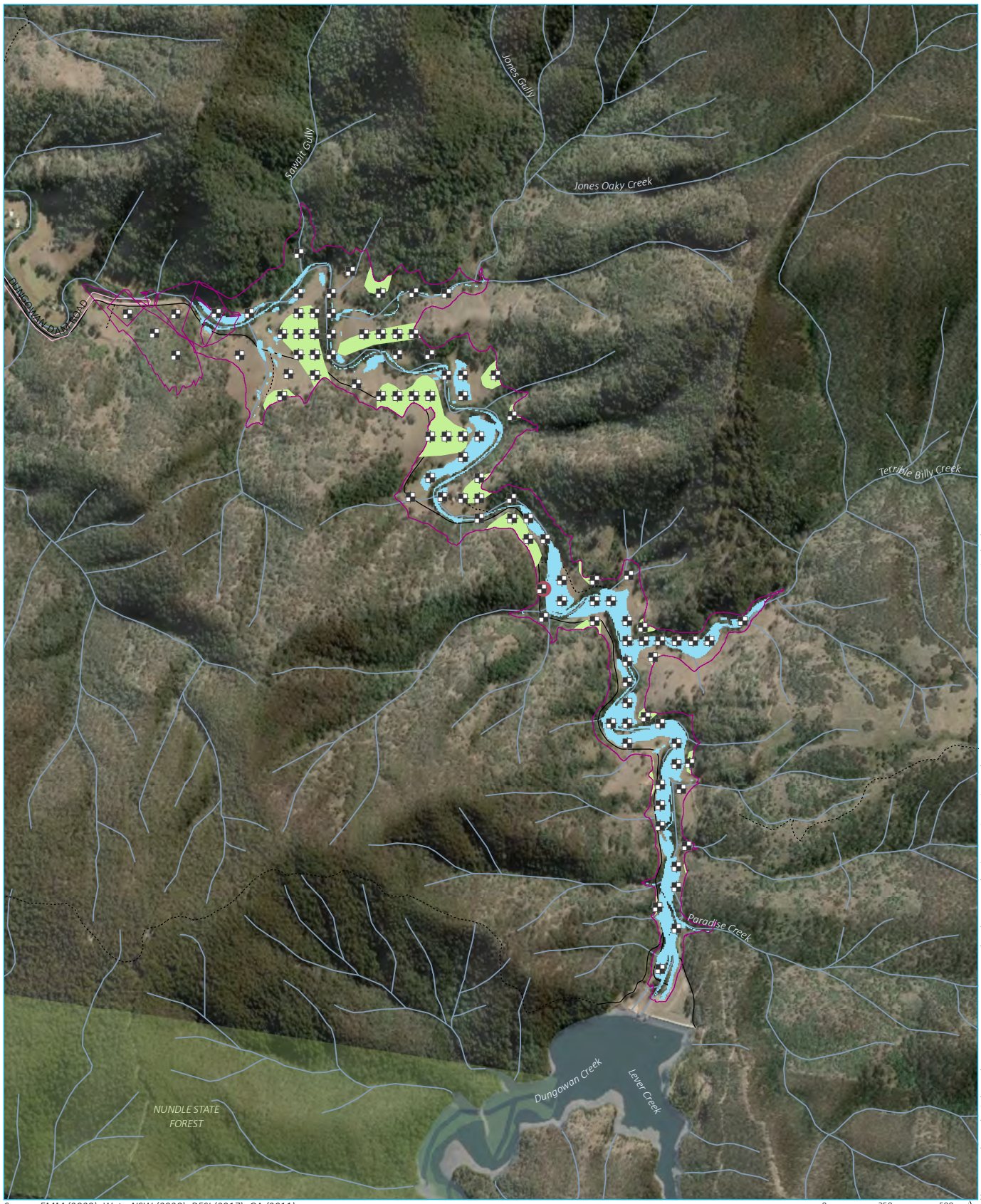

Source: EMM (2020); WaterNSW (2020); DFSI (2017); GA (2011)

*Inundation area should be considered approximate only. It is based on current limited available spatial data and is subject to future verification.

0 250 500 m

GDA 1994 MGA Zone 56

N

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KEY

- Archaeological test location
- Project footprint
- Indicative pipeline alignment (20 m buffer)
- Local road
- Track
- Watercourse
- Waterbody
- State forest

Area of archaeological potential

- Crest landform
- Level to gently inclined landforms within 100 m of primary watercourse
- Very steep to precipitous terrain

Indicative archaeological test excavation program

Dungowan Dam Project
Aboriginal consulation
Figure 4

EMM
creating opportunities

Appendix A

COVID-19 consultation methods

A.1 General

WaterNSW and their consultants are cognisant of the importance of safety to community and stakeholders, clients and staff. Prior to any engagement those with the greatest risk of more serious illness with COVID-19 will be considered:

- Aboriginal and Torres Strait Island people over the age of 50; and
- those aged 60 year and over.

We adhere to the Government requirements regarding COVID-19 and amend our approach as required in this dynamic environment. At the time of writing this document, we note the need to:

- restrict outdoor gatherings to no more than 2 people;
- maintain a 1.5m distance when outside;
- maintain a 4 sqm distance when inside;
- regularly wash hands using soap and water or alcohol-based hand sanitiser;
- surfaces are cleaned prior and after use using alcohol-based sanitiser; and
- observe all travel bans.

The current COVID-19 pandemic and the government requirements to self-isolate and practice social distancing has necessitated a different approach to community and stakeholder engagement. EMM has responded by adopting the practices outlined in Table A1.

Table A.1 Aboriginal community and stakeholder engagement options – COVID-19

Previous approach	COVID-19 methods
Face to face interviews	• Videoconference; • Teleconference; • Where access to hardware and/or software is not available two options could apply: – iPad could be provided to those in remote and isolated locations that is preloaded with: ▪ Prepaid SIM; ▪ Facetime (this is the easiest platform to use for inexperienced users); and ▪ EMM person contact details. – Satellite model where a safe location is provided[7] in negotiation with the client and or participant/s. The location will be set to have: ▪ Person to welcome and direct person to computer station and be available to assist if required (not to be present in the room while interview is being undertaken); ▪ Computer station with videoconference session ready ie person only needs to sit and participate in the face to face interview; ▪ Sanitary wipes to allow the participant to wipe keyboard and mouse before and after participation in the interview. • In the case of satellite model, identify where possible those we have an existing relationship locally who can act as the contact person and/or assist in identifying the appropriate participant/s. There would need to be an agreement up from on: – Who will be responsible locally for facilitating and arranging for participants to attend meetings; – Pre-arranged times and dates (including timeframes eg 3 months) for meetings; and – Pre agreed incentives eg donation of device to the organiser. ***Note: payment for face to face participation would still apply if replaced with videoconferencing/teleconferencing options.***
Group meetings/ workshops	• Videoconference and/or • Online forum/discussions using Social Pinpoint or equivalent • Satellite model where a safe location is provided[8] in negotiation with the client and or participant/s. The location will be set to have: – Person to welcome and direct person to computer station and be available to assist if required; – Computer station with videoconference session ready ie person only needs to sit and participate in the group discussion; – Sanitary wipes to allow the participant to wipe keyboard and mouse before and after participation in the interview.
Community information sessions	• Online forum/discussions using Social Pinpoint
On-line surveys	• On-line surveys integrated with Social Pinpoint • On-line survey via Survey Monkey delivered via email addresses
Newsletters/ Information delivered in person or via letterbox drop	• Provided passively on agreed resident/Council Facebook pages, project websites; • Provided via email; • Where available letterbox drop; and/or • Integrated to the project's Social Pinpoint page.

[7] If inside 4 sqm per person or computer station, if outside 1.5m between each person or computer station.

[8] If inside 4 sqm per person or computer station, if outside 1.5m between each person or computer station.

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7 May 2020

Fiona Snape
Tamworth Local Aboriginal Land Council
123 Marius Street
Tamworth NSW 2340

Re: Dungowan Dam and associated infrastructure - Project information and assessment methodology

Dear Fiona,

1 Introduction

Thank you for registering your interest in the Dungowan Dam project, southeast of Tamworth, NSW (Figures 1 and 2). WaterNSW has engaged EMM Consulting Pty Ltd (EMM) to prepare the Aboriginal Cultural Heritage Assessment (ACHA) to investigate and understand the cultural heritage values of the project area and surrounds. The assessment will consider the potential impacts of the project and how mitigation and management of cultural heritage needs to be integrated into the delivery of the project. The assessment forms part of an Environmental Impact Statement or Review of Environmental Factors currently being prepared.

This document is provided in accordance with sections 4.2 and 4.3 of the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (DECCW 2010), which sets out the Aboriginal consultation requirements for the project. Additional Aboriginal community liaison and participation opportunities will occur in accordance with a project specific consultation strategy.

The aims of this letter are to:

- provide an overview of the project and how it will be assessed;
- provide background on the project and some of the initial investigations to date;
- establish the purpose and aims of the Aboriginal consultation process;
- seek information about any Aboriginal cultural heritage values associated with the project and how they may affect, inform or refine the project and/or assessment methods;
- seek information on any cultural activities (such as fishing and hunting) that has historically and/or is actively being undertaken in the project area;
- identify any culturally appropriate protocols that registered parties wish to be adopted during the information gathering process (eg protocols during field survey, or handling of culturally sensitive information); and
- present a draft of the intended assessment methods for your review and comment.

We welcome your feedback at your earliest convenience, and will be consulting with the registered Aboriginal parties for the duration of the ACHA, currently proposed to extend to the end of 2020. However, for the purposes of this initial stage and in accordance with the Department of Planning, Industry and Environment (DPIE) guidelines, we request any written response on the information and process below by **4 June 2020.**

At this time, we propose to conduct all consultation via teleconferencing, e-mail or phone due to the social distancing rules from the COVID-19 outbreak. However, where feasible, we would meet in person (face-to-face meetings), and would ensure appropriate protocols are in place as per Government health advice at that time. Appendix A of this document provides our proposed methods for social distancing during consultation at this time. We would like to hear from your organisation on this to ensure that you are able to contribute knowledge to the project and have the opportunity to be involved, whilst ensuring we comply with up-to-date social distancing requirements.

For reference, the WaterNSW contact is: Meredith Abrams, Community Engagement Officer, P: 1300 662 077, E: meredith.abrams@waternsw.com.au. EMM is working on the proponent's behalf, and all queries should be directed through EMM. Feedback can be provided to:

Georgia Burnett

Address: PO Box 21, St Leonards, NSW 1590

Phone: 02 9493 9500

Email: gburnett@emmconsulting.com.au

2 Project information

2.1 Project overview and proposed assessment

WaterNSW is proposing to undertake the planning and delivery of three new or augmented dams in NSW, which includes a new Dungowan Dam and supply pipeline. The need to deliver the dams is critical to the State's drought recovery process and needs to be completed to the highest standard in relation to the assessment and delivery. Each dam is to be constructed rapidly to create security for the various town water supplies and associated industries reliant on the delivery of water for viability.

The project includes:

- a new dam downstream of the existing Dungowan Dam, with a nominal capacity of 22.5 gigalitres (GL);
- partial or full decommissioning of the existing Dungowan Dam and rehabilitation of the storage area of the dam; and
- a new delivery pipeline from the proposed dam to the junction with the Chaffey Dam pipeline and a further stage from the junction to the Calala water treatment plant located in Tamworth.

The project is identified as Critical State Significant Infrastructure (CSSI) under the provisions of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act). A CSSI project requires approval from the NSW Minister for Planning and Public Spaces and is accompanied by an EIS. The assessment of Aboriginal cultural heritage would be one of several investigations included in the EIS. The assessment would be developed in response to Secretary Environmental Assessment Requirements (SEARs) issued by DPIE, which will outline the investigative requirements for Aboriginal heritage. These will likely require an assessment that aligns with DPIE guidelines[1] for investigating and assessing Aboriginal heritage and consulting with the Aboriginal community. However, CSSI projects do not require separate approvals under the *National Parks and Wildlife Act 1974* (eg Aboriginal heritage impact permits), rather any subsequent requirements for heritage are managed in accordance with the conditions of approval, provided by the Minister.

The section of the pipeline between its junction with the Chaffey Dam pipeline and extending to the Calala water treatment plant would be delivered as the 'early work' for the project, and will be assessed separately to the EIS, within a Review of Environmental Factors (REF) under Part 5 of the EP&A Act. This component of the project may require approval under the *National Parks and Wildlife Act 1974* if impacts on Aboriginal heritage are identified. This assessment would adopt the process and requirements described within DPIE guidelines.

2.2 Initial Aboriginal heritage investigations

An investigation of Aboriginal heritage and the potential for cultural material to be present in the project area was undertaken as part of the scoping study – the document lodged in March 2020 with DPIE to inform the contents of the EIS. This study was primarily a desktop investigation, including a review of previous investigations and the application of key environmental landforms to identify areas of archaeological interest (Figure 3).[2] The study resulted in the following conclusions:

> …there is currently no information on the Aboriginal heritage of the immediate environment. A search of the surrounding region reveals only a small number of previously documented sites ($\bar{x}$=~1 site per 50 km^2), with the nearest some 9 km from the study area. In comparison with Chaffey Dam, a nearby dam in a similar environmental context, the data suggest that the proposed works would affect primarily stone artefact sites associated with the transient and ephemeral use of the landscape in the past. These would likely be found as surface and/or sub-surface deposits in the vicinity of Dungowan Creek, Terrible Billy Creek and/or Jones Oaky Creek. A site inspection validates these predictions, with a number of elevated terraces and floodplains adjacent the creeks revealing cultural material. Specifically, areas within 100 m either sides of these creeks are considered to have high potential for surface and sub-surface cultural material. The latter quite possible in stratified contexts, and thereby able to provide significant information on the past use of the region by Aboriginal people.
>
> While predictions indicated the potential for rockshelters and associated features (such as art) to be present along the valley edges and where other geological outcropping is found, none were observed. The nature of the geomorphology resulted in more moderate hills and slopes, and the potential for such sites is therefore considered low. Similarly, exposed geologically outcropping in the rivers themselves were not encountered, and as such the presence of grinding grooves may similarly be considered low. However, the site inspection cannot definitively determine the presence or absence of ceremonial activities and/or natural resource sites, that are known in the region. These sites are commonly considered of significance and will likely require more detailed understanding and management through the project.

[1] *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in New South Wales* (OEH 2011)

[2] EMM Consulting Pty Ltd, 2020, Three Dams Project - Dungowan Dam - Aboriginal and Historic heritage constraints assessment report, Report for Water NSW. Available for download here: https://www.planningportal.nsw.gov.au/major-projects/project/30026

In addition to above, the observations along the main creeklines within the project area, suggest that they have the potential to contain complex geomorphology, including a range of alluvial terraces. Some of these appear to be >1m in depth and have potential to be of significant age. The establishment of the existing dam and subsequent regulation of river flow in the 20th century has also potentially modified and/or affected these alluvial deposits and require further investigation.

Following these findings, EMM is now undertaking a more extensive investigation of the Aboriginal heritage values of the project area, including consultation with and participation of Aboriginal stakeholders. For the early works, we will be producing an ACHA in accordance with DPIE guidelines. For the remainder of the works, our investigations will broadly follow DPIE guidelines, but the accelerated timeframe of the overall project requires some modifications to the process detailed in the guidelines. This includes undertaking archaeological test excavation immediately following the field survey (rather than a more extended gap between the two in some projects); and the adoption of mechanically assisted excavations to maximise coverage and depths given the potential for deep alluvial floodplains. These are outlined further below.

3 Aboriginal stakeholders

Following the notification process undertaken between 17 April – 1 May 2020, the following Aboriginal stakeholders have expressed an interest in being involved in the project:

- Tamworth Local Aboriginal Land Council;
- Nunawanna Aboriginal Corporation;
- The Gomeroi People;
- DFVT Enterprises;
- [redacted]
- AT Gomilaroi Cultural Consultancy; and
- Galamaay Cultural Consultants.

4 Dungowan pipeline (early works) – REF assessment methodology

The assessment of the pipeline component between Calala water treatment plant and its junction with the Chaffey Dam pipeline is to be assessed under Part 5 of the EP&A Act (Figure 2). As such, additional approvals required under the *National Parks and Wildlife Act 1974* may apply, and therefore it must conform with the following guidelines:

- *Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW* (OEH 2011);
- *Code of Practice for Archaeological Investigations of Aboriginal Objects in NSW* (the Code of Practice) (DECCW 2010); and
- *Aboriginal Consultation Requirements for Proponents 2010* (DECCW 2010).

4.1 Methods

The purpose of the assessment is to identify and manage the Aboriginal cultural heritage values of all areas that will be affected by the study. In summary, this will involve.

- consultation with the Aboriginal stakeholders to identify socio-cultural values of the project area and places of special significance that should be considered;
- a search of the AHIMS register for records of previously registered Aboriginal sites;
- a review of past Aboriginal heritage reports covering the study area;
- environmental landscape analysis to identify past Aboriginal resources and suitable occupation areas;
- synthesis of background research to develop a predictive model of Aboriginal site location;
- field investigation to validate the findings of the desktop and identify any previously undocumented cultural material. This would include surface inspection and may extend to test excavations of areas of archaeological interest;
- an assessment of significance for Aboriginal cultural heritage values in the project area (with input from the registered Aboriginal stakeholders);
- an impact assessment of how the project will affect Aboriginal cultural heritage values in the project area; and
- development of management recommendations based on the results of the assessment and input from registered Aboriginal stakeholders during the consultation process and particularly from the draft ACHA review period.

4.1.1 Field investigation

Survey of the project area would be undertaken to identify any extant Aboriginal objects or sites. Surface investigation will consist of the survey team evenly spaced (5-10 m apart) walking transects across accessible parts of the study area, with a key focus on targeting areas of low disturbance. The focus of the team will be to both investigate soil exposures for extant Aboriginal objects and identify landforms that have potential for cultural material to be present (either surface or subsurface). It should be acknowledged that the entire ground surface within the project area project boundary is unlikely to be surveyed, but a representative sample of each landform within the project area will be gathered to characterise the archaeology, or its potential, of the project area. All Aboriginal objects and/or landforms of interest would be mapped and documented using hand-held GPS, photographs, sketches and written description.

The survey will be undertaken in accordance with Requirements 5 to 10 of the Code of Practice. In summary, the Code of Practice requires the following general methodology:

- pedestrian survey;
- survey and recording according to survey unit and/or transect;
- recording of beginning and end points of transects or the boundaries of survey units, and the spacing between survey personnel;
- recording of landform, soil information, land surface, vegetation conditions, visibility and exposure, and survey coverage;

- recording of any identified Aboriginal sites identified according to Requirements 6-8, and recording of any identified Aboriginal objects in accordance with Requirements 18-24 of the Code of Practice;

- if any Aboriginal objects and/or sites are identified in the course of the survey, site cards will be completed and submitted to the AHIMS registrar; and

- in the event of Aboriginal heritage being identified within the project footprint, undertake discussions on site as to the potential further investigation and/or management of these finds.

At this stage, no test excavations are proposed for the early works stage, and the aim of the project is to avoid such a program for this phase where possible (due to the shortened assessment timeframes). Rather, it is anticipated that there is enough flexibility in the pipeline route and construction methods to avoid any areas identified as archaeologically sensitive. However, if test excavations are required to further characterise the archaeological resource of an area identified in the survey, they would be implemented shortly following the survey, in accordance with the Code of Practice. Specifically, they would include the following activities:

- all test excavation pits would be spatially located using a differential GPS device, which would also provide elevation data;

- manual excavation of 0.25m² test pits in a systematic grid across areas of archaeological interest within the impact footprint. The spatial resolution of the grid would be dependent on on-ground conditions, but would likely have test pits between 20-50m apart;

- All excavation would use hand tools. Excavation of the first unit would be in 5cm spits, with subsequent excavation allowed in 10cm spits or according to stratigraphy (whichever is smallest) depending on the results of the first unit. Manual excavation would continue to either: i) the base of the cultural deposits; ii) to the depth of the underlying geology; or iii) to the maximum depth possible via hand excavation (likely ~ 80cm).

- sieving of all manually excavated material through a 5mm sieve;

- reduced levels of the top and bottom of the test pit would be documented using a dumpy level against a known elevation. Other levels may be taken as required;

- soil profiles would be recorded in accordance with the Code of Practice, including scaled drawings, photographs, and written descriptions;

- soil samples may be collected for description, sedimentological and chronological analysis where such analysis is considered likely to contribute significant information; and

- excavation procedures and protocols may be modified at the discretion of the Excavation Director, in consultation with the Aboriginal stakeholders and the proponent as the conditions in the field and nature of the excavations develop. This includes the movement of test pits to avoid existing built structures, buried services and disturbances not identified during the desktop phase.

4.2 Timeframes

The following indicative timeframes for the Pipeline REF assessment would apply:

- distribution of this document to the registered Aboriginal stakeholders: May 2020;

- field investigation of the project area: early to mid-June 2020;

- distribution of the draft report: early July 2020;

- input into recommendations and review of draft report: mid July – mid August 2020;
- report finalisation and submission of AHIP application (if required): mid-August 2020;
- determination of the REF: September 2020; and
- construction commencing on the early work section of pipeline: October 2020.

5 Dungowan Dam (main works) – EIS assessment methodology

An EIS will be prepared to assess the dam and associated infrastructure (Figure 1) as a CSSI assessment under Division 5.2 of the EP&A Act. As such, it is required to follow and address Aboriginal heritage requirements as outlined by the SEARs. The assessment will be developed in *broad* accordance with the following guidelines:

- *Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW* (DECCW 2010); and
- *Aboriginal Consultation Requirements for Proponents 2010* (DECCW 2010).

5.1 Methods

The purpose of the assessment is to identify and manage the Aboriginal cultural heritage values of all areas that will be affected by the study. In summary, this will involve:

- consultation with the Aboriginal stakeholders to identify socio-cultural values of the project area, greater understanding of cultural fishing and hunting activities, and places of special significance that should be considered;
- a search of the AHIMS register for records of previously registered Aboriginal sites;
- a review of past Aboriginal heritage reports covering the study area;
- environmental landscape analysis to identify past Aboriginal resources and suitable occupation areas;
- synthesis of background research to develop a predictive model of Aboriginal site location;
- field investigation to validate the findings of the desktop, and identify any previously undocumented cultural material. This would include surface inspection and test excavations of areas of archaeological interest;
- an assessment of significance for Aboriginal cultural heritage values in the project area (with input from the registered Aboriginal stakeholders);
- an impact assessment of how the project will affect Aboriginal cultural heritage values in the project area; and
- development of management recommendations based on the results of the assessment and input from registered Aboriginal stakeholders during the consultation process and particularly from the draft assessment review period.

5.1.1 Field investigation

Survey of the project area would be undertaken to identify any extant Aboriginal objects or sites. Surface investigation will consist of the survey team evenly spaced (5-10 m apart) walking transects across accessible parts of the study area. The focus of the team will be to both investigate soil exposures for extant Aboriginal objects and identify landforms that have potential for cultural material to be present (either surface or subsurface). All Aboriginal objects and/or landforms of interest would be mapped and documented using hand-held GPS, photographs, sketches and written description.

The survey will be undertaken using the following general methodology:

- pedestrian survey;
- survey and recording according to survey unit and/or transect;
- recording of beginning and end points of transects or the boundaries of survey units, and the spacing between survey personnel;
- recording of landform, soil information, land surface, vegetation conditions, visibility and exposure, and survey coverage;
- recording of any identified Aboriginal sites identified according to Requirements 6-8, and recording of any identified Aboriginal objects in accordance with Requirements 18-24 of the Code of Practice;
- if any Aboriginal objects and/or sites are identified in the course of the survey, site cards will be completed and submitted to the AHIMS registrar; and
- in the event of Aboriginal heritage being identified within the project footprint, undertake discussions on site as to the potential further investigation and/or management of these finds.

In addition to the field survey, an archaeological test excavation is proposed for the project area. The investigations will be developed to fulfil the research aims and objectives outlined below. Given the large size of the project area, and the potential for deep deposits – likely to extend below depths that can be easily investigated manually –a grid of mechanically excavated test pits across the site (Figure 4) are proposed. These test pits would be distributed to: i) focus on areas of archaeological interest as determined by the earlier desktop investigations (Section 2.2); ii) to improve our understanding of the area's geomorphological history, and iii) in response to any findings of the field survey undertaken above that may influence areas for future investigation. With respect to the timeframes provided and in anticipation of any obstructions faced on site, we propose up to 40-60 test pits be excavated across the project area. The excavations would adopt the following methods:

- all test excavation pits would be spatially located using a differential GPS device;
- mechanical excavation of some 40-60 ~2m^2 (2x1m) test pits in a systematic grid across the project area;
- all excavation would be undertaken with a flat mud bucket and in controlled 20cm spits, to either: i) the base of the cultural deposits; or ii) to the depth of the underlying geology, or iii) to the full extent of the excavator reach (~3m) where neither (i) or (ii) are met;
- reduced levels of the top and bottom of the test pit would be documented using a dumpy level against a known elevation. Other levels may be taken as required;

- all sediment would be stockpiled in its respective spits, labelled according to its assigned test pit number and recorded and documented. Fifty per cent (50%) of each stockpile – typically ~800kg – would be placed in buckets or bulk soil bags. This sediment would then be wet-sieved through a 5mm wire aperture mesh, and any cultural material recovered, labelled and bagged for subsequent analysis and curation. In the event that Aboriginal objects are recovered, the remaining 50% of the sediment from that spit would be sieved to maximise cultural material recovery. Where no Aboriginal objects are recovered in the initial 50% sub-sample, no further sieving of that spit would occur;

- soil profiles would be recorded in accordance with the Code of Practice, including scaled drawings, photographs, and written descriptions;

- soil samples may be collected for description, sedimentological and chronological analysis where such analysis is considered likely to contribute significant information; and

- excavation procedures and protocols may be modified at the discretion of the Excavation Director, in consultation with the Aboriginal stakeholders and the proponent as the conditions in the field and nature of the excavations develop. This includes the movement of test pits to avoid existing built structures, buried services and disturbances not identified during the desktop phase.

i Research aims and objectives

Our understanding of the cultural materials across the project area is poor, but visual observations suggests that there is a complex and deep fluvial history. It is envisaged that within this complex fluvial history, cultural materials may have been deposited, either through discard by Aboriginal people, or through natural accumulation of materials in these types of deposits. Based on this limited understanding of the project area, a number of overarching aims can be developed for the assessment:

- Identify, map and characterise the nature, age, extent, integrity and significance of the Aboriginal cultural material within the project area.

- Answer research questions including:

    - What are the environmental characteristics associated with the distribution of Aboriginal cultural heritage within the project area?

    - Can the formative processes of the stratigraphic profile provide information on the nature and/or survivability of the archaeological resources?

    - Are there other key factors in the distribution and extent of the material culture within the project area (eg how the dam has affected these deposits)?

    - What are the cultural, social and public values associated with the Aboriginal archaeological resource within the project area?

    - How should the Aboriginal sites in the region be conserved and managed in future?

- Better assess the significance and historical meaning of the cultural materials that exist within the project area so that future archaeological investigation can advance our understanding of past Aboriginal cultural behaviour and environmental adaptation.

- Direct future heritage activities and mitigation measures (if required) for the project area.

ii Analysis, Reporting and Temporary Storage

Post-excavation analysis and reporting will be required to inform the ACHA and subsequent documentation. The post-excavation analysis would be designed to address the research objectives, along with other relevant questions that may arise based on the results of the excavation. Results of the analysis would be presented in relation to comparative site data where possible, and where useful in addressing research questions about the nature, extent, and timing of Aboriginal occupation of the area in the past. These results and discussions would be incorporated into the assessment, which will be provided to the Aboriginal stakeholders for review prior to finalisation.

Once the excavations are completed, all Aboriginal cultural material recovered will be securely stored at the EMM Sydney office for analysis. At the completion of the analysis and reporting, the final location of the assemblage would be discussed with the Aboriginal stakeholders and proponent to determine a suitable long term repository for the cultural materials.

5.2 Timeframes

The following indicative timeframes for the main works EIS assessment would apply:

- distribution of this document to the registered Aboriginal stakeholders: May 2020;
- field investigation of the project area: early June – mid July 2020 (4-6 weeks);
- distribution of the draft report: early October 2020;
- input into recommendations and review of draft report: mid-October – early November 2020;
- finalisation of report for inclusion in EIS: early December 2020; and
- environmental impact assessment development and submission: early December – October 2021
- construction commencing on the main works portion of Dungowan Dam: October 2021. Construction is expected to take four years, dependant on design.

6 What we need from you

In addition to the archaeological evidence described above, Aboriginal heritage incorporates a wide range of values such as stories, traditions and cultural practices. EMM welcomes advice from the Aboriginal community about cultural values (which might include archaeological sites or other types of values) relevant to the project area and its surrounds. EMM is relying on the Aboriginal community for advice on non-archaeological and intangible Aboriginal values for the study area. We are happy to discuss any information which you are willing to share and will respect confidentiality where requested.

EMM would appreciate your feedback on the above methodology proposed for the investigation and assessment of the project area. In responding, please also consider the following questions:

- Are there any other knowledge-holders or traditional owner groups we should be contacting to obtain cultural information on this area?
- Are there any protocols in relation to community interaction and/or cultural heritage that you would like adopted during the project?
- Are you aware of any Aboriginal objects, places, sites or stories of cultural significance and/or importance that you are aware of within the project area? If so, please advise us how you wish them to be dealt with during the project.

- Are you aware of any past or current fishing and hunting activities within the project area? Do you have any views on how these should be managed into the future?

- Is the information you are providing sensitive, gender specific, etc? If so, how would you like the information you provide to EMM to be managed? Noting that some documentation for the ACHA process will be required.

- Do you require any further information prior to EMM proceeding with the project?

In your response, can you please also clearly identify who you would like EMM to talk to within your organisation, and provide contact details for these individuals. Please also ensure your preferred method of communication (eg telephone call, e-mail, letter, etc) is highlighted for subsequent stages of the project.

7 Closing

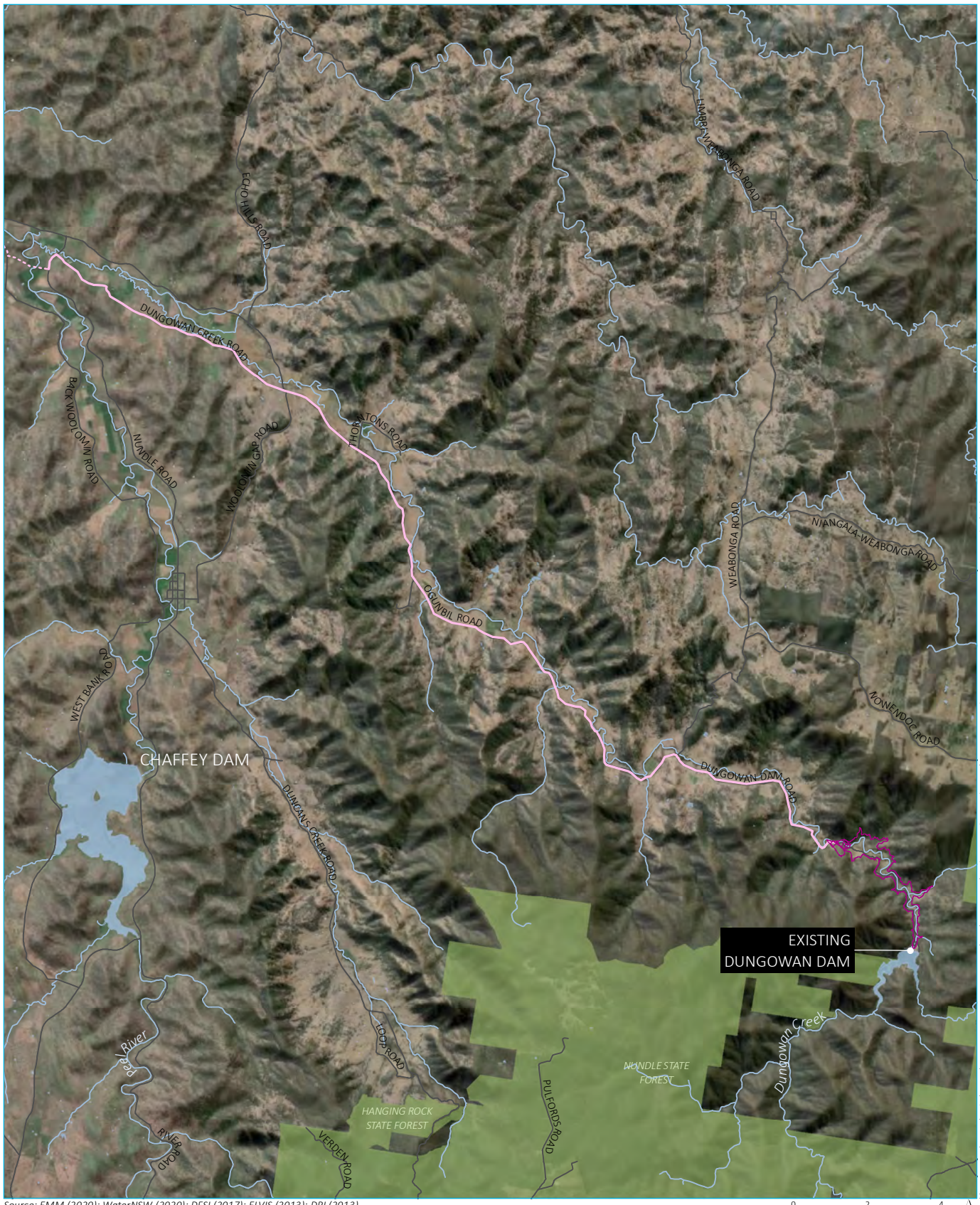
We look forward to receiving any response your organisation wishes to make about the proposed method by **4 June 2020**. Your response will be documented and considered in the assessment. Most importantly, your cultural information is also welcome within this timeframe; but it can also be submitted up until the completion of the draft ACHA.

Please feel free to contact me with any questions.

Yours sincerely

Georgia Burnett
Archaeologist

gburnett@emmconsulting.com.au



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Source: EMM (2020); WaterNSW (2020); DFSI (2017); ELVIS (2013); DPI (2013)

**Inundation area should be considered approximate only. It is based on current limited available spatial data and is subject to future verification.*

0 2 4 km

GDA 1994 MGA Zone 56

N

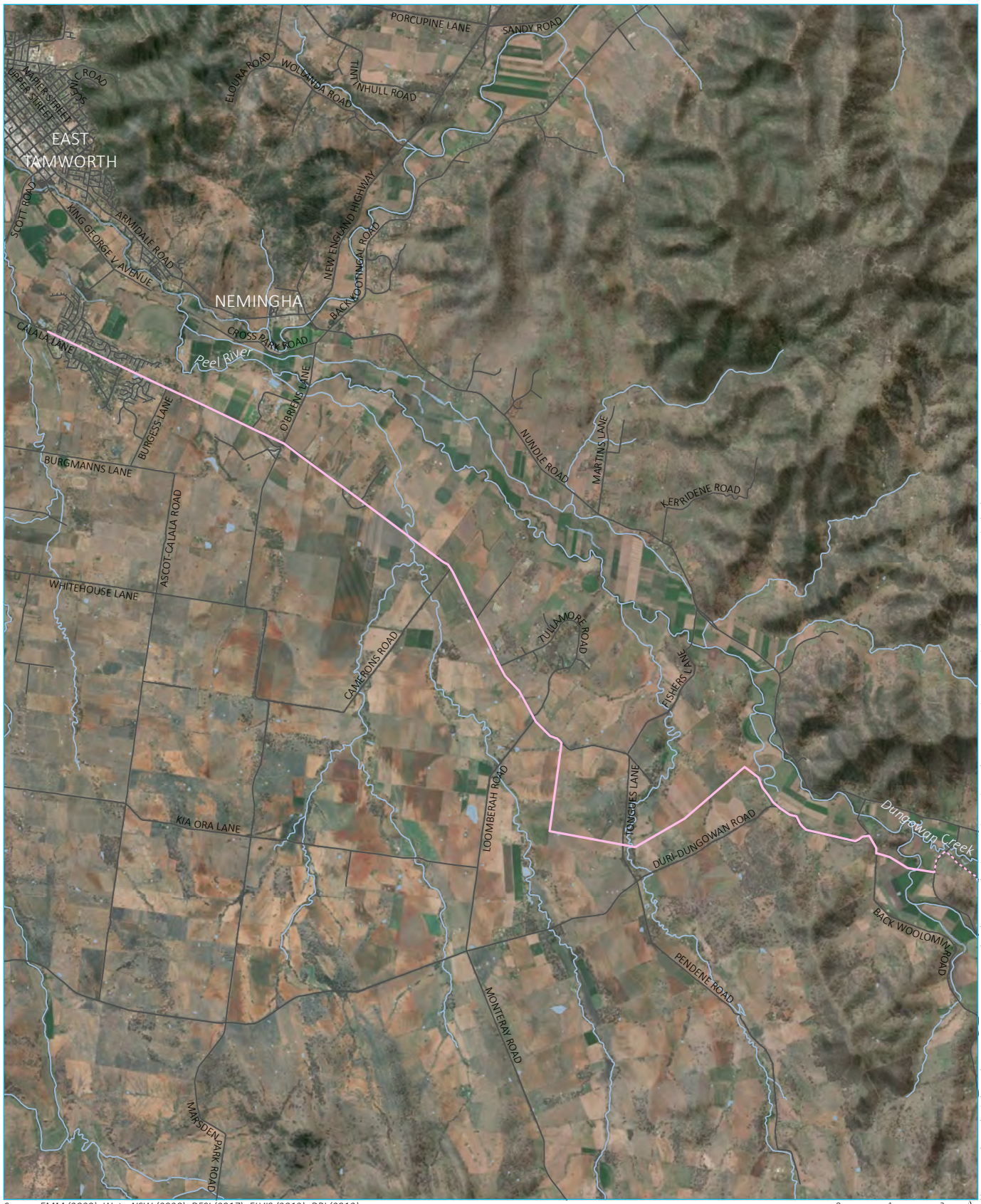
KEY

- Project footprint
- Indicative pipeline alignment (EIS)
- Indicative pipeline alignment (REF)
- Main road
- Named watercourse
- Waterbody
- State forest

The proposed project

Dungowan Dam Project
Aboriginal consultation
Figure 1

EMM
creating opportunities



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Source: EMM (2020); WaterNSW (2020); DFSI (2017); ELVIS (2013); DPI (2013)

**Inundation area should be considered approximate only. It is based on current limited available spatial data and is subject to future verification.*

0 1 2 km

GDA 1994 MGA Zone 56

N

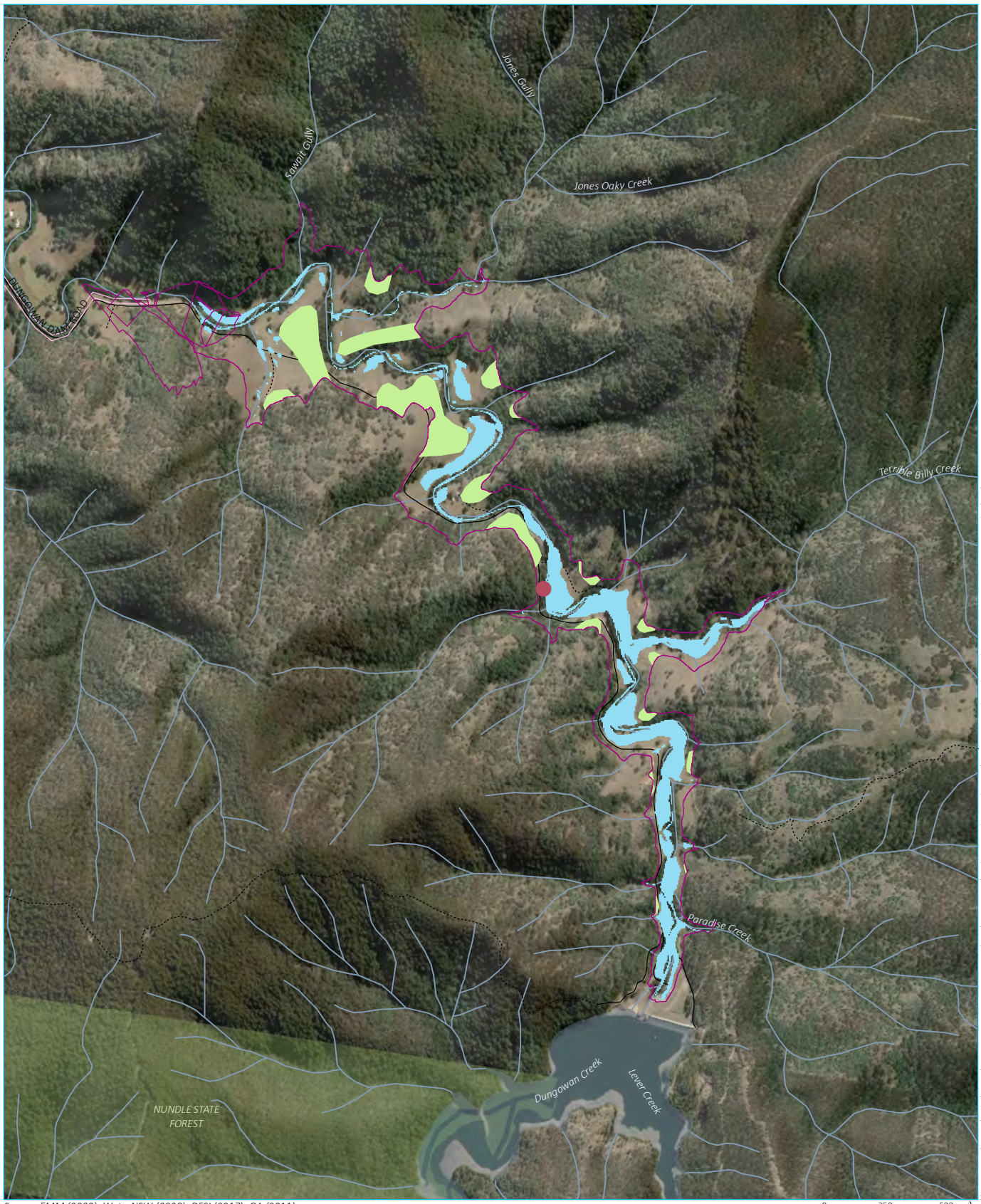
KEY

- Indicative pipeline alignment (REF)
- Indicative pipeline alignment (EIS)
- Main road
- Named watercourse
- Waterbody

The early works study area

Dungowan Dam Project
Aboriginal consultation
Figure 2

EMM
creating opportunities



Source: EMM (2020); WaterNSW (2020); DFSI (2017); GA (2011)

*Inundation area should be considered approximate only. It is based on current limited available spatial data and is subject to future verification.

0 250 500 m

GDA 1994 MGA Zone 56

N

KEY

- Project footprint
- Indicative pipeline alignment (20 m buffer)
- Local road
- Track
- Watercourse
- Waterbody
- State forest

Area of archaeological potential

- Crest landform
- Level to gently inclined landforms within 100 m of primary watercourse
- Very steep to precipitous terrain

Areas of archaeological sensitivity

Dungowan Dam Project
Aboriginal consulation
Figure 3

EMM creating opportunities

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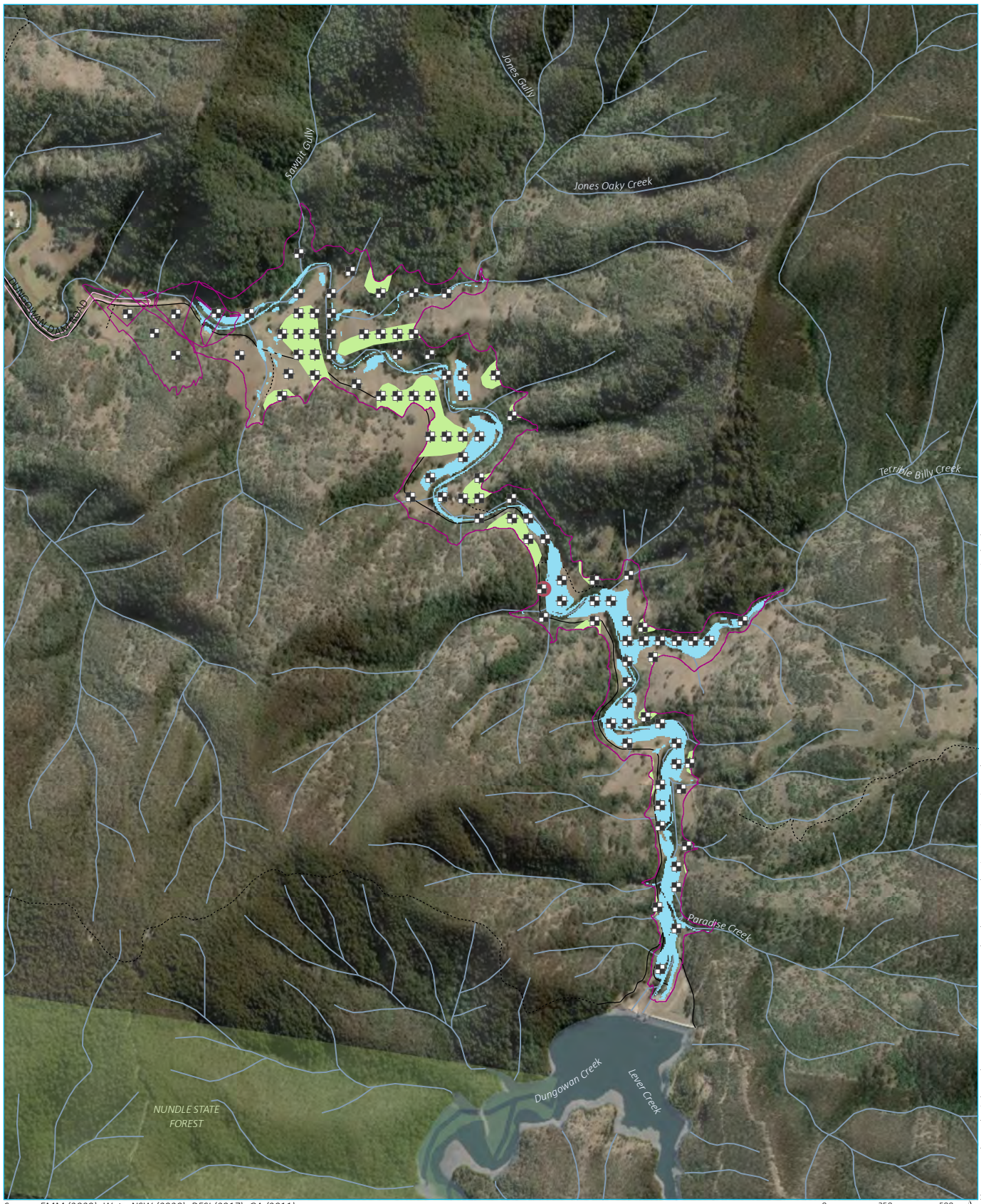

Source: EMM (2020); WaterNSW (2020); DFSI (2017); GA (2011)

*Inundation area should be considered approximate only. It is based on current limited available spatial data and is subject to future verification.

0 250 500 m

GDA 1994 MGA Zone 56

N

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KEY

- Archaeological test location
- Project footprint
- Indicative pipeline alignment (20 m buffer)
- Local road
- Track
- Watercourse
- Waterbody
- State forest

Area of archaeological potential

- Crest landform
- Level to gently inclined landforms within 100 m of primary watercourse
- Very steep to precipitous terrain

Indicative archaeological test excavation program

Dungowan Dam Project
Aboriginal consulation
Figure 4

EMM
creating opportunities

Appendix A

COVID-19 consultation methods

A.1 General

WaterNSW and their consultants are cognisant of the importance of safety to community and stakeholders, clients and staff. Prior to any engagement those with the greatest risk of more serious illness with COVID-19 will be considered:

- Aboriginal and Torres Strait Island people over the age of 50; and
- those aged 60 year and over.

We adhere to the Government requirements regarding COVID-19 and amend our approach as required in this dynamic environment. At the time of writing this document, we note the need to:

- restrict outdoor gatherings to no more than 2 people;
- maintain a 1.5m distance when outside;
- maintain a 4 sqm distance when inside;
- regularly wash hands using soap and water or alcohol-based hand sanitiser;
- surfaces are cleaned prior and after use using alcohol-based sanitiser; and
- observe all travel bans.

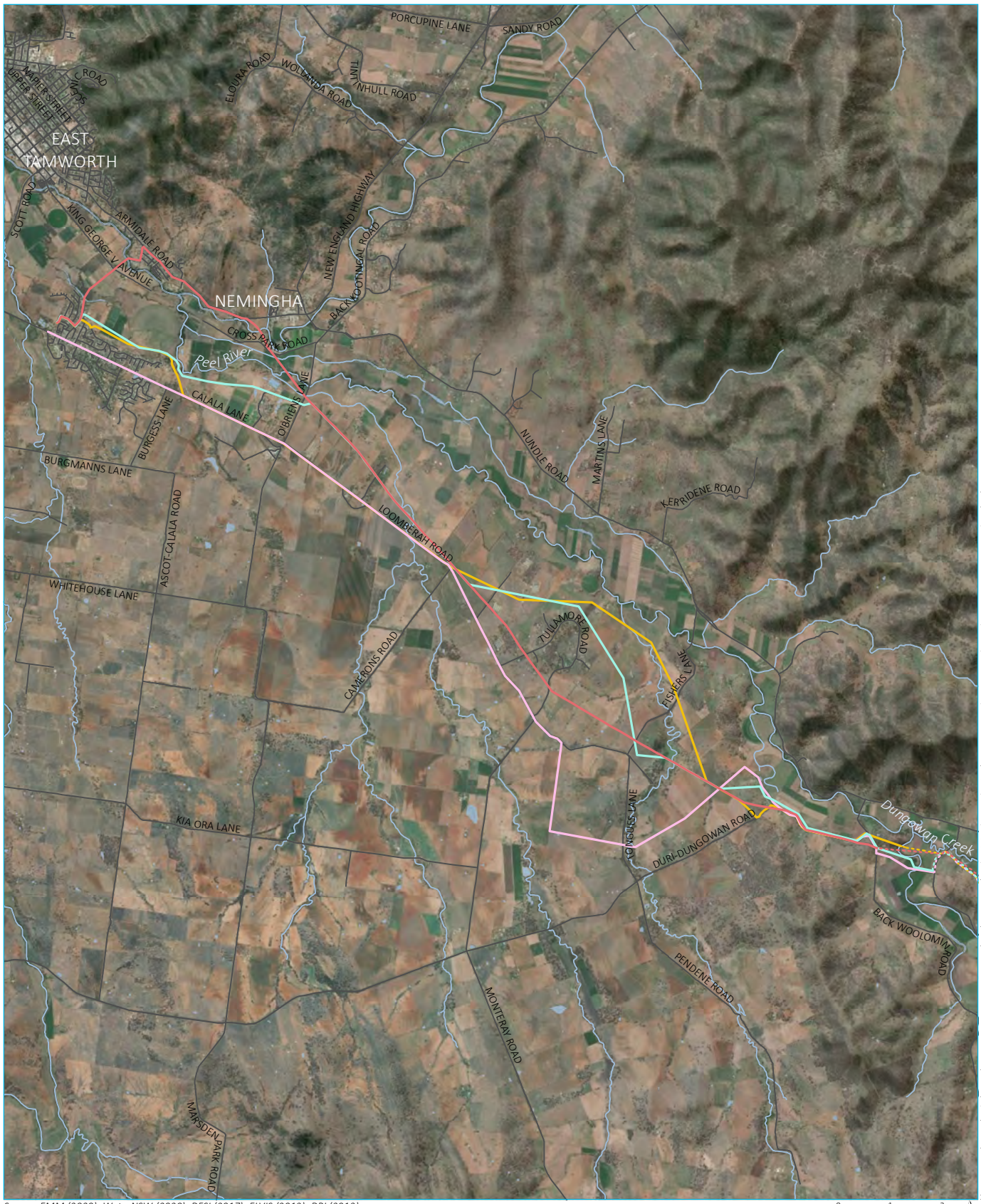
The current COVID-19 pandemic and the government requirements to self-isolate and practice social distancing has necessitated a different approach to community and stakeholder engagement. EMM has responded by adopting the practices outlined in Table A1.

Table A.1 Aboriginal community and stakeholder engagement options – COVID-19

Previous approach	COVID-19 methods
Face to face interviews	• Videoconference; • Teleconference; • Where access to hardware and/or software is not available two options could apply: – iPad could be provided to those in remote and isolated locations that is preloaded with: ▪ Prepaid SIM; ▪ Facetime (this is the easiest platform to use for inexperienced users); and ▪ EMM person contact details. – Satellite model where a safe location is provided[3] in negotiation with the client and or participant/s. The location will be set to have: ▪ Person to welcome and direct person to computer station and be available to assist if required (not to be present in the room while interview is being undertaken); ▪ Computer station with videoconference session ready ie person only needs to sit and participate in the face to face interview; ▪ Sanitary wipes to allow the participant to wipe keyboard and mouse before and after participation in the interview. • In the case of satellite model, identify where possible those we have an existing relationship locally who can act as the contact person and/or assist in identifying the appropriate participant/s. There would need to be an agreement up from on: – Who will be responsible locally for facilitating and arranging for participants to attend meetings; – Pre-arranged times and dates (including timeframes eg 3 months) for meetings; and – Pre agreed incentives eg donation of device to the organiser. ***Note: payment for face to face participation would still apply if replaced with videoconferencing/teleconferencing options.***
Group meetings/ workshops	• Videoconference and/or • Online forum/discussions using Social Pinpoint or equivalent • Satellite model where a safe location is provided[4] in negotiation with the client and or participant/s. The location will be set to have: – Person to welcome and direct person to computer station and be available to assist if required; – Computer station with videoconference session ready ie person only needs to sit and participate in the group discussion; – Sanitary wipes to allow the participant to wipe keyboard and mouse before and after participation in the interview.
Community information sessions	• Online forum/discussions using Social Pinpoint
On-line surveys	• On-line surveys integrated with Social Pinpoint • On-line survey via Survey Monkey delivered via email addresses
Newsletters/ Information delivered in person or via letterbox drop	• Provided passively on agreed resident/Council Facebook pages, project websites; • Provided via email; • Where available letterbox drop; and/or • Integrated to the project's Social Pinpoint page.

[3] If inside 4 sqm per person or computer station, if outside 1.5m between each person or computer station.

[4] If inside 4 sqm per person or computer station, if outside 1.5m between each person or computer station.



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Source: EMM (2020); WaterNSW (2020); DFSI (2017); ELVIS (2013); DPI (2013)

**Inundation area should be considered approximate only. It is based on current limited available spatial data and is subject to future verification.*

0 1 2 km

GDA 1994 MGA Zone 56

N

KEY

- Main road
- Named watercourse
- Waterbody

Option using existing pipeline(subject to change)

- Indicative pipeline alignment (REF)
- Indicative pipeline alignment (EIS)

Option C2 (subject to change)

- Indicative pipeline alignment (REF)
- Indicative pipeline alignment (EIS)

Option C3 (subject to change)

- Indicative pipeline alignment (REF)
- Indicative pipeline alignment (EIS)

Option C4 (subject to change)

- Indicative pipeline alignment (REF)
- Indicative pipeline alignment (EIS)

The early works study area

Dungowan Dam Project
Aboriginal consultation
Figure 2

EMM creating opportunities

Georgia Burnett

From: Georgia Burnett
Sent: Monday, 11 May 2020 1:25 PM
To: 'mntrac2380[redacted]
Subject: RE: Dungowan Dam, NSW - Proposed methodology
Attachments: Figure 2 - HER02_LocalContextEarlyWorks_20200511_03.pdf

Hi Aaron,

Further to my email from Thursday, please find attached an updated figure showing several possible routes for the Dungowan pipeline (discussed in Section 4 of the assessment letter). WaterNSW has not selected a final route for the pipeline, and as the assessment letter explains, it is anticipated that there is enough flexibility in the pipeline route and construction methods to avoid any areas identified as archaeologically sensitive. Therefore, when the fieldwork commences (likely in June), there is a chance that a number of routes will still be on the table that require investigation and that specific findings may even influence the route at that point.

As we are providing updated information regarding the location of the assessment, we will be extending the comment period to **COB Monday 8 June 2020**. Please let me know if you have any questions or comments.

Kind regards,
Georgia

Georgia Burnett
Archaeologist

T 02 9493 9500
M 0400 472 412
www.emmconsulting.com.au

From: Georgia Burnett
Sent: Thursday, 7 May 2020 4:14 PM
To: mntrac2380[redacted]
Subject: Dungowan Dam, NSW - Proposed methodology

Dear Aaron,

Thank you for your registration of interest in the Aboriginal Cultural Heritage Assessments (ACHAs) currently being undertaken for the proposed redevelopment of Dungowan Dam and associated infrastructure, southeast of Tamworth NSW. The proposed methodology for the both the early and main works ACHAs, including archaeological survey and test excavations for both, is attached to this email.

If you have any comments on the methodology, please send them by **COB Thursday, 4 June 2018**. If you do not have any comments, it would be appreciated if you could still reply to this email acknowledging that you received it.

At this stage, no dates have been set regarding the timing of the fieldwork; however, given the short timeframes of project, it is likely that we will be mobilising for fieldwork shortly following the end of the review period. When the fieldwork dates are confirmed, I will ensure you are advised with a reasonable notice period.

If you have any questions, comments or concerns, please don't hesitate to contact me at 0400 472 412 or at gburnett@emmconsulting.com.au.

Kind regards,
Georgia

Georgia Burnett
Archaeologist
creating opportunities

T 02 9493 9500
M 0400 472 412
Connect with us

SYDNEY | Ground floor, 20 Chandos Street, St Leonards NSW 2065

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Georgia Burnett

From: Georgia Burnett
Sent: Monday, 11 May 2020 4:18 PM
To: [redacted]
Subject: RE: Dungowan Dam, NSW - Proposed methodology
Attachments: Figure 2 - HER02_LocalContextEarlyWorks_20200511_03.pdf; J200042 _Method_DFTV.pdf

Hi Derrick,

Thank you for calling today, I hope the information I was able to provide was helpful.

Please find attached both the methodology from last week (spelling corrected!) and the map I sent out today; I thought it might be helpful for you to have both documents in one place.

If you have any other questions, let me know – as I mentioned on the phone, we will be able to provide more specifics regarding the fieldwork program in the coming weeks.

Kind regards,
Georgia

Georgia Burnett
Archaeologist

T 02 9493 9500
M 0400 472 412
www.emmconsulting.com.au

From: Georgia Burnett
Sent: Monday, 11 May 2020 1:26 PM
To: [redacted]
Subject: RE: Dungowan Dam, NSW - Proposed methodology

Hi Derrick,

Further to my email from Thursday, please find attached an updated figure showing several possible routes for the Dungowan pipeline (discussed in Section 4 of the assessment letter). WaterNSW has not selected a final route for the pipeline, and as the assessment letter explains, it is anticipated that there is enough flexibility in the pipeline route and construction methods to avoid any areas identified as archaeologically sensitive. Therefore, when the fieldwork commences (likely in June), there is a chance that a number of routes will still be on the table that require investigation and that specific findings may even influence the route at that point.

As we are providing updated information regarding the location of the assessment, we will be extending the comment period to **COB Monday 8 June 2020**. Please let me know if you have any questions or comments.

Kind regards,
Georgia

Georgia Burnett
Archaeologist

T 02 9493 9500
M 0400 472 412
www.emmconsulting.com.au

From: Georgia Burnett
Sent: Thursday, 7 May 2020 4:16 PM
To: [redacted]
Subject: Dungowan Dam, NSW - Proposed methodology

Dear Derrick,

Thank you for your registration of interest in the Aboriginal Cultural Heritage Assessments (ACHAs) currently being undertaken for the proposed redevelopment of Dungowan Dam and associated infrastructure, southeast of Tamworth NSW. The proposed methodology for the both the early and main works ACHAs, including archaeological survey and test excavations for both, is attached to this email.

If you have any comments on the methodology, please send them by **COB Thursday, 4 June 2018**. If you do not have any comments, it would be appreciated if you could still reply to this email acknowledging that you received it.

At this stage, no dates have been set regarding the timing of the fieldwork; however, given the short timeframes of project, it is likely that we will be mobilising for fieldwork shortly following the end of the review period. When the fieldwork dates are confirmed, I will ensure you are advised with a reasonable notice period.

If you have any questions, comments or concerns, please don't hesitate to contact me at 0400 472 412 or at gburnett@emmconsulting.com.au.

Kind regards,
Georgia

Georgia Burnett
Archaeologist
EMM creating opportunities

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Georgia Burnett

From: Georgia Burnett
Sent: Monday, 11 May 2020 1:24 PM
To: Robert Slater
Subject: RE: Dungowan Dam, NSW - Proposed methodology
Attachments: Figure 2 - HER02_LocalContextEarlyWorks_20200511_03.pdf

Hi Robert,

Thank you for your response, much appreciated – I look forward to working with you.

Further to my email from Thursday, please find attached an updated figure showing several possible routes for the Dungowan pipeline (discussed in Section 4 of the assessment letter). WaterNSW has not selected a final route for the pipeline, and as the assessment letter explains, it is anticipated that there is enough flexibility in the pipeline route and construction methods to avoid any areas identified as archaeologically sensitive. Therefore, when the fieldwork commences (likely in June), there is a chance that a number of routes will still be on the table that require investigation and that specific findings may even influence the route at that point.

Please let me know if this affects your response, or if you have any questions or comments in the meantime.

Kind regards,
Georgia

Georgia Burnett
Archaeologist

T 02 9493 9500
M 0400 472 412
www.emmconsulting.com.au

From: Robert Slater [redacted]
Sent: Saturday, 9 May 2020 9:50 AM
To: Georgia Burnett <gburnett@emmconsulting.com.au>
Subject: Re: Dungowan Dam, NSW - Proposed methodology

Hi Georgia

I on behalf of Galamaay Cultural Consultants supports the methodology for this project.

We look forward to hearing from you soon.

Thanks
Robert Slater

From: Georgia Burnett <gburnett@emmconsulting.com.au>
Sent: Thursday, 7 May 2020 4:15 PM
To: [redacted]
Subject: Dungowan Dam, NSW - Proposed methodology

Dear Robert,

Thank you for your registration of interest in the Aboriginal Cultural Heritage Assessments (ACHAs) currently being undertaken for the proposed redevelopment of Dungowan Dam and associated infrastructure, southeast of Tamworth NSW. The proposed methodology for the both the early and main works ACHAs, including archaeological survey and test excavations for both, is attached to this email.

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Kind regards,
Georgia

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Georgia Burnett

From: Georgia Burnett
Sent: Monday, 11 May 2020 1:25 PM
To: gomeroito[redacted]
Subject: RE: Dungowan Dam, NSW - Proposed methodology
Attachments: Figure 2 - HER02_LocalContextEarlyWorks_20200511_03.pdf

Hi Steve,

Further to my email from Thursday, please find attached an updated figure showing several possible routes for the Dungowan pipeline (discussed in Section 4 of the assessment letter). WaterNSW has not selected a final route for the pipeline, and as the assessment letter explains, it is anticipated that there is enough flexibility in the pipeline route and construction methods to avoid any areas identified as archaeologically sensitive. Therefore, when the fieldwork commences (likely in June), there is a chance that a number of routes will still be on the table that require investigation and that specific findings may even influence the route at that point.

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Kind regards,
Georgia

Georgia Burnett
Archaeologist

T 02 9493 9500
M 0400 472 412
www.emmconsulting.com.au

From: Georgia Burnett
Sent: Thursday, 7 May 2020 4:15 PM
To: gomeroito[redacted]
Subject: Dungowan Dam, NSW - Proposed methodology

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If you have any questions, comments or concerns, please don't hesitate to contact me at 0400 472 412 or at gburnett@emmconsulting.com.au.

Kind regards,
Georgia

Georgia Burnett
Archaeologist

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Georgia Burnett

From: Georgia Burnett
Sent: Monday, 11 May 2020 1:26 PM
To: 'cahoy[redacted]
Subject: RE: Dungowan Dam, NSW - Proposed methodology
Attachments: Figure 2 - HER02_LocalContextEarlyWorks_20200511_03.pdf

Hi Colin,

Further to my email from Thursday, please find attached an updated figure showing several possible routes for the Dungowan pipeline (discussed in Section 4 of the assessment letter). WaterNSW has not selected a final route for the pipeline, and as the assessment letter explains, it is anticipated that there is enough flexibility in the pipeline route and construction methods to avoid any areas identified as archaeologically sensitive. Therefore, when the fieldwork commences (likely in June), there is a chance that a number of routes will still be on the table that require investigation and that specific findings may even influence the route at that point.

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Kind regards,
Georgia

Georgia Burnett
Archaeologist

T 02 9493 9500
M 0400 472 412
www.emmconsulting.com.au

From: Georgia Burnett
Sent: Thursday, 7 May 2020 4:15 PM
To: cahoy[redacted]
Subject: Dungowan Dam, NSW - Proposed methodology

Dear Colin,

Thank you for your registration of interest in the Aboriginal Cultural Heritage Assessments (ACHAs) currently being undertaken for the proposed redevelopment of Dungowan Dam and associated infrastructure, southeast of Tamworth NSW. The proposed methodology for the both the early and main works ACHAs, including archaeological survey and test excavations for both, is attached to this email.

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If you have any questions, comments or concerns, please don't hesitate to contact me at 0400 472 412 or at gburnett@emmconsulting.com.au.

Kind regards,
Georgia

Georgia Burnett
Archaeologist

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Georgia Burnett

From: Georgia Burnett
Sent: Tuesday, 12 May 2020 2:06 PM
To: Corroboree Aboriginal Corporation
Subject: RE: Dungowan Dam, NSW - Proposed methodology

Thanks Marilyn, I'll be sending out further details for the project later in the month.

Cheers,
Georgia

Georgia Burnett
Archaeologist

T 02 9493 9500
M 0400 472 412
www.emmconsulting.com.au

From: Corroboree Aboriginal Corporation <[redacted]
Sent: Monday, 11 May 2020 8:02 PM
To: Georgia Burnett <gburnett@emmconsulting.com.au>
Subject: Re: Dungowan Dam, NSW - Proposed methodology

Hi Georgia
We agree with the proposed methodology.

Kind regards
Marilyn

> On 7 May 2020, at 4:14 pm, Georgia Burnett <gburnett@emmconsulting.com.au> wrote:
>
> Dear Marilyn,
>
> Thank you for your registration of interest in the Aboriginal Cultural Heritage Assessments (ACHAs) currently being undertaken for the proposed redevelopment of Dungowan Dam and associated infrastructure, southeast of Tamworth NSW. The proposed methodology for the both the early and main works ACHAs, including archaeological survey and test excavations for both, is attached to this email.
>
> If you have any comments on the methodology, please send them by **COB Thursday, 4 June 2018**. If you do not have any comments, it would be appreciated if you could still reply to this email acknowledging that you received it.
>
> At this stage, no dates have been set regarding the timing of the fieldwork; however, given the short timeframes of project, it is likely that we will be mobilising for fieldwork shortly following the end of the review period. When the fieldwork dates are confirmed, I will ensure you are advised with a reasonable notice period.

If you have any questions, comments or concerns, please don't hesitate to contact me at 0400 472 412 or at gburnett@emmconsulting.com.au.

Kind regards,
Georgia

Georgia Burnett
Archaeologist

<image002.png> <image003.png>

T 02 9493 9500
M 0400 472 412
<image004.png>
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<image006.jpg>

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<J200042_Method_Corroboree.pdf>

Georgia Burnett

From: Georgia Burnett
Sent: Thursday, 14 May 2020 9:42 AM
To: fiona[redacted]
Subject: RE: Dungowan Dam, NSW - Proposed methodology

Thanks for letting me know, Fiona – we will be in touch soon with more details regarding site work.

Please let me know if you have any other questions or comments in the meantime.

Kind regards,
Georgia

Georgia Burnett
Archaeologist

T 02 9493 9500
M 0400 472 412
www.emmconsulting.com.au

From: [redacted]
Sent: Thursday, 14 May 2020 8:38 AM
To: Georgia Burnett <gburnett@emmconsulting.com.au>
Subject: RE: Dungowan Dam, NSW - Proposed methodology

Hi Georgia

Our Sites Officer has reviewed the map and has no comment at this stage, however, he looks forward to the onsite inspection

Regards
Fiona

From: Georgia Burnett <gburnett@emmconsulting.com.au>
Sent: Monday, 11 May 2020 1:26 PM
To: fiona[redacted]
Subject: RE: Dungowan Dam, NSW - Proposed methodology

Hi Fiona,

Further to my email from Thursday, please find attached an updated figure showing several possible routes for the Dungowan pipeline (discussed in Section 4 of the assessment letter). WaterNSW has not selected a final route for the pipeline, and as the assessment letter explains, it is anticipated that there is enough flexibility in the pipeline route and construction methods to avoid any areas identified as archaeologically sensitive. Therefore, when the fieldwork commences (likely in June), there is a chance that a number of routes will still be on the table that require investigation and that specific findings may even influence the route at that point.

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Kind regards,
Georgia

Georgia Burnett
Archaeologist

T 02 9493 9500
M 0400 472 412
www.emmconsulting.com.au

From: Georgia Burnett
Sent: Thursday, 7 May 2020 4:16 PM
To: fiona[redacted]
Subject: Dungowan Dam, NSW - Proposed methodology

Dear Fiona,

Thank you for your registration of interest in the Aboriginal Cultural Heritage Assessments (ACHAs) currently being undertaken for the proposed redevelopment of Dungowan Dam and associated infrastructure, southeast of Tamworth NSW. The proposed methodology for the both the early and main works ACHAs, including archaeological survey and test excavations for both, is attached to this email.

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If you have any questions, comments or concerns, please don't hesitate to contact me at 0400 472 412 or at gburnett@emmconsulting.com.au.

Kind regards,
Georgia

Georgia Burnett
Archaeologist
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Georgia Burnett

From: Georgia Burnett
Sent: Thursday, 14 May 2020 11:27 AM
To: vicki[redacted]
Subject: Dungowan Dam, NSW - Invitation to register
Attachments: 20200417_Dungowan Dam_Notification.pdf

Dear Vicky,

I am emailing to enquire if you wish to express interest as a Registered Aboriginal Party for the proposed development of a new Dungowan Dam and associated infrastructure, south east of Tamworth; please find an attached letter outlining the project in more detail. Your name and group, Kawul Cultural Services, is listed on the North West DPIE stakeholder list as a potentially interested party for proposed works in the Tamworth region, and the following postal address was supplied: PO Box 817 Singleton NSW 2330. We posted a notification letter to the identified postal address on 17 April 2020, however the letter was returned to our office as undeliverable. I am hoping this email will reach you instead.

If you wish to register an interest in the Dungowan Dam project, please let me know as soon as possible and I will send on an the proposed assessment method.

Thank you for your time.

Kind regards,
Georgia

Georgia Burnett
Archaeologist
EMM creating opportunities
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M 0400 472 412
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Georgia Burnett

From: Georgia Burnett
Sent: Thursday, 14 May 2020 11:29 AM
To: deshickey[redacted]
Subject: Dungowan Dam, NSW - Invitation to register
Attachments: 20200417_Dungowan Dam_Notification.pdf

Hi Des,

I am emailing to enquire if you wish to express interest as a Registered Aboriginal Party for the proposed development of a new Dungowan Dam and associated infrastructure, south east of Tamworth; please find an attached letter outlining the project in more detail. Your name and group, Wattaka Cultural Service, is listed on the North West DPIE stakeholder list as a potentially interested party for proposed works in the Tamworth region, and the following postal address was supplied: PO Box 479 Tamworth NSW 2340. We posted a notification letter to the identified postal address on 17 April 2020, however the letter was returned to our office as undeliverable. I am hoping this email will reach you instead.

If you wish to register an interest in the Dungowan Dam project, please let me know as soon as possible and I will send on the proposed assessment method.

Thank you for your time.

Kind regards,
Georgia

Georgia Burnett
Archaeologist
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Ground floor, 20 Chandos Street
St Leonards NSW 2065
PO Box 21
St Leonards NSW 1590

T 02 9493 9500
E info@emmconsulting.com.au

www.emmconsulting.com.au

15 May 2020

Richard Slater
Huckada Dreamin Heritage Group
121 Robert Street
Tamworth NSW 2340

Re: Dungowan Dam and associated infrastructure - Project information and assessment methodology

Dear Richard,

1 Introduction

Thank you for registering your interest in the Dungowan Dam project, southeast of Tamworth, NSW (Figures 1 and 2). WaterNSW has engaged EMM Consulting Pty Ltd (EMM) to prepare the Aboriginal Cultural Heritage Assessment (ACHA) to investigate and understand the cultural heritage values of the project area and surrounds. The assessment will consider the potential impacts of the project and how mitigation and management of cultural heritage needs to be integrated into the delivery of the project. The assessment forms part of an Environmental Impact Statement or Review of Environmental Factors currently being prepared.

This document is provided in accordance with sections 4.2 and 4.3 of the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (DECCW 2010), which sets out the Aboriginal consultation requirements for the project. Additional Aboriginal community liaison and participation opportunities will occur in accordance with a project specific consultation strategy.

The aims of this letter are to:

- provide an overview of the project and how it will be assessed;
- provide background on the project and some of the initial investigations to date;
- establish the purpose and aims of the Aboriginal consultation process;
- seek information about any Aboriginal cultural heritage values associated with the project and how they may affect, inform or refine the project and/or assessment methods;
- seek information on any cultural activities (such as fishing and hunting) that has historically and/or is actively being undertaken in the project area;
- identify any culturally appropriate protocols that registered parties wish to be adopted during the information gathering process (eg protocols during field survey, or handling of culturally sensitive information); and
- present a draft of the intended assessment methods for your review and comment.

We welcome your feedback at your earliest convenience, and will be consulting with the registered Aboriginal parties for the duration of the ACHA, currently proposed to extend to the end of 2020. However, for the purposes of this initial stage and in accordance with the Department of Planning, Industry and Environment (DPIE) guidelines, we request any written response on the information and process below by **4 June 2020.**

At this time, we propose to conduct all consultation via teleconferencing, e-mail or phone due to the social distancing rules from the COVID-19 outbreak. However, where feasible, we would meet in person (face-to-face meetings), and would ensure appropriate protocols are in place as per Government health advice at that time. Appendix A of this document provides our proposed methods for social distancing during consultation at this time. We would like to hear from your organisation on this to ensure that you are able to contribute knowledge to the project and have the opportunity to be involved, whilst ensuring we comply with up-to-date social distancing requirements.

For reference, the WaterNSW contact is: Meredith Abrams, Community Engagement Officer, P: 1300 662 077, E: meredith.abrams@waternsw.com.au. EMM is working on the proponent's behalf, and all queries should be directed through EMM. Feedback can be provided to:

Georgia Burnett

Address: PO Box 21, St Leonards, NSW 1590

Phone: 02 9493 9500

Email: gburnett@emmconsulting.com.au

2 Project information

2.1 Project overview and proposed assessment

WaterNSW is proposing to undertake the planning and delivery of three new or augmented dams in NSW, which includes a new Dungowan Dam and supply pipeline. The need to deliver the dams is critical to the State's drought recovery process and needs to be completed to the highest standard in relation to the assessment and delivery. Each dam is to be constructed rapidly to create security for the various town water supplies and associated industries reliant on the delivery of water for viability.

The project includes:

- a new dam downstream of the existing Dungowan Dam, with a nominal capacity of 22.5 gigalitres (GL);
- partial or full decommissioning of the existing Dungowan Dam and rehabilitation of the storage area of the dam; and
- a new delivery pipeline from the proposed dam to the junction with the Chaffey Dam pipeline and a further stage from the junction to the Calala water treatment plant located in Tamworth.

The project is identified as Critical State Significant Infrastructure (CSSI) under the provisions of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act). A CSSI project requires approval from the NSW Minister for Planning and Public Spaces and is accompanied by an EIS. The assessment of Aboriginal cultural heritage would be one of several investigations included in the EIS. The assessment would be developed in response to Secretary Environmental Assessment Requirements (SEARs) issued by DPIE, which will outline the investigative requirements for Aboriginal heritage. These will likely require an assessment that aligns with DPIE guidelines[1] for investigating and assessing Aboriginal heritage and consulting with the Aboriginal community. However, CSSI projects do not require separate approvals under the *National Parks and Wildlife Act 1974* (eg Aboriginal heritage impact permits), rather any subsequent requirements for heritage are managed in accordance with the conditions of approval, provided by the Minister.

The section of the pipeline between its junction with the Chaffey Dam pipeline and extending to the Calala water treatment plant would be delivered as the 'early work' for the project, and will be assessed separately to the EIS, within a Review of Environmental Factors (REF) under Part 5 of the EP&A Act. This component of the project may require approval under the *National Parks and Wildlife Act 1974* if impacts on Aboriginal heritage are identified. This assessment would adopt the process and requirements described within DPIE guidelines.

2.2 Initial Aboriginal heritage investigations

An investigation of Aboriginal heritage and the potential for cultural material to be present in the project area was undertaken as part of the scoping study – the document lodged in March 2020 with DPIE to inform the contents of the EIS. This study was primarily a desktop investigation, including a review of previous investigations and the application of key environmental landforms to identify areas of archaeological interest (Figure 3).[2] The study resulted in the following conclusions:

> …there is currently no information on the Aboriginal heritage of the immediate environment. A search of the surrounding region reveals only a small number of previously documented sites ($\bar{x}$=~1 site per 50 km^2), with the nearest some 9 km from the study area. In comparison with Chaffey Dam, a nearby dam in a similar environmental context, the data suggest that the proposed works would affect primarily stone artefact sites associated with the transient and ephemeral use of the landscape in the past. These would likely be found as surface and/or sub-surface deposits in the vicinity of Dungowan Creek, Terrible Billy Creek and/or Jones Oaky Creek. A site inspection validates these predictions, with a number of elevated terraces and floodplains adjacent the creeks revealing cultural material. Specifically, areas within 100 m either sides of these creeks are considered to have high potential for surface and sub-surface cultural material. The latter quite possible in stratified contexts, and thereby able to provide significant information on the past use of the region by Aboriginal people.
>
> While predictions indicated the potential for rockshelters and associated features (such as art) to be present along the valley edges and where other geological outcropping is found, none were observed. The nature of the geomorphology resulted in more moderate hills and slopes, and the potential for such sites is therefore considered low. Similarly, exposed geologically outcropping in the rivers themselves were not encountered, and as such the presence of grinding grooves may similarly be considered low. However, the site inspection cannot definitively determine the presence or absence of ceremonial activities and/or natural resource sites, that are known in the region. These sites are commonly considered of significance and will likely require more detailed understanding and management through the project.

[1] *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in New South Wales* (OEH 2011)

[2] EMM Consulting Pty Ltd, 2020, Three Dams Project - Dungowan Dam - Aboriginal and Historic heritage constraints assessment report, Report for Water NSW. Available for download here: https://www.planningportal.nsw.gov.au/major-projects/project/30026

In addition to above, the observations along the main creeklines within the project area, suggest that they have the potential to contain complex geomorphology, including a range of alluvial terraces. Some of these appear to be >1m in depth and have potential to be of significant age. The establishment of the existing dam and subsequent regulation of river flow in the 20th century has also potentially modified and/or affected these alluvial deposits and require further investigation.

Following these findings, EMM is now undertaking a more extensive investigation of the Aboriginal heritage values of the project area, including consultation with and participation of Aboriginal stakeholders. For the early works, we will be producing an ACHA in accordance with DPIE guidelines. For the remainder of the works, our investigations will broadly follow DPIE guidelines, but the accelerated timeframe of the overall project requires some modifications to the process detailed in the guidelines. This includes undertaking archaeological test excavation immediately following the field survey (rather than a more extended gap between the two in some projects); and the adoption of mechanically assisted excavations to maximise coverage and depths given the potential for deep alluvial floodplains. These are outlined further below.

3 Aboriginal stakeholders

Following the notification process undertaken between 17 April – 1 May 2020, the following Aboriginal stakeholders have expressed an interest in being involved in the project:

- Tamworth Local Aboriginal Land Council;
- Nunawanna Aboriginal Corporation;
- The Gomeroi People;
- DFVT Enterprises;
- [redacted]
- AT Gomilaroi Cultural Consultancy; and
- Galamaay Cultural Consultants.

4 Dungowan pipeline (early works) – REF assessment methodology

The assessment of the pipeline component between Calala water treatment plant and its junction with the Chaffey Dam pipeline is to be assessed under Part 5 of the EP&A Act (Figure 2). As such, additional approvals required under the *National Parks and Wildlife Act 1974* may apply, and therefore it must conform with the following guidelines:

- *Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW* (OEH 2011);
- *Code of Practice for Archaeological Investigations of Aboriginal Objects in NSW* (the Code of Practice) (DECCW 2010); and
- *Aboriginal Consultation Requirements for Proponents 2010* (DECCW 2010).

4.1 Methods

The purpose of the assessment is to identify and manage the Aboriginal cultural heritage values of all areas that will be affected by the study. In summary, this will involve.

- consultation with the Aboriginal stakeholders to identify socio-cultural values of the project area and places of special significance that should be considered;
- a search of the AHIMS register for records of previously registered Aboriginal sites;
- a review of past Aboriginal heritage reports covering the study area;
- environmental landscape analysis to identify past Aboriginal resources and suitable occupation areas;
- synthesis of background research to develop a predictive model of Aboriginal site location;
- field investigation to validate the findings of the desktop and identify any previously undocumented cultural material. This would include surface inspection and may extend to test excavations of areas of archaeological interest;
- an assessment of significance for Aboriginal cultural heritage values in the project area (with input from the registered Aboriginal stakeholders);
- an impact assessment of how the project will affect Aboriginal cultural heritage values in the project area; and
- development of management recommendations based on the results of the assessment and input from registered Aboriginal stakeholders during the consultation process and particularly from the draft ACHA review period.

4.1.1 Field investigation

Survey of the project area would be undertaken to identify any extant Aboriginal objects or sites. Surface investigation will consist of the survey team evenly spaced (5-10 m apart) walking transects across accessible parts of the study area, with a key focus on targeting areas of low disturbance. The focus of the team will be to both investigate soil exposures for extant Aboriginal objects and identify landforms that have potential for cultural material to be present (either surface or subsurface). It should be acknowledged that the entire ground surface within the project area project boundary is unlikely to be surveyed, but a representative sample of each landform within the project area will be gathered to characterise the archaeology, or its potential, of the project area. All Aboriginal objects and/or landforms of interest would be mapped and documented using hand-held GPS, photographs, sketches and written description.

The survey will be undertaken in accordance with Requirements 5 to 10 of the Code of Practice. In summary, the Code of Practice requires the following general methodology:

- pedestrian survey;
- survey and recording according to survey unit and/or transect;
- recording of beginning and end points of transects or the boundaries of survey units, and the spacing between survey personnel;
- recording of landform, soil information, land surface, vegetation conditions, visibility and exposure, and survey coverage;

- recording of any identified Aboriginal sites identified according to Requirements 6-8, and recording of any identified Aboriginal objects in accordance with Requirements 18-24 of the Code of Practice;

- if any Aboriginal objects and/or sites are identified in the course of the survey, site cards will be completed and submitted to the AHIMS registrar; and

- in the event of Aboriginal heritage being identified within the project footprint, undertake discussions on site as to the potential further investigation and/or management of these finds.

At this stage, no test excavations are proposed for the early works stage, and the aim of the project is to avoid such a program for this phase where possible (due to the shortened assessment timeframes). Rather, it is anticipated that there is enough flexibility in the pipeline route and construction methods to avoid any areas identified as archaeologically sensitive. However, if test excavations are required to further characterise the archaeological resource of an area identified in the survey, they would be implemented shortly following the survey, in accordance with the Code of Practice. Specifically, they would include the following activities:

- all test excavation pits would be spatially located using a differential GPS device, which would also provide elevation data;

- manual excavation of 0.25m² test pits in a systematic grid across areas of archaeological interest within the impact footprint. The spatial resolution of the grid would be dependent on on-ground conditions, but would likely have test pits between 20-50m apart;

- All excavation would use hand tools. Excavation of the first unit would be in 5cm spits, with subsequent excavation allowed in 10cm spits or according to stratigraphy (whichever is smallest) depending on the results of the first unit. Manual excavation would continue to either: i) the base of the cultural deposits; ii) to the depth of the underlying geology; or iii) to the maximum depth possible via hand excavation (likely ~ 80cm).

- sieving of all manually excavated material through a 5mm sieve;

- reduced levels of the top and bottom of the test pit would be documented using a dumpy level against a known elevation. Other levels may be taken as required;

- soil profiles would be recorded in accordance with the Code of Practice, including scaled drawings, photographs, and written descriptions;

- soil samples may be collected for description, sedimentological and chronological analysis where such analysis is considered likely to contribute significant information; and

- excavation procedures and protocols may be modified at the discretion of the Excavation Director, in consultation with the Aboriginal stakeholders and the proponent as the conditions in the field and nature of the excavations develop. This includes the movement of test pits to avoid existing built structures, buried services and disturbances not identified during the desktop phase.

4.2 Timeframes

The following indicative timeframes for the Pipeline REF assessment would apply:

- distribution of this document to the registered Aboriginal stakeholders: May 2020;

- field investigation of the project area: early to mid-June 2020;

- distribution of the draft report: early July 2020;

- input into recommendations and review of draft report: mid July – mid August 2020;
- report finalisation and submission of AHIP application (if required): mid-August 2020;
- determination of the REF: September 2020; and
- construction commencing on the early work section of pipeline: October 2020.

5 Dungowan Dam (main works) – EIS assessment methodology

An EIS will be prepared to assess the dam and associated infrastructure (Figure 1) as a CSSI assessment under Division 5.2 of the EP&A Act. As such, it is required to follow and address Aboriginal heritage requirements as outlined by the SEARs. The assessment will be developed in *broad* accordance with the following guidelines:

- *Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW* (DECCW 2010); and
- *Aboriginal Consultation Requirements for Proponents 2010* (DECCW 2010).

5.1 Methods

The purpose of the assessment is to identify and manage the Aboriginal cultural heritage values of all areas that will be affected by the study. In summary, this will involve:

- consultation with the Aboriginal stakeholders to identify socio-cultural values of the project area, greater understanding of cultural fishing and hunting activities, and places of special significance that should be considered;
- a search of the AHIMS register for records of previously registered Aboriginal sites;
- a review of past Aboriginal heritage reports covering the study area;
- environmental landscape analysis to identify past Aboriginal resources and suitable occupation areas;
- synthesis of background research to develop a predictive model of Aboriginal site location;
- field investigation to validate the findings of the desktop, and identify any previously undocumented cultural material. This would include surface inspection and test excavations of areas of archaeological interest;
- an assessment of significance for Aboriginal cultural heritage values in the project area (with input from the registered Aboriginal stakeholders);
- an impact assessment of how the project will affect Aboriginal cultural heritage values in the project area; and
- development of management recommendations based on the results of the assessment and input from registered Aboriginal stakeholders during the consultation process and particularly from the draft assessment review period.

5.1.1 Field investigation

Survey of the project area would be undertaken to identify any extant Aboriginal objects or sites. Surface investigation will consist of the survey team evenly spaced (5-10 m apart) walking transects across accessible parts of the study area. The focus of the team will be to both investigate soil exposures for extant Aboriginal objects and identify landforms that have potential for cultural material to be present (either surface or subsurface). All Aboriginal objects and/or landforms of interest would be mapped and documented using hand-held GPS, photographs, sketches and written description.

The survey will be undertaken using the following general methodology:

- pedestrian survey;
- survey and recording according to survey unit and/or transect;
- recording of beginning and end points of transects or the boundaries of survey units, and the spacing between survey personnel;
- recording of landform, soil information, land surface, vegetation conditions, visibility and exposure, and survey coverage;
- recording of any identified Aboriginal sites identified according to Requirements 6-8, and recording of any identified Aboriginal objects in accordance with Requirements 18-24 of the Code of Practice;
- if any Aboriginal objects and/or sites are identified in the course of the survey, site cards will be completed and submitted to the AHIMS registrar; and
- in the event of Aboriginal heritage being identified within the project footprint, undertake discussions on site as to the potential further investigation and/or management of these finds.

In addition to the field survey, an archaeological test excavation is proposed for the project area. The investigations will be developed to fulfil the research aims and objectives outlined below. Given the large size of the project area, and the potential for deep deposits – likely to extend below depths that can be easily investigated manually –a grid of mechanically excavated test pits across the site (Figure 4) are proposed. These test pits would be distributed to: i) focus on areas of archaeological interest as determined by the earlier desktop investigations (Section 2.2); ii) to improve our understanding of the area's geomorphological history, and iii) in response to any findings of the field survey undertaken above that may influence areas for future investigation. With respect to the timeframes provided and in anticipation of any obstructions faced on site, we propose up to 40-60 test pits be excavated across the project area. The excavations would adopt the following methods:

- all test excavation pits would be spatially located using a differential GPS device;
- mechanical excavation of some 40-60 ~2m^2 (2x1m) test pits in a systematic grid across the project area;
- all excavation would be undertaken with a flat mud bucket and in controlled 20cm spits, to either: i) the base of the cultural deposits; or ii) to the depth of the underlying geology, or iii) to the full extent of the excavator reach (~3m) where neither (i) or (ii) are met;
- reduced levels of the top and bottom of the test pit would be documented using a dumpy level against a known elevation. Other levels may be taken as required;

- all sediment would be stockpiled in its respective spits, labelled according to its assigned test pit number and recorded and documented. Fifty per cent (50%) of each stockpile – typically ~800kg – would be placed in buckets or bulk soil bags. This sediment would then be wet-sieved through a 5mm wire aperture mesh, and any cultural material recovered, labelled and bagged for subsequent analysis and curation. In the event that Aboriginal objects are recovered, the remaining 50% of the sediment from that spit would be sieved to maximise cultural material recovery. Where no Aboriginal objects are recovered in the initial 50% sub-sample, no further sieving of that spit would occur;

- soil profiles would be recorded in accordance with the Code of Practice, including scaled drawings, photographs, and written descriptions;

- soil samples may be collected for description, sedimentological and chronological analysis where such analysis is considered likely to contribute significant information; and

- excavation procedures and protocols may be modified at the discretion of the Excavation Director, in consultation with the Aboriginal stakeholders and the proponent as the conditions in the field and nature of the excavations develop. This includes the movement of test pits to avoid existing built structures, buried services and disturbances not identified during the desktop phase.

i Research aims and objectives

Our understanding of the cultural materials across the project area is poor, but visual observations suggests that there is a complex and deep fluvial history. It is envisaged that within this complex fluvial history, cultural materials may have been deposited, either through discard by Aboriginal people, or through natural accumulation of materials in these types of deposits. Based on this limited understanding of the project area, a number of overarching aims can be developed for the assessment:

- Identify, map and characterise the nature, age, extent, integrity and significance of the Aboriginal cultural material within the project area.

- Answer research questions including:

    - What are the environmental characteristics associated with the distribution of Aboriginal cultural heritage within the project area?

    - Can the formative processes of the stratigraphic profile provide information on the nature and/or survivability of the archaeological resources?

    - Are there other key factors in the distribution and extent of the material culture within the project area (eg how the dam has affected these deposits)?

    - What are the cultural, social and public values associated with the Aboriginal archaeological resource within the project area?

    - How should the Aboriginal sites in the region be conserved and managed in future?

- Better assess the significance and historical meaning of the cultural materials that exist within the project area so that future archaeological investigation can advance our understanding of past Aboriginal cultural behaviour and environmental adaptation.

- Direct future heritage activities and mitigation measures (if required) for the project area.

ii Analysis, Reporting and Temporary Storage

Post-excavation analysis and reporting will be required to inform the ACHA and subsequent documentation. The post-excavation analysis would be designed to address the research objectives, along with other relevant questions that may arise based on the results of the excavation. Results of the analysis would be presented in relation to comparative site data where possible, and where useful in addressing research questions about the nature, extent, and timing of Aboriginal occupation of the area in the past. These results and discussions would be incorporated into the assessment, which will be provided to the Aboriginal stakeholders for review prior to finalisation.

Once the excavations are completed, all Aboriginal cultural material recovered will be securely stored at the EMM Sydney office for analysis. At the completion of the analysis and reporting, the final location of the assemblage would be discussed with the Aboriginal stakeholders and proponent to determine a suitable long term repository for the cultural materials.

5.2 Timeframes

The following indicative timeframes for the main works EIS assessment would apply:

- distribution of this document to the registered Aboriginal stakeholders: May 2020;
- field investigation of the project area: early June – mid July 2020 (4-6 weeks);
- distribution of the draft report: early October 2020;
- input into recommendations and review of draft report: mid-October – early November 2020;
- finalisation of report for inclusion in EIS: early December 2020; and
- environmental impact assessment development and submission: early December – October 2021
- construction commencing on the main works portion of Dungowan Dam: October 2021. Construction is expected to take four years, dependant on design.

6 What we need from you

In addition to the archaeological evidence described above, Aboriginal heritage incorporates a wide range of values such as stories, traditions and cultural practices. EMM welcomes advice from the Aboriginal community about cultural values (which might include archaeological sites or other types of values) relevant to the project area and its surrounds. EMM is relying on the Aboriginal community for advice on non-archaeological and intangible Aboriginal values for the study area. We are happy to discuss any information which you are willing to share and will respect confidentiality where requested.

EMM would appreciate your feedback on the above methodology proposed for the investigation and assessment of the project area. In responding, please also consider the following questions:

- Are there any other knowledge-holders or traditional owner groups we should be contacting to obtain cultural information on this area?
- Are there any protocols in relation to community interaction and/or cultural heritage that you would like adopted during the project?
- Are you aware of any Aboriginal objects, places, sites or stories of cultural significance and/or importance that you are aware of within the project area? If so, please advise us how you wish them to be dealt with during the project.

- Are you aware of any past or current fishing and hunting activities within the project area? Do you have any views on how these should be managed into the future?

- Is the information you are providing sensitive, gender specific, etc? If so, how would you like the information you provide to EMM to be managed? Noting that some documentation for the ACHA process will be required.

- Do you require any further information prior to EMM proceeding with the project?

In your response, can you please also clearly identify who you would like EMM to talk to within your organisation, and provide contact details for these individuals. Please also ensure your preferred method of communication (eg telephone call, e-mail, letter, etc) is highlighted for subsequent stages of the project.

7 Closing

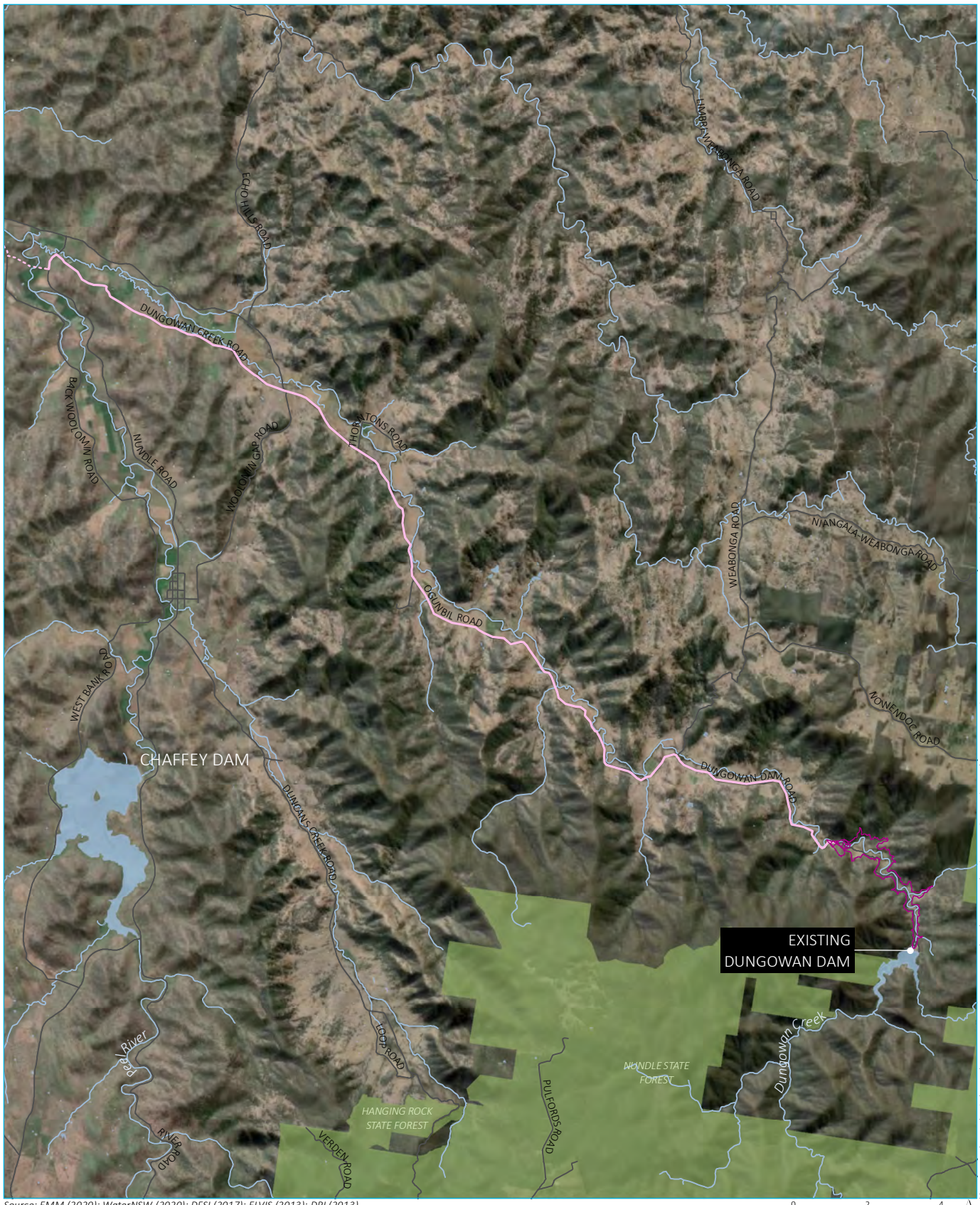
We look forward to receiving any response your organisation wishes to make about the proposed method by **4 June 2020**. Your response will be documented and considered in the assessment. Most importantly, your cultural information is also welcome within this timeframe; but it can also be submitted up until the completion of the draft ACHA.

Please feel free to contact me with any questions.

Yours sincerely

Georgia Burnett
Archaeologist

gburnett@emmconsulting.com.au



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Source: EMM (2020); WaterNSW (2020); DFSI (2017); ELVIS (2013); DPI (2013)

**Inundation area should be considered approximate only. It is based on current limited available spatial data and is subject to future verification.*

0 2 4 km

GDA 1994 MGA Zone 56

N

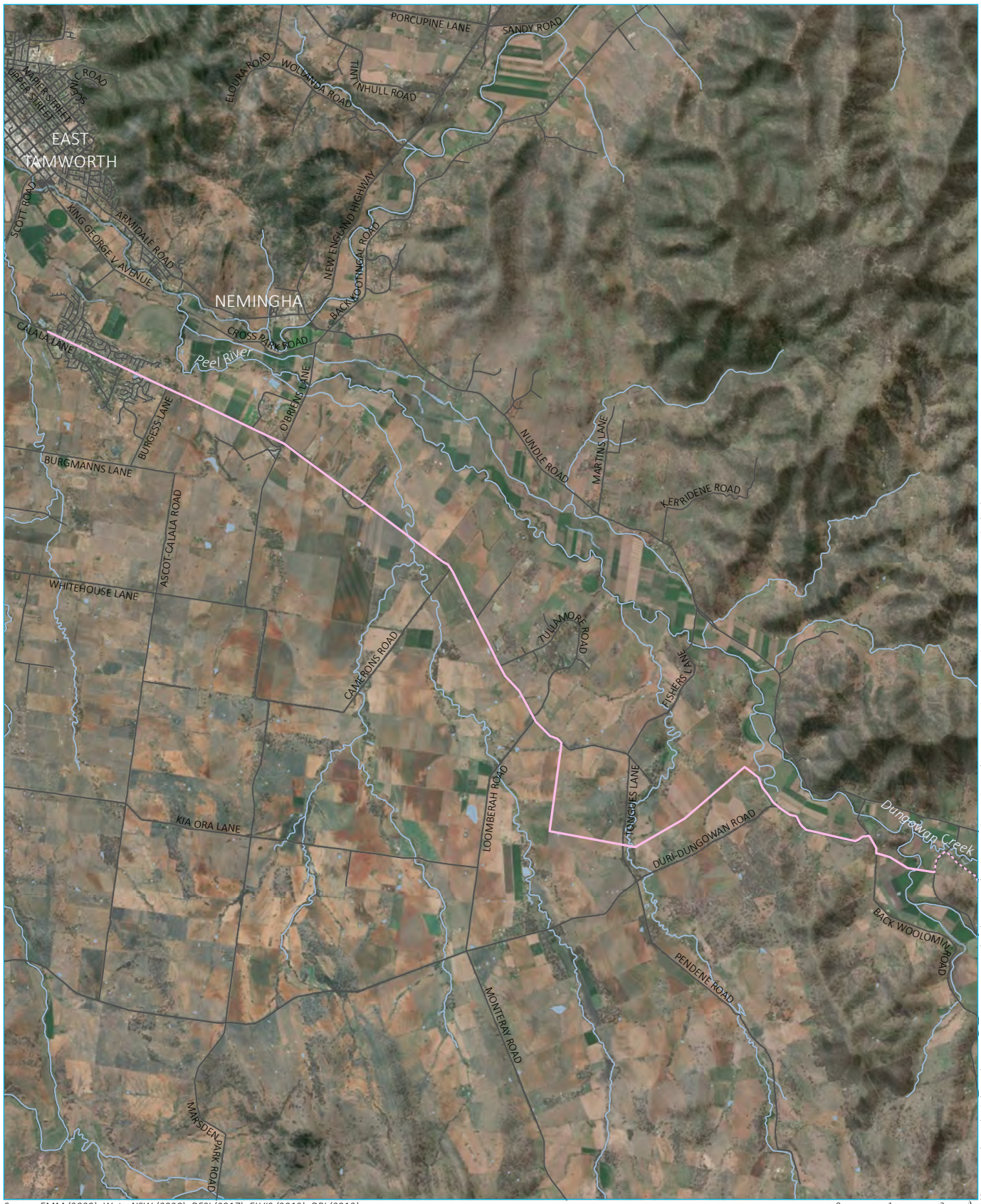
KEY

- Project footprint
- Indicative pipeline alignment (EIS)
- Indicative pipeline alignment (REF)
- Main road
- Named watercourse
- Waterbody
- State forest

The proposed project

Dungowan Dam Project
Aboriginal consultation
Figure 1

EMM
creating opportunities



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Source: EMM (2020); WaterNSW (2020); DFSI (2017); ELVIS (2013); DPI (2013)

**Inundation area should be considered approximate only. It is based on current limited available spatial data and is subject to future verification.*

0 1 2 km

GDA 1994 MGA Zone 56

N

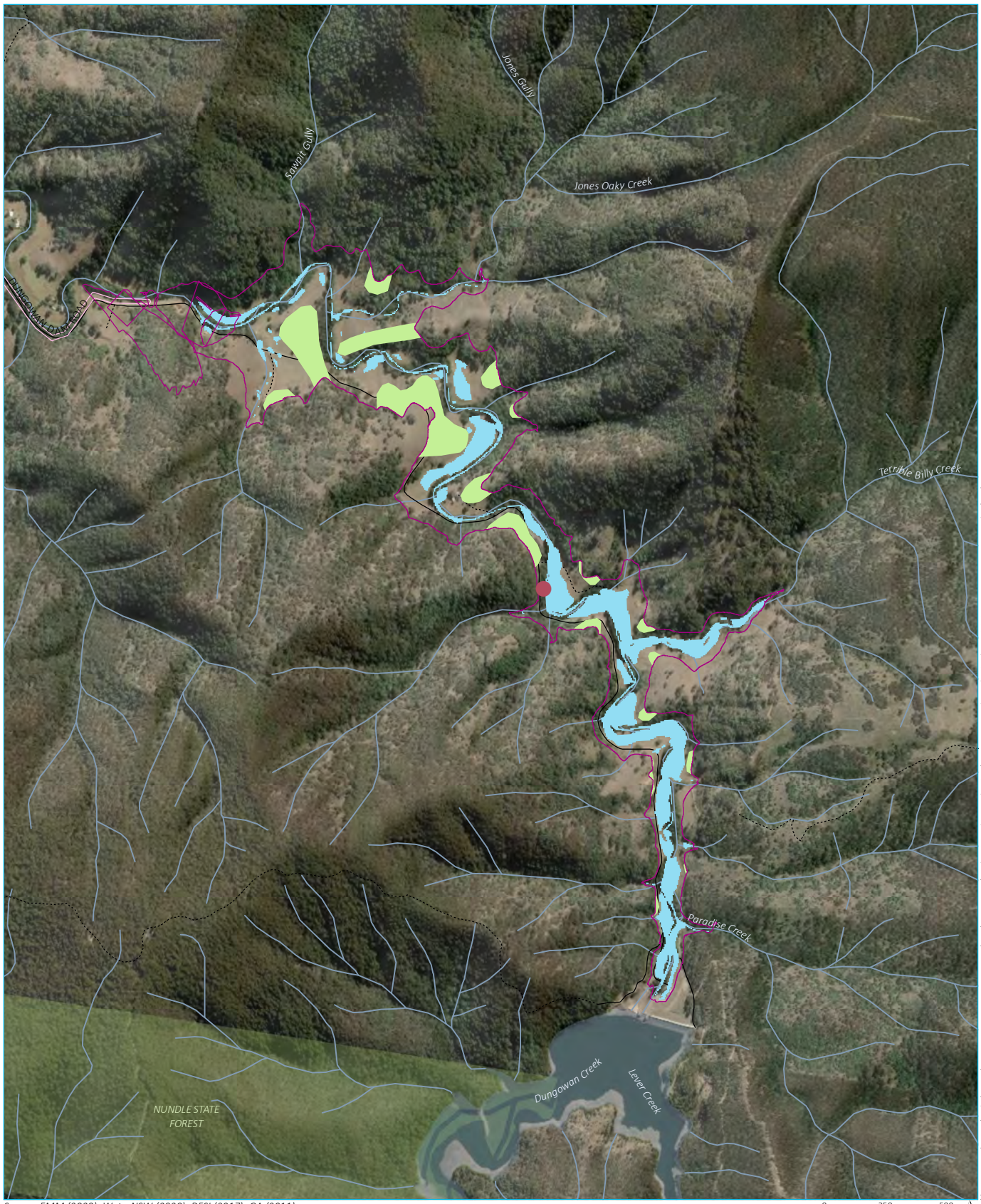
KEY

- Indicative pipeline alignment (REF)
- Indicative pipeline alignment (EIS)
- Main road
- Named watercourse
- Waterbody

The early works study area

Dungowan Dam Project
Aboriginal consultation
Figure 2

EMM
creating opportunities



Source: EMM (2020); WaterNSW (2020); DFSI (2017); GA (2011)

*Inundation area should be considered approximate only. It is based on current limited available spatial data and is subject to future verification.

0 250 500 m

GDA 1994 MGA Zone 56

N

KEY

- Project footprint
- Indicative pipeline alignment (20 m buffer)
- Local road
- Track
- Watercourse
- Waterbody
- State forest

Area of archaeological potential

- Crest landform
- Level to gently inclined landforms within 100 m of primary watercourse
- Very steep to precipitous terrain

Areas of archaeological sensitivity

Dungowan Dam Project
Aboriginal consulation
Figure 3

EMM creating opportunities

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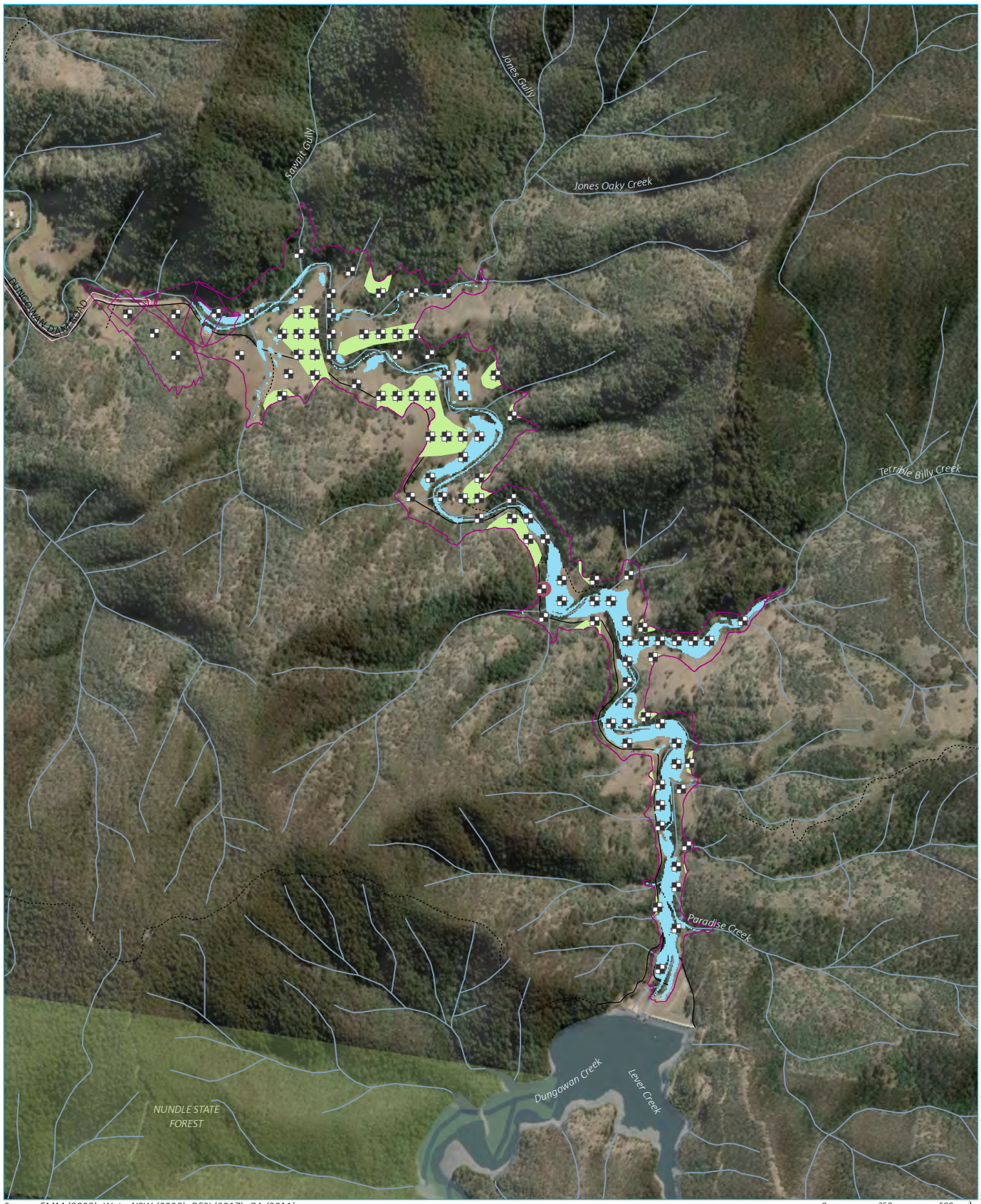

Source: EMM (2020); WaterNSW (2020); DFSI (2017); GA (2011)

*Inundation area should be considered approximate only. It is based on current limited available spatial data and is subject to future verification.

0 250 500 m

GDA 1994 MGA Zone 56

N

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KEY

- Archaeological test location
- Project footprint
- Indicative pipeline alignment (20 m buffer)
- Local road
- Track
- Watercourse
- Waterbody
- State forest

Area of archaeological potential

- Crest landform
- Level to gently inclined landforms within 100 m of primary watercourse
- Very steep to precipitous terrain

Indicative archaeological test excavation program

Dungowan Dam Project
Aboriginal consulation
Figure 4

EMM
creating opportunities

Appendix A

COVID-19 consultation methods

A.1 General

WaterNSW and their consultants are cognisant of the importance of safety to community and stakeholders, clients and staff. Prior to any engagement those with the greatest risk of more serious illness with COVID-19 will be considered:

- Aboriginal and Torres Strait Island people over the age of 50; and
- those aged 60 year and over.

We adhere to the Government requirements regarding COVID-19 and amend our approach as required in this dynamic environment. At the time of writing this document, we note the need to:

- restrict outdoor gatherings to no more than 2 people;
- maintain a 1.5m distance when outside;
- maintain a 4 sqm distance when inside;
- regularly wash hands using soap and water or alcohol-based hand sanitiser;
- surfaces are cleaned prior and after use using alcohol-based sanitiser; and
- observe all travel bans.

The current COVID-19 pandemic and the government requirements to self-isolate and practice social distancing has necessitated a different approach to community and stakeholder engagement. EMM has responded by adopting the practices outlined in Table A1.

Table A.1 Aboriginal community and stakeholder engagement options – COVID-19

Previous approach	COVID-19 methods
Face to face interviews	• Videoconference; • Teleconference; • Where access to hardware and/or software is not available two options could apply: – iPad could be provided to those in remote and isolated locations that is preloaded with: ▪ Prepaid SIM; ▪ Facetime (this is the easiest platform to use for inexperienced users); and ▪ EMM person contact details. – Satellite model where a safe location is provided[3] in negotiation with the client and or participant/s. The location will be set to have: ▪ Person to welcome and direct person to computer station and be available to assist if required (not to be present in the room while interview is being undertaken); ▪ Computer station with videoconference session ready ie person only needs to sit and participate in the face to face interview; ▪ Sanitary wipes to allow the participant to wipe keyboard and mouse before and after participation in the interview. • In the case of satellite model, identify where possible those we have an existing relationship locally who can act as the contact person and/or assist in identifying the appropriate participant/s. There would need to be an agreement up from on: – Who will be responsible locally for facilitating and arranging for participants to attend meetings; – Pre-arranged times and dates (including timeframes eg 3 months) for meetings; and – Pre agreed incentives eg donation of device to the organiser. ***Note: payment for face to face participation would still apply if replaced with videoconferencing/teleconferencing options.***
Group meetings/ workshops	• Videoconference and/or • Online forum/discussions using Social Pinpoint or equivalent • Satellite model where a safe location is provided[4] in negotiation with the client and or participant/s. The location will be set to have: – Person to welcome and direct person to computer station and be available to assist if required; – Computer station with videoconference session ready ie person only needs to sit and participate in the group discussion; – Sanitary wipes to allow the participant to wipe keyboard and mouse before and after participation in the interview.
Community information sessions	• Online forum/discussions using Social Pinpoint
On-line surveys	• On-line surveys integrated with Social Pinpoint • On-line survey via Survey Monkey delivered via email addresses
Newsletters/ Information delivered in person or via letterbox drop	• Provided passively on agreed resident/Council Facebook pages, project websites; • Provided via email; • Where available letterbox drop; and/or • Integrated to the project's Social Pinpoint page.

[3] If inside 4 sqm per person or computer station, if outside 1.5m between each person or computer station.

[4] If inside 4 sqm per person or computer station, if outside 1.5m between each person or computer station.

Georgia Burnett

From: Georgia Burnett
Sent: Friday, 15 May 2020 11:30 AM
To: 'richard slater'
Subject: RE: Dungowan Dam, NSW
Attachments: 20200515_Method_HDHG.pdf; 20200511_1.5_Method_Updated pipeline map.pdf

Much appreciated Richard, thank you.

I have attached a copy of the methodology to this email addressed to you, for your records, as well as a summary update on the additional figure for the proposed pipeline that was distributed shortly after (the figure is also attached): WaterNSW has not selected a final route for the pipeline, and as the assessment letter explains, it is anticipated that there is enough flexibility in the pipeline route and construction methods to avoid any areas identified as archaeologically sensitive. Therefore, when the fieldwork commences (likely in June), there is a chance that a number of routes will still be on the table that require investigation and that specific findings may even influence the route at that point.

Please let me know if you need anything else, or have any questions in the meantime. As you might have seen already, we distributed a consultation strategy today and would appreciate any feedback on preferred consultation methods (especially in light of the social distancing restrictions in place at the moment).

Kind regards,
Georgia

Georgia Burnett
Archaeologist
T 02 9493 9500
M 0400 472 412
www.emmconsulting.com.au

-----Original Message-----
From: richard slater <richard.slater[redacted]
Sent: Thursday, 14 May 2020 4:39 PM
To: Georgia Burnett <gburnett@emmconsulting.com.au>
Subject: Re: Dungowan Dam, NSW

Hi

Yes for the proposed Dungowan dam project.
Address is [redacted]

[redacted]

Richard

Sent from my iPhone

> On 14 May 2020, at 4:30 pm, Georgia Burnett <gburnett@emmconsulting.com.au> wrote:
>
> Hi Richard,
>
> Thank you for your email. Can I just confirm, was email in regards to the assessment methodology letter we sent out this week for proposed Dungowan Dam project? If so, I don't have you listed as a Registered Aboriginal Party for the project, but can quickly solve that if you can provide your consent to add you to our stakeholder list, a mailing address and contact phone number.
>
> Also please let me know if you want a copy of the letter addressed to your group, for your records.
>
> Kind regards,
> Georgia
>
>
> Georgia Burnett
> Archaeologist
> T 02 9493 9500
> M 0400 472 412
> www.emmconsulting.com.au
>
> -----Original Message-----
> From: richard slater [redacted]
> Sent: Thursday, 14 May 2020 4:21 PM
> To: Georgia Burnett <gburnett@emmconsulting.com.au>
> Subject:
>
> Hi Georgia
>
> I on behalf of Huckada Dreamin Heritage Group supports the methodology for this project We look forward to hearing from you soon
>
> Thanks
> Richard Slater
>
> Sent from my iPhone

Ground floor, 20 Chandos Street
St Leonards NSW 2065
PO Box 21
St Leonards NSW 1590

T 02 9493 9500
E info@emmconsulting.com.au

www.emmconsulting.com.au

7 May 2020

Des Hickey
Wattaka Cultural Service
deshickey[redacted]

Re: Dungowan Dam and associated infrastructure - Project information and assessment methodology

Dear Des,

1 Introduction

Thank you for registering your interest in the Dungowan Dam project, southeast of Tamworth, NSW (Figures 1 and 2). WaterNSW has engaged EMM Consulting Pty Ltd (EMM) to prepare the Aboriginal Cultural Heritage Assessment (ACHA) to investigate and understand the cultural heritage values of the project area and surrounds. The assessment will consider the potential impacts of the project and how mitigation and management of cultural heritage needs to be integrated into the delivery of the project. The assessment forms part of an Environmental Impact Statement or Review of Environmental Factors currently being prepared.

This document is provided in accordance with sections 4.2 and 4.3 of the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (DECCW 2010), which sets out the Aboriginal consultation requirements for the project. Additional Aboriginal community liaison and participation opportunities will occur in accordance with a project specific consultation strategy.

The aims of this letter are to:

- provide an overview of the project and how it will be assessed;
- provide background on the project and some of the initial investigations to date;
- establish the purpose and aims of the Aboriginal consultation process;
- seek information about any Aboriginal cultural heritage values associated with the project and how they may affect, inform or refine the project and/or assessment methods;
- seek information on any cultural activities (such as fishing and hunting) that has historically and/or is actively being undertaken in the project area;
- identify any culturally appropriate protocols that registered parties wish to be adopted during the information gathering process (eg protocols during field survey, or handling of culturally sensitive information); and
- present a draft of the intended assessment methods for your review and comment.

We welcome your feedback at your earliest convenience, and will be consulting with the registered Aboriginal parties for the duration of the ACHA, currently proposed to extend to the end of 2020. However, for the purposes of this initial stage and in accordance with the Department of Planning, Industry and Environment (DPIE) guidelines, we request any written response on the information and process below by **4 June 2020.**

At this time, we propose to conduct all consultation via teleconferencing, e-mail or phone due to the social distancing rules from the COVID-19 outbreak. However, where feasible, we would meet in person (face-to-face meetings), and would ensure appropriate protocols are in place as per Government health advice at that time. Appendix A of this document provides our proposed methods for social distancing during consultation at this time. We would like to hear from your organisation on this to ensure that you are able to contribute knowledge to the project and have the opportunity to be involved, whilst ensuring we comply with up-to-date social distancing requirements.

For reference, the WaterNSW contact is: Meredith Abrams, Community Engagement Officer, P: 1300 662 077, E: meredith.abrams@waternsw.com.au. EMM is working on the proponent's behalf, and all queries should be directed through EMM. Feedback can be provided to:

Georgia Burnett

Address: PO Box 21, St Leonards, NSW 1590

Phone: 02 9493 9500

Email: gburnett@emmconsulting.com.au

2 Project information

2.1 Project overview and proposed assessment

WaterNSW is proposing to undertake the planning and delivery of three new or augmented dams in NSW, which includes a new Dungowan Dam and supply pipeline. The need to deliver the dams is critical to the State's drought recovery process and needs to be completed to the highest standard in relation to the assessment and delivery. Each dam is to be constructed rapidly to create security for the various town water supplies and associated industries reliant on the delivery of water for viability.

The project includes:

- a new dam downstream of the existing Dungowan Dam, with a nominal capacity of 22.5 gigalitres (GL);
- partial or full decommissioning of the existing Dungowan Dam and rehabilitation of the storage area of the dam; and
- a new delivery pipeline from the proposed dam to the junction with the Chaffey Dam pipeline and a further stage from the junction to the Calala water treatment plant located in Tamworth.

The project is identified as Critical State Significant Infrastructure (CSSI) under the provisions of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act). A CSSI project requires approval from the NSW Minister for Planning and Public Spaces and is accompanied by an EIS. The assessment of Aboriginal cultural heritage would be one of several investigations included in the EIS. The assessment would be developed in response to Secretary Environmental Assessment Requirements (SEARs) issued by DPIE, which will outline the investigative requirements for Aboriginal heritage. These will likely require an assessment that aligns with DPIE guidelines[1] for investigating and assessing Aboriginal heritage and consulting with the Aboriginal community. However, CSSI projects do not require separate approvals under the *National Parks and Wildlife Act 1974* (eg Aboriginal heritage impact permits), rather any subsequent requirements for heritage are managed in accordance with the conditions of approval, provided by the Minister.

The section of the pipeline between its junction with the Chaffey Dam pipeline and extending to the Calala water treatment plant would be delivered as the 'early work' for the project, and will be assessed separately to the EIS, within a Review of Environmental Factors (REF) under Part 5 of the EP&A Act. This component of the project may require approval under the *National Parks and Wildlife Act 1974* if impacts on Aboriginal heritage are identified. This assessment would adopt the process and requirements described within DPIE guidelines.

2.2 Initial Aboriginal heritage investigations

An investigation of Aboriginal heritage and the potential for cultural material to be present in the project area was undertaken as part of the scoping study – the document lodged in March 2020 with DPIE to inform the contents of the EIS. This study was primarily a desktop investigation, including a review of previous investigations and the application of key environmental landforms to identify areas of archaeological interest (Figure 3).[2] The study resulted in the following conclusions:

> …there is currently no information on the Aboriginal heritage of the immediate environment. A search of the surrounding region reveals only a small number of previously documented sites ($\bar{x}$=~1 site per 50 km^2), with the nearest some 9 km from the study area. In comparison with Chaffey Dam, a nearby dam in a similar environmental context, the data suggest that the proposed works would affect primarily stone artefact sites associated with the transient and ephemeral use of the landscape in the past. These would likely be found as surface and/or sub-surface deposits in the vicinity of Dungowan Creek, Terrible Billy Creek and/or Jones Oaky Creek. A site inspection validates these predictions, with a number of elevated terraces and floodplains adjacent the creeks revealing cultural material. Specifically, areas within 100 m either sides of these creeks are considered to have high potential for surface and sub-surface cultural material. The latter quite possible in stratified contexts, and thereby able to provide significant information on the past use of the region by Aboriginal people.
>
> While predictions indicated the potential for rockshelters and associated features (such as art) to be present along the valley edges and where other geological outcropping is found, none were observed. The nature of the geomorphology resulted in more moderate hills and slopes, and the potential for such sites is therefore considered low. Similarly, exposed geologically outcropping in the rivers themselves were not encountered, and as such the presence of grinding grooves may similarly be considered low. However, the site inspection cannot definitively determine the presence or absence of ceremonial activities and/or natural resource sites, that are known in the region. These sites are commonly considered of significance and will likely require more detailed understanding and management through the project.

[1] *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in New South Wales* (OEH 2011)

[2] EMM Consulting Pty Ltd, 2020, Three Dams Project - Dungowan Dam - Aboriginal and Historic heritage constraints assessment report, Report for Water NSW. Available for download here: https://www.planningportal.nsw.gov.au/major-projects/project/30026

In addition to above, the observations along the main creeklines within the project area, suggest that they have the potential to contain complex geomorphology, including a range of alluvial terraces. Some of these appear to be >1m in depth and have potential to be of significant age. The establishment of the existing dam and subsequent regulation of river flow in the 20th century has also potentially modified and/or affected these alluvial deposits and require further investigation.

Following these findings, EMM is now undertaking a more extensive investigation of the Aboriginal heritage values of the project area, including consultation with and participation of Aboriginal stakeholders. For the early works, we will be producing an ACHA in accordance with DPIE guidelines. For the remainder of the works, our investigations will broadly follow DPIE guidelines, but the accelerated timeframe of the overall project requires some modifications to the process detailed in the guidelines. This includes undertaking archaeological test excavation immediately following the field survey (rather than a more extended gap between the two in some projects); and the adoption of mechanically assisted excavations to maximise coverage and depths given the potential for deep alluvial floodplains. These are outlined further below.

3 Aboriginal stakeholders

Following the notification process undertaken between 17 April – 1 May 2020, the following Aboriginal stakeholders have expressed an interest in being involved in the project:

- Tamworth Local Aboriginal Land Council;
- Nunawanna Aboriginal Corporation;
- The Gomeroi People;
- DFVT Enterprises;
- [redacted]
- AT Gomilaroi Cultural Consultancy; and
- Galamaay Cultural Consultants.

4 Dungowan pipeline (early works) – REF assessment methodology

The assessment of the pipeline component between Calala water treatment plant and its junction with the Chaffey Dam pipeline is to be assessed under Part 5 of the EP&A Act (Figure 2). As such, additional approvals required under the *National Parks and Wildlife Act 1974* may apply, and therefore it must conform with the following guidelines:

- *Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW* (OEH 2011);
- *Code of Practice for Archaeological Investigations of Aboriginal Objects in NSW* (the Code of Practice) (DECCW 2010); and
- *Aboriginal Consultation Requirements for Proponents 2010* (DECCW 2010).

4.1 Methods

The purpose of the assessment is to identify and manage the Aboriginal cultural heritage values of all areas that will be affected by the study. In summary, this will involve.

- consultation with the Aboriginal stakeholders to identify socio-cultural values of the project area and places of special significance that should be considered;
- a search of the AHIMS register for records of previously registered Aboriginal sites;
- a review of past Aboriginal heritage reports covering the study area;
- environmental landscape analysis to identify past Aboriginal resources and suitable occupation areas;
- synthesis of background research to develop a predictive model of Aboriginal site location;
- field investigation to validate the findings of the desktop and identify any previously undocumented cultural material. This would include surface inspection and may extend to test excavations of areas of archaeological interest;
- an assessment of significance for Aboriginal cultural heritage values in the project area (with input from the registered Aboriginal stakeholders);
- an impact assessment of how the project will affect Aboriginal cultural heritage values in the project area; and
- development of management recommendations based on the results of the assessment and input from registered Aboriginal stakeholders during the consultation process and particularly from the draft ACHA review period.

4.1.1 Field investigation

Survey of the project area would be undertaken to identify any extant Aboriginal objects or sites. Surface investigation will consist of the survey team evenly spaced (5-10 m apart) walking transects across accessible parts of the study area, with a key focus on targeting areas of low disturbance. The focus of the team will be to both investigate soil exposures for extant Aboriginal objects and identify landforms that have potential for cultural material to be present (either surface or subsurface). It should be acknowledged that the entire ground surface within the project area project boundary is unlikely to be surveyed, but a representative sample of each landform within the project area will be gathered to characterise the archaeology, or its potential, of the project area. All Aboriginal objects and/or landforms of interest would be mapped and documented using hand-held GPS, photographs, sketches and written description.

The survey will be undertaken in accordance with Requirements 5 to 10 of the Code of Practice. In summary, the Code of Practice requires the following general methodology:

- pedestrian survey;
- survey and recording according to survey unit and/or transect;
- recording of beginning and end points of transects or the boundaries of survey units, and the spacing between survey personnel;
- recording of landform, soil information, land surface, vegetation conditions, visibility and exposure, and survey coverage;

- recording of any identified Aboriginal sites identified according to Requirements 6-8, and recording of any identified Aboriginal objects in accordance with Requirements 18-24 of the Code of Practice;

- if any Aboriginal objects and/or sites are identified in the course of the survey, site cards will be completed and submitted to the AHIMS registrar; and

- in the event of Aboriginal heritage being identified within the project footprint, undertake discussions on site as to the potential further investigation and/or management of these finds.

At this stage, no test excavations are proposed for the early works stage, and the aim of the project is to avoid such a program for this phase where possible (due to the shortened assessment timeframes). Rather, it is anticipated that there is enough flexibility in the pipeline route and construction methods to avoid any areas identified as archaeologically sensitive. However, if test excavations are required to further characterise the archaeological resource of an area identified in the survey, they would be implemented shortly following the survey, in accordance with the Code of Practice. Specifically, they would include the following activities:

- all test excavation pits would be spatially located using a differential GPS device, which would also provide elevation data;

- manual excavation of 0.25m² test pits in a systematic grid across areas of archaeological interest within the impact footprint. The spatial resolution of the grid would be dependent on on-ground conditions, but would likely have test pits between 20-50m apart;

- All excavation would use hand tools. Excavation of the first unit would be in 5cm spits, with subsequent excavation allowed in 10cm spits or according to stratigraphy (whichever is smallest) depending on the results of the first unit. Manual excavation would continue to either: i) the base of the cultural deposits; ii) to the depth of the underlying geology; or iii) to the maximum depth possible via hand excavation (likely ~ 80cm).

- sieving of all manually excavated material through a 5mm sieve;

- reduced levels of the top and bottom of the test pit would be documented using a dumpy level against a known elevation. Other levels may be taken as required;

- soil profiles would be recorded in accordance with the Code of Practice, including scaled drawings, photographs, and written descriptions;

- soil samples may be collected for description, sedimentological and chronological analysis where such analysis is considered likely to contribute significant information; and

- excavation procedures and protocols may be modified at the discretion of the Excavation Director, in consultation with the Aboriginal stakeholders and the proponent as the conditions in the field and nature of the excavations develop. This includes the movement of test pits to avoid existing built structures, buried services and disturbances not identified during the desktop phase.

4.2 Timeframes

The following indicative timeframes for the Pipeline REF assessment would apply:

- distribution of this document to the registered Aboriginal stakeholders: May 2020;

- field investigation of the project area: early to mid-June 2020;

- distribution of the draft report: early July 2020;

- input into recommendations and review of draft report: mid July – mid August 2020;
- report finalisation and submission of AHIP application (if required): mid-August 2020;
- determination of the REF: September 2020; and
- construction commencing on the early work section of pipeline: October 2020.

5 Dungowan Dam (main works) – EIS assessment methodology

An EIS will be prepared to assess the dam and associated infrastructure (Figure 1) as a CSSI assessment under Division 5.2 of the EP&A Act. As such, it is required to follow and address Aboriginal heritage requirements as outlined by the SEARs. The assessment will be developed in *broad* accordance with the following guidelines:

- *Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW* (DECCW 2010); and
- *Aboriginal Consultation Requirements for Proponents 2010* (DECCW 2010).

5.1 Methods

The purpose of the assessment is to identify and manage the Aboriginal cultural heritage values of all areas that will be affected by the study. In summary, this will involve:

- consultation with the Aboriginal stakeholders to identify socio-cultural values of the project area, greater understanding of cultural fishing and hunting activities, and places of special significance that should be considered;
- a search of the AHIMS register for records of previously registered Aboriginal sites;
- a review of past Aboriginal heritage reports covering the study area;
- environmental landscape analysis to identify past Aboriginal resources and suitable occupation areas;
- synthesis of background research to develop a predictive model of Aboriginal site location;
- field investigation to validate the findings of the desktop, and identify any previously undocumented cultural material. This would include surface inspection and test excavations of areas of archaeological interest;
- an assessment of significance for Aboriginal cultural heritage values in the project area (with input from the registered Aboriginal stakeholders);
- an impact assessment of how the project will affect Aboriginal cultural heritage values in the project area; and
- development of management recommendations based on the results of the assessment and input from registered Aboriginal stakeholders during the consultation process and particularly from the draft assessment review period.

5.1.1 Field investigation

Survey of the project area would be undertaken to identify any extant Aboriginal objects or sites. Surface investigation will consist of the survey team evenly spaced (5-10 m apart) walking transects across accessible parts of the study area. The focus of the team will be to both investigate soil exposures for extant Aboriginal objects and identify landforms that have potential for cultural material to be present (either surface or subsurface). All Aboriginal objects and/or landforms of interest would be mapped and documented using hand-held GPS, photographs, sketches and written description.

The survey will be undertaken using the following general methodology:

- pedestrian survey;
- survey and recording according to survey unit and/or transect;
- recording of beginning and end points of transects or the boundaries of survey units, and the spacing between survey personnel;
- recording of landform, soil information, land surface, vegetation conditions, visibility and exposure, and survey coverage;
- recording of any identified Aboriginal sites identified according to Requirements 6-8, and recording of any identified Aboriginal objects in accordance with Requirements 18-24 of the Code of Practice;
- if any Aboriginal objects and/or sites are identified in the course of the survey, site cards will be completed and submitted to the AHIMS registrar; and
- in the event of Aboriginal heritage being identified within the project footprint, undertake discussions on site as to the potential further investigation and/or management of these finds.

In addition to the field survey, an archaeological test excavation is proposed for the project area. The investigations will be developed to fulfil the research aims and objectives outlined below. Given the large size of the project area, and the potential for deep deposits – likely to extend below depths that can be easily investigated manually –a grid of mechanically excavated test pits across the site (Figure 4) are proposed. These test pits would be distributed to: i) focus on areas of archaeological interest as determined by the earlier desktop investigations (Section 2.2); ii) to improve our understanding of the area's geomorphological history, and iii) in response to any findings of the field survey undertaken above that may influence areas for future investigation. With respect to the timeframes provided and in anticipation of any obstructions faced on site, we propose up to 40-60 test pits be excavated across the project area. The excavations would adopt the following methods:

- all test excavation pits would be spatially located using a differential GPS device;
- mechanical excavation of some 40-60 ~2m^2 (2x1m) test pits in a systematic grid across the project area;
- all excavation would be undertaken with a flat mud bucket and in controlled 20cm spits, to either: i) the base of the cultural deposits; or ii) to the depth of the underlying geology, or iii) to the full extent of the excavator reach (~3m) where neither (i) or (ii) are met;
- reduced levels of the top and bottom of the test pit would be documented using a dumpy level against a known elevation. Other levels may be taken as required;

- all sediment would be stockpiled in its respective spits, labelled according to its assigned test pit number and recorded and documented. Fifty per cent (50%) of each stockpile – typically ~800kg – would be placed in buckets or bulk soil bags. This sediment would then be wet-sieved through a 5mm wire aperture mesh, and any cultural material recovered, labelled and bagged for subsequent analysis and curation. In the event that Aboriginal objects are recovered, the remaining 50% of the sediment from that spit would be sieved to maximise cultural material recovery. Where no Aboriginal objects are recovered in the initial 50% sub-sample, no further sieving of that spit would occur;

- soil profiles would be recorded in accordance with the Code of Practice, including scaled drawings, photographs, and written descriptions;

- soil samples may be collected for description, sedimentological and chronological analysis where such analysis is considered likely to contribute significant information; and

- excavation procedures and protocols may be modified at the discretion of the Excavation Director, in consultation with the Aboriginal stakeholders and the proponent as the conditions in the field and nature of the excavations develop. This includes the movement of test pits to avoid existing built structures, buried services and disturbances not identified during the desktop phase.

i Research aims and objectives

Our understanding of the cultural materials across the project area is poor, but visual observations suggests that there is a complex and deep fluvial history. It is envisaged that within this complex fluvial history, cultural materials may have been deposited, either through discard by Aboriginal people, or through natural accumulation of materials in these types of deposits. Based on this limited understanding of the project area, a number of overarching aims can be developed for the assessment:

- Identify, map and characterise the nature, age, extent, integrity and significance of the Aboriginal cultural material within the project area.

- Answer research questions including:

    - What are the environmental characteristics associated with the distribution of Aboriginal cultural heritage within the project area?

    - Can the formative processes of the stratigraphic profile provide information on the nature and/or survivability of the archaeological resources?

    - Are there other key factors in the distribution and extent of the material culture within the project area (eg how the dam has affected these deposits)?

    - What are the cultural, social and public values associated with the Aboriginal archaeological resource within the project area?

    - How should the Aboriginal sites in the region be conserved and managed in future?

- Better assess the significance and historical meaning of the cultural materials that exist within the project area so that future archaeological investigation can advance our understanding of past Aboriginal cultural behaviour and environmental adaptation.

- Direct future heritage activities and mitigation measures (if required) for the project area.

ii Analysis, Reporting and Temporary Storage

Post-excavation analysis and reporting will be required to inform the ACHA and subsequent documentation. The post-excavation analysis would be designed to address the research objectives, along with other relevant questions that may arise based on the results of the excavation. Results of the analysis would be presented in relation to comparative site data where possible, and where useful in addressing research questions about the nature, extent, and timing of Aboriginal occupation of the area in the past. These results and discussions would be incorporated into the assessment, which will be provided to the Aboriginal stakeholders for review prior to finalisation.

Once the excavations are completed, all Aboriginal cultural material recovered will be securely stored at the EMM Sydney office for analysis. At the completion of the analysis and reporting, the final location of the assemblage would be discussed with the Aboriginal stakeholders and proponent to determine a suitable long term repository for the cultural materials.

5.2 Timeframes

The following indicative timeframes for the main works EIS assessment would apply:

- distribution of this document to the registered Aboriginal stakeholders: May 2020;
- field investigation of the project area: early June – mid July 2020 (4-6 weeks);
- distribution of the draft report: early October 2020;
- input into recommendations and review of draft report: mid-October – early November 2020;
- finalisation of report for inclusion in EIS: early December 2020; and
- environmental impact assessment development and submission: early December – October 2021
- construction commencing on the main works portion of Dungowan Dam: October 2021. Construction is expected to take four years, dependant on design.

6 What we need from you

In addition to the archaeological evidence described above, Aboriginal heritage incorporates a wide range of values such as stories, traditions and cultural practices. EMM welcomes advice from the Aboriginal community about cultural values (which might include archaeological sites or other types of values) relevant to the project area and its surrounds. EMM is relying on the Aboriginal community for advice on non-archaeological and intangible Aboriginal values for the study area. We are happy to discuss any information which you are willing to share and will respect confidentiality where requested.

EMM would appreciate your feedback on the above methodology proposed for the investigation and assessment of the project area. In responding, please also consider the following questions:

- Are there any other knowledge-holders or traditional owner groups we should be contacting to obtain cultural information on this area?
- Are there any protocols in relation to community interaction and/or cultural heritage that you would like adopted during the project?
- Are you aware of any Aboriginal objects, places, sites or stories of cultural significance and/or importance that you are aware of within the project area? If so, please advise us how you wish them to be dealt with during the project.

- Are you aware of any past or current fishing and hunting activities within the project area? Do you have any views on how these should be managed into the future?

- Is the information you are providing sensitive, gender specific, etc? If so, how would you like the information you provide to EMM to be managed? Noting that some documentation for the ACHA process will be required.

- Do you require any further information prior to EMM proceeding with the project?

In your response, can you please also clearly identify who you would like EMM to talk to within your organisation, and provide contact details for these individuals. Please also ensure your preferred method of communication (eg telephone call, e-mail, letter, etc) is highlighted for subsequent stages of the project.

7 Closing

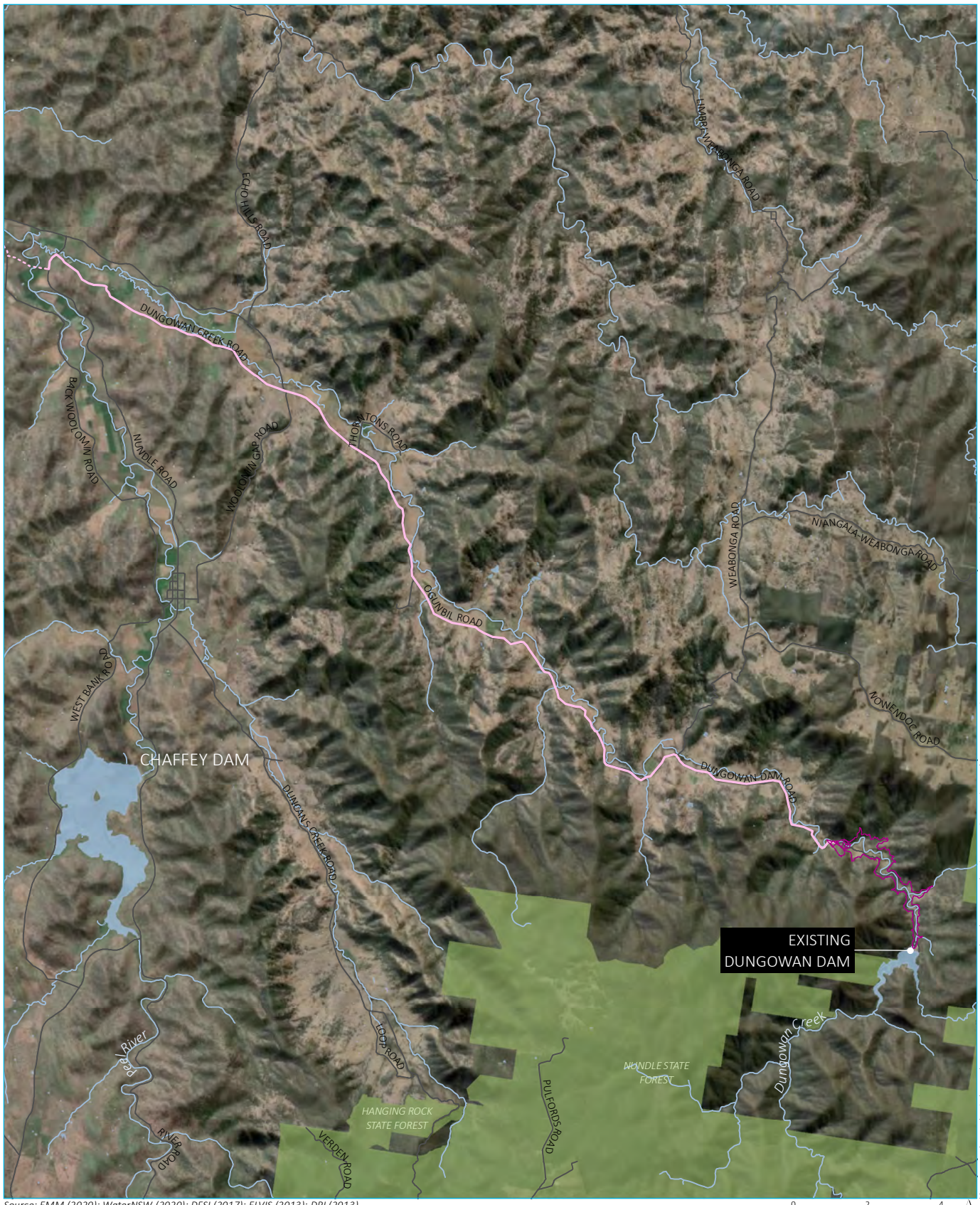
We look forward to receiving any response your organisation wishes to make about the proposed method by **4 June 2020**. Your response will be documented and considered in the assessment. Most importantly, your cultural information is also welcome within this timeframe; but it can also be submitted up until the completion of the draft ACHA.

Please feel free to contact me with any questions.

Yours sincerely

Georgia Burnett
Archaeologist

gburnett@emmconsulting.com.au



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Source: EMM (2020); WaterNSW (2020); DFSI (2017); ELVIS (2013); DPI (2013)

**Inundation area should be considered approximate only. It is based on current limited available spatial data and is subject to future verification.*

0 2 4 km

GDA 1994 MGA Zone 56

N

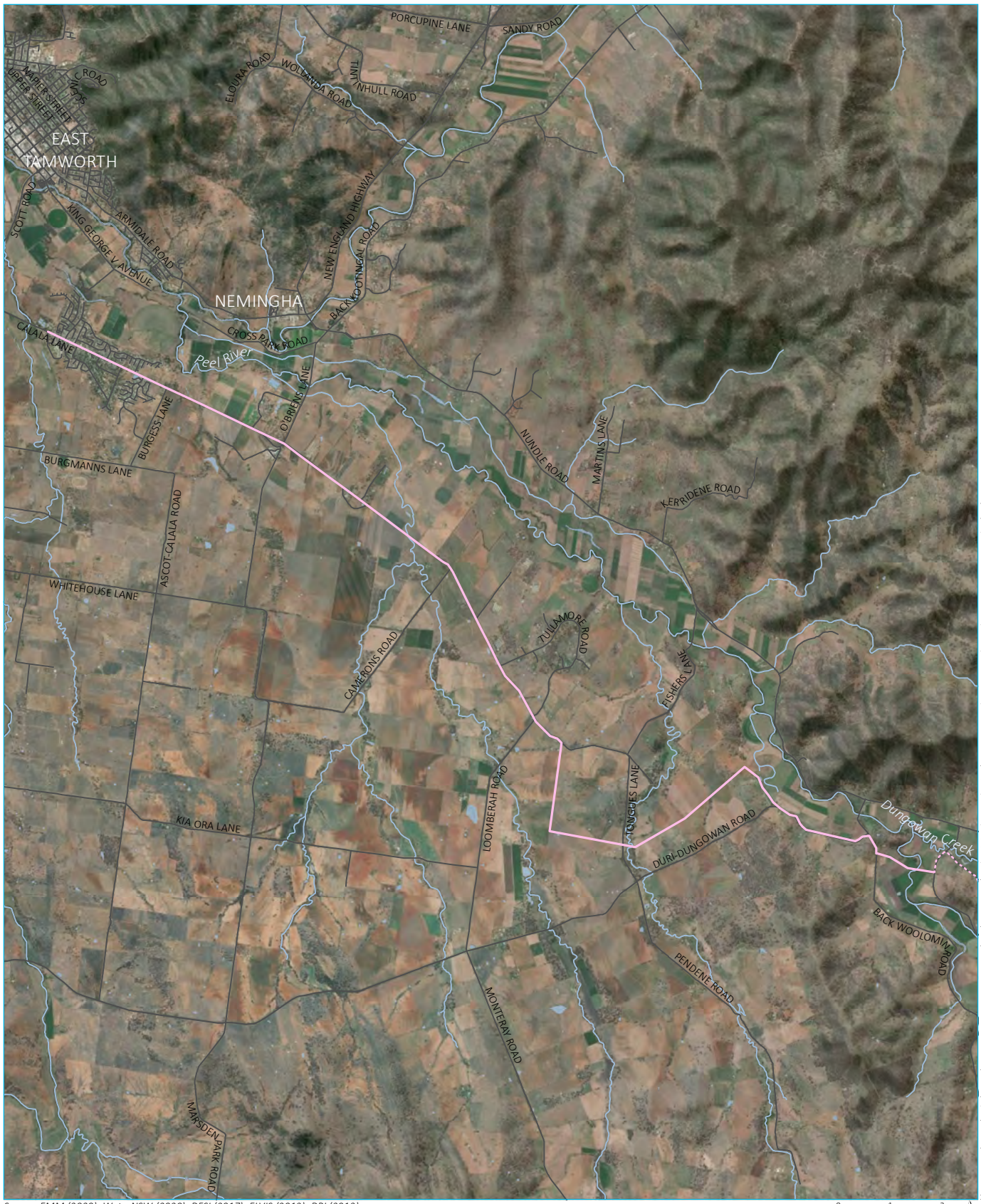
KEY

- Project footprint
- Indicative pipeline alignment (EIS)
- Indicative pipeline alignment (REF)
- Main road
- Named watercourse
- Waterbody
- State forest

The proposed project

Dungowan Dam Project
Aboriginal consultation
Figure 1

EMM
creating opportunities



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Source: EMM (2020); WaterNSW (2020); DFSI (2017); ELVIS (2013); DPI (2013)

**Inundation area should be considered approximate only. It is based on current limited available spatial data and is subject to future verification.*

0 1 2 km

GDA 1994 MGA Zone 56

N

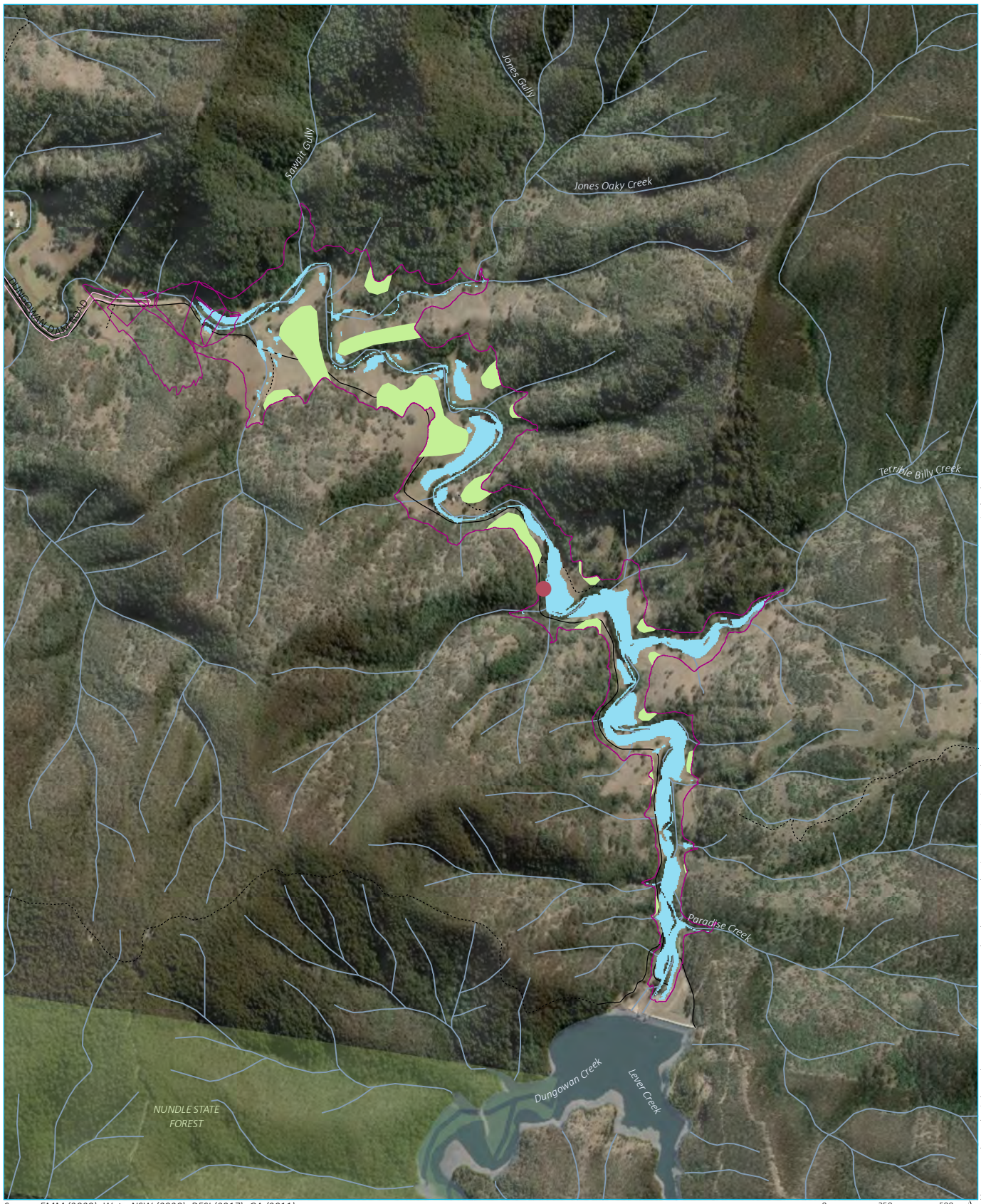
KEY

- Indicative pipeline alignment (REF)
- Indicative pipeline alignment (EIS)
- Main road
- Named watercourse
- Waterbody

The early works study area

Dungowan Dam Project
Aboriginal consultation
Figure 2

EMM
creating opportunities



Source: EMM (2020); WaterNSW (2020); DFSI (2017); GA (2011)

*Inundation area should be considered approximate only. It is based on current limited available spatial data and is subject to future verification.

0 250 500 m

GDA 1994 MGA Zone 56

N

KEY

- Project footprint
- Indicative pipeline alignment (20 m buffer)
- Local road
- Track
- Watercourse
- Waterbody
- State forest

Area of archaeological potential

- Crest landform
- Level to gently inclined landforms within 100 m of primary watercourse
- Very steep to precipitous terrain

Areas of archaeological sensitivity

Dungowan Dam Project
Aboriginal consulation
Figure 3

EMM creating opportunities

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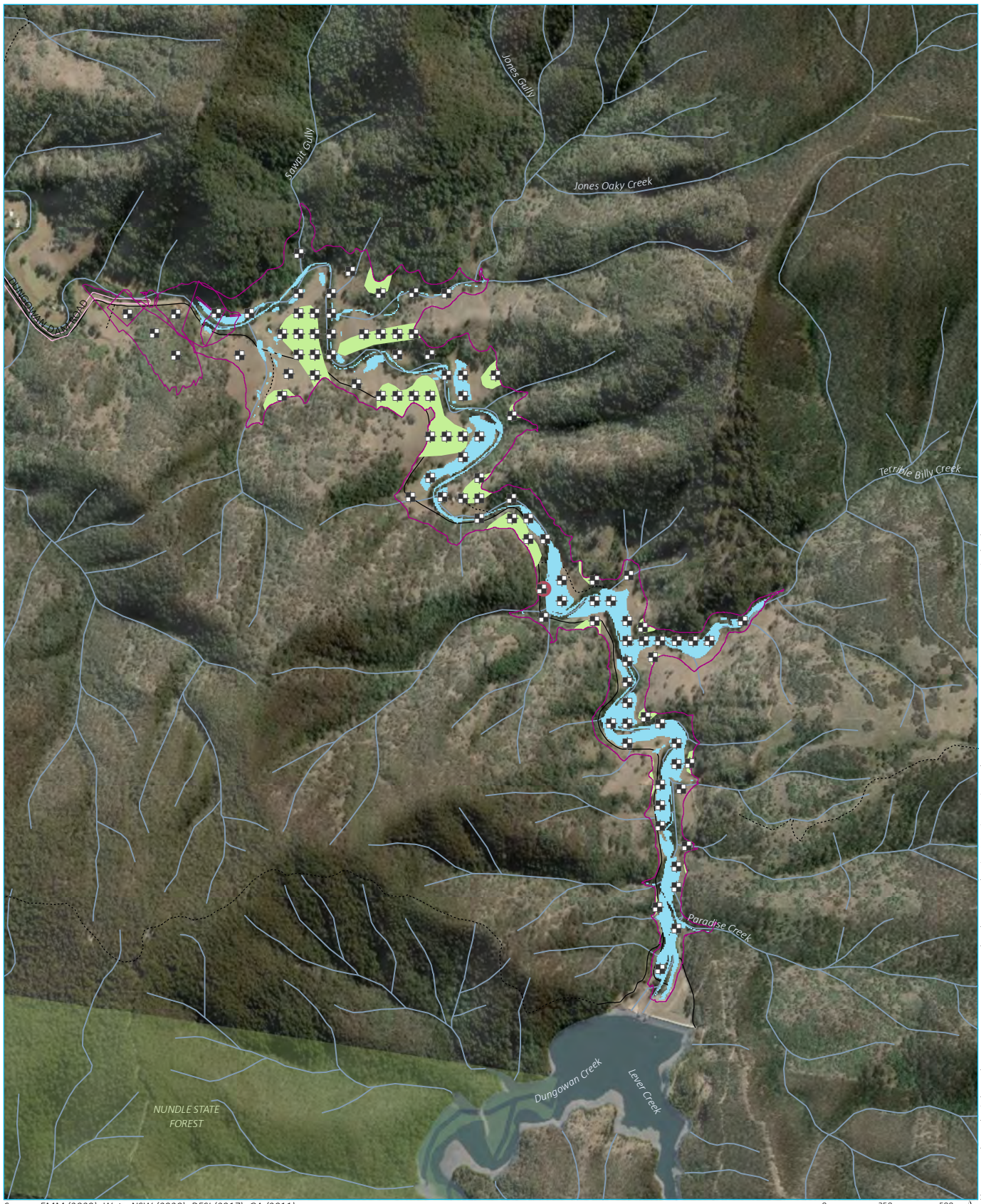

Source: EMM (2020); WaterNSW (2020); DFSI (2017); GA (2011)

*Inundation area should be considered approximate only. It is based on current limited available spatial data and is subject to future verification.

0 250 500 m

GDA 1994 MGA Zone 56

N

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KEY

- Archaeological test location
- Project footprint
- Indicative pipeline alignment (20 m buffer)
- Local road
- Track
- Watercourse
- Waterbody
- State forest

Area of archaeological potential

- Crest landform
- Level to gently inclined landforms within 100 m of primary watercourse
- Very steep to precipitous terrain

Indicative archaeological test excavation program

Dungowan Dam Project
Aboriginal consulation
Figure 4

EMM
creating opportunities

Appendix A

COVID-19 consultation methods

A.1 General

WaterNSW and their consultants are cognisant of the importance of safety to community and stakeholders, clients and staff. Prior to any engagement those with the greatest risk of more serious illness with COVID-19 will be considered:

- Aboriginal and Torres Strait Island people over the age of 50; and
- those aged 60 year and over.

We adhere to the Government requirements regarding COVID-19 and amend our approach as required in this dynamic environment. At the time of writing this document, we note the need to:

- restrict outdoor gatherings to no more than 2 people;
- maintain a 1.5m distance when outside;
- maintain a 4 sqm distance when inside;
- regularly wash hands using soap and water or alcohol-based hand sanitiser;
- surfaces are cleaned prior and after use using alcohol-based sanitiser; and
- observe all travel bans.

The current COVID-19 pandemic and the government requirements to self-isolate and practice social distancing has necessitated a different approach to community and stakeholder engagement. EMM has responded by adopting the practices outlined in Table A1.

Table A.1 Aboriginal community and stakeholder engagement options – COVID-19

Previous approach	COVID-19 methods
Face to face interviews	• Videoconference; • Teleconference; • Where access to hardware and/or software is not available two options could apply: – iPad could be provided to those in remote and isolated locations that is preloaded with: ▪ Prepaid SIM; ▪ Facetime (this is the easiest platform to use for inexperienced users); and ▪ EMM person contact details. – Satellite model where a safe location is provided[3] in negotiation with the client and or participant/s. The location will be set to have: ▪ Person to welcome and direct person to computer station and be available to assist if required (not to be present in the room while interview is being undertaken); ▪ Computer station with videoconference session ready ie person only needs to sit and participate in the face to face interview; ▪ Sanitary wipes to allow the participant to wipe keyboard and mouse before and after participation in the interview. • In the case of satellite model, identify where possible those we have an existing relationship locally who can act as the contact person and/or assist in identifying the appropriate participant/s. There would need to be an agreement up from on: – Who will be responsible locally for facilitating and arranging for participants to attend meetings; – Pre-arranged times and dates (including timeframes eg 3 months) for meetings; and – Pre agreed incentives eg donation of device to the organiser. ***Note: payment for face to face participation would still apply if replaced with videoconferencing/teleconferencing options.***
Group meetings/ workshops	• Videoconference and/or • Online forum/discussions using Social Pinpoint or equivalent • Satellite model where a safe location is provided[4] in negotiation with the client and or participant/s. The location will be set to have: – Person to welcome and direct person to computer station and be available to assist if required; – Computer station with videoconference session ready ie person only needs to sit and participate in the group discussion; – Sanitary wipes to allow the participant to wipe keyboard and mouse before and after participation in the interview.
Community information sessions	• Online forum/discussions using Social Pinpoint
On-line surveys	• On-line surveys integrated with Social Pinpoint • On-line survey via Survey Monkey delivered via email addresses
Newsletters/ Information delivered in person or via letterbox drop	• Provided passively on agreed resident/Council Facebook pages, project websites; • Provided via email; • Where available letterbox drop; and/or • Integrated to the project's Social Pinpoint page.

[3] If inside 4 sqm per person or computer station, if outside 1.5m between each person or computer station.

[4] If inside 4 sqm per person or computer station, if outside 1.5m between each person or computer station.

Georgia Burnett

From: Georgia Burnett
Sent: Friday, 15 May 2020 3:52 PM
To: deshickey[redacted]
Subject: FW: Dungowan Dam, NSW - Invitation to register
Attachments: 20200514_CSSI Dams_Aboriginal Community Engagement Strategy_May2020.pdf

And the consultation strategy.

Cheers,
Georgia

Georgia Burnett
Archaeologist

T 02 9493 9500
M 0400 472 412
www.emmconsulting.com.au

From: Georgia Burnett
Sent: Friday, 15 May 2020 3:46 PM
To: deshickey[redacted]
Subject: RE: Dungowan Dam, NSW - Invitation to register

Hi Des,

No problem.

Please find attached a couple of things we have already sent out to stakeholders:

- The proposed assessment methodology.
- An updated map of the options for the pipeline - when the fieldwork commences (likely in June), there is a chance that a number of routes will still be on the table that require investigation and that specific findings may even influence the route at that point.
- A project specific consultation strategy document and associated email – please read both, as the email specifically asks for feedback regarding meeting availability and preferred formats (with respect to current social distancing restrictions).

A standard 28 review period applies for the methodology. If you could though, I would appreciate comment on the methodology and the consultation strategy as soon as possible; we are hoping to arrange a meeting for late May, and the fieldwork is looking to start in mid-late June.

Please let me know if you have any questions in the meantime, happy to discuss. The attachments are too large to send in one email, so I am going to forward the consultation strategy as a separate email.

Cheers,
Georgia

Georgia Burnett
Archaeologist

T 02 9493 9500
M 0400 472 412
www.emmconsulting.com.au

From: deshickey@[redacted]
Sent: Friday, 15 May 2020 1:18 PM
To: Georgia Burnett <gburnett@emmconsulting.com.au>
Subject: Re: Dungowan Dam, NSW - Invitation to register

Hi Georgia

Thank you for your email, yes I wish to register my groups interest in the Dungowan Dam project please send the proposed assessment method, if you need further information from me please let me know , I can be contacted by phone [redacted] or by email.

Thanks'

Des

-------Original Message-------

From: Georgia Burnett
Date: 14/05/2020 11:29:20 AM
To: deshickey[redacted]
Subject: Dungowan Dam, NSW - Invitation to register

Hi Des,

I am emailing to enquire if you wish to express interest as a Registered Aboriginal Party for the proposed development of a new Dungowan Dam and associated infrastructure, south east of Tamworth; please find an attached letter outlining the project in more detail. Your name and group, Wattaka Cultural Service, is listed on the North West DPIE stakeholder list as a potentially interested party for proposed works in the Tamworth region, and the following postal address was supplied: PO Box 479 Tamworth NSW 2340. We posted a notification letter to the identified

postal address on 17 April 2020, however the letter was returned to our office as undeliverable. I am hoping this email will reach you instead.

If you wish to register an interest in the Dungowan Dam project, please let me know as soon as possible and I will send on the proposed assessment method.

Thank you for your time.

Kind regards,

Georgia

Georgia Burnett
Archaeologist

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Georgia Burnett

From: Georgia Burnett
Sent: Wednesday, 10 June 2020 1:24 PM
To: 'Vicki Slater'
Cc: Alan Williams
Subject: RE: Dungowan Dam, NSW - Invitation to register
Attachments: 20200514_CSSI Dams_Aboriginal Community Engagement Strategy_May2020.pdf; Figure 1 - HER01_LocalContextEISProject_20200511_03.pdf; Figure 2 - HER02 _LocalContextEarlyWorks_20200511_03.pdf; EMM Conditions of Engagement of Subconsultants 04042019.pdf; Confidentiality Deed.docx; Proposed Dungowan Dam - Aboriginal Focus Group Meeting - 28 May 2020

Hi Vicki,

Apologies for the delay in replying, I have been in the field.

I have added your details to our list of contacts, and will include you in correspondence moving forward. I attach a few documents for your review, explained briefly below. Apologies for the information overload; consultation began several weeks ago, and the project is proceeding with accelerated timeframes.

One is the consultation strategy that outlines how we envisage consultation will be undertaken throughout the project - the key components being regular monthly meetings to discuss the project as it progresses, as well as regular project updated and involvement in field survey and archaeological investigations. The approximate timing of all these is presented in one of the appendices. This is a 'live' document intended to be regularly updated and modified to ensure it continues to allow effective communication, as well as identify any issues identified during our discussions and how they have been addressed where possible. You'll see for example that section 5 needs completion following the initial meetings just held. If you have any suggestions/concerns/inputs, please let me know.

The second document is the proposed Aboriginal heritage assessment methodology. This outlines how we propose to undertake the on-site investigations of the proposed dam location and pipeline (shown in figures 1 and 2, attached), including survey and test excavations. These largely follow the Department of Planning, Industry and Environment (DPIE) guidelines that dictate how such investigations are undertaken, but it does deviate in relation to the methods of excavation. Here, we propose to adopt the use of mechanical excavation, since there is a likelihood the river may contain deep deposits that cannot be reached by hand. It also asks a number of questions of the Aboriginal stakeholders in terms of how they wish to be consulted, identification of any areas of value at the site, and how they would like any information provided to be managed. Again, please provide any feedback/comment/concerns, and I'll endeavour to address them though I note that some of the works proposed have started/are imminent.

The third document is the subcontractor agreement that forms a commercial arrangement between your organisation and EMM for the purposes of payment in subsequent stages of work, etc. (We'll provide a work scope that links to this as each task comes up). Can you please review (or have your legal representative review), and if happy please sign and return. If you have issues, please let me know and we can look to modify this if required.

A fourth attachment provides a summary of the first stakeholder meeting held on 28 May 2020 at the Tamworth LALC offices. It includes a summary of the consultation engagement strategy going forward, the proposed assessment and excavation methodology for the project, and discussions and outcomes resolved.

Finally, I would like to advise you that as of this week geotechnical investigations of the study area, supervised by archaeological monitoring, have commenced this week. The archaeological survey of the early works component will

commence the next week (16th and 17th of June). While both of these activities have already been arranged, please let me know if you are interested in participating in the later fieldwork programmes and/or meetings.

Please let me know if you have any questions or concerns, happy to discuss.

Cheers,
Georgia

Georgia Burnett
Archaeologist

T 02 9493 9500
M 0400 472 412
www.emmconsulting.com.au

From: Vicki Slater <Vicki.slater[redacted]
Sent: Monday, 1 June 2020 6:15 PM
To: Georgia Burnett <gburnett@emmconsulting.com.au>
Subject: Re: Dungowan Dam, NSW - Invitation to register

Hi Georgia

Yes I would love the opportunity to be engaged for the project.

I will forward Insurances tomorrow.

Will call you tomorrow
Cheers

Vicky Slater

Wurrumay Pty Ltd

M:[redacted]

From: Georgia Burnett <gburnett@emmconsulting.com.au>
Sent: Thursday, 14 May 2020 1:27 AM
To: vicki.slater@[redacted]
Subject: Dungowan Dam, NSW - Invitation to register

Dear Vicky,

I am emailing to enquire if you wish to express interest as a Registered Aboriginal Party for the proposed development of a new Dungowan Dam and associated infrastructure, south east of Tamworth; please find an attached letter outlining the project in more detail. Your name and group, Kawul Cultural Services, is listed on the North West DPIE stakeholder list as a potentially interested party for proposed works in the Tamworth region, and the following postal address was supplied: PO Box 817 Singleton NSW 2330. We posted a notification letter to the identified postal address on 17 April 2020, however the letter was returned to our office as undeliverable. I am hoping this email will reach you instead.

If you wish to register an interest in the Dungowan Dam project, please let me know as soon as possible and I will send on an the proposed assessment method.

Thank you for your time.

Kind regards,
Georgia

Georgia Burnett
Archaeologist
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M 0400 472 412
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Georgia Burnett

From: Vicki Slater <Vicki.slater[redacted]
Sent: Monday, 1 June 2020 6:15 PM
To: Georgia Burnett
Subject: Re: Dungowan Dam, NSW - Invitation to register

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Vicky Slater

Wurrumay Pty Ltd

M[redacted]

From: Georgia Burnett <gburnett@emmconsulting.com.au>
Sent: Thursday, 14 May 2020 1:27 AM
To: vicki.slater@[redacted]
Subject: Dungowan Dam, NSW - Invitation to register

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Thank you for your time.

Kind regards,
Georgia

Georgia Burnett
Archaeologist

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From:	Alan Williams
To:	Alan Williams
Cc:	Ben Phillips; Georgia Burnett; Meredith Abrams
Subject:	Proposed Dungowan Dam - Archaeological test excavation revised methodology
Date:	Tuesday, 21 July 2020 12:06:14 PM
Attachments:	20200717_Dungowan Aboriginal heritage methods_v3.pdf image001.png image002.png image003.png image004.jpg

Dear All,

As you may be aware from our provided documentation, a key component of the Aboriginal cultural heritage investigations of the proposed Mole River Dam is undertaking test excavations to characterise the subsurface cultural materials. The methodology for this works was provided early in the project for your review and input. The methodology was also provided to Heritage NSW for review and comment as a requirement of the Secretary Environmental Assessment Requirements. They required revisions to the methodology, including shifting from mechanical to manual excavation techniques, and increasing our focus on areas of archaeological sensitivity rather than a landform approach.

I include a revised methodology and further information in the attached to address Heritage NSW's input, can you please review the information and if you have any comments/input, please let me know. Can I please get any comments back by end of July if possible to allow finalisation before we have to kick off the excavation in early August. I will also raise this this at the AFG meeting next week to ensure everyone has opportunity to explore the ramifications of the change, and provide input.

Thanks
Al

Dr Alan Williams FSA MAACAI
Associate Director
National Technical Leader, Aboriginal Heritage

Bushfire, Ecology, Heritage and Spatial Solutions

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D 02 9493 9584
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17 July 2020

Re: Dungowan Dam and associated infrastructure - revised archaeological excavation methodology

As you will be aware, as part of the Aboriginal cultural heritage assessment (ACHA) for the proposed Dungowan Dam project, EMM Consulting Pty Ltd (EMM) is proposing to undertake archaeological test excavations across the site. These works were outlined in detail in a letter to your organisation dated 6 May 2020, and subsequent information provided during the Aboriginal focus group meeting in late May 2020.

Our original approach included the use of mechanical excavation to allow for a large-scale landform investigation approach to characterise the site, as well as ensure the deep alluvial deposits could be reliably explored. Our approach was provided to Heritage NSW for review as a requirement of the assessment process. An outcome of the review by Heritage NSW is the requirement to use the *Code of Practise for the Archaeological Investigation of Aboriginal Objects in NSW* for the archaeological excavations, which does not permit the use of mechanical excavation.

Heritage NSW further suggested that rather than the landform approach, we focus on known areas of archaeological importance. Currently based on limited desktop information, these are primarily the edges of Dungowan Creek, Terrible Billy's Creek, and Oakey Creek. Preliminary findings from the recent field survey largely supports some of these areas as the most probable locations for sub-surface cultural materials to be present. These areas were the focus of our initial excavation strategy in our letter dated 6 May 2020 and we propose to maintain these areas (Figure 1). Specifically, we propose to undertake test pits in these locations, but modify our methods to conform with Heritage NSW's direction. Overall, the number of test pits will not change significantly, although the methods will now need to shift to manual excavation. Investigation of deeper alluvial deposits is being explored, but is now likely to be unfeasible using these methods, and may require further consideration during a later stage of the project.

This letter is provided for your information and we are happy to receive comments and feedback on the methodology. In addition to providing this letter, discussions at the Aboriginal Focus Group meeting in July will also include opportunity to review the updated approach. For further project information, we would direct your organisation to the previously provided letter (dated 6 May 2020), which includes extensive information on the ACHA. Here, we only provide a revised excavation method for the CSSI component of the project.

Our revised methods would consist of the following:

- all test excavation pits would be spatially located using a differential GPS device, which would also provide elevation data;
- manual excavation of 1m^2 test pits (dug as four contiguous 0.25m^2 quadrants) in a systematic grid across areas of archaeological interest within the impact footprint (see Figure 1);

- expansion of test pits in 0.25m^2 test pits up to a size of 3m^2 in any one location were further information or characterisations is deemed necessary. Given the timeframes of the project, it is likely only a small number of locations would be achievable for expansion;

- all excavation would use hand tools. Excavation of the first unit would be in 5cm spits, with subsequent excavation allowed in 10cm spits or according to stratigraphy (whichever is smallest) depending on the results of the first unit. Manual excavation would continue to either: i) the base of the cultural deposits; ii) to the depth of the underlying geology; or iii) to the maximum depth possible via hand excavation (likely ~ 80cm).

- sieving of all manually excavated material through a 5mm sieve;

- reduced levels of the top and bottom of the test pit would be documented using a dumpy level against a known elevation. Other levels may be taken as required;

- soil profiles would be recorded in accordance with the Code of Practice, including scaled drawings, photographs, and written descriptions;

- soil samples may be collected for description, sedimentological and chronological analysis where such analysis is considered likely to contribute significant information; and

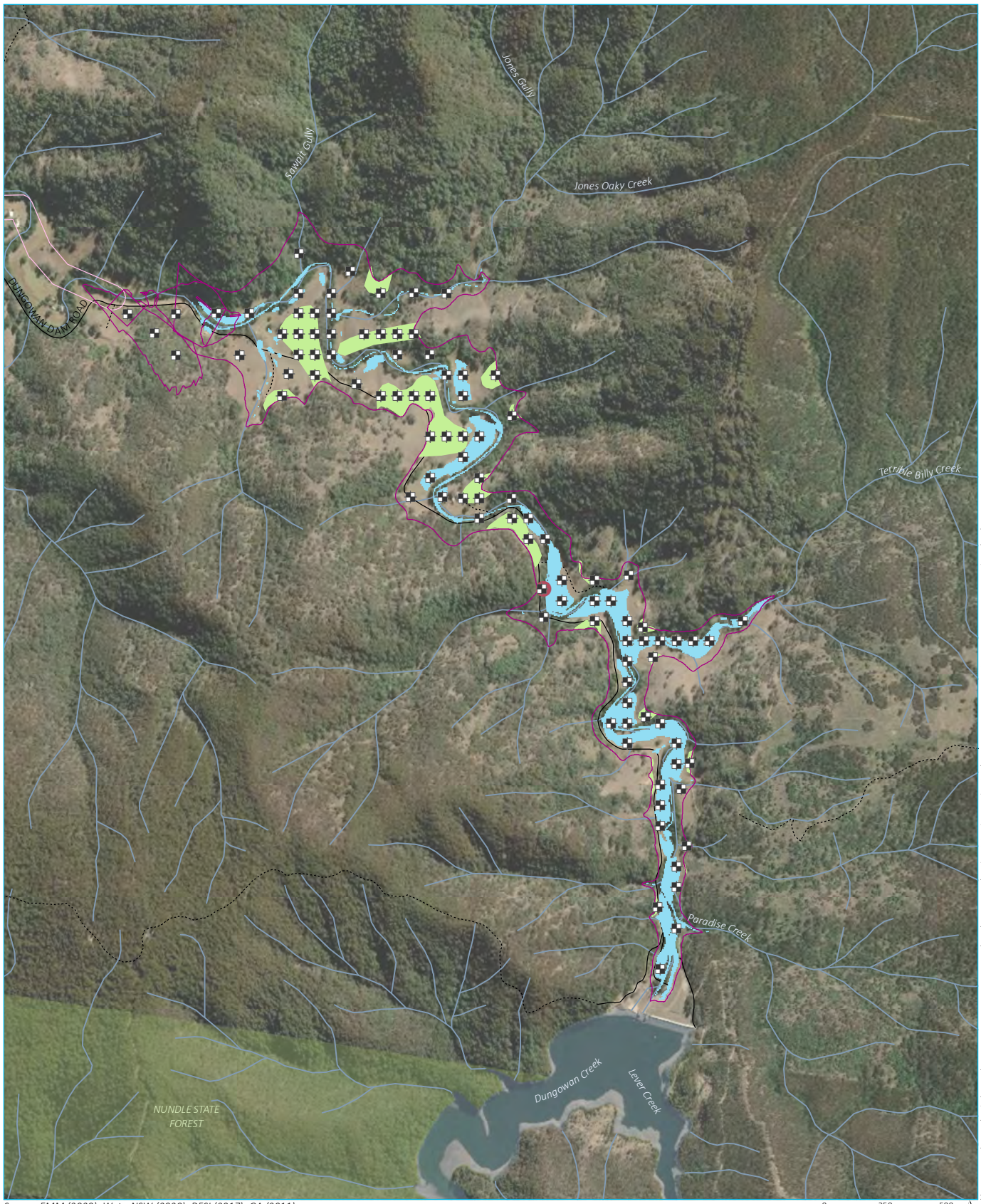
- excavation procedures and protocols may be modified at the discretion of the Excavation Director, in consultation with the Aboriginal stakeholders and the proponent as the conditions in the field and nature of the excavations develop. This includes the movement of test pits to avoid existing built structures, buried services and disturbances not identified during the desktop phase.

If you have any enquiries or questions, please contact me on 0438 104 740 or awilliams@emmconsulting.com.au.

Yours sincerely

Dr Alan Williams FSA MAACAI
Associate Director

awilliams@emmconsulting.com.au



Source: EMM (2020); WaterNSW (2020); DFSI (2017); GA (2011)

0 250 500 m

GDA 1994 MGA Zone 56

N

KEY

- Archaeological test location
- Project footprint
- Indicative pipeline alignment (50 m buffer)
- Local road
- Track
- Watercourse
- Waterbody
- State forest

Area of archaeological potential

- Crest landform
- Level to gently inclined landforms within 100 m of primary watercourse
- Very steep to precipitous terrain

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Indicative archaeological test excavation program

Dungowan Dam Project
Aboriginal consulation
Figure 1

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Georgia Burnett

From: Alan Williams
Sent: Tuesday, 8 September 2020 9:59 AM
To: natasharodgers[redacted]
Cc: Georgia Burnett
Subject: Proposed Dungowan Dam - Aboriginal heritage cultural heritage assessment
Attachments: EMM Conditions of Engagement of Subconsultants 04042019_RAPs.pdf; COVID-19 FIELDWORK SCREENING QUESTIONNAIRE.pdf; 20200826_CSSI Dams_Aboriginal Community Engagement Strategy_v7.pdf; 20200717_Dungowan Aboriginal heritage methods_v4.pdf; J200042_Method_general.pdf

Hi Natasha,

Thank you for your call yesterday. As you are aware, EMM is undertaking the environmental impact assessment of the proposed dam, a component of which is the need to identify and understand the Aboriginal heritage values (tangible and intangible) of the site. Consultation with the Aboriginal community has been initiated as part of these investigations, beginning in early-April 2020 and continuing up to present. I apologise that you were not contacted sooner, but I can find no record of a previous communication either to you or from you prior to yesterday. Regardless, I have now registered you for the project.

I attach several documents for your review and information. One is the consultation strategy that outlines how we envisage consultation will be undertaken throughout the project - the key components being regular monthly meetings to discuss the project as it progresses, as well as regular project updated and involvement in field survey and archaeological investigations. The approximate timing of all these is presented in one of the appendices. This is a 'live' document intended to be regularly updated and modified to ensure it continues to allow effective communication, as well as identify any issues identified during our discussions and how they have been addressed where possible. It has just been updated, and is out for review to the stakeholders now until mid September. If you have any suggestions/concerns/inputs, please let me know. Importantly, the strategy includes meeting minutes in the appendices of all previous discussions on the project.

The second document is the proposed Aboriginal heritage assessment methodology. This outlines how we propose to undertake the on-site investigations of the proposed dam location, including survey and test excavations. These largely follow the Heritage NSW guidelines that dictate how such investigations are undertaken. Initially proposed to include mechanical excavation, Heritage NSW has now required us to adopt manual methods (and the relevant document for this change is also attached). It also asks a number of questions of the Aboriginal stakeholders in terms of how they wish to be consulted, identification of any areas of value at the site, and how they would like any information provided to be managed. Again, please provide any feedback/comment/concerns, and I'll endeavour to address them. Much of the fieldwork for the project is unfortunately complete, so these are primarily for your information on what has happened, but a range of meetings and ongoing discussion is proposed for the next several months.

The third document is the subcontractor agreement that forms a commercial arrangement between your organisation and EMM for the purposes of payment in subsequent stages of work, etc. (We'll provide a work scope that links to this as each task comes up). Can you please review (or have your legal representative review), and if happy please sign and return. If you have issues, please let me know and we can look to modify this if required. At this stage, we will be offering up to $110 (ex GST) per hour for a representative to attend meetings and/or participate on fieldwork. Travel is not being paid, but can be discussed on a case-by-case basis.

Our next meeting is proposed in late September, and I'll be in touch when organised. If you are interested in attending, please let me know. If you are proposing to attend any onsite aspects of the project, please review the COVID

questionnaire, and if you answer ‘yes’ to any of the questions, please give me a call before attending. If you do have any concerns about meeting in person, we are undertaking online/phone meetings with a number of stakeholders, and can accommodate you using these methods if you wish.

Happy to discuss

Thanks
Al

Dr Alan Williams FSA MAACAI
Associate Director
National Technical Leader, Aboriginal Heritage

Bushfire, Ecology, Heritage and Spatial Solutions

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Georgia Burnett

From: Alan Williams
Sent: Tuesday, 8 September 2020 9:09 PM
To: Aaron Slater
Cc: Georgia Burnett
Subject: Proposed Dungowan Dam - Aboriginal heritage cultural heritage assessment
Attachments: EMM Conditions of Engagement of Subconsultants 04042019_RAPs.pdf; COVID-19 FIELDWORK SCREENING QUESTIONNAIRE.pdf; 20200826_CSSI Dams_Aboriginal Community Engagement Strategy_v7.pdf; 20200717_Dungowan Aboriginal heritage methods_v4.pdf; J200042_Method_general.pdf

Hi Aaron

Thank you for registering your interest. As you are aware, EMM is undertaking the environmental impact assessment of the proposed dam, a component of which is the need to identify and understand the Aboriginal heritage values (tangible and intangible) of the site. Consultation with the Aboriginal community has been initiated as part of these investigations, beginning in early-April 2020 and continuing up to present.

I attach several documents for your review and information. One is the consultation strategy that outlines how we envisage consultation will be undertaken throughout the project - the key components being regular monthly meetings to discuss the project as it progresses, as well as regular project updated and involvement in field survey and archaeological investigations. The approximate timing of all these is presented in one of the appendices. This is a 'live' document intended to be regularly updated and modified to ensure it continues to allow effective communication, as well as identify any issues identified during our discussions and how they have been addressed where possible. It has just been updated, and is out for review to the stakeholders now until mid September. If you have any suggestions/concerns/inputs, please let me know. Importantly, the strategy includes meeting minutes in the appendices of all previous discussions on the project.

The second document is the proposed Aboriginal heritage assessment methodology. This outlines how we propose to undertake the on-site investigations of the proposed dam location, including survey and test excavations. These largely follow the Heritage NSW guidelines that dictate how such investigations are undertaken. Initially proposed to include mechanical excavation, Heritage NSW has now required us to adopt manual methods (and the relevant document for this change is also attached). It also asks a number of questions of the Aboriginal stakeholders in terms of how they wish to be consulted, identification of any areas of value at the site, and how they would like any information provided to be managed. Much of the fieldwork for the project is unfortunately complete, so these are primarily for your information on what has happened, but a range of meetings and ongoing discussion is proposed for the next several months.

The third document is the subcontractor agreement that forms a commercial arrangement between your organisation and EMM for the purposes of payment in subsequent stages of work, etc. (We'll provide a work scope that links to this as each task comes up). Can you please review (or have your legal representative review), and if happy please sign and return. If you have issues, please let me know and we can look to modify this if required. At this stage, we will be offering up to $110 (ex GST) per hour for a representative to attend meetings and/or participate on fieldwork. Travel is not being paid, but can be discussed on a case-by-case basis.

Our next meeting is proposed in late September, and I'll be in touch when organised. If you are interested in attending, please let me know. If you are proposing to attend any onsite aspects of the project, please review the COVID questionnaire, and if you answer 'yes' to any of the questions, please give me a call before attending. If you do have any concerns about meeting in person, we are undertaking online/phone meetings with a number of stakeholders, and can accommodate you using these methods if you wish.

Happy to discuss

Thanks
Al

Dr Alan Williams FSA MAACAI
Associate Director
National Technical Leader, Aboriginal Heritage

Bushfire, Ecology, Heritage and Spatial Solutions

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Georgia Burnett

From: Alan Williams
Sent: Tuesday, 8 September 2020 10:24 AM
To: wyrodger[redacted]
Cc: Georgia Burnett
Subject: Proposed Dungowan Dam - Aboriginal heritage cultural heritage assessment
Attachments: EMM Conditions of Engagement of Subconsultants 04042019_RAPs.pdf; COVID-19 FIELDWORK SCREENING QUESTIONNAIRE.pdf; 20200826_CSSI Dams_Aboriginal Community Engagement Strategy_v7.pdf; 20200717_Dungowan Aboriginal heritage methods_v4.pdf; J200042_Method_general.pdf

Hi Yvonne,

Thank you for your call yesterday. As you are aware, EMM is undertaking the environmental impact assessment of the proposed dam, a component of which is the need to identify and understand the Aboriginal heritage values (tangible and intangible) of the site. Consultation with the Aboriginal community has been initiated as part of these investigations, beginning in early-April 2020 and continuing up to present. I apologise that you were not contacted sooner, but I can find no record of a previous communication either to you or from you prior to yesterday. Regardless, I have now registered you for the project.

I attach several documents for your review and information. One is the consultation strategy that outlines how we envisage consultation will be undertaken throughout the project - the key components being regular monthly meetings to discuss the project as it progresses, as well as regular project updated and involvement in field survey and archaeological investigations. The approximate timing of all these is presented in one of the appendices. This is a 'live' document intended to be regularly updated and modified to ensure it continues to allow effective communication, as well as identify any issues identified during our discussions and how they have been addressed where possible. It has just been updated, and is out for review to the stakeholders now until mid September. If you have any suggestions/concerns/inputs, please let me know. Importantly, the strategy includes meeting minutes in the appendices of all previous discussions on the project.

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Happy to discuss

Thanks
Al

Dr Alan Williams FSA MAACAI
Associate Director
National Technical Leader, Aboriginal Heritage

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Georgia Burnett

From: Alan Williams
Sent: Monday, 11 January 2021 11:32 AM
To: wonn1sites[redacted]; arthur.c.fletcher[redacted]
Cc: Georgia Burnett
Subject: Proposed Dungowan Dam - Aboriginal heritage cultural heritage assessment
Attachments: EMM Conditions of Engagement of Subconsultants 04042019_RAPs.pdf; COVID-19 FIELDWORK SCREENING QUESTIONNAIRE.pdf; 20200826_CSSI Dams_Aboriginal Community Engagement Strategy_v7.pdf; 20200717_Dungowan Aboriginal heritage methods_v4.pdf; J200042_Method_general.pdf; Confidentiality Deed.docx

Hi Arthur,

Thank you for you getting in touch. As discussed, EMM is undertaking the environmental impact assessment of the proposed dam, a component of which is the need to identify and understand the Aboriginal heritage values (tangible and intangible) of the site. Consultation with the Aboriginal community has been initiated as part of these investigations, beginning in early-April 2020 and continuing up to present. As requested, I have now registered you for the project.

I attach several documents for your review and information. One is the consultation strategy that outlines how we envisage consultation will be undertaken throughout the project - the key components being regular monthly meetings to discuss the project as it progresses, as well as regular project updated and involvement in field survey and archaeological investigations. The approximate timing of all these is presented in one of the appendices. This is a 'live' document intended to be regularly updated and modified to ensure it continues to allow effective communication, as well as identify any issues identified during our discussions and how they have been addressed where possible. It has just been updated, and a slightly modified version will be distributed shortly for review. If you have any suggestions/concerns/inputs, please let me know. Importantly, the strategy includes meeting minutes in the appendices of all previous discussions on the project.

The second document is the proposed Aboriginal heritage assessment methodology. This outlines how we propose to undertake the on-site investigations of the proposed dam location, including survey and test excavations. These largely follow the Heritage NSW guidelines that dictate how such investigations are undertaken. Initially proposed to include mechanical excavation, Heritage NSW required us to adopt manual methods (and the relevant document for this change is also attached). It also asks a number of questions of the Aboriginal stakeholders in terms of how they wish to be consulted, identification of any areas of value at the site, and how they would like any information provided to be managed. Much of the fieldwork for the project is unfortunately complete, so these are primarily for your information on what has happened, but a range of meetings and ongoing discussion is proposed for the next 12 months.

The remaining documents are the subcontractor agreement and confidentiality agreement that forms a commercial arrangement between your organisation and EMM for the purposes of payment in subsequent stages of work, etc. (We'll provide a work scope that links to this as each task comes up). Can you please review (or have your legal representative review), and if happy please sign and return. If you have issues, please let me know and we can look to modify this if required. At this stage, we will be offering up to $110 (ex GST) per hour for a representative to attend meetings and/or participate on fieldwork. Travel is not being paid, but can be discussed on a case-by-case basis.

Our next meeting is proposed in late February, and I'll be in touch when organised. If you are interested in attending, please let me know. If you are proposing to attend any onsite aspects of the project, please review the COVID questionnaire, and if you answer 'yes' to any of the questions, please give me a call before attending. If you do have any

concerns about meeting in person, we are undertaking online/phone meetings with a number of stakeholders, and can accommodate you using these methods if you wish.

Happy to discuss

Thanks
Al

Dr Alan Williams FSA MAACAI
Associate Director
National Technical Leader, Aboriginal Heritage

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B.4 Stage 4 – issue of draft ACHA and responses

If provided, this section contains the following documents:

- RAP feedback from draft ACHA report.

Georgia Burnett

From: Alan Williams
Sent: Tuesday, 1 December 2020 11:23 AM
To: Alan Williams
Cc: Mark Trudgett; Georgia Burnett; Meredith Abrams; Christopher Holloway
Subject: Proposed Dungowan Dam - Interim Aboriginal heritage report - For Information
Attachments: J200042_InterimReport_v2.pdf

Hi All,

As promised in my last project update, please find attached an interim report on the findings of our work at the proposed Dungowan Dam site to date. This compiles, and where appropriate combines, the results of the field survey and test excavations to provide an overall model of the cultural materials identified, and where they may be expected to occur. It does not include the cultural mapping results, which I hope to have prior to our next meeting. I understand that with a couple of exceptions many of the sites identified in the cultural mapping are already captured here.

This report is for your information only at this stage, with opportunity at our upcoming meetings to further interrogate the data, and of course review the formal Aboriginal cultural heritage assessment based on this data in due course. However, I think this will be useful in our upcoming discussions on the potential management and mitigation measures for the project.

I reiterate that this report is confidential to the project, so please keep it within your organisation and/or family group, and do not distribute further. Noting also, that it includes archaeologically and culturally sensitive information that we will be redacting in discussion with you, before it goes to any broader audience.

Thanks
Al

Dr Alan Williams FSA MAACAI
Associate Director
National Technical Leader, Aboriginal Heritage

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Our offices will be closed from Thursday 24 December and will reopen on Monday 4 January 2021.

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Georgia Burnett

From: Colin Ahoy <cahoy[redacted]
Sent: Friday, 19 February 2021 5:46 PM
To: Alan Williams
Cc: Georgia Burnett
Subject: Re: Proposed Dungowan Dam - Cultural Mapping Report

CAUTION: This email originated outside of the Organisation.

Hello Alan,

In the cultural mapping report it states that the Koala is the totemic species for the Anaiwan people and this is in correct. I would just like it to be known that the Echidna is the totemic animal for the Anaiwan people.

And I would also like to state that Nganyaywana is part of 5 language groups that make up the Anaiwan nation which the boundary for the Anaiwan nation starts at the top of the Moonbi ranges.

Kind regards

Get Outlook for iOS

From: Alan Williams <awilliams@emmconsulting.com.au>
Sent: Friday, February 19, 2021 12:49:15 PM
To: Alan Williams <awilliams@emmconsulting.com.au>
Cc: Georgia Burnett <gburnett@emmconsulting.com.au>; Mark Trudgett <mtrudgett@emmconsulting.com.au>
Subject: Proposed Dungowan Dam - Cultural Mapping Report

Dear All,

As indicated in my previous e-mail, please find attached the cultural mapping report for the proposed Dungowan Dam, having now been reviewed and suitably redacted by the participants.

I look forward to catching up with everyone in a couple of weeks to discuss this and other aspects of the project.

Happy to discuss
Thanks
Al

Dr Alan Williams FSA FRSA MAACAI
Associate Director
National Technical Leader, Aboriginal Heritage

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From:	Alan Williams
To:	Alan Williams
Cc:	Georgia Burnett; Alex Frolich; Christopher Holloway; Martin Hicks
Subject:	Proposed Dungowan Dam - ACHA - for review input and comment
Date:	Thursday, 15 July 2021 3:52:09 PM
Attachments:	image001.png image002.png image003.png image004.jpg image005.png

Dear All,

It is with great pleasure that I include a link below to the draft Aboriginal cultural heritage assessment (ACHA) for the proposed Dungowan Dam project. This is the proposed dam location itself, the piece of the pipeline from the dam to Dungowan Station, and the transmission line that runs from Ogunbil to the north. The ACHA has been developed based on our last 12 months of consultation and on-site works with many of you and your organisations, and so hopefully aligns with our discussions and your expectations.

In brief, the site encompasses some 17 identified Aboriginal sites and places (including cultural sites, stone arrangements, culturally modified trees and stone artefacts), as well as a zone adjacent Dungowan Creek and Peel River within which high densities of stone artefact material are expected to occur. A small number of these would be adversely affected by the proposed works, although several are either outside the footprint and/or would only be inundated. While acknowledging access would be lost due to inundation, a number of studies show that the flooding would actually conserve many of these deposits from future harm. The potential impacts are explored in detail, and a range of mitigation measures are proposed to address them, including the suitable excavation and recovery of areas of significant cultural material, interpretation, etc.

The management and recommendations of the report are similar to those that we have discussed at previous AFG meetings, and include the need to develop an Aboriginal cultural heritage management plan to provide future heritage management for the project (including further details of salvage excavation and other on-site activities); the development of an interpretation strategy to further explore options to acknowledge and celebrate the culture of the project area; and under certain conditions, the development of a cultural flow management plan to specifically manage hydrology around sites where this resource is essential to their significance. All of these would include ongoing consultation with you or your organisation.

The ACHA can be found in the below folder for download. The report is presented both in its entirety, and then also split between the main report and appendices. They are both the same document, the latter just keeping the memory size down for ease of download and viewing. I am also happy to send out a hard copy for anyone that wants one, please just let me know and I'll get it printed and posted.

Dungowan

In accordance with Heritage NSW guidelines, we provide 28 days for the comment on the ACHA, and in addition I would like to hold a last Aboriginal Focus Group meeting during this time to meet and discuss the report in detail with you. **As such, can I please ask for comments by the**

20 August 2021. I will try and organise **an AFG meeting for the last week before the comment period expires in mid August**, and will touch base with you on this shortly.

Happy to discuss
Thanks
Al

Dr Alan Williams FSA FRSA MAACAI
Associate Director
National Technical Leader, Aboriginal Heritage

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From:	Alan Williams
To:	Alan Williams
Cc:	Alex Frolich; Georgia Burnett; Christopher Holloway; Meredith Abrams; Martin Hicks
Subject:	Proposed Dungowan Dam - Aboriginal heritage - project update
Date:	Wednesday, 4 August 2021 11:10:18 AM
Attachments:	image001.png image002.png image003.png image004.jpg

Hi All,

Thank you to those that have had an opportunity to review and provide feedback on the Aboriginal cultural heritage assessment (ACHA) and archaeological research design (ARD) for the proposed Dungowan Dam project and associated geotechnical works. I am sending this e-mail for a couple of reasons:

1. As a reminder that we are intending to finalise the ACHA and ARD on the 20 August 2021, so please provide any comments or inputs by that time via phone, e-mail, letter, etc.

2. As previously discussed, I would like to undertake a meeting in the Tamworth area to discuss through the two reports and allow discussion on the findings, proposed course of action, etc. Given the COVID situation, I cannot attend in person, but I am proposing a hybrid meeting in which Meredith Abrams will be attending in person and I'll be on screen. At this stage, I would like to propose this to occur on the morning of **Thursday 12 August 2021**. I am exploring a venue that would have the facilities to undertake this and will provide that shortly. In addition, for those that cannot, or do not want to, attend in person, we would be able to connect you remotely to such a meeting (please let me know if that is your preference). As per previous meetings, we will offer $110 ex GST per hour for your representative to attend whether in person or online.

3. The recent methodology for the additional survey and test excavations of the early work portion of the pipeline is nearing expiry. To date, I have not received any feedback identifying any concerns. We are currently exploring land access requirements, but are aiming to undertake these works in mid-late August. Tentatively, this will consist of a two day field survey between 17-20 August, followed by up to two weeks of excavation between 23 August and 3 September. I'll be in touch with those that we can incorporate into the field program in the coming days.

Please note that EMM has specific COVID plans for all activities that both our personnel and your representatives will need to comply with. However, I highlight that **no on-site works will include EMM personnel from Greater Sydney** for any of the above tasks.

Happy to discuss

Thanks
Al

Dr Alan Williams FSA FRSA MAACAI
Associate Director

National Technical Leader, Aboriginal Heritage

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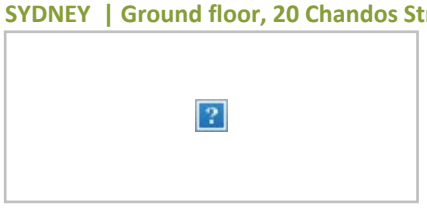

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From:	Alan Williams
To:	Alan Williams
Cc:	Georgia Burnett; Alex Frolich; Christopher Holloway; Meredith Abrams
Subject:	Proposed Dungowan Dam - ACH - COVID update - Aug 21
Date:	Tuesday, 10 August 2021 12:42:08 PM
Attachments:	image001.png image002.png image003.png image004.jpg

Hi All,

As many of you have no doubt seen, Tamworth has recently gone into lockdown, as well as Sydney, Newcastle and the Hunter. This captures a significant portion of EMM's field team and a number of the Aboriginal parties involved in the proposed Dungowan Dam project. As such, please find the following:

1. Unfortunately we are not going to be able to undertake the AFG meeting next week in person. Rather, I will shortly send an invite around for people to attend virtually via a computer/phone/iPAD, etc. We will still pay for your online attendance as we would if you attended in person. We will look to undertake an in-person catch up for those interested as soon as we are able, but it's unlikely to be before we will be finalising the ACHA and ARD documents in late August 2021. For anyone struggling with the online option, I'll follow up with a standard phone call to chat the day after (Friday next week) about the project.

2. We are still aiming for the fieldwork in late August. We are exploring having people attending from lockdown areas and protocols for making the works COVID-safe. At this stage, for those I have contacted, please continue to plan towards proposed dates and activities, however, I will keep you in the loop as things progress.

Happy to discuss
Thanks
Al

Dr Alan Williams FSA FRSA MAACAI
Associate Director
National Technical Leader, Aboriginal Heritage

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From: Steven Talbott
To: Alan Williams
Subject: Aboriginal cultural heritage assessment n methodology reports
Date: Tuesday, 17 August 2021 5:25:24 PM

CAUTION: This email originated outside of the Organisation.

Hi Al
I've read both above said reports (ACHA n methodology there needs to be more discussion in regards to where artefacts final resting place will be eg keeping place Tamworth LALC buried or scattered bac on country also analysts to be carried out with community being involved these need to be added in reports along with further ongoing to talks re artefacts methodology report I agree n support as well ACHA
Any Questions please call me on below number

Thanks

From:	Fiona
To:	Alan Williams
Cc:	Michelle
Subject:	RE: Proposed Dungowan Dam - AHIP + research design - for review and comment
Date:	Friday, 23 July 2021 12:37:34 PM
Attachments:	image005.png image006.png image007.png image008.png image009.png image010.jpg

CAUTION: This email originated outside of the Organisation.

Good afternoon Alan

Please see comment below from Tamworth LALC Sites Officers – (Thanks Michelle)

Regards
Fiona

From: Michelle <michelle[redacted]
Sent: Friday, 23 July 2021
To: Fiona <fiona@tamworthlalc.com.au>
Subject: RE: Proposed Dungowan Dam - AHIP + research design - for review and comment

Hey Fiona,

I have had a discussion with dad in regard to the email attached below.
Our comments are as follows.
Please feel free to forwards to Alan or I can sent it to Alan and cc you in.

Dungowan Dam and Pipeline Project:

Everything seems to be in order except for the following.

- Work undertaken by Geotechnical should be all right to go ahead as long as the work comes to a stop if any cultural materials are identified.
- The Geotechnical test pits at costean #8 and costean #2/3b where denser cultural material is expected to occur, we request that a sites officer/ RAP be present to search soil to identify any cultural material.
- We agree with the Overall Aims of the ARD listed under section 4.1, Rationale, Objective and Aims
- We agree with the Excavation methods in Phases 1 and 2.
- We would like to have a more in-depth discussion in regard to the storage of the Cultural materials now and in the future.

Sites Officer, Christopher (Donny) Fermor wishes to be in attendance at the next meeting in order to discuss this further.

Kind Regards
Michelle Fermor- Futures Mentor
Opportunity Hub - Tamworth Local Aboriginal Land Council
123 Marius Street, Tamworth, NSW 2340 (PO Box 57)
Phone: (
E-mail: [redacted] **Web:** www.tamworthlalc.com.au

I would like to acknowledge the traditional custodians of the Gamilaroi/Gomeroi/Kamilaroi nation and it's people. I recognise their continuing connection to the land I work on and I pay my respects to Elders past and present, and also acknowledge the youth of whom will be our future leaders.

From: Fiona <fiona@tamworthlalc.com.au>
Sent: Monday, 19 July 2021 4:01 PM
To: Mich[redacted] design - for review and comment

Hi Michelle

As discussed can you review with dad and provide comment to Alan

Thanks
Fiona

From: Alan Williams <awilliams@emmconsulting.com.au>
Sent: Thursday, 15 July 2021 4:05 PM
To: Alan Williams <awilliams@emmconsulting.com.au>
Cc: Georgia Burnett <gburnett@emmconsulting.com.au>; Alex Frolich <afrolich@emmconsulting.com.au>; Christopher Holloway <cholloway@emmconsulting.com.au>; Martin Hicks <Martin.Hicks@waternsw.com.au>
Subject: Proposed Dungowan Dam - AHIP + research design - for review and comment

Dear All,

Following on from the distribution of the draft ACHA, and as outlined in my previous e-mails, the project is proposing to undertake detailed geotechnical investigations of the proposed dam site to inform the engineering designs. Several of these activities are proposed to occur in areas that we have identified as archaeological sensitive. Since these proposed works are being undertaken before the approval of the project, they are subject to the *National Parks and Wildlife Act 1974*. Therefore, due to the risk of harming cultural heritage by the works, an Aboriginal heritage

impact permit (AHIP) for harm is being sought from Heritage NSW for these activities. The AHIP harm areas are proposed to only be the geotechnical works and ancillary activities (eg tracks), and not for any other aspects of the dam project.

To support the AHIP application, we have developed an Archaeological research design (ARD) to first investigate and then salvage excavate (conservation ex situ) any cultural materials within the proposed geotechnical activities. These include an initial program of test pits within the footprint of each drill pad and bore-hole location (numbering about 50 locations). This is followed by salvage excavation of up to six 25m^2 open area excavations in areas of significant cultural material. The location, methods and further information of these works are outlined in the attached ARD. I am also happy to send out a hard copy for anyone that wants one, please just let me know and I'll get it printed and posted.

In accordance with Heritage NSW guidelines, we provide 28 days for the comment on the ARD, and in addition I would like to hold a last Aboriginal Focus Group meeting during this time to meet and discuss the approach in detail with you. **As such, can I please ask for comments by the 20 August 2021**. I will try and organise **an AFG meeting for the last week before the comment period expires in mid August**, and will touch base with you on this shortly.

Happy to discuss
Thanks
Al

Dr Alan Williams FSA FRSA MAACAI
Associate Director
National Technical Leader, Aboriginal Heritage

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From:	Alan Williams
To:	Aaron Talbott
Cc:	Georgia Burnett; Alex Frolich; Christopher Holloway; Meredith Abrams
Subject:	RE: Proposed Dungowan Dam - AFG Meeting (August 2021) - Meeting Minutes
Date:	Wednesday, 25 August 2021 7:45:51 AM
Attachments:	image001.png image002.png image003.png image004.jpg

Thanks Aaron,

No worries, I think the majority of your comments are already captured in the report/s. Specifically, Terrible Billy, etc, is out of the footprint, the culturally modified trees are proposed for further investigation, and the artefacts are now all proposed to be returned to Country (DDCS 5, the old school site is the nominated location). Further investigations and archaeological mitigation through the proposed Aboriginal cultural heritage management plan would also be looking to address heritage impacts from the proposed dam.

I'd be interested in any information you have on a 'massacre', since I don't think this has come up in any of our previous consultation.

Thanks
Al

Dr Alan Williams FSA FRSA MAACAI
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I work flexibly. I'm sending you this message now because it's a good time for me, but do not expect you to read, respond or action it outside your regular hours

From: Aaron Talbott [redacted]
Sent: Wednesday, 25
To: Alan Williams <awilliams@emmconsulting.com.au>
Cc: Georgia Burnett <gburnett@emmconsulting.com.au>; Alex Frolich <afrolich@emmconsulting.com.au>; Christopher Holloway <cholloway@emmconsulting.com.au>; Meredith Abrams <Meredith.Abrams@waternsw.com.au>
Subject: Re: Proposed Dungowan Dam - AFG Meeting (August 2021) - Meeting Minutes

CAUTION: This email originated outside of the Organisation.

Yaama Alan

My apologies for missing meeting. I totally forgot about the meeting. The only issue I

would raise is Terrible Billy Area and rock formations. The scar within the she oak (river) as well. I would like further investigations in regards to the recorded Massacre in the area. All artefacts to be returned to country prefably in the areas found. If the dam goes ahead at least the artefacts will not be impacted by human activity. Put it to council that some land be donated to the aboriginal community to acknowledge the cultural material recorded and cultural values of the area. I have not read the Ecologists report yet but interest to know of any rare fauna or flora of the area..

Look forward to next meeting and cultural assessment.

Yalu

Aaron Talbott
AT Gomilaroi Cultural Consultancy
ABN: 92 005 620 045

13 Hunter Street
Gunnedah NSW 2380
M [redacted]

AT Gomilaroi Cultural Consultancy acknowledges the Traditional Custodians on which Land we converse. Respect to the Generations of the Past, the Present and Future.

●●●●●●●●●●●●●●●●●●

From: Alan Williams <awilliams@emmconsulting.com.au>
Sent: Tuesday, August 24, 2021 8:27:43 AM
To: Alan Williams <awilliams@emmconsulting.com.au>
Cc: Georgia Burnett <gburnett@emmconsulting.com.au>; Alex Frolich <afrolich@emmconsulting.com.au>; Christopher Holloway <cholloway@emmconsulting.com.au>; Meredith Abrams <Meredith.Abrams@waternsw.com.au>
Subject: Proposed Dungowan Dam - AFG Meeting (August 2021) - Meeting Minutes

Hi All,

Please find the final minutes from our meeting last week below.

Thanks
Al

Online meeting (12 August 2021): Alan Williams (EMM), Meredith Abrams (WaterNSW), Derrick Vale (DFTV Enterprises), Marilyn Johnson (Corroboree Aboriginal Corporation), Michelle Fermor (Tamworth LALC), Rick Slater (Hucka Dreaming Heritage Group), Rob Slater (Galamaay Cultural Consultants), Steve Talbott (Gomeroi People), Lily Carroll (Didge Ngunawal Clan)
Apologies (indicated attendance 23 August 2021, but could not ultimately attend): Aaron Talbott (AT Gomilaroi)

Key points and actions:

AW provided information on the following:

- A review of the draft Aboriginal cultural heritage assessment (ACHA) provided a few weeks ago. This was focussed on the overall findings of the report outlining identified sites and places of cultural materials and values, significance of the finds, their potential impacts, and a detailed line by line discussion of the management strategy and recommendations;
- Provision of background of the geotechnical works, the need for an Aboriginal Heritage Impact Permit (AHIP), and a review of the Archaeological Research Design (ARD) proposed for implementation as part of these works.

- Discussions and outcomes included:
    - AW outlined the last few sections of the draft ACHA in detail, including:
        - This included outlining the findings of the cultural mapping, field survey and test excavation, and how they had all been synthesised into a series of maps. AW outlined how these sites has been assigned a formal or tentative classification, with the latter requiring further investigation pre- or post-approval. How the sites had been assigned a significance value, and especially how the cultural criterion had been determined – sought thoughts from the participants on these values.
        - AW outlined some of the potential impacts from the proposed project, and further discussion the direct impacts (eg the dam wall, spillway, etc) versus the indirect impacts (from inundation). This extended to the likely removal of vegetation, especially trees, prior to flooding and the implication this may have on scarred trees. AW however did suggest that inundation would result in limited impacts to buried cultural material based on studies of dams in other parts of the world.
        - AW spoke at length about the subsequent actions that would be recommended. AW outlined that few of the highly significant sites would be affected, and significant data indicates that inundation would result in little impact, albeit a loss of access to future generations. AW outlined how these impacts therefore required further investigation and mitigation to manage their effects. These included further investigation into the validation of culturally modified trees and stone arrangements; and the methods that may be applied to each.. In relation to likely recommendations, AW advised that there would be three project specific requirements proposed: 1) the development of an Aboriginal cultural heritage management plan to provide the post-approval framework for cultural heritage, and which would include the methods of ongoing consultation, mitigation of identified and potential Aboriginal sites and deposits, and protection of those outside the project footprint; 2) the development of an interpretation strategy to acknowledge and celebrate cultural heritage, and with a focus on the old school site downstream of the dam that has been regularly mentioned by several stakeholders; and 3) where river systems, especially downstream, would be

affected, the development of a cultural flow management plan that would inform and manage these effects on cultural heritage where water is intrinsic to their value (a contemporary fishing campsite was used as an example). Extensive details on the likely aims and content of each of these documents was outlined in the meeting.

- AW outlined the draft ARD, including:
    - Background on the proposed geotechnical works including the reason for them to further inform the dam design; and the assessment and approval pathway. This identified that the proposed works would not be considered under the CSSI assessment process, but rather through a process in which Water NSW would assess the work, and therefore require an Aboriginal heritage impact permit (AHIP) from Heritage NSW to allow them to proceed. To apply for an AHIP, the ACHA along with a separate ARD was required to both inform the extent of cultural materials across the site, and how the project would mitigate them in advance of the proposed activity.
    - A detailed review of the extent and nature of the geotechnical works, including bore-holes, mechanical test pits, access tracks, and water crossings. The majority of these would require some ground preparation that may affect the upper 60cm of the soil profile within which all cultural materials recovered was found. None of the identified sites or heritage foci areas (dense stone artefacts) would be affected, and the majority of the works are outside the 70m buffer of the creek identified within which higher value cultural materials has been found.
    - Undertook a line by line review of the proposed two stage archaeological excavation program to be implemented prior to the geotechnical works. This included the discrete test pitting of the various work areas, followed by more substantial salvage excavations where certain thresholds are met. Thresholds include dense and/or deep cultural material, rare artefacts or features, and locations were key research questions around past occupation and use can be further explored. While the amount of archaeological excavation is uncertain, it would consist of ~150 sq.m in the investigative phase, with a further 150sq.m in the salvage phase. Archaeological methods were also discussed and consist of similar approaches to the completed ACHA investigations, including manual excavation in controlled spits, with all sediment wet-sieved. Discussion included the staged approach of the works, and that the geotechnical investigations may be occurring concurrently and/or immediately following the completion of the archaeological works, with significant portions of the areas being approved for activity following the investigative phase of excavations.
    - Discussions were also undertaken of the proposed post-excavation analysis and reporting of any assemblage, and the proposed re-burial location of the cultural assemblage. This included the types of stone artefact, chronological and environmental analysis, and the presentation of the current location of the re-burial at DD CS 5 – a previously identified social history site adjacent the dam site.
- Feedback occurred throughout the meeting. This was generally supportive of the

both the ACHA and the ARD, with a number of points of minor correction and/or clarification. These included:

- A concern that the salvage excavations works (Phase 2 in the ARD) had a finite spatial area, and that what would happen if significant cultural assemblage was present once these numbers had reached. AW indicated that there was some fluidity in how the salvage excavation areas were to be determined and could be undertaken as six smaller open areas, or lesser larger areas. This would ideally allow for flexibility to undertake extra excavations in areas of high value, while still providing some certainty around the overall amount of archaeological work required.
- A request that areas outside of 70m from the creek edge are subject to cultural monitoring, rather than no observations as is currently proposed. AW indicated he would consider with Water NSW some provisions around this, but did not expect that monitoring of all proposed works was feasible given the areas proposed.
- A preference that the stone artefact analysis be undertaken with participation and observation of the Aboriginal community. This was an aim of the ACHA process, but was hindered by various COVID issues, AW to ensure this is written into the ARD to ensure Aboriginal community have an opportunity to learn from the stone lithics analyst during the post excavation analysis.
- Strong views on the long term curation of the cultural assemblage. Happy with the proposed location of DD CS 5, but concerns around a proposed 're-burial'. A preference was for the assemblage to be kept on the surface and/or other accessible manner to allow future education opportunities. Further, if this location proves unfeasible at any time, the second option must remain on Country, with a preference for an existing keeping place at Tamworth. AW to update the ARD to reflect these changed methods/locations.

- AW outlined some potential timeframes for the finalisation of the ACHA, submission of the AHIP and potential associated work.

Please let me know if I have omitted or forgotten anything, happy to correct were inaccurate.

Happy to discuss.

Thanks
A

Dr Alan Williams FSA MAACAI
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Mark Trudgett

From: Georgia Burnett
Sent: Thursday, 23 June 2022 3:08 PM
Cc: Alan Williams; Mark Trudgett; Christopher Holloway
Subject: Dungowan Dam - Draft ACHA for review and input
Attachments: J200042_DUN-EMM-EN-RPT-0012_ACHA_v7_Redacted_Report only_opt.pdf

Hi all,

Thank you all for your ongoing involvement in Aboriginal cultural heritage assessment for the proposed new Dungowan Dam, located near Tamworth NSW. As you will recall, a draft ACHA was present for your review in July 2021. Following some minor changes to the report, I am writing to provide you with a copy of the revised ACHA, currently in draft, for your review. Following finalisation this round, it will complied into the EIS for submission in the second half of 2022.

The report is available for download here: Dungowan
Due to the large size of the report, it has been broken up into:

- The full ACHA – includes report and appendices
- Report only (also attached to this email)
- Appendices only

I am also happy to send out a hard copy for anyone that wants one, please just let me know – and provide a current postal address – and I'll get it printed and posted.

With consideration to the archaeological assessment of the site, the report is largely identical to the version provided mid last year; majority of changes in the report reflect tinkering with the project design and alignment, which have flow on effects to the impact assessment (see Section 10). Notably, this version does include information regarding the changes to streamflow as a result of the proposed dam (also addressed in Section 10). Also, the project is no longer considered Critical State Significant Infrastructure, and is now following the State Significant Infrastructure approval processes; however this does not affect our assessment process or the SEARs we have been working to, rather it more effects the post-submission to Department of Planning and Environment (DPE) process. Please note, this report does not include information relating to the early works pipeline (finalised separately earlier this year), nor the geotechnical investigations that have been ongoing over the past few months (will be provided as a separate report when complete).

In accordance with Heritage NSW guidelines, we provide 28 days for the comment on the ACHA and request that comments are provided by **COB 21 July 2022**.

Please let me know you have any issues, happy to discuss.

Kind regards,
Georgia

Georgia Burnett
Archaeologist
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B.5 Additional consultation

This section contains the following documents:

- updates to RAPs regarding the project specific consultation strategy;
- monthly AFG meeting invitations and minutes;
- monthly project update emails.

Georgia Burnett

From: Alan Williams
Sent: Friday, 15 May 2020 10:24 AM
To: Alan Williams
Cc: Georgia Burnett
Subject: Dungowan Dam - Consultation Strategy and Request for Meeting
Attachments: 20200514_CSSI Dams_Aboriginal Community Engagement Strategy_May2020.pdf

Dear All,

Thank you for registering an interest in the Aboriginal cultural heritage assessment for the proposed Dungowan Dam development. I apologise that I haven't managed to catch up with you all yet, but I very much hope that will change in the coming days and weeks.

The reason for this e-mail is twofold. Firstly, I wanted to provide you with a copy of the Aboriginal consultation strategy proposed for the project. As you will be aware from recent correspondence, we are conforming with DPIE's Aboriginal consultation guidelines, most evident in our recent provision of the archaeological methodology. However, in addition to this process, the strategy includes a range of other interactions we are planning to undertake. Of note is the intention to hold monthly meetings with you all to discuss the project as it progresses, as well as regular information packages, etc, and of course participation in the survey and test excavations. This is a live document, and you will see gaps and incomplete sections, since we are seeking both feedback on the document, and will be updating it as the project progresses. Please feel free to review the document and provide any thoughts, input, suggested changes if you wish. I'll also be seeking input at our first meeting (see below).

Secondly, as you will also see from the appendices of the strategy, we have nominally identified when activities are happening, including the broad timing of the monthly meetings. With this in mind – and since some of the on-ground activities are proposed for June – I wanted to try and organise a meeting with you all before the end of May to discuss the strategy, the works and the project in general. I therefore wondered if you could provide me with your availability over the next couple of weeks to organise this.

I'd just highlight when I reference 'meeting', we are very aware of the COVID-19 pandemic, and your thoughts on how you'd like to undertake communication with us would be most welcome – we can try and organise some form of face-to-face gathering locally with appropriate social distancing, one-on-one meetings staggered across a day, organise a digital meeting, or a range of other possibilities. Please let us know your preference and we'll endeavour to organise something that works for everybody. (We also talk about this more in the appendices in the strategy).

Our intention is also, of course, to pay for your time at meetings (whether in person or online) and on-site with us, and I'll be shortly sending around a subcontractor agreement for everyone to review and sign to enable this.

Finally, can you please ensure we have all your contact details, since I notice a few gaps in the strategy, and be great to ensure we have everything we need going forward.

Thanks
Al

PS We are also happy to provide hard copy documents of anything we send, just let myself of Georgia know.

Dr Alan Williams FSA MAACAI
Associate Director

National Technical Leader, Aboriginal Heritage

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Georgia Burnett

From: Alan Williams
Sent: Wednesday, 20 May 2020 9:14 PM
To: Alan Williams
Cc: Georgia Burnett
Subject: Proposed Dungowan Dam - meeting update and geotechnical works

Dear All,

Thank you for the many responses in relation to the consultation strategy and request for a meeting last week. I have a mixture of responses, and am just working through some potential group meetings locally, as well as online/digital meetings for those that cannot or do not want to attend. I'll come back to you likely tomorrow with some more details on all this if I can get it organised.

I'll outline the program and various activities in far more detail when I catch up with each of you, many of which are likely to get underway in late June and early July. However, I wanted to advise that geotechnical investigations of the project are proposed to get underway on the 1 June for a period of between 1 and 2 weeks. These works are permissible as part of the assessment process. However, to ensure no inadvertent impacts to Aboriginal heritage from these investigations, we propose to have an archaeologist and an Aboriginal stakeholder representative on-site to oversee and monitor the mechanical test pitting associated with these works. As such, I am seeking your organisation's interest in participating in this activity?

I emphasise that we currently have 9 registered Aboriginal parties, so it is unlikely that everyone can assist in the archaeological monitoring. However, there is several opportunities for fieldwork for those who wish to be involved in the coming weeks. So my apologies if I cannot accommodate everyone's interest for these works, but I'll endeavour to ensure equitable involvement as the project progresses.

Thanks
Al

Dr Alan Williams FSA MAACAI
Associate Director
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Georgia Burnett

From: Alan Williams
Sent: Friday, 22 May 2020 9:18 PM
To: Alan Williams
Cc: Georgia Burnett; Meredith.Abrams@waternsw.com.au; Ben Phillips
Subject: Proposed Dungowan Dam - Meeting - 28 May 2020

Dear All,

As suggested last week, I'd like to organise a meeting with you all to discuss the proposed Dungowan dam project. Following discussions over the last week and today, I'd like to propose a face-to-face meeting to be undertaken at the Tamworth LALC offices (123 Marius Street, Tamworth NSW 2340) between **1-3pm on Thursday 28 May 2020** by myself, Meredith Abrams (WaterNSW) and a representative of each of the registered Aboriginal parties (seven have confirmed). I am currently working through the COVID requirements of this meeting to be undertaken safely with Fiona at the LALC, and we may end up moving the gathering to a nearby outdoor park in the event we cannot all fit safely into the LALC offices. I'll also explore other venues in Tamworth, and will provide an updated venue if something comes up.

The aim of the meeting will be to provide a briefing on the project and Aboriginal heritage components proposed, information on their general timing and scope, discussion of the consultation strategy, and obviously for you to provide any input/feedback/concerns on any of these things. And I reiterate that this is the first of regular stakeholder meetings proposed to occur throughout the project.

Please note that for those unable to attend, or who do not want to gather given the COVID situation, I completely understand. In this situation, I would be happy to organise an online/digital meeting with you at your convenience. Ideally, I'd like to aim for Monday, Tuesday or Wednesday next week to ensure we touch base before activities on site get underway, but am entirely flexible. Please just get in touch and we'll organise this to ensure you're involvement.

Happy to discuss, and I look forward to seeing you next week (either in person or online!).

Thanks
Al

Dr Alan Williams FSA MAACAI
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Georgia Burnett

From: Alan Williams
Sent: Monday, 1 June 2020 9:08 PM
To: Alan Williams
Cc: Georgia Burnett; Christopher Holloway; Ben Phillips; Mark Trudgett
Subject: Proposed Dungowan Dam - Aboriginal Focus Group Meeting - 28 May 2020

Dear All,

Thank you to those that were able to attend the meeting last week (and/or were available online), please find below some of the key points that were raised and discussed.

Online meetings (25 and 27 May 2020): Colin Ahoy (Nunawanna Aboriginal Corporation), redacted (Corroboree Aboriginal Corporation).
Meeting Attendees (28 May 2020): Alan Williams (EMM), Meredith Abrams (WaterNSW), Aaron Talbott (AT Gomilaroi), Derrick Vale (DFTV Enterprises), Rick Slater (HDH Group), Rob Slater (Galamaay Cultural Consultants), Rosalyn Sampson/Sam Sampson (Wattaka WWCC Services), Donny Fermor (Tamworth LALC).

Key points and actions:

- AW undertook a detailed briefing on the Aboriginal consultation engagement strategy, focussing on:
    - Timing of the project, which aims for initiation of early works by October 2020, and main works by October 2021; and which has the majority of the Aboriginal heritage works to be undertaken by December 2020;
    - Discussing key people in relation to WaterNSW, EMM (including an Indigenous representative proposed to be engaged by EMM via Indigeco), and the registered Aboriginal parties;
    - Outlining the main methods of communication with the Aboriginal stakeholders, which is proposed to consist of a monthly meeting (in person or digital) to discuss activities in the previous four weeks, and what is proposed in the upcoming four weeks, as well as any key findings or areas of concern identified at that time. And in addition, communication every two weeks via e-mail/document, and thereby ensuring a point of contact with the project every two weeks between now and October 2021; and
    - Providing the action plan for these activities, which outlines the general timing of meetings and activities for the project.
- AW undertook a detailed briefing on the proposed assessment and excavation methodology for the project, which included:
    - Outlining the nature of the approval processes, including how CSSI differed from the usual AHIP process;
    - Outlining the general methods and focus of both the survey and excavation methods proposed, including how they differ from DPIE's code of practise; and
    - Exploring the questions at the end of the methodology document, including any knowledge of sites or areas of cultural value known at this time.
- Discussions and outcomes included:
    - Interest in the Indigeco appointment of two Aboriginal personnel for supporting the EMM environmental impact statement, including the nature of the roles, timing of appointment, and who was running this. It was recommended that both male and female candidates be considered for the role evenly. [AW has advised Indigeco of the need to consider both gender's for the roles in the event that this was not already part of their process].
    - Some questions were raised about the Peel Valley pipeline and the ongoing works for this. While not part of the project, Meredith is following up, and will report back on this in due course.

- The strong desire for all Aboriginal stakeholders to be provided an opportunity to re-connect with country; and during which areas of cultural value are more likely to become apparent. Generally, a belief that the Dungowan creek would have been used by Aboriginal people for hunting and fishing in the past.
- No issues identified with the proposed methodology, as long as survey allows for comprehensive coverage of the project area. Ideally, any mechanical excavations would also be undertaken away from identified surface finds to minimise impacts.
- General discussion around the number of Aboriginal stakeholders to be involved in each day of the field program, with a desire for all parties to be represented. However, currently, between 3-5 people per day are being considered due to logistics and budgetary constraints.
- A requirement that geotechnical investigations are monitored by an Aboriginal stakeholders (which is proposed). AW to advise on the geotechnical program and this participation once organised.
- AW confirmed that meetings and fieldwork would be paid participation, and AW to distribute subcontractor agreements followed by scope of works once fees for these stages of work are confirmed by WaterNSW.

I would like to tentatively book our next monthly gathering on the **23 June 2020**, and will organise it to be on-site at the proposed dam location (as requested by the Aboriginal stakeholders). Again, I am happy for on-line or digital meetings around this time for people that do now wish/cannot make a meeting at this time.

Please let me know if I have omitted or forgotten anything, happy to correct were inaccurate.

Happy to discuss.

Thanks
Al

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Georgia Burnett

From: Alan Williams
Sent: Friday, 12 June 2020 4:41 PM
To: Alan Williams
Cc: Meredith Abrams; Georgia Burnett; Ben Phillips
Subject: Proposed Dungowan - AFG Meeting - 22 June 2020

Dear All,

Thank you all for your ongoing involvement and discussions over the proposed Dungowan Dam project in recent days and weeks.

As discussed at our last meeting, our intent is to hold monthly catch ups with you as the project progresses. As such, I would like to organise a meeting with you on **Monday 22 June 2020** to discuss the status of the project, our recent activities, and the next steps. As requested, I am exploring the possibility of this meeting being on-site, likely early afternoon, and will come back to you once organised. Can I please ask you to let me know if you are available to attend? Further, if there are any aspects of the project you wish to discuss, please let me know and I'll get them on an agenda.

Given the ongoing COVID-19 issues, I am happy to undertake meetings online/digital/phone that for those that are unable/unwilling to attend the face-to-face meeting. Please just let me know and I'll organise this as we have done previously (probably on 19 June).

As per my previous correspondence, we are happy to pay for your attendance at the meeting (whether in person or online). If you haven't already, please provide the signed subcontractor agreement, so I can facilitate these payments. (If you have any issues with the agreement, please let me know and I am happy to discuss/modify).

Thanks
Al

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Georgia Burnett

From: Alan Williams
Sent: Thursday, 25 June 2020 12:57 PM
To: Alan Williams
Cc: Meredith Abrams; Georgia Burnett; Ben Phillips; Mark Trudgett
Subject: Proposed Dungowan Dam - Aboriginal Focus Group Meeting - 22 June 2020

Dear All,

Thank you to those that were able to attend the meeting earlier this week (and/or were available online), please find below some of the key points that were raised and discussed.

Online meetings (19 June 2020): Colin Ahoy (Nunawanna Aboriginal Corporation), redacted (Corroboree Aboriginal Corporation).
Meeting Attendees (22 June 2020): Alan Williams (EMM), Meredith Abrams (WaterNSW), Derrick Vale (DFTV Enterprises), Rick Slater (HDH Group), Rob Slater (Galamaay Cultural Consultants), Donny Fermor and Fiona Snape (Tamworth LALC).
Apologies (proposed to attend, but cancelled): Aaron Talbott (AT Gomilaroi), Des Hickey (Wattaka WWCC Services)

Key points and actions:

- The site visit was undertake at the proposed Dungowan Dam site to provide 'site familarisation' for the Aboriginal stakeholders. The meeting consisted of several stops along the Dungowan Dam Road to discuss and explore various aspects of the works
- During the site visit, AW provided information on the following:
    - Provided a summary of the geotechnical works that occurred in the previous two weeks, including the identification of a single stone artefact near the proposed dam wall itself. The information also provided information on the depth and nature of the soil landscapes across the site, with two main types evidence: 1) a 40-60cm residual soil composed of a clayey loam topsoil over subsoils/saprolite; and 2) a deeper alluvial sequence nearer the creek, where deposits of up to 2m were observed.
    - Provided a summary of the field survey undertaken as part of the early works pipeline running from Calala to Dungowan station. AW advised that little cultural material was observed, with much of the area being subject to intense farming, flooding and/or being within road verge. However, a handful of locations, mainly near water crossings, were considered to have potential for cultural materials. In terms of management, this was to still to be determined, but may include re-design of pipeline route or the proposed methods of installation and/or the near to seek an Aboriginal heritage impact permit (AHIP) to allow the works. Due to timeframes it was suggested that any mitigation measures (such as monitoring) be undertaken following receipt of the approval.
    - Provided information on the upcoming activities for the project, which includes the field survey investigation of the main dam site in late June and early July. Subsequent e-mails seeking interest in these investigations were provided, and a range of Aboriginal stakeholders have been assigned.
    - Provided a revised test excavation map that included test pits investigating a broader footprint than the original to ensure the established archaeological models were robust.
    - Information on the new Indigeco appointments assisting EMM/SMEC in the project were provided (and I include them again below).

- Discussions and outcomes included:
    - Discussion on the inclusion of the Tamworth Local Aboriginal Land Council during any on-site activities, Donny Fermor considering the Dungowan dam area to be his ancestral home (and showing a number of locations where he undertook activities as a child).

- Discussions around the process of higher resolution of test excavation where areas of cultural material are found. AW advised that there may be some opportunity for this, but more likely more detailed investigations would occur in the post-approval phase, with the current program trying to provide a broad picture of cultural materials across the entire dam site, rather than focussing on discrete areas.

I would like to tentatively book our next monthly gathering on the **22 July 2020**, and will organise it to be somewhere in Tamworth. Again, I am happy for on-line or digital meetings around this time for people that do now wish/cannot make a meeting at this time.

Please let me know if I have omitted or forgotten anything, happy to correct were inaccurate.

Happy to discuss.

Thanks
Al

Indigeco Representatives
Tomeisa Fing (T: [redacted]

Tomeisa is a young lady who grew up in Moree and is very proud of her Kamilaroi heritage and connection to country. She is a young mother of two and has resides in Tamworth. Tomeisa feels that its time for her to get back into the workforce and teach her children early about good work ethics and to create a better future for them. She was interested in the position because its “something different” and because Indigenous people were the original care takers of the land and environment and she wants to learn more.

Brady Porter (T[redacted]

Brady is a young local Kamilaroi man who has lived in Tamworth since he was 6 and went to Westdale Public School and Peel High School.He is a keen and determined lad with a good work history and is excited for an opportunity to work in this space as he has never done anything like this before. Brady is after an opportunity that will lead him into full time and sustainable employment, hence why he applied for this position.

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Georgia Burnett

From: Alan Williams
Sent: Thursday, 16 July 2020 9:26 PM
To: Alan Williams
Cc: Georgia Burnett; Meredith Abrams; Ben Phillips; Mark Trudgett; Taylar Reid; Alex Frolich
Subject: Proposed Dungowan Dam - Aboriginal heritage - project update (mid July 2020)

Dear All,

This is a short e-mail to update you of activities on the proposed Dungowan Dam project since our last Aboriginal focus group (AFG) meeting, and imminent tasks ahead.

Specifically:

- The early works component of the pipeline (the portion nearest Calala) is nearing completion. The field survey was completed prior to the last AFG, and the results are now being compiled. Overall, the investigation found that much of the alignment was heavily disturbed, being in the existing road corridor, or in intensively farmed locations – the latter significantly affecting the upper soil profile where cultural material may be expected. There were three areas were cultural materials were found or likely to be considered, including a low number of surface stone artefacts (mostly isolated finds) found in the vicinity of Sandy Creek, and the potential for sub-surface deposits near the pipe's crossing of Sandy Creek, Reedy Creek and near the Peel River (in the vicinity of Calala). The report is nearing completion and will likely be provided to you for review in the next several weeks. In relation to the potential archaeological deposits (PADs), we are currently in discussions with WaterNSW about their management and I'll report back on this at the AFG if not before.

- The archaeological survey of the main works, including the dam and accessible parts of the pipeline (the non-early works portion) has been completed over the last couple of weeks. The survey covered significant areas, with about 10km of transects walked each day. Overall, the survey found 12 artefact scatters, 11 isolated stone artefacts, and several possible sites that require further analysis and investigation, including 4 stone arrangements, one grinding groove, and one burial (20th Century, but Aboriginal). A number of potential archaeological deposits, all situated on the banks of Dungowan Creek and its confluence with Oakey Creek and Terrible Billy's Creek were also identified – and are not very different to our initial desktop sensitivity mapping provided to you previously. In addition to these tangible values, there is some reference to the upper reaches of Terrible Billy's Creek having cultural values to several of the Aboriginal community representatives, and we will discuss this with them going forward. I'll report more fully on these findings to you at our next AFG. (Note: a number of historical sites or features were also documented).

- Investigation of some additional geotechnical investigation areas for the early works were inspected by the survey field team. These identified only one proposed location near Sandy Creek as having some risk of harming cultural material (within one of the PADs mentioned above), and this was removed from the proposed program. The remaining locations were in heavily disturbed locations, and considered of low risk to harm cultural materials.

- Our next stage of the investigations is the archaeological test excavation of the main dam site. The proposed methodology that included the use of mechanical excavations, has just been reviewed by Heritage NSW; and they require the use of the *Code of Practise for Archaeological Investigation of Aboriginal Objects in NSW* guidelines. As such, we will shortly be sending a revised methodology out for your comment and information. The proposed number of test pits will largely remain the same, but our focus will now shift to smaller test pits dug by hand and focussing solely on the terraces and flats surrounding the major water courses (rather than the

broader landscape approach originally proposed). Given this change, and the potential need for the Heritage NSW to provide further input, and of course to provide you opportunity to review these changes, we envisage that the excavations will kick off in the first week or two of August (and will be in touch on this).

- **I would like to propose the next AFG meeting for 12.30pm at 28 July 2020**. For those willing to undertake face-to-face meetings, I will organise the Best Western Inn on Goonoo Goonoo Road, which has a large meeting room, but will confirm this closer the time. Can those that want to meet in person, please let me know, so we can determine numbers. For those that do not wish/cannot attend the face-to-face meeting, I am as usual happy to undertake digital/online/phone meetings with you on the Monday before (27 July 2020), or other time of your choosing, just let me know and I'll organise.

Thanks
Al

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Georgia Burnett

From: Alan Williams
Sent: Tuesday, 21 July 2020 5:58 PM
To: Alan Williams
Cc: Meredith Abrams; Georgia Burnett
Subject: Aboriginal Focus Group Meeting - Tuesday 28 July 2020 - Details

Hi All,

As per my previous correspondence, can I please ask for a representative of your organisation's attendance at the July Aboriginal focus group meeting. The meeting details are as follows:

- Tuesday 28 July – 12.30 – 2.30pm – Best Western Motor Inn, 212-218 Goonoo Goonoo Rd, Tamworth NSW 2340.

Please can you let me know if you're attending to work out numbers.

Key focus points for discussion, include:

- Findings and recommendations of the early works;
- Findings and discussion of the main works field survey; and
- Revisions to the excavation methodology, and proposed test excavation in early August.

Please let me know if there is anything else you want to discuss, and I'll include it in our agenda.

Again, I reiterate that with COVID-19, I am more than happy to meet/discuss the project with people online/digital, etc where they do not want to/cannot attend this meeting.

Thanks
Al

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Georgia Burnett

From: Alan Williams
Sent: Monday, 3 August 2020 12:21 PM
To: Alan Williams
Cc: Georgia Burnett; Ben Phillips; Alex Frolich; Christopher Holloway; Meredith Abrams; Mark Trudgett
Subject: Proposed Dungowan Dam - AFG Meeting (July) - Meeting Minutes
Attachments: HER005_SurveySites_20200723_01.pdf

Dear All,

Thank you to those that were able to attend the meeting last week (and/or were available online), please find below some of the key points that were raised and discussed. For those I haven't managed to speak with yet, please just let me know suitable times/locations/methods and I'll happily run you through the information below in more detail.

Meeting Attendees (28 July 2020): Alan Williams (EMM), Meredith Abrams (WaterNSW), Donny and Michelle Fermor (Tamworth LALC), Steve Talbott (Gomeroi People), Derrick Vale (DFTV Enterprises), Robert Slater (Galamaay Cultural Consultants), Rick Slater (Huckada Dreamin Heritage Group).
Apologies (indicated attendance online/in person, but could not ultimately attend): Vicky Slater (Wurrumay Pty Ltd).
Online meeting (30 July 2020): Redacted (Corroboree Aboriginal Corporation)
Online meeting (3 August 2020): Aaron Talbott (AT Gomilaroi Cultural Consultancy)

Key points and actions:

- AW provided information on the following:
    - Provided information on the revisions to the main works archaeological test excavation following review of the methodology by Heritage NSW. AW advised that the number of test pits remained the same, but their location now focussed on areas of archaeological interest only (including those identified by the field survey); and the changing excavations methods from mechanical to manual. AW indicated the approach would make investigation of deep deposits problematic, but that expansion of test pits up to 3sq.m would allow an attempt at deeper depths to be explored in some instances.
    - Provided information on the main works field survey recently completed in recent weeks, including a brief outline of the archaeological sites identified (see attached). Key discussions focussed on the sites initially considered more significant, including the high density artefact scatter on Terrible Billy's Creek, and the stone arrangements and early 20th century (Aboriginal) burial near Oaky Creek.
    - Provided information on the recently completed report on the early works pipeline component of the project. Discussions including presentation of the archaeological findings, notably the three potential archaeological deposits (PAD) on Peel River, Reedy Creek and Sandy Creek; and the recommendations proposed for the report, including the need for further archaeological test excavations in accordance with code of practise for the PAD areas and as outlined in previously provided methodologies. AW indicated that the report would be provided shortly for review, and likely require finalisation before the next AFG meeting in August.

- Discussions and outcomes included:
    - All satisfied with the proposed changes to the main works excavation methodology. Some discussion around the need to expand and/or increase the resolution of the test pit grid where significant finds were found. AW indicated this was likely within the limits of the Code of Practise guidelines, but anything further would likely form a requirement of the post-approval phase. This led to a discussion that sought to ensure the inclusion of EMM into the post-approval works to ensure the continuity of archaeological consultant. AW indicated that this could not be guaranteed at this stage of the project,

but detailed assessment recommendations and liaison with Heritage NSW may ensure the intent of the findings and discussions undertaken for the EIS are integrated into the project approval conditions.

- Discussions indicated a preference for any cultural material to be returned to country, but in a process and location that allow future education and visitation by Aboriginal people (school children was especially mentioned). As such, a preference for cultural materials to be left on the surface was indicated. Further, in terms of location, DF suggested that somewhere near the Paradise homestead may be an option. AW/MA to provide further options once the areas outside of inundation footprint and/or other WaterNSW sites that may be considered for this; and that it would form a discussion point for the next several months as the report begins to get finalised.
- Concerns that some geotechnical works appeared to be happening without supervision. AW clarified that only those test pits in archaeological significant areas were proposed for monitoring, and these have all been completed (with the possible exception of some downstream of the dam).
- Discussion that further investigation of plants used by Aboriginal people in the past within the study area, notably water cress and some form of unidentified reed, is desirable. Suggestions that meeting with ecologists and discussing key plant species would be worthwhile, with this perhaps feeding into subsequent assessment recommendations around representative collection prior to works, and/or remediation with these plant species following construction. AW to explore the implementation of some form of cultural mapping, including the ethno-botanical aspects, during the test excavation program.
- Discussions around the findings of the field survey, with an initial thinking of potential mitigation and post-approval requirements. These included further discussions with DF on the stories behind the stone arrangements (in relation to catfish), that the inundation of the burial location was preferred rather than recovery, and the need to ensure that sites outside the impact footprint are suitably protected during construction. The need for cultural awareness of subcontractors was also recommended. The need to investigate areas that were not accessible at the time of the field survey also desirable.
- There was a recommendation that analysis of any cultural material recovered be undertaken with participation of the Aboriginal stakeholders and the Indigeco interns involved in the project; and that plain-English information on the works is provided to allow education of others (notably school children).
- In the case of the early works, there was support for the general findings of the works and the need to undertake further excavations in accordance with the code of practise guidelines. No issues identified with the remaining components of the pipe. Discussions included the 19th Century Aboriginal camp near Calala, which DF indicated were likely either in the vicinity of the Calala Cottage and/or near the Ferrer Memorial Agricultural High School; and the need to ensure any laydown/ancillary activities for the works (and which are not in the investigated corridor) are assessed prior to implementation.
- A couple of people asked about the previous information, including other disciplines such as ecology. The scoping report – effectively early desktop review of the site – can be found at: https://www.planningportal.nsw.gov.au/major-projects/project/30026

At this stage, we are looking toward a start date of the test excavation on the 10 August; and then our next AFG meeting sometime in the last week or so of August.

Please let me know if I have omitted or forgotten anything, happy to correct were inaccurate.

Happy to discuss.

Thanks
A

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Georgia Burnett

From: Alan Williams
Sent: Wednesday, 12 August 2020 11:29 AM
To: Alan Williams
Cc: Georgia Burnett; Mark Trudgett; Alex Frolich; Ben Phillips
Subject: Proposed Dungowan Dam - Project Update (mid August 2020)

Hi All,

This is just a brief project update as we're partway through the month:

- The Aboriginal cultural heritage assessment for the early works pipeline between Calala and Dungowan Station is still out for comment. We'll be finalising this on the 1 September 2020, so please provide comments by then if you wish;

- The archaeological test excavations have just got underway, and reports are that artefacts are already being found in the upper 50cm of the soil profile. Works to date are beginning in the south and progressively working to the north over the next several weeks. As outlined previously, these works will all be in accordance with *Code of Practise for Archaeological Investigation of Aboriginal Objects in NSW* guidelines, And currently consist of manual excavation of test pits mostly along Dungowan Creek.

- Some geotechnical investigations are proposed for a small number of proposed borrow pits (areas that may use material for the interior of the proposed dam) downstream of the main dam site. These are occurring this week, and will be monitored by members of the excavation team. The methods and monitoring approaches are consistent with previous phases of this work over the last couple of months (specifically in areas of archaeological sensitivity, the site would initially be inspected for cultural materials, and then the test pits observed as they are dug with any cultural materials suitably documented/recovered).

- **I would like to propose the next AFG meeting on the morning of 31 August 2020**. I'll advice on time and venue for those willing to attend in due course. Can those that want to meet in person, please let me know, so we can determine numbers. For those that do not wish/cannot attend the face-to-face meeting, I am as usual happy to undertake digital/online/phone meetings with you.

Happy to discuss

Thanks
Al

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Georgia Burnett

From: Alan Williams
Sent: Friday, 21 August 2020 10:34 AM
To: Alan Williams
Cc: Alex Frolich; Christopher Holloway; Georgia Burnett; Meredith Abrams
Subject: Proposed Dungowan Dam - AFG Meeting - 31 August 2020

Hi All,

I would like to organise the next AFG meeting for the proposed Dungowan Dam. Given many of the likely participants to the meeting will be involved in the ongoing test excavations, I'd like to suggest we hold the meeting at the dam site itself. The finalisation of the early works ACHA currently out for comment will also form one of the key discussion points, as well as how the excavations are proceeding.

I propose we meet at **9am on Monday 31 August 2020 at the junction of Dungowan Dam Road and Ogunbil Road**; and we can head to the excavations from there as a group. Given we will be on site, can anyone attending please ensure they have the usual PPE (hi-vis, boots, long pants and shirt, hat). Given the phone signal issues, please contact me before 8am on the Monday if you're having any issues.

As usual, given the COVID19 situation, I am happy to organise online/virtual/phone meetings for those that do not wish/cannot attend the meeting above. Just let me know.

Payment will be in the usual - $110 (ex GST) per hour of the meeting for your representatives attendance (regardless of attendance in person or online, etc).

Thanks
Al

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Georgia Burnett

From: Alan Williams
Sent: Wednesday, 26 August 2020 9:10 PM
To: Alan Williams
Cc: Christopher Holloway; Claire Burnes; Mark Trudgett; Alex Frolich; Georgia Burnett; Meredith Abrams
Subject: CSSI Dams (Dungowan and Mole River) - Consultation Strategy - Update
Attachments: 20200826_CSSI Dams_Aboriginal Community Engagement Strategy_v7.pdf

Dear All,

As you may recall from some of our earliest meetings on the CSSI Dams (Dungowan/Mole River) project, we are liaising with the Aboriginal community in accordance with a consultation strategy. This was provided as part of our introductory information to all Aboriginal stakeholders that have registered an interest in the project.

The consultation strategy is proposed for regular review and update about every 4-5 months to ensure it is fulfilling the project needs and all involved. Since we are nearly five months into the project, please find attached an updated consultation strategy for your review and input. Changes from the previous iteration are minimal, and include an update of the identification of stakeholders (section 2.2), since we were required to undertake notification as per Heritage NSW guidelines; the inclusion of Section 5 on main discussion and issues points to date; and updating the appendices to reflect the timeframes for activities, which have slipped a bit since April.

I'll discuss all the changes and finalisation process at the next AFG meeting. At this stage, depending on these discussions, I'll be looking to finalise this document around 11 September 2020, until its next review towards the end of the year.

Thanks
Al

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Georgia Burnett

From: Alan Williams
Sent: Wednesday, 9 September 2020 2:00 PM
To: Alan Williams
Cc: Georgia Burnett; Alex Frolich; Mark Trudgett; Christopher Holloway; Meredith Abrams
Subject: RE: Proposed Dungowan Dam - AFG Meeting (August) - Meeting Minutes (final)

Hi All,

Final minutes for the August meeting below.

Thank you to those that were able to attend the meeting this week (and/or were available online), please find below some of the key points that were raised and discussed. For those I haven't managed to speak with yet, please just let me know suitable times/locations/methods and I'll happily run you through the information below in more detail.

Meeting Attendees (31 August 2020): Alan Williams (EMM), Donny Fermor (Tamworth LALC), Steve Talbott (Gomeroi People), Derrick Vale (DFTV Enterprises), Rick Slater (Huckada Dreamin Heritage Group).
Apologies (indicated attendance online/in person, but could not ultimately attend): Colin Ahoy (Nunawanna Aboriginal Corporation); Aaron Talbott (AT Gomilaroi Cultural Consultancy) – who provided brief text message verifying previous minutes.
Online meeting (31 August 2020): Meredith Abrams (WaterNSW), Vicky Slater (Wurrumay Pty Ltd).
Online meeting (7 September 2020): Meredith Abrams (WaterNSW), Marilyn Johnson (Corroboree Aboriginal Corporation Pty Ltd).

Key points and actions:

- AW provided information on the following:
    - Provided information on the recently updated consultation strategy, highlighting main areas of change and update. Sought information on the length of comment period preferred.
    - Provided information on the recently completed report on the early works pipeline component of the project. Discussions including presentation of the archaeological findings, notably the three potential archaeological deposits (PAD) on Peel River, Reedy Creek and Sandy Creek; and the recommendations proposed for the report, including the need for further archaeological test excavations in accordance with code of practise for the PAD areas and as outlined in previously provided methodologies. AW indicated that the report would be finalised in the next few days.
    - Reviewed the ongoing test excavations (the meeting held on site, with many of the participants actively involved in the works), including interim findings, how the test pit grid was updated to reflect the findings of the project as it progressed (namely an increased focussed on alluvial terraces).
    - Update on the timing of the post excavation and reporting phases, with an indication that the September and October AFG meetings would focus on findings, recommendations and future actions.
    - Provided an update on the cultural values mapping, which is expected to be supported by WaterNSW in the coming days.
- Discussions and outcomes included. (It should be noted that several points from the previous meeting where re-iterated here):

- Some concerns raised about the amount of test excavation being undertaken and the general spacing between the test pits. AW advised that: 1) the spacing was based on trying to explore as much of the alluvial terraces as possible, but as greater understanding of the cultural deposits as the works progressed allowed these grids to be further refined and focussed; and 2) that there was likely to be further investigation and conservation ex situ (salvage) of some of the areas highlighted following the approval (if issued), a component of which would likely be improved resolution across the locales in the first instance to focus in on this type of work.

- There were numerous discussions around activities occurring on the excavations, including buckets too heavy for sievers, occurrence of asbestos, contamination believed to be present near Terrible Billy's Creek, and an old cyanide can near Donny Fermor's old house, and directions to ensure only men were involved in excavations in the upper parts of Terrible Billy Creek (considered a men's site). All information was passed onto the excavation director for review, action and implementation.

- Discussions indicated a preference for any cultural material to be returned to country, but in a process and location that allow future education and visitation by Aboriginal people (school children was especially mentioned). As such, a preference for cultural materials to be left on the surface was indicated, although further discussions on how to ensure the longevity of the site (given the heavy rain and erosion of the region) was needed. Further, in terms of location, DF suggested that somewhere near the Paradise homestead may be an option, or a significant knapping event on the southern edge of Terrible Billy's Creek.

- Brief discussions around the potential burials near Oakey Creek. However, all very happy for them to remain untouched and inundated by the proposed works.

- Concerns that some geotechnical works appeared to be happening without supervision. AW clarified that only those test pits in archaeological significant areas were proposed for site clearance and/or monitoring, and these have all been completed over the last couple of weeks. DF raised concerns about potential impacts to an identified scarred tree; AW confirmed that no vegetation clearance was proposed as part of the works.

- Concerns around discussions with on-site council personnel of a substantial access road being proposed for the existing dam, and its potential impacts to cultural heritage. AW unaware of any access tracks, and would follow up.

- There was a recommendation that analysis of any cultural material recovered be undertaken with participation of the Aboriginal stakeholders and the Indigeco interns involved in the project; and that plain-English information on the works is provided to allow education of others (notably school children). AW to explore the feasibility of undertaking artefact analysis in Tamworth, potentially at the LALC, to allow people to participate.

- No issues or site specific concerns were raised in relation to the early works ACHA, supportive of recommendations, and no objections to its finalisation in the coming days.

- No issues with identified with the updated consultation strategy (a more general point on other RAP involvement was raised – see below). No one requested additional time beyond the 14 days to review the document.

- ST with the support of several others, indicated the need for all documentation to include a recommendation that EMM continue with the cultural heritage works until their completion in the post approval phase. They identified a common issue with other projects of the disconnection between one

consultant and another as a project progresses often at the expense of cultural heritage and/or Aboriginal stakeholder involvement. AW indicated he would include this recommendation in the consultation strategy (where it was specifically discussed).

- A number of Aboriginal stakeholders raised concerns about other Aboriginal participants who are involved, but either not from country or not actively involved in the consultation process; and indicated a preference to see ensure these participants did not have as much involvement or influence in subsequent activities or when developing mitigations, recommendations and the way forward. AW indicated that consultation with all Aboriginal stakeholders needed to be undertaken in accordance with NSW guidelines, but that a core group of participants had clearly been extensively involved in the project since the beginning, and/or had been identified as knowledge-holders of the site, and their input into the future reporting stages would be strongly favoured in the event of dispute.

Please let me know if I have omitted or forgotten anything, happy to correct were inaccurate.

Happy to discuss.

Thanks
A

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Georgia Burnett

From: Alan Williams
Sent: Monday, 14 September 2020 11:23 AM
To: Alan Williams
Cc: Meredith Abrams; Georgia Burnett; Mark Trudgett; Alex Frolich; Christopher Holloway
Subject: Proposed Dungowan Dam - Project Update (mid September 2020)

Hi All,

This is just a brief project update as we're partway through the month:

- The Aboriginal cultural heritage assessment for the early works pipeline between Calala and Dungowan Station has now been finalised. As discussed, there are additional recommendations for further investigation in three areas around Peel River, Sandy Creek and Reedy Creek, and I'll let you know when a decision is made on these works;

- The archaeological test excavations across the main dam site are nearing completion. The works have achieved the 100 test pits proposed for these works (and more I believe). Overall, the test pits focussed on the flat alluvial terraces on either side of Dungowan Creek, and on average have been about 50cm deep, with occasional excavations deeper than this (to ~1.2m). I don't have exact artefact numbers, but understand most test pits contained some objects, with higher densities near the confluence of Terrible Billy's Creek. At least one test pit near Donny Fermor's old residence, recovered >100. The last information I got a week ago was that about 900 had been recovered overall, but we are likely more than that now. The results of this program will form a focus of the next AFG meeting, as well as discussions on their management.

- During the archaeological excavations, various geotechnical micro-siting and a brief survey of parts of the pipeline between the dam and the Dungowan Station area were undertaken. (Noting a significant portion of this alignment was surveyed as part of the main dams work with Taylar Reid (EMM) in June/July). These identified similar findings to the remained of the survey, namely that the areas close to the river have some potential for buried cultural material. A single site was identified that included a handful of stone artefacts.

- I will be finalising the consultation strategy towards the end of this week if you have any comments, amendments, concerns with it, please let me know by Wednesday. As discussed, we'll revisit this as the project progresses, with a formal update proposed for November 2020.

- **I would like to propose the next AFG meeting on the morning of 30 September 2020**. I'll advice on time and venue for those willing to attend in due course. Can those that want to meet in person, please let me know, so we can determine numbers. For those that do not wish/cannot attend the face-to-face meeting, I am as usual happy to undertake digital/online/phone meetings with you.

Happy to discuss

Thanks
Al

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Georgia Burnett

From: Alan Williams
Sent: Monday, 21 September 2020 9:45 AM
To: Alan Williams
Cc: Georgia Burnett; Meredith Abrams; Alex Frolich; Christopher Holloway
Subject: Proposed Dungowan Dam - AFG Meeting - 30 September 2020
Attachments: COVID-19 FIELDWORK SCREENING QUESTIONNAIRE.pdf

Dear All,

As mentioned last week, I would like to organise the next Aboriginal Focus Group (AFG) meeting for the proposed Dungowan Dam.

With the recent completion of the test excavations, I propose to hold this at our usual motel venue (see below) to allow maps/online documents to be reviewed and discussed. While we are still compiling our data from the test excavations, our next few meetings need to shift focus towards identifying the overall cultural resource of the site, the potential impacts to this, and management and mitigation measures to address such impacts. As always, happy to have further discussions on any other aspects of the project anyone wishes to.

I propose we meet at **10am on Wednesday 30 September 2020 at the Best Western Plus All Settlers Motor Inn (191 Goonoo Goonoo Road, Tamworth)**. For those attending, please review the COVID questionnaire attached, and contact me before attending if you answer yes to any of the questions.

As usual, given the COVID19 situation, I am happy to organise online/virtual/phone meetings for those that do not wish/cannot attend the meeting above. Just let me know.

Payment will be in the usual - $[redacted] (ex GST) per hour of the meeting for your representatives attendance (regardless of attendance in person or online, etc).

Thanks
Al

Dr Alan Williams FSA MAACAI
Associate Director
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Georgia Burnett

From: Alan Williams
Sent: Monday, 12 October 2020 10:02 AM
To: Alan Williams
Cc: Georgia Burnett; Meredith Abrams; Christopher Holloway; Mark Trudgett
Subject: Proposed Dungowan Dam - AFG Meeting (September) - Meeting Minutes (Final)
Attachments: AFG003_TestPitsArchaeologicalSites_20200925_02.pdf; AFG004_PowerEasement_20200925_03.pdf; AFG002_TestPitsArtefacts_20200925_02.pdf

Hi All,

Updated and final minutes below.

Thank you to those that were able to attend the meeting this week (and/or were available online), please find below some of the key points that were raised and discussed. For those I haven't managed to speak with yet, please just let me know suitable times/locations/methods and I'll happily run you through the information below in more detail.

Meeting Attendees (29 September 2020): Alan Williams (EMM), Donny Fermor (Tamworth LALC), Derrick Vale (DFTV Enterprises), Aaron Talbott (AT Gomilaroi Cultural Consultancy)
Online meeting (2 October 2020): Alan Williams (EMM), Meredith Abrams (WaterNSW)
Phone briefing (9 October 2020: Alan Williams (EMM), Steve Talbott (Gomeroi People)
Phone meeting (12 October 2020): Alan Williams (EMM), Rick Slater (Huckada Dreamin Heritage Group), Rob Slater (Galamaay Cultural Consultants)
Apologies (indicated attendance online/in person, but could not ultimately attend): Natasha Rodgers, Aaron Slater (Warragil),

Key points and actions:

- AW provided information on the following:
    - Led discussion on the cultural mapping, and outlined its timing and sought feedback on participants to attend, and a focus of these works.
    - Provided information on a potential powerline installation associated with the project near Ogunbil, and the level and type of assessment that may be required in the coming weeks.
    - Provided information on the results of the archaeological test excavation, identifying key nodes of past occupation; and how they broadly relate to the previous survey works.
    - Provided information on the potential impacts of the dam, both from the construction and the inundation.
    - Led discussion on the potential management and mitigation measures that may be considered in the event that the dam is built. Focussed on key sites and general site types to get a general idea of the views of the Aboriginal stakeholders on specific management measures, as well as general principles.
- Discussions and outcomes included:
    - It was reiterated by some stakeholders of concerns about other Aboriginal participants who are involved, but either not from country or not actively involved in the consultation process; and indicated

a preference to see ensure these participants did not have as much involvement or influence in subsequent activities or when developing mitigations, recommendations and the way forward. AW indicated that consultation with all Aboriginal stakeholders needed to be undertaken in accordance with NSW guidelines, but that a core group of participants had clearly been extensively involved in the project since the beginning, and/or had been identified as knowledge-holders of the site, and their input into the future reporting stages would be strongly favoured in the event of dispute.

- Discussion was undertaken in relation to the cultural mapping. AW outlined the personnel undertaking the cultural mapping (Dr Philip Clarke), the timing, its focus on intangible values of the site and its associated flora and fauna. It was considered that a focus on Terrible Billy Creek and surrounds was critical, as well as other areas; and reference to cultural fishing along the study area was also mentioned. AW sought input on who should participate in the cultural mapping, and two knowledge-holders comprised of Donny Fermor and Aaron Talbott were discussed. AW has recently sought information for others that may require inclusion. Organisation of the work for is underway.
- AW outlined the potential for a new powerline to be installed as part of the works (see attached map). These works consist of a new power easement running from the Ogunbil area to the north before joining an existing powerline. No ground disturbance works are likely on this latter existing component. AW indicated that full details of the alignment were still being developed, but if required it would be assessed in accordance with Heritage NSW guidelines and as per other field surveys undertaken for the project.
- AW outlined the potential impacts of the dam. These would include significant ground disturbance from the dam itself, two proposed quarry sites within the inundation areas, and various ancillary activities associated with these works. The inundation itself is not likely to cause significant direct impacts, with geomorphologists advising that inundation generally results in limited change to the natural soil profile and silting up leads to its burial in situ. However, ground disturbance impacts are likely around the edge of the inundation footprint where the wave action (similar to like at a beach) sees erosion and landscape change. In addition, there is rock armouring proposed around the water's edge to limit this erosion, but the initial establishment of which would require ground disturbance. Some concern raised about a new access track running around the edge of the dam in areas we haven't investigated, AW to explore with project team.
- AW provided a map of the recent test excavations (see attached map) identifying those test pits containing greater than 30 artefacts/m^2 and which AW considered to reflect more intense/longer occupation in the past. AW indicated that the second alluvial terrace over the river appeared to have been a focus for past use, and these areas, as well as those identified sites would form a focus for future management and mitigation if required. AW will be developing a map that combines the field survey and excavation results to present an overall archaeological resource of the study area, and which will be used to form the basis of subsequent detailed recommendations.
- Discussions were undertaken on the potential management and mitigation of the identified sites in the event that the dam is constructed. These included the preferred conservation and/or avoidance (which encompassed submergence) of significant sites, including the potential burial locations (DDB1-B4 inclusive), and the high density artefact scatter (DDOS12) on the top of the hill near Terrible Billy. The men's site at Terrible Billy was also raised, but will be further explored as part of the cultural mapping. There was a desire for the archaeological recovery (surface collection and excavation) of any sites within the direct impact footprint, and a selection of those that may provide more information on the nature of past activity in the region. Test pit 77 where significant numbers of cultural material was specifically mentioned. Overall, there was support for leaving sites untouched were feasible (and allowing them to be inundated), but suitable archaeological recovery were that was unfeasible. Some felt further investigative works would be required once the details of the design were finalised. AW advised that many of the management and mitigation measures would likely only be explored and discussed in the impact assessment report, and having to be further developed in the post-approval phase of the project.

- Ongoing discussion about the final repository of any cultural materials recovered, with a suggestion of the Old School ground north of the dam site may be another possible location. This was a result of the DDOS12 site being potentially inaccessible following construction of the dam.
- Some discussion also included potential memorial or Aboriginal signage around DDOS12 that may be accessed by the Aboriginal community. AW indicated that some form of post-approval interpretation was likely to be included as a recommendation, and these suggestions would form part of those studies and reports. They would however be included in the ACHA as a discussion point.

Please let me know if I have omitted or forgotten anything, happy to correct were inaccurate.

Happy to discuss.

Thanks
A

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Georgia Burnett

From: Alan Williams
Sent: Thursday, 15 October 2020 11:33 AM
To: Alan Williams
Cc: Meredith Abrams; Mark Trudgett; Christopher Holloway; Georgia Burnett
Subject: Proposed Dungowan Dam - Project Update (mid October 2020)
Attachments: ConstructionFootprintQuarryAccess_20201014.jpg

Hi All,

This is just a brief project update as we're partway through the month:

- The cultural mapping investigations of the Dungowan Dam and pipeline with our anthropologist (Dr Phil Clarke) and identified knowledge-holders are nearing completion, and I hope to be reporting on the findings of this (within cultural sensitivities) at the next AFG meeting.

- The ACHA reporting is progressing and beginning to incorporate some of the discussions and requirements identified by the Aboriginal participants in our last couple of AFG meetings. Initially, we are writing a brief interim report – likely a short letter with maps – that will pull all the findings together. This is proposed for October, and I'll hopefully be able to provide this at the next AFG meeting, if not shortly after.

- There is some additional design information that has now been refined, and I wanted to provide (attached – white areas). As discussed previously, the development design of the proposed dam is ongoing and being updated continuously, and hence minor variations from the original footprint are to be expected. Attached is further information on some of the ancillary workings around the dam site themselves, and which now extends downstream more than predicted, and the proposed workings around quarry and borrow pits that may be required for material for the dam construction. In the case of this latter activity, the majority of them are within the areas already proposed for inundation, but one of the proposed access tracks is situated slightly north of the dam footprint (white line at base of figure); and this may be the track that some of the stakeholders questioned at the last stakeholder meeting. All of these new activities, including the power easement discussed at the AFG are likely to be subject to on-site field survey by archaeologists and Aboriginal stakeholders in November.

- **I would like to propose the next AFG meeting on the morning of Monday 26 October 2020**. I'll advice on time and venue for those willing to attend in due course. Can those that want to meet in person, please let me know, so we can determine numbers. For those that do not wish/cannot attend the face-to-face meeting, I am as usual happy to undertake digital/online/phone meetings with you.

Happy to discuss

Thanks
Al

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Georgia Burnett

Subject:	Proposed Dungowan Dam - AFG (October) - Meeting
Location:	Best Western Plus All Settlers Motor Inn (191 Goonoo Goonoo Road, Tamworth)
Start:	Mon 26/10/2020 10:00 AM
End:	Mon 26/10/2020 12:00 PM
Show Time As:	Tentative
Recurrence:	(none)
Meeting Status:	Not yet responded
Organizer:	Alan Williams
Required Attendees:	Meredith Abrams; fiona@ cahoy gomeroito@ deckavale@ corroboreecorp aaron Galamaay richard.slater@ Des Hickey; Vicki.slater aboriginalhistoryhunter@ natasharodgers wyrodger@ Aaron Slater
Optional Attendees:	Georgia Burnett

Hi All,

As mentioned last week, I would like to organise the next Aboriginal Focus Group (AFG) meeting for the proposed Dungowan Dam.

Our discussions will continue to focus on the refinement of the cultural materials identified and recent updated development designs, as well as continuing to shift towards the potential post-approval management measures in the event the project proceeds. As always, happy to have further discussions on any other aspects of the project anyone wishes to.

I propose we meet at **10am-12pm on Monday 26 October 2020 at the Best Western Plus All Settlers Motor Inn (191 Goonoo Goonoo Road, Tamworth)**. For those attending, please review the COVID questionnaire attached, and contact me before attending if you answer yes to any of the questions.

As usual, given the COVID19 situation, I am happy to organise online/virtual/phone meetings for those that do not wish/cannot attend the meeting above. Just let me know.

Payment will be in the usual - $ (ex GST) per hour of the meeting for your representatives attendance (regardless of attendance in person or online, etc).

Thanks
Al

Georgia Burnett

From: Alan Williams
Sent: Monday, 2 November 2020 11:45 AM
To: Alan Williams
Cc: Meredith Abrams; Christopher Holloway; Mark Trudgett; Georgia Burnett
Subject: Proposed Dungowan Dam - AFG Meeting (October) - Meeting Minutes
Attachments: AFG006_PredictiveModelPipeline_20201023_02.pdf; AFG005_PredictiveModel_20201023_03.pdf; AFG003_TestPitsArchaeologicalSites_20201020_03.pdf

Hi All,

Thank you to those that were able to attend the meeting last week (and/or were available online), please find below some of the key points that were raised and discussed. For those I haven't managed to speak with yet, please just let me know suitable times/locations/methods and I'll happily run you through the information below in more detail.

Meeting Attendees (26 October 2020): Alan Williams (EMM), Meredith Abrams (WaterNSW), Donny Fermor (Tamworth LALC), Derrick Vale (DFTV Enterprises), Rick Slater (Huckada Dreamin Heritage Group), Rob Slater (Galamaay Cultural Consultants)
Online meeting (2 November 2020): Alan Williams (EMM), Meredith Abrams (WaterNSW)
Apologies (indicated attendance online/in person, but could not ultimately attend): Aaron Talbott (AT Gomilaroi Cultural Consultancy), Aaron Slater (Warragil), Steve Talbott (Gomeroi People)

Key points and actions:

- AW provided information on the following:
    - Reviewed the previous minutes and run through how they had been addressed.
    - Provided brief summary of the findings of the cultural mapping, and outlined the process or reporting, review by participants and provision to the remaining Aboriginal stakeholders.
    - Provided information on the timing of the potential powerline installation associated with the project near Ogunbil.
    - Provided information on the compilation of the field survey and test excavation results into areas of occupation and activity, as well as a broader predictive model that extends along the pipeline to Dungowan.
    - Provided information on the potential impacts of the dam, both from the construction and the inundation. Now including details on quarrying and coffer dams, etc.
    - Continued discussion on the potential management and mitigation measures that may be considered in the event that the dam is built. Focussed on key sites and general site types to get a general idea of the views of the Aboriginal stakeholders on specific management measures, as well as general principles.
    - Provided a presentation of the webmap, including latest proposed impact footprints, and a 3D presentation.
- Discussions and outcomes included:

- Discussion was undertaken in relation to the findings of the cultural mapping. While AW did not have details, he ran through the activities that were undertaken, with a subsequent focus on Terrible Billy Creek and the associated men's business in the area. Details were not available, but DF indicated that the location had been identified with Phil, and that he would be unwilling to go back into the area without good reason. Also made brief mention of the catfish ancestor story in the area, and around some of the flora. AW indicated the report would likely be available in mid November, and would be vetted by DF and Aaron Talbott (participants) before distributing more broadly.
- DF raised an additional site within the area. Specifically, he made mention of the Old School ground, somewhere immediately downstream of the proposed dam, near which a possible burial ground was nearby based on information he had been advised of. The Old School grounds remains an area of interest for the Aboriginal community, and a likely keeping place/artefact repository for the project. DF also flagged an areas of potential post-contact activity around the Dungowan Station, partway along the pipeline. AW was provided the location, which will be incorporated into the cultural mapping findings of the project.
- AW outlined the new powerline to be installed as part of the works near Ogunbil. AW advised of timing and the complexity of gaining access to the site; and that he would be in touch shortly to undertake a field survey of this area. DF sought information on a nearby mining lease in the area, although AW does not believe it encompasses the alignment.
- AW continued to outline the potential impacts of the dam, including the quarry locations, construction camps, and discussions around the coffer dam. Further consideration of how these impacts would affect the sites identified was undertaken, with many of the significant sites (potential burials) being outside, but close to some of these ground disturbance activities. Discussions undertaken about the nature of buffers and procedures to ensure these sites remain unaffected, including buffers of at least 50m and ideally more, suitable fencing, and potentially vegetation barriers to maintain the natural expression of the locales. AW presented the webmap of these proposed impacts, and the 3D model of the dam. AW to provide an updated figure in next update showing the sites in relation to proposed impacts in more detail.
- A significant part of the meeting was to discuss the compilation and modelling of the data accumulated. In the attached figure, AW explained how the numerous surface sites and the test excavation had been combined to show areas of occupation/activity versus those that contained lesser evidence of cultural materials. In the latter case, AW identified that all cultural materials – focussing on stone artefacts – were all within 60 m of the major creek system; and preferentially on terraces/lower slopes (yellow in attached figure). As such, our management and mitigation approaches will now focus on these main zones, rather than individual objects or sites. This zone of cultural activity was also extrapolated along the pipeline, and similarly identified areas where works would have to happen in any post-approval phase.
- Discussions were undertaken on the potential management and mitigation of the identified sites in the event that the dam is constructed. The focus of these discussions were on the predictive model presented, and that further field survey, test and/or salvage excavations of these areas would need to be implemented in the event the project is approved.

Please let me know if I have omitted or forgotten anything, happy to correct were inaccurate.

Happy to discuss.

Thanks
A

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Georgia Burnett

From: Alan Williams
Sent: Monday, 16 November 2020 1:46 PM
To: Alan Williams
Cc: Christopher Holloway; Georgia Burnett; Mark Trudgett; Meredith Abrams
Subject: Proposed Dungowan Dam - Project Update (mid November 2020)

Hi All,

This is just a brief project update as we're partway through the month:

- The cultural mapping investigations of the Dungowan Dam and pipeline with our anthropologist (Dr Phil Clarke) and identified knowledge-holders has neared completion and I have a first draft of the report. I hope to be reporting on the findings of this (within cultural sensitivities) at the next AFG meeting.

- The ACHA reporting is progressing with the aim of a draft for by the first half of December. This will need to be reviewed by WaterNSW, but will be provided to you shortly after I hope. The general findings of the report do not differ significantly from our previous discussions on the findings and proposed management actions.

- We are still proposing to undertake additional excavations of the three potential archaeological deposits near Calala as part of the 'early works' pipeline component. This is still on track for the first half of December, and running close to the Xmas shutdown. Information on those involved, etc, has already been provided, but please let me know if you require further information on the program. This will again be run by Georgia Burnett, who will touch base with many of you on the specifics in the next couple of weeks (meeting places, etc). I envisage that we'll update the current ACHA document for this component with the results of the program in January 2021.

- The consultation strategy is due for review, and I'll be updating this over the next week or so. I'll provide a revised version for your review shortly after, and include it as a discussion point at the next AFG meeting. Changes are likely to be minor, mainly modifying the timing of activities and events as they get a little closer. If you have any suggestions or inclusions you'd like to see in the strategy, please let me know asap.

- **I would like to propose the next AFG meeting on the lunch/afternoon of Friday 11 December 2020**. (Please note that I am pushing the November AFG meeting into early December to better align with reporting requirements, and to try and deal with the long Xmas shutdown that makes a late December meeting unlikely). I'll advice on time and venue for those willing to attend in due course. Can those that want to meet in person, please let me know, so we can determine numbers. For those that do not wish/cannot attend the face-to-face meeting, I am as usual happy to undertake digital/online/phone meetings with you.

Happy to discuss

Thanks
Al

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Georgia Burnett

From: Alan Williams
Sent: Tuesday, 8 December 2020 10:18 AM
To: Alan Williams
Cc: Georgia Burnett; Christopher Holloway; Mark Trudgett; Meredith Abrams
Subject: Proposed Dungowan Dam - AFG Meeting - 15 December 2020
Attachments: COVID-19 FIELDWORK SCREENING QUESTIONNAIRE.pdf

Dear All,

As mentioned over the last couple of weeks, I would like to organise the next Aboriginal Focus Group (AFG) meeting for the proposed Dungowan Dam. At this meeting, I would like to discuss the overall map of cultural finds and their management in detail, as well as elements of the ACHA report (if available). I am also hopeful to be able to present the findings of the cultural mapping, pending approval from those involved in this aspect of the project. As always, happy to discuss any aspects of the project you wish to raise as well.

The meeting will be held at 9.30-11am on Tuesday 15 December at the Best Western Plus Settlers Inn (191 Goonoo Goonoo Rd, South Tamworth NSW 2340). I am also hoping to get out to site for those currently involved in test excavations (probably around 11.30-12.30), and can outline any discussions undertaken for those that cannot attend. Can you please let me know if you are proposing to attend, so I have an idea of numbers.

For those attending, please review the COVID questionnaire attached, and contact me before attending if you answer yes to any of the questions.

As usual, I am happy to organise online/virtual/phone meetings for those that do not wish/cannot attend the meeting above. Just let me know.

Payment will be in the usual - $[redacted] (ex GST) per hour of the meeting for your representatives attendance (regardless of attendance in person or online, etc). At this stage, we are not offering travel allowance, but this is a current discussion, and I'll advise if it changes between now and the meeting.

Thanks

A

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National Technical Leader, Aboriginal Heritage

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Our offices will be closed from Thursday 24 December and will reopen on Monday 4 January 2021.

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Georgia Burnett

From: Alan Williams
Sent: Wednesday, 16 December 2020 9:10 PM
To: Alan Williams
Cc: Meredith Abrams; Mark Trudgett; Georgia Burnett; Christopher Holloway
Subject: Proposed Dungowan Dam - AFG Meeting (December) - Meeting Minutes
Attachments: GIS01_ConstructionArea_20201120_01.pdf

Hi All,

Thank you to those that were able to attend the meeting earlier this week (and/or were available online), please find below some of the key points that were raised and discussed. For those I haven't managed to speak with yet, please just let me know suitable times/locations/methods and I'll happily run you through the information below in more detail.

Online meeting (14 December 2020): Alan Williams (EMM), Meredith Abrams (WaterNSW), Derrick Vale (DFTV Enterprises), Marilyn Johnson (Corroboree Aboriginal Corporation)
Meeting Attendees (14 December 2020): Alan Williams (EMM), Meredith Abrams (WaterNSW), Donny Fermor (Tamworth LALC), Rick Slater (Huckada Dreamin Heritage Group), Rob Slater (Galamaay Cultural Consultants), Steve Talbott (Gomeroi People)
Apologies (indicated attendance online/in person, but could not ultimately attend):

Key points and actions:

- AW provided information on the following:
    - Reviewed the previous minutes and run through how they had been addressed.
    - Provided an update on timeframes and key points through the project over the next year.
    - Provided brief summary of the findings of the cultural mapping, and outlined some of the preliminary findings of the report and process from here.
    - Provided increasingly detailed maps and figures of the field survey results, test excavations (including further context based on specialist studies beginning to come back), and an overarching predictive model.
    - Undertook detailed discussion on the potential impacts from the works, and developing guiding principles on the management of site types that may be affected by the project for incorporation into the report.

- Discussions and outcomes included (note all the figures presented are in the preliminary report provided to you last week):
    - AW outlined some potential timeframes for the distribution of the ACHA, the re-initiation of the early works and incomplete survey of the powerline, and meetings next year. Many of these will likely be kicked off again in late January/early February, with meetings being reduced over the year, reflecting the general completion of much of the ACHA components of the EIS.
    - AW provided further information on the cultural mapping report that is nearing completion, and which has been provided to key knowledge-holders for review prior to broader release. Further details of this method were outlined, including a review and sign off by the key knowledge-holders and suitable redaction before further distribution to the Aboriginal and broader community. AW indicated that the report would divide identified places and sites into three classifications: 1) cultural sites – those that can

be verified via contextual information and/or have wider community knowledge; 2) social history places – reflecting those sites that have a direct knowledge of the contemporary community, such as former residences, old camping spots, etc; and 3) purported cultural sites – those that the information is limited to a single individual, not always agreed and/or that cannot be validated through other means. AW indicated that all sites would be included in the reporting, but that (1) and (2) would likely have greater significance having both scientific values and broader information that they could be compared against. Extensive discussion with Donny, one of the knowledge-holders on the management, distribution and redaction of the report occurred, with ST also providing some suggestions.

- AW provided a detailed rundown of the archaeological excavations that had now been further refined and compiled. He outlined the key field survey results of the dam and pipeline (totalling 36 sites dominated by stone artefacts), and the excavations of 100 or so test pits, the recovery of >1,000 artefacts primarily at depths of <60cm. He outlined that the archaeological assemblage had several foci of activity (areas where >30 artefacts/sq.m were found) amongst a generally lower density of cultural material; and that areas within 70m of the major creeks had a much higher potential for these to be present. Ultimately, based on the results, AW indicates that six areas are considered to be 'foci' of past activity, containing significant cultural material, as well as a range of other non-stone artefact sites (such as stone arrangements, scarred trees, etc). Further information was outlined, including that the assemblage characteristics suggested visitation over the last few thousand years, with a focus on raw materials from Dungowan Creek; and that the formation of the alluvial terraces had been preliminarily dated to ~9-6ka . This moved into discussions on the overall archaeological predictive model map presented, and how this used the archaeological data to outline areas where high density artefacts would be present versus a background scatter; and especially how this informed the pipeline that was only subject to limited field inspection.
- AW outlined some of the potential impacts (attached) from the proposed project, and further discussion the direct impacts (eg the dam wall, spillway, etc) versus the indirect impacts (from inundation). This extended to the likely removal of vegetation, especially trees, prior to flooding and the implication this may have on scarred trees. AW however did suggest that inundation would result in limited impacts to buried cultural material based on studies of dams in other parts of the world.
- AW led discussion on general principles around some of the potential management and mitigation options for the identified cultural sites and materials using the assumption of complete impact within the footprint. These are to be incorporated into the ACHA report (AW indicated that these would be likely incorporated into the development of a management plan, which is the common overarching recommendation). Overall, the following was generally agreed:
    - Scarred trees – in the first instance, there was a need for further specialist investigation of these sites to validate their cultural origins. Where considered to reflect traditional practice, there was generally a preference for these to be suitable removed and relocated elsewhere on country. This relocation was discussed as part of the broader post-approval interpretation and acknowledgement of country that is outlined below.
    - Grinding grooves - in the first instance, there was a need for further specialist investigation of this site to validate its cultural origins. Where considered to reflect traditional practice, there was generally a preference for these to be suitable removed and relocated elsewhere on country. This relocation was discussed as part of the broader post-approval interpretation and acknowledgement of country that is outlined below.
    - Stone arrangements/potential burials – preference was for these sites to be left unaffected and inundated if necessary. Suitable archival recording, and inclusion in any post-approval interpretation was recommended.
    - Stone artefact sites – six areas of past foci – regardless of the proposed impacts, there was a recommendation that all of these six areas are subject to further investigative and salvage

excavations post-approval to understand, characterise, and recover further significant cultural material from the sites. These works can occur post-approval.

- Buffer zones where high sensitivity cultural material is likely – where these areas are subject to direct impacts, a further program of investigate – and if necessary salvage – excavation should be undertaken to understand the cultural materials being affected. These works can occur post-approval.
- Post-contact habitation site – DF indicated that the church on Dungowan Station was on the site of a former school where Aboriginal people were known to attend. This site and its surrounds has importance to the Aboriginal community (a social history place), and any activities in this area require the inclusion of Aboriginal participants, and which may include survey, excavations and/or monitoring of the works.

- A significant part of the management options discussion above included the need for post-approval interpretive opportunities for the Aboriginal community, with references to visual acknowledgement in the general area – the old school ground was mentioned. AW indicated that an interpretation strategy could be recommended, and which could then explore potential locations of any such visual interpretation, nature of the presentation/signage, etc. A number of the site types above where considered suitable for incorporation into any interpretation that may be installed.
- ST continued to champion the ongoing inclusion of EMM into the post-approval phase to ensure that the year long rapport and relationships that have been developed as part of the project are maintained; and to ensure discussions, agreements and recommendations are continued through into this phase. AW indicated he would seek suitable wording of this within the ACHA where possible.

Please let me know if I have omitted or forgotten anything, happy to correct were inaccurate.

Happy to discuss.

Thanks
A

Dr Alan Williams FSA MAACAI
Associate Director
National Technical Leader, Aboriginal Heritage

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Georgia Burnett

From: Alan Williams
Sent: Tuesday, 19 January 2021 1:59 PM
To: Alan Williams
Cc: Georgia Burnett; Meredith Abrams; Mark Trudgett; Christopher Holloway
Subject: Proposed Dungowan Dam - Aboriginal consultation strategy - update and revision (Nov 20)
Attachments: 20210119_CSSI Dams_Aboriginal Community Engagement Strategy_v8.pdf

Dear All,

Happy New Year for those I haven't caught up with.

As indicated in my meeting in December, the consultation strategy has been subject to its regular three month review and update. Unfortunately, it got delayed in release over the Xmas period. There are limited changes from the previous version, which include the addition of new Aboriginal stakeholders who have registered and modification of the timing of activities such as meetings (presented in the Appendices).

As with previous versions, can you please review the document and let me know if you require any changes/additions before it's finalised. Please can you provide comments by the 2 February 2020. Once finalised, we will work to this plan until the next review in a couple of months.

Happy to discuss

Thanks
Al

Dr Alan Williams FSA MAACAI
Associate Director
National Technical Leader, Aboriginal Heritage

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Georgia Burnett

From: Alan Williams
Sent: Wednesday, 17 February 2021 4:22 PM
To: Alan Williams
Cc: Georgia Burnett; Mark Trudgett; Christopher Holloway
Subject: Proposed Dungowan Dam - Project Update (mid February 2021)

Hi All,

This is just a brief project update since our last communication. The project hasn't progressed much in the last couple of weeks, so there is some duplication here – please note the proposed AFG meeting information below though.

- The cultural mapping investigations of the Dungowan Dam and pipeline has now been provided to the key knowledge-holders involved, and we have received their responses on both content and any necessary redaction. This report will be with you shortly, I am hopeful before our March meeting.

- The ACHA report has been largely completed and is under-going various internal and project review. It is unclear whether the report will be available at our next meeting, but regardless I will be talking to numerous points on the findings, significance and recommendations. As required in the Heritage NSW guidelines, a period of at least 28 days for comment will be provided to you all for this when it has been released. The report has been written in the full knowledge of our many discussions over the last 6-9 months, so hopefully will align well with your view and perceptions of the project to date.

  Please note I am still awaiting returned confidentiality agreements from some of you. For those that have not provided it, I will need this agreement before I can distribute the above documents to you.

- The consultation strategy has been updated and was provided to you all a week or so ago for review. I have received no comments, and have therefore finalised it until we review it again in a few months.

- The on-site investigations of the power easement have now been completed. I believe the ground was extremely steep, and a further potential scarred tree was recorded.

- The test excavations of PAD 3 as part of the early works portion of the pipeline are now organised and are proposed for the **8 March** for a period of between 1-2 weeks. We will be in touch with you next week as we begin to organise the logistics, participation, etc.

- I am aiming for the next **AFG meeting on the early afternoon of Monday 1 March 2021 in Tamworth**. Please book this into your diary for now, and I will contact you all next week as I begin to organise and can confirm venues, people and timing. Can those that want to meet in person, please let me know, so we can determine numbers. For those that do not wish/cannot attend the face-to-face meeting, I am as usual happy to undertake digital/online/phone meetings with you.

Happy to discuss

Thanks
Al

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Georgia Burnett

From: Alan Williams
Sent: Friday, 5 March 2021 3:50 PM
To: Alan Williams
Cc: Meredith Abrams; Georgia Burnett; Mark Trudgett; Christopher Holloway
Subject: Proposed Dungowan Dam - AFG Meeting (March 2021) - Meeting Minutes

Hi All,

Thank you to those that were able to attend the meeting earlier this week (and/or were available online), please find below some of the key points that were raised and discussed. For those I haven't managed to speak with yet, please just let me know suitable times/locations/methods and I'll happily run you through the information below in more detail.

Meeting Attendees (1 March 2021): Alan Williams (EMM), Meredith Abrams (WaterNSW), Donny and Edward Fermor (Tamworth LALC), Rick Slater (Huckada Dreamin Heritage Group), Brianne Slater (Galamaay Cultural Consultants)
Online meeting (5 March 2021): Alan Williams (EMM), Meredith Abrams (WaterNSW), Derrick Vale (DFTV Enterprises), Aaron Talbott (AT Gomilaroi), Marilyn Johnson (Corroboree Aboriginal Corporation)
Apologies (indicated attendance online/in person, but could not ultimately attend): N/A

Key points and actions:

- AW provided information on the following:
    - Provided an update on timeframes and key points through the project over the next few months.
    - Undertook detailed discussion of the overall ACHA findings, significance, potential impacts, further investigation and management recommendations. This included running the participants through the report content and maps on screen.

- Discussions and outcomes included:
    - AW outlined some potential timeframes for the distribution of the ACHA, the re-initiation of the early works, and meetings this year.
    - AW outlined the last few sections of the draft ACHA in detail, including:
        - This included outlining the findings of the cultural mapping, field survey and test excavation, and how they had all been synthesised into a series of maps. AW outlined how these sites has been assigned a formal or tentative classification, with the latter requiring further investigation pre- or post-approval. How the sites had been assigned a significance value, and especially how the cultural criterion had been determined – sought thoughts from the participants on these values.
        - AW outlined some of the potential impacts (attached) from the proposed project, and further discussion the direct impacts (eg the dam wall, spillway, etc) versus the indirect impacts (from inundation). This extended to the likely removal of vegetation, especially trees, prior to flooding and the implication this may have on scarred trees. AW however did suggest that inundation would result in limited impacts to buried cultural material based on studies of dams in other parts of the world.

- AW spoke at length about the subsequent actions that would be recommended. AW outlined that few of the highly significant sites would be affected, and significant data indicates that inundation would result in little impact, albeit a loss of access to future generations. AW outlined how these impacts therefore required further investigation and mitigation to manage their effects. These included further investigation into the validation of culturally modified trees and stone arrangements; and the methods that may be applied to each.. In relation to likely recommendations, AW advised that there would be three project specific requirements proposed: 1) the development of an Aboriginal cultural heritage management plan to provide the post-approval framework for cultural heritage, and which would include the methods of ongoing consultation, mitigation of identified and potential Aboriginal sites and deposits, and protection of those outside the project footprint; 2) the development of an interpretation strategy to acknowledge and celebrate cultural heritage, and with a focus on the old school site downstream of the dam that has been regularly mentioned by several stakeholders; and 3) where river systems, especially downstream, would be affected, the development of a cultural flow management plan that would inform and manage these effects on cultural heritage where water is intrinsic to their value (a contemporary fishing campsite was used as an example). Extensive details on the likely aims and content of each of these documents was outlined in the meeting.

- Feedback occurred throughout the meeting, generally seeking clarification on the points above, and which (where relevant) will be integrated into the ACHA. There was generally support for the proposed actions, and no additional ideas or requirements were suggested; a few indicated that they would like to review and digest the report in detail. Strong interest in the cultural flow management plan was voiced. Key points raised included the ongoing concern of the impacts of the proposed pipeline, with AW outlining how the management plan would manage these areas, and the nature of such management would be developed in that plan with the Aboriginal stakeholders (if the recommendation is endorsed by DPIE). However, access had been limited to date, and as such the management would be primarily in a post-approval phase, limiting conservation opportunity. There was some concern of leaving legacy issues for property owners where sites had been identified, but would be left unaffected. In discussions with the need to investigate and validate the stone arrangement sites, DF indicated that they were not similar to others near Barraba; and that any investigation should be sensitive to the potential high significance of these sites as burial areas if verified.

Please let me know if I have omitted or forgotten anything, happy to correct were inaccurate.

Happy to discuss.

Thanks
A

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National Technical Leader, Aboriginal Heritage

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Georgia Burnett

From: Alan Williams
Sent: Friday, 9 April 2021 2:53 PM
To: Alan Williams
Cc: Georgia Burnett; Mark Trudgett; Christopher Holloway
Subject: Proposed Dungowan Dam - Project Update (early April 2021)

Hi All,

Sorry I haven't caught up recently, please find a project update for the Dungowan Dam project:

- The ACHA report has been completed and is under-going various internal and project reviews. I am hopeful that this report will be provided to you within the next few weeks for your review and inputs. As required in the Heritage NSW guidelines, a period of at least 28 days for comment will be provided to you all for this regardless. The report has been written in the full knowledge of our many discussions over the last 6-9 months -and for those that attended our last meetings where I ran through it in detail has not change significantly - so hopefully will align well with your view and perceptions of the project to date.

- We still have some on-site investigations associated with the potential archaeological deposits along the proposed pipe alignment. These were initiated in March, but land access issues and poor weather hindered their completion. At this stage, it is unclear when we these works will be completed, but we are actively trying to re-initiate them. I'd be surprised if they would be up and running until at least May, but will continue to be in touch as it gets resolved.

- Our next AFG meeting for the project is proposed for June 2021. I will contact you all some weeks before this when I organise and can confirm venues, people and timing.

I'll continue to provide monthly updates between now and June when I look forward to catching up with you all again.

Happy to discuss

Thanks
Al

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Georgia Burnett

From: Alan Williams
Sent: Friday, 30 April 2021 9:52 AM
To: Alan Williams
Cc: Georgia Burnett; Mark Trudgett; Christopher Holloway
Subject: Proposed Dungowan Dam - Project Update (late April 2021)

Hi All,

Please find a project update for the Dungowan Dam project:

- Geotechnical investigations are being proposed on the *existing* Dungowan Dam to understand its composition and content in May/June 2021. I understand as part of these works that there is also a couple of bore-holes on the steeper slopes near the proposed dam, and non-invasive seismic investigations. There are no Aboriginal heritage requirements for the existing dam activities, but I believe the works around the new dam will likely involve some monitoring and/or pre-clearance activities. I'll come back to everyone when I have more details on all this.

- The ACHA report has been completed and continues to undergo an internal review. We believe that these reviews and any required changes should have been completed by mid-May 2021, and we will distribute the report shortly after for your review and inputs. As required in the Heritage NSW guidelines, a period of at least 28 days for comment will be provided to you all for this regardless. The report has been written in the full knowledge of our many discussions over the last 6-9 months -and for those that attended our last meetings where I ran through it in detail has not change significantly - so hopefully will align well with your view and perceptions of the project to date.

- We still have some on-site investigations associated with the potential archaeological deposits along the proposed pipe alignment. These were initiated in March, but land access issues and poor weather hindered their completion. At this stage, I have no indication of when we will get back on site. Given we would need a couple of weeks to mobilise, I would be surprised if they were re-initiated before late May at the earliest.

- Our next AFG meeting for the project is proposed for mid June 2021. I will contact you all some weeks before this when I organise and can confirm venues, people and timing.

I'll continue to provide monthly updates between now and June when I look forward to catching up with you all again.

Happy to discuss

Thanks
Al

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Kim Lane

From: Alan Williams
Sent: Wednesday, 30 June 2021 1:53 PM
To: Alan Williams
Cc: Georgia Burnett; Alex Frolich; Christopher Holloway
Subject: Proposed Dungowan Dam - Project Update - June 2021
Attachments: AARD004_ProposedGeotech_20210611_02.pdf

Dear All,

Please find a project update for the Dungowan Dam project:

- Geotechnical investigations are being proposed to further inform the *proposed* dam and the various quarrying/borrow pits areas (see attached figure). This will require various types of excavation and access tracks into areas that we have identified as archaeologically sensitive in the Aboriginal cultural heritage assessment (ACHA). These works are not being considered as part of the Critical State Significant Infrastructure (CSSI) assessment of the Dam. Rather they are being assessed under an REF by Water NSW, which means from an Aboriginal heritage perspective that an Aboriginal heritage impact permit (AHIP) from Heritage NSW will be required to allow them to proceed. We have developed an *archaeological research design* for these components, which includes the need to undertake further archaeological test excavations (both further test pits and open area excavations) to offset the potential harm to cultural material. This will be provided to you shortly for review, and will be discussed in detail at the next AFG meeting. A period of 28 days will be provided to comment on the research design, during which I hope to hold the meeting and discuss it with you all. If agreed, the research design along with the ACHA (see below) would be submitted to Heritage NSW to seek the AHIP to allow the works to proceed. In terms of timing, it's unlikely that the archaeological works would occur until the end of 2021.

- The ACHA report has been completed and continues to undergo an internal review. We believe that these reviews and any required changes should have been completed by late June 2021, and we will distribute the report shortly after for your review and inputs. As required in the Heritage NSW guidelines, a period of at least 28 days for comment will be provided to you all for this regardless. The report has been written in the full knowledge of our many discussions over the last 6-9 months -and for those that attended our last meetings where I ran through it in detail has not change significantly - so hopefully will align well with your view and perceptions of the project to date. The AFG meeting will be undertaken during the comment period to allow discussion of the report and its recommendations as well as the geotechnical investigations above.

- The proposed pipeline between the proposed dam and Calala is still under assessment. The route that we have previously investigated (both as the early works and as part of the broader CSSI) has been changed in several locations. I will shortly be providing updated details of these changes, as well as both field survey and further test excavations that we believe will be required to inform the ACHAs. This process will also include the excavations that remain outstanding following issues with land access earlier this year. Once completed, the ACHAs will be updated to reflect the findings of these additional works, and provided to you all for review, inputs and comment. In terms of timing, it is considered likely that these works would occur in August to September 2021.

- Our next AFG meeting for the project is proposed for late August 2021. I will contact you all some weeks before this when I organise and can confirm venues, people and timing.

Thanks
Al

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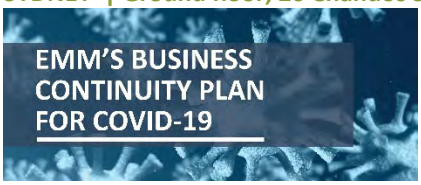

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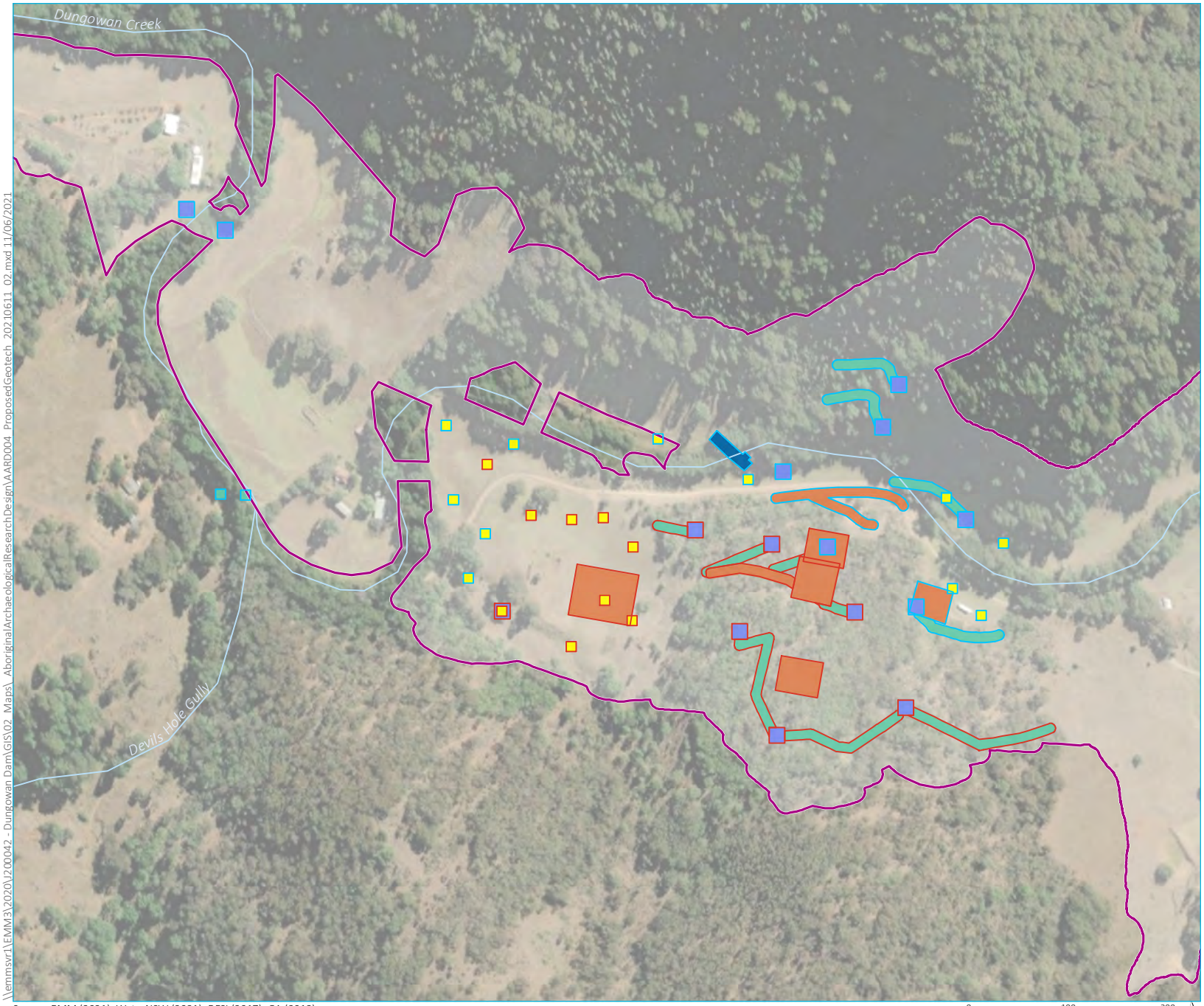

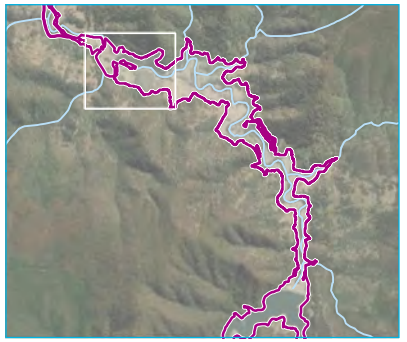

KEY

- Construction and operational footprint
- Named watercourse
- Stage 2B
- Stage 2C
- Geotechnical test pit
- Borehole
- Costean
- Access
- Waterway access crossing

DRAFT

The proposed geotechnical works

Dungowan Dam and pipeline project
Aboriginal Archaeological Research Design
Figure 3.1a

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Source: EMM (2021); WaterNSW (2021); DFSI (2017); GA (2013)

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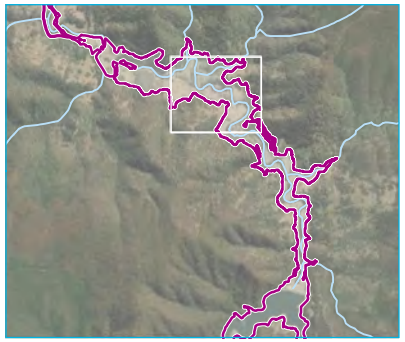

KEY

- Construction and operational footprint
- Named watercourse
- Stage 2C
- Geotechnical test pit

DRAFT

Source: EMM (2021); WaterNSW (2021); DFSI (2017); GA (2013)

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GDA 1994 MGA Zone 56

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The proposed geotechnical works

Dungowan Dam and pipeline project
Aboriginal Archaeological Research Design
Figure 3.1b

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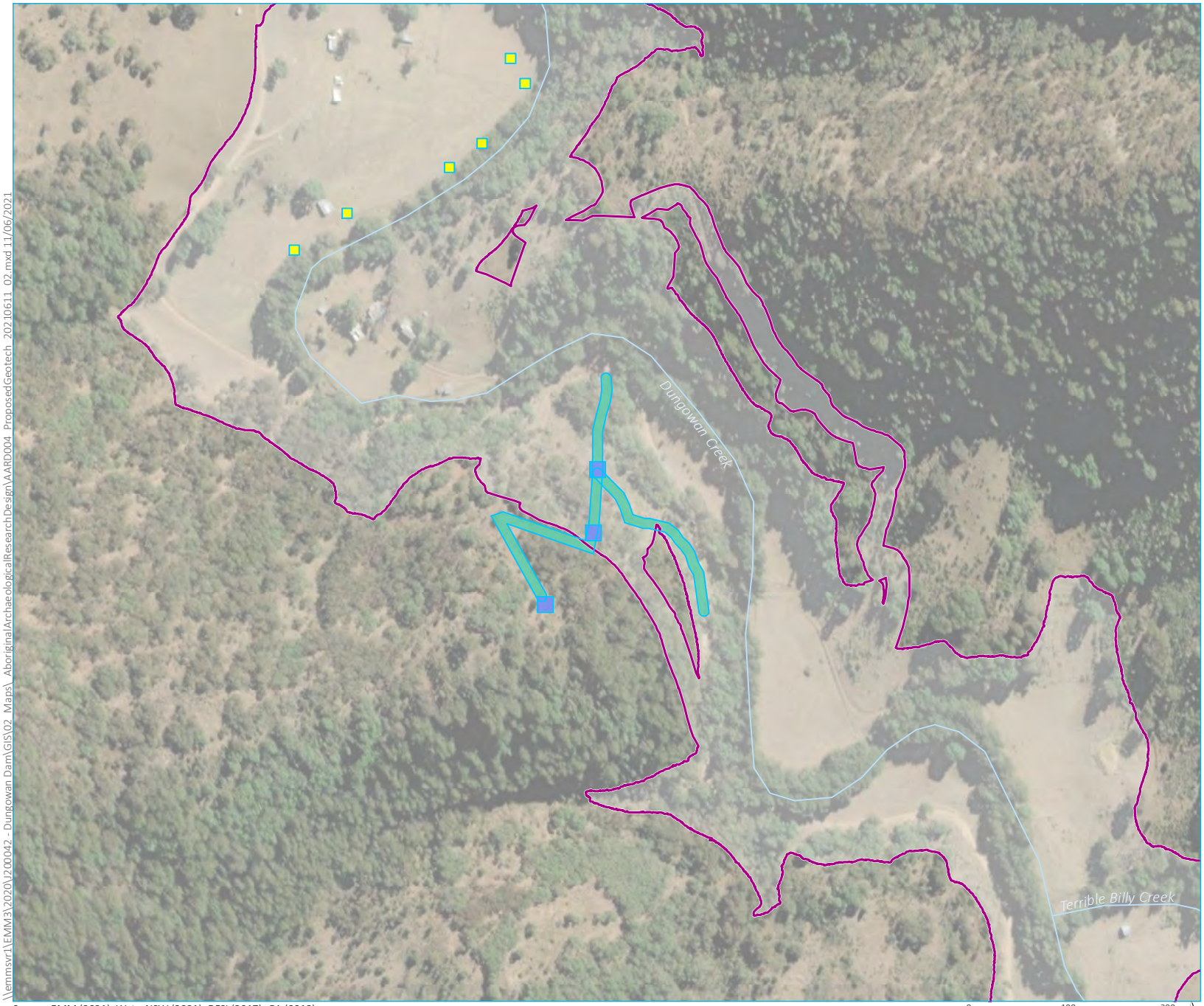

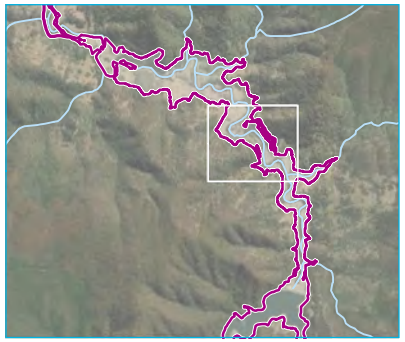

KEY

- Construction and operational footprint
- Named watercourse
- Stage 2C
- Geotechnical test pit
- Borehole
- Access

DRAFT

The proposed geotechnical works

Dungowan Dam and pipeline project
Aboriginal Archaeological Research Design
Figure 3.1c

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Source: EMM (2021); WaterNSW (2021); DFSI (2017); GA (2013)

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GDA 1994 MGA Zone 56

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From:	Alan Williams
To:	Alan Williams
Cc:	Alex Frolich; Georgia Burnett; Christopher Holloway; Meredith Abrams; Martin Hicks
Subject:	Proposed Dungowan Dam - Aboriginal heritage - project update
Date:	Wednesday, 4 August 2021 11:10:18 AM
Attachments:	image001.png image002.png image003.png image004.jpg

Hi All,

Thank you to those that have had an opportunity to review and provide feedback on the Aboriginal cultural heritage assessment (ACHA) and archaeological research design (ARD) for the proposed Dungowan Dam project and associated geotechnical works. I am sending this e-mail for a couple of reasons:

1. As a reminder that we are intending to finalise the ACHA and ARD on the 20 August 2021, so please provide any comments or inputs by that time via phone, e-mail, letter, etc.

2. As previously discussed, I would like to undertake a meeting in the Tamworth area to discuss through the two reports and allow discussion on the findings, proposed course of action, etc. Given the COVID situation, I cannot attend in person, but I am proposing a hybrid meeting in which Meredith Abrams will be attending in person and I'll be on screen. At this stage, I would like to propose this to occur on the morning of **Thursday 12 August 2021**. I am exploring a venue that would have the facilities to undertake this and will provide that shortly. In addition, for those that cannot, or do not want to, attend in person, we would be able to connect you remotely to such a meeting (please let me know if that is your preference). As per previous meetings, we will offer $110 ex GST per hour for your representative to attend whether in person or online.

3. The recent methodology for the additional survey and test excavations of the early work portion of the pipeline is nearing expiry. To date, I have not received any feedback identifying any concerns. We are currently exploring land access requirements, but are aiming to undertake these works in mid-late August. Tentatively, this will consist of a two day field survey between 17-20 August, followed by up to two weeks of excavation between 23 August and 3 September. I'll be in touch with those that we can incorporate into the field program in the coming days.

Please note that EMM has specific COVID plans for all activities that both our personnel and your representatives will need to comply with. However, I highlight that **no on-site works will include EMM personnel from Greater Sydney** for any of the above tasks.

Happy to discuss

Thanks
Al

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National Technical Leader, Aboriginal Heritage

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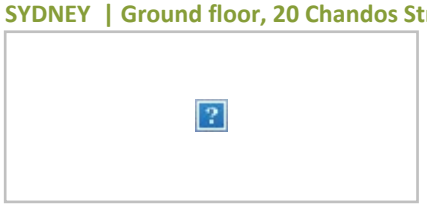

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From:	Alan Williams
To:	Alan Williams
Cc:	Georgia Burnett; Alex Frolich; Christopher Holloway; Meredith Abrams
Subject:	Proposed Dungowan Dam - ACH - COVID update - Aug 21
Date:	Tuesday, 10 August 2021 12:42:08 PM
Attachments:	image001.png image002.png image003.png image004.jpg

Hi All,

As many of you have no doubt seen, Tamworth has recently gone into lockdown, as well as Sydney, Newcastle and the Hunter. This captures a significant portion of EMM's field team and a number of the Aboriginal parties involved in the proposed Dungowan Dam project. As such, please find the following:

1. Unfortunately we are not going to be able to undertake the AFG meeting next week in person. Rather, I will shortly send an invite around for people to attend virtually via a computer/phone/iPAD, etc. We will still pay for your online attendance as we would if you attended in person. We will look to undertake an in-person catch up for those interested as soon as we are able, but it's unlikely to be before we will be finalising the ACHA and ARD documents in late August 2021. For anyone struggling with the online option, I'll follow up with a standard phone call to chat the day after (Friday next week) about the project.

2. We are still aiming for the fieldwork in late August. We are exploring having people attending from lockdown areas and protocols for making the works COVID-safe. At this stage, for those I have contacted, please continue to plan towards proposed dates and activities, however, I will keep you in the loop as things progress.

Happy to discuss
Thanks
Al

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From:	Alan Williams
To:	Alan Williams
Cc:	Georgia Burnett; Alex Frolich; Christopher Holloway; Meredith Abrams
Subject:	Proposed Dungowan Dam - AFG Meeting (August 2021) - Meeting Minutes
Date:	Wednesday, 18 August 2021 8:38:43 AM
Attachments:	image001.png image002.png image003.png image004.jpg

Hi All,

Thank you to those that were able to attend the meeting today. I apologise we couldn't hold it in person. Please find below some of the key points that were raised and discussed. For those I haven't managed to speak with yet, please just let me know suitable times/locations/methods and I'll happily run you through the information below in more detail.

Online meeting (12 August 2021): Alan Williams (EMM), Meredith Abrams (WaterNSW), Derrick Vale (DFTV Enterprises), Marilyn Johnson (Corroboree Aboriginal Corporation), Michelle Fermor (Tamworth LALC), Rick Slater (Hucka Dreaming Heritage Group), Rob Slater (Galamaay Cultural Consultants), Steve Talbott (Gomeroi People), Lily Carroll (Didge Ngunawal Clan)
Apologies (indicated attendance, but could not ultimately attend): Aaron Talbott (AT Gomilaroi)

Key points and actions:

- AW provided information on the following:
    - A review of the draft Aboriginal cultural heritage assessment (ACHA) provided a few weeks ago. This was focussed on the overall findings of the report outlining identified sites and places of cultural materials and values, significance of the finds, their potential impacts, and a detailed line by line discussion of the management strategy and recommendations;
    - Provision of background of the geotechnical works, the need for an Aboriginal Heritage Impact Permit (AHIP), and a review of the Archaeological Research Design (ARD) proposed for implementation as part of these works.

- Discussions and outcomes included:
    - AW outlined the last few sections of the draft ACHA in detail, including:
        - This included outlining the findings of the cultural mapping, field survey and test excavation, and how they had all been synthesised into a series of maps. AW outlined how these sites has been assigned a formal or tentative classification, with the latter requiring further investigation pre- or post-approval. How the sites had been assigned a significance value, and especially how the cultural criterion had been determined – sought thoughts from the participants on these values.
        - AW outlined some of the potential impacts from the proposed project, and further discussion the direct impacts (eg the dam wall, spillway, etc) versus the indirect impacts (from inundation). This extended to the likely removal of vegetation, especially trees, prior to flooding and the implication this may

have on scarred trees. AW however did suggest that inundation would result in limited impacts to buried cultural material based on studies of dams in other parts of the world.

- AW spoke at length about the subsequent actions that would be recommended. AW outlined that few of the highly significant sites would be affected, and significant data indicates that inundation would result in little impact, albeit a loss of access to future generations. AW outlined how these impacts therefore required further investigation and mitigation to manage their effects. These included further investigation into the validation of culturally modified trees and stone arrangements; and the methods that may be applied to each.. In relation to likely recommendations, AW advised that there would be three project specific requirements proposed: 1) the development of an Aboriginal cultural heritage management plan to provide the post-approval framework for cultural heritage, and which would include the methods of ongoing consultation, mitigation of identified and potential Aboriginal sites and deposits, and protection of those outside the project footprint; 2) the development of an interpretation strategy to acknowledge and celebrate cultural heritage, and with a focus on the old school site downstream of the dam that has been regularly mentioned by several stakeholders; and 3) where river systems, especially downstream, would be affected, the development of a cultural flow management plan that would inform and manage these effects on cultural heritage where water is intrinsic to their value (a contemporary fishing campsite was used as an example). Extensive details on the likely aims and content of each of these documents was outlined in the meeting.

- AW outlined the draft ARD, including:
  - Background on the proposed geotechnical works including the reason for them to further inform the dam design; and the assessment and approval pathway. This identified that the proposed works would not be considered under the CSSI assessment process, but rather through a process in which Water NSW would assess the work, and therefore require an Aboriginal heritage impact permit (AHIP) from Heritage NSW to allow them to proceed. To apply for an AHIP, the ACHA along with a separate ARD was required to both inform the extent of cultural materials across the site, and how the project would mitigate them in advance of the proposed activity.
  - A detailed review of the extent and nature of the geotechnical works, including bore-holes, mechanical test pits, access tracks, and water crossings. The majority of these would require some ground preparation that may affect the upper 60cm of the soil profile within which all cultural materials recovered was found. None of the identified sites or heritage foci areas (dense stone artefacts) would be affected, and the majority of the works are outside the 70m buffer of the creek identified within which higher value cultural materials has been found.
  - Undertook a line by line review of the proposed two stage archaeological excavation program to be implemented prior to the geotechnical works. This included the discrete test pitting of the various work areas, followed by more

substantial salvage excavations where certain thresholds are met. Thresholds include dense and/or deep cultural material, rare artefacts or features, and locations were key research questions around past occupation and use can be further explored. While the amount of archaeological excavation is uncertain, it would consist of ~150 sq.m in the investigative phase, with a further 150sq.m in the salvage phase. Archaeological methods were also discussed and consist of similar approaches to the completed ACHA investigations, including manual excavation in controlled spits, with all sediment wet-sieved. Discussion included the staged approach of the works, and that the geotechnical investigations may be occurring concurrently and/or immediately following the completion of the archaeological works, with significant portions of the areas being approved for activity following the investigative phase of excavations.

- Discussions were also undertaken of the proposed post-excavation analysis and reporting of any assemblage, and the proposed re-burial location of the cultural assemblage. This included the types of stone artefact, chronological and environmental analysis, and the presentation of the current location of the re-burial at DD CS 5 – a previously identified social history site adjacent the dam site.

- Feedback occurred throughout the meeting. This was generally supportive of the both the ACHA and the ARD, with a number of points of minor correction and/or clarification. These included:

    - A concern that the salvage excavations works (Phase 2 in the ARD) had a finite spatial area, and that what would happen if significant cultural assemblage was present once these numbers had reached. AW indicated that there was some fluidity in how the salvage excavation areas were to be determined and could be undertaken as six smaller open areas, or lesser larger areas. This would ideally allow for flexibility to undertake extra excavations in areas of high value, while still providing some certainty around the overall amount of archaeological work required.

    - A request that areas outside of 70m from the creek edge are subject to cultural monitoring, rather than no observations as is currently proposed. AW indicated he would consider with Water NSW some provisions around this, but did not expect that monitoring of all proposed works was feasible given the areas proposed.

    - A preference that the stone artefact analysis be undertaken with participation and observation of the Aboriginal community. This was an aim of the ACHA process, but was hindered by various COVID issues, AW to ensure this is written into the ARD to ensure Aboriginal community have an opportunity to learn from the stone lithics analyst during the post excavation analysis.

    - Strong views on the long term curation of the cultural assemblage. Happy with the proposed location of DD CS 5, but concerns around a proposed ‘re-burial’. A preference was for the assemblage to be kept on the surface and/or other accessible manner to allow future education opportunities. Further, if this location proves unfeasible at any time, the second option

must remain on Country, with a preference for an existing keeping place at Tamworth. AW to update the ARD to reflect these changed methods/locations.

- AW outlined some potential timeframes for the finalisation of the ACHA, submission of the AHIP and potential associated work.

Please let me know if I have omitted or forgotten anything, happy to correct were inaccurate.

Happy to discuss.

Thanks
A

Dr Alan Williams FSA MAACAI
Associate Director
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From:	Alan Williams
To:	Alan Williams
Cc:	Christopher Holloway; Georgia Burnett; Alex Frolich; Martin Hicks
Subject:	Proposed Dungowan Dam - Aboriginal heritage - project update (Sept 21)
Date:	Tuesday, 7 September 2021 3:33:34 PM
Attachments:	image007.png image009.png image010.png image001.png image002.jpg

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Hi All,

I hope everyone is doing well in these rather chaotic times. Please find below a project update for the proposed Dungowan Dam project:

1. Thank you to everyone that provided input, comment and review of the Aboriginal cultural heritage assessment (ACHA) for the project. We finalised this report in late August, and a final copy is in the folder below for you to download. I am happy to send a hard copy if you need, just let me know.

2. We also finalised the Aboriginal heritage impact permit (AHIP) application and associated archaeological research design (ARD) for the archaeological salvage excavations in advance of the geotechnical program. A final copy of this is also in the below folder. The AHIP was lodged with Heritage NSW for their consideration in early September. I will be in touch as the permit progresses, and when/if issued. Currently, my experience with such permits is that they require at least 2 months to process, so I don't expect a response much before Xmas.

3. The early works activities are still being explored, but are hampered by the ongoing COVID restrictions. I have no update on when these may happen, but they are still planned to occur as soon as feasible.

Dungowan

Happy to discuss

Thanks
Al

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From:	Alan Williams
To:	Alan Williams
Cc:	Alex Frolich; Christopher Holloway; Georgia Burnett; Martin Hicks
Subject:	Proposed Dungowan Dam - Aboriginal heritage - project update (Oct 21)
Date:	Friday, 8 October 2021 8:21:55 AM
Attachments:	image001.png image003.png image004.png image005.jpg

Hi All,

Please find below a project update for the proposed Dungowan Dam project:

1. The Aboriginal heritage impact permit (AHIP) was submitted to Heritage NSW last month. I will be in touch as the permit progresses, and when/if issued. Currently, my experience with such permits is that they require at least 2 months to process, so I don't expect a response much before Christmas.

2. The early works activities are still being explored, but are hampered by the ongoing COVID restrictions. At this stage, it is planned that the field survey component will continue once movement to the regions is more feasible (perhaps November). Given land access issues, it is now proposed that the archaeological excavations of the three potential archaeological deposits will form a recommendation of the report, and an AHIP will be sought to undertake these works immediately in advance of the construction installation. As such, there is likely to be at least a few months delay between the field survey and the eventual archaeological excavations.

Happy to discuss

Thanks
Al

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Christopher Holloway

From: Alan Williams
Sent: Tuesday, 15 February 2022 10:35 AM
To: Alan Williams
Cc: Christopher Holloway; Mark Trudgett; Georgia Burnett; Warren Mayers
Subject: Proposed Dungowan Dam - ACH - Project update

Dear All,

Thank you for your continued involvement in the proposed Dungowan Dam project. I apologise we've been a little quiet over the Xmas period, but activities have only just started to get up and running following the recent Omicron outbreak. Please find a summary of key activities ongoing, nearing completion or in the near future:

- Early works pipeline (Calala – Dungowan Station). As you know, we finalised the Aboriginal cultural heritage assessment (ACHA) for this portion of the pipeline in late January 2022. This ACHA recommended that additional test excavations of three 'potential archaeological deposits' be undertaken prior to development impacts in those areas, as well as the need for an Aboriginal heritage impact permit (AHIP) for the recovery and relocation of a handful of isolated stone artefacts. The test excavations of these three potential archaeological deposits have been undertaken in late January and early February 2022. We will be developing an addendum report on the findings of these works to integrate into the existing ACHA and further inform any necessary approvals. At this stage, little further cultural materials were encountered as part of these excavations, with further characterisation of the previous surface finds (and the past use of Sandy Creek) being the main finding.

- Geotechnical investigations. We have now received the AHIP for undertaking an archaeological investigation and salvage program of a series of proposed geotechnical works within the dam footprint. At this stage, the fees for these works are being considered by Water Infrastructure NSW. Should these be approved, we will get in touch to begin to organise this field program. We are hoping a decision will be made shortly, with any works to occur 4-6 weeks later should they be approved.

- Historical burial. As you may have heard, as part of the European heritage investigations of the proposed dam site, a burial was discovered last week. All of the documentary evidence, along with landowner oral history, that led to the location of this find strongly indicates that these are the remains of an Englishman (John Wilson) from 1883. However, there has been some concerns raised that this individual may have been Aboriginal. As such, we are proposing to undertake a number of future steps – all in full consultation with the Aboriginal stakeholders - to further understand the ancestral origins of this individual. In the first instance, we will be undertaking a smoking ceremony and making the site safe with some of the Aboriginal stakeholders shortly. At the same time, we will also be inviting a physical anthropologist – a specialist in analysis of human bones – Dr Sarah Croker to be attending the site, inspecting the exposed remains and seeing whether a determination on the ancestral origins can be determined from them. We are not confident of success in this first outing and are developing additional approaches such as further excavation to recover more of the individual and/or DNA research for consideration by the Aboriginal stakeholders and the consent authority. We envisage that this may require a few months to organise. We entirely acknowledge the sensitivity of such a find, and will not be implementing any activity that does not have the full support of the Aboriginal stakeholders.

As always, please feel free to contact me to discuss any of above, or any other aspects of the project.

Thanks
A

Dr Alan Williams FSA FRSA MAACAI
Associate Director
National Technical Leader, Aboriginal Heritage

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Christopher Holloway

From: Alan Williams
Sent: Tuesday, 22 February 2022 12:53 PM
To: dhfermor64[redacted] fiona@[redacted] Steven Talbott; Derrick Vale; Aaron Talbott; Robert Slater; richard slater
Cc: Christopher Holloway; Georgia Burnett; Warren Mayers; Mark Trudgett; Pamela Kottaras
Subject: Proposed Dungowan Dam - human remains - summary and update

HI All,

Thank you all for your positive involvement in our recent investigations of the human remains found in the proposed Dungowan Dam footprint. Below, I outline the main activities and outcomes from the day as I interpreted them. As always, please don't hesitate to let me know if I have omitted or got anything wrong.

Present: Alan Williams, Pamela Kottaras (EMM), Warren Mayes (Water Infrastructure NSW), Dr Sarah Croker (University of Sydney), Donny Fermor, Edward Fermor (Tamworth LALC), Rick Slater (Huckada Dreamin Heritage Group), Aaron Talbott (AT Gomilaroi Cultural Consultancy).
Apologies: Steve Talbott (Gomeroi People), Derrick Vale (DFTV Enterprises), Rob Slater (Galamaay Cultural Consultants).

- Background
    - The partial remains of an historical burial were encountered during the historical investigations of the proposed Dungowan Dam footprint in mid-February 2022. These remains and their location were based on historical research and landowner oral history that indicated an Englishman (John Wilson) was found dead and subsequently buried in the footprint. The investigation was being undertaken to further inform the historical assessment of the EIS for the project and was targeting the identification of the burial. Excavations of the general location looking for evidence of his grave (not his skeletal remains) was undertaken by a historical archaeologist and overseen by a member of the Tamworth LALC. The remains were accidentally uncovered during the monitoring work, since they were extremely shallowly buried beneath the surface, and not in a formal grave. Once identified, works stopped and the find reported to the NSW Police. The NSW Police and Heritage NSW have now been contacted, informed and provided direction on the find.

    - There appears no documentary evidence that the individual is Aboriginal, but this was raised as a concern by the registered Aboriginal parties following the discovery, and as such further activities (see below) were implemented to try and resolve this issue, as well as discuss next steps.

    - A site inspection was undertaken on the 18 February 2022 with all key stakeholders invited to attend.

- Key activities undertaken:
    - Following arrival at the location of previously identified human remains and the discussion of WHS and COVID protocols, AW provided an outline of the site inspection, which was to include: i) a smoking ceremony; ii) where agreed, an inspection of the remains by an attending specialist; iii) making the site safe since any further activities was probably weeks away; and iv) discussion and agreement on next steps.

    - Following careful uncovering of the remains (which has been temporarily covered after discovery), Donny Fermor led a smoking ceremony with all participants. This was followed by a rendition of the Lord's Prayer at the request of several participants.

- PK provided a detailed history of how EMM came to be investigating the human remains, including the background, excavations undertaken to date, identification and subsequent management of the find.

- Approval was given for investigation of the remains, and analysis was undertaken by Dr Sarah Croker – a physical anthropologist from the University of Sydney. Over several hours, this included answering a wide range of questions from all participants on the remains and what they may be able to tell us about the individual, as well around the potential original location of the finds, and some of the possibly next steps.

- The team discussed ways to make the site safe for at least the next few weeks, if not months, as next steps were explored and implemented. This included the establishment of a sediment fence, fencing off of the paddock (rather than the specific excavation containing the remains), and the suitable re-burial of the remains under direction from Dr. Croker.

- Key outcomes from the discussions:
  - Dr Croker spent several hours inspecting the remains, and will provide a short report that will be provided to everyone. Unfortunately, discussions on site indicate that the observed remains (no further excavation was permissible at this stage) was dominated by the upper leg bones, as well as a small selection of vertebrae, a piece of the mandible and fragments of the arms. None of these observable remains were able to provide a definitive indication of whether the remains were Aboriginal or European, which typically requires part of the skull. The remains did, however, exhibit the loss of teeth and extensive arthritis, which correlates with the old age of John Wilson (83) when he died. The exact location of the original burial could not be determined, but was considered probably to either extend deeper and/or to the east of the current find.

  - Discussion was undertaken in relation to future activities, which included seeking permission from the regulators to undertake further excavation of the human remains to: i) either recover additional parts of the skeleton to provide Dr Croker with diagnostic features to determine the ancestral origins; or ii) to demonstrate that such remains are not present and provide justification for the recovery of a small amount of bone for DNA analysis. Given there was some speculation that the individual may be part-Aboriginal, and which may not be visible in the skeletal remains, it was considered that DNA analysis was probably required into the future. AW provided an outline of the general process for this, including the submission of samples to the University of Adelaide who undertake this type of analysis.

  - There was some discussion and general agreement that following additional excavation, the remains would be exhumed and stored off-site during the rest of the EIS process (with some concern over natural or anthropogenic loss of the remains in the intervening period otherwise), and would be re-buried following approval of the project. Re-burial was proposed to be outside the impact footprint, but to remain on-Country, with Paradise House nearby suggested. AW/PK advised that further research of the family of the individual would be required, and the eventual re-burial may be dictated by relatives in this event that they are identified, but otherwise such re-burial would be further explored. Short-term storage of the individual is to be determined, but Dr Croker indicated that she would explore the University of Sydney, which has facilities for such remains as one potential option.

  - AW advised that a report on the proposed way forward, including methods, analysis, recovery and storage would be developed for consideration by Heritage NSW and the Aboriginal stakeholders. It was probable that once developed, AW would undertake a meeting with the stakeholders to work through the report and ensure everyone is happy with the approach proposed before submitted to regulators for consideration.

In the below link, I include all the photographs I took on the day for your interest and information. Please note that these photographs contain images of the human remains.

Burial photos

Happy to discuss
Thanks
Al

Dr Alan Williams FSA FRSA MAACAI
Associate Director
National Technical Leader, Aboriginal Heritage

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Christopher Holloway

From: Alan Williams
Sent: Thursday, 21 April 2022 3:29 PM
To: Alan Williams
Cc: Georgia Burnett
Subject: Proposed Dungowan Dam - Replacement Pipeline - ACHA (final)

Dear All,

Thank you for your ongoing involvement in the proposed Dungowan Dam project. As you may recall, last month we distributed an Aboriginal cultural heritage assessment for the portion of the proposed pipeline between Calagla and Dungowan Station for review and comment. This has now been finalised and submitted to Heritage NSW. A copy of the final version can be found at the below link for your records.

ACHA replacement pipeline

Happy to discuss,

Thanks
Al

Dr Alan Williams FSA FRSA MAACAI
Associate Director
National Technical Leader, Aboriginal Heritage

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Christopher Holloway

From: Alan Williams
Sent: Thursday, 19 May 2022 11:03 AM
To: Alan Williams
Cc: Georgia Burnett; Mark Trudgett; Christopher Holloway
Subject: Proposed Dungowan Dam - Replacement Pipeline - AHIP 4899
Attachments: AHIP 4899 - Water Infrastructure NSW, Dungowan Dam Replacement Pipeline Project.pdf

Importance: High

Dear All,

As you nmay recall, Water Infrastructure NSW submitted an AHIP application for a portion of the proposed pipeline nearest Calala. This was assessed under a Review of Environmental Factors and therefore was subject to the National Parks and Wildlife Act 1974. As a result of several cultural materials being encountered on the pipeline alignment, an Aboriginal heritage impact permit (AHIP) was sought to allow their recovery and removal. This was issued yesterday by Heritage NSW, and I provide it here for your records.

I will be in touch shortly to discuss the mitigation works that are required by the AHIP to allow the works to proceed. These include the collection of a small number of isolated stone artefacts and the monitoring of a piece of the pipeline in the vicinity of Sandy Creek.

Happy to discuss
Thanks
Al

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Annexure C
Historical aerials

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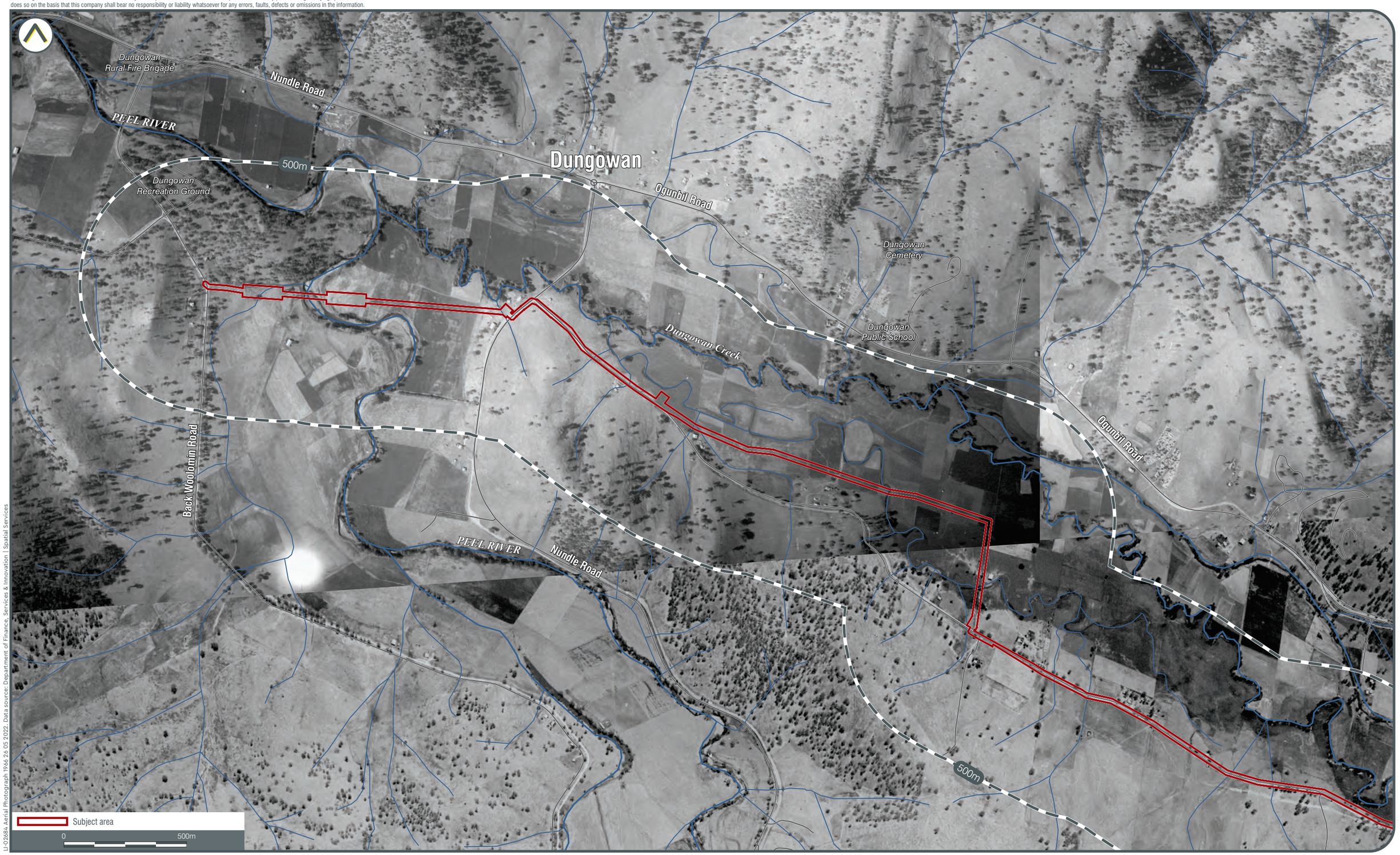

LI-02684 Aerial Photograph 1966 26 05 2022. Data source: Department of Finance, Services & Innovation | Spatial Services

AERIAL PHOTOGRAPH - 1960 (0-5km)

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LI-02684 Aerial Photograph 1960 0 (10-15km) 26 05 2022. Data source: Department of Finance, Services & Innovation | Spatial Services

AERIAL PHOTOGRAPH - 1960 (10-15km)

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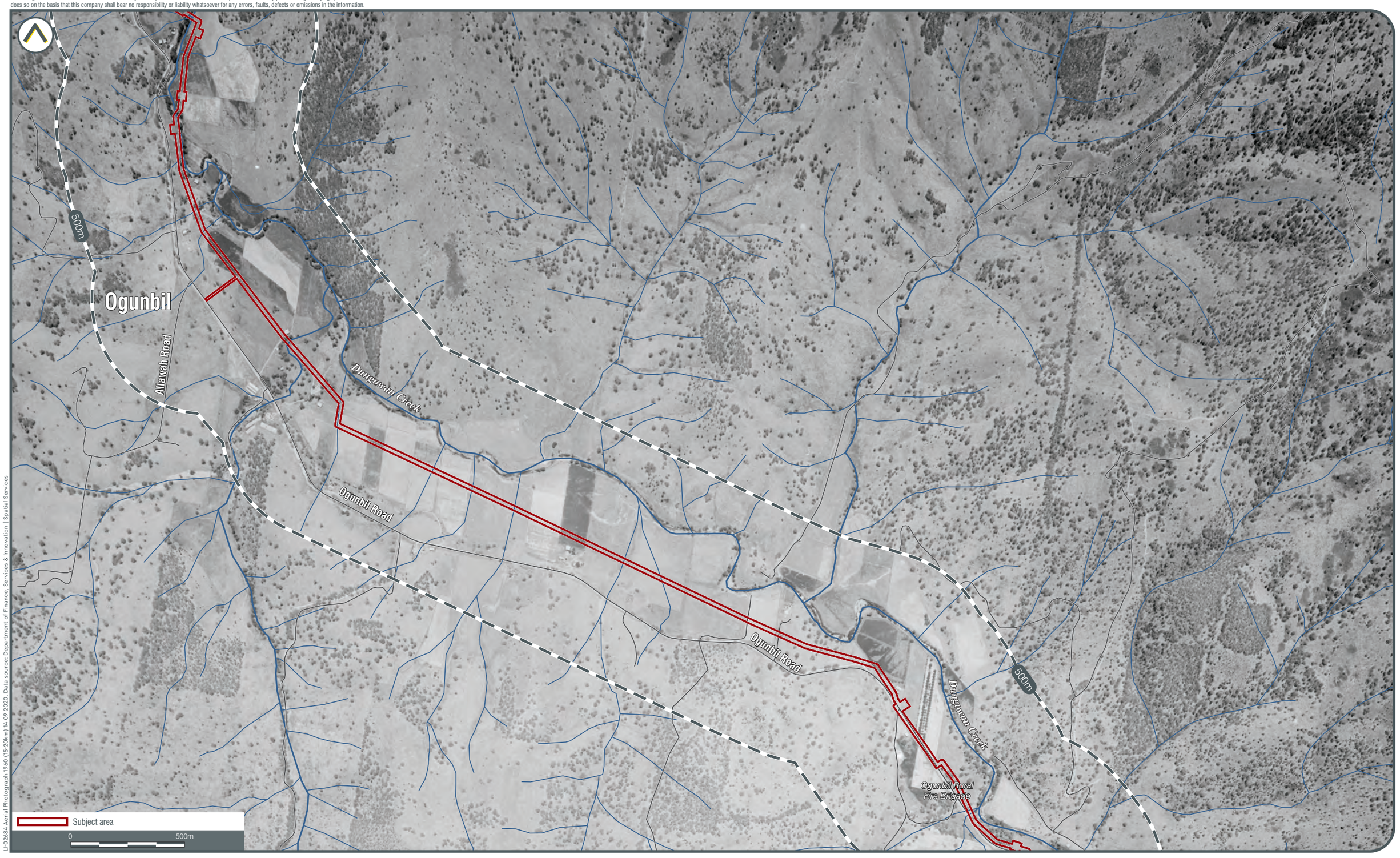

LI-02684 Aerial Photograph 1960 (15-20km) 14 09 2020. Data source: Department of Finance, Services & Innovation | Spatial Services

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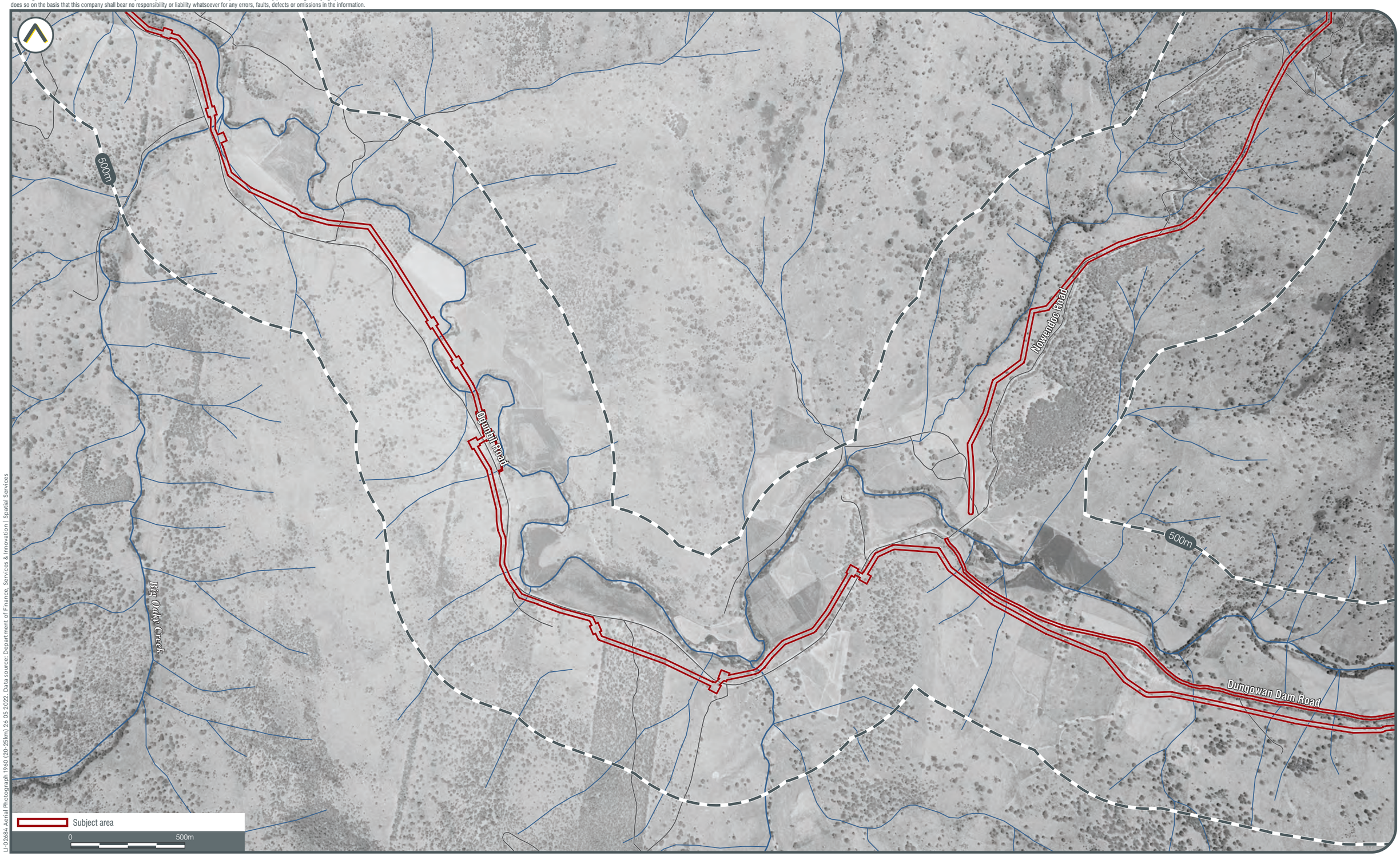

LI 02684 Aerial Photograph 1960 (20-25km) 26 05 2022. Data source: Department of Finance, Services & Innovation | Spatial Services

AERIAL PHOTOGRAPH - 1960 (20-25km)

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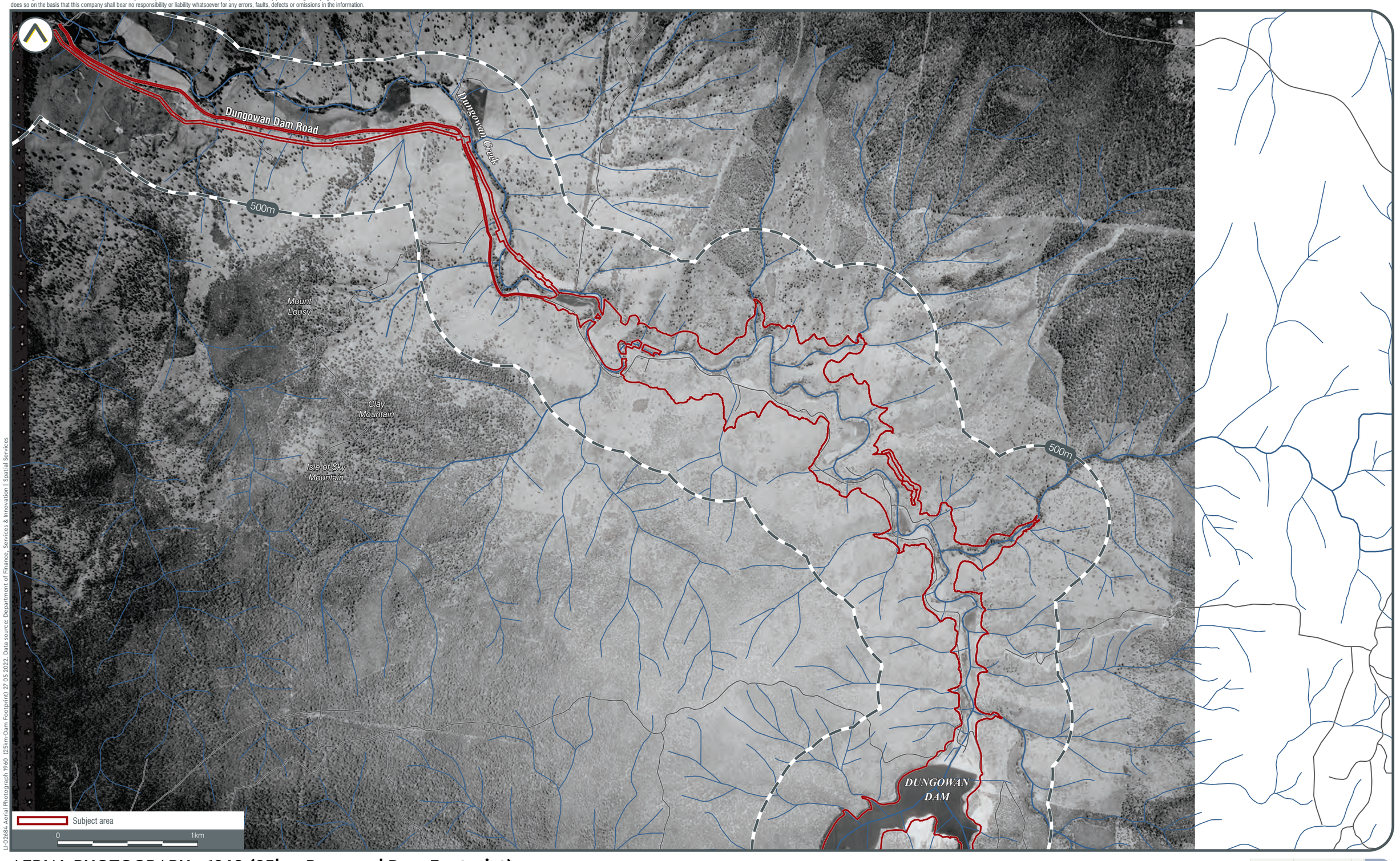

LI-02684 Aerial Photograph 1960 (25km-Dam Footprint) 27 05 2022. Data source: Department of Finance, Services & Innovation | Spatial Services

AERIAL PHOTOGRAPH - 1960 (25km-Proposed Dam Footprint)

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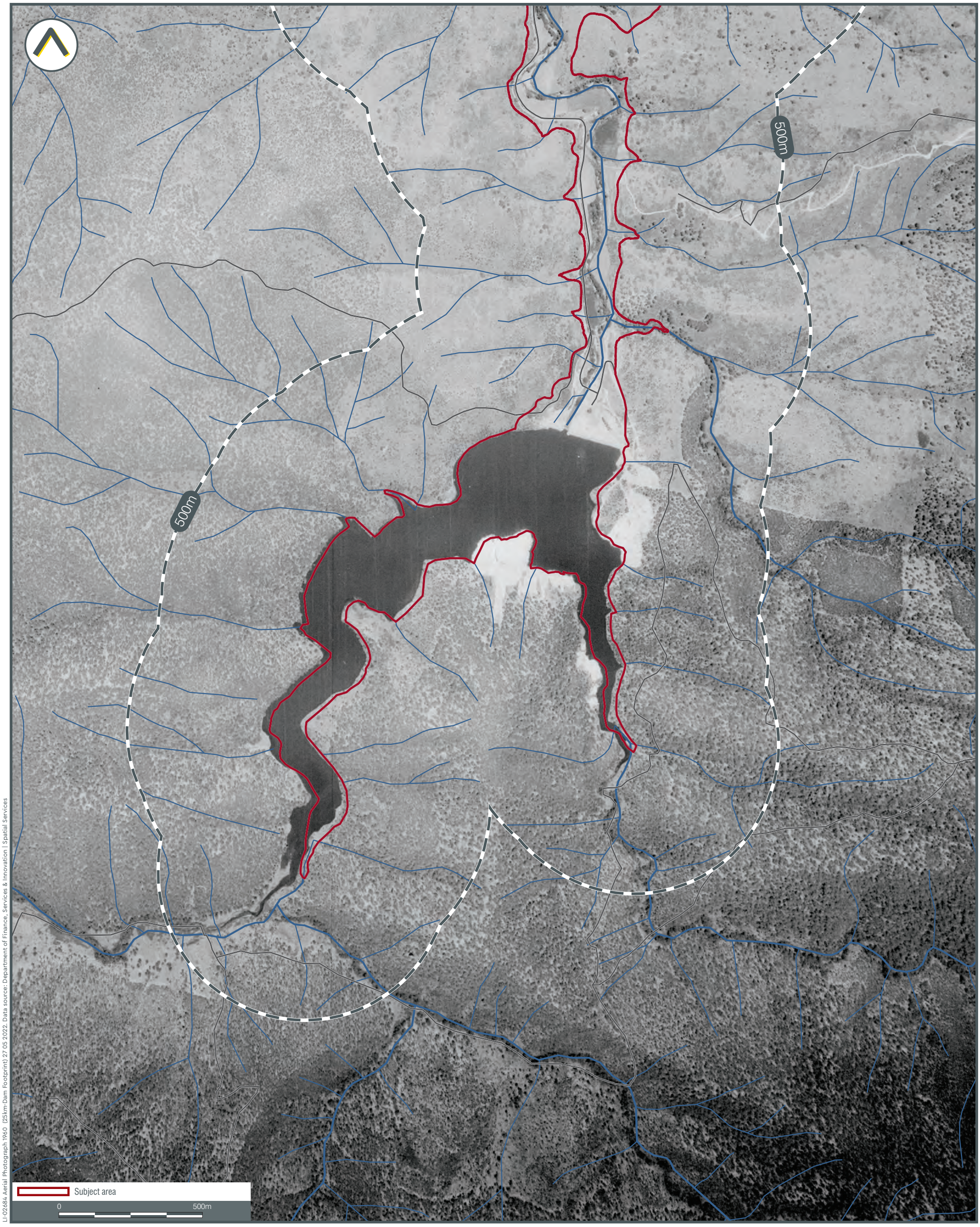

LI-02684 Aerial Photograph 1960 (25km-Dam Footprint) 27 05 2022. Data source: Department of Finance, Services & Innovation | Spatial Services

AERIAL PHOTOGRAPH - 1960 (Dungowan Dam)

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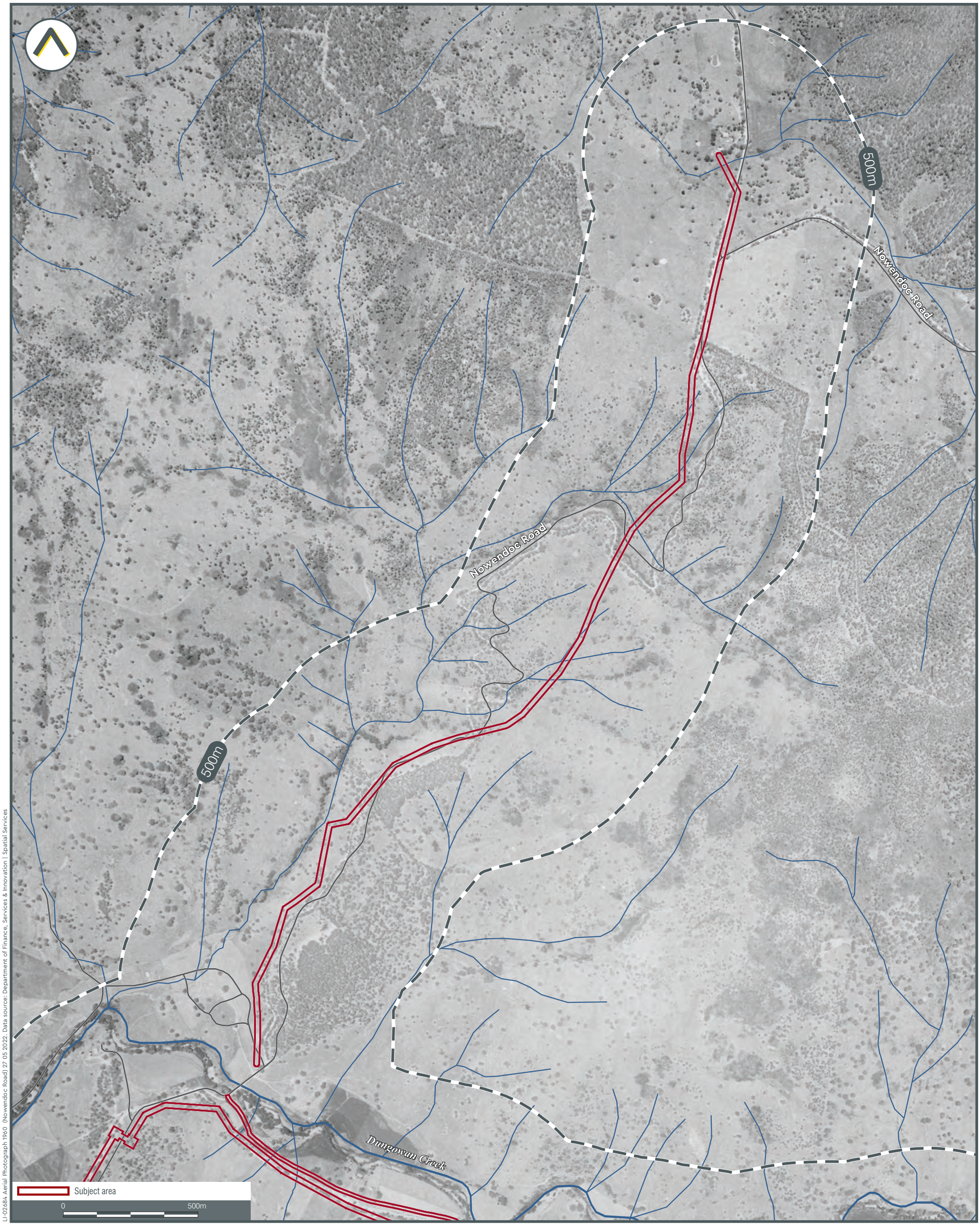

LI-02684 Aerial Photograph 1960 (Nowendoc Road) 27 05 2022. Data source: Department of Finance, Services & Innovation | Spatial Services

AERIAL PHOTOGRAPH - 1960 (Nowendoc Road)

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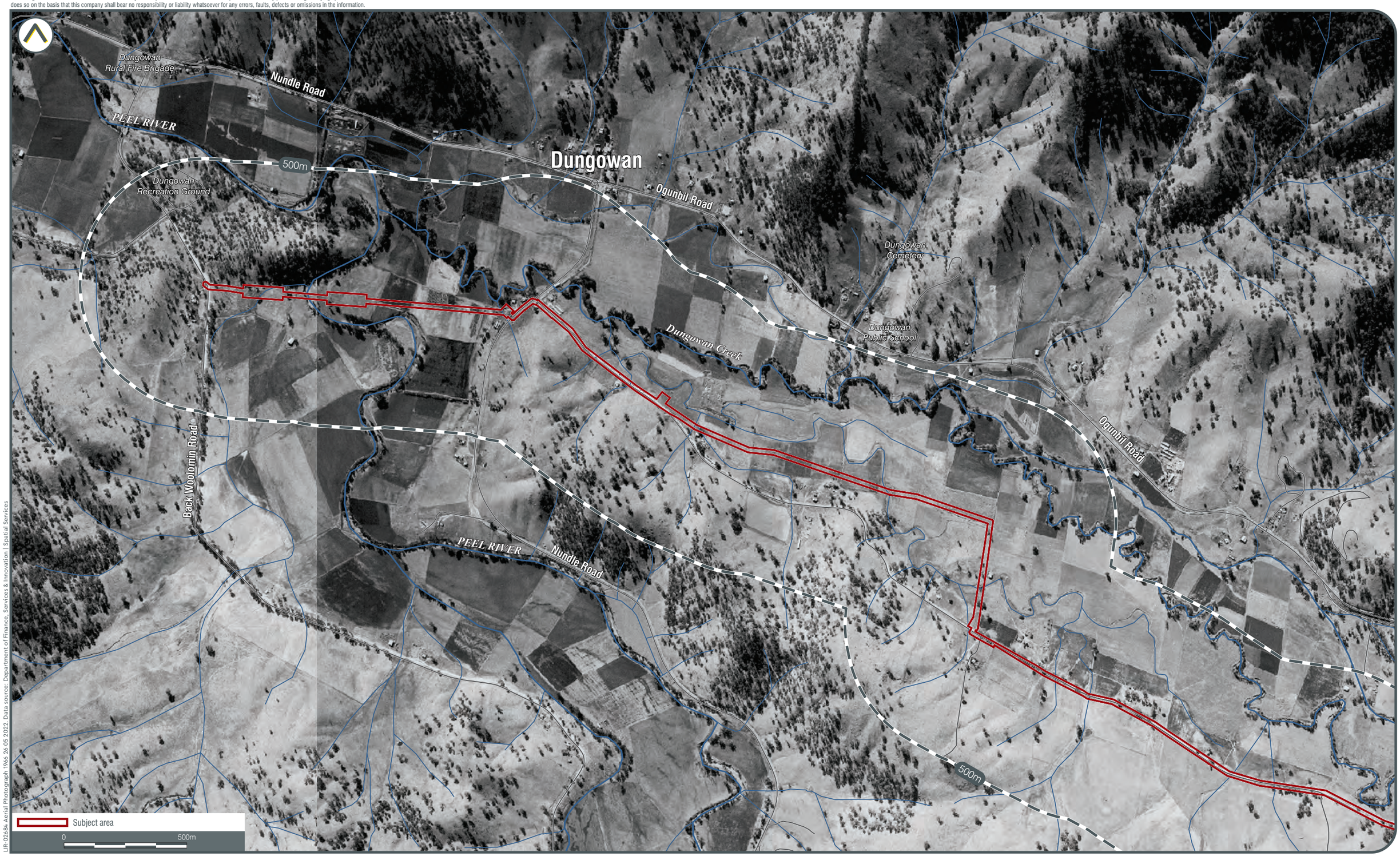

LIR-02684, Aerial Photograph 1966 26 05 2022, Data source: Department of Finance, Services & Innovation | Spatial Services

AERIAL PHOTOGRAPH - 1966 (0-5km)

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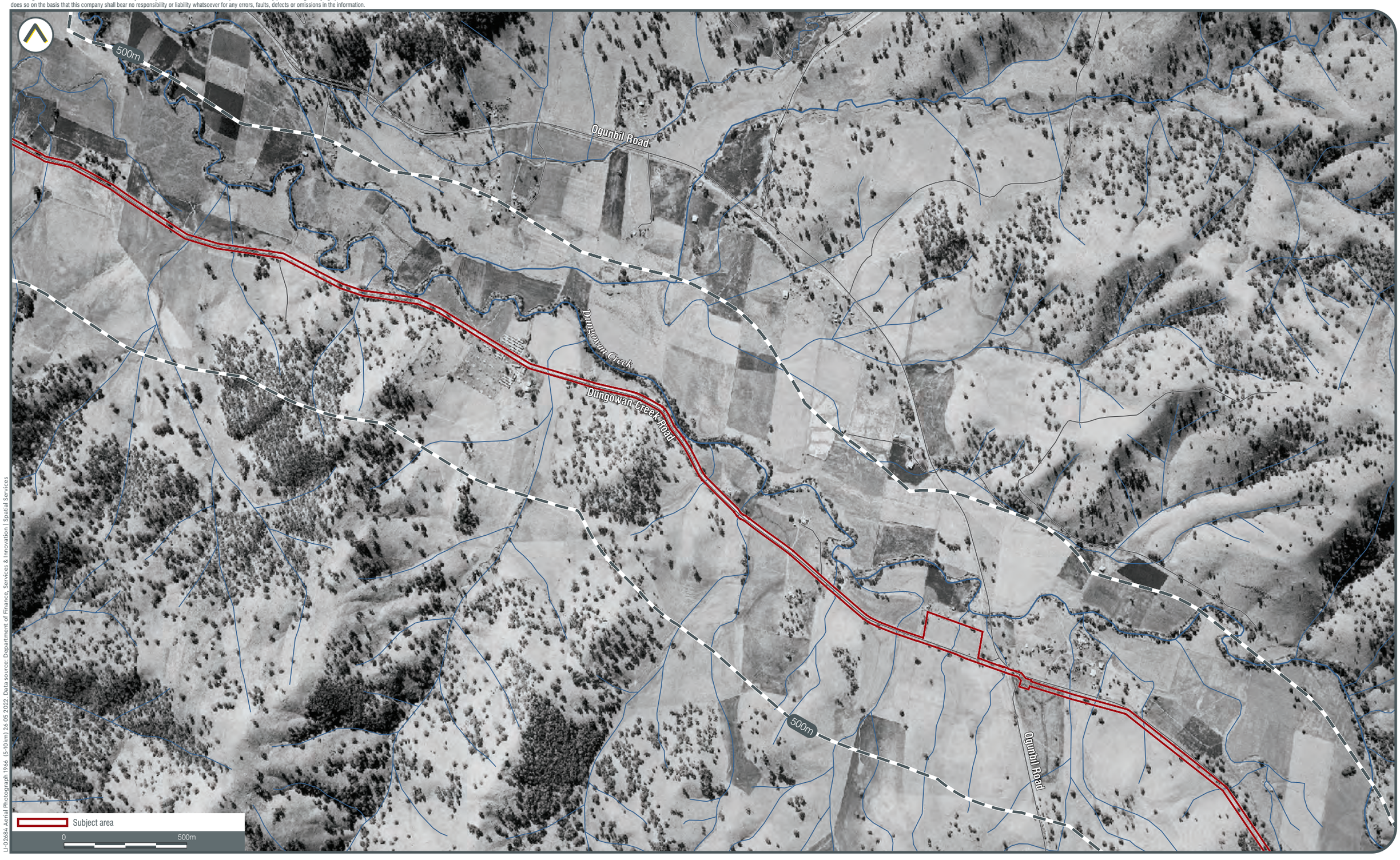

LI-02684 Aerial Photograph 1966 (5-10km) 26 05 2022. Data source: Department of Finance, Services & Innovation | Spatial Services

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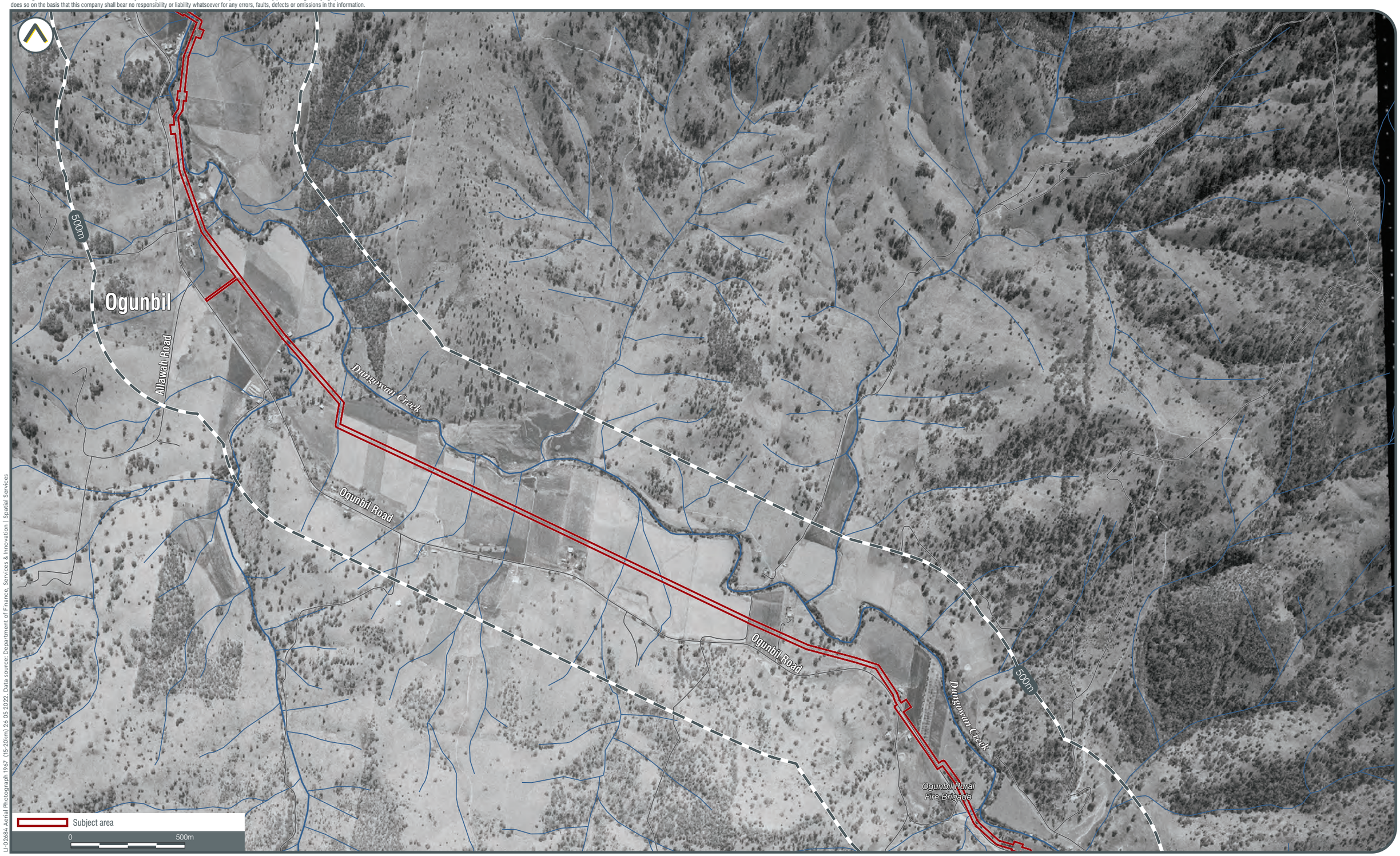

LI-02684 Aerial Photograph 1967 (15-20km) 26 05 2022. Data source: Department of Finance, Services & Innovation | Spatial Services

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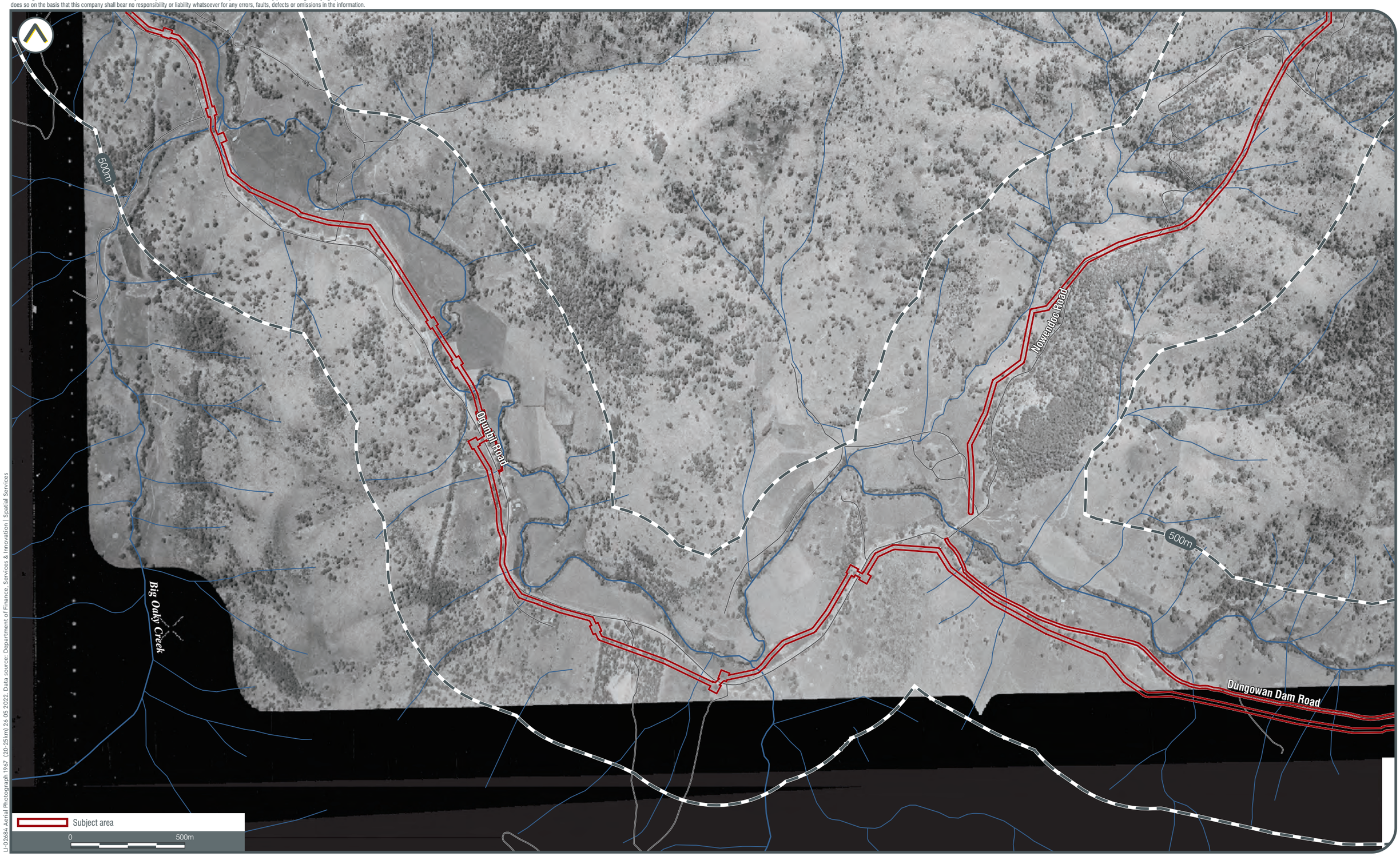

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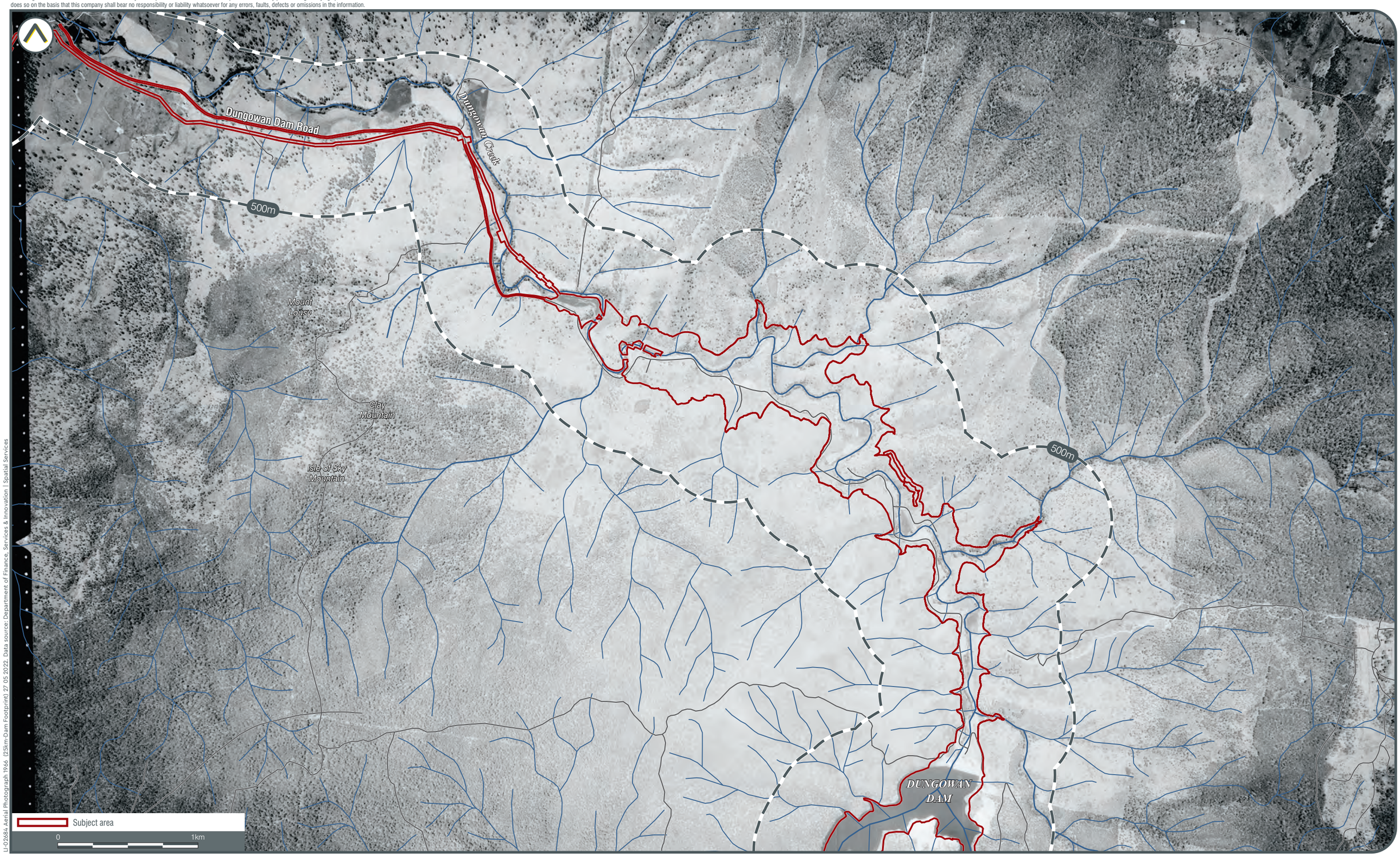

LI-07084 Aerial Photograph 1966 (25km-Dam Footprint) 27 05 2022. Data source: Department of Finance, Services & Innovation | Spatial Services

AERIAL PHOTOGRAPH - 1966 (25km-Proposed Dam Footprint)

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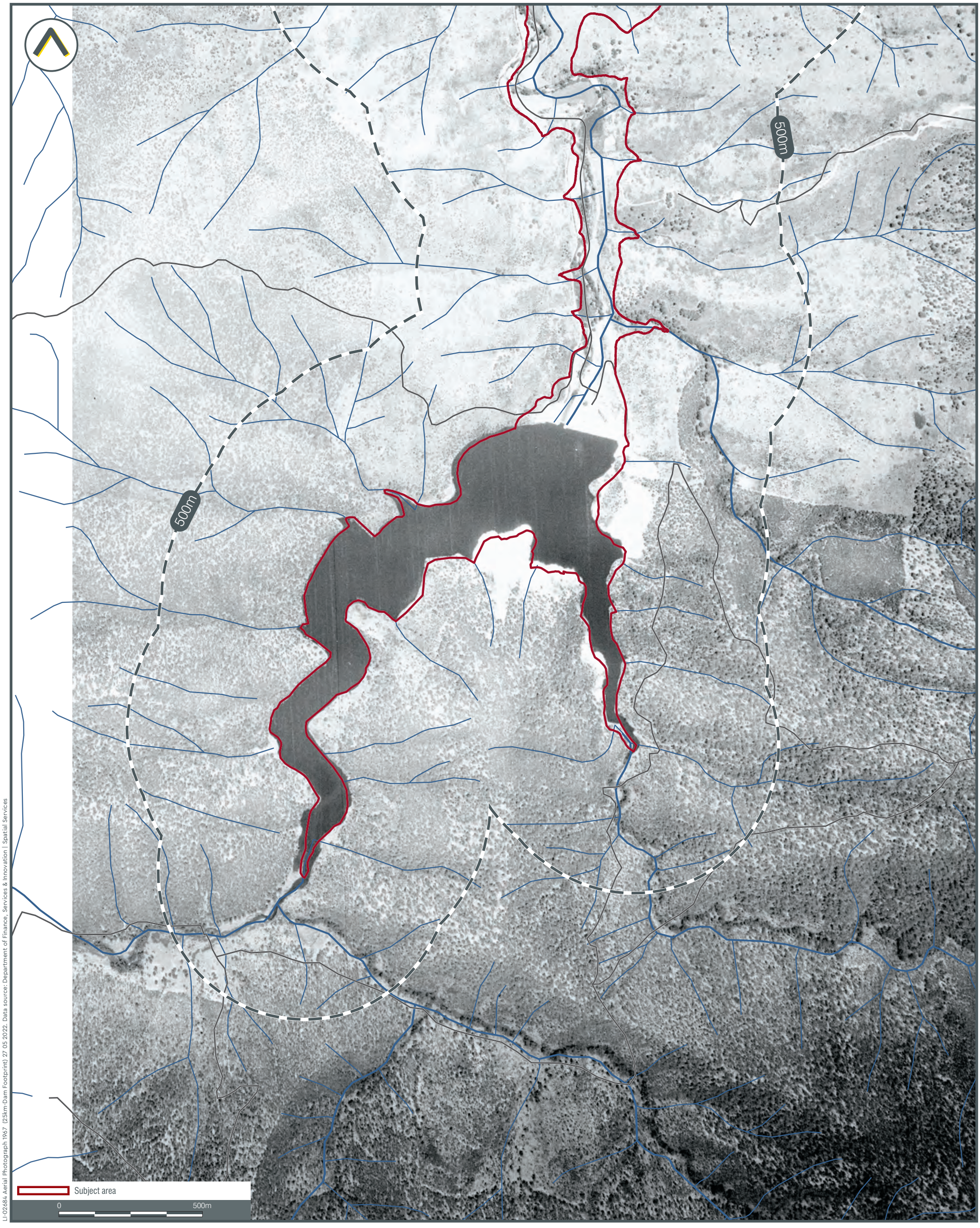

LI-02684 Aerial Photograph 1967 (25km-Dam Footprint) 27 05 2022. Data source: Department of Finance, Services & Innovation | Spatial Services

AERIAL PHOTOGRAPH - 1967 (Dungowan Dam)

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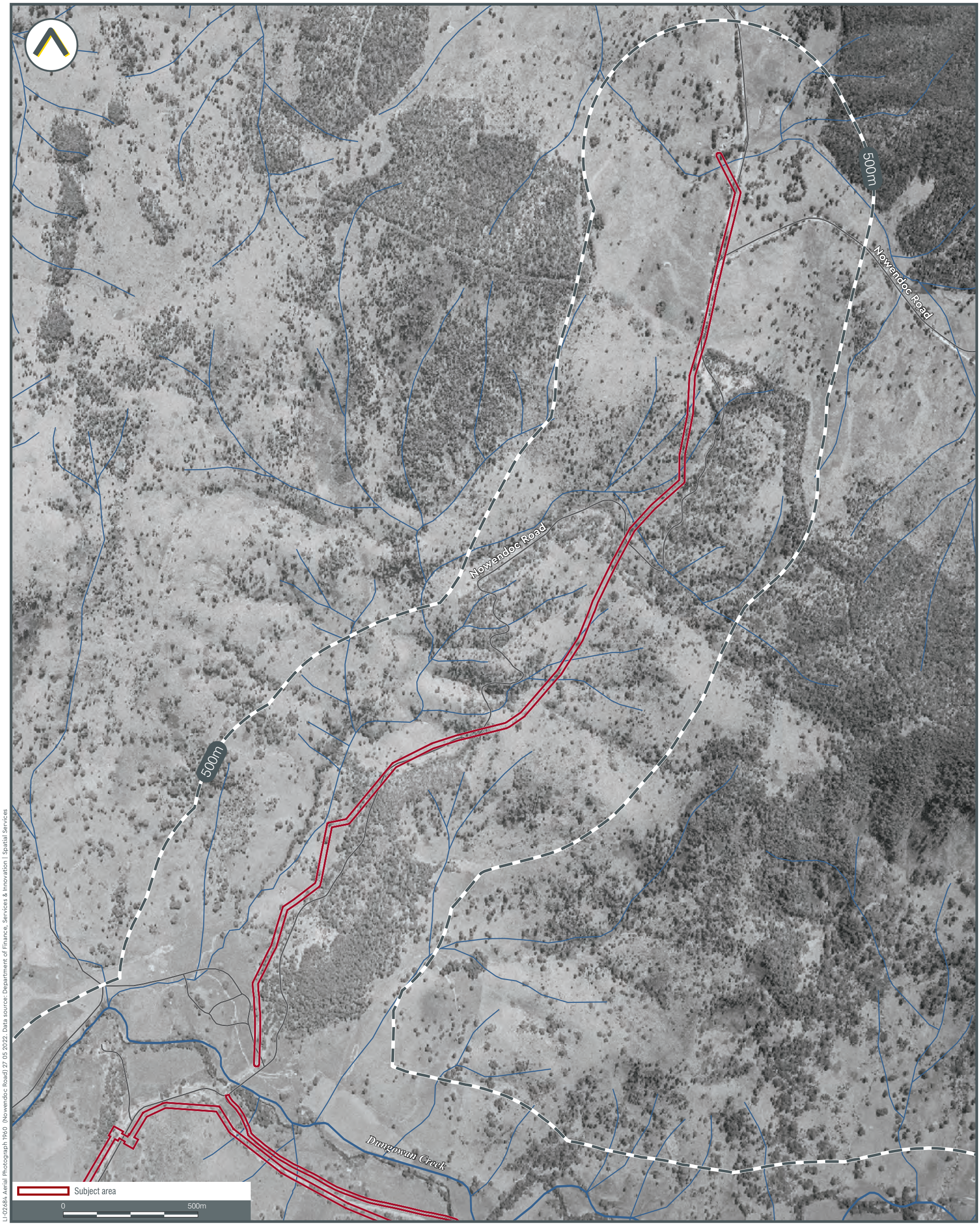

LI-02684 Aerial Photograph 1960 (Nowendoc Road) 27 05 2022. Data source: Department of Finance, Services & Innovation | Spatial Services

AERIAL PHOTOGRAPH - 1960 (Nowendoc Road)

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Annexure D

Cultural mapping report

EMM
creating opportunities

THE DUNGOWAN

ABORIGINAL LANDSCAPE REPORT

Philip A. Clarke

24th January 2021

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Confidential Report
Prepared for EMM Consulting
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20 Chandos Street
St Leonards, NSW, 2065

Executive Summary

The cultural mapping has determined the following:

- the relevant Aboriginal community to consult with in relation to the Dungowan Dam project is the Gamilaraay (sometimes called Komilaroi) people, and in particular members who live in towns and on properties in the greater Tamworth region and whose interests are represented by the Tamworth Local Aboriginal Land Council;[1]

- Members of the Fermor family, as represented by senior knowledge-holder Donny Fermor, have relevant experiences and knowledge of the Dungowan Creek area that help explain its cultural and historical relationships with the Gamilaraay community;

- Aboriginal people with connections to Dungowan Creek perceive the area, along with the surrounding country, as the product of deeds by the Creation Ancestors, such as the Catfish, and believe that it is within a mountainous region that is still be occupied by spirit beings, such as the 'hairy men';

- the presence of identified and purported Aboriginal sites, which include modified trees and stone arrangements, as well as gender-specific places, such as the men's area at Terrible Billy Creek, is consistent with the ethnographic model for the whole of Gamilaraay country; and

- while some identified and purported cultural and historical sites are within the footprint of the dam project, the men's area is outside it. During the mapping project there were no Aboriginal sites identified within the pipe alignment area.

Introduction

This report, generated from the desktop research and on-site investigations with key knowledge-holders, is a response to the need to capture the intangible values of the Dungowan Creek area as part of the broader proposed Aboriginal heritage investigations of the Dungowan Dam. It should be read in conjunction with reports that deal with relevant archaeological issues. The Study Area is defined as the greater Tamworth region of the Great Dividing Range surrounding the Dungowan Creek watershed, with a focus on the proposed Dungowan Dam footprint and associated pipe alignment.

The scope of the requested cultural mapping work was to:

- provide a brief review of existing anthropological and ethnobotanical literature in the region in order to establish the ethnographic model as context and to allow verification of oral history; and where possible to identify who speaks for country;
- to undertake an on-site investigation with key Aboriginal stakeholders in order to capture relevant oral histories and to document the local areas/features of traditional/contemporary value; and
- to develop a report that presents the methods for the tasks above and their findings, and provides a map of cultural values and any flora and fauna requiring further consideration (see Appendix A).

The opinions I express in this report are wholly or substantially based on my specialised knowledge, arising from my training, study and experience in the field of anthropology. The methodological skills that I have brought to this report are related to the generation and processing of data about the relationships human societies and cultures have with country. The methods of anthropology are basically those of social science in general and concern the application of reason and evidence in the understanding of society and culture. The use of these anthropological 'tools' is supported by a body of professional literature that was produced from the late-19th century to the present.

The following sections describe aspects of the Gamilaraay culture in order to build a model that will be relevant when assessing the findings of cultural mapping.

Aboriginal 'tribes', clans and language groups

The Study Area is part of the country occupied by the Gamilaraay people, who are a large group with prominence in the historical records and literature of Aboriginal Australia.[2] Their name was also often written as Gomeroi, Kamilaroi, Kamillaroi and other variations (see Appendix B). One of the foundational anthropological studies of Australian Aboriginal social structure was a detailed study of Gamilaraay (Kamilaroi) marriages published by Lorimer Fison in 1880.[3] Gamilaraay lands extend from central New South Wales into southeast Queensland. Traditional land ownership would have been held by the local clans, whose members had totemic and ceremonial responsibilities for looking after country. [redacted] To the east of the Gamilaraay clans residing in the vicinity of Tamworth is the country of the Nganyaywana (Anaiwan) people, and to the southeast the Dainggati (Daingati) and Biripi (Birpai) peoples (see Figs.1-4). The holding of initiation ceremonies and the organisation of marriages were not just restricted to the clans within each language group, as they involved people from across a broad region.[4]

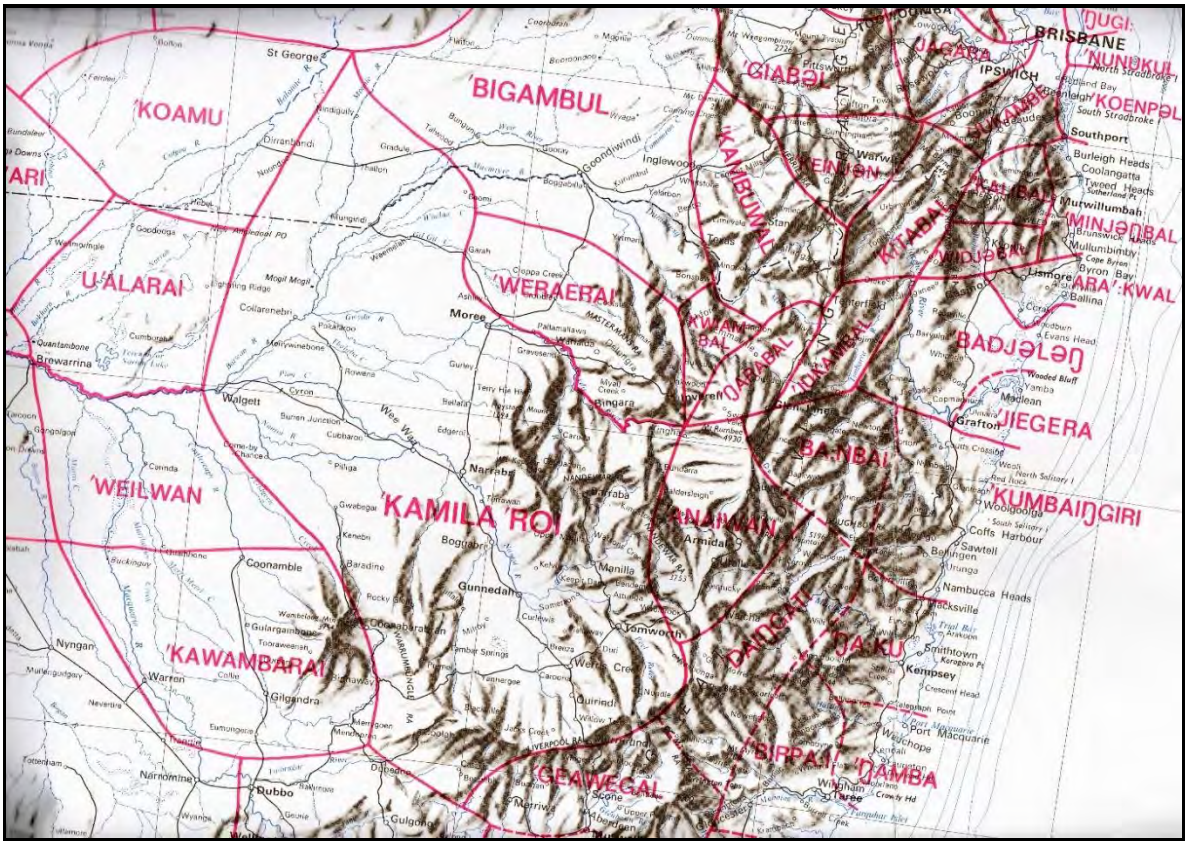
The historical mapping of Aboriginal connections to country within the Study Area reflects changing anthropological views about the nature of Aboriginal group structure. The early ethnographers, such as John MacPherson, mapped local land-owning groups as 'tribes' or 'clans' that were generally restricted to particular watersheds. In the mid-20th century, the museum-based scholar Norman B. Tindale combined many of these smaller groups into larger units, which he claimed each spoke a single language, and also generally married within and otherwise acted more or less independently of others.[5] Several decades of native title research in Australia has rejected Tindale's model, and has instead shown that the land-owning groups have more complex relationships with broader regional cultures whose members recognise many shared traditional laws and customs.[6] Linguists have mapped the distribution of the Aboriginal languages, and in relation to the Study Area have established that it was dominated by speakers of one of several dialects of the Gamilaraay language.

Fig.1. Map of the 'tribes' in New England (MacPherson, 1904, plate XXI). The location of 'tribe' boundaries appears to be influenced by the distribution of watersheds.

Fig.2. Detail of the 'tribes' in New England (MacPherson, 1904, plate XXI). The Study Area at Dungowan is shown as 'Kamilroi' (Gamilaraay) country, with the 'Inuwon' (Nganyaywana) to the near north, and 'Dang-getti' (Danggetti) group further east towards the coast.

The exact distribution of 'tribes', as reflected in the ethnographic literature, is confused by a number of factors, such as the conflation of land-owning groups with language groups, and by the historical movements of Aboriginal people. On the last point, Tindale explained that:

> John MacPherson (1904) published a sketch map of tribes in the New England area. This was based on statements of aborigines [sic] in the region between Tenterfield, Glen Innes, and Inverell. It is most useful for that area, but the more distant tribes are placed only in the general direction of where they are situated. Names of distant peoples are those current among his informants. He shows two Kamilaroi groups, evidently being misled by the very large area occupied by the Kamilaroi, into searching for differences.[7]


'KOAMU
'BIGAMBUL
'U'ALARAI
'WERAERAI
'WEILWAN
'KAMILA'ROI
'KAWAMBARAI
'GEAWEGAL
'BIRPAI
'DAMBA
'DAKU
'BANBAI
'KUMBAIŋGIRI
'JEGERA
'BADJƏLƏŋ
'MINJƏNBAL
'KOENPƏL
'NUNƏKUL
'JUGI
'KAMBUWAL
'KWAMBAL
'DJABABAL
'DJAKAMBAL
'KWAMBAL
'KITABAL
'WIDJƏBAL
'KALIBAL
'ANAIWAN
'DAJGAL
'JAGARA
'GIABƏL
'EINJƏN
'ARA'KWAL
'ARI
St George
Moree
Walgett
Narrabri
Coonamble
Gunnedah
Quirindi
Tamworth
Armidale
Dubbo
Warren
Nyngan
Gilgandra
Coonabarabran
Narromine
Inglewood
Warwick
Stanthorpe
Tenterfield
Inverell
Glen Innes
Grafton
Casino
Lismore
Byron Bay
Ballina
Tweed Heads
Coolangatta
Burleigh Heads
Southport
Surfers Paradise
Brisbane
Ipswich
Toowoomba
Dirranbandi
Goondiwindi
Mungindi
Goodooga
Collarenebri
Mungindi
Quantambone
Browarrina
Cumborah
Cubbaroon
Bourke
Brewarrina
Walgett
Cryon
Burren Junction
Pilliga
Baradine
Gwabegar
Rowena
Wee Waa
Narrabri
Boggabri
Manilla
Barraba
Gunnedah
Curlewis
Tamworth
Werris Creek
Quirindi
Liverpool Plains
Mullaley
Gulargambone
Coonabarabran
Mendooran
Dunedoo
Coolah
Merriwa
Scone
Aberdeen
Muswellbrook
Singleton
Maitland
Newcastle
Port Stephens
Nelson Bay
Raymond Terrace
Kempsey
Port Macquarie
Crescent Head
Wauchope
Taree
Wingham
Gloucester
Forster
Tuncurry
Nambucca Heads
Coffs Harbour
Sawtell
Bellingen
Urunga
Woolgoolga
Red Rock
Grafton
Maclean
Yamba
Wooded Bluff
Evans Head
Ballina
Lismore
Mullumbimby
Brunswick Heads
Cape Byron
Byron Bay
Murwillumbah
Tweed Heads
Coolangatta
Burleigh Heads
Southport
South Stradbroke
North Stradbroke
Redland Bay
Logan
Ipswich
Toowoomba
Warwick
Stanthorpe
Inglewood
Texas
Yelarbon
Talwood
Boomi
Bungunya
Wyaga
Mungindi
Goondiwindi
Dirranbandi
Nindigully
Gradule
Hebel
Mogil Mogil
Collarenebri
Pokataroo
Mungindi
Gurley
Terry Hie Hie
Rowena
Wee Waa
Burren Junction
Cubbaroon
Pilliga
Baradine
Gwabegar
Kenebri
Rocky Gully

The Gamilaraay language has been studied by linguists using historically recorded wordlists and the recordings of the last fluent speakers who were still alive in the 1950s.[9] Although the language is no longer spoken fluently, the Gamilaraay community derive from it many important aspects of their contemporary identity, apart from just its name.

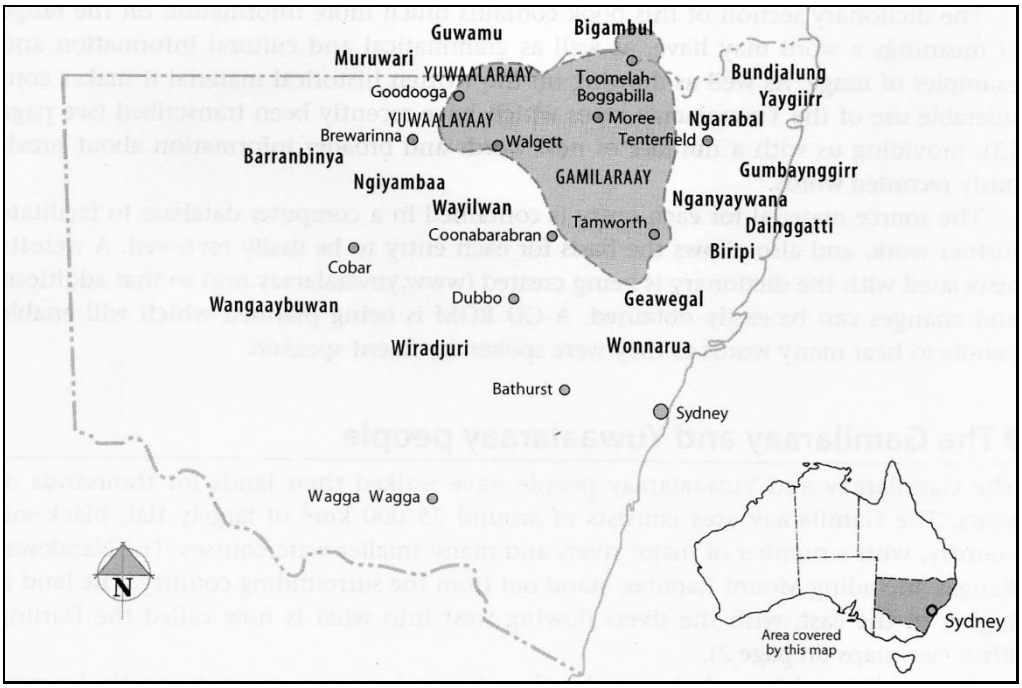


Fig.4. The former distribution of speakers from the Gamilaraay, Yuwaalaraay and Yuwaalayaay language cluster (shaded grey), and surrounding languages (Ash *et al.*, 2003, p.2). Note that Dungowan Creek is to the southeast of Tamworth and just within Gamilaraay country.

Contemporary Aboriginal people who identify as Gamilaraay are widely spread across New South Wales. They are descendants of people who, during the restrictive welfare period of the early-20th century,[10] were based in declared Aboriginal reserves such as Brewarrina, Boggabilla, Kempsey, Pilliga Station and Wallaga Lake, where genealogical data was compiled by Tindale in 1938-39.[11] In recent decades, members of the Gamilaraay community who have maintained a connection to country have attempted to gain native title recognition by registering the Gomeroi People native title claim (NC2011/006; NSD37/2019), which is yet to be determined. The section of Dungowan Creek within the footprint of the intended works is just outside of the native title claim area, and there are no other registered native title claims in the vicinity.[12]

Ancestors and spirit beings

It is a Gamilaraay tradition that during the Creation (Dreamtime) a god-like male Ancestor, Baiame (Baiamai, Bayme), created rivers, mountains, and the forests on Earth.[13] He also gave Aboriginal people their traditional laws and practices. Baiame made the first initiation site, known as a *bora*, where teenage boys were made into men. Many of the surrounding groups had the same or related beliefs concerning Baiame.[14] For the Gamilaraay, images of Baiame and his wife [redacted] which were drawn on the ground, bark sheets and on tree trunks, were utilised for the bora ceremony during which male youths were initiated.[15] Particular waterholes were reportedly seen as dangerous places. The Gamilaraay believed in the existence of 'a legendary, serpent-like monster called the [redacted] which is supposed to have its abode in deep lagoons and other sheets of water, and devours human beings who may come within its reach'.[16] These 'monsters', which were sometimes described as 'crocodile' beings, are related to the Rainbow Serpent.[17]

The ethnographic literature of southeastern Australia has many accounts of humanoid creatures who were separate from both Aboriginal people and their Ancestors, but who also occupied the landscape.[18] For instance, in the southeast of New South Wales, the ethnographer Robert H. Mathews documented the Yaroma, which was believed to be 'a creature closely resembling a man, but of greater stature, and having hair all over the body'.[19] It is believed that the Australian English word, 'yowie', was derived from a northern New South Wales Yuwaalaraay word, *yuwi*, meaning a 'dream spirit'.[20] Beliefs in the existence of spirit beings in the local folklore is one of the enduring aspects on Aboriginal culture across Australia.[21]

Aboriginal people of southeastern Australia believed that the health of the river system was maintained by the Creation Ancestors, whose actions in shaping the land and making the waters were later celebrated in ceremonial dance, ritual and song.[22] It was a belief that after the Creation was over, [redacted]. In this way, the physical and cultural dimensions of looking after country were closely intertwined. For contemporary Gamilaraay people, the traditions of the past are still relevant, in spite of the last of the bora ceremonies having occurred back in 1895 at Tallwood.[23] Today, Aboriginal people in southeastern Australia perceive that the wellbeing of their community is dependent upon the 'cultural flows' in the rivers and creeks of their country.[24] Leaving enough water to flow through the water courses serves to maintain or improve the cultural value of the whole river

system.[25] In the Murray-Darling Basin, Aboriginal people assert that the adequate allocations of water for cultural flow supports the continuation of their cultural activities, such as fishing, hunting, artefact-making, ritual and the maintenance of their knowledge on the tracks of the Ancestors.[26]

Gender-specific sites

The early ethnographic literature for eastern New South Wales mentioned sites that have specific significance to either men or women. The bora ceremonies were important for the whole community, although specifically directed at the education of young men.[27] Mathews stated that for the Gamilaraay people:

> The Bora is a great educational institution for the admission of the youths of the tribe to the privileges, duties, and obligations of manhood. The ceremonies are apparently intended to strengthen the authority of the elder men over the younger, and to impress in an indelible manner those rules of conduct which form the moral and civil law of the tribe.[28]

The 'head men', whose duty it was to prepare the bora ground, would invite Aboriginal groups in from the surrounding region.[29] Mathews said that 'A suitable camping ground is accordingly selected near some river, creek, or waterhole in a part of the tribe's domain in which there is sufficient game and vegetable products to furnish food for all the people during the continuance of the ceremonies'.[30]

In the case of women, there were also places where they would conduct certain rituals. Enright recorded that there was a deep waterhole close to Salamander Bay in the central coast of New South Wales where once 'women resorted to perform increase ceremonies'.[31] He also claimed:

> When any woman of the Worimi [Warrimay] tribe residing about Port Stephens, New South Wales, desired to have a child, she would go to a big fresh-water hole near Sandy Point; there she would express her wish to have a child, and then completely immerse herself in water. No further rites were performed.[32]

Modified trees

Today, living and dead trees are often found with scars, and, in a few cases, these are deep enough to have involved cutting into the heartwood. Today, such scars are sometimes seen as the possible result of an Aboriginal modification to the tree, and in areas where there are old trees of various long-lived species this remains a possibility. In earlier times, trees were deeply scarred when Aboriginal people extracted green wood from living trees to make artefacts, and when they removed bark sheets for a variety of purposes.

The Aboriginal practice of carving *en bloc* from the living tree, when making a range of artefacts, was common across Australia.[33] The green wood was seasoned over the fire during the manufacturing process. Bundjalung people in northern coastal New South Wales carved their shields directly from the trunks of grey mangroves, with many scarred trees still reportedly found in the estuaries today.[34]

The 'dendroglyphs', which are decoratively scarred trees, are a distinctive feature of the Aboriginal material culture for New South Wales.[35] Along the north coast of New South Wales the designs were incised into the bark, but to the west of the Great Dividing Range they were made by the removal of bark in order to expose the heartwood for deep decorative carving. The scarred trees were typically located near the bora or ceremonial grounds in the forests of central and eastern New South Wales and southeast Queensland.[36] Other trees were scarred to mark the grave of an important member.[37] Dungowan Creek is not an area where such decoratively scarred trees have been found, although they have been recorded to the west at Tamworth.[38]

Bark was also removed for a variety of purposes, such as for making artefacts, burial containers, canoes and for shelters.[39] In eastern New South Wales, sheets of bark, probably cut from eucalypts, had images of spiritual Ancestors painted on them for display at Bora initiation rituals.[40] When the bark sheeting was removed from long-lived species, like the river red gum (*Eucalyptus camaldulensis*), the resulting scar could persist over a hundred years. When the scar was relatively small, such when removed to make a bark dish, the scar would heal over in a matter of a few decades. In rare cases, when the trees have died soon after the bark was cut, the dead trunks have remained much longer with their evidence of the bark removed being apparent.

Stone arrangements

Aboriginal stone arrangements were widely recorded across Australia, although generally the ethnographic evidence for their meaning and intended use is poor since they were often discovered in the landscape independent of their Aboriginal custodians.[41] Such structures have been recorded in New England.[42] The Gamilaraay people would sometimes bury their dead in the ground, using logs and dead wood to keep dingoes away,[43] and so it is possible that stones were similarly used, but previous documentation of this remains absent.

Stone arrangements were often found at ceremonial sites which were at centres where important rituals were performed. Anthropologist Alfred Radcliffe-Brown stated:

> At such centres there is sometimes a natural feature, such as an outcrop of rock, a cave, or a tree or trees, which play some part in the ceremony. Sometimes a temporary structure of bushes may be made for the ceremony. Very frequently the ceremonial ground is marked out by heaps or lines of piled up soil, or by heaps and lines of stones. Each ceremonial ground has its own particular arrangement and plan, no two being exactly the same, though certain general principles recur with some frequency.[44]

Some of the stone arrangements in the vicinity of bora grounds near creeks may have related to the Catfish Ancestor. Enright explained, from inland of the Port Stephens area, that:

> Recently I have learnt that when the candidate for initiation was taken to each of the carved trees around the scared ring he was told a story about the carvings thereon. The aborigines [sic] have a legend that it was the cat-fish who founded the "Keepara" ceremony [Bora for male initiations], and pointed out as proof that the catfish built a ring of stones as a nest, and the male guarded it. If we knew the full story we might find that the catfish embodies one of their ancestral heroes.[45]

Ethnobiology

There is a considerable body of literature relating to the Australian Aboriginal use and perception of plants and animals for the region that contains the Study Area.[46] From this it can be determined that the flora and fauna of the Study Area would have provided important sources of food, medicine and materials for making artefacts. The Great Dividing Range was where the first plant collectors were sent out from the late-18th century, along with their Aboriginal assistants, to gather plant specimens for their botanist masters in Europe.[47]

It is likely that Aboriginal people in the New England region, as with other parts of Australia, possessed a rich pharmacopeia. The use of herbal remedies was structured by Aboriginal beliefs concerning the fundamental causes of sickness.[48] From the coast of New South Wales, missionary William Ridley wrote that here:

> The medical properties of various herbs are known to the blacks. One common medicine is "boiyoi" (pennyroyal [*Mentha satureiodes*]), a tonic. The people are strongly endowed with the self-restoring force, and recover from the ghastly wounds often inflicted in their fights with wonderful rapidity. Their usual surgical treatment of a wound is to rub earth into it. But the chief business of the medicine-man (krodgee or kuradyi) is to disenchant the afflicted. All kinds of pain and disease are ascribed to the magic of enemies; and the usual way in which that magic is supposed to be exercised is by injecting stones into the body of the sufferer.[49]

John MacPherson has provided an account of Aboriginal medicine as practiced by specially trained 'doctors', who had been initiated at the 'Bull-bah', or 'Bora Initiation ceremonies',[50] and their treatments involved much 'blowing, manipulating and sucking'.[51] Some of their treatments involved the use of plant medicines. MacPherson reported that:

> The tannin-containing kino of the Apple-tree (*Angophora* sp.) was included in the Ngarrabul pharmacopeia. Mr. J. F. Mann also speaks of the use of the astringent sap [kino]of the Apple tree in aboriginal [sic] therapeutics. In times of drought the Yukumbul Blacks procured water from Apple trees to obviate their drinking impure, natural water ….[52]

Howitt described the *koradji*, who was a 'medicine-man and doctor' among the Gamilaraay people, and explained how they utilised sucking as a treatment, but he also said:

> I have learned that these Koradjis also applied herbs as remedies, and treated snakebite by sucking and then rinsing out their mouths with water. They also used the "earth bath" as a cure for colds, which was effective, unless the patient were weak and died.[53]

Cultural Mapping Methods

My approach to a cultural mapping exercise is broadly the same that I employ as a consultant anthropologist working in the arenas of native title and land rights, and it includes a strong emphasis on the use of historical material to show continuity with the present. This

methodology was discussed with Dr Alan Williams, the Aboriginal heritage study lead at EMM Consulting Pty Ltd, prior to commencing the work.

Cultural mapping

Cultural mapping is described more fully as cultural resource mapping or cultural landscape mapping, and it refers to an eclectic range of research techniques and scholarly tools that are employed to 'map' the tangible and intangible cultural assets of people within the local landscape. UNESCO recognises that cultural mapping is a crucial tool and technique in preserving the world's intangible and tangible cultural assets, as part of their brief to safeguard cultural diversity in a rapidly transforming global economy.[54] It involves the application of a wide variety of techniques and activities, from community-based participatory data collection and management to the use of sophisticated mapping based on Geographic Information Systems, in order to come to terms with cultural resources for communities and places. Proponents of cultural mapping as cultural inquiry have claimed that:

> From this perspective, cultural mapping is regarded as a systematic tool to involve communities in the identification and recording of local cultural assets, with the implication that this knowledge will then be used to inform collective strategies, planning processes, or other initiatives. These assets are both tangible, or quantitative (e.g., physical spaces, cultural organizations, public forms of promotion and self-representation, public art, cultural industries, natural and cultural heritage, architecture, people, artifacts, and other material resources) and intangible, or qualitative (e.g., values and norms, beliefs and philosophies, language, community narratives, histories and memories, relationships, rituals, traditions, identities, and shared sense of place). Together, these assets help define communities (and help communities define themselves) in terms of cultural identity, vitality, sense of place, and quality of life.[55]

As with all heritage work in Aboriginal Australia, the sites that are discovered through cultural mapping are comprised of places, such as historical buildings and other structures, that scholars would emphasise as being regionally important, but also of sites that Aboriginal people consider are particularly important for their own local cultural identity, such as those associated with spirit beings and ceremonial beliefs. As an anthropologist, I categorise the recorded sites in the following way:

- Cultural sites that can reasonably be assumed to have been in existence when Europeans first arrived in the region, or at least shortly afterwards when Aboriginal people were

still living in a traditional foraging lifestyle. These are places, such as specific bora grounds, that are documented in the available records, or sites, like scarred trees, that can be archaeologically determined to be of early Aboriginal origin. It is these established cultural sites that are often recorded on Aboriginal heritage site registers maintained by government authorities.

- Social history places, such as former Aboriginal house sites, gazetted cemeteries and schools associated with the local Aboriginal community. The documentation of these places helps to build a narrative that explains the experiences that members of local Aboriginal communities have had growing up on a country, and often reflect themes such as the excessive control of Aboriginal welfare agencies and poor social conditions. These historical sites, particularly those defined as missions and designated Aboriginal camps and reserves, are also often recorded on Aboriginal heritage site registers.

- Purported cultural sites that have come to attention of the project team through senior community members travelling to an area, for which they may have little or no direct life experience, and then interpreting the landscape through a process of seeing what is there (i.e., archaeological material on site, potentially Aboriginal modified trees etc.) and gauging their own reaction to the space (i.e., their feelings of a spirit's presence, Ancestor's powers etc.). This category of sites highlights the cultural values of the environment as perceived by contemporary Aboriginal people, but can be problematic for a number of reasons, such as by asserting the existence of places based on a single person's reactions and by generating sites for which they can be no ready means of validation, either through the shared experience of other community members outside the parameters of the project or through matching with existing records. The recording of such sites poses a major risk of juxtaposing a contemporary Aboriginal view of a place with that of a heritage professional, such as an archaeologist, historian or anthropologist.

The method undertaken in the current cultural mapping exercise was to record all places that the Aboriginal participants have declared to have some significance to them, and to determine whether there exists any sense of spatial boundaries. Through documenting the proposed sites an attempt would be made to determine the extent to which the stated importance

is based on existing experience and knowledge of the Aboriginal informant, and to ascertain whether this is likely to be a shared opinion with other Aboriginal participants. The site data obtained is compared with the model of Aboriginal relationships with country, described above in the Introduction section of this report, and then summarised in the Results section below. The conclusions of the cultural mapping exercise are provided in the Summary section.

Fieldwork practice

The Aboriginal people who I interviewed for the Dungowan Dam project were briefed prior to my arrival by EMM about the role I was undertaking, and the intended aims for my component of the project. Additionally, upon meeting the Aboriginal participants on country I explained what type of work I generally do (i.e., land claims, native title claims, mining meetings etc.) and what categories of information I needed to record in order to enable the writing of a report that would put the landscape into an Aboriginal cultural perspective.

Once introductions between the Aboriginal participants and myself were complete, as planned I invited the Aboriginal knowledge holders to take me to the sites that were relevant to the project, including places they had prior knowledge of through their own life history and those sites that were discovered more recently during archaeological surveys. At the conclusion of each session, we took the opportunity to briefly discuss what we had seen and spoken about during the day, and I then offered participants the opportunity to add to anything that they had earlier mentioned. I also checked key information with them to make certain that I had recorded it appropriately.

Information was gathered through a set of questions I had already formulated, as well through the act of following up points raised through the many informal conversations during the day. It was made clear to participants that if there was anything cultural or otherwise that I should not record, either in my fieldnotes or with my camera, that they would tell me and that I would comply without question. Due to rough field conditions, data was to be first recorded as a form of shorthand in an exercise book, before I would transcribe it into a more comprehensive anthropologist's journal format at the conclusion of each session (i.e., at night back in the motel). Although video and tape recorders are sometimes used during field consultations, I do not utilise this recording technology as in my experience they often have

the effect of truncating the information being offered – the use of a notebook is far less intrusive.

As a practice, all information in my journal is dated, so it is apparent if anything is added, such as a footnote on the lefthand side which I leave blank for this purpose, which was not part of the original recording. I keep the rough notes in case these are ever needed for legal reasons, but I have always found that the journal account is amply sufficient for generating the text for my reports. I also take many digital photographs during the course of the fieldwork, and these images are used as reminders to help with my journal writing and can be useful for other purposes, such as report production. As a consultant anthropologist, I routinely leave copies of my relevant journal entries and photographs with the clients, in this case EMM. A draft of this report was commented upon by the participants.

Results

At Tamworth on the morning of the 12th of October 2020, I met Donny Fermor, who is a senior Gamilaraay (Komilaroi) community member. Along with archaeologist Pamela Chauvel from EMM and Donny's son, Edward (Waddy) Fermor, we travelled towards Dungowan Dam to begin the week's work. On this day and the next, we visited places that had already been identified by Donny during the survey stage of the project. On the 14th of October, we were joined by Gamilaraay man Aaron Talbott from Gunnedah, and Edward Fermor was replaced by his sister Michelle Fermor for the last day in the Dungowan Creek area. On the 15th of October, Pamela Chauvel and I interviewed Aaron Talbott in Tamworth. I returned to Adelaide via Sydney the following day.

During fieldwork, a number of plants and animals were said by the Aboriginal participants to have some significance to the local culture. This information is summarised in Table 1 below. The sites visited during cultural mapping exercise were chiefly those that were considered by the Aboriginal participants, after the initial survey prior to my arrival, to have some cultural status. Table 2, below, provides the site data I recorded for sites and places for which there is some anthropological support. Table 3 provides site data for places that were identified, but which could not be verified anthropologically.

Table 1. Important plants, animals and spirit beings identified by Aboriginal participants during fieldwork.

Common Name	**Species**	**Notes**
Plants		
Bush tomatoes	*Solanum* species	Eaten with watercress like a salad.
Gumtrees	*Eucalyptus* species	Bark slab cut from the trunk used as a burial shroud when transporting the body to a place up in the tree. Scarred trees were typically found along walking tracks. Green foliage, silver-leaved gum preferably, used for smoking ceremonies to rid people of any bad spirits picked up when walking through country. Kino (resin) is mixed with ochre and used medicinally.
Kurrajong	*Brachychiton populneus*	Inner bark used for making string for netting. Edible seeds crushed up and then baked into cakes. As a contemporary practice, a person at Gunnedah makes milky coffee from the seeds.
Mistletoe, snotty gobble	*Lysiana* & *Amyema* species	Edible fruit, although sticky.
Native orange	*Capparis mitchelli*	Edible fruit. Known in Gamilaraay as *bambul*. Woman's tree. [redacted]
Native passionfruit vine	*Passiflora* species	Edible fruit.
Native willow	*Pittosporum angustifolium*	Widely known as *gumbi-gumbi*. Used medicinally to treat infections, burns and reduce tumours. As a contemporary practice, a person in Inverell dries the leaves and puts them into capsules.
Quinine-bush	*Petalostigma pubescens*	The light bark from the root was boiled and used as a fish poison in small ponds.
River oak	*Casuarina cunninghamiana*	Gamilaraay woman, Lindy Bartel, told Donny Fermor that the river oak was a 'grounding tree'. It soothes Donny, and just before it rains it sometimes starts to 'cry' (drips water) – afterwards it rains.
River red gum	*Eucalyptus camaldulensis*	When river red gums in flower, its spring time & Murray cod fish are breeding – 'don't fish'.

Sandalwood	*Santalum lanceolatum*	Foliage used for smoking ceremonies, which are performed for 'cleansing bad spirits'.
Stinging nettle	*Urtica* species	Boiled juice of the nettle is good as a rub for arthritis. Leaf is boiled and eaten like cabbage.
Tall flat-sedge	*Cyperus exaltatus*	Stems used for making fibrecraft, such as baskets and rope.
Yellow box tree	*Eucalyptus melliodora*	Used for an early stage of burial. Aaron Talbott said that the Red Chief of the Gamilaraay people was placed inside a yellow box tree, probably prior to the remains being removed for burial elsewhere.
Unknown - special leaf	Unidentified species	Donny's mother's brother, Mervan Gardiner, would treat the family when they were feeling sick with a special leaf wrapped in cloth, but he doesn't know what it was.
Watercress	*Centella asiatica*	A favourite food, that grows in shallow water. Young fresh growth eaten, as older growth has a bite to it. Eaten with bush tomatoes.
Wild fig	*Ficus* species	Wild fig trees were planted at sacred sites.
Wild tobacco	*Verbascum thapsus*	Tobacco made from the root. It was mixed with rum to 'keep it moist', and it would then be smoked. This plant was introduced into Australia, having originated from Europe and north Africa.
Wilga	*Geijera parviflora*	[redacted] Foliage used as a painkiller and as a hallucinogenic.
Wild quince	*Alectryon subcinereus*	Edible fruit.
Yam daisy	*Microseris lanceolata*	Edible tubers.
Insects		
Bull ants	Various species	Donny's mother's brother, Mervan Gardiner, would pull off the head of the bull ant and place it's closing jaws along the edge of deep cuts for sutures. For each cut, several of them were used in this way, the number depending on the length of the wound.

Fish		
Fish in general	Various species	Known in Gamilaraay as *dula*. Fishtraps used in the region. At Bendemeer there is a large scoop pool in the creek, and close by a smaller wading pool for keeping the caught fish.
Freshwater catfish	*Tandanus tandanus*	Fished in the Dungowan Creek. The ceremony for this species is associated with Terrible Billy Creek. The Catfish Ancestor carved out the rivers.
Murray cod	*Maccullochella peelii*	Fished in 'cod hole' of the Dungowan Creek below Donny Fermor's old house site. 'Don't fish' when the river red gums are in flower, as the fish are breeding.
Trout	*Salmo trutta*	Fished. Introduced species.
Yellowbelly	*Macquaria ambigua*	Fished in the Dungowan Creek.
Reptiles		
Goanna	Various species	Hunted for food. Liver is medicine – mixed with ochre and blood.
Blue-bellied black snake	*Pseudechis guttatus*	Known in Gamilaraay as *ngurray*. Totemic species.
Red-bellied black snake	*Pseudechis porphyriacus*	Known in Gamilaraay as *galibaay*. [redacted]
Birds		
Emu	*Dromaius novaehollandiae*	Dark spot in the Milky Way represents the Emu Ancestor, while other dark spots nearby are the eggs. Before these 'eggs' can be seen in the night sky, the male emu is sitting on them – should not be collected then.
Kookaburra	*Dacelo novaeguineae*	Known in Gamilaraay as *gugurrgaagaa*. Sings out as a sign for a storm. Follow them for fish in a creek – 'leave one behind – respect'.
Owl	Various species	Special totemic and spirit bird for the Gamilaraay.

Wedge-tailed eagle	*Aquila audax*	Known in Gamilaraay as *maliyan*. This bird is Baiame, 're-incarnation of deity'. He 'cut off one of its legs to make man' and 'sours above watching us'.
White cockatoos	*Cacatua galerita* (probably)	Donny Fermor was told by Gamilaraay man, Len Waters, that in the Dreamtime these birds fly across the heavens as the Pointers, while looking for their former roosting tree, the Southern Cross.
White-tipped currawong (pied currawong)	*Strepera graculina*	Known in Gamilaraay as *galawa*, and in Nganyaywana as *galapa*.
Willie-wagtail	*Rhipidura leucophrys*	Known in Gamilaraay as *dhirridhirri* ('sticky beaks'). It is a 'messenger bird' and 'trouble-maker', and if you 'see them, then someone is coming'. Also called 'farmer's friend'.
Mammals		
Cat	*Felis catus*	Known in Gamilaraay as *burrgiyan*.
Cattle	*Bos taurus*	Cattle pats were burnt in the house to keep mosquitos away.
Dog	*Canis familiaris*	Tame dog used in hunting. Known in Gamilaraay as *buruma*.
Echidna	*Tachyglossus aculeatus*	Hunted for food. Known in Gamilaraay as *bigibila*. Totemic species.
Eastern grey kangaroo	*Macropus giganteus*	Hunted for food. Known in Gamilaraay as *bandaarr*. Burning the grass brought them in when new growth appeared. Kangaroo manure was burnt in the house to keep mosquitos away.
Kangaroo rat	*Dipodomys* species	Seen at Dungowan when Donny Fermor was a child.
Koala	*Phascolarctos cinereus*	Totemic species for the Anaiwan. Not eaten by most.
Platypus	*Ornithorhynchus anatinus*	Once eaten for food – rare now.
Rabbit	*Oryctolagus cuniculus*	Hunted for food. Known in Gamilaraay as *bina guraarr*, *wombabara* ('stupid-dig'). During the 20th century, skins sold to make Akubra hats.
Red kangaroo	*Osphranter rufus*	Known in Gamilaraay as *bawurra*. [redacted] Linked to the Gamilaraay 'Red Chief' written about by Ion Idriess (1953 [2020]).

Rock wallaby	*Petrogale lateralis*	Hunted for food. Called 'stinkies'. [redacted]
Pig	*Sus scrofa*	Hunted for food.
Possum	Various species	Known in Gamilaraay as *mudhay*. Skin used as a cloak to wrap up a dead body. Donny Fermor's family totem.
Wallaroo	*Osphranter robustus*	Hunted for food.
Wombat	*Vombatus ursinus*	Hunted for food. Burrows on the flats.

Fig.5. Wild tobacco (*Verbascum thapsus*), an exotic species (Dungowan Creek, 12th October 2020)

Fig.6. Wild quince (*Alectryon subcinereus*), with edible fruit (Terrible Billy Creek,14th October 2020)

Table 2. Aboriginal heritage places identified by Gamilaraay participants during fieldwork, for which there is some anthropological support.

Site No.	Location	Description	Notes
DDCS5	Dungowan Creek - Former Dungowan School site	Some foundations and a shed in a regenerating forest. Outside of the proposed dam footprint.	Donny Fermor has plans to develop the area for Gamilaraay heritage. There are stone artefacts on the surface and plants significant to the Gamilaraay growing on the reserve.
DDCS3	Dungowan Creek - former Fermor family house site	Open paddock, with some remains of the buildings. Within the proposed dam footprint.	Social history for the local Gamilaraay family of Hunter Edward Fermor.
DDCS4	Dungowan Creek - Gun Reserve	Reserve alongside Dungowan Creek. Outside of the proposed dam footprint.	Long term Aboriginal camping place. Donny Fermor's family would often camp here during the 1960s and 1970s. Caught fish here, such as Murray cod, catfish and yellowbelly.
DDCS1	Terrible Billy Creek	A creek that runs through a gorge prior to joining with Dungowan Creek on the flat. Lower sections are inside the proposed dam footprint.	Location of men's sites – upstream beyond the dam footprint. [redacted] Anthropologically, this account seems credible.
DDGG1	Terrible Billy Creek – near where it joins the Dungowan Creek	Deep groove in the bedrock close to the creek. Within the proposed dam footprint.	According to Donny Fermor, this is a possible place for grinding wooden spearheads.
DDSA3	Jones Oaky Creek– just north of, on the east side of Dungowan Creek	Large stone arrangement, with naturally formed large boulders as the main body. Within the proposed dam footprint.	Donny Fermor as a child found this arrangement (some 20+ years ago), and he linked it to the Catfish Ancestor through its known association with Terrible Billy Creek. Anthropologically, this account seems credible. See Fig.7.
DDST1	Dungowan Creek - scarred tree	A large white box tree, which is still alive and bears a large scar. Outside the proposed dam footprint.	Donny Fermor believes that the scar was formed when removing bark - possibly for a burial shroud, coolamon (container) or even a canoe.
DDST2	Dungowan Creek - scarred tree	A large dead eucalypt tree that bears a large scar. Outside the proposed dam footprint.	Donny Fermor believes that the scar was formed when removing bark - possibly for a burial shroud or even a canoe.

Table 3. Aboriginal heritage places identified by Gamilaraay participants during fieldwork, for which there is little anthropological support.

Site No.	Location	Description	Notes
DDCS2	Dungowan Creek – box canyon	A canyon with steep walls. Within the proposed dam footprint.	[redacted]
DDB1	Jones Oaky Creek – near its junction with Dungowan Creek	A rockpile on the flat. Within the proposed dam footprint.	Donny Fermor suggests that this might be the grave of a young Aboriginal boy who he was told, drowned there in the 1920s or 1930s. There are similar rock piles further up the hill. According to Donny, the 'grave is like the 'campfire' seen near the celestial 'creek' (Milky Way). Also, he thinks it might possibly be a boundary marker between the Gamilaraay and Biripi people.
DDB3	Terrible Billy Creek – near the flat	Several piles of rocks, one next to a scarred river oak tree. Within the proposed dam footprint.	[redacted]

Site Discussion

The Gamilaraay participants of the cultural mapping exercise recognised that their Indigenous identity relied upon their acknowledgment of their Creation Ancestors having shaped and given meaning to the land and its waters. This situation has been observed in other parts of 'settled' Australia,[56] so to this extent it is not unique. Donny Fermor spoke of Baiame, who was a Supreme Ancestor who took the form of a wedge-tailed eagle, called *maliyan*, and who kept watch over the Gamilaraay people from above. He said that in the Dreamtime, Baiame had crystal canoe in the heavens, which exploded and fragments of it fell to earth as australites. Donny knows, via his father Hunter Edward Fermor, that the Catfish Ancestor was particularly important to the Dungowan Creek/Terrible Billy Creek area. [redacted] The Ancestors are

responsible for the ‘cultural flows’ that maintain the physical and spiritual health of the river system.

Gamilaraay man, Len Waters, taught Donny Fermor about the Ancestors in the night sky.[57] A [redacted] spirit had taken the first Gamilaraay man to die up there using for a ladder a large tree, which is now seen as the Southern Cross. The Pointers are cockatoos who are flying across the night sky looking for this same tree, that had become consumed in smoke. The Milky Way is symbolically a creek, seen from earth with campfires of the Ancestors along its banks. In the Milky Way, the dark section known as the Coal Sack is the head of the Emu Ancestor, that stretches to its body across to near Scorpius, while the nearby dark spots are seen as the Emu’s eggs.[58] The Pleiades are sisters being chased by the Orion men.

Donny was told by his elder sister, who is now infirmed, that there are rock carvings somewhere below the Fermor family home site within the Dungowan Dam footprint, but Donny has not found them yet. There is a Catfish stone arrangement at Dungowan Creek, which Donny had found many years ago as a child (see Table 2). There is a knapping site on a hill near the entrance of Terrible Billy Creek, which as a lookout is where Donny believes that older men would have waited until receiving a sign to travel up the creek gorge for ceremonial business. If there had once been a bora ground in the Dungowan area, it would probably have been on the flat near the former Fermor house site.

There is a rich folklore of spirit beings among the contemporary Gamilaraay community, the existence of which is consistent with other parts of Australia where Aboriginal people still live on their traditional country.[59] [redacted] An incident, such as when an owl flies into the car windscreen at night, is taken as a bad portent.

The ‘hairy man’ lives in the forests, and for Aboriginal people it is variously called *yahoo* (from its call), *yawi* and y*urri*, and it is referred to as ‘Red eyes’. Today, in Australian English they are popularly called ‘yowies’.[60] In the Dungowan Creek area, it was reportedly seen several times over the years by Donny Fermor and his kin. Stories of it are used by Gamilaraay people as a threat to quieten their children for sleeping or as a warning not to stray far from

camp. When you are approaching a place where there are 'hairy men' you must say 'I am here. I'm on your country', and you leave behind food, such as fruit, to 'show your respect'. The 'hairy men' do not like rifles, chain saws, dogs or anything that makes a loud noise.

As part of the protocol when entering country where spirits, such as 'hairy men', are likely to be present, the Gamilaraay people sing out *Yaama wanda*, literally 'welcome spirits', and conversely when leaving they shout *Yaluu wanda*, meaning 'We are leaving'. People who are visiting their country without showing respect get stones pelted at them. The 'hairy men' smell terrible, 'like wet dog or billy goat smell'. A stone stacking ritual is used to respectfully show spirits that people visited there. Later, smoking ceremonies, when green eucalyptus foliage is burnt, helps to rid people of spirits and to cleanse.

The 'water dog' is a spirit of the rivers and creeks, but mainly found out further west. There are special places associated with them that are not for fishing or swimming, as these spirits will eat people. The 'crocodile man' at Bendemeer was another water spirit. [redacted]

Donny said that his cousin saw one of the *gudiny* (little hairy people), but it disappeared when he got close. One should always leave something behind when visiting a sacred place, out of respect for the local spirits. Donny also believes in the existence of the 'min-min light', which is an apparition of a malignant spirit that takes the form of a mysterious dancing light or will-o'-the wisp that moves across the plains at night.[61]

The existence of gender specific sites was recorded during the cultural mapping investigations. According to Donny Fermor, the cluster of 'men's sites' along Terrible Billy Creek was associated with the Catfish Ancestor. He was not told more by his father, who kept his culture secret through fear of the authorities, but when Donny was a child his father and older brother Steven would go up there alone and be away all day. [redacted]

Donny Fermor said that there was a 'women's site' in the Dungowan Dam area that was already underwater. When talking about such places, Donny stated that 'For ceremonial

reasons we need to have access to places not under water', meaning that they need to maintain access via tracks to places isolated by the rising dam levels. [redacted]

Donny Fermor explained that when his family were living at Dungowan Creek his father would annually fire the scrub and grass along the creeks – in August/September, but never later when it was too dry and therefore dangerous. Such small burnings were designed to clean up the country, and the animals there could escape up into the nearby hills. New grass brought in kangaroos to feed later. 'Fire makes rain', his father said.

According to Donny Fermor, there are Aboriginal walking tracks that have bushtucker growing alongside them. There is one track that runs from the Dungowan Hotel, to Dungowan Dam and across to Mount Crawney. His uncle Alfred (Dummy) Pacey had told Donny when young that in the early-20th century he had once seen a 'full blood' Aboriginal man walking up the valley – he had come through Biripi land. There is another track along the Kootingal Highway to Bendemeer. The system of tracks linked the Gamilaraay people with the country of other Aboriginal groups, such as the Nganyaywana, Biripi and Dainggati towards the coast. There are fig trees planted at sacred places, such as at Bendemeer. For ceremony, the Gamilaraay and Nganyaywana peoples would meet at Boundary Rock to the west of Tamworth. Donny thought that Terrible Billy Creek, which he and Aaron considered to be on Gamilaraay land, was perhaps where the Gamilaraay and Biripi peoples would similarly meet to hold ceremonies.

Donny Fermor and his children, Edward and Michelle, had recently been employed to work with the EMM archaeologists when they were conducting surveys and digging test pits in the area. [redacted]

Conclusions

The cultural mapping has documented how contemporary Gamilaraay people experience their country, particularly the area proposed for the Dungowan Dam project. The men's sites along Terrible Billy Creek were found to be outside the dam footprint, as were two scarred trees. There are other sites, such as the purported Catfish stone arrangement and the possible grave of an Aboriginal child, that are located below the anticipated water level. The main Gamilaraay knowledge holder, Donny Fermor, has requested that a system of access tracks be created around the new dam in order to maintain the community's access to important cultural areas cut off by existing roads becoming inundated.

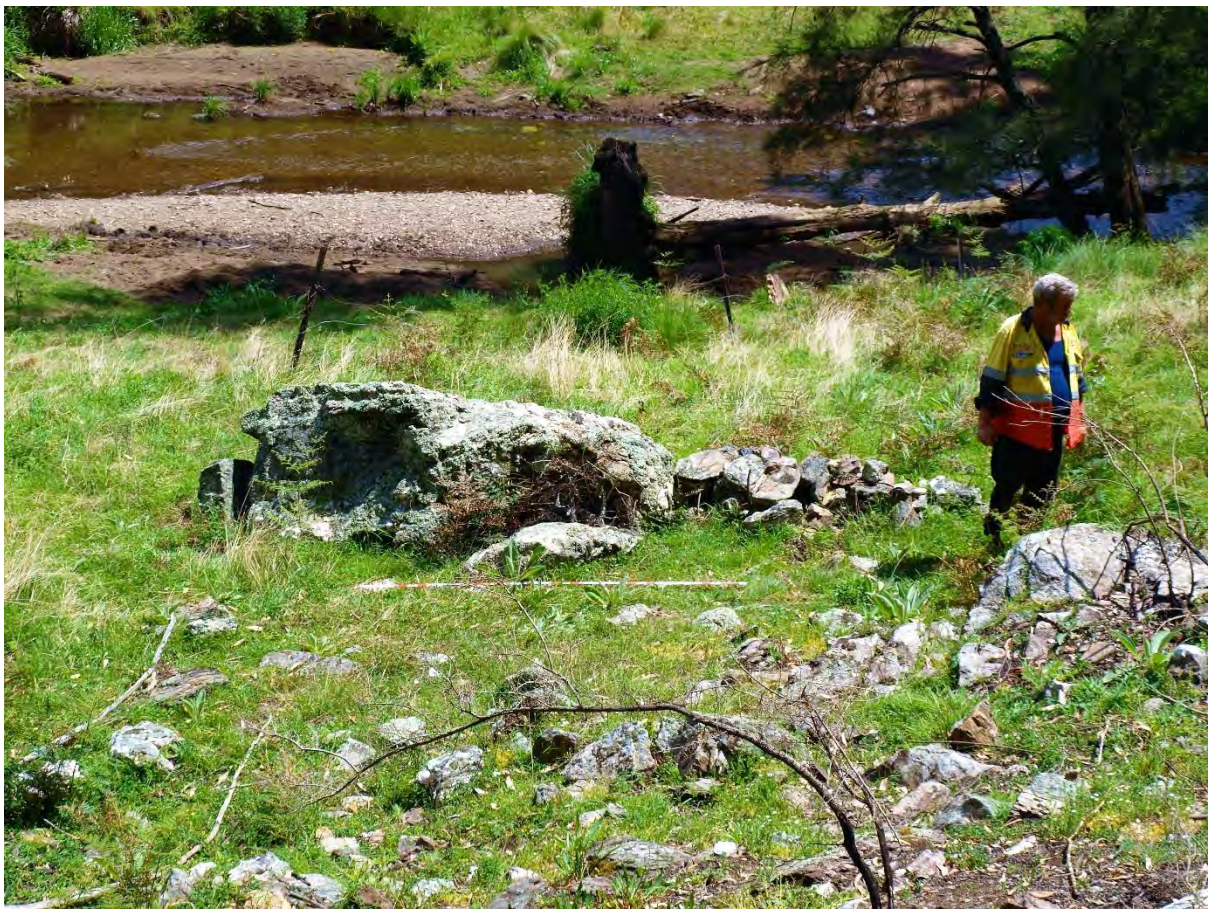


Fig.7. Gamilaraay Knowledge-holder, Donny Fermor, at the Catfish stone arrangement (Jones Oaky Creek, 12th October 2020).

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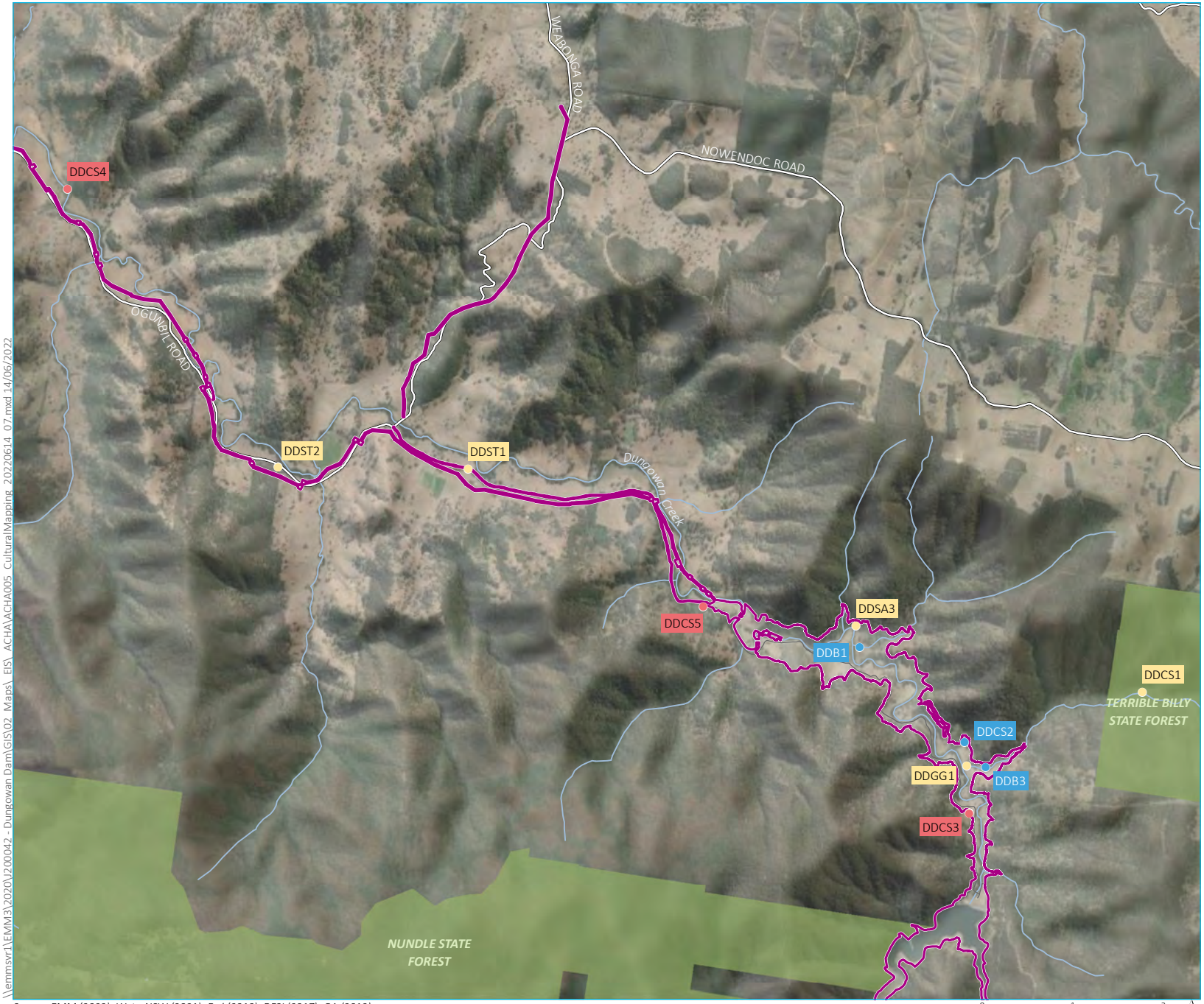
APPENDIX A: MAPS



KEY

- Project footprint

Cultural mapping results

- Cultural site
- Purported cultural site
- Social history place

Existing environment

- Major road
- Minor road
- Named watercourse
- State forest

Cultural mapping results

\\emmsvr1\EMM3\2020\200042 - Dungowan Dam\GIS\02 Maps\ EIS\ ACHA\ACHA005 CulturalMapping 20220614 07.mxd 14/06/2022

Source: EMM (2022); WaterNSW (2021); Esri (2019); DFSI (2017); GA (2013)

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GDA 1994 MGA Zone 56

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EMM creating opportunities

APPENDIX B: N.B. Tindale (1974, pp.191-195) 'Tribe' Entries. Refer to map (Fig.3)

Anaiwan 'Anaiwan

Loc.: New England tableland from Guyra and Ben Lomond south to Uralla and Moombie Range; northwest to Tingha; at Bendemeer and Armidale.

Coord.: 151°30'E x 30°30'S.

Area: 3,200 sq. m. (8,300 sq. km.).

Alt.: Anaywan, Anewan, Nowan, Enni-won, Yenniwon, Ee-na-won, En-nee-win, Eneewin, Inuwan, Inuwon, Neeinuwon, Enuin.

Ref.: Wyndham, 1889; Mathews, 1896 (Gr. 6425), 1897 (Gr. 6431, 6567), 1898 (Gr. 6468), 1901 (Gr. 6502), 1903 (Gr. 6490); Buchanan, 1901; MacPherson, 1902, 1904; Radcliffe-Brown, 1930; Capell, 1956; Walker, 1964 MS; Court in Wurm, 1966.

Dainggati 'Dainggati

Loc.: From about Point Lookout south to the MacLeay River headwaters and about Mount Royal Range; inland to Dividing Range and Walcha; east to crests of coast ranges. According to MacPherson the southwestern area around Walcha and Ingleba was occupied by the "Himberrong," which seems to have been a horde. Radcliffe-Brown called this horde Amberu and considered it and the Burgadi to be separate tribes. Henderson's account (1851:2, 96-180) gives a picture of the people of the area of this tribe in the 1830s. The name Yunggai represents a problem. It seems to be equivalent to this tribe but Mathews (1897:169; Gr. 6567) groups Dainggati with the coastal tribes rather than with the New England Anaiwan. Additional data would be most useful in this area.

Coord.: 151°50'E x 31°5'S.

Area: 3,500 sq. m. (9,100 sq. km.).

Alt.: Djaingadi, Dang-getti, Danghetti, Danggadi, Dhangatty, Thangatti, Thangatty, Dangati, Dangadi, Yuungai, Yunggai, Tangetti, Tang-gette, Burugardi (inland horde),
Burgadi, Boorkutti, Nulla Nulla, Amberu (see above), Himberrong, Jang (coastal name for this tableland tribe, meaning "bad folk"), Yung.

Ref.: Henderson, 1851; B------, 1897; Mathews, 1897 (Gr. 6567), 1898 (Gr. 6468), 1900 (Gr. 5624), 1901 (Gr. 6502), 1904 (Gr. 6451); MacPherson, 1904; Radcliffe-Brown, 1929, 1930; Enright, 1937, 1939; Tindale, 1940, and MS; Walker, 1964 MS; Holmer, 1966; See, 1968; Holmer and Holmer, 1969.

Kamilaroi 'K amila ro i

Loc.: Walgett, N.S.W., to Nindigully, Qld.; near Talwood and Garah; at Moree, Mungindi, Mogil Mogil, Narrabri, Pilliga, Gunnedah, Bingara, Tamworth, Quirindi, Bundella, Barraba, Gwabegar, and Come-by-Chance; on headwaters of the Hunter River. The grammar and vocabulary published by Hale (1845) ostensibly of this tribe relates to the Geawegal of the lower Hunter River (which see). Mathews (1904) with a broad-brush type of statement suggested the Kamilaroi language extended to Jerry's Plains this including about one half of the Geawegal territory and also some Wonnarua country. In his 1917 paper he included Boggabilla, which is well within Bigambul territory, in his Kamilaroi tribe area; perhaps a slip of the pen. Color plates 5, 7 are relevant.

Coord.: 140°35'E x 30°15'S.

Area: 29,000 sq. m. (75,400 sq. km.).

Alt.: Kamilarai, Kamilari, Kamilroi, Kamilarai, Kamularoi, Kaamee'larrai, Kamileroi, Koomilroi, Komleroy, Gamilaroi, Gamilroi, Kahmilaharoy, Kamilary, Gumilroi,
Gummilroi, Gummilray, Kimilari, Karmil, Kamil (['kamil] = no), Comleroy, Ghummilarai, Cammealroy, Kahmilari, Kakmilari (typographical error), Cumilri, Cam-ell-eri, Cummilroy, Cummeroy, Gunnilaroi, Kämilarai (name applied by the Wiradjuri), Camel Duhai, Yauan (mystic language name), Tjake (mystic language name), Tyake.

Ref.: Breton, 1833; Mitchell, 1838; (not Hale, 1845); Bunce, 1856; Ridley, 1861, 1863, 1875, 1886; Pechey, 1872; Ridley in Fison, 1874; Bridgman in Smyth, 1878; Greenway in Ridley, 1878; Fison and Howitt, 1880; Mueller, 1882; Howitt, 1884, 1885, 1902 (2 papers), 1904, 1908; Fraser, 1882, 1892; Wyndham, 1889; Bucknell, 1896, 1899; W., J.C., 1896; Mathews, 1894 (Gr. 6396), 1895 (Gr. 6475), 1896 (Gr. 6425), 1897 (Gr. 6414, 6426,

6431, 6567), 1898 (Gr. 6400, 6417, 6457, 6468, 6476), 1900 (Gr. 6524), 1902 (Gr. 6487), 1903 (Gr. 6489), 1904 (Gr. 6451), 1906 (Gr. 6542), 1907 (Gr. 6510, 6513), 1908 (Gr. 6460), 1912 (Gr. 6493), 1917 (Gr. 6438); Fawcett, 1898; Bootle, 1899; Greenway, 1901, 1902, 1909-1912; Cameron, 1902; Howitt, 1902, 1904, 1908; Vernon, 1902; Withnell, 1902; Richards, 1903; MacPherson, 1904; Naseby in Howitt, 1904; Parker, 1905; Brown, 1910; Richardson, 1910; Bucknell, 1912; Radcliffe-Brown, 1930; Tindale, 1940; Elkin, 1945; Berndt, 1947; Worms, 1950; Capell, 1956; Wurm, 1963; Tindale and George, 1971.

End Notes

[1] Refer to the Tamworth Local Aboriginal Land Council (https://alc.org.au/land_council/tamworth/, accessed 1st December 2020).
[2] Howitt (1904, pp.57-58) and Tindale (1974, p.129).
[3] Fison & Howitt (1880, Part 1).
[4] Enright (1940, pp.322-323).
[5] Sutton (2015) and Tindale (1940, 1953, 1974, 1976, 1978).
[6] Palmer (2018) and Sutton (1995, 1998, 2001, 2002, 2003).
[7] Tindale (1974, p.129).
[8] Tindale (1974, p.129).
[9] Ash *et al.* (2003) and Giacon (2014).
[10] Rowley (1972).
[11] Tindale (1938-39a, 1938-39b).
[12] Refer to the National Native Title Tribunal website (http://www nntt.gov.au/searchRegApps/NativeTitleRegisters/RNTC%20Extracts/NC2011_006/Map%20of%20the%20area%20covered%20by%20the%20Application.pdf, accessed 10th November 2020).
[13] Greenway (1878, pp.242-244), Howitt (1904, pp.405,407-408,494,499,502-503,507,585,593) and Ridley (1875, pp.135-136,153-156).
[14] Thomas (1900, p.166) and Wyndam (1889, pp.36-37).
[15] Howitt (1904, pp.587,593) and Mathews (1907, pp.8,10).
[16] Mathews (1907, p.10).
[17] Mathews (1899, pp.20-22) and Radcliffe-Brown (1930, pp.343-344).
[18] Clarke (1999, 2018a, 2018b).
[19] Mathews (1907, p.26). See also Enright (1937, p.91).
[20] Dixon *et al.* (1992, p.111).
[21] Clarke (2007b).
[22] Clarke (2018a, 2018b).
[23] Mathews (1897).
[24] Birckhead *et al.* (2011, p.3) and Weir (2006).
[25] Maclean *et al.* (2012, pp.28,44-45).
[26] Jackson & Nias (2019) and Mooney & Cullen (2019).
[27] Greenway (1901), Mathews (1897, pp.150-173) and Small (1898, p.46).
[28] Mathews (1907, p.5).
[29] Mathews (1897, p.138).
[30] Mathews (1907, p.5).
[31] Enright (1939, p.195).
[32] Enright (1937, p.90).
[33] Clarke (2012, Chapter 5).
[34] Low (2003, p.14).
[35] Briggs & Jackson (2011), Etheridge (1918), McCarthy (1940) and Rhodes (2018, Chapter 6).
[36] Mathews (1907, pp.8-11) and McCarthy (1940, pp.163-164).
[37] McCarthy (1940, p.161).
[38] Etheridge (1918, Map).
[39] Clarke (2012, Chapter 7) and Edwards (1972).
[40] Edwards (1978, p.37) and McCarthy (1978, p.27).
[41] Casey (1938), Clarke (2018c, pp.260-263), Dow (1938), Radcliffe-Brown (1924), Rowlands & Rowlands (1966), Towle (1938) and Wood Jones (1925).
[42] Enright (1932, pp.76-77; 1937, pp.89-90).
[43] Howitt (1904, p.466).
[44] Radcliffe-Brown (1924, pp.204-205).
[45] Enright (1932, p.77).
[46] Ash *et al.* (2003), Beck *et al.* (2015, pp.51-53), Brouwer *et al.* (2005), Clarke (2003a, 2003b, 2007a, 2012), Low (2003), Maiden (1889), MacPherson (1925, 1931, 1934, 1939), Packer *et al.* (2012) and Stewart & Percival (1997).
[47] Clarke (2008a).
[48] Clarke (2008b).
[49] Ridley (1875, p.158).
[50] MacPherson (1902, pp.637).
[51] MacPherson (1902, pp.638).

[52] MacPherson (1902, pp.641).
[53] Howitt (1904, p.384).
[54] Poole (2003). Also refer to https://bangkok.unesco.org/content/cultural-mapping (accessed 13th November 2020).
[55] Duxbury *et al.* (2015, p.2).
[56] Clarke (1995) and Sutton (1988).
[57] For an account of Gamilaraay ethnoastronomy, refer to Fuller *et al.* (2014).
[58] For Emu Dreamtime accounts from eastern New South Wales, refer to Norris & Norris (2009).
[59] Clarke (1999, 2007b, 2018a, 2018b).
[60] Healy & Cropper (2006).
[61] Dixon *et al.* (1992, p.195).
[62] Mathews (1897).

Annexure E

Archaeological background

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E.1 Site definitions and recording methods used for this assessment

E.1.1 Aboriginal sites

In the AHIMS database, Aboriginal sites are defined in several ways. At the simplest level, sites are recorded as 'closed' or 'open'. Closed sites are associated with rockshelters and include other evidence of Aboriginal occupation that may be present, such as areas where subsurface Aboriginal objects may occur within the shelter ('potential archaeological deposit' (PAD)), faunal remains, and art on the shelter walls (paintings/engravings). Open sites are broadly defined and encompass all other types of Aboriginal site features that are located in areas where there is no rockshelter. The most common open site features found generally include artefacts, grinding grooves, art, culturally modified trees, and shell deposits (middens) (OEH 2012). The presence or absence of stone artefacts is often a defining factor in site identification, with almost every site likely to have at least some associated artefacts, as discard or loss of this most ubiquitous and practically indestructible marker of past Aboriginal visitation.

Any one site (or group of linked sites described as a 'complex') can contain several different site features. For example, a shelter may have art on the walls, artefacts on the floor surface or outside the shelter, and be predicted to contain faunal remains and further artefacts in the accumulated deposit inside.

A description of terms used to describe different site features known to occur in the vicinity of the project area is provided in Table E.1 and use definitions provided by OEH and those adopted by EMM in their field investigations to produce consistency in recording. Similarly, there may be places of contemporary significance to Aboriginal people in the region and that will require consultation with this community to identify.

Table E.1 Site definitions and recording

Site feature	Definition and recording methods
Aboriginal ceremony and Dreaming	Previously referred to as mythological sites these are spiritual/story places where no physical evidence of previous use of the place may occur; eg, natural unmodified landscape features, ceremonial or spiritual areas, men's/women's sites, dreaming (creation) tracks, marriage places etc.
Artefact site (open stone artefact site)	Objects such as stone tools, and associated flaked material, spears, manuports, grindstones, discarded stone flakes, modified glass or shell demonstrating evidence of use of the area by Aboriginal people. Open stone artefact sites were defined by the presence of one (isolated find) or more (artefact scatter) stone artefacts visible on the ground surface. The boundaries of a site are limited to the spatial extent of the visible stone artefacts. The mapped site points and/or 'site areas' do not represent the areas of potential archaeological deposit (PAD) that also apply to some sites (refer to the term 'PAD' below). Open stone artefact sites were recorded by marking each artefact location or each cluster of artefacts within a 5 m radius as a separate waypoint in the GPS. Site boundaries were allocated by drawing a line around the cluster waypoints for each site using ArcGIS software. Stone artefacts more than 50 m apart were recorded as separate sites. EMM acknowledges that the 50 m rule applied here is an arbitrary distinction for site boundaries and is used mainly for efficiencies in site management and to establish consistency in site recording methods
Burials	A traditional or contemporary (post-contact) burial of an Aboriginal person, which may occur outside designated cemeteries and may not be marked; eg, in caves, marked by stone cairns, in sand areas, along creek banks etc.
Fish trap	A modified area on watercourses where fish were trapped for short-term storage and gathering.
Grinding grooves	Grinding grooves were defined as an area of outcropping bedrock containing evidence of one or more grinding grooves where ground-stone hatchets or other grinding practices (ie seed grinding) were implemented.

Table E.1 Site definitions and recording

Site feature	Definition and recording methods
Habitation structure	Structures constructed by Aboriginal people for short- or long-term shelter. More temporary structures are commonly preserved away from the NSW coastline, may include historic camps of contemporary significance. Smaller structures may make use of natural materials such as branches, logs and bark sheets or manufactured materials such as corrugated iron to form shelters. Archaeological remains of a former structure such as chimney/fireplace, raised earth building platform, excavated pits, rubble mounds etc.
Modified tree (carved or scarred)	Trees which show the marks of modification as a result of cutting of bark from the trunk for use in the production of shields, canoes, boomerangs, burials shrouds, for medicinal purposes, foot holds etc., or alternately intentional carving of the heartwood of the tree to form a permanent marker to indicate ceremonial use/significance of a nearby area, again these carvings may also act as territorial or burial markers. Modified trees (either carved or scarred) can be difficult to identify. Scars commonly occur on trees through natural processes such a branch tears, insect damage, storm and fire damage and faunal damage. Scars can also occur from mechanical damage from vehicles or farming equipment. The attributes of potential scarred trees were discussed during the survey amongst archaeologists and RAPs before it was decided if a scar would be recorded or not. A precautionary approach was adopted, whereby some of the more ambiguous examples were recorded anyway. The assessment of scar trees was made from the experience of the survey team and the guideline *Aboriginal scarred trees in New South Wales: a field manual* (DEC 2005). In some of the more ambiguous examples, it cannot be verified whether some scars recorded during the survey are of natural or Aboriginal origin. In such instances, an expert evaluation by a scar tree expert (arborist or other) would be required to determine the status of certain trees.
Potential archaeological deposit (PAD)	An area where Aboriginal objects may occur below the ground surface. The term 'potential archaeological deposit' was first applied in Sydney regional archaeology in the 1980s, and referred to rockshelters that were large enough and contained enough accumulated deposit to allow archaeologists to predict that subsurface cultural material was likely to be present. Since then the term has come to include open sites where the same prediction can be made. EMM has defined PADs as the predicted extent of concentrated subsurface Aboriginal objects in a particular area. PADs are not technically Aboriginal sites until, and if, subsurface Aboriginal objects are identified, which is typically established through archaeological test excavation. PAD areas have been assigned to landforms that are distinguishable from the surrounding landscape (eg elevated areas with good outlook overlooking watercourses) as being likely to retain higher artefact densities than the assumed 'background scatter' of archaeological material in the broader landscape. The identification of PADs associated with Aboriginal open camp sites was partly based on observations in the field and discussions with RAPs, but also related to the predictive model. Although PAD was attributed to areas for a variety of reasons, the main qualifiers were: • The presence of surface artefacts or other Aboriginal objects. Ground surface visibility as part of the archaeological survey effort was typically considered high enough in each PAD area to identify at least one or more surface artefacts thereby indicating likelihood of subsurface potential. Notwithstanding, finding no visible surface artefacts in an area would not disqualify an area from being attributed with PAD. • Level to gently inclined ground (<10%) indicating suitable camping or activity areas. • Contours that distinguish the landforms with PAD from the surrounding landscape (eg spur crest, hill crest or knoll). Landform boundaries were also interpreted through observations in the field. Notably, rocky crest landforms that were protected from intensive cultivation were often attributed with PAD. • Proximity to water: typically up to 100 m from 1st and 2nd order streams and up to 200 m from 3rd order streams and above. Elevated landforms at the confluence of higher order streams were also more likely to be attributed with PAD. EMM acknowledges that all PAD areas have been historically cleared of native vegetation and some have been subject to pasture improvements such as ploughing. As such, the term PAD does not assume high subsurface integrity; instead it is a prediction of potential subsurface artefact concentrations. All stone quarry sites are predicted to have PAD. The assumption is that in most cases the visible surface material at quarries is represented by larger artefacts (such as cores) and that smaller material (eg flakes) is likely to be buried.

Table E.1 Site definitions and recording

Site feature	Definition and recording methods
Restricted	Site information contained in the Aboriginal Heritage Information Management System is available only to certain authorised groups of people, as requested by the Aboriginal community. Detailed information may not be available in search reports.
Shell	An accumulation or deposit of shellfish from beach, estuarine, lacustrine or riverine species resulting from Aboriginal gathering or consumption. Usually found in deposits previously referred to as shell middens. Must be found in association with other objects like stone tools, fish bones, charcoal, fireplaces/hearths, and burials. Will vary greatly in size and composition.
Stone quarry	Usually a source of good quality stone which is quarried and used for the production of stone tools. Stone quarries represent where Aboriginal people gathered raw stone materials for stone tools and/or manufactured stone tools from the adjacent source material. Quarry sites are found at rock outcrops where the material was of suitable quality to have been used to manufacture stone tools. Stone quarries were defined by the presence of outcropping stone material with nearby evidence of the same material type used in the stone tool manufacture process. This was most commonly indicated by large stone cores or stone flakes distributed amongst the same naturally outcropping material. EMM acknowledges that the 'open stone artefact' site type shares some of the same characteristics as 'stone quarries', such as the presence of stone artefacts. However, they have been distinguished from each other because quarries can not only represent open camping activities, but also a fixed location where Aboriginal people needed to visit to extract a resource. In contrast, the locations of typical open camp sites were not fixed, but chosen by Aboriginal people for their favourable conditions.

Annexure F
Field investigation

EMM
creating opportunities

F.1 Survey transect information

Table F.1 Summary of each field survey transect undertaken

Transect #	Length (m)	Area (m^2)	Landform	Exposure (%)	Visibility (%)	Effective coverage (m^2)	Effective coverage (%)
DD01W	2,309	230,885	Alluvial terrace	20	10	4,618	2
DD02C	424	42,431	Hillcrest	10	10	424	1
DD03S	236	23,620	Hillslope	20	10	472	2
DD04W	891	89,055	Alluvial terrace	10	10	891	1
DD05W	318	31,844	Alluvial terrace	10	10	318	1
DD06S	84	8,404	Hillslope	20	5	84	1
DD07W	497	49,736	Alluvial terrace	30	10	1,492	3
DD08W	348	34,808	Alluvial terrace	20	20	1,392	4
DD09W	130	12,965	Alluvial terrace	20	10	259	2
DD10W	1,905	190,474	Alluvial terrace	20	30	11,428	6
DD11S	586	58,621	Hillslope	10	5	293	1
DD12SS	122	12,205	Steep slope	40	30	1,465	12
DD13W	243	24,315	Alluvial terrace	20	10	486	2
DD14S	1,044	104,427	Hillslope	20	10	2,089	2
DD15W	654	65,374	Alluvial terrace	20	10	1,307	2
DD16C	185	18,482	Hillcrest	20	30	1,109	6
DD17W	579	57,872	Alluvial terrace	20	20	2,315	4
DD18SS	279	27,889	Steep slope	10	10	279	1
DD19C	386	38,597	Hillcrest	10	20	772	2
DD20W	152	15,183	Alluvial terrace	20	20	607	4
DD21W	842	84,216	Alluvial terrace	30	30	7,579	9
DD22W	3,290	328,980	Alluvial terrace	50	30	49,347	15

Table F.1 Summary of each field survey transect undertaken

Transect #	Length (m)	Area (m²)	Landform	Exposure (%)	Visibility (%)	Effective coverage (m²)	Effective coverage (%)
DD23C	183	18,332	Hillcrest	10	10	183	1
DD24S	6,387	638,747	Hillslope	30	30	57,487	9
DD25W	922	92,202	Alluvial terrace	20	5	922	1
DD26C	4,309	430,895	Hillcrest	40	30	51,707	12
DD27W	4,309	430,895	Alluvial terrace	70	40	120,651	28
DD28W	2,316	231,562	Alluvial terrace	30	20	13,894	6
DD29W	3,229	322,897	Alluvial terrace	20	10	6,458	2
DD30S	3,740	374,020	Hillslope	30	30	33,662	9
DD31S	3,942	394,188	Hillslope	20	10	7,884	2
DD32SS	1,376	137,555	Steep slope	30	20	8,253	6
DD33S	1,073	107,320	Hillslope	10	5	537	1
DD34W	4,068	406,819	Alluvial terrace	30	20	24,409	6
DD35S	15,035	1,503,512	Hillslope	30	10	45,105	3
DD36S	12,638	1,263,793	Hillslope	30	30	113,741	9
DD37W	3,942	394,188	Alluvial terrace	20	10	7,884	2
DD38SS	3,942	394,188	Steep slope	70	80	220,745	56
DD39C	3,942	394,188	Hillcrest	30	20	23,651	6
DD40	817	16,340	Hillslope	20	70	2,288	14
DD41	1,250	25,000	Hilllslope	10	50	1,250	5
DDP1	619	74,280	Alluvial terrace	10	20	1,485	2%
DDP2	735	88,200	Alluvial terrace	20	40	7,056	8%
DDP3	1,324	158,880	Hillslope	15	20	4,766	3%
DDP4	411	49,320	Hillslope	15	20	1,480	3%
DDP5	1,873	224,760	Steep slope	20	30	13,485	6%
DDP6	3,061	367,320	Alluvial terrace	10	20	7,346	2%
DDP7	1,455	174,600	Alluvial terrace	30	30	15,714	9%

Table F.1 Summary of each field survey transect undertaken

Transect #	Length (m)	Area (m²)	Landform	Exposure (%)	Visibility (%)	Effective coverage (m²)	Effective coverage (%)
DDP8	1,262	151,440	Alluvial terrace	20	10	3,029	2%
DDP9	1,939	232,680	Alluvial terrace	10	30	6,980	3%
DDP10	718	86,160	Alluvial terrace	20	20	3,446	4%
Total	**106,321**	**10,734,664**				**894,524**	
Average	*2,085*	*210,484*		*23*	*21*	*17,540*	*5*

F.2 Photographic catalogue (field survey)

On subsequent pages we present a map of each location where information was gathered as part of the field investigations. Each point is correlated with a photograph, which is also provided in subsequent pages.

F.2.1 Aboriginal site photographs

Dungowan Dam_Site (130)

Dungowan Dam_Site (131)

Dungowan Dam_Site (132)

Dungowan Dam_Site (133)

Dungowan Dam_Site (134)

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Dungowan Dam_Site (145)

Dungowan Dam_Site (146)

Dungowan Dam_Site (147)

Dungowan Dam_Site (1)

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Dungowan Dam_Site (4)

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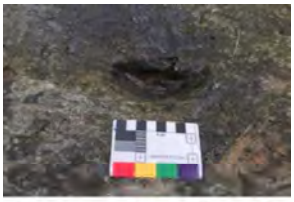
Dungowan Dam_Site (61)

Dungowan Dam_Site (62)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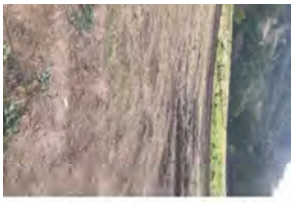
Dungowan Dam_Site (97)


Dungowan Dam_Site (98)

Dungowan Dam_Site (99)

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Dungowan Dam_Site (123)

Dungowan Dam_Site (124)

Dungowan Dam_Site (125)

Dungowan Dam_Site (126)

Dungowan Dam_Site (127)

Dungowan Dam_Site (128)

Dungowan Dam_Site (129)

Table F.1 Aboriginal site photographs.

Point ID	Image file name	Site name	Comment
A01	Dungowan Dam_Site 1	DDOS1	Artefact detail.
A01	Dungowan Dam_Site 2	DDOS1	Artefact detail.
A01	Dungowan Dam_Site 3	DDOS1	Artefact detail.
A01	Dungowan Dam_Site 4	DDOS1	Artefact detail.
A01	Dungowan Dam_Site 5	DDOS1	View facing north.
A02	Dungowan Dam_Site 6	DDOS2	Artefact detail.
A02	Dungowan Dam_Site 7	DDOS2	Artefact detail.
A02	Dungowan Dam_Site 8	DDOS2	View facing north.
A02	Dungowan Dam_Site 9	DDOS2	View facing west.
A03	Dungowan Dam_Site 10	DDOS3	Artefact detail.
A03	Dungowan Dam_Site 11	DDOS3	Artefact detail.
A03	Dungowan Dam_Site 12	DDOS3	Artefact detail.
A03	Dungowan Dam_Site 13	DDOS3	Artefact detail.
A03	Dungowan Dam_Site 14	DDOS3	Artefact detail.
A03	Dungowan Dam_Site 15	DDOS3	View facing south west.
A03	Dungowan Dam_Site 16	DDOS3	View facing south east.
A03	Dungowan Dam_Site 17	DDOS3	View facing north east towards creek.
A04	Dungowan Dam_Site 18	DDIF2	View facing east towards creek.
A04	Dungowan Dam_Site 19	DDIF2	View facing north.
A04	Dungowan Dam_Site 20	DDIF2	Artefact detail.
A04	Dungowan Dam_Site 21	DDIF2	Artefact detail.
A05	Dungowan Dam_Site 22	DDOS6	View facing north.
A05	Dungowan Dam_Site 23	DDOS6	Artefact detail.
A05	Dungowan Dam_Site 24	DDOS6	Artefact detail.
A05	Dungowan Dam_Site 25	DDOS6	Artefact detail.
A06	Dungowan Dam_Site 26	DDOS5	Artefact detail.
A06	Dungowan Dam_Site 27	DDOS5	View facing north east towards creek.
A06	Dungowan Dam_Site 28	DDOS5	View facing east.
A06	Dungowan Dam_Site 29	DDOS5	Artefact detail.
A07	Dungowan Dam_Site 30	DDOS4	Artefact detail.
A07	Dungowan Dam_Site 31	DDOS4	Artefact detail.

Table F.1 Aboriginal site photographs.

Point ID	Image file name	Site name	Comment
A07	Dungowan Dam_Site 32	DDOS4	View facing west.
A07	Dungowan Dam_Site 33	DDOS4	View facing east.
A08	Dungowan Dam_Site 34	DDIF1	Artefact detail.
A08	Dungowan Dam_Site 35	DDIF1	Artefact detail.
A08	Dungowan Dam_Site 36	DDIF1	Artefact detail.
A08	Dungowan Dam_Site 37	DDIF1	View facing west.
A08	Dungowan Dam_Site 38	DDIF1	View facing east.
A09	Dungowan Dam_Site 39	DDST1	View facing north.
A09	Dungowan Dam_Site 40	DDST1	View facing north.
A09	Dungowan Dam_Site 41	DDST1	View facing north east towards creek.
A10	Dungowan Dam_Site 42	DDIF3	Artefact detail.
A10	Dungowan Dam_Site 43	DDIF3	Artefact detail.
A10	Dungowan Dam_Site 44	DDIF3	Artefact detail.
A10	Dungowan Dam_Site 45	DDIF3	View facing west towards creek.
A10	Dungowan Dam_Site 46	DDIF3	View facing south (PAD).
A11	Dungowan Dam_Site 47	DDSA2	Stone arrangement detail.
A11	Dungowan Dam_Site 48	DDSA2	View facing west.
A11	Dungowan Dam_Site 49	DDSA2	Scar tree detail, facing west.
A11	Dungowan Dam_Site 50	DDSA2	View facing north west.
A11	Dungowan Dam_Site 51	DDSA2	Scar tree detail.
A12	Dungowan Dam_Site 52	DDOS7	Artefact detail.
A12	Dungowan Dam_Site 53	DDOS7	Artefact detail.
A12	Dungowan Dam_Site 54	DDOS7	North towards DD CS2 (wallaby trap).
A12	Dungowan Dam_Site 55	DDOS7	View facing south.
A13	Dungowan Dam_Site 56	DDB3	View facing west.
A13	Dungowan Dam_Site 57	DDB3	Burial detail.
A13	Dungowan Dam_Site 58	DDB3	View facing west.
A15	Dungowan Dam_Site 59	DDGG1	Grinding groove detail.
A15	Dungowan Dam_Site 60	DDGG1	Grinding groove detail.
A15	Dungowan Dam_Site 61	DDGG1	View facing south west.
A15	Dungowan Dam_Site 62	DDGG1	View facing north.

Table F.1 Aboriginal site photographs.

Point ID	Image file name	Site name	Comment
A16	Dungowan Dam_Site 63	DDIF10	Artefact detail.
A16	Dungowan Dam_Site 64	DDIF10	Artefact detail.
A16	Dungowan Dam_Site 65	DDIF10	Artefact detail.
A16	Dungowan Dam_Site 66	DDIF10	View facing west.
A16	Dungowan Dam_Site 67	DDIF10	View facing east.
A17	Dungowan Dam_Site 68	DDIF9	Artefact detail.
A17	Dungowan Dam_Site 69	DDIF9	Artefact detail.
A17	Dungowan Dam_Site 70	DDIF9	Artefact detail.
A17	Dungowan Dam_Site 71	DDIF9	View facing south west.
A17	Dungowan Dam_Site 72	DDIF9	View facing north east.
A18	Dungowan Dam_Site 73	DDB2	Stone arrangement detail.
A18	Dungowan Dam_Site 74	DDB2	Stone arrangement detail.
A18	Dungowan Dam_Site 75	DDB2	Stone arrangement detail.
A18	Dungowan Dam_Site 76	DDB2	Stone arrangement detail.
A18	Dungowan Dam_Site 77	DDB2	View facing west.
A18	Dungowan Dam_Site 78	DDB2	View facing north west.
A18	Dungowan Dam_Site 79	DDB2	View facing west.
A18	Dungowan Dam_Site 80	DDB2	View facing east.
A19	Dungowan Dam_Site 81	DDOS11	View facing north east.
A19	Dungowan Dam_Site 82	DDOS11	View facing south east.
A19	Dungowan Dam_Site 83	DDOS11	Artefact detail.
A19	Dungowan Dam_Site 84	DDOS11	Artefact detail.
A19	Dungowan Dam_Site 85	DDOS11	Artefact detail.
A19	Dungowan Dam_Site 86	DDOS11	Artefact detail.
A19	Dungowan Dam_Site 87	DDOS11	Artefact detail.
A19	Dungowan Dam_Site 88	DDOS11	Artefact detail.
A20	Dungowan Dam_Site 89	DDIF5	Artefact detail.
A20	Dungowan Dam_Site 90	DDIF5	View facing west.
A21	Dungowan Dam_Site 91	DDIF7	Artefact detail.
A21	Dungowan Dam_Site 92	DDIF7	Artefact detail.
A21	Dungowan Dam_Site 93	DDIF7	View facing east.

Table F.1 Aboriginal site photographs.

Point ID	Image file name	Site name	Comment
A21	Dungowan Dam_Site 94	DDIF7	View facing west.
A22	Dungowan Dam_Site 95	DDIF6	Artefact detail.
A22	Dungowan Dam_Site 96	DDIF6	Artefact detail.
A22	Dungowan Dam_Site 97	DDIF6	Artefact detail.
A22	Dungowan Dam_Site 98	DDIF6	View facing south.
A22	Dungowan Dam_Site 99	DDIF6	View facing west.
A23	Dungowan Dam_Site 100	DDSA1	Stone arrangement detail.
A23	Dungowan Dam_Site 101	DDSA1	Stone arrangement detail.
A23	Dungowan Dam_Site 102	DDSA1	View facing north west.
A23	Dungowan Dam_Site 103	DDSA1	View facing north.
A23	Dungowan Dam_Site 104	DDSA1	View facing south.
A24	Dungowan Dam_Site 105	DDB1	Burial detail.
A24	Dungowan Dam_Site 106	DDB1	View facing north towards creek.
A24	Dungowan Dam_Site 107	DDB1	View facing south east.
A25	Dungowan Dam_Site 108	DDOS10	Artefact detail.
A25	Dungowan Dam_Site 109	DDOS10	View facing south east.
A25	Dungowan Dam_Site 110	DDOS10	View facing north west.
A25	Dungowan Dam_Site 111	DDOS10	Artefact detail.
A25	Dungowan Dam_Site 112	DDOS10	Artefact detail.
A26	Dungowan Dam_Site 113	DDIF8	Artefact detail.
A26	Dungowan Dam_Site 114	DDIF8	Artefact detail.
A26	Dungowan Dam_Site 115	DDIF8	View facing south.
A26	Dungowan Dam_Site 116	DDIF8	View facing north.
A27	Dungowan Dam_Site 117	DDOS9	Artefact detail.
A27	Dungowan Dam_Site 118	DDOS9	View facing north.
A27	Dungowan Dam_Site 119	DDOS9	View facing south.
A28	Dungowan Dam_Site 120	DDOS8	Artefact detail.
A28	Dungowan Dam_Site 121	DDOS8	View facing south west.
A28	Dungowan Dam_Site 122	DDOS8	Artefact detail.
A29	Dungowan Dam_Site 123	DDIF11	Artefact detail.
A29	Dungowan Dam_Site 124	DDIF11	Artefact detail.

Table F.1 Aboriginal site photographs.

Point ID	Image file name	Site name	Comment
A29	Dungowan Dam_Site 125	DDIF11	Artefact detail.
A29	Dungowan Dam_Site 126	DDIF11	Artefact detail.
A29	Dungowan Dam_Site 127	DDIF11	View facing east.
A29	Dungowan Dam_Site 128	DDIF11	View facing south.
A31	Dungowan Dam_Site 129	DDST4	View facing east.
A31	Dungowan Dam_Site 130	DDST4	View facing east.
B367	Dungowan Dam_Site 131	DDST3	View facing west.
B367	Dungowan Dam_Site 132	DDST3	View facing west.
B367	Dungowan Dam_Site 133	DDST3	View facing west.
B367	Dungowan Dam_Site 134	DDST3	Scar detail.
TBC	Dungowan Dam_Site 135	DDST2	Scar detail.
TBC	Dungowan Dam_Site 136	DDST2	Scar detail.
TBC	Dungowan Dam_Site 137	DDST2	Scar detail.
TBC	Dungowan Dam_Site 138	DDOS13	Artefact detail.
TBC	Dungowan Dam_Site 139	DDOS13	Artefact detail.
TBC	Dungowan Dam_Site 140	DDOS13	View facing north.
TBC	Dungowan Dam_Site 141	DDOS13	View facing south east.
TBC	Dungowan Dam_Site 142	DDOS13	View facing south.
TBC	Dungowan Dam_Site 143	DDOS14	Artefact detail.
TBC	Dungowan Dam_Site 144	DDOS14	Artefact detail.
TBC	Dungowan Dam_Site 145	DDOS14	View facing east.
TBC	Dungowan Dam_Site 146	DDOS14	View facing north.
TBC	Dungowan Dam_Site 147	DDOS14	View facing north.

F.2.2 Survey and transect photographs

Dungowan Dam_Transect (1)

Dungowan Dam_Transect (2)

Dungowan Dam_Transect (3)

Dungowan Dam_Transect (4)

Dungowan Dam_Transect (5)

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Table F.2 Survey transect photographs.

Point ID	Image file name	Comment
B001	Dungowan Dam_Transect 1	View facing north west.
B001	Dungowan Dam_Transect 2	View facing north towards creek.
B001	Dungowan Dam_Transect 3	View facing south west.
B002	Dungowan Dam_Transect 4	View facing north.
B002	Dungowan Dam_Transect 5	View facing south.
B003	Dungowan Dam_Transect 6	View facing north.
B003	Dungowan Dam_Transect 7	View facing south.
B003	Dungowan Dam_Transect 8	View facing south west.
B003	Dungowan Dam_Transect 9	View facing north east.
B003	Dungowan Dam_Transect 10	View facing south west.
B003	Dungowan Dam_Transect 11	View facing east.
B004	Dungowan Dam_Transect 12	View facing north towards rock outcrop.
B004	Dungowan Dam_Transect 13	View facing west towards alluvial terrace.
B004	Dungowan Dam_Transect 14	View facing south.
B005	Dungowan Dam_Transect 15	View facing south.
B005	Dungowan Dam_Transect 16	View facing south east.
B005	Dungowan Dam_Transect 17	View facing north.
B006	Dungowan Dam_Transect 18	View facing east.
B006	Dungowan Dam_Transect 19	View facing west.
B007	Dungowan Dam_Transect 20	View facing south.
B007	Dungowan Dam_Transect 21	View facing north.
B007	Dungowan Dam_Transect 22	View facing east towards creek.
B007	Dungowan Dam_Transect 23	View facing west.
B008	Dungowan Dam_Transect 24	View facing south.
B008	Dungowan Dam_Transect 25	View facing north west.
B008	Dungowan Dam_Transect 26	View facing east.
B009	Dungowan Dam_Transect 27	View facing west.
B009	Dungowan Dam_Transect 28	View facing west.
B010	Dungowan Dam_Transect 29	View facing north west.
B010	Dungowan Dam_Transect 30	View facing north towards creek.
B011	Dungowan Dam_Transect 31	View facing east.
B011	Dungowan Dam_Transect 32	View facing south.

Table F.2 Survey transect photographs.

Point ID	Image file name	Comment
B012	Dungowan Dam_Transect 33	View facing north.
B012	Dungowan Dam_Transect 34	View facing east.
B012	Dungowan Dam_Transect 35	View facing south west.
B014	Dungowan Dam_Transect 36	View facing west.
B014	Dungowan Dam_Transect 37	View facing west.
B015	Dungowan Dam_Transect 38	View facing north.
B015	Dungowan Dam_Transect 39	View facing south.
B015	Dungowan Dam_Transect 40	View facing west.
B016	Dungowan Dam_Transect 41	View facing south west.
B016	Dungowan Dam_Transect 42	View facing north west.
B016	Dungowan Dam_Transect 43	View facing north east.
B016	Dungowan Dam_Transect 44	View facing south east.
B017	Dungowan Dam_Transect 45	View facing north east.
B017	Dungowan Dam_Transect 46	View facing west.
B017	Dungowan Dam_Transect 47	View facing south.
B018	Dungowan Dam_Transect 48	View facing south west.
B018	Dungowan Dam_Transect 49	View facing west.
B018	Dungowan Dam_Transect 50	View facing north.
B018	Dungowan Dam_Transect 51	View facing east.
B019	Dungowan Dam_Transect 52	View facing north.
B019	Dungowan Dam_Transect 53	View facing east.
B019	Dungowan Dam_Transect 54	View facing south.
B019	Dungowan Dam_Transect 55	View facing west.
B020	Dungowan Dam_Transect 56	View facing south.
B020	Dungowan Dam_Transect 57	View facing east.
B020	Dungowan Dam_Transect 58	View facing west.
B021	Dungowan Dam_Transect 59	View facing south.
B021	Dungowan Dam_Transect 60	View facing east.
B022	Dungowan Dam_Transect 61	View facing north.
B022	Dungowan Dam_Transect 62	View facing east towards creek.
B022	Dungowan Dam_Transect 63	View facing south west towards hillslope.
B023	Dungowan Dam_Transect 64	View facing north.

Table F.2 Survey transect photographs.

Point ID	Image file name	Comment
B023	Dungowan Dam_Transect 65	View facing east towards creek.
B024	Dungowan Dam_Transect 66	View facing west.
B024	Dungowan Dam_Transect 67	View facing south.
B025	Dungowan Dam_Transect 68	View facing south.
B025	Dungowan Dam_Transect 69	View facing east.
B025	Dungowan Dam_Transect 70	View facing north.
B025	Dungowan Dam_Transect 71	View facing west towards creek.
B026	Dungowan Dam_Transect 72	View facing east.
B026	Dungowan Dam_Transect 73	View facing north.
B026	Dungowan Dam_Transect 74	View facing west.
B026	Dungowan Dam_Transect 75	View facing south.
B027	Dungowan Dam_Transect 76	View facing north.
B027	Dungowan Dam_Transect 77	View facing west.
B027	Dungowan Dam_Transect 78	View facing south.
B027	Dungowan Dam_Transect 79	View facing east.
B028	Dungowan Dam_Transect 80	View facing south towards creek.
B028	Dungowan Dam_Transect 81	View facing west.
B028	Dungowan Dam_Transect 82	View facing north.
B028	Dungowan Dam_Transect 83	View facing east.
B029	Dungowan Dam_Transect 84	View facing south east.
B029	Dungowan Dam_Transect 85	View facing south.
B030	Dungowan Dam_Transect 86	View facing south.
B030	Dungowan Dam_Transect 87	View facing west.
B030	Dungowan Dam_Transect 88	View facing north.
B030	Dungowan Dam_Transect 89	View facing east.
B031	Dungowan Dam_Transect 90	View facing north.
B031	Dungowan Dam_Transect 91	View facing west.
B031	Dungowan Dam_Transect 92	View facing south.
B031	Dungowan Dam_Transect 93	View facing east.
B032	Dungowan Dam_Transect 94	View facing east towards creek.
B032	Dungowan Dam_Transect 95	View facing north.
B032	Dungowan Dam_Transect 96	View facing west.

Table F.2 Survey transect photographs.

Point ID	Image file name	Comment
B032	Dungowan Dam_Transect 97	View facing south towards existing dam.
B033	Dungowan Dam_Transect 98	View facing north.
B033	Dungowan Dam_Transect 99	View facing east towards creek.
B033	Dungowan Dam_Transect 100	View facing south west.
B044	Dungowan Dam_Transect 101	View facing east.
B044	Dungowan Dam_Transect 102	View facing west.
B046	Dungowan Dam_Transect 103	View facing north west.
B046	Dungowan Dam_Transect 104	View facing south.
B046	Dungowan Dam_Transect 105	View facing east.
B047	Dungowan Dam_Transect 106	View facing west.
B047	Dungowan Dam_Transect 107	View facing north.
B049	Dungowan Dam_Transect 108	View facing north west.
B049	Dungowan Dam_Transect 109	View facing north towards creek.
B049	Dungowan Dam_Transect 110	View facing south west.
B050	Dungowan Dam_Transect 111	View facing north.
B050	Dungowan Dam_Transect 112	View facing south.
B051	Dungowan Dam_Transect 113	View facing north.
B051	Dungowan Dam_Transect 114	View facing south.
B051	Dungowan Dam_Transect 115	View facing south west.
B051	Dungowan Dam_Transect 116	View facing north east.
B051	Dungowan Dam_Transect 117	View facing south west.
B051	Dungowan Dam_Transect 118	View facing east.
B052	Dungowan Dam_Transect 119	View facing north towards rock outcrop.
B052	Dungowan Dam_Transect 120	View facing west towards alluvial terrace.
B052	Dungowan Dam_Transect 121	View facing south.
B053	Dungowan Dam_Transect 122	View facing south.
B053	Dungowan Dam_Transect 123	View facing south east.
B053	Dungowan Dam_Transect 124	View facing north.
B054	Dungowan Dam_Transect 125	View facing east.
B054	Dungowan Dam_Transect 126	View facing west.
B055	Dungowan Dam_Transect 127	View facing south.
B055	Dungowan Dam_Transect 128	View facing north.

Table F.2 Survey transect photographs.

Point ID	Image file name	Comment
B055	Dungowan Dam_Transect 129	View facing east towards creek.
B055	Dungowan Dam_Transect 130	View facing west.
B056	Dungowan Dam_Transect 131	View facing south.
B056	Dungowan Dam_Transect 132	View facing north west.
B056	Dungowan Dam_Transect 133	View facing east.
B057	Dungowan Dam_Transect 134	View facing west.
B058	Dungowan Dam_Transect 135	View facing north west.
B058	Dungowan Dam_Transect 136	View facing north towards creek.
B059	Dungowan Dam_Transect 137	View facing east.
B059	Dungowan Dam_Transect 138	View facing south.
B060	Dungowan Dam_Transect 139	View facing north.
B060	Dungowan Dam_Transect 140	View facing east.
B060	Dungowan Dam_Transect 141	View facing south west.
B062	Dungowan Dam_Transect 142	View facing west.
B062	Dungowan Dam_Transect 143	View facing west.
B063	Dungowan Dam_Transect 144	View facing north.
B063	Dungowan Dam_Transect 145	View facing south.
B063	Dungowan Dam_Transect 146	View facing west.
B064	Dungowan Dam_Transect 147	View facing south west.
B064	Dungowan Dam_Transect 148	View facing north west.
B064	Dungowan Dam_Transect 149	View facing north east.
B064	Dungowan Dam_Transect 150	View facing south east.
B065	Dungowan Dam_Transect 151	View facing north east.
B065	Dungowan Dam_Transect 152	View facing west.
B065	Dungowan Dam_Transect 153	View facing south
B066	Dungowan Dam_Transect 154	View facing south west.
B066	Dungowan Dam_Transect 155	View facing west.
B066	Dungowan Dam_Transect 156	View facing north.
B066	Dungowan Dam_Transect 157	View facing east.
B067	Dungowan Dam_Transect 158	View facing north.
B067	Dungowan Dam_Transect 159	View facing east.
B067	Dungowan Dam_Transect 160	View facing south.

Table F.2 Survey transect photographs.

Point ID	Image file name	Comment
B067	Dungowan Dam_Transect 161	View facing west.
B068	Dungowan Dam_Transect 162	View facing south.
B068	Dungowan Dam_Transect 163	View facing east.
B068	Dungowan Dam_Transect 164	View facing west.
B069	Dungowan Dam_Transect 165	View facing south.
B069	Dungowan Dam_Transect 166	View facing east.
B070	Dungowan Dam_Transect 167	View facing north west.
B070	Dungowan Dam_Transect 168	View facing east towards creek.
B070	Dungowan Dam_Transect 169	View facing south west towards hillslope.
B071	Dungowan Dam_Transect 170	View facing north.
B071	Dungowan Dam_Transect 171	View facing east towards creek.
B072	Dungowan Dam_Transect 172	View facing west.
B072	Dungowan Dam_Transect 173	View facing south.
B073	Dungowan Dam_Transect 174	View facing south.
B073	Dungowan Dam_Transect 175	View facing east.
B073	Dungowan Dam_Transect 176	View facing north.
B073	Dungowan Dam_Transect 177	View facing west towards creek.
B074	Dungowan Dam_Transect 178	View facing east.
B074	Dungowan Dam_Transect 179	View facing north.
B074	Dungowan Dam_Transect 180	View facing west.
B074	Dungowan Dam_Transect 181	View facing south.
B075	Dungowan Dam_Transect 182	View facing north.
B075	Dungowan Dam_Transect 183	View facing west.
B075	Dungowan Dam_Transect 184	View facing south.
B075	Dungowan Dam_Transect 185	View facing east.
B076	Dungowan Dam_Transect 186	View facing south towards creek.
B076	Dungowan Dam_Transect 187	View facing west.
B076	Dungowan Dam_Transect 188	View facing north.
B076	Dungowan Dam_Transect 189	View facing east.
B077	Dungowan Dam_Transect 190	View facing south east.
B077	Dungowan Dam_Transect 191	View facing south.
B078	Dungowan Dam_Transect 192	View facing south.

Table F.2 Survey transect photographs.

Point ID	Image file name	Comment
B078	Dungowan Dam_Transect 193	View facing west.
B078	Dungowan Dam_Transect 194	View facing north.
B078	Dungowan Dam_Transect 195	View facing east.
B079	Dungowan Dam_Transect 196	View facing north.
B079	Dungowan Dam_Transect 197	View facing west.
B079	Dungowan Dam_Transect 198	View facing south.
B079	Dungowan Dam_Transect 199	View facing east.
B080	Dungowan Dam_Transect 200	View facing east towards creek.
B080	Dungowan Dam_Transect 201	View facing north.
B080	Dungowan Dam_Transect 202	View facing west.
B080	Dungowan Dam_Transect 203	View facing south towards existing dam.
B081	Dungowan Dam_Transect 204	View facing north.
B081	Dungowan Dam_Transect 205	View facing east towards creek.
B081	Dungowan Dam_Transect 206	View facing south west.

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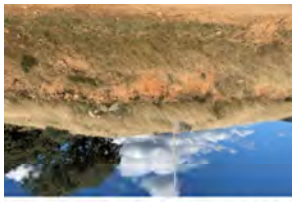
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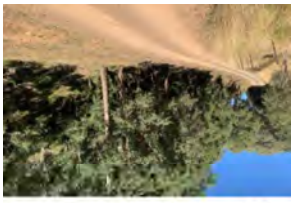
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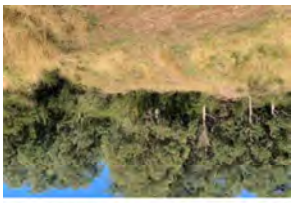
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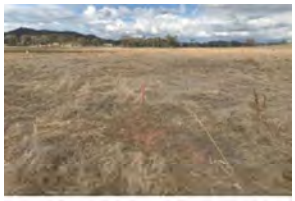
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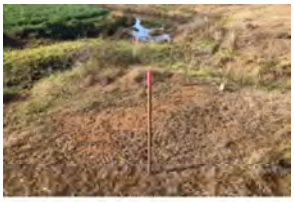
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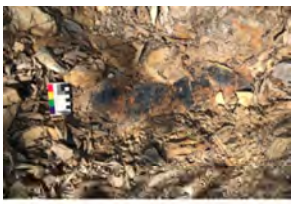
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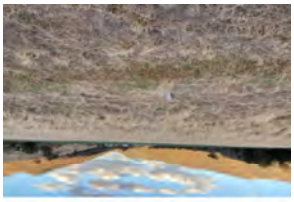
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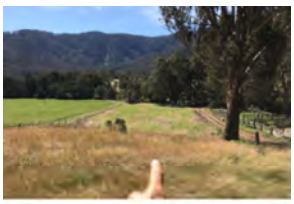
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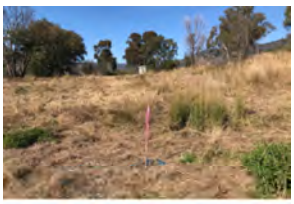
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)ungowan Dam_Survey (1296

)ungowan Dam_Survey (1297

Table F.3 Survey photographs.

Point ID	Image file name	Comment
B082	Dungowan Dam_Survey 1	View facing east.
B082	Dungowan Dam_Survey 2	View facing south west.
B082	Dungowan Dam_Survey 3	View facing north towards creek.
B083	Dungowan Dam_Survey 4	Exposure, view facing west.
B083	Dungowan Dam_Survey 5	View facing north.
B083	Dungowan Dam_Survey 6	View facing south west.
B083	Dungowan Dam_Survey 7	View facing north east.
B084	Dungowan Dam_Survey 8	View facing north.
B084	Dungowan Dam_Survey 9	View facing east.
B084	Dungowan Dam_Survey 10	View facing south.
B084	Dungowan Dam_Survey 11	View facing west.
B085	Dungowan Dam_Survey 12	View facing south.
B085	Dungowan Dam_Survey 13	Exposure, view facing north.
B085	Dungowan Dam_Survey 14	View facing east.
B085	Dungowan Dam_Survey 15	View facing west.
B086	Dungowan Dam_Survey 16	View facing north east.
B086	Dungowan Dam_Survey 17	View facing south towards alluvial terrace.
B086	Dungowan Dam_Survey 18	View facing north.
B087	Dungowan Dam_Survey 19	View facing south east.
B087	Dungowan Dam_Survey 20	View facing east.
B087	Dungowan Dam_Survey 21	View facing north.
B088	Dungowan Dam_Survey 22	View facing south.
B088	Dungowan Dam_Survey 23	View facing north west.
B089	Dungowan Dam_Survey 24	View facing east.
B089	Dungowan Dam_Survey 25	View facing north.
B089	Dungowan Dam_Survey 26	View facing west.
B089	Dungowan Dam_Survey 27	View facing south.
B090	Dungowan Dam_Survey 28	View facing north towards creek.
B090	Dungowan Dam_Survey 29	View facing north west.
B091	Dungowan Dam_Survey 30	View facing north east.
B092	Dungowan Dam_Survey 31	View facing west.

Table F.3 Survey photographs.

Point ID	Image file name	Comment
B092	Dungowan Dam_Survey 32	View facing north.
B092	Dungowan Dam_Survey 33	View facing east.
B093	Dungowan Dam_Survey 34	View facing north east.
B094	Dungowan Dam_Survey 35	Possible artefact, detail.
B094	Dungowan Dam_Survey 36	Possible artefact, detail.
B094	Dungowan Dam_Survey 37	View facing south west.
B095	Dungowan Dam_Survey 38	View facing north.
B095	Dungowan Dam_Survey 39	View facing west.
B095	Dungowan Dam_Survey 40	View facing south.
B096	Dungowan Dam_Survey 41	Local gravels, detail.
B096	Dungowan Dam_Survey 42	View facing west.
B096	Dungowan Dam_Survey 43	View facing east.
B097	Dungowan Dam_Survey 44	Detail, schist bedrock.
B116	Dungowan Dam_Survey 45	View facing south west.
B116	Dungowan Dam_Survey 46	View facing north west.
B116	Dungowan Dam_Survey 47	View facing south east.
B117	Dungowan Dam_Survey 48	View facing south.
B117	Dungowan Dam_Survey 49	View facing north.
B118	Dungowan Dam_Survey 50	View facing south.
B118	Dungowan Dam_Survey 51	View facing south west.
B118	Dungowan Dam_Survey 52	View facing north east.
B118	Dungowan Dam_Survey 53	View facing south east.
B119	Dungowan Dam_Survey 54	View facing south east.
B119	Dungowan Dam_Survey 55	View facing north east.
B119	Dungowan Dam_Survey 56	View facing south.
B120	Dungowan Dam_Survey 57	View facing east.
B120	Dungowan Dam_Survey 58	View facing south east.
B121	Dungowan Dam_Survey 59	View facing east.
B121	Dungowan Dam_Survey 60	View facing south.
B122	Dungowan Dam_Survey 61	View facing north.
B122	Dungowan Dam_Survey 62	View facing west.
B122	Dungowan Dam_Survey 63	View facing south.

Table F.3 Survey photographs.

Point ID	Image file name	Comment
B123	Dungowan Dam_Survey 64	View facing south west.
B123	Dungowan Dam_Survey 65	View facing south east.
B123	Dungowan Dam_Survey 66	View facing north west.
B125	Dungowan Dam_Survey 67	Local gravels, detail.
B125	Dungowan Dam_Survey 68	Local gravels, detail.
B125	Dungowan Dam_Survey 69	Local gravels, detail.
B125	Dungowan Dam_Survey 70	View facing north west towards creek.
B125	Dungowan Dam_Survey 71	View facing east.
B126	Dungowan Dam_Survey 72	View facing north.
B126	Dungowan Dam_Survey 73	View facing east.
B126	Dungowan Dam_Survey 74	View facing south.
B126	Dungowan Dam_Survey 75	View facing west.
B127	Dungowan Dam_Survey 76	View facing north.
B127	Dungowan Dam_Survey 77	View facing west.
B127	Dungowan Dam_Survey 78	View facing south east.
B128	Dungowan Dam_Survey 79	View facing west.
B128	Dungowan Dam_Survey 80	View facing east.
B129	Dungowan Dam_Survey 81	View facing south east.
B129	Dungowan Dam_Survey 82	View facing south.
B130	Dungowan Dam_Survey 83	View facing north.
B130	Dungowan Dam_Survey 84	View facing north east.
B130	Dungowan Dam_Survey 85	View facing west.
B131	Dungowan Dam_Survey 86	View facing west.
B131	Dungowan Dam_Survey 87	View facing east.
B132	Dungowan Dam_Survey 88	View facing south west.
B132	Dungowan Dam_Survey 89	View facing south.
B132	Dungowan Dam_Survey 90	View facing east.
B133	Dungowan Dam_Survey 91	View facing north west.
B133	Dungowan Dam_Survey 92	View facing east.
B134	Dungowan Dam_Survey 93	View facing west.
B134	Dungowan Dam_Survey 94	View facing south west.
B135	Dungowan Dam_Survey 95	View facing south.

Table F.3 Survey photographs.

Point ID	Image file name	Comment
B135	Dungowan Dam_Survey 96	View facing south east.
B136	Dungowan Dam_Survey 97	View facing south.
B137	Dungowan Dam_Survey 98	View facing east.
B137	Dungowan Dam_Survey 99	View facing south east.
B137	Dungowan Dam_Survey 100	View facing south.
B137	Dungowan Dam_Survey 101	View facing west.
B137	Dungowan Dam_Survey 102	View facing north.
B138	Dungowan Dam_Survey 103	View facing south.
B138	Dungowan Dam_Survey 104	View facing north.
B138	Dungowan Dam_Survey 105	View facing west.
B138	Dungowan Dam_Survey 106	View facing east.
B139	Dungowan Dam_Survey 107	View facing south.
B139	Dungowan Dam_Survey 108	View facing west.
B139	Dungowan Dam_Survey 109	View facing north.
B140	Dungowan Dam_Survey 110	View facing north.
B140	Dungowan Dam_Survey 111	View facing south.
B140	Dungowan Dam_Survey 112	View facing east.
B141	Dungowan Dam_Survey 113	View facing south.
B141	Dungowan Dam_Survey 114	View facing south, no access.
B141	Dungowan Dam_Survey 115	View facing north.
B142	Dungowan Dam_Survey 116	View facing east.
B142	Dungowan Dam_Survey 117	Local gravels, detail.
B142	Dungowan Dam_Survey 118	Local gravels, detail.
B143	Dungowan Dam_Survey 119	View facing east towards alluvial terrace.
B143	Dungowan Dam_Survey 120	View facing south.
B143	Dungowan Dam_Survey 121	View facing west.
B143	Dungowan Dam_Survey 122	View facing north.
B144	Dungowan Dam_Survey 123	View facing north.
B144	Dungowan Dam_Survey 124	View facing north west.
B144	Dungowan Dam_Survey 125	View facing south.
B145	Dungowan Dam_Survey 126	View facing north east.
B145	Dungowan Dam_Survey 127	View facing east.

Table F.3 Survey photographs.

Point ID	Image file name	Comment
B145	Dungowan Dam_Survey 128	View facing south.
B146	Dungowan Dam_Survey 129	View facing south.
B146	Dungowan Dam_Survey 130	View facing south east.
B147	Dungowan Dam_Survey 131	View facing south.
B147	Dungowan Dam_Survey 132	View facing north towards creek.
B148	Dungowan Dam_Survey 133	View facing east.
B148	Dungowan Dam_Survey 134	View facing north west.
B149	Dungowan Dam_Survey 135	View facing west.
B150	Dungowan Dam_Survey 136	View facing north.
B150	Dungowan Dam_Survey 137	View facing north.
B151	Dungowan Dam_Survey 138	View facing north.
B151	Dungowan Dam_Survey 139	View facing east.
B152	Dungowan Dam_Survey 140	View facing east.
B152	Dungowan Dam_Survey 141	View facing south.
B153	Dungowan Dam_Survey 142	View facing north.
B153	Dungowan Dam_Survey 143	View facing west.
B153	Dungowan Dam_Survey 144	View facing east.
B153	Dungowan Dam_Survey 145	View facing south.
B154	Dungowan Dam_Survey 146	View facing north east.
B154	Dungowan Dam_Survey 147	View facing north west.
B155	Dungowan Dam_Survey 148	View facing east.
B155	Dungowan Dam_Survey 149	View facing south east.
B155	Dungowan Dam_Survey 150	View facing west.
B156	Dungowan Dam_Survey 151	View facing north east.
B156	Dungowan Dam_Survey 152	View facing north.
B156	Dungowan Dam_Survey 153	View facing south.
B157	Dungowan Dam_Survey 154	View facing north east.
B157	Dungowan Dam_Survey 155	View facing north west.
B158	Dungowan Dam_Survey 156	View facing south.
B158	Dungowan Dam_Survey 157	View facing east.
B158	Dungowan Dam_Survey 158	View facing north.
B158	Dungowan Dam_Survey 159	View facing west.

Table F.3 Survey photographs.

Point ID	Image file name	Comment
B159	Dungowan Dam_Survey 160	View facing east.
B159	Dungowan Dam_Survey 161	View facing south.
B159	Dungowan Dam_Survey 162	View facing north east.
B160	Dungowan Dam_Survey 163	View facing west.
B160	Dungowan Dam_Survey 164	View facing north.
B160	Dungowan Dam_Survey 165	View facing east.
B161	Dungowan Dam_Survey 166	View facing north.
B162	Dungowan Dam_Survey 167	View facing north.
B162	Dungowan Dam_Survey 168	View facing south east.
B162	Dungowan Dam_Survey 169	View facing south west.
B162	Dungowan Dam_Survey 170	View facing north west.
B163	Dungowan Dam_Survey 171	View facing east.
B163	Dungowan Dam_Survey 172	View facing north east.
B163	Dungowan Dam_Survey 173	View facing west.
B163	Dungowan Dam_Survey 174	View facing east.
B164	Dungowan Dam_Survey 175	View facing west.
B164	Dungowan Dam_Survey 176	View facing east.
B165	Dungowan Dam_Survey 177	View facing west.
B165	Dungowan Dam_Survey 178	View facing north.
B166	Dungowan Dam_Survey 179	View facing west.
B166	Dungowan Dam_Survey 180	View facing west.
B166	Dungowan Dam_Survey 181	View facing west.
B167	Dungowan Dam_Survey 182	View facing north towards creek.
B167	Dungowan Dam_Survey 183	View facing west.
B167	Dungowan Dam_Survey 184	View facing south west.
B168	Dungowan Dam_Survey 185	View facing south east.
B168	Dungowan Dam_Survey 186	View facing east.
B168	Dungowan Dam_Survey 187	View facing west.
B169	Dungowan Dam_Survey 188	View facing north.
B169	Dungowan Dam_Survey 189	View facing south west.
B169	Dungowan Dam_Survey 190	View facing east.
B170	Dungowan Dam_Survey 191	Local gravels, detail.

Table F.3 Survey photographs.

Point ID	Image file name	Comment
B170	Dungowan Dam_Survey 192	View facing east towards creek.
B170	Dungowan Dam_Survey 193	Local gravels, detail.
B170	Dungowan Dam_Survey 194	Local gravels, detail.
B171	Dungowan Dam_Survey 195	View facing west.
B171	Dungowan Dam_Survey 196	View facing east.
B172	Dungowan Dam_Survey 197	View facing north.
B172	Dungowan Dam_Survey 198	View facing south.
B173	Dungowan Dam_Survey 199	View facing west.
B173	Dungowan Dam_Survey 200	View facing east.
B173	Dungowan Dam_Survey 201	View facing north.
B173	Dungowan Dam_Survey 202	View facing south.
B174	Dungowan Dam_Survey 203	View facing north.
B174	Dungowan Dam_Survey 204	View facing west.
B174	Dungowan Dam_Survey 205	View facing west.
B175	Dungowan Dam_Survey 206	View facing north.
B175	Dungowan Dam_Survey 207	View facing west.
B175	Dungowan Dam_Survey 208	View facing south west.
B176	Dungowan Dam_Survey 209	View facing east.
B176	Dungowan Dam_Survey 210	View facing west.
B176	Dungowan Dam_Survey 211	View facing north.
B177	Dungowan Dam_Survey 212	View facing south.
B177	Dungowan Dam_Survey 213	View facing east.
B177	Dungowan Dam_Survey 214	View facing north.
B177	Dungowan Dam_Survey 215	View facing west.
B178	Dungowan Dam_Survey 216	View facing north.
B178	Dungowan Dam_Survey 217	View facing south west.
B178	Dungowan Dam_Survey 218	View facing south.
B179	Dungowan Dam_Survey 219	View facing south.
B179	Dungowan Dam_Survey 220	View facing east.
B179	Dungowan Dam_Survey 221	View facing north.
B179	Dungowan Dam_Survey 222	View facing west.
B180	Dungowan Dam_Survey 223	View facing north east.

Table F.3 Survey photographs.

Point ID	Image file name	Comment
B180	Dungowan Dam_Survey 224	View facing north.
B181	Dungowan Dam_Survey 225	View facing south.
B181	Dungowan Dam_Survey 226	View facing south east.
B181	Dungowan Dam_Survey 227	View facing north east.
B182	Dungowan Dam_Survey 228	View facing north west.
B182	Dungowan Dam_Survey 229	View facing south.
B182	Dungowan Dam_Survey 230	View facing east.
B183	Dungowan Dam_Survey 231	View facing south.
B183	Dungowan Dam_Survey 232	View facing west.
B183	Dungowan Dam_Survey 233	View facing north west.
B184	Dungowan Dam_Survey 234	View facing west.
B184	Dungowan Dam_Survey 235	View facing east.
B184	Dungowan Dam_Survey 236	View facing north east.
B185	Dungowan Dam_Survey 237	View facing south.
B185	Dungowan Dam_Survey 238	View facing north.
B186	Dungowan Dam_Survey 239	View facing south east.
B186	Dungowan Dam_Survey 240	View facing north west.
B188	Dungowan Dam_Survey 241	View facing south.
B188	Dungowan Dam_Survey 242	View facing north.
B189	Dungowan Dam_Survey 243	View facing south.
B189	Dungowan Dam_Survey 244	View facing west.
B189	Dungowan Dam_Survey 245	View facing north east.
B189	Dungowan Dam_Survey 246	View facing south east.
B190	Dungowan Dam_Survey 247	View facing north.
B190	Dungowan Dam_Survey 248	View facing east.
B190	Dungowan Dam_Survey 249	View facing west.
B191	Dungowan Dam_Survey 250	View facing south.
B191	Dungowan Dam_Survey 251	View facing south west.
B191	Dungowan Dam_Survey 252	View facing west.
B192	Dungowan Dam_Survey 253	View facing west.
B192	Dungowan Dam_Survey 254	View facing north west.
B193	Dungowan Dam_Survey 255	View facing south east.

Table F.3 Survey photographs.

Point ID	Image file name	Comment
B193	Dungowan Dam_Survey 256	View facing west.
B194	Dungowan Dam_Survey 257	View facing south west.
B194	Dungowan Dam_Survey 258	View facing east.
B194	Dungowan Dam_Survey 259	View facing north west.
B195	Dungowan Dam_Survey 260	View facing south west.
B195	Dungowan Dam_Survey 261	View facing east.
B195	Dungowan Dam_Survey 262	View facing north.
B195	Dungowan Dam_Survey 263	View facing west towards creek.
B196	Dungowan Dam_Survey 264	View facing west.
B196	Dungowan Dam_Survey 265	View facing east.
B197	Dungowan Dam_Survey 266	View facing east.
B197	Dungowan Dam_Survey 267	View facing west towards creek.
B197	Dungowan Dam_Survey 268	View facing south west.
B198	Dungowan Dam_Survey 269	View facing east.
B199	Dungowan Dam_Survey 270	View facing north.
B199	Dungowan Dam_Survey 271	View facing south.
B199	Dungowan Dam_Survey 272	View facing north west.
B199	Dungowan Dam_Survey 273	View facing south east.
B200	Dungowan Dam_Survey 274	View facing north.
B200	Dungowan Dam_Survey 275	View facing south.
B200	Dungowan Dam_Survey 276	View facing west.
B201	Dungowan Dam_Survey 277	View facing north.
B201	Dungowan Dam_Survey 278	View facing south.
B201	Dungowan Dam_Survey 279	View facing east.
B202	Dungowan Dam_Survey 280	View facing east.
B203	Dungowan Dam_Survey 281	View facing north east.
B204	Dungowan Dam_Survey 282	View facing south.
B205	Dungowan Dam_Survey 283	Detail of subsurface impacts.
B205	Dungowan Dam_Survey 284	View facing south.
B205	Dungowan Dam_Survey 285	View facing north.
B206	Dungowan Dam_Survey 286	View facing west.
B207	Dungowan Dam_Survey 287	View facing north.

Table F.3 Survey photographs.

Point ID	Image file name	Comment
B207	Dungowan Dam_Survey 288	View facing west.
B207	Dungowan Dam_Survey 289	View facing south.
B207	Dungowan Dam_Survey 290	View facing east.
B208	Dungowan Dam_Survey 291	View facing west.
B208	Dungowan Dam_Survey 292	View facing west.
B208	Dungowan Dam_Survey 293	View facing north west.
B208	Dungowan Dam_Survey 294	View facing north.
B209	Dungowan Dam_Survey 295	View facing west.
B209	Dungowan Dam_Survey 296	View facing south.
B209	Dungowan Dam_Survey 297	View facing north.
B209	Dungowan Dam_Survey 298	View facing east.
B210	Dungowan Dam_Survey 299	View facing south.
B210	Dungowan Dam_Survey 300	View facing north west.
B210	Dungowan Dam_Survey 301	View facing north east.
B211	Dungowan Dam_Survey 302	View facing west.
B211	Dungowan Dam_Survey 303	View facing north east.
B211	Dungowan Dam_Survey 304	View facing north.
B211	Dungowan Dam_Survey 305	View facing south east.
B212	Dungowan Dam_Survey 306	View facing north.
B212	Dungowan Dam_Survey 307	View facing north east.
B212	Dungowan Dam_Survey 308	View facing east.
B213	Dungowan Dam_Survey 309	View facing north east towards rock outcropping.
B213	Dungowan Dam_Survey 310	View facing east.
B213	Dungowan Dam_Survey 311	View facing east.
B214	Dungowan Dam_Survey 312	View facing east.
B214	Dungowan Dam_Survey 313	View facing north.
B214	Dungowan Dam_Survey 314	View facing east.
B215	Dungowan Dam_Survey 315	View facing west.
B215	Dungowan Dam_Survey 316	View facing east
B215	Dungowan Dam_Survey 317	View facing south.
B215	Dungowan Dam_Survey 318	View facing north.

Table F.3 Survey photographs.

Point ID	Image file name	Comment
B216	Dungowan Dam_Survey 319	View facing east.
B217	Dungowan Dam_Survey 320	View facing north east.
B217	Dungowan Dam_Survey 321	View facing north.
B217	Dungowan Dam_Survey 322	View facing west.
B217	Dungowan Dam_Survey 323	View facing south.
B218	Dungowan Dam_Survey 324	View facing east.
B218	Dungowan Dam_Survey 325	View facing south.
B218	Dungowan Dam_Survey 326	View facing west.
B219	Dungowan Dam_Survey 327	View facing south.
B219	Dungowan Dam_Survey 328	View facing west.
B220	Dungowan Dam_Survey 329	View facing west.
B220	Dungowan Dam_Survey 330	View facing east.
B220	Dungowan Dam_Survey 331	View facing north.
B221	Dungowan Dam_Survey 332	View facing east.
B221	Dungowan Dam_Survey 333	View facing north west.
B221	Dungowan Dam_Survey 334	View facing south.
B222	Dungowan Dam_Survey 335	View facing north.
B222	Dungowan Dam_Survey 336	View facing west.
B222	Dungowan Dam_Survey 337	View facing south.
B222	Dungowan Dam_Survey 338	View facing east.
B222	Dungowan Dam_Survey 339	View facing west.
B223	Dungowan Dam_Survey 340	View facing east.
B223	Dungowan Dam_Survey 341	View facing north east.
B223	Dungowan Dam_Survey 342	View facing north.
B223	Dungowan Dam_Survey 343	View facing west.
B223	Dungowan Dam_Survey 344	View facing south.
B224	Dungowan Dam_Survey 345	View facing south.
B224	Dungowan Dam_Survey 346	View facing east.
B224	Dungowan Dam_Survey 347	View facing north east.
B225	Dungowan Dam_Survey 348	View facing east.
B225	Dungowan Dam_Survey 349	View facing south.
B225	Dungowan Dam_Survey 350	View facing west.

Table F.3 Survey photographs.

Point ID	Image file name	Comment
B225	Dungowan Dam_Survey 351	View facing north west.
B226	Dungowan Dam_Survey 352	View facing east.
B226	Dungowan Dam_Survey 353	View facing west.
B227	Dungowan Dam_Survey 354	Detail of bottles.
B227	Dungowan Dam_Survey 355	Detail of bottles.
B227	Dungowan Dam_Survey 356	View facing east.
B227	Dungowan Dam_Survey 357	View facing west.
B227	Dungowan Dam_Survey 358	View facing south.
B228	Dungowan Dam_Survey 359	View facing north.
B228	Dungowan Dam_Survey 360	View facing west.
B228	Dungowan Dam_Survey 361	View facing south.
B228	Dungowan Dam_Survey 362	View facing east.
B229	Dungowan Dam_Survey 363	View facing west.
B229	Dungowan Dam_Survey 364	View facing south west.
B229	Dungowan Dam_Survey 365	View facing east.
B230	Dungowan Dam_Survey 366	View facing north west.
B230	Dungowan Dam_Survey 367	View facing west.
B231	Dungowan Dam_Survey 368	View facing east.
B231	Dungowan Dam_Survey 369	View facing north.
B232	Dungowan Dam_Survey 370	View facing west.
B232	Dungowan Dam_Survey 371	View facing north west.
B232	Dungowan Dam_Survey 372	View facing east.
B233	Dungowan Dam_Survey 373	View facing south east.
B233	Dungowan Dam_Survey 374	View facing west.
B234	Dungowan Dam_Survey 375	View facing west.
B234	Dungowan Dam_Survey 376	View facing east.
B234	Dungowan Dam_Survey 377	View facing north.
B234	Dungowan Dam_Survey 378	View facing south west.
B235	Dungowan Dam_Survey 379	View facing east.
B235	Dungowan Dam_Survey 380	View facing north.
B236	Dungowan Dam_Survey 381	View facing west.
B236	Dungowan Dam_Survey 382	View facing north.

Table F.3 Survey photographs.

Point ID	Image file name	Comment
B236	Dungowan Dam_Survey 383	View facing south.
B237	Dungowan Dam_Survey 384	View facing south.
B237	Dungowan Dam_Survey 385	View facing east.
B237	Dungowan Dam_Survey 386	View facing north west.
B238	Dungowan Dam_Survey 387	View facing north.
B239	Dungowan Dam_Survey 388	View facing west.
B239	Dungowan Dam_Survey 389	View facing south.
B240	Dungowan Dam_Survey 390	View facing south.
B240	Dungowan Dam_Survey 391	View facing west.
B240	Dungowan Dam_Survey 392	View facing north.
B240	Dungowan Dam_Survey 393	View facing north.
B241	Dungowan Dam_Survey 394	View facing west.
B241	Dungowan Dam_Survey 395	View facing north.
B242	Dungowan Dam_Survey 396	View facing south east.
B242	Dungowan Dam_Survey 397	View facing east.
B242	Dungowan Dam_Survey 398	View facing north.
B243	Dungowan Dam_Survey 399	View facing north.
B243	Dungowan Dam_Survey 400	View facing south.
B243	Dungowan Dam_Survey 401	View facing north east.
B244	Dungowan Dam_Survey 402	View facing south.
B244	Dungowan Dam_Survey 403	View facing north.
B244	Dungowan Dam_Survey 404	View facing east.
B244	Dungowan Dam_Survey 405	View facing west.
B245	Dungowan Dam_Survey 406	View facing north.
B245	Dungowan Dam_Survey 407	View facing south west.
B246	Dungowan Dam_Survey 408	View facing east.
B246	Dungowan Dam_Survey 409	View facing west.
B246	Dungowan Dam_Survey 410	View facing north.
B247	Dungowan Dam_Survey 411	View facing south.
B247	Dungowan Dam_Survey 412	View facing north.
B248	Dungowan Dam_Survey 413	View facing south.
B248	Dungowan Dam_Survey 414	View facing east.

Table F.3 Survey photographs.

Point ID	Image file name	Comment
B248	Dungowan Dam_Survey 415	View facing north.
B249	Dungowan Dam_Survey 416	View facing east.
B249	Dungowan Dam_Survey 417	View facing west.
B249	Dungowan Dam_Survey 418	View facing south towards creek.
B249	Dungowan Dam_Survey 419	View facing south west towards dam.
B250	Dungowan Dam_Survey 420	View facing north.
B250	Dungowan Dam_Survey 421	View facing west.
B250	Dungowan Dam_Survey 422	View facing south east towards PAD.
B250	Dungowan Dam_Survey 423	View facing north east toward possible burials (DDB2).
B251	Dungowan Dam_Survey 424	View facing west.
B251	Dungowan Dam_Survey 425	View facing north.
B251	Dungowan Dam_Survey 426	View facing south.
B252	Dungowan Dam_Survey 427	View facing east.
B252	Dungowan Dam_Survey 428	View facing south east.
B252	Dungowan Dam_Survey 429	View facing west.
B253	Dungowan Dam_Survey 430	View facing west.
B253	Dungowan Dam_Survey 431	View facing north.
B254	Dungowan Dam_Survey 432	Possible artefact, detail.
B254	Dungowan Dam_Survey 433	Possible artefact, detail.
B254	Dungowan Dam_Survey 434	View facing south.
B255	Dungowan Dam_Survey 435	View facing north.
B255	Dungowan Dam_Survey 436	View facing south.
B256	Dungowan Dam_Survey 437	View facing south.
B256	Dungowan Dam_Survey 438	View facing west.
B257	Dungowan Dam_Survey 439	View facing north west.
B257	Dungowan Dam_Survey 440	View facing south west.
B257	Dungowan Dam_Survey 441	View facing east.
B257	Dungowan Dam_Survey 442	View facing east.
B259	Dungowan Dam_Survey 443	View facing south.
B259	Dungowan Dam_Survey 444	View facing north west.
B259	Dungowan Dam_Survey 445	View facing east.

Table F.3 Survey photographs.

Point ID	Image file name	Comment
B260	Dungowan Dam_Survey 446	View facing north west.
B261	Dungowan Dam_Survey 447	View facing west.
B261	Dungowan Dam_Survey 448	View facing east.
B261	Dungowan Dam_Survey 449	View facing north.
B262	Dungowan Dam_Survey 450	View facing south.
B262	Dungowan Dam_Survey 451	View facing north.
B262	Dungowan Dam_Survey 452	View facing east.
B263	Dungowan Dam_Survey 453	View facing north east.
B263	Dungowan Dam_Survey 454	View facing south west.
B264	Dungowan Dam_Survey 455	View facing south east.
B264	Dungowan Dam_Survey 456	View facing north.
B265	Dungowan Dam_Survey 457	View facing south west.
B265	Dungowan Dam_Survey 458	View facing north west.
B265	Dungowan Dam_Survey 459	View facing north.
B266	Dungowan Dam_Survey 460	View facing north east.
B266	Dungowan Dam_Survey 461	View facing south east.
B266	Dungowan Dam_Survey 462	View facing south west.
B266	Dungowan Dam_Survey 463	View facing north west.
B267	Dungowan Dam_Survey 464	View facing north.
B267	Dungowan Dam_Survey 465	View facing east.
B267	Dungowan Dam_Survey 466	View facing south.
B267	Dungowan Dam_Survey 467	View facing west.
B268	Dungowan Dam_Survey 468	View facing north.
B268	Dungowan Dam_Survey 469	View facing west.
B268	Dungowan Dam_Survey 470	View facing south.
B268	Dungowan Dam_Survey 471	View facing north east.
B269	Dungowan Dam_Survey 472	View facing north west.
B269	Dungowan Dam_Survey 473	View facing north.
B269	Dungowan Dam_Survey 474	View facing east.
B269	Dungowan Dam_Survey 475	View facing south west.
B270	Dungowan Dam_Survey 476	View facing north.
B270	Dungowan Dam_Survey 477	View facing north west.

Table F.3 Survey photographs.

Point ID	Image file name	Comment
B270	Dungowan Dam_Survey 478	View facing south.
B270	Dungowan Dam_Survey 479	View facing east.
B271	Dungowan Dam_Survey 480	View facing north west.
B271	Dungowan Dam_Survey 481	View facing south west.
B271	Dungowan Dam_Survey 482	View facing north.
B272	Dungowan Dam_Survey 483	View facing west.
B272	Dungowan Dam_Survey 484	View facing south.
B272	Dungowan Dam_Survey 485	View facing north east.
B273	Dungowan Dam_Survey 486	View facing west.
B273	Dungowan Dam_Survey 487	View facing north.
B273	Dungowan Dam_Survey 488	View facing east.
B273	Dungowan Dam_Survey 489	View facing south west.
B274	Dungowan Dam_Survey 490	View facing north.
B274	Dungowan Dam_Survey 491	View facing east.
B274	Dungowan Dam_Survey 492	View facing south east.
B274	Dungowan Dam_Survey 493	View facing north.
B274	Dungowan Dam_Survey 494	View facing north west.
B275	Dungowan Dam_Survey 495	View facing west.
B275	Dungowan Dam_Survey 496	View facing north.
B275	Dungowan Dam_Survey 497	View facing south west.
B276	Dungowan Dam_Survey 498	View facing south west.
B276	Dungowan Dam_Survey 499	View facing north west.
B276	Dungowan Dam_Survey 500	View facing north.
B276	Dungowan Dam_Survey 501	View facing north east.
B277	Dungowan Dam_Survey 502	View facing west.
B277	Dungowan Dam_Survey 503	View facing north west.
B277	Dungowan Dam_Survey 504	View facing south.
B278	Dungowan Dam_Survey 505	View facing east.
B278	Dungowan Dam_Survey 506	View facing west.
B279	Dungowan Dam_Survey 507	View facing north.
B279	Dungowan Dam_Survey 508	View facing south.
B280	Dungowan Dam_Survey 509	View facing north.

Table F.3 Survey photographs.

Point ID	Image file name	Comment
B280	Dungowan Dam_Survey 510	View facing south.
B281	Dungowan Dam_Survey 511	View facing east.
B281	Dungowan Dam_Survey 512	View facing south.
B281	Dungowan Dam_Survey 513	View facing west.
B282	Dungowan Dam_Survey 514	View facing south east.
B282	Dungowan Dam_Survey 515	View facing north west.
B282	Dungowan Dam_Survey 516	View facing south west.
B283	Dungowan Dam_Survey 517	View facing south.
B283	Dungowan Dam_Survey 518	View facing north.
B284	Dungowan Dam_Survey 519	View facing south west.
B284	Dungowan Dam_Survey 520	View facing north.
B285	Dungowan Dam_Survey 521	View facing north.
B285	Dungowan Dam_Survey 522	View facing east.
B285	Dungowan Dam_Survey 523	View facing west.
B286	Dungowan Dam_Survey 524	View facing south.
B286	Dungowan Dam_Survey 525	View facing west.
B286	Dungowan Dam_Survey 526	View facing north east.
B287	Dungowan Dam_Survey 527	View facing south east.
B287	Dungowan Dam_Survey 528	View facing north.
B288	Dungowan Dam_Survey 529	View facing west.
B288	Dungowan Dam_Survey 530	View facing north east.
B289	Dungowan Dam_Survey 531	View facing north.
B289	Dungowan Dam_Survey 532	View facing north.
B289	Dungowan Dam_Survey 533	View facing south west.
B290	Dungowan Dam_Survey 534	View facing south west.
B290	Dungowan Dam_Survey 535	View facing south east.
B290	Dungowan Dam_Survey 536	View facing north.
B291	Dungowan Dam_Survey 537	View facing north west.
B291	Dungowan Dam_Survey 538	View facing south west.
B292	Dungowan Dam_Survey 539	View facing west.
B292	Dungowan Dam_Survey 540	View facing west.
B293	Dungowan Dam_Survey 541	View facing north.

Table F.3 Survey photographs.

Point ID	Image file name	Comment
B293	Dungowan Dam_Survey 542	View facing west.
B294	Dungowan Dam_Survey 543	View facing west.
B294	Dungowan Dam_Survey 544	View facing south.
B294	Dungowan Dam_Survey 545	View facing north.
B295	Dungowan Dam_Survey 546	View facing west.
B295	Dungowan Dam_Survey 547	View facing north east.
B295	Dungowan Dam_Survey 548	View facing south east.
B296	Dungowan Dam_Survey 549	View facing south.
B296	Dungowan Dam_Survey 550	View facing north east.
B297	Dungowan Dam_Survey 551	View facing north.
B297	Dungowan Dam_Survey 552	View facing south.
B297	Dungowan Dam_Survey 553	View facing east.
B298	Dungowan Dam_Survey 554	View facing north.
B298	Dungowan Dam_Survey 555	View facing east.
B298	Dungowan Dam_Survey 556	View facing south.
B298	Dungowan Dam_Survey 557	View facing west.
B299	Dungowan Dam_Survey 558	View facing east.
B299	Dungowan Dam_Survey 559	View facing west.
B299	Dungowan Dam_Survey 560	View facing east.
B300	Dungowan Dam_Survey 561	View facing south east.
B300	Dungowan Dam_Survey 562	View facing east.
B300	Dungowan Dam_Survey 563	Raw material outcrop, detail.
B301	Dungowan Dam_Survey 564	View facing north.
B301	Dungowan Dam_Survey 565	View facing west.
B301	Dungowan Dam_Survey 566	View facing east.
B301	Dungowan Dam_Survey 567	View facing south east.
B302	Dungowan Dam_Survey 568	View facing north.
B302	Dungowan Dam_Survey 569	View facing south.
B302	Dungowan Dam_Survey 570	View facing east.
B303	Dungowan Dam_Survey 571	View facing south east.
B303	Dungowan Dam_Survey 572	View facing east.
B303	Dungowan Dam_Survey 573	View facing south.

Table F.3 Survey photographs.

Point ID	Image file name	Comment
B304	Dungowan Dam_Survey 574	View facing west.
B304	Dungowan Dam_Survey 575	View facing south.
B304	Dungowan Dam_Survey 576	View facing west.
B305	Dungowan Dam_Survey 577	View facing south west towards creek.
B305	Dungowan Dam_Survey 578	View facing north towards creek.
B305	Dungowan Dam_Survey 579	View facing north west.
B305	Dungowan Dam_Survey 580	View facing east.
B306	Dungowan Dam_Survey 581	View facing west.
B306	Dungowan Dam_Survey 582	View facing south.
B306	Dungowan Dam_Survey 583	View facing north.
B306	Dungowan Dam_Survey 584	View facing east.
B307	Dungowan Dam_Survey 585	View facing north.
B307	Dungowan Dam_Survey 586	View facing west.
B307	Dungowan Dam_Survey 587	View facing south.
B307	Dungowan Dam_Survey 588	View facing east.
B308	Dungowan Dam_Survey 589	View facing west.
B308	Dungowan Dam_Survey 590	View facing south.
B308	Dungowan Dam_Survey 591	View facing east.
B308	Dungowan Dam_Survey 592	View facing north.
B309	Dungowan Dam_Survey 593	View facing south east.
B309	Dungowan Dam_Survey 594	View facing south west.
B309	Dungowan Dam_Survey 595	View facing north.
B310	Dungowan Dam_Survey 596	View facing west.
B310	Dungowan Dam_Survey 597	View facing south.
B310	Dungowan Dam_Survey 598	View facing north.
B310	Dungowan Dam_Survey 599	View facing east.
B311	Dungowan Dam_Survey 600	View facing east.
B311	Dungowan Dam_Survey 601	View facing west.
B311	Dungowan Dam_Survey 602	View facing south.
B311	Dungowan Dam_Survey 603	View facing north.
B312	Dungowan Dam_Survey 604	View facing west.
B312	Dungowan Dam_Survey 605	View facing south.

Table F.3 Survey photographs.

Point ID	Image file name	Comment
B312	Dungowan Dam_Survey 606	View facing south.
B313	Dungowan Dam_Survey 607	View facing south.
B313	Dungowan Dam_Survey 608	View facing north east.
B313	Dungowan Dam_Survey 609	View facing west.
B314	Dungowan Dam_Survey 610	Watercress.
B314	Dungowan Dam_Survey 611	Watercress.
B315	Dungowan Dam_Survey 612	View facing south east.
B315	Dungowan Dam_Survey 613	View facing south west.
B315	Dungowan Dam_Survey 614	View facing north.
B315	Dungowan Dam_Survey 615	View facing east.
B316	Dungowan Dam_Survey 616	View facing south east.
B316	Dungowan Dam_Survey 617	View facing south.
B316	Dungowan Dam_Survey 618	View facing east.
B316	Dungowan Dam_Survey 619	View facing west.
B317	Dungowan Dam_Survey 620	View facing west.
B317	Dungowan Dam_Survey 621	View facing east.
B318	Dungowan Dam_Survey 622	View facing south.
B318	Dungowan Dam_Survey 623	View facing north.
B318	Dungowan Dam_Survey 624	View facing east.
B318	Dungowan Dam_Survey 625	View facing west.
B319	Dungowan Dam_Survey 626	Pig mandible.
B319	Dungowan Dam_Survey 627	View facing north.
B319	Dungowan Dam_Survey 628	View facing west towards creek.
B320	Dungowan Dam_Survey 629	View facing east.
B320	Dungowan Dam_Survey 630	View facing west
B321	Dungowan Dam_Survey 631	View facing north.
B321	Dungowan Dam_Survey 632	View facing north.
B322	Dungowan Dam_Survey 633	View facing north east.
B322	Dungowan Dam_Survey 634	View facing north.
B323	Dungowan Dam_Survey 635	View facing north.
B323	Dungowan Dam_Survey 636	View facing south.
B323	Dungowan Dam_Survey 637	View facing north.

Table F.3 Survey photographs.

Point ID	Image file name	Comment
B324	Dungowan Dam_Survey 638	View facing west.
B324	Dungowan Dam_Survey 639	View facing east.
B324	Dungowan Dam_Survey 640	View facing north.
B324	Dungowan Dam_Survey 641	View facing north east.
B325	Dungowan Dam_Survey 642	View facing west.
B325	Dungowan Dam_Survey 643	View facing east.
B326	Dungowan Dam_Survey 644	View facing west.
B326	Dungowan Dam_Survey 645	View facing south east.
B326	Dungowan Dam_Survey 646	View facing west.
B327	Dungowan Dam_Survey 647	View facing north west.
B327	Dungowan Dam_Survey 648	View facing east.
B327	Dungowan Dam_Survey 649	View facing south west.
B328	Dungowan Dam_Survey 650	View facing west.
B328	Dungowan Dam_Survey 651	View facing east.
B328	Dungowan Dam_Survey 652	View facing north.
B329	Dungowan Dam_Survey 653	View facing south west.
B329	Dungowan Dam_Survey 654	View facing east.
B329	Dungowan Dam_Survey 655	View facing north.
B330	Dungowan Dam_Survey 656	View facing north.
B330	Dungowan Dam_Survey 657	View facing south east.
B330	Dungowan Dam_Survey 658	View facing west.
B331	Dungowan Dam_Survey 659	View facing east.
B331	Dungowan Dam_Survey 660	View facing north west.
B331	Dungowan Dam_Survey 661	View facing south west.
B332	Dungowan Dam_Survey 662	View facing south
B332	Dungowan Dam_Survey 663	View facing west.
B332	Dungowan Dam_Survey 664	View facing north.
B333	Dungowan Dam_Survey 665	View facing north.
B333	Dungowan Dam_Survey 666	View facing west.
B333	Dungowan Dam_Survey 667	View facing east.
B334	Dungowan Dam_Survey 668	View facing north east.
B334	Dungowan Dam_Survey 669	View facing north.

Table F.3 Survey photographs.

Point ID	Image file name	Comment
B334	Dungowan Dam_Survey 670	View facing west.
B335	Dungowan Dam_Survey 671	View facing west.
B335	Dungowan Dam_Survey 672	View facing north.
B336	Dungowan Dam_Survey 673	View facing north.
B336	Dungowan Dam_Survey 674	View facing west.
B338	Dungowan Dam_Survey 675	View facing north.
B338	Dungowan Dam_Survey 676	View facing south.
B339	Dungowan Dam_Survey 677	View facing south towards dam.
B339	Dungowan Dam_Survey 678	View facing north.
B339	Dungowan Dam_Survey 679	View facing east.
B339	Dungowan Dam_Survey 680	View facing west.
B340	Dungowan Dam_Survey 681	View facing west.
B340	Dungowan Dam_Survey 682	View facing south.
B340	Dungowan Dam_Survey 683	View facing north east.
B341	Dungowan Dam_Survey 684	View facing south east.
B341	Dungowan Dam_Survey 685	View facing west.
B342	Dungowan Dam_Survey 686	View facing west.
B342	Dungowan Dam_Survey 687	View facing east.
B343	Dungowan Dam_Survey 688	View facing south.
B343	Dungowan Dam_Survey 689	View facing west.
B344	Dungowan Dam_Survey 690	View facing north.
B344	Dungowan Dam_Survey 691	View facing south.
B345	Dungowan Dam_Survey 692	View facing north.
B346	Dungowan Dam_Survey 693	View facing north east.
B346	Dungowan Dam_Survey 694	View facing north west towards creek.
B347	Dungowan Dam_Survey 695	View facing west.
B347	Dungowan Dam_Survey 696	View facing east.
B348	Dungowan Dam_Survey 697	View facing east.
B348	Dungowan Dam_Survey 698	View facing south.
B348	Dungowan Dam_Survey 699	View facing west.
B348	Dungowan Dam_Survey 700	View facing north.
B349	Dungowan Dam_Survey 701	Possible artefact, detail.

Table F.3 Survey photographs.

Point ID	Image file name	Comment
B349	Dungowan Dam_Survey 702	View facing north.
B349	Dungowan Dam_Survey 703	View facing south.
B350	Dungowan Dam_Survey 704	View facing east.
B350	Dungowan Dam_Survey 705	View facing west.
B350	Dungowan Dam_Survey 706	View facing north.
B350	Dungowan Dam_Survey 707	View facing south.
B351	Dungowan Dam_Survey 708	View facing north.
B351	Dungowan Dam_Survey 709	View facing north east.
B352	Dungowan Dam_Survey 710	View facing north.
B352	Dungowan Dam_Survey 711	View facing north.
B353	Dungowan Dam_Survey 712	View facing west.
B353	Dungowan Dam_Survey 713	View facing east towards creek.
B354	Dungowan Dam_Survey 714	View facing south west.
B354	Dungowan Dam_Survey 715	View facing east towards PAD.
B355	Dungowan Dam_Survey 716	View facing east.
B355	Dungowan Dam_Survey 717	View facing south.
B355	Dungowan Dam_Survey 718	View facing west towards creek.
B355	Dungowan Dam_Survey 719	View facing north.
B356	Dungowan Dam_Survey 720	View facing east.
B356	Dungowan Dam_Survey 721	View facing west.
B356	Dungowan Dam_Survey 722	View facing north.
B356	Dungowan Dam_Survey 723	View facing south.
B357	Dungowan Dam_Survey 724	View facing north.
B357	Dungowan Dam_Survey 725	View facing east.
B357	Dungowan Dam_Survey 726	View facing west.
B357	Dungowan Dam_Survey 727	View facing south.
B358	Dungowan Dam_Survey 728	Axe damage, detail.
B358	Dungowan Dam_Survey 729	Limb tearing, detail.
B358	Dungowan Dam_Survey 730	Axe damage, detail.
B359	Dungowan Dam_Survey 731	View facing south.
B359	Dungowan Dam_Survey 732	View facing north.
B359	Dungowan Dam_Survey 733	View facing west towards creek.

Table F.3 Survey photographs.

Point ID	Image file name	Comment
B359	Dungowan Dam_Survey 734	View facing east.
B360	Dungowan Dam_Survey 735	View facing south east.
B360	Dungowan Dam_Survey 736	View facing east.
B360	Dungowan Dam_Survey 737	View facing north west.
B360	Dungowan Dam_Survey 738	View facing west.
B360	Dungowan Dam_Survey 739	View facing south.
B361	Dungowan Dam_Survey 740	View facing west.
B361	Dungowan Dam_Survey 741	View facing east.
B361	Dungowan Dam_Survey 742	View facing south.
B362	Dungowan Dam_Survey 743	View facing east.
B362	Dungowan Dam_Survey 744	View facing south.
B362	Dungowan Dam_Survey 745	View facing west.
B362	Dungowan Dam_Survey 746	View facing north.
B363	Dungowan Dam_Survey 747	View facing east.
B363	Dungowan Dam_Survey 748	View facing north.
B363	Dungowan Dam_Survey 749	View facing west.
B363	Dungowan Dam_Survey 750	View facing south.
B364	Dungowan Dam_Survey 751	View facing west.
B364	Dungowan Dam_Survey 752	View facing east.
B364	Dungowan Dam_Survey 753	View facing north.
B365	Dungowan Dam_Survey 754	View facing east.
B365	Dungowan Dam_Survey 755	View facing west.
B365	Dungowan Dam_Survey 756	View facing north.
B366	Dungowan Dam_Survey 757	View facing east.
B366	Dungowan Dam_Survey 758	View facing north.
B366	Dungowan Dam_Survey 759	View facing west.
B366	Dungowan Dam_Survey 760	View facing south.
B369	Dungowan Dam_Survey 761	View facing east.
B369	Dungowan Dam_Survey 762	View facing north.
B369	Dungowan Dam_Survey 763	View facing west.
B369	Dungowan Dam_Survey 764	View facing south.
B370	Dungowan Dam_Survey 765	View facing north

Table F.3 Survey photographs.

Point ID	Image file name	Comment
B370	Dungowan Dam_Survey 766	View facing west.
B370	Dungowan Dam_Survey 767	View facing south.
B370	Dungowan Dam_Survey 768	View facing east.
B371	Dungowan Dam_Survey 769	View facing west.
B371	Dungowan Dam_Survey 770	View facing east.
B371	Dungowan Dam_Survey 771	View facing north.
B372	Dungowan Dam_Survey 772	View facing east.
B372	Dungowan Dam_Survey 773	View facing north.
B372	Dungowan Dam_Survey 774	View facing west.
B372	Dungowan Dam_Survey 775	View facing south.
B373	Dungowan Dam_Survey 776	View facing north east.
B373	Dungowan Dam_Survey 777	View facing east towards creek.
B373	Dungowan Dam_Survey 778	View facing south east.
B373	Dungowan Dam_Survey 779	View facing west.
B373	Dungowan Dam_Survey 780	View facing north west.
B374	Dungowan Dam_Survey 781	View facing east.
B375	Dungowan Dam_Survey 782	View facing north.
B375	Dungowan Dam_Survey 783	View facing east towards creek.
B375	Dungowan Dam_Survey 784	View facing west.
B375	Dungowan Dam_Survey 785	View facing south.
B376	Dungowan Dam_Survey 786	View facing north west.
B376	Dungowan Dam_Survey 787	View facing north east.
B376	Dungowan Dam_Survey 788	View facing south east.
B377	Dungowan Dam_Survey 789	View facing north west.
B377	Dungowan Dam_Survey 790	View facing north east.
B378	Dungowan Dam_Survey 791	View facing north.
B378	Dungowan Dam_Survey 792	Raw material outcrop, detail.
B378	Dungowan Dam_Survey 793	View facing south.
B378	Dungowan Dam_Survey 794	View facing east towards creek.
B379	Dungowan Dam_Survey 795	View facing north west.
B379	Dungowan Dam_Survey 796	View facing north.
B379	Dungowan Dam_Survey 797	View facing north east.

Table F.3 Survey photographs.

Point ID	Image file name	Comment
B379	Dungowan Dam_Survey 798	View facing south.
B380	Dungowan Dam_Survey 799	View facing north.
B380	Dungowan Dam_Survey 800	View facing south.
B380	Dungowan Dam_Survey 801	View facing east towards creek.
B380	Dungowan Dam_Survey 802	View facing west.
B381	Dungowan Dam_Survey 803	View facing west.
B381	Dungowan Dam_Survey 804	View facing west.
B381	Dungowan Dam_Survey 805	View facing north.
B382	Dungowan Dam_Survey 806	View facing north east.
B382	Dungowan Dam_Survey 807	View facing north west.
B382	Dungowan Dam_Survey 808	View facing south.
B383	Dungowan Dam_Survey 809	View facing west.
B383	Dungowan Dam_Survey 810	View facing north west.
B383	Dungowan Dam_Survey 811	View facing east.
B384	Dungowan Dam_Survey 812	View facing south.
B384	Dungowan Dam_Survey 813	View facing west.
B384	Dungowan Dam_Survey 814	View facing east towards creek.
B384	Dungowan Dam_Survey 815	View facing north east.
B385	Dungowan Dam_Survey 816	View facing north west.
B385	Dungowan Dam_Survey 817	View facing east towards creek.
B385	Dungowan Dam_Survey 818	View facing west.
B386	Dungowan Dam_Survey 819	View facing north west.
B386	Dungowan Dam_Survey 820	View facing west.
B386	Dungowan Dam_Survey 821	View facing east.
B387	Dungowan Dam_Survey 822	View facing north east.
B387	Dungowan Dam_Survey 823	View facing west.
B387	Dungowan Dam_Survey 824	View facing east.
B388	Dungowan Dam_Survey 825	Raw material, detail.
B388	Dungowan Dam_Survey 826	Raw material, detail.
B388	Dungowan Dam_Survey 827	Raw material, detail.
B388	Dungowan Dam_Survey 828	View facing east.
B389	Dungowan Dam_Survey 829	View facing south west.

Table F.3 Survey photographs.

Point ID	Image file name	Comment
B389	Dungowan Dam_Survey 830	View facing west.
B389	Dungowan Dam_Survey 831	View facing north west.
B389	Dungowan Dam_Survey 832	View facing east towards creek.
B390	Dungowan Dam_Survey 833	View facing north, tree detail.
B390	Dungowan Dam_Survey 834	View facing north.
B390	Dungowan Dam_Survey 835	View facing north east.
B391	Dungowan Dam_Survey 836	View facing north.
B391	Dungowan Dam_Survey 837	View facing east.
B391	Dungowan Dam_Survey 838	View facing west.
B391	Dungowan Dam_Survey 839	View facing south.
B392	Dungowan Dam_Survey 840	View facing west.
B392	Dungowan Dam_Survey 841	View facing east towards creek.
B392	Dungowan Dam_Survey 842	View facing south east.
B392	Dungowan Dam_Survey 843	View facing north.
B393	Dungowan Dam_Survey 844	View facing east.
B393	Dungowan Dam_Survey 845	View facing west.
B393	Dungowan Dam_Survey 846	View facing north east.
B394	Dungowan Dam_Survey 847	View facing west.
B394	Dungowan Dam_Survey 848	View facing east towards creek.
B395	Dungowan Dam_Survey 849	View east towards potential PAD.
B395	Dungowan Dam_Survey 850	View facing west towards creek.
B395	Dungowan Dam_Survey 851	View facing north.
B396	Dungowan Dam_Survey 852	View facing west, tree detail.
B397	Dungowan Dam_Survey 853	View facing east towards creek.
B398	Dungowan Dam_Survey 854	View facing north east.
B398	Dungowan Dam_Survey 855	View facing north east towards creek.
B399	Dungowan Dam_Survey 856	View facing north west.
B399	Dungowan Dam_Survey 857	View facing north east.
B399	Dungowan Dam_Survey 858	View facing south east.
B400	Dungowan Dam_Survey 859	View facing north east towards creek.
B401	Dungowan Dam_Survey 860	View facing west.
B401	Dungowan Dam_Survey 861	View facing east towards creek.

Table F.3 Survey photographs.

Point ID	Image file name	Comment
B402	Dungowan Dam_Survey 862	View facing north west.
B402	Dungowan Dam_Survey 863	View facing north.
B402	Dungowan Dam_Survey 864	View facing east.
B403	Dungowan Dam_Survey 865	View facing east.
B403	Dungowan Dam_Survey 866	View facing north.
B403	Dungowan Dam_Survey 867	View facing west.
B403	Dungowan Dam_Survey 868	View facing south.
B404	Dungowan Dam_Survey 869	Raw material, detail.
B404	Dungowan Dam_Survey 870	Raw material, detail.
B404	Dungowan Dam_Survey 871	View facing east.
B404	Dungowan Dam_Survey 872	View facing north.
B405	Dungowan Dam_Survey 873	View facing east.
B405	Dungowan Dam_Survey 874	View facing west.
B405	Dungowan Dam_Survey 875	View facing north.
B405	Dungowan Dam_Survey 876	View facing south.
B406	Dungowan Dam_Survey 877	View facing west.
B406	Dungowan Dam_Survey 878	View facing south.
B406	Dungowan Dam_Survey 879	View facing north.
B407	Dungowan Dam_Survey 880	View facing north.
B408	Dungowan Dam_Survey 881	Limb tearing, detail.
B409	Dungowan Dam_Survey 882	View facing north.
B409	Dungowan Dam_Survey 883	View facing west.
B409	Dungowan Dam_Survey 884	View facing south.
B409	Dungowan Dam_Survey 885	View facing east.
B410	Dungowan Dam_Survey 886	View facing east.
B410	Dungowan Dam_Survey 887	View facing north.
B410	Dungowan Dam_Survey 888	View facing west.
B410	Dungowan Dam_Survey 889	View facing south.
B411	Dungowan Dam_Survey 890	View facing east.
B411	Dungowan Dam_Survey 891	View facing north.
B411	Dungowan Dam_Survey 892	View facing west.
B411	Dungowan Dam_Survey 893	View facing south.

Table F.3 Survey photographs.

Point ID	Image file name	Comment
B412	Dungowan Dam_Survey 894	View facing east.
B412	Dungowan Dam_Survey 895	View facing north.
B412	Dungowan Dam_Survey 896	View facing west.
B412	Dungowan Dam_Survey 897	View facing south.
B413	Dungowan Dam_Survey 898	View facing south.
B413	Dungowan Dam_Survey 899	View facing east.
B413	Dungowan Dam_Survey 900	View facing north.
B413	Dungowan Dam_Survey 901	View facing west.
B414	Dungowan Dam_Survey 902	View facing north.
B414	Dungowan Dam_Survey 903	View facing west.
B414	Dungowan Dam_Survey 904	View facing south.
B414	Dungowan Dam_Survey 905	View facing east.
B415	Dungowan Dam_Survey 906	View facing south.
B415	Dungowan Dam_Survey 907	View facing east.
B415	Dungowan Dam_Survey 908	View facing north.
B415	Dungowan Dam_Survey 909	View facing west.
B416	Dungowan Dam_Survey 910	View facing south.
B416	Dungowan Dam_Survey 911	View facing east.
B416	Dungowan Dam_Survey 912	View facing north.
B416	Dungowan Dam_Survey 913	View facing west.
B416	Dungowan Dam_Survey 914	View facing south west.
B417	Dungowan Dam_Survey 915	View facing south.
B417	Dungowan Dam_Survey 916	View facing east.
B417	Dungowan Dam_Survey 917	View facing north.
B417	Dungowan Dam_Survey 918	View facing west.
B417	Dungowan Dam_Survey 919	View facing north east.
B418	Dungowan Dam_Survey 920	View facing south.
B418	Dungowan Dam_Survey 921	View facing east.
B418	Dungowan Dam_Survey 922	View facing north.
B418	Dungowan Dam_Survey 923	View facing west.
B419	Dungowan Dam_Survey 924	View facing south.
B419	Dungowan Dam_Survey 925	View facing east.

Table F.3 Survey photographs.

Point ID	Image file name	Comment
B419	Dungowan Dam_Survey 926	View facing north.
B419	Dungowan Dam_Survey 927	View facing west.
B420	Dungowan Dam_Survey 928	View facing east.
B420	Dungowan Dam_Survey 929	View facing north.
B420	Dungowan Dam_Survey 930	View facing west.
B420	Dungowan Dam_Survey 931	View facing south.
B421	Dungowan Dam_Survey 932	View facing east.
B421	Dungowan Dam_Survey 933	View facing north.
B421	Dungowan Dam_Survey 934	View facing west.
B422	Dungowan Dam_Survey 935	Potential scar tree, no access.
B422	Dungowan Dam_Survey 936	Potential scar tree, no access.
B423	Dungowan Dam_Survey 937	View facing west.
B423	Dungowan Dam_Survey 938	View facing north.
B423	Dungowan Dam_Survey 939	View facing east.
B423	Dungowan Dam_Survey 940	View facing south.
B424	Dungowan Dam_Survey 941	View facing north.
B424	Dungowan Dam_Survey 942	View facing south.
B424	Dungowan Dam_Survey 943	View facing east.
B424	Dungowan Dam_Survey 944	View facing east.
B424	Dungowan Dam_Survey 945	View facing west.
B425	Dungowan Dam_Survey 946	View facing west.
B425	Dungowan Dam_Survey 947	View facing south.
B425	Dungowan Dam_Survey 948	View facing east.
B425	Dungowan Dam_Survey 949	View facing north.
B426	Dungowan Dam_Survey 950	View facing south.
B426	Dungowan Dam_Survey 951	View facing east.
B426	Dungowan Dam_Survey 952	View facing north.
B426	Dungowan Dam_Survey 953	View facing west.
B427	Dungowan Dam_Survey 954	View facing east.
B427	Dungowan Dam_Survey 955	View facing north.
B427	Dungowan Dam_Survey 956	View facing west.
B427	Dungowan Dam_Survey 957	View facing south.

Table F.3 Survey photographs.

Point ID	Image file name	Comment
B428	Dungowan Dam_Survey 958	View facing south.
B428	Dungowan Dam_Survey 959	View facing north.
B428	Dungowan Dam_Survey 960	View facing west.
B428	Dungowan Dam_Survey 961	View facing east.
B429	Dungowan Dam_Survey 962	View facing east.
B429	Dungowan Dam_Survey 963	View facing west.
B429	Dungowan Dam_Survey 964	View facing north.
B429	Dungowan Dam_Survey 965	View facing south.
B430	Dungowan Dam_Survey 966	View facing east.
B430	Dungowan Dam_Survey 967	View facing north.
B430	Dungowan Dam_Survey 968	View facing west.
B430	Dungowan Dam_Survey 969	View facing south.
B431	Dungowan Dam_Survey 970	View facing east.
B431	Dungowan Dam_Survey 971	View facing east.
B431	Dungowan Dam_Survey 972	View facing west.
B431	Dungowan Dam_Survey 973	View facing south.
B431	Dungowan Dam_Survey 974	View facing south east.
B432	Dungowan Dam_Survey 975	View facing south east.
B432	Dungowan Dam_Survey 976	View facing east.
B432	Dungowan Dam_Survey 977	View facing north.
B432	Dungowan Dam_Survey 978	View facing west.
B432	Dungowan Dam_Survey 979	View facing south.
B433	Dungowan Dam_Survey 980	View facing north east.
B433	Dungowan Dam_Survey 981	View facing south east.
B433	Dungowan Dam_Survey 982	View facing north west.
B434	Dungowan Dam_Survey 983	View facing south east.
B434	Dungowan Dam_Survey 984	View facing east towards creek.
B434	Dungowan Dam_Survey 985	View facing north.
B434	Dungowan Dam_Survey 986	View facing west.
B435	Dungowan Dam_Survey 987	View facing south east.
B435	Dungowan Dam_Survey 988	View facing east towards creek.
B435	Dungowan Dam_Survey 989	View facing north east.

Table F.3 Survey photographs.

Point ID	Image file name	Comment
B435	Dungowan Dam_Survey 990	View facing west.
B435	Dungowan Dam_Survey 991	View facing south west.
B436	Dungowan Dam_Survey 992	View facing north west.
B436	Dungowan Dam_Survey 993	View facing north.
B436	Dungowan Dam_Survey 994	View facing east towards creek.
B436	Dungowan Dam_Survey 995	View facing south.
B437	Dungowan Dam_Survey 996	View facing north east.
B437	Dungowan Dam_Survey 997	View facing north west.
B437	Dungowan Dam_Survey 998	View facing south west.
B438	Dungowan Dam_Survey 999	View facing north east.
B438	Dungowan Dam_Survey 1000	View facing north.
B438	Dungowan Dam_Survey 1001	View facing north west.
B438	Dungowan Dam_Survey 1002	View facing south east.
B438	Dungowan Dam_Survey 1003	View facing south west.
B439	Dungowan Dam_Survey 1004	View facing west.
B439	Dungowan Dam_Survey 1005	View facing north.
B439	Dungowan Dam_Survey 1006	View facing east.
B439	Dungowan Dam_Survey 1007	View facing south.
B440	Dungowan Dam_Survey 1008	View facing west towards PAD.
B440	Dungowan Dam_Survey 1009	View facing north towards PAD.
B440	Dungowan Dam_Survey 1010	View facing east towards creek.
B440	Dungowan Dam_Survey 1011	View facing south east.
B440	Dungowan Dam_Survey 1012	View facing south west.
B441	Dungowan Dam_Survey 1013	View facing north west towards PAD.
B441	Dungowan Dam_Survey 1014	View facing north east towards PAD.
B441	Dungowan Dam_Survey 1015	View facing east.
B441	Dungowan Dam_Survey 1016	View facing south west.
B441	Dungowan Dam_Survey 1017	View facing south east towards creek.
B442	Dungowan Dam_Survey 1018	View facing north east.
B442	Dungowan Dam_Survey 1019	View facing south.
B442	Dungowan Dam_Survey 1020	View facing west.
B443	Dungowan Dam_Survey 1021	View facing south west.

Table F.3 Survey photographs.

Point ID	Image file name	Comment
B443	Dungowan Dam_Survey 1022	View facing south towards PAD.
B443	Dungowan Dam_Survey 1023	View facing south east towards PAD.
B443	Dungowan Dam_Survey 1024	View facing east towards creek.
B443	Dungowan Dam_Survey 1025	View facing north.
B444	Dungowan Dam_Survey 1026	View facing west.
B444	Dungowan Dam_Survey 1027	View facing north.
B444	Dungowan Dam_Survey 1028	View facing east towards creek.
B444	Dungowan Dam_Survey 1029	View facing south.
B445	Dungowan Dam_Survey 1030	View facing north west.
B445	Dungowan Dam_Survey 1031	View facing north.
B445	Dungowan Dam_Survey 1032	View facing east.
B445	Dungowan Dam_Survey 1033	View facing south.
B445	Dungowan Dam_Survey 1034	View facing west.
B446	Dungowan Dam_Survey 1035	View facing south east towards creek.
B446	Dungowan Dam_Survey 1036	View facing south.
B446	Dungowan Dam_Survey 1037	View facing west.
B446	Dungowan Dam_Survey 1038	View facing north.
B447	Dungowan Dam_Survey 1039	View facing west.
B447	Dungowan Dam_Survey 1040	View facing north.
B447	Dungowan Dam_Survey 1041	View facing east towards PAD.
B447	Dungowan Dam_Survey 1042	View facing south.
B448	Dungowan Dam_Survey 1043	View facing east.
B448	Dungowan Dam_Survey 1044	View facing south.
B448	Dungowan Dam_Survey 1045	View facing west.
B448	Dungowan Dam_Survey 1046	View facing north.
B449	Dungowan Dam_Survey 1047	View facing south east.
B449	Dungowan Dam_Survey 1048	View facing south west.
B449	Dungowan Dam_Survey 1049	View facing north.
B450	Dungowan Dam_Survey 1050	View facing west.
B450	Dungowan Dam_Survey 1051	View facing north east towards creek.
B451	Dungowan Dam_Survey 1052	View facing north east towards creek.
B451	Dungowan Dam_Survey 1053	View facing north.

Table F.3 Survey photographs.

Point ID	Image file name	Comment
B451	Dungowan Dam_Survey 1054	View facing north west.
B452	Dungowan Dam_Survey 1055	Scarring, detail.
B452	Dungowan Dam_Survey 1056	View facing west.
B452	Dungowan Dam_Survey 1057	View facing east.
B453	Dungowan Dam_Survey 1058	View facing south west.
B453	Dungowan Dam_Survey 1059	View facing west.
B453	Dungowan Dam_Survey 1060	View facing north west.
B453	Dungowan Dam_Survey 1061	View facing east.
B454	Dungowan Dam_Survey 1062	View facing north west.
B454	Dungowan Dam_Survey 1063	View facing east.
B454	Dungowan Dam_Survey 1064	View facing south.
B455	Dungowan Dam_Survey 1065	View facing north west.
B455	Dungowan Dam_Survey 1066	View facing east.
B455	Dungowan Dam_Survey 1067	View facing east.
B456	Dungowan Dam_Survey 1068	View facing east.
B456	Dungowan Dam_Survey 1069	View facing east towards creek.
B456	Dungowan Dam_Survey 1070	View facing west.
B457	Dungowan Dam_Survey 1071	View facing north west.
B457	Dungowan Dam_Survey 1072	View facing north east.
B457	Dungowan Dam_Survey 1073	View facing south.
B458	Dungowan Dam_Survey 1074	View facing north west.
B458	Dungowan Dam_Survey 1075	View facing north east.
B458	Dungowan Dam_Survey 1076	View facing south.
B459	Dungowan Dam_Survey 1077	View facing south east.
B459	Dungowan Dam_Survey 1078	View facing east.
B459	Dungowan Dam_Survey 1079	View facing south west.
B459	Dungowan Dam_Survey 1080	View facing north west.
B460	Dungowan Dam_Survey 1081	View facing north
B460	Dungowan Dam_Survey 1082	View facing east.
B460	Dungowan Dam_Survey 1083	View facing south.
B460	Dungowan Dam_Survey 1084	View facing west.
B461	Dungowan Dam_Survey 1085	View facing north.

Table F.3 Survey photographs.

Point ID	Image file name	Comment
B461	Dungowan Dam_Survey 1086	View facing west.
B461	Dungowan Dam_Survey 1087	View facing south.
B461	Dungowan Dam_Survey 1088	View facing east.
B462	Dungowan Dam_Survey 1089	View facing west.
B463	Dungowan Dam_Survey 1090	View facing north.
B463	Dungowan Dam_Survey 1091	View facing east.
B463	Dungowan Dam_Survey 1092	View facing south
B463	Dungowan Dam_Survey 1093	View facing west.
B464	Dungowan Dam_Survey 1094	View facing north.
B464	Dungowan Dam_Survey 1095	View facing east.
B464	Dungowan Dam_Survey 1096	View facing south
B464	Dungowan Dam_Survey 1097	View facing west.
B465	Dungowan Dam_Survey 1098	View facing north.
B465	Dungowan Dam_Survey 1099	View facing east.
B465	Dungowan Dam_Survey 1100	View facing south
B465	Dungowan Dam_Survey 1101	View facing west.
B466	Dungowan Dam_Survey 1102	View facing west.
B466	Dungowan Dam_Survey 1103	View facing north.
B466	Dungowan Dam_Survey 1104	View facing east.
B466	Dungowan Dam_Survey 1105	View facing south
B467	Dungowan Dam_Survey 1106	View facing west.
B467	Dungowan Dam_Survey 1107	View facing north west.
B467	Dungowan Dam_Survey 1108	View facing south west.
B467	Dungowan Dam_Survey 1109	View facing north east.
B468	Dungowan Dam_Survey 1110	View facing west.
B468	Dungowan Dam_Survey 1111	View facing west.
B468	Dungowan Dam_Survey 1112	View facing north.
B468	Dungowan Dam_Survey 1113	View facing north west.
B469	Dungowan Dam_Survey 1114	View facing south.
B469	Dungowan Dam_Survey 1115	View facing west.
B469	Dungowan Dam_Survey 1116	View facing north.
B469	Dungowan Dam_Survey 1117	View facing east towards creek.

Table F.3 Survey photographs.

Point ID	Image file name	Comment
B470	Dungowan Dam_Survey 1118	View facing south.
B470	Dungowan Dam_Survey 1119	View facing west.
B470	Dungowan Dam_Survey 1120	View facing north.
B470	Dungowan Dam_Survey 1121	View facing east towards creek.
B471	Dungowan Dam_Survey 1122	View facing east.
B471	Dungowan Dam_Survey 1123	View facing north east.
B471	Dungowan Dam_Survey 1124	View facing east.
B471	Dungowan Dam_Survey 1125	View facing south.
B472	Dungowan Dam_Survey 1126	View facing east towards creek.
B472	Dungowan Dam_Survey 1127	View facing south.
B472	Dungowan Dam_Survey 1128	View facing west.
B472	Dungowan Dam_Survey 1129	View facing north.
B473	Dungowan Dam_Survey 1130	View facing south.
B473	Dungowan Dam_Survey 1131	View facing west.
B473	Dungowan Dam_Survey 1132	View facing north.
B473	Dungowan Dam_Survey 1133	View facing east towards creek.
B474	Dungowan Dam_Survey 1134	View facing east towards creek.
B474	Dungowan Dam_Survey 1135	View facing south.
B474	Dungowan Dam_Survey 1136	View facing west.
B474	Dungowan Dam_Survey 1137	View facing north.
B475	Dungowan Dam_Survey 1138	View facing north towards creek.
B475	Dungowan Dam_Survey 1139	View facing east.
B475	Dungowan Dam_Survey 1140	View facing south.
B475	Dungowan Dam_Survey 1141	View facing west.
B476	Dungowan Dam_Survey 1142	View facing east towards creek.
B476	Dungowan Dam_Survey 1143	View facing south.
B476	Dungowan Dam_Survey 1144	View facing west.
B476	Dungowan Dam_Survey 1145	View facing north.
B477	Dungowan Dam_Survey 1146	View facing west.
B477	Dungowan Dam_Survey 1147	View facing south east towards creek.
B477	Dungowan Dam_Survey 1148	View facing east.
B478	Dungowan Dam_Survey 1149	View facing east towards creek.

Table F.3 Survey photographs.

Point ID	Image file name	Comment
B478	Dungowan Dam_Survey 1150	View facing south.
B478	Dungowan Dam_Survey 1151	View facing west.
B478	Dungowan Dam_Survey 1152	View facing north.
B479	Dungowan Dam_Survey 1153	View facing east towards creek.
B479	Dungowan Dam_Survey 1154	View facing south.
B479	Dungowan Dam_Survey 1155	View facing west.
B479	Dungowan Dam_Survey 1156	View facing north.
B480	Dungowan Dam_Survey 1157	View facing east towards creek.
B480	Dungowan Dam_Survey 1158	View facing south.
B480	Dungowan Dam_Survey 1159	View facing west.
B480	Dungowan Dam_Survey 1160	View facing north.
B481	Dungowan Dam_Survey 1161	View facing east towards creek.
B481	Dungowan Dam_Survey 1162	View facing south.
B481	Dungowan Dam_Survey 1163	View facing west.
B481	Dungowan Dam_Survey 1164	View facing north.
B481	Dungowan Dam_Survey 1165	View facing north.
B482	Dungowan Dam_Survey 1166	View facing north.
B482	Dungowan Dam_Survey 1167	View facing east.
B482	Dungowan Dam_Survey 1168	View facing west.
B483	Dungowan Dam_Survey 1169	View facing east towards creek.
B483	Dungowan Dam_Survey 1170	View facing north.
B483	Dungowan Dam_Survey 1171	View facing west.
B483	Dungowan Dam_Survey 1172	View facing east.
B484	Dungowan Dam_Survey 1173	View facing east towards creek.
B484	Dungowan Dam_Survey 1174	View facing south.
B484	Dungowan Dam_Survey 1175	View facing west.
B484	Dungowan Dam_Survey 1176	View facing north.
B487	Dungowan Dam_Survey 1177	Possible artefacts, detail.
B487	Dungowan Dam_Survey 1178	View facing south.
B487	Dungowan Dam_Survey 1179	View facing north.
B487	Dungowan Dam_Survey 1180	View facing west.
B488	Dungowan Dam_Survey 1181	View facing west.

Table F.3 Survey photographs.

Point ID	Image file name	Comment
B488	Dungowan Dam_Survey 1182	View facing north west.
B488	Dungowan Dam_Survey 1183	View facing east.
B488	Dungowan Dam_Survey 1184	View facing north.
B489	Dungowan Dam_Survey 1185	View facing south.
B489	Dungowan Dam_Survey 1186	View facing north.
B489	Dungowan Dam_Survey 1187	View facing north.
B489	Dungowan Dam_Survey 1188	View facing west.
B490	Dungowan Dam_Survey 1189	View facing north.
B490	Dungowan Dam_Survey 1190	View facing north.
B490	Dungowan Dam_Survey 1191	View facing north west.
B490	Dungowan Dam_Survey 1192	View facing north east.
B490	Dungowan Dam_Survey 1193	View facing south towards creek.
B491	Dungowan Dam_Survey 1194	View facing north.
B492	Dungowan Dam_Survey 1195	View facing west.
B492	Dungowan Dam_Survey 1196	View facing west.
B492	Dungowan Dam_Survey 1197	View facing east.
B492	Dungowan Dam_Survey 1198	View facing west.
B493	Dungowan Dam_Survey 1199	View facing east.
B493	Dungowan Dam_Survey 1200	View facing east.
B493	Dungowan Dam_Survey 1201	View facing south.
B493	Dungowan Dam_Survey 1202	View facing south west.
B496	Dungowan Dam_Survey 1203	View facing south.
B496	Dungowan Dam_Survey 1204	View facing north.
B496	Dungowan Dam_Survey 1205	View facing west.
B497	Dungowan Dam_Survey 1206	View facing east.
B497	Dungowan Dam_Survey 1207	View facing south.
B498	Dungowan Dam_Survey 1208	View facing east.
B498	Dungowan Dam_Survey 1209	View facing west.
B499	Dungowan Dam_Survey 1210	View facing south.
B499	Dungowan Dam_Survey 1211	View facing north.
B499	Dungowan Dam_Survey 1212	View facing west.
B500	Dungowan Dam_Survey 1213	View facing west.

Table F.3 Survey photographs.

Point ID	Image file name	Comment
B500	Dungowan Dam_Survey 1214	View facing east.
B500	Dungowan Dam_Survey 1215	View facing south.
B501	Dungowan Dam_Survey 1216	View facing east.
B501	Dungowan Dam_Survey 1217	View facing south.
B501	Dungowan Dam_Survey 1218	View facing west.
B502	Dungowan Dam_Survey 1219	View facing east.
B502	Dungowan Dam_Survey 1220	View facing north east.
B503	Dungowan Dam_Survey 1221	View facing east.
B503	Dungowan Dam_Survey 1222	Rock outcropping, detail.
B504	Dungowan Dam_Survey 1223	View facing north.
B504	Dungowan Dam_Survey 1224	View facing east.
B505	Dungowan Dam_Survey 1225	View facing south.
B505	Dungowan Dam_Survey 1226	View facing east towards creek.
B506	Dungowan Dam_Survey 1227	View facing north.
B506	Dungowan Dam_Survey 1228	View facing south.
B506	Dungowan Dam_Survey 1229	View facing north east.
B507	Dungowan Dam_Survey 1230	View facing north.
B507	Dungowan Dam_Survey 1231	View facing south.
B507	Dungowan Dam_Survey 1232	View facing east.
B507	Dungowan Dam_Survey 1233	View facing east.
B508	Dungowan Dam_Survey 1234	View facing north east.
B508	Dungowan Dam_Survey 1235	View facing east.
B508	Dungowan Dam_Survey 1236	View facing north.
B508	Dungowan Dam_Survey 1237	View facing west.
B509	Dungowan Dam_Survey 1238	View facing west.
B509	Dungowan Dam_Survey 1239	View facing east.
B509	Dungowan Dam_Survey 1240	View facing north east.
B510	Dungowan Dam_Survey 1241	View facing north west.
B510	Dungowan Dam_Survey 1242	View facing north west.
B511	Dungowan Dam_Survey 1243	View facing south east.
B511	Dungowan Dam_Survey 1244	View facing south east.
B511	Dungowan Dam_Survey 1245	View facing north east.

Table F.3 Survey photographs.

Point ID	Image file name	Comment
B512	Dungowan Dam_Survey 1246	View facing south east.
B512	Dungowan Dam_Survey 1247	View facing north west.
B513	Dungowan Dam_Survey 1248	View facing south east.
B514	Dungowan Dam_Survey 1249	View facing north west.
B514	Dungowan Dam_Survey 1250	View facing north.

F.3 Photographic catalogue (excavation)

On subsequent pages we present a catalogue and contact sheet of all photographs taken as documentation of the test excavation.

TP3 (1)

TP3 (2)

TP3 (3)

TP3 (4)

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TP3 (7)

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TP12 EXPANSION (1)

TP12 EXPANSION (2)

TP12 EXPANSION (3)

TP12 EXPANSION (4)

TP12 EXPANSION (5)

TP12 EXPANSION (6)

TP12A (1)

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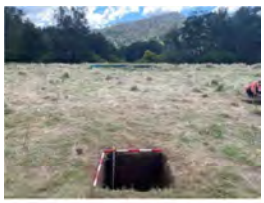
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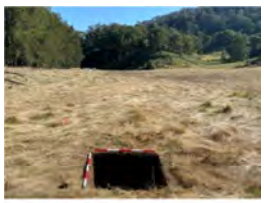
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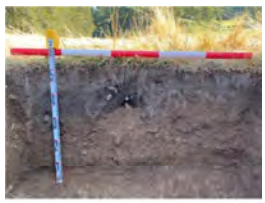
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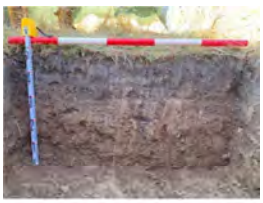
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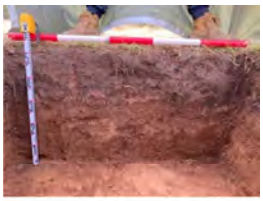
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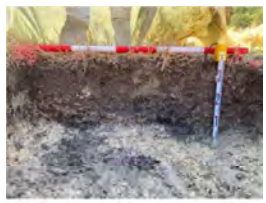
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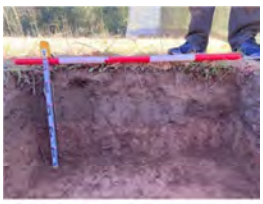
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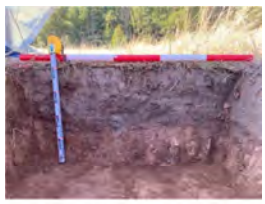
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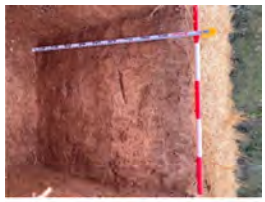

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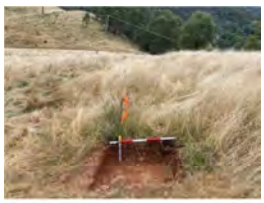

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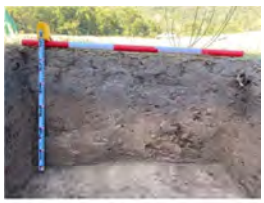
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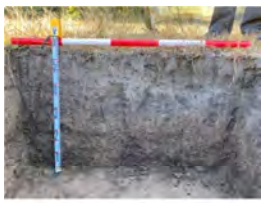
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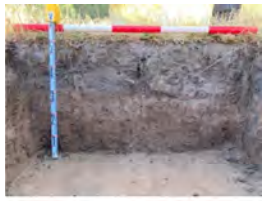
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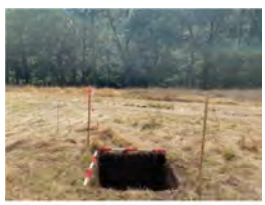
P110 CHARCOAL FEATUR

TP111 (1)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TP112 (2)

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TP113 (3)

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TP114 (1)

TP114 (2)

TP114 (3)

TP114 (4)

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TP114 (7)

TP115 (1)

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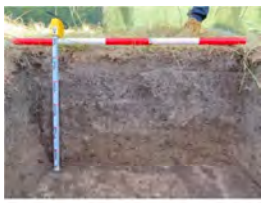
TP115 (7)

TP116 (1)

TP116 (2)

TP116 (3)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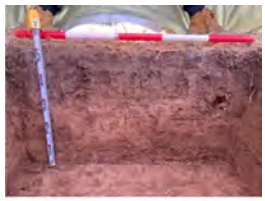
TP118 (7)

TP119 (1)

TP119 (2)

TP119 (3)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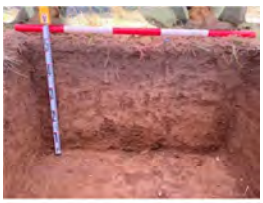
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TP122 (7)

TP123 (1)

TP123 (2)

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TP123 (5)

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TP123 (7)

TP124 (1)

TP124 (2)

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TP125 (1)

TP125 (2)

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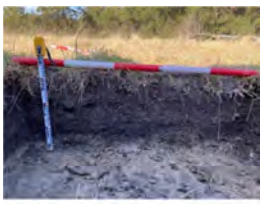
TP126 (2)

TP126 (3)

TP126 (4)

TP126 (5)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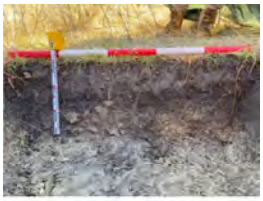
TP127 (3)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TP128 (4)

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TP129 (4)

TP129 (5)

TP129 (6)

TP129 (7)

TP130 (1)

TP130 (2)

TP130 (3)

TP130 (4)

TP130 (5)

TP130 (6)

TP130 (7)

TP131 (1)

TP131 (2)

TP131 (3)

TP131 (4)

TP131 (5)

TP131 (6)

TP131 (7)

TP132 (1)

TP132 (2)

TP132 (3)

TP132 (4)

TP132 (5)

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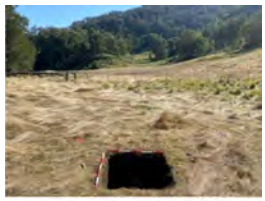
TP133 (6)

TP134 (1)



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TP134 (6)

TP134 (7)

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TP135 (5)

TP135 (6)

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TP136 (1)

TP136 (2)

TP136 (3)

TP136 (4)

TP136 (5)

TP136 (6)

TP136 (7)

TP137 (1)

TP137 (2)

TP137 (3)

TP137 (4)

TP137 (5)

TP137 (6)

TP138 (1)

TP138 (2)

TP138 (3)

TP138 (4)

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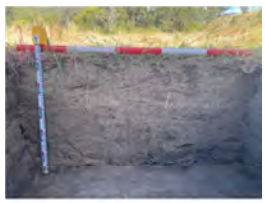
TP141 (3)

TP141 (4)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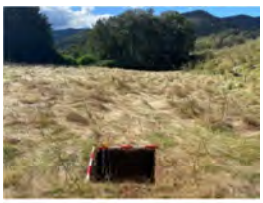
TP142 (1)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TP142 (7)

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TP144 (3)

TP144 (4)

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TP144 (7)

TP145 (1)

TP145 (2)

TP145 (3)

TP145 (4)

TP145 (5)

TP145 (6)

TP145 (7)

TP146 (1)

TP146 (2)

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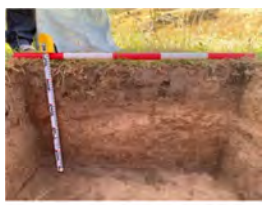
TP147 (4)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TP147 (7)

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TP148 (3)

TP148 (4)

TP148 (5)

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TP148 (7)

TP149 (1)

TP149 (2)

TP149 (3)

TP149 (4)

TP149 (5)

TP149 (6)

TP149 (7)

TP150 (1)

TP150 (2)

TP150 (3)

TP150 (4)

TP150 (5)

TP150 (6)

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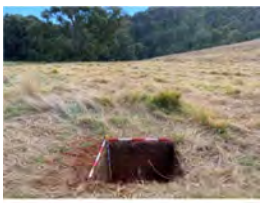
TP151 (7)

TP152 (1)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TP153 (1)

TP153 (2)

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TP154 (1)

TP154 (2)

TP154 (3)

TP154 (4)

TP154 (5)

TP154 (6)

TP154 (7)

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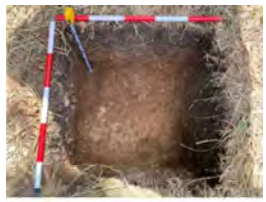
TP156 (1)

TP156 (2)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TP156 (5)

TP156 (6)

TP156 (7)

TP157 (1)

TP157 (1)

TP157 (2)

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TP157 (4)

TP157 (5)

TP158 (1)

TP158 (2)

TP158 (3)

TP158 (4)

TP158 (5)

TP158 (6)

TP158 (7)

TP159 (1)

TP159 (8)

TP159 (9)

TP159 (10)

TP159 (11)

TP159 (12)

TP159 (13)

Table F.4 Dungowan Dam test excavation photograph catalogue.

Image File No.	Description	Orientation
TP3 (1)	Placeholder	N/A
TP3 (2)	Location (post-excavation)	Facing north
TP3 (3)	Overview of test pit	Facing north
TP3 (4)	Detail of northern section	Facing north
TP3 (5)	Detail of eastern section	Facing east
TP3 (6)	Detail of southern section	Facing south
TP3 (7)	Detail of western section	Facing west
TP7 (1)	Placeholder	N/A
TP7 (2)	Location (post-excavation)	Facing north
TP7 (3)	Overview of test pit	Facing north
TP7 (4)	Detail of northern section	Facing north
TP7 (5)	Detail of eastern section	Facing east
TP7 (6)	Detail of southern section	Facing south
TP7 (7)	Detail of western section	Facing west
TP8 (1)	Placeholder	N/A
TP8 (2)	Location (post-excavation)	Facing north
TP8 (3)	Overview of test pit	Facing north
TP8 (4)	Detail of northern section	Facing north
TP8 (5)	Detail of eastern section	Facing east
TP8 (6)	Detail of southern section	Facing south
TP8 (7)	Detail of western section	Facing west
TP12 (1)	Placeholder	N/A
TP12 (2)	Location (post-excavation)	Facing north
TP12 (3)	Overview of test pit	Facing north
TP12 (4)	Detail of northern section	Facing north
TP12 (5)	Detail of eastern section	Facing east
TP12 (6)	Detail of southern section	Facing south
TP12 (7)	Detail of western section	Facing west
TP12 (8)	Detail of OSL sampling	Facing north
TP12 (9)	Detail of OSL sampling	Facing north
TP12 (10)	Detail of OSL sampling	Facing north
TP12 Expansion (1)	Location (post-excavation)	Facing north

Table F.4 Dungowan Dam test excavation photograph catalogue.

Image File No.	Description	Orientation
TP12 Expansion (2)	Location (post-excavation)	Facing east
TP12 Expansion (3)	Location (post-excavation)	Facing south
TP12 Expansion (4)	Location (post-excavation)	Facing west
TP12 Expansion (5)	Location (post-excavation)	Facing south
TP12 Expansion (6)	Location (post-excavation)	Facing west
TP12A (1)	Placeholder	N/A
TP12A (2)	Location (post-excavation)	Facing north
TP12A (3)	Overview of test pit	Facing north
TP12A (4)	Detail of northern section	Facing north
TP12A (5)	Detail of eastern section	Facing east
TP12A (6)	Detail of southern section	Facing south
TP12A (7)	Detail of western section	Facing west
TP12B (1)	Placeholder	N/A
TP12B (2)	Location (post-excavation)	Facing north
TP12B (3)	Overview of test pit	Facing north
TP12B (4)	Detail of northern section	Facing north
TP12B (5)	Detail of eastern section	Facing east
TP12B (6)	Detail of southern section	Facing south
TP12C (1)	Detail of northern section	Facing north
TP12C (2)	Placeholder	N/A
TP12C (3)	Location (post-excavation)	Facing north
TP12C (4)	Overview of test pit	Facing north
TP12C (5)	Detail of eastern section	Facing east
TP12C (6)	Detail of southern section	Facing south
TP12C (7)	Detail of western section	Facing west
TP12D (1)	Placeholder	N/A
TP12D (2)	Location (post-excavation)	Facing north
TP12D (3)	Overview of test pit	Facing north
TP12D (4)	Detail of northern section	Facing north
TP12D (5)	Detail of eastern section	Facing east
TP12D (6)	Detail of southern section	Facing south
TP12D (7)	Detail of western section	Facing west

Table F.4 Dungowan Dam test excavation photograph catalogue.

Image File No.	Description	Orientation
TP13 (1)	Placeholder	N/A
TP13 (2)	Location (post-excavation)	Facing north
TP13 (3)	Overview of test pit	Facing north
TP13 (4)	Detail of the northern section	Facing north
TP13 (5)	Detail of the eastern section	Facing east
TP13 (6)	Detail of the southern section	Facing south
TP13 (7)	Detail of the western section	Facing west
TP14 (1)	Placeholder	N/A
TP14 (2)	Location (post-excavation)	Facing north
TP14 (3)	Overview of test pit	Facing north
TP14 (4)	Detail of northern section	Facing north
TP14 (5)	Detail of eastern section	Facing east
TP14 (6)	Detail of southern section	Facing south
TP14 (7)	Detail of western section	Facing west
TP15 (1)	Placeholder	N/A
TP15 (2)	Location (post-excavation)	Facing north
TP15 (3)	Overview of test pit	Facing north
TP15 (4)	Detail of northern section	Facing north
TP15 (5)	Detail of eastern section	Facing east
TP15 (6)	Detail of southern section	Facing south
TP15 (7)	Detail of western section	Facing west
TP17 (1)	Placeholder	N/A
TP17 (2)	Location (post-excavation)	Facing north
TP17 (3)	Overview of test pit	Facing north
TP17 (4)	Detail of northern section	Facing north
TP17 (5)	Detail of eastern section	Facing east
TP17 (6)	Detail of southern section	Facing south
TP17 (7)	Detail of western section	Facing west
TP18 (1)	Placeholder	N/A
TP18 (2)	Location (post-excavation)	Facing north
TP18 (3)	Overview of test pit	Facing north
TP18 (4)	Detail of northern section	Facing north

Table F.4 Dungowan Dam test excavation photograph catalogue.

Image File No.	Description	Orientation
TP18 (5)	Detail of eastern section	Facing east
TP18 (6)	Detail of southern section	Facing south
TP19 (1)	Placeholder	N/A
TP19 (2)	Location (post-excavation)	Facing north
TP19 (3)	Overview of test pit	Facing north
TP19 (4)	Detail of northern section	Facing north
TP19 (5)	Detail of eastern section	Facing east
TP19 (6)	Detail of southern section	Facing south
TP19 (7)	Detail of western section	Facing west
TP20 (1)	Placeholder	N/A
TP20 (2)	Location (post-excavation)	Facing north
TP20 (3)	Overview of test pit	Facing north
TP20 (4)	Detail of northern section	Facing north
TP20 (5)	Detail of eastern section	Facing east
TP20 (6)	Detail of southern section	Facing south
TP20 (7)	Detail of western section	Facing west
TP22 (1)	Placeholder	N/A
TP22 (2)	Location (post-excavation)	Facing north
TP22 (3)	Overview of test pit	Facing north
TP22 (4)	Detail of northern section	Facing north
TP22 (5)	Detail of eastern section	Facing east
TP22 (6)	Detail of southern section	Facing south
TP22 (7)	Detail of western section	Facing west
TP23 (1)	Placeholder	N/A
TP23 (2)	Location (post-excavation)	Facing north
TP23 (3)	Overview of test pit	Facing north
TP23 (4)	Detail of northern section	Facing north
TP23 (5)	Detail of eastern section	Facing east
TP23 (6)	Detail of southern section	Facing south
TP23 (7)	Detail of western section	Facing west
TP29 (1)	Placeholder	N/A
TP29 (2)	Location (post-excavation)	Facing north

Table F.4 Dungowan Dam test excavation photograph catalogue.

Image File No.	Description	Orientation
TP29 (3)	Overview of test pit	Facing north
TP29 (4)	Detail of northern section	Facing north
TP29 (5)	Detail of eastern section	Facing east
TP29 (6)	Detail of southern section	Facing south
TP29 (7)	Detail of western section	Facing west
TP32 (1)	Placeholder	N/A
TP32 (2)	Location (post-excavation)	Facing north
TP32 (3)	Overview of test pit	Facing north
TP32 (4)	Detail of northern section	Facing north
TP32 (5)	Detail of eastern section	Facing east
TP32 (6)	Detail of southern section	Facing south
TP32 (7)	Detail of western section	Facing west
TP34 (1)	Placeholder	N/A
TP34 (2)	Location (post-excavation)	Facing north
TP34 (3)	Overview of test pit	Facing north
TP34 (4)	Detail of northern section	Facing north
TP34 (5)	Detail of eastern section	Facing east
TP34 (6)	Detail of southern section	Facing south
TP34 (7)	Detail of western section	Facing west
TP35 (1)	Placeholder	N/A
TP35 (2)	Location (post-excavation)	Facing north
TP35 (3)	Overview of test pit	Facing north
TP35 (4)	Detail of northern section	Facing north
TP35 (5)	Detail of eastern section	Facing east
TP35 (6)	Detail of southern section	Facing south
TP35 (7)	Detail of western section	Facing west
TP38 (1)	Placeholder	N/A
TP38 (2)	Location (post-excavation)	Facing north
TP38 (3)	Overview of test pit	Facing north
TP38 (4)	Detail of northern section	Facing north
TP38 (5)	Detail of eastern section	Facing east
TP38 (6)	Detail of southern section	Facing south

Table F.4 Dungowan Dam test excavation photograph catalogue.

Image File No.	Description	Orientation
TP38 (7)	Detail of western section	Facing west
TP41 (1)	Placeholder	N/A
TP41 (1)	Location (post-excavation)	Facing north
TP41 (1)	Overview of test pit	Facing north
TP41 (1)	Detail of northern section	Facing north
TP41 (1)	Detail of eastern section	Facing east
TP41 (1)	Detail of southern section	Facing south
TP41 (1)	Detail of western section	Facing west
TP45 (1)	Placeholder	N/A
TP45 (2)	Location (post-excavation)	Facing north
TP45 (3)	Overview of test pit	Facing north
TP45 (4)	Detail of northern section	Facing north
TP45 (5)	Detail of eastern section	Facing east
TP45 (6)	Detail of southern section	Facing south
TP45 (7)	Detail of western section	Facing west
TP47 (1)	Placeholder	N/A
TP47 (2)	Location (post-excavation)	Facing north
TP47 (3)	Overview of test pit	Facing north
TP47 (4)	Detail of northern section	Facing north
TP47 (5)	Detail of eastern section	Facing east
TP47 (6)	Detail of southern section	Facing south
TP47 (7)	Detail of western section	Facing west
TP48 (1)	Placeholder	N/A
TP48 (2)	Location (post-excavation)	Facing north
TP48 (3)	Overview of test pit	Facing north
TP48 (4)	Detail of northern section	Facing north
TP48 (5)	Detail of eastern section	Facing east
TP48 (6)	Detail of southern section	Facing south
TP48 (7)	Detail of western section	Facing west
TP49 (1)	Placeholder	N/A
TP49 (2)	Location (post-excavation)	Facing north
TP49 (3)	Overview of test pit	Facing north

Table F.4 Dungowan Dam test excavation photograph catalogue.

Image File No.	Description	Orientation
TP49 (4)	Detail of northern section	Facing north
TP49 (5)	Detail of eastern section	Facing east
TP49 (6)	Detail of southern section	Facing south
TP49 (7)	Detail of western section	Facing west
TP50 (1)	Placeholder	N/A
TP50 (2)	Location (post-excavation)	Facing north
TP50 (3)	Overview of test pit	Facing north
TP50 (4)	Detail of northern section	Facing north
TP50 (5)	Detail of eastern section	Facing east
TP50 (6)	Detail of southern section	Facing south
TP50 (7)	Detail of western section	Facing west
TP51 (1)	Placeholder	N/A
TP51 (2)	Location (post-excavation)	Facing north
TP51 (3)	Overview of test pit	Facing north
TP51 (4)	Detail of northern section	Facing north
TP51 (5)	Detail of eastern section	Facing east
TP51 (6)	Detail of southern section	Facing south
TP51 (7)	Detail of western section	Facing west
TP54 (1)	Placeholder	N/A
TP54 (2)	Location (post-excavation)	Facing north
TP54 (3)	Overview of test pit	Facing north
TP54 (4)	Detail of northern section	Facing north
TP54 (5)	Detail of eastern section	Facing east
TP54 (6)	Detail of southern section	Facing south
TP54 (7)	Detail of western section	Facing west
TP55 (1)	Placeholder	N/A
TP55 (2)	Location (post-excavation)	Facing north
TP55 (3)	Overview of test pit	Facing north
TP55 (4)	Detail of northern section	Facing north
TP55 (5)	Detail of eastern section	Facing east
TP55 (6)	Detail of southern section	Facing south
TP55 (7)	Detail of western section	Facing west

Table F.4 Dungowan Dam test excavation photograph catalogue.

Image File No.	Description	Orientation
TP56 (1)	Location (post-excavation)	Facing north
TP56 (1)	Location (post-excavation)	Facing north
TP56 (2)	Overview of test pit	Facing north
TP56 (3)	Detail of northern section	Facing north
TP56 (4)	Detail of eastern section	Facing east
TP56 (5)	Detail of southern section	Facing south
TP56 (6)	Detail of western section	Facing west
TP57 (1)	Placeholder	N/A
TP57 (2)	Location (post-excavation)	Facing north
TP57 (3)	Overview of test pit	Facing north
TP57 (4)	Detail of northern section	Facing north
TP57 (5)	Detail of eastern section	Facing east
TP57 (6)	Detail of southern section	Facing south
TP57 (7)	Detail of western section	Facing west
TP59 (1)	Placeholder	N/A
TP59 (2)	Location (post-excavation)	Facing north
TP59 (3)	Detail of northern section	Facing north
TP59 (4)	Detail of eastern section	Facing east
TP59 (5)	Detail of southern section	Facing south
TP59 (6)	Detail of western section	Facing west
TP63 (1)	Placeholder	N/A
TP63 (2)	Location (post-excavation)	Facing north
TP63 (3)	Detail of northern section	Facing north
TP63 (4)	Detail of eastern section	Facing east
TP63 (5)	Detail of southern section	Facing south
TP63 (6)	Detail of western section	Facing west
TP64 (1)	Placeholder	N/A
TP64 (2)	Location (post-excavation)	Facing north
TP64 (3)	Overview of test pit	Facing north
TP64 (4)	Detail of northern section	Facing north
TP64 (5)	Detail of eastern section	Facing east
TP64 (6)	Detail of southern section	Facing south

Table F.4 Dungowan Dam test excavation photograph catalogue.

Image File No.	Description	Orientation
TP64 (7)	Detail of western section	Facing west
TP67 (1)	Placeholder	N/A
TP67 (2)	Location (post-excavation)	Facing north
TP67 (3)	Overview of test pit	Facing north
TP67 (4)	Detail of northern section	Facing north
TP67 (5)	Detail of eastern section	Facing east
TP67 (6)	Detail of southern section	Facing south
TP67 (7)	Detail of western section	Facing west
TP68 (1)	Location (post-excavation)	Facing north
TP68 (1)	Location (post-excavation)	Facing north
TP68 (2)	Overview of test pit	Facing north
TP68 (3)	Detail of northern section	Facing north
TP68 (4)	Detail of eastern section	Facing east
TP68 (5)	Detail of southern section	Facing south
TP68 (6)	Detail of western section	Facing west
TP69 (1)	Placeholder	N/A
TP69 (2)	Location (post-excavation)	Facing north
TP69 (3)	Overview of test pit	Facing north
TP69 (4)	Detail of northern section	Facing north
TP69 (5)	Detail of eastern section	Facing east
TP69 (6)	Detail of southern section	Facing south
TP69 (7)	Detail of western section	Facing west
TP77 (1)	Placeholder	N/A
TP77 (2)	Location (post-excavation)	Facing north
TP77 (3)	Overview of test pit	Facing north
TP77 (4)	Detail of northern section	Facing north
TP77 (5)	Detail of eastern section	Facing east
TP77 (6)	Detail of southern section	Facing south
TP77 (7)	Detail of western section	Facing west
TP78 (1)	Placeholder	N/A
TP78 (2)	Location (post-excavation)	Facing north
TP78 (3)	Overview of test pit	Facing north

Table F.4 Dungowan Dam test excavation photograph catalogue.

Image File No.	Description	Orientation
TP78 (4)	Detail of northern section	Facing north
TP78 (5)	Detail of eastern section	Facing east
TP78 (6)	Detail of southern section	Facing south
TP78 (7)	Detail of western section	Facing west
TP80 (1)	Placeholder	N/A
TP80 (2)	Location (post-excavation)	Facing north
TP80 (3)	Overview of test pit	Facing north
TP80 (4)	Detail of northern section	Facing north
TP80 (5)	Detail of eastern section	Facing east
TP80 (6)	Detail of southern section	Facing south
TP80 (7)	Detail of western section	Facing west
TP90 (1)	Placeholder	N/A
TP90 (2)	Location (post-excavation)	Facing north
TP90 (4)	Overview of test pit	Facing north
TP90 (5)	Detail of northern section	Facing north
TP90 (6)	Detail of eastern section	Facing east
TP90 (7)	Detail of southern section	Facing south
TP90 (8)	Detail of western section	Facing west
TP93 (1)	Placeholder	N/A
TP93 (2)	Location (post-excavation)	Facing north
TP93 (3)	Overview of test pit	Facing north
TP93 (4)	Detail of northern section	Facing north
TP93 (5)	Detail of eastern section	Facing east
TP93 (6)	Detail of southern section	Facing south
TP93 (7)	Detail of western section	Facing west
TP94 (1)	Placeholder	N/A
TP94 (2)	Overview of test pit	Facing north
TP94 (3)	Detail of northern section	Facing north
TP94 (4)	Detail of eastern section	Facing east
TP94 (5)	Detail of southern section	Facing south
TP94 (6)	Detail of western section	Facing west
TP97 (1)	Placeholder	N/A

Table F.4 Dungowan Dam test excavation photograph catalogue.

Image File No.	Description	Orientation
TP97 (2)	Location (post-excavation)	Facing north
TP97 (3)	Overview of test pit	Facing north
TP97 (4)	Detail of northern section	Facing north
TP97 (5)	Detail of eastern section	Facing east
TP97 (6)	Detail of southern section	Facing south
TP97 (7)	Detail of western section	Facing west
TP100 (1)	Placeholder	N/A
TP100 (2)	Location (post-excavation)	Facing north
TP100 (3)	Overview of test pit	Facing north
TP100 (4)	Detail of northern section	Facing north
TP100 (5)	Detail of eastern section	Facing east
TP100 (6)	Detail of southern section	Facing south
TP100 (7)	Detail of western section	Facing west
TP101 (1)	Placeholder	N/A
TP101 (2)	Location (post-excavation)	Facing north
TP101 (3)	Overview of test pit	Facing north
TP101 (4)	Detail of northern section	Facing north
TP101 (5)	Detail of eastern section	Facing east
TP101 (6)	Detail of southern section	Facing south
TP101 (7)	Detail of western section	Facing west
TP101	Detail of OSL sampling	Facing north
TP102 (1)	Placeholder	N/A
TP102 (2)	Location (post-excavation)	Facing north
TP102 (3)	Overview of test pit	Facing north
TP102 (4)	Detail of northern section	Facing north
TP102 (5)	Detail of eastern section	Facing east
TP102 (6)	Detail of southern section	Facing south
TP102 (7)	Detail of western section	Facing west
TP103 (1)	Placeholder	N/A
TP103 (2)	Location (post-excavation)	Facing north
TP103 (3)	Overview of test pit	Facing north
TP103 (4)	Detail of northern section	Facing north

Table F.4 Dungowan Dam test excavation photograph catalogue.

Image File No.	Description	Orientation
TP103 (5)	Detail of eastern section	Facing east
TP103 (6)	Detail of southern section	Facing south
TP103 (7)	Detail of western section	Facing west
TP104 (1)	Placeholder	N/A
TP104 (2)	Location (post-excavation)	Facing north
TP104 (3)	Overview of test pit	Facing north
TP104 (4)	Detail of northern section	Facing north
TP104 (5)	Detail of eastern section	Facing east
TP104 (6)	Detail of southern section	Facing south
TP104 (7)	Detail of western section	Facing west
TP105 (1)	Placeholder	N/A
TP105 (2)	Location (post-excavation)	Facing north
TP105 (3)	Overview of test pit	Facing north
TP105 (4)	Detail of northern section	Facing north
TP105 (5)	Detail of eastern section	Facing east
TP105 (6)	Detail of southern section	Facing south
TP105 (7)	Detail of western section	Facing west
TP106 (1)	Placeholder	N/A
TP106 (2)	Location (post-excavation)	Facing north
TP106 (4)	Detail of northern section	Facing north
TP106 (5)	Detail of eastern section	Facing east
TP106 (6)	Detail of southern section	Facing south
TP106 (7)	Detail of western section	Facing west
TP107 (0)	Placeholder	N/A
TP107 (2)	Location (post-excavation)	Facing north
TP107 (3)	Overview of test pit	Facing north
TP107 (4)	Detail of northern section	Facing north
TP107 (5)	Detail of eastern section	Facing east
TP107 (6)	Detail of southern section	Facing south
TP107 (7)	Detail of western section	Facing west
TP108 (1)	Placeholder	N/A
TP108 (2)	Location (post-excavation)	Facing north

Table F.4 Dungowan Dam test excavation photograph catalogue.

Image File No.	Description	Orientation
TP108 (3)	Overview of test pit	Facing north
TP108 (4)	Detail of northern section	Facing north
TP108 (5)	Detail of eastern section	Facing east
TP108 (6)	Detail of southern section	Facing south
TP108 (7)	Detail of western section	Facing west
TP108 (8)	Placeholder	N/A
TP108 (9)	Location (post-excavation)	Facing north
TP108 (10)	Overview of test pit	Facing north
TP108 (11)	Detail of northern section	Facing north
TP108 (12)	Detail of eastern section	Facing east
TP108 (13)	Detail of southern section	Facing south
TP108 (14)	Detail of western section	Facing west
TP109 (1)	Placeholder	N/A
TP109 (2)	Location (post-excavation)	Facing north
TP109 (3)	Overview of test pit	Facing north
TP109 (4)	Detail of northern section	Facing north
TP109 (5)	Detail of eastern section	Facing east
TP109 (6)	Detail of southern section	Facing south
TP109 (7)	Detail of western section	Facing west
TP110 (1)	Placeholder	N/A
TP110 (2)	Location (post-excavation)	Facing north
TP110 (3)	Overview of test pit	Facing north
TP110 (4)	Detail of northern section	Facing north
TP110 (5)	Detail of eastern section	Facing east
TP110 (6)	Detail of southern section	Facing south
TP110 (7)	Detail of western section	Facing west
TP110 Charcoal Feature	Detail of charcoal feature	Facing north
TP111 (1)	Placeholder	N/A
TP111 (2)	Location (post-excavation)	Facing north
TP111 (3)	Overview of test pit	Facing north
TP111 (4)	Detail of northern section	Facing north
TP111 (5)	Detail of eastern section	Facing east

Table F.4 Dungowan Dam test excavation photograph catalogue.

Image File No.	Description	Orientation
TP111 (6)	Detail of southern section	Facing south
TP111 (7)	Detail of western section	Facing west
TP112 (1)	Placeholder	N/A
TP112 (2)	Location (post-excavation)	Facing north
TP112 (3)	Overview of test pit	Facing north
TP112 (4)	Detail of northern section	Facing north
TP112 (5)	Detail of eastern section	Facing east
TP112 (6)	Detail of southern section	Facing south
TP112 (7)	Detail of western section	Facing west
TP113 (1)	Placeholder	N/A
TP113 (2)	Location (post-excavation)	Facing north
TP113 (3)	Overview of test pit	Facing north
TP113 (4)	Detail of northern section	Facing north
TP113 (5)	Detail of eastern section	Facing east
TP113 (6)	Detail of southern section	Facing south
TP113 (7)	Detail of western section	Facing west
TP114 (1)	Placeholder	N/A
TP114 (2)	Location (post-excavation)	Facing north
TP114 (3)	Overview of test pit	Facing north
TP114 (4)	Detail of northern section	Facing north
TP114 (5)	Detail of eastern section	Facing east
TP114 (6)	Detail of southern section	Facing south
TP114 (7)	Detail of western section	Facing west
TP116 (1)	Placeholder	N/A
TP116 (2)	Location (post-excavation)	Facing north
TP116 (3)	Overview of test pit	Facing north
TP116 (4)	Detail of northern section	Facing north
TP116 (5)	Detail of eastern section	Facing east
TP116 (6)	Detail of southern section	Facing south
TP116 (7)	Detail of western section	Facing west
TP117 (1)	Placeholder	Facing north
TP117 (2)	Location (post-excavation)	Facing north

Table F.4 Dungowan Dam test excavation photograph catalogue.

Image File No.	Description	Orientation
TP117 (3)	Overview of test pit	Facing north
TP117 (4)	Detail of the northern section	Facing north
TP117 (5)	Detail of the eastern section	Facing east
TP117 (6)	Detail of the southern section	Facing south
TP117 (7)	Detail of the western section	Facing west
TP118 (1)	Placeholder	N/A
TP118 (2)	Location (post-excavation)	Facing north
TP118 (3)	Overview of test pit	Facing north
TP118 (4)	Detail of northern section	Facing north
TP118 (5)	Detail of eastern section	Facing east
TP118 (6)	Detail of southern section	Facing south
TP118 (7)	Detail of western section	Facing west
TP119 (1)	Placeholder	N/A
TP119 (2)	Location (post-excavation)	Facing north
TP119 (3)	Overview of test pit	Facing north
TP119 (4)	Detail of northern section	Facing north
TP119 (5)	Detail of eastern section	Facing east
TP119 (6)	Detail of southern section	Facing south
TP119 (7)	Detail of western section	Facing west
TP120 (1)	Placeholder	N/A
TP120 (2)	Location (post-excavation)	Facing north
TP120 (3)	Overview of test pit	Facing north
TP120 (4)	Detail of northern section	Facing north
TP120 (5)	Detail of eastern section	Facing east
TP120 (6)	Detail of southern section	Facing south
TP120 (7)	Detail of western section	Facing west
TP121 (1)	Placeholder	N/A
TP121 (2)	Location (post-excavation)	Facing north
TP121 (3)	Overview of test pit	Facing north
TP121 (4)	Detail of northern section	Facing north
TP121 (5)	Detail of eastern section	Facing east
TP121 (6)	Detail of southern section	Facing south

Table F.4 Dungowan Dam test excavation photograph catalogue.

Image File No.	Description	Orientation
TP121 (7)	Detail of western section	Facing west
TP122 (1)	Placeholder	N/A
TP122 (2)	Location (post-excavation)	Facing north
TP122 (3)	Overview of test pit	Facing north
TP122 (4)	Detail of northern section	Facing north
TP122 (5)	Detail of eastern section	Facing east
TP122 (6)	Detail of southern section	Facing south
TP122 (7)	Detail of western section	Facing west
TP123 (1)	Placeholder	N/A
TP123 (2)	Location (post-excavation)	Facing north
TP123 (3)	Overview of test pit	Facing north
TP123 (4)	Detail of northern section	Facing north
TP123 (5)	Detail of eastern section	Facing east
TP123 (6)	Detail of southern section	Facing south
TP123 (7)	Detail of western section	Facing west
TP124 (1)	Placeholder	N/A
TP124 (2)	Location (post-excavation)	Facing north
TP124 (3)	Overview of test pit	Facing north
TP124 (4)	Detail of northern section	Facing north
TP124 (5)	Detail of eastern section	Facing east
TP124 (6)	Detail of southern section	Facing south
TP124 (7)	Detail of western section	Facing west
TP125 (1)	Placeholder	N/A
TP125 (2)	Location (post-excavation)	Facing north
TP125 (3)	Overview of test pit	Facing north
TP125 (5)	Detail of northern section	Facing north
TP125 (6)	Detail of eastern section	Facing east
TP125 (7)	Detail of southern section	Facing south
TP125 (8)	Detail of western section	Facing west
TP126 (1)	Placeholder	N/A
TP126 (2)	Location (post-excavation)	Facing north
TP126 (3)	Overview of test pit	Facing north

Table F.4 Dungowan Dam test excavation photograph catalogue.

Image File No.	Description	Orientation
TP126 (4)	Detail of northern section	Facing north
TP126 (5)	Detail of eastern section	Facing east
TP126 (6)	Detail of southern section	Facing south
TP126 (7)	Detail of western section	Facing west
TP127 (1)	Placeholder	N/A
TP127 (2)	Location (post-excavation)	Facing north
TP127 (3)	Overview of test pit	Facing north
TP127 (4)	Detail of northern section	Facing north
TP127 (5)	Detail of eastern section	Facing east
TP127 (6)	Detail of southern section	Facing south
TP127 (7)	Detail of western section	Facing west
TP128 (1)	Placeholder	N/A
TP128 (2)	Location (post-excavation)	Facing north
TP128 (3)	Overview of test pit	Facing north
TP128 (4)	Detail of northern section	Facing north
TP128 (5)	Detail of eastern section	Facing east
TP128 (6)	Detail of southern section	Facing south
TP128 (7)	Detail of western section	Facing west
TP129 (1)	Placeholder	N/A
TP129 (2)	Location (post-excavation)	Facing north
TP129 (3)	Overview of test pit	Facing north
TP129 (4)	Detail of northern section	Facing north
TP129 (5)	Detail of eastern section	Facing east
TP129 (6)	Detail of southern section	Facing south
TP129 (7)	Detail of western section	Facing west
TP130 (1)	Placeholder	N/A
TP130 (2)	Location (post-excavation)	Facing north
TP130 (3)	Overview of test pit	Facing north
TP130 (4)	Detail of northern section	Facing north
TP130 (5)	Detail of eastern section	Facing east
TP130 (6)	Detail of southern section	Facing south
TP130 (7)	Detail of western section	Facing west

Table F.4 Dungowan Dam test excavation photograph catalogue.

Image File No.	Description	Orientation
TP131 (1)	Placeholder	N/A
TP131 (2)	Location (post-excavation)	Facing north
TP131 (3)	Overview of test pit	Facing north
TP131 (4)	Detail of northern section	Facing north
TP131 (5)	Detail of eastern section	Facing east
TP131 (6)	Detail of southern section	Facing south
TP131 (7)	Detail of western section	Facing west
TP132 (1)	Placeholder	N/A
TP132 (2)	Location (post-excavation)	Facing north
TP132 (3)	Overview of test pit	Facing north
TP132 (4)	Detail of northern section	Facing north
TP132 (5)	Detail of eastern section	Facing east
TP132 (6)	Detail of southern section	Facing south
TP132 (7)	Detail of western section	Facing west
TP133 (1)	Placeholder	N/A
TP133 (2)	Location (post-excavation)	Facing north
TP133 (3)	Detail of northern section	Facing north
TP133 (4)	Detail of eastern section	Facing east
TP133 (5)	Detail of southern section	Facing south
TP133 (6)	Detail of western section	Facing west
TP134 (1)	Placeholder	N/A
TP134 (2)	Location (post-excavation)	Facing north
TP134 (3)	Overview of test pit	Facing north
TP134 (4)	Detail of northern section	Facing north
TP134 (5)	Detail of eastern section	Facing east
TP134 (6)	Detail of southern section	Facing south
TP134 (7)	Detail of western section	Facing west
TP135 (1)	Placeholder	N/A
TP135 (2)	Location (post-excavation)	Facing north
TP135 (3)	Overview of test pit	Facing north
TP135 (4)	Detail of northern section	Facing north
TP135 (5)	Detail of eastern section	Facing east

Table F.4 Dungowan Dam test excavation photograph catalogue.

Image File No.	Description	Orientation
TP135 (6)	Detail of southern section	Facing south
TP135 (7)	Detail of western section	Facing west
TP136 (1)	Placeholder	N/A
TP136 (2)	Location (post-excavation)	Facing north
TP136 (3)	Overview of test pit	Facing north
TP136 (4)	Detail of northern section	Facing north
TP136 (5)	Detail of eastern section	Facing east
TP136 (6)	Detail of southern section	Facing south
TP136 (7)	Detail of western section	Facing west
TP137 (1)	Placeholder	N/A
TP137 (2)	Location (post-excavation)	Facing north
TP137 (3)	Overview of test pit	Facing north
TP137 (4)	Detail of northern section	Facing north
TP137 (5)	Detail of eastern section	Facing east
TP137 (6)	Detail of southern section	Facing south
TP138 (1)	Placeholder	N/A
TP138 (2)	Location (post-excavation)	Facing north
TP138 (3)	Overview of test pit	Facing north
TP138 (4)	Detail of northern section	Facing north
TP138 (5)	Detail of eastern section	Facing east
TP138 (6)	Detail of southern section	Facing south
TP138 (7)	Detail of western section	Facing west
TP140 (1)	Placeholder	N/A
TP140 (2)	Location (post-excavation)	Facing north
TP140 (3)	Overview of test pit	Facing north
TP140 (4)	Detail of northern section	Facing north
TP140 (5)	Detail of eastern section	Facing east
TP140 (6)	Detail of southern section	Facing south
TP140 (7)	Detail of western section	Facing west
TP141 (1)	Placeholder	N/A
TP141 (2)	Location (post-excavation)	Facing north
TP141 (3)	Overview of test pit	Facing north

Table F.4 Dungowan Dam test excavation photograph catalogue.

Image File No.	Description	Orientation
TP141 (4)	Detail of northern section	Facing north
TP141 (5)	Detail of eastern section	Facing east
TP141 (6)	Detail of southern section	Facing south
TP141 (7)	Detail of western section	Facing west
TP142 (1)	Placeholder	N/A
TP142 (2)	Location (post-excavation)	Facing north
TP142 (3)	Overview of test pit	Facing north
TP142 (4)	Detail of northern section	Facing north
TP142 (5)	Detail of eastern section	Facing east
TP142 (6)	Detail of southern section	Facing south
TP142 (7)	Detail of western section	Facing west
TP143 (1)	Placeholder	N/A
TP143 (2)	Location (post-excavation)	Facing north
TP143 (3)	Overview of test pit	Facing north
TP143 (4)	Detail of northern section	Facing north
TP143 (5)	Detail of eastern section	Facing east
TP143 (6)	Detail of southern section	Facing south
TP143 (7)	Detail of western section	Facing west
TP144 (1)	Placeholder	N/A
TP144 (2)	Location (post-excavation)	Facing north
TP144 (3)	Overview of test pit	Facing north
TP144 (4)	Detail of northern section	Facing north
TP144 (5)	Detail of eastern section	Facing east
TP144 (6)	Detail of southern section	Facing south
TP144 (7)	Detail of western section	Facing west
TP145 (1)	Placeholder	N/A
TP145 (2)	Location (post-excavation)	Facing north
TP145 (3)	Overview of test pit	Facing north
TP145 (4)	Detail of northern section	Facing north
TP145 (5)	Detail of eastern section	Facing east
TP145 (6)	Detail of southern section	Facing south
TP145 (7)	Detail of western section	Facing west

Table F.4 Dungowan Dam test excavation photograph catalogue.

Image File No.	Description	Orientation
TP146 (1)	Placeholder	N/A
TP146 (2)	Location (post-excavation)	Facing north
TP146 (3)	Overview of test pit	Facing north
TP146 (4)	Detail of northern section	Facing north
TP146 (5)	Detail of eastern section	Facing east
TP146 (6)	Detail of southern section	Facing south
TP146 (7)	Detail of western section	Facing west
TP147 (1)	Placeholder	N/A
TP147 (2)	Location (post-excavation)	Facing north
TP147 (3)	Overview of test pit	Facing north
TP147 (4)	Detail of northern section	Facing north
TP147 (5)	Detail of eastern section	Facing east
TP147 (6)	Detail of southern section	Facing south
TP147 (7)	Detail of western section	Facing west
TP148 (1)	Placeholder	N/A
TP148 (2)	Location (post-excavation)	Facing north
TP148 (3)	Overview of test pit	Facing north
TP148 (4)	Detail of northern section	Facing north
TP148 (5)	Detail of eastern section	Facing east
TP148 (6)	Detail of southern section	Facing south
TP148 (7)	Detail of western section	Facing west
TP149 (1)	Placeholder	N/A
TP149 (2)	Location (post-excavation)	Facing north
TP149 (3)	Overview of test pit	Facing north
TP149 (4)	Detail of northern section	Facing north
TP149 (5)	Detail of eastern section	Facing east
TP149 (6)	Detail of southern section	Facing south
TP149 (7)	Detail of western section	Facing west
TP150 (1)	Placeholder	N/A
TP150 (2)	Location (post-excavation)	Facing north
TP150 (3)	Overview of test pit	Facing north
TP150 (4)	Detail of northern section	Facing north

Table F.4 Dungowan Dam test excavation photograph catalogue.

Image File No.	Description	Orientation
TP150 (5)	Detail of eastern section	Facing east
TP150 (6)	Detail of southern section	Facing south
TP150 (7)	Detail of western section	Facing west
TP151 (1)	Placeholder	N/A
TP151 (2)	Location (post-excavation)	Facing north
TP151 (3)	Overview of test pit	Facing north
TP151 (4)	Detail of northern section	Facing north
TP151 (5)	Detail of eastern section	Facing east
TP151 (6)	Detail of southern section	Facing south
TP151 (7)	Detail of western section	Facing west
TP152 (1)	Placeholder	N/A
TP152 (2)	Location (post-excavation)	Facing north
TP152 (3)	Overview of test pit	Facing north
TP152 (4)	Detail of northern section	Facing north
TP152 (5)	Detail of eastern section	Facing east
TP152 (6)	Detail of southern section	Facing south
TP152 (7)	Detail of western section	Facing west
TP153 (1)	Placeholder	N/A
TP153 (2)	Location (post-excavation)	Facing north
TP153 (3)	Overview of test pit	Facing north
TP153 (4)	Detail of northern section	Facing north
TP153 (5)	Detail of eastern section	Facing east
TP153 (6)	Detail of southern section	Facing south
TP153 (7)	Detail of western section	Facing west
TP154 (1)	Placeholder	N/A
TP154 (2)	Location (post-excavation)	Facing north
TP154 (3)	Overview of test pit	Facing north
TP154 (4)	Detail of northern section	Facing north
TP154 (5)	Detail of eastern section	Facing east
TP154 (6)	Detail of southern section	Facing south
TP154 (7)	Detail of western section	Facing west
TP155 (1)	Placeholder	N/A

Table F.4 Dungowan Dam test excavation photograph catalogue.

Image File No.	Description	Orientation
TP155 (2)	Location (post-excavation)	Facing north
TP155 (3)	Overview of test pit	Facing north
TP155 (4)	Detail of northern section	Facing north
TP155 (5)	Detail of eastern section	Facing east
TP155 (6)	Detail of southern section	Facing south
TP155 (7)	Detail of western section	Facing west
TP156 (1)	Placeholder	N/A
TP156 (2)	Location (post-excavation)	Facing north
TP156 (3)	Overview of test pit	Facing north
TP156 (4)	Detail of northern section	Facing north
TP156 (5)	Detail of eastern section	Facing east
TP156 (6)	Detail of southern section	Facing south
TP156 (7)	Detail of western section	Facing west
TP157 (1)	Placeholder	N/A
TP157 (1)	Overview of test pit	Facing north
TP157 (2)	Detail of northern section	Facing north
TP157 (3)	Detail of eastern section	Facing east
TP157 (4)	Detail of southern section	Facing south
TP157 (5)	Detail of western section	Facing west
TP158 (1)	Placeholder	N/A
TP158 (2)	Location (post-excavation)	Facing north
TP158 (3)	Overview of test pit	Facing north
TP158 (4)	Detail of northern section	Facing north
TP158 (5)	Detail of eastern section	Facing east
TP158 (6)	Detail of southern section	Facing south
TP158 (7)	Detail of western section	Facing west
TP159 (1)	Placeholder	N/A
TP159 (8)	Location (post-excavation)	Facing north
TP159 (9)	Overview of test pit	Facing north
TP159 (10)	Detail of northern section	Facing north
TP159 (11)	Detail of eastern section	Facing east
TP159 (12)	Detail of southern section	Facing south

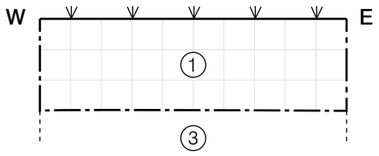
Table F.4 Dungowan Dam test excavation photograph catalogue.

Image File No.	Description	Orientation
TP159 (13)	Detail of western section	Facing west

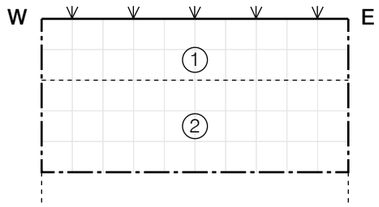
F.4 Section drawings

On subsequent pages we present detailed section drawings showing stratigraphic information for each test pit.

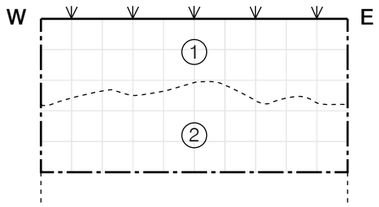
TP03 NORTH



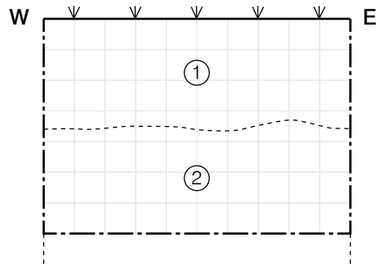
TP07 NORTH



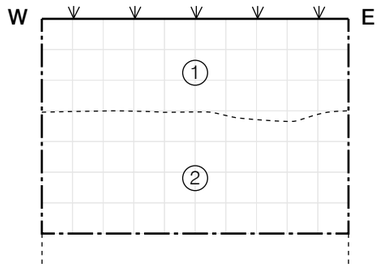
TP08 NORTH



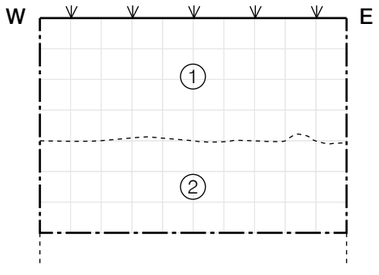
TP12 NORTH



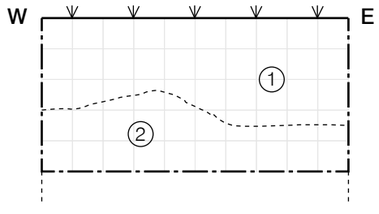
TP12A NORTH



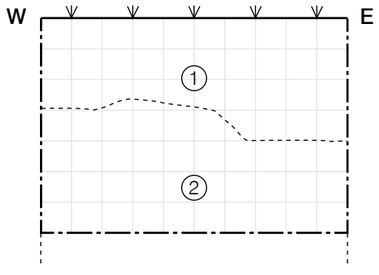
TP12B NORTH



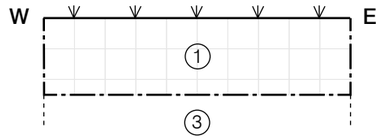
TP12C NORTH



TP12D NORTH



TP13 NORTH



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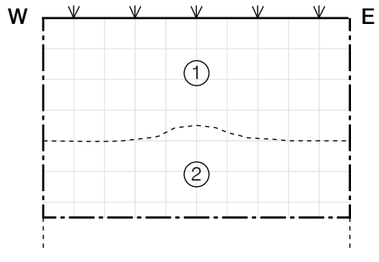

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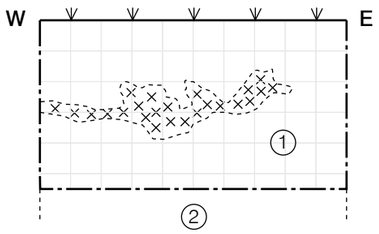

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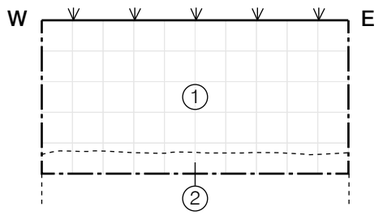
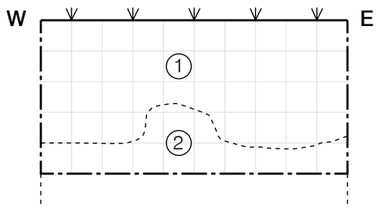
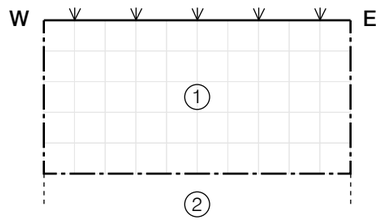


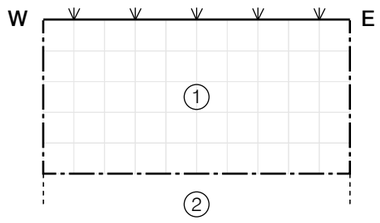
TP18 NORTH



TP19 NORTH



TP20 NORTH



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E info@emmconsulting.com.au
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N.O.	DESCRIPTION	DATE
A	DRAFT SECTIONS	02/12/2020

LEGEND

- CLAY
- CHARCOAL
- IRON STONE
- TREE ROOT
- STONE FRAG/-GRAVEL
- BURNT CLAY

CLIENT: WATERNSW

PROJECT: CSSI DAMS - DUNGOWAN DAM

TEST EXCAVATION PIT SECTIONS

TITLE: SECTIONS - SHEET 1

TP SECTION DRAWINGS

SCALE	DRAWN/CHECK	SHEET NO.
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PROJECT NO.	REVISION	
J200042	A	

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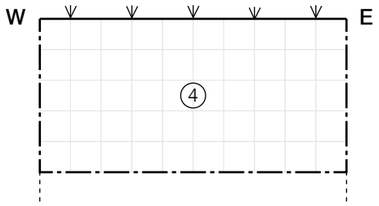

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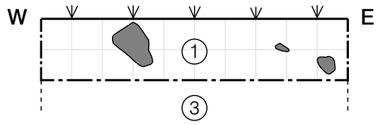

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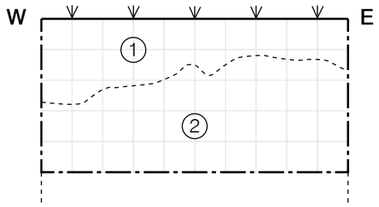

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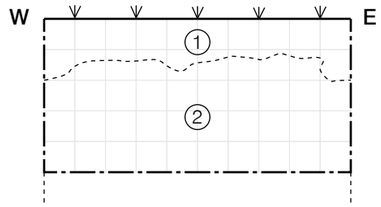
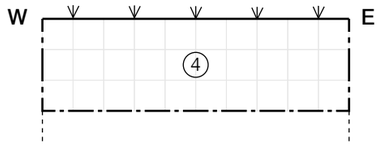


TP34 NORTH



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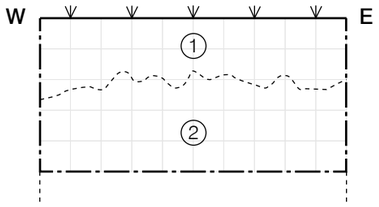

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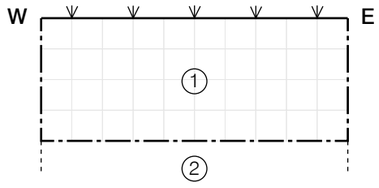

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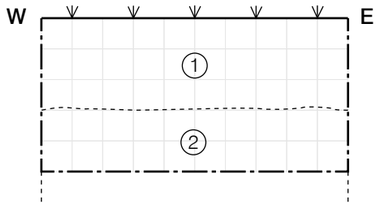

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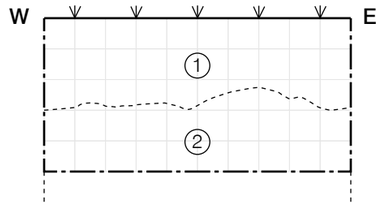

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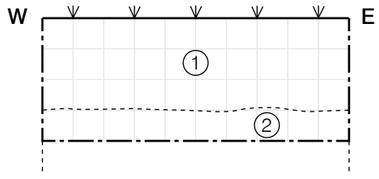
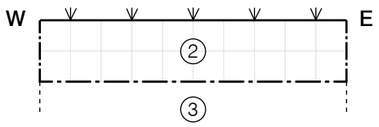


TP48 NORTH



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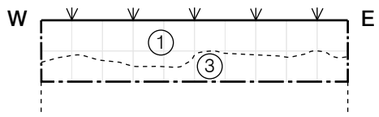
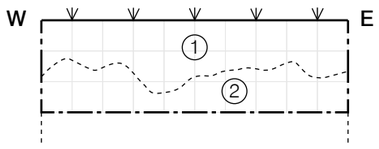
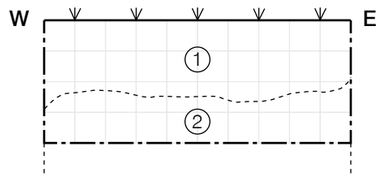


TP50 NORTH

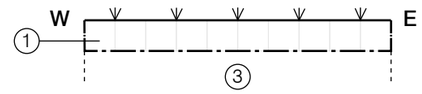


NOTE: WATERLOGGED AT BASE (GLEY)
(ADJACENT TO FORMER HOUSE SITE)

TP51 NORTH



TP54 NORTH



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N.O.	DESCRIPTION	DATE
A	DRAFT SECTIONS	02/12/2020

LEGEND
CLAY
CHARCOAL
IRON STONE
TREE ROOT
STONE FRAG/-GRAVEL
BURNT CLAY

CLIENT
WATERNSW

PROJECT
CSSI DAMS - DUNGOWAN DAM
TEST EXCAVATION PIT SECTIONS

TITLE
SECTIONS - SHEET 2

TP SECTION DRAWINGS

SCALE	DRAWN/CHECK	SHEET NO.
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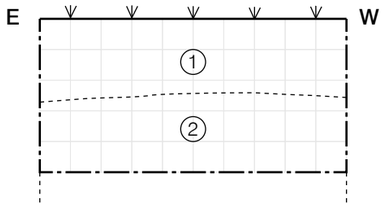
PROJECT NO.	REVISION	
J200042	A	

TP55 SOUTH



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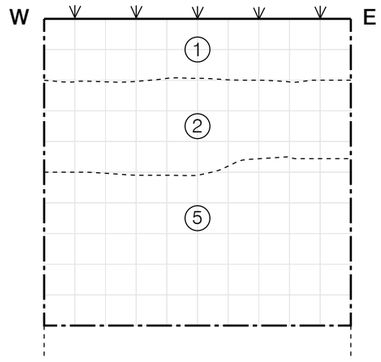

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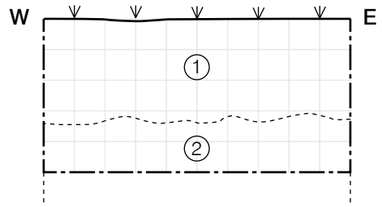

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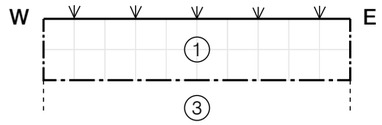

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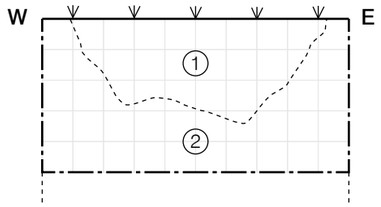
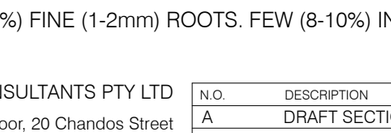


TP64 NORTH

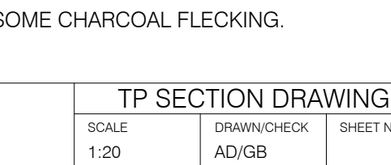
TP67 NORTH



TP68 NORTH

TP69 NORTH

TP77 NORTH



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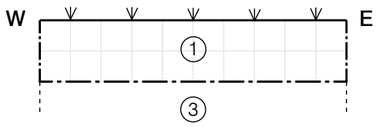

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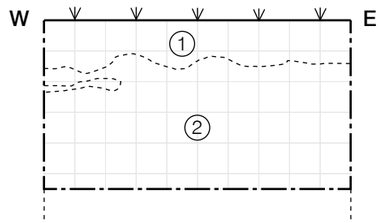

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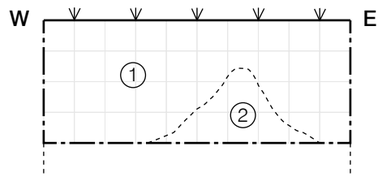

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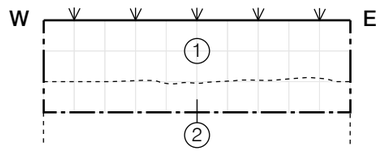

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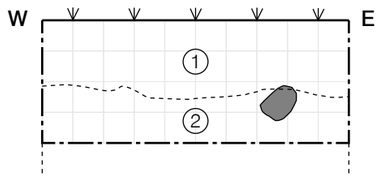

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② MEDIUM ORANGE BROWN SILTY CLAY. FEW ROOTS (2-10%), GENERALLY FINE (1-2mm). WEAKLY COMPACTED, MOIST DUE TO RECENT RAIN. GENERALLY FEW INCLUSIONS (2-10%), WITH SIZE INCREASING FROM MEDIUM TO COURSE GRAVELS (6-60mm) GENERALLY OF LOCAL STONE. OCCASIONALLY INCLUSION ABUNDANCE IS HIGHER (10-20%), GENERALLY WHERE THE ALUVIAL TERRACE IS CLOSER TO THE LOWER SLOPES OF THE SUR-ROUNDING HILLS. SOME CHARCOAL FLECKING.

③ DEGRADING SCHIST BEDROCK. GENERALLY ON CRESTS OR SPURS. WHERE ANY SOIL MATERIAL IS PRESENT, SIMILAR TO ① .

④ MODERN ALLUVIUM. VERY COURSE LOAMY SAND, DARK BROWN. FEW FINE ROOTS (2-10%), GENERALLY FINE (1.2mm) LOOSELY COMPACTED. INCLUSIONS ARE COMMON (10-20%), INCREASING IN ABUNDANCE (20-50%) WITH DEPTH. FORMER RIVER BED AT BASE.

⑤ MEDIUM BROWN CLAY, VERY FEW (<2%) FINE (1-2mm) ROOTS. FEW (8-10%) INCLUSIONS, GENERALLY FINE (2-6mm) BUT ARE INFREQUENT COBBLES (20-60mm). WEAKLY COMPACTED. SOME CHARCOAL FLECKING.

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N.O.	DESCRIPTION	DATE
A	DRAFT SECTIONS	02/12/2020

LEGEND

CLAY
CHARCOAL
IRON STONE
TREE ROOT
STONE FRAG/-GRAVEL
BURNT CLAY

CLIENT
WATERNSW

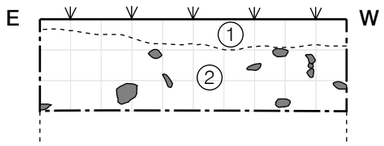
PROJECT
CSSI DAMS - DUNGOWAN DAM
TEST EXCAVATION PIT SECTIONS

TITLE
SECTIONS - SHEET 3

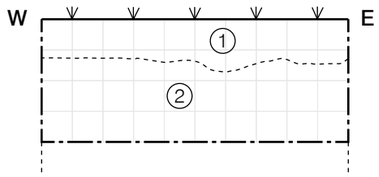
TP SECTION DRAWINGS

SCALE	DRAWN/CHECK	SHEET NO.
1:20	AD/GB	003
PROJECT NO.	REVISION	
J200042	A	

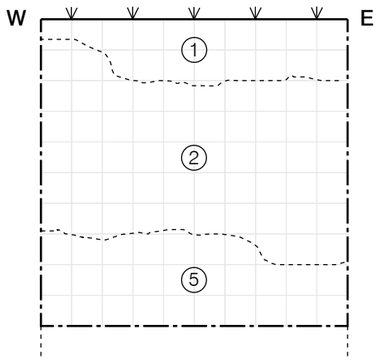
TP97 NORTH



TP100 NORTH



TP101 NORTH



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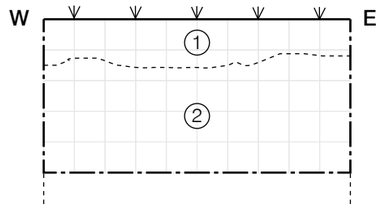

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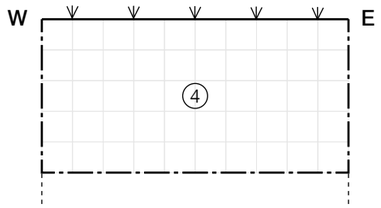

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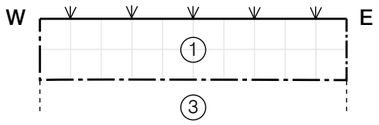
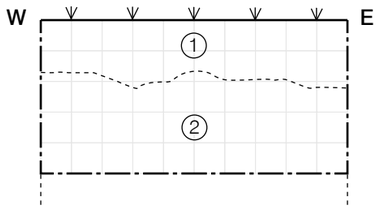


TP105 NORTH

TP106 NORTH



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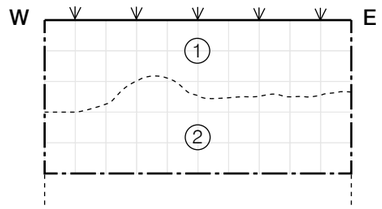

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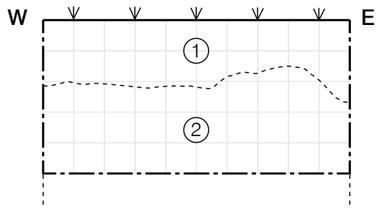

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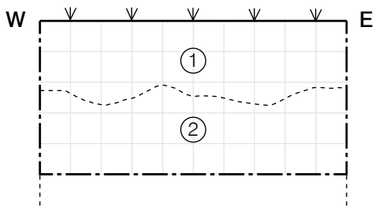

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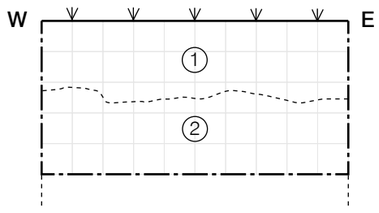
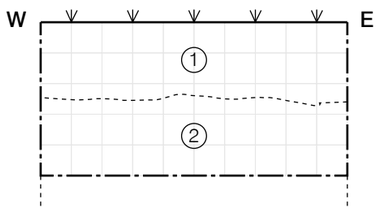
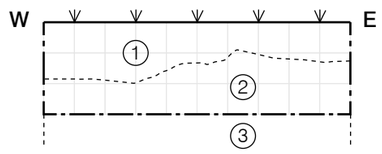


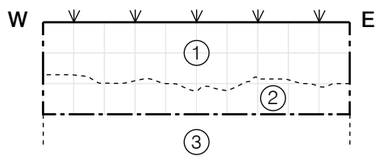
TP111 NORTH



TP112 NORTH



TP113 NORTH



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N.O.	DESCRIPTION	DATE
A	DRAFT SECTIONS	02/12/2020

LEGEND

CLAY
CHARCOAL
IRON STONE
TREE ROOT
STONE FRAG/-GRAVEL
BURNT CLAY

CLIENT
WATERNSW

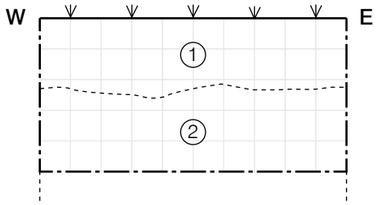
PROJECT
CSSI DAMS - DUNGOWAN DAM
TEST EXCAVATION PIT SECTIONS

TITLE
SECTIONS - SHEET 4

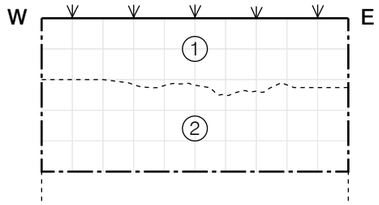
TP SECTION DRAWINGS

SCALE	DRAWN/CHECK	SHEET NO.
1:20	AD/GB	004
PROJECT NO.	REVISION	
J200042	A	

TP114 NORTH



TP115 NORTH



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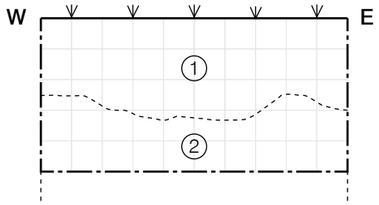

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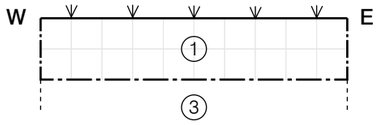
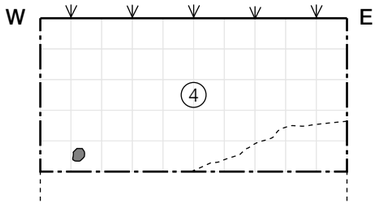
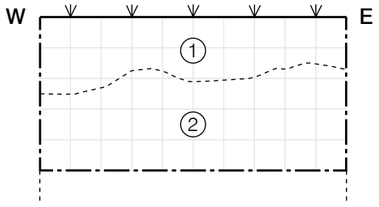


NOTE: MODERN RUBBISH AT BASE.

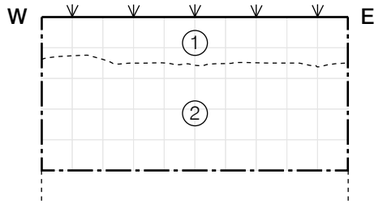
TP118 NORTH



TP119 NORTH



TP120 NORTH



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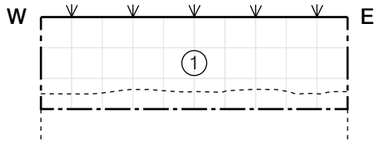
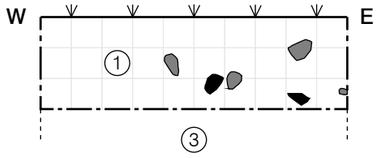
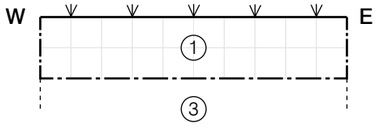


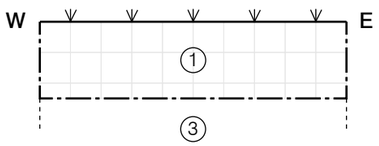
TP122 NORTH



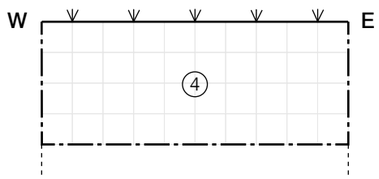
TP123 NORTH



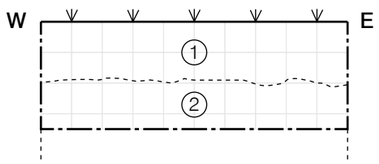
TP124 NORTH



TP125 NORTH

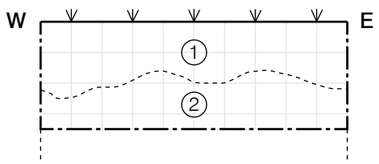


TP126 NORTH

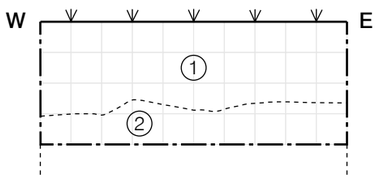


NOTE: WATERLOGGED AT BASE (GLEY)
(UPHILL DAM)

TP127 NORTH



TP128 NORTH



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N.O.	DESCRIPTION	DATE
A	DRAFT SECTIONS	02/12/2020

LEGEND

- CLAY
- CHARCOAL
- IRON STONE
- TREE ROOT
- STONE FRAG/-GRAVEL
- BURNT CLAY

CLIENT
WATERNSW

PROJECT
CSSI DAMS - DUNGOWAN DAM
TEST EXCAVATION PIT SECTIONS

TITLE
SECTIONS - SHEET 5

TP SECTION DRAWINGS

SCALE	DRAWN/CHECK	SHEET NO.
1:20	AD/GB	005
PROJECT NO.	REVISION	
J200042	A	

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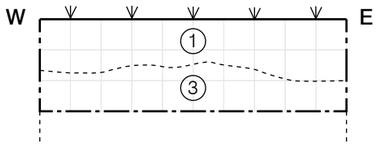

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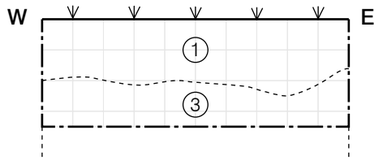
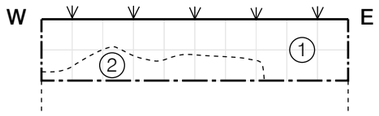
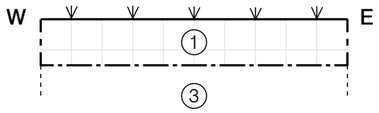


TP131 NORTH

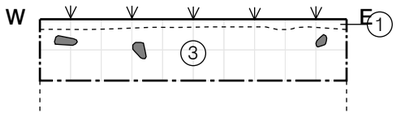


NOTE: WATERLOGGED AT BASE (GLEY)

TP132 NORTH



TP133 NORTH



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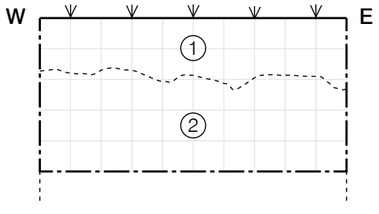

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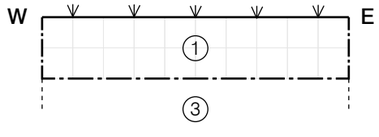
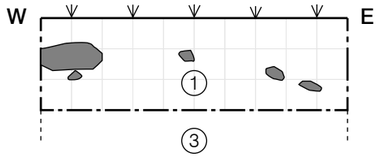


TP136 NORTH



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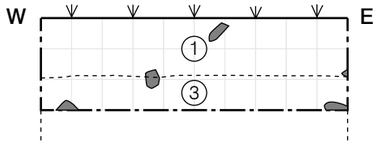

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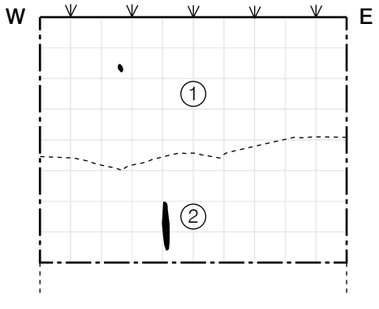
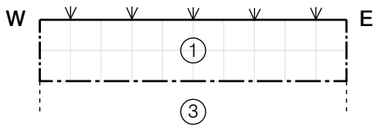


TP140 NORTH



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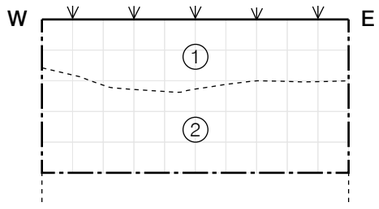
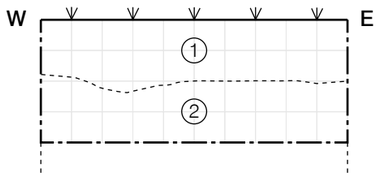


TP142 NORTH



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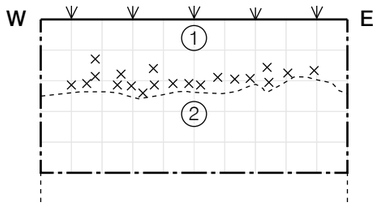

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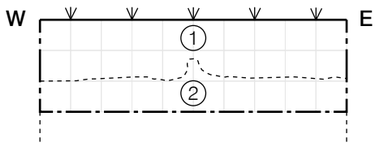

① DARK BROWN HUMIC SILTY LOAM. ROOTS ARE COMMON (10-20%), FINE TO MEDIUM (1-5mm). WEAKLY COMPACTED. FEW INCLUSIONS. GENERALLY MEDIUM (6-20mm) RIVER GRAVELS OF LOCAL STONE

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www.emmconsulting.com.au

N.O.	DESCRIPTION	DATE
A	DRAFT SECTIONS	02/12/2020

LEGEND

CLAY
CHARCOAL
IRON STONE
TREE ROOT
STONE FRAG/-GRAVEL
BURNT CLAY

CLIENT
WATERNSW

PROJECT
CSSI DAMS - DUNGOWAN DAM
TEST EXCAVATION PIT SECTIONS

TITLE
SECTIONS - SHEET 6

TP SECTION DRAWINGS

SCALE	DRAWN/CHECK	SHEET NO.
1:20	AD/GB	006
PROJECT NO.	REVISION	
J200042	A	

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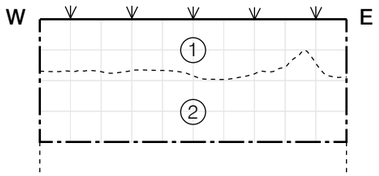
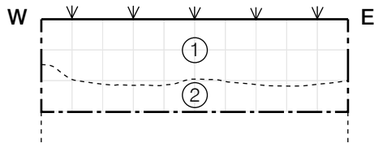


TP146 NORTH



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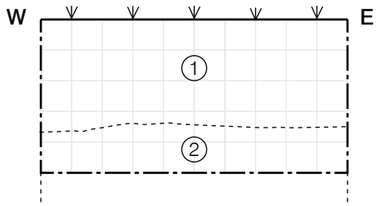
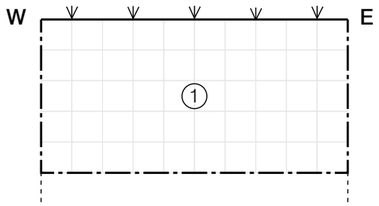


TP148 NORTH



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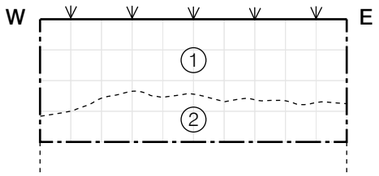

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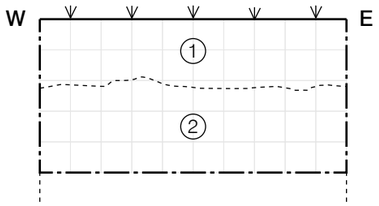

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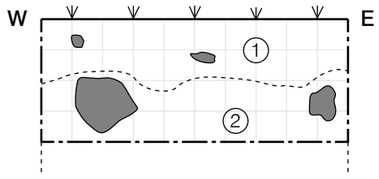
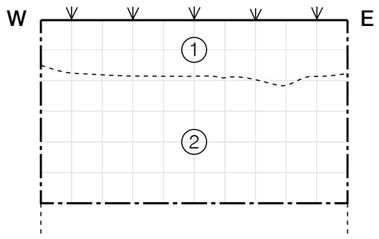


NOTE: SOIL MATRIX EXHIBIT INCREASED INCLUSIONS (POSSIBLY INTRODUCED).

TP152 NORTH



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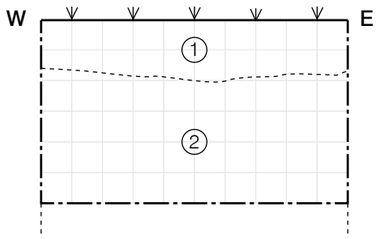

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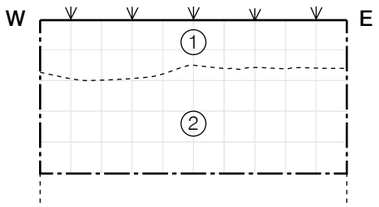

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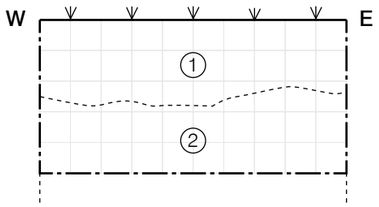

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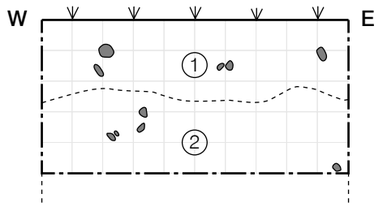

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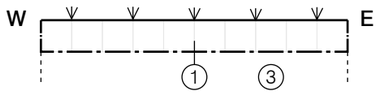

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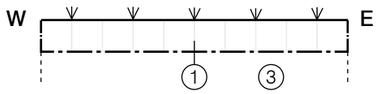

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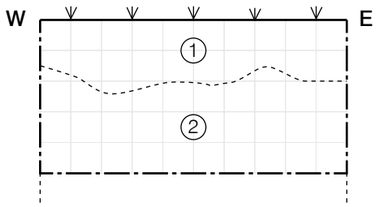

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N.O.	DESCRIPTION	DATE
A	DRAFT SECTIONS	02/12/2020

LEGEND

CLAY · TREE ROOT · CHARCOAL · STONE FRAG/-GRAVEL · IRON STONE · BURNT CLAY

CLIENT: WATERNSW

PROJECT: CSSI DAMS - DUNGOWAN DAM
TEST EXCAVATION PIT SECTIONS

TITLE: SECTIONS - SHEET 7

TP SECTION DRAWINGS

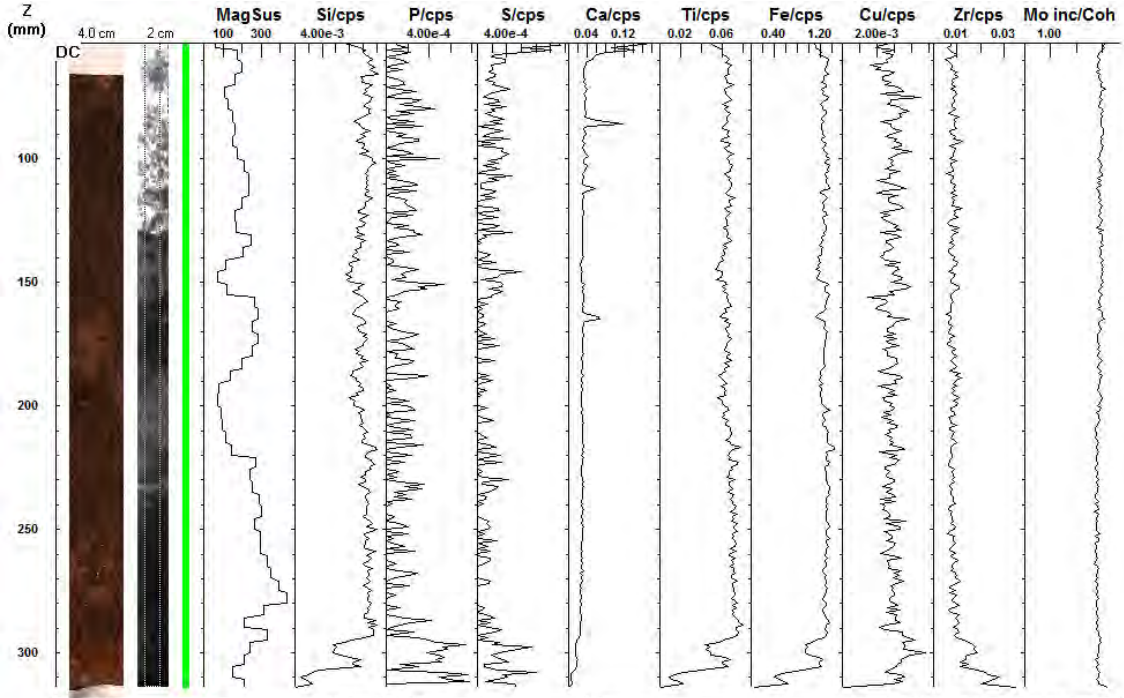
SCALE	DRAWN/CHECK	SHEET NO.
1:20	AD/GB	007
PROJECT NO.	REVISION	
J200042	A	

F.5 Sedimentological analysis

On subsequent pages we present the ITRAX and particle size analysis of the vertical soil core sample from TP12A.

Dungowan Creek

A 32 cm core was analysed using Itrax µXRF core scanner at Australian Nuclear Science and Technology Organisation (ANSTO). The core was scanned at 1 mm interval for elemental variation down core. An optical image, X-ray radiograph and Magnetic Susceptibility profiles were also obtained. See plot below.



Core: DC	Section: DC_XRF	User:	Date: 04/11/2020 - ItraX-PLOT V2.68
X-Ray tube: Mo target	Line camera signal 298821 at 25 ms	Filename: DC_XRF	Data produced by the ANSTO Itrax
XRF Conditions	30 kV 55 mA	Step Size: 1000 microns	Count-time: 10 seconds/increment
X-radiograph Conditions	50 kV 30 mA	Step Size: 1000 microns	Dwell time: 0 ms/increment

ANSTO – Isotope Tracing in Natural Systems (ITNS)

Dear Geogia,
Please find below details of the samples you submitted for analysis at ANSTO-ITNS.
Should you have any queries regarding the report please do not hesitate to contact me.

Regards,
Atun Zawadzki

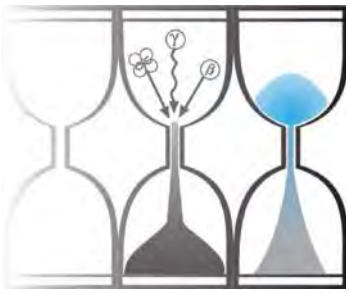
Client Organisation:	EMM Consulting
Contact:	Ms Geogia Burnett
Samples received date:	26-Nov-20
Number of samples:	15
Analysis requested:	Grain size analysis
Date report sent :	4-Nov-20
Analytical method:	About 1-2 cm^3 sample aliquots were heated with hydrogen proxide to oxidise organic materials in the samples. Followed by the adition of dilute $(NaPO_3)_6$ to disperse the clay materials. Grain size distribution analysis on the procerssed samples was performed using the Malvern Mastersizer 2000 laser diffraction particle analyser.
Analysis performed by:	Lira Budiarty and Atun Zawadzki 3-Nov-20

We value your feedback and suggestions. Please click on the link below to fill out our short survey form. Thank you.
https://www.surveymonkey.com/r/H7M5RXZ

F.6 OSL report

University of Gloucestershire

Luminescence dating laboratory



Optical dating of sediments: Dungowan Dam excavations, Australia

to

Georgia Burnett

EMM Consulting

Analysis & Reporting, Prof. P.S. Toms
Sample Preparation & Measurement, Dr J.C. Wood
21 December 2020

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Scope of Report

This is a standard report of the Luminescence dating laboratory, University of Gloucestershire. In large part, the document summarises the processes, diagnostics and data drawn upon to deliver Table 1. A conclusion on the analytical validity of each sample's optical age estimate is expressed in Table 2; where there are caveats, the reader is directed to the relevant section of the report that explains the issue further in general terms.

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Field Code	Lab Code	Overburden (m)	Grain size (μm)	Moisture content (%)	Ge γ-spectrometry (*ex situ*)			α D_r ($Gy.ka^{-1}$)	β D_r ($Gy.ka^{-1}$)	γ D_r ($Gy.ka^{-1}$)	Cosmic D_r ($Gy.ka^{-1}$)	Preheat (°C for 10s)	Low Dose Repeat Ratio	High Dose Repeat Ratio	Post-IR OSL Ratio
					K (%)	Th (ppm)	U (ppm)								
TP12-OSL#1	GL20069	0.15	125-180	20 ± 5	1.30 ± 0.10	6.57 ± 0.46	1.08 ± 0.11	-	0.96 ± 0.13	0.59 ± 0.10	0.19 ± 0.03	220	0.99 ± 0.04	1.01 ± 0.03	0.98 ± 0.04
TP12-OSL#3	GL20058	0.45	125-180	18 ± 4	1.01 ± 0.09	6.42 ± 0.45	1.09 ± 0.11	-	0.81 ± 0.11	0.54 ± 0.09	0.18 ± 0.02	260	0.99 ± 0.01	1.00 ± 0.01	0.98 ± 0.01
TP12-OSL#4	GL20055	0.60	125-180	16 ± 4	1.47 ± 0.11	7.03 ± 0.48	1.13 ± 0.11	-	1.12 ± 0.14	0.67 ± 0.10	0.17 ± 0.02	260	0.98 ± 0.02	1.00 ± 0.01	0.97 ± 0.02
TP101-OSL#2	GL20059	0.30	180-250	13 ± 3	1.24 ± 0.10	6.01 ± 0.44	1.03 ± 0.13	-	0.98 ± 0.12	0.65 ± 0.10	0.18 ± 0.02	260	0.98 ± 0.02	0.98 ± 0.02	0.97 ± 0.02
TP101-OSL#3	GL20060	0.50	180-250	11 ± 3	1.48 ± 0.11	6.33 ± 0.46	1.06 ± 0.11	-	1.15 ± 0.13	0.68 ± 0.10	0.18 ± 0.02	260	1.00 ± 0.04	1.02 ± 0.04	0.99 ± 0.04
TP101-OSL#4	GL20061	0.70	180-250	11 ± 3	1.66 ± 0.11	5.45 ± 0.44	1.00 ± 0.12	-	1.24 ± 0.14	0.68 ± 0.11	0.17 ± 0.02	280	1.00 ± 0.04	1.00 ± 0.03	0.98 ± 0.04
TP101-OSL#5	GL20056	0.90	180-250	12 ± 3	1.59 ± 0.11	5.86 ± 0.44	1.00 ± 0.11	-	1.19 ± 0.14	0.67 ± 0.11	0.16 ± 0.02	260	1.00 ± 0.03	1.01 ± 0.03	1.00 ± 0.03
TP138-OSL#3	GL20054	0.50	5-15	25 ± 6	1.40 ± 0.10	6.60 ± 0.47	1.11 ± 0.10	0.22 ± 0.03	1.02 ± 0.13	0.57 ± 0.06	0.18 ± 0.02	260	1.00 ± 0.04	1.01 ± 0.03	0.99 ± 0.04
TP138-OSL#4	GL20057	0.70	125-180	18 ± 4	1.33 ± 0.10	7.26 ± 0.49	1.21 ± 0.12	-	1.03 ± 0.13	0.65 ± 0.10	0.17 ± 0.02	260	1.00 ± 0.01	1.00 ± 0.01	0.99 ± 0.01

Field Code	Lab Code	Total D_r ($Gy.ka^{-1}$)	D_e (Gy)	Age (ka)
TP12-OSL#1	GL20069	1.73 ± 0.16	0.5 ± 0.0	0.28 ± 0.03 (0.03)
TP12-OSL#3	GL20058	1.53 ± 0.14	7.5 ± 0.4	4.9 ± 0.5 (0.5)
TP12-OSL#4	GL20055	1.97 ± 0.17	12.2 ± 0.6	6.2 ± 0.6 (0.5)
TP101-OSL#2	GL20059	1.77 ± 0.14	8.8 ± 0.4	5.0 ± 0.4 (0.4)
TP101-OSL#3	GL20060	2.01 ± 0.15	17.6 ± 0.7	8.7 ± 0.7 (0.6)
TP101-OSL#4	GL20061	2.09 ± 0.16	20.4 ± 1.0	9.7 ± 0.9 (0.7)
TP101-OSL#5	GL20056	2.03 ± 0.15	19.7 ± 0.8	9.7 ± 0.8 (0.7)
TP138-OSL#3	GL20054	1.98 ± 0.14	6.6 ± 0.2	3.4 ± 0.3 (0.2)
TP138-OSL#4	GL20057	1.84 ± 0.16	11.7 ± 0.5	6.4 ± 0.6 (0.5)

Table 1 D_r, D_e and Age data of submitted samples located at c. 31°S, 151°E, 650m. Age estimates expressed relative to year of sampling. Uncertainties in age are quoted at 1σ confidence, are based on analytical errors and reflect combined systematic and experimental variability and (in parenthesis) experimental variability alone (see 6.0). **Blue** indicates samples with accepted age estimates, **red**, age estimates with caveats (see Table 2).

Generic considerations	Field Code	Lab Code	Sample specific considerations
Absence of *in situ* γ spectrometry data (see section 4.0)	TP12-OSL#1	GL20069	None
	TP12-OSL#3	GL20058	None
	TP12-OSL#4	GL20055	None
	TP101-OSL#2	GL20059	None
	TP101-OSL#3	GL20060	None
	TP101-OSL#4	GL20061	None
	TP101-OSL#5	GL20056	None
	TP138-OSL#3	GL20054	None
	TP138-OSL#4	GL20057	None

Table 2 Analytical validity of sample suite age estimates and caveats for consideration

1.0 Mechanisms and principles

Upon exposure to ionising radiation, electrons within the crystal lattice of insulating minerals are displaced from their atomic orbits. Whilst this dislocation is momentary for most electrons, a portion of charge is redistributed to meta-stable sites (traps) within the crystal lattice. In the absence of significant optical and thermal stimuli, this charge can be stored for extensive periods. The quantity of charge relocation and storage relates to the magnitude and period of irradiation. When the lattice is optically or thermally stimulated, charge is evicted from traps and may return to a vacant orbit position (hole). Upon recombination with a hole, an electron's energy can be dissipated in the form of light generating crystal luminescence providing a measure of dose absorption.

Herein, quartz is segregated for dating. The utility of this minerogenic dosimeter lies in the stability of its datable signal over the mid to late Quaternary period, predicted through isothermal decay studies (e.g. Smith *et al.*, 1990; retention lifetime 630 Ma at 20°C) and evidenced by optical age estimates concordant with independent chronological controls (e.g. Murray and Olley, 2002). This stability is in contrast to the anomalous fading of comparable signals commonly observed for other ubiquitous sedimentary minerals such as feldspar and zircon (Wintle, 1973; Templer, 1985; Spooner, 1993)

Optical age estimates of sedimentation (Huntley *et al.*, 1985) are premised upon reduction of the minerogenic time dependent signal (Optically Stimulated Luminescence, OSL) to zero through exposure to sunlight and, once buried, signal reformulation by absorption of litho- and cosmogenic radiation. The signal accumulated post burial acts as a dosimeter recording total dose absorption, converting to a chronometer by estimating the rate of dose absorption quantified through the assay of radioactivity in the surrounding lithology and streaming from the cosmos.

$$\text{Age} = \frac{\text{Mean Equivalent Dose } (D_e, \text{ Gy})}{\text{Mean Dose Rate } (D_r, \text{ Gy.ka}^{-1})}$$

Aitken (1998) and Bøtter-Jensen *et al.* (2003) offer a detailed review of optical dating.

2.0 Sample Preparation

Eight sediment samples were collected within opaque tubing and submitted for Optical dating. To preclude optical erosion of the datable signal prior to measurement, all samples were opened and prepared under controlled laboratory illumination provided by Encapsulite RB-10 (red) filters. To isolate that material potentially exposed to daylight during sampling, sediment located within 20 mm of each tube-end was removed.

The remaining sample was dried and then sieved. The fine sand and fine silt fractions were segregated and subjected to acid and alkaline digestion (10% HCl, 15% H_2O_2) to attain removal of carbonate and organic components respectively.

For fine sand fractions, a further acid digestion in HF (40%, 60 mins) was used to etch the outer 10-15 μm layer affected by α radiation and degrade each samples' feldspar content. During HF treatment, continuous magnetic stirring was used to effect isotropic etching of grains. 10% HCl was then added to remove acid soluble fluorides. Each sample was dried, resieved and quartz isolated from the remaining heavy mineral fraction using a sodium polytungstate density separation at 2.68g.cm^{-3}. Twelve 8 mm multi-grain aliquots (*c.* 3-6 mg) of quartz from each sample were then mounted on aluminium discs for determination of D_e values.

Fine silt sized quartz, along with other mineral grains of varying density and size, was extracted by sample sedimentation in acetone (<15 μm in 2 min 20 s, >5 μm in 21 mins at 20ºC). Feldspars and amorphous silica were then removed from

this fraction through acid digestion (35% H_2SiF_6 for 2 weeks, Jackson *et al*., 1976; Berger *et al*., 1980). Following addition of 10% HCl to remove acid soluble fluorides, grains degraded to <5 μm as a result of acid treatment were removed by acetone sedimentation. Twelve multi-grain aliquots (ca. 1.5 mg) were then mounted on aluminium discs for D_e evaluation.

All drying was conducted at 40°C to prevent thermal erosion of the signal. All acids and alkalis were Analar grade. All dilutions (removing toxic-corrosive and non-minerogenic luminescence-bearing substances) were conducted with distilled water to prevent signal contamination by extraneous particles.

3.0 Acquisition and accuracy of D_e value

All minerals naturally exhibit marked inter-sample variability in luminescence per unit dose (sensitivity). Therefore, the estimation of D_e acquired since burial requires calibration of the natural signal using known amounts of laboratory dose. D_e values were quantified using a single-aliquot regenerative-dose (SAR) protocol (Murray and Wintle 2000; 2003) facilitated by a Risø TL-DA-15 irradiation-stimulation-detection system (Markey *et al*., 1997; Bøtter-Jensen *et al*., 1999). Within this apparatus, optical signal stimulation is provided by an assembly of blue diodes (5 packs of 6 Nichia NSPB500S), filtered to 470±80 nm conveying 15 $mW.cm^{-2}$ using a 3 mm Schott GG420 positioned in front of each diode pack. Infrared (IR) stimulation, provided by 6 IR diodes (Telefunken TSHA 6203) stimulating at 875±80nm delivering ~5 $mW.cm^{-2}$, was used to indicate the presence of contaminant feldspars (Hütt *et al*., 1988). Stimulated photon emissions from quartz aliquots are in the ultraviolet (UV) range and were filtered from stimulating photons by 7.5 mm HOYA U-340 glass and detected by an EMI 9235QA photomultiplier fitted with a blue-green sensitive bialkali photocathode. Aliquot irradiation was conducted using a 1.48 GBq $^{90}Sr/^{90}Y$ β source calibrated for multi-grain aliquots of 5-15, 125-180 and 180-250 μm quartz against the 'Hotspot 800' ^{60}Co γ source located at the National Physical Laboratory (NPL), UK.

SAR by definition evaluates D_e through measuring the natural signal (Fig. 1) of a single aliquot and then regenerating that aliquot's signal by using known laboratory doses to enable calibration. For each aliquot, five different regenerative-doses were administered so as to image dose response. D_e values for each aliquot were then interpolated, and associated counting and fitting errors calculated, by way of exponential plus linear regression (Fig. 1). Weighted (geometric) mean D_e values were calculated from 12 aliquots using the central age model outlined by Galbraith *et al*. (1999) and are quoted at 1σ confidence (Table 1). The accuracy with which D_e equates to total absorbed dose and that dose absorbed since burial was assessed. The former can be considered a function of laboratory factors, the latter, one of environmental issues. Diagnostics were deployed to estimate the influence of these factors and criteria instituted to optimise the accuracy of D_e values.

3.1 Laboratory Factors

3.1.1 Feldspar contamination

The propensity of feldspar signals to fade and underestimate age, coupled with their higher sensitivity relative to quartz makes it imperative to quantify feldspar contamination. At room temperature, feldspars generate a signal (IRSL; Fig. 1) upon exposure to IR whereas quartz does not. The signal from feldspars contributing to OSL can be depleted by prior exposure to IR. For all aliquots the contribution of any remaining feldspars was estimated from the OSL IR depletion ratio (Duller, 2003). The influence of IR depletion on the OSL signal can be illustrated by comparing the regenerated post-IR OSL D_e with the applied regenerative-dose. If the addition to OSL by feldspars is insignificant, then the repeat dose ratio of OSL to post-IR OSL should be statistically consistent with unity (Table 1). If any aliquots do not fulfil this criterion, then the sample age estimate should be accepted tentatively. The source of feldspar contamination is rarely rooted in sample preparation; it predominantly results from the occurrence of feldspars as inclusions within quartz.

3.1.2 Preheating

Preheating aliquots between irradiation and optical stimulation is necessary to ensure comparability between natural and laboratory-induced signals. However, the multiple irradiation and preheating steps that are required to define single-aliquot regenerative-dose response leads to signal sensitisation, rendering calibration of the natural signal inaccurate. The SAR protocol (Murray and Wintle, 2000; 2003) enables this sensitisation to be monitored and corrected using a test dose, here set at 5 Gy preheated to 220°C for 10s, to track signal sensitivity between irradiation-preheat steps. However, the accuracy of sensitisation correction for both natural and laboratory signals can be preheat dependent.

The Dose Recovery test was used to assess the optimal preheat temperature for accurate correction and calibration of the time dependent signal. Dose Recovery (Fig. 2) attempts to quantify the combined effects of thermal transfer and sensitisation on the natural signal, using a precise lab dose to simulate natural dose. The ratio between the applied dose and recovered D_e value should be statistically concordant with unity. For this diagnostic, 6 aliquots were each assigned a 10 s preheat between 180°C and 280°C.

That preheat treatment fulfilling the criterion of accuracy within the Dose Recovery test was selected to generate the final D_e value from a further 12 aliquots. Further thermal treatments, prescribed by Murray and Wintle (2000; 2003), were applied to optimise accuracy and precision. Optical stimulation occurred at 125ºC in order to minimise effects associated with photo-transferred thermoluminescence and maximise signal to noise ratios. Inter-cycle optical stimulation was conducted at 280ºC to minimise recuperation.

3.1.3 Irradiation

For all samples having D_e values in excess of 100 Gy, matters of signal saturation and laboratory irradiation effects are of concern. With regards the former, the rate of signal accumulation generally adheres to a saturating exponential form and it is this that limits the precision and accuracy of D_e values for samples having absorbed large doses. For such samples, the functional range of D_e interpolation by SAR has been verified up to 600 Gy by Pawley *et al*. (2010). Age estimates based on D_e values exceeding this value should be accepted tentatively.

3.1.4 Internal consistency

Abanico plots (Dietze *et al*., 2016) are used to illustrate inter-aliquot D_e variability (Fig. 3). D_e values are standardised relative to the central D_e value for natural signals and are described as overdispersed when >5% lie beyond $\pm 2\sigma$ of the standardising value; resulting from a heterogeneous absorption of burial dose and/or response to the SAR protocol. For multi-grain aliquots, overdispersion of natural signals does not necessarily imply inaccuracy. However where overdispersion is observed for regenerated signals, the efficacy of sensitivity correction may be problematic. Murray and Wintle (2000; 2003) suggest repeat dose ratios (Table 1) offer a measure of SAR protocol success, whereby ratios ranging across 0.9-1.1 represent effective sensitivity correction. However, this variation of repeat dose ratios in the high-dose region can have a significant impact on D_e interpolation.

3.2 Environmental factors

3.2.1 Incomplete zeroing

Post-burial OSL signals residual of pre-burial dose absorption can result where pre-burial sunlight exposure is limited in spectrum, intensity and/or period, leading to age overestimation. This effect is particularly acute for material eroded and redeposited sub-aqueously (Olley *et al*., 1998, 1999; Wallinga, 2002) and exposed to a burial dose of <20 Gy (e.g. Olley *et al*., 2004), has some influence in sub-aerial contexts but is rarely of consequence where aerial transport has occurred. Within single-aliquot regenerative-dose optical dating there are two diagnostics of partial resetting (or bleaching); signal analysis (Agersnap-Larsen *et al*., 2000; Bailey *et al*., 2003) and inter-aliquot D_e distribution studies (Murray *et al*., 1995).

Within this study, signal analysis was used to quantify the change in D_e value with respect to optical stimulation time for multi-grain aliquots. This exploits the existence of traps within minerogenic dosimeters that bleach with different efficiency for a given wavelength of light to verify partial bleaching. D_e (t) plots (Fig. 4; Bailey *et al*., 2003) are constructed from separate integrals of signal decay as laboratory optical stimulation progresses. A statistically significant increase in natural D_e (t) is indicative of partial bleaching assuming three conditions are fulfilled. Firstly, that a statistically significant increase in D_e (t) is observed when partial bleaching is simulated within the laboratory. Secondly, that there is no significant rise in D_e (t) when full bleaching is simulated. Finally, there should be no significant augmentation in D_e (t) when zero dose is simulated. Where partial bleaching is detected, the age derived from the sample should be considered a maximum estimate only. However, the utility of signal analysis is strongly dependent upon a samples pre-burial experience of sunlight's spectrum and its residual to post-burial signal ratio. Given in the majority of cases, the spectral exposure history of a deposit is uncertain, the absence of an increase in natural D_e (t) does not necessarily testify to the absence of partial bleaching.

Where requested and feasible, the insensitivities of multi-grain single-aliquot signal analysis may be circumvented by inter-aliquot D_e distribution studies. This analysis uses aliquots of single sand grains to quantify inter-grain D_e distribution. At present, it is contended that asymmetric inter-grain D_e distributions are symptomatic of partial bleaching and/or pedoturbation (Murray *et al*., 1995; Olley *et al*., 1999; Olley *et al*., 2004; Bateman *et al*., 2003). For partial bleaching at least, it is further contended that the D_e acquired during burial is located in the minimum region of such ranges. The mean and breadth of this minimum region is the subject of current debate, as it is additionally influenced by heterogeneity in microdosimetry, variable inter-grain response to SAR and residual to post-burial signal ratios.

3.2.2 Turbation

As noted in section 3.1.1, the accuracy of sedimentation ages can further be controlled by post-burial trans-strata grain movements forced by pedo- or cryoturbation. Berger (2003) contends pedogenesis prompts a reduction in the apparent sedimentation age of parent material through bioturbation and illuviation of younger material from above and/or by biological recycling and resetting of the datable signal of surface material. Berger (2003) proposes that the chronological products of this remobilisation are A-horizon age estimates reflecting the cessation of pedogenic activity, Bc/C-horizon ages delimiting the maximum age for the initiation of pedogenesis with estimates obtained from Bt-horizons providing an intermediate age 'close to the age of cessation of soil development'. Singhvi et al. (2001), in contrast, suggest that B and C-horizons closely approximate the age of the parent material, the A-horizon, that of the 'soil forming episode'. Recent analyses of inter-aliquot D_e distributions have reinforced this complexity of interpreting burial age from pedoturbated deposits (Lombard *et al*., 2011; Gliganic *et al*., 2015; Jacobs *et al*., 2008; Bateman *et al*., 2007; Gliganic *et al*., 2016). At present there is no definitive post-sampling mechanism for the direct detection of and correction for post-burial sediment remobilisation. However, intervals of palaeosol evolution can be delimited by a maximum age derived from parent material and a minimum age obtained from a unit overlying the palaeosol. Inaccuracy forced by cryoturbation may be bidirectional, heaving older material upwards or drawing younger material downwards into the level to be dated. Cryogenic deformation of matrix-supported material is, typically, visible; sampling of such cryogenically-disturbed sediments can be avoided.

4.0 Acquisition and accuracy of D_r value

Lithogenic D_r values were defined through measurement of U, Th and K radionuclide concentration and conversion of these quantities into α, β and γ D_r values (Table 1). α and β contributions were estimated from sub-samples by laboratory-based γ spectrometry using an Ortec GEM-S high purity Ge coaxial detector system, calibrated using certified reference materials supplied by CANMET. γ dose rates can be estimated from *in situ* NaI gamma spectrometry or, where direct measurements are unavailable as in the present case, from laboratory-based Ge γ spectrometry. *In situ*

measurements reduce uncertainty relating to potential heterogeneity in the γ dose field surrounding each sample. The level of U disequilibrium was estimated by laboratory-based Ge γ spectrometry. Estimates of radionuclide concentration were converted into D_r values (Adamiec and Aitken, 1998), accounting for D_r modulation forced by grain size (Mejdahl, 1979), present moisture content (Zimmerman, 1971) and, where D_e values were generated from 5-15 μm quartz, reduced signal sensitivity to α radiation (a-value 0.050 $\pm$ 0.002). Cosmogenic D_r values were calculated on the basis of sample depth, geographical position and matrix density (Prescott and Hutton, 1994).

The spatiotemporal validity of D_r values can be considered a function of five variables. Firstly, age estimates devoid of *in situ* γ spectrometry data should be accepted tentatively if the sampled unit is heterogeneous in texture or if the sample is located within 300 mm of strata consisting of differing texture and/or mineralogy. However, where samples are obtained throughout a vertical profile, consistent values of γ D_r based solely on laboratory measurements may evidence the homogeneity of the γ field and hence accuracy of γ D_r values. Secondly, disequilibrium can force temporal instability in U and Th emissions. The impact of this infrequent phenomenon (Olley *et al*., 1996) upon age estimates is usually insignificant given their associated margins of error. However, for samples where this effect is pronounced (>50% disequilibrium between ^{238}U and ^{226}Ra; Fig. 5), the resulting age estimates should be accepted tentatively. Thirdly, pedogenically-induced variations in matrix composition of B and C-horizons, such as radionuclide and/or mineral remobilisation, may alter the rate of energy emission and/or absorption. If D_r is invariant through a dated profile and samples encompass primary parent material, then element mobility is likely limited in effect. Fourthly, spatiotemporal detractions from present moisture content are difficult to assess directly, requiring knowledge of the magnitude and timing of differing contents. However, the maximum influence of moisture content variations can be delimited by recalculating D_r for minimum (zero) and maximum (saturation) content. Finally, temporal alteration in the thickness of overburden alters cosmic D_r values. Cosmic D_r often forms a negligible portion of total D_r. It is possible to quantify the maximum influence of overburden flux by recalculating D_r for minimum (zero) and maximum (surface sample) cosmic D_r.

5.0 Estimation of Age

Ages reported in Table 1 provide an estimate of sediment burial period based on mean D_e and D_r values and their associated analytical uncertainties. Uncertainty in age estimates is reported as a product of systematic and experimental errors, with the magnitude of experimental errors alone shown in parenthesis (Table 1). Cumulative frequency plots indicate the inter-aliquot variability in age (Fig. 6). The maximum influence of temporal variations in D_r forced by minima-maxima in moisture content and overburden thickness is also illustrated in Fig. 6. Where uncertainty in these parameters exists this age range may prove instructive, however the combined extremes represented should not be construed as preferred age estimates. The analytical validity of each sample is presented in Table 2.

6.0 Analytical uncertainty

All errors are based upon analytical uncertainty and quoted at 1σ confidence. Error calculations account for the propagation of systematic and/or experimental (random) errors associated with D_e and D_r values.

For D_e values, systematic errors are confined to laboratory β source calibration. Uncertainty in this respect is that combined from the delivery of the calibrating γ dose (1.2%; NPL, pers. comm.), the conversion of this dose for SiO_2 using the respective mass energy-absorption coefficient (2%; Hubbell, 1982) and experimental error, totalling 3.5%. Mass attenuation and bremsstrahlung losses during γ dose delivery are considered negligible. Experimental errors relate to D_e interpolation using sensitisation corrected dose responses. Natural and regenerated sensitisation corrected dose points (S_i) were quantified by,

$$S_i = (D_i - x.L_i) / (d_i - x.L_i) \quad \textbf{Eq.1}$$

where D_i = Natural or regenerated OSL, initial 0.2 s

L_i = Background natural or regenerated OSL, final 5 s

d_i = Test dose OSL, initial 0.2 s

x = Scaling factor, 0.08

The error on each signal parameter is based on counting statistics, reflected by the square-root of measured values. The propagation of these errors within Eq. 1 generating σS_i follows the general formula given in Eq. 2. σS_i were then used to define fitting and interpolation errors within exponential plus linear regressions.

For D_r values, systematic errors accommodate uncertainty in radionuclide conversion factors (5%), β attenuation coefficients (5%), a-value (4%; derived from a systematic α source uncertainty of 3.5% and experimental error), matrix density (0.20 $g.cm^{-3}$), vertical thickness of sampled section (specific to sample collection device), saturation moisture content (3%), moisture content attenuation (2%) and burial moisture content (25% relative, unless direct evidence exists of the magnitude and period of differing content). Experimental errors are associated with radionuclide quantification for each sample by Ge gamma spectrometry.

The propagation of these errors through to age calculation was quantified using the expression,

$$\sigma y\ (\delta y/\delta x) = (\Sigma\ ((\delta y/\delta x_n).\sigma x_n)^2)^{1/2} \quad \textbf{Eq. 2}$$

where y is a value equivalent to that function comprising terms x_n and where σy and σx_n are associated uncertainties.

Errors on age estimates are presented as combined systematic and experimental errors and experimental errors alone. The former (combined) error should be considered when comparing luminescence ages herein with independent chronometric controls. The latter assumes systematic errors are common to luminescence age estimates generated by means identical to those detailed herein and enable direct comparison with those estimates.

Fig. 1 Signal Calibration

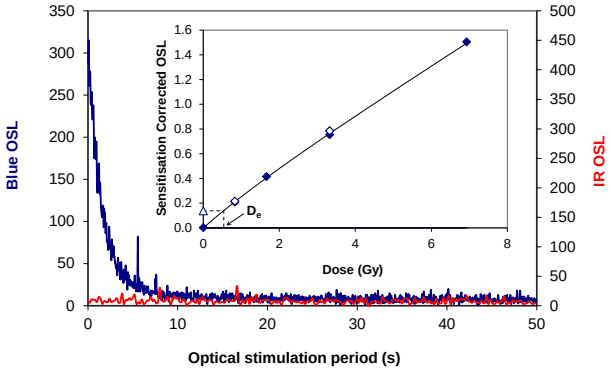

Fig. 2 Dose Recovery

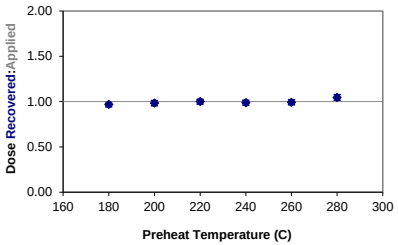

Fig. 4 Signal Analysis

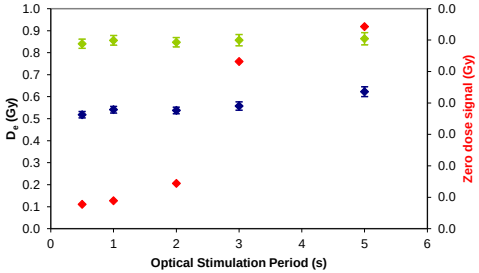

Fig. 3 Inter-aliquot D_e distribution

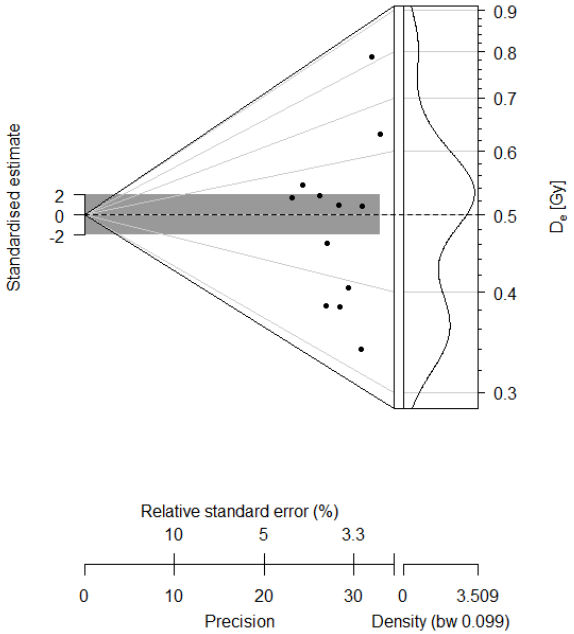

Fig. 5 U Decay Activity

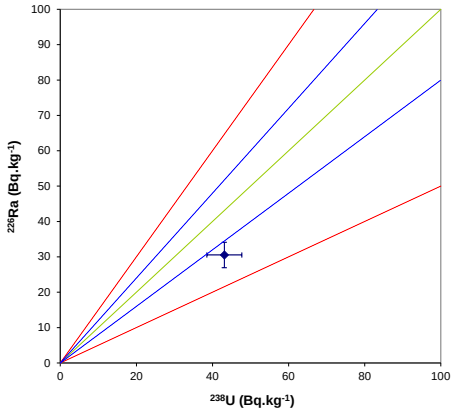

Fig. 6 Age Range

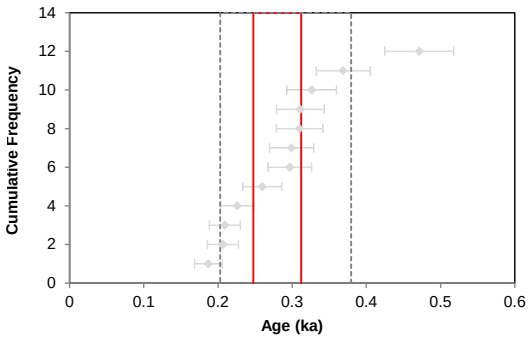

Fig. 1 Signal Calibration Natural blue and laboratory-induced infrared (IR) OSL signals. Detectable IR signal decays are diagnostic of feldspar contamination. Inset, the natural blue OSL signal (open triangle) of each aliquot is calibrated against known laboratory doses to yield equivalent dose (D_e) values. Repeats of low and high doses (open diamonds) illustrate the success of sensitivity correction.

Fig. 2 Dose Recovery The acquisition of D_e values is necessarily predicated upon thermal treatment of aliquots succeeding environmental and laboratory irradiation. The Dose Recovery test quantifies the combined effects of thermal transfer and sensitisation on the natural signal using a precise lab dose to simulate natural dose. Based on this an appropriate thermal treatment is selected to generate the final D_e value.

Fig. 3 Inter-aliquot D_e distribution Abanico plot of inter-aliquot statistical concordance in D_e values derived from **natural** irradiation. Discordant data (those points lying beyond ±2 standardised ln D_e) reflect heterogeneous dose absorption and/or inaccuracies in calibration.

Fig. 4 Signal Analysis Statistically significant increase in **natural** D_e value with signal stimulation period is indicative of a partially-bleached signal, provided a significant increase in D_e results from **simulated partial bleaching** followed by insignificant adjustment in D_e for simulated **zero** and **full bleach** conditions. Ages from such samples are considered maximum estimates. In the absence of a significant rise in D_e with stimulation time, simulated partial bleaching and zero/full bleach tests are not assessed.

Fig. 5 U Activity Statistical concordance (equilibrium) in the activities of the daughter radioisotope ^{226}Ra with its parent ^{238}U may signify the temporal stability of D_r emissions from these chains. Significant differences (disequilibrium; >50%) in activity indicate addition or removal of isotopes creating a time-dependent shift in D_r values and increased uncertainty in the accuracy of age estimates. A 20% disequilibrium marker is also shown.

Fig. 6 Age Range The Cumulative frequency plot indicates the inter-aliquot variability in age. It also shows the **mean age range**; an estimate of sediment burial period based on mean D_e and D_r values with associated analytical uncertainties. The **maximum influence** of temporal variations in D_r forced by minima-maxima variation in moisture content and overburden thickness is outlined and may prove instructive where there is uncertainty in these parameters. However the combined extremes represented should not be construed as preferred age estimates.

Sample: GL20069

Fig. 1 Signal Calibration

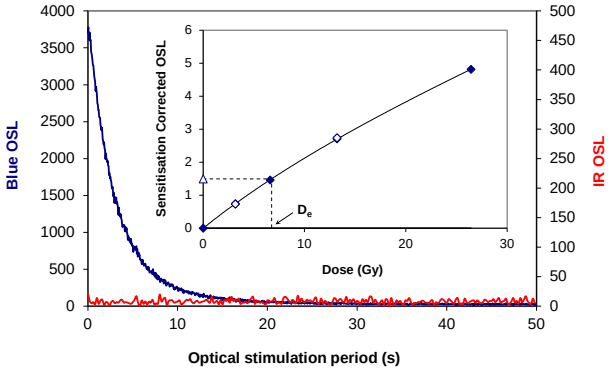

Fig. 2 Dose Recovery

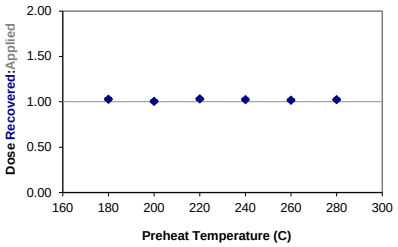

Fig. 4 Signal Analysis

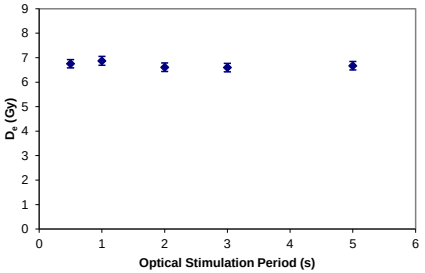

Fig. 3 Inter-aliquot D_e distribution

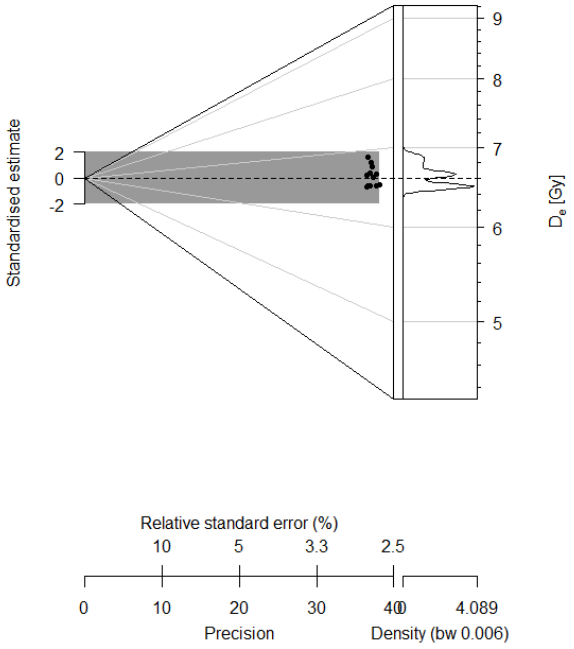

Fig. 5 U Decay Activity

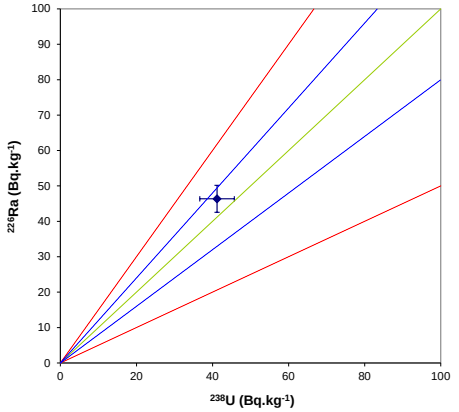

Fig. 6 Age Range

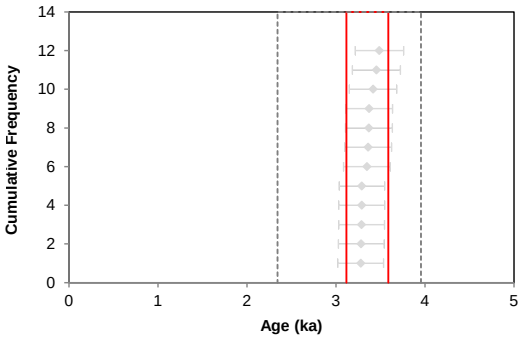

Fig. 1 Signal Calibration Natural blue and laboratory-induced infrared (IR) OSL signals. Detectable IR signal decays are diagnostic of feldspar contamination. Inset, the natural blue OSL signal (open triangle) of each aliquot is calibrated against known laboratory doses to yield equivalent dose (D_e) values. Repeats of low and high doses (open diamonds) illustrate the success of sensitivity correction.

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Fig. 4 Signal Analysis Statistically significant increase in **natural** D_e value with signal stimulation period is indicative of a partially-bleached signal, provided a significant increase in D_e results from **simulated partial bleaching** followed by insignificant adjustment in D_e for simulated **zero** and **full bleach** conditions. Ages from such samples are considered maximum estimates. In the absence of a significant rise in D_e with stimulation time, simulated partial bleaching and zero/full bleach tests are not assessed.

Fig. 5 U Activity Statistical concordance (equilibrium) in the activities of the daughter radioisotope ^{226}Ra with its parent ^{238}U may signify the temporal stability of D_r emissions from these chains. Significant differences (disequilibrium; >50%) in activity indicate addition or removal of isotopes creating a time-dependent shift in D_r values and increased uncertainty in the accuracy of age estimates. A 20% disequilibrium marker is also shown.

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Sample: GL20054

Fig. 1 Signal Calibration

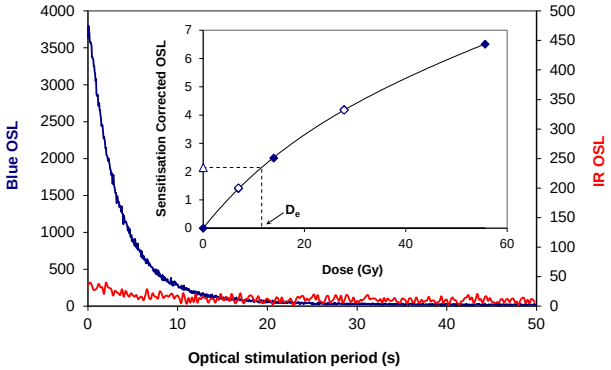

Fig. 2 Dose Recovery

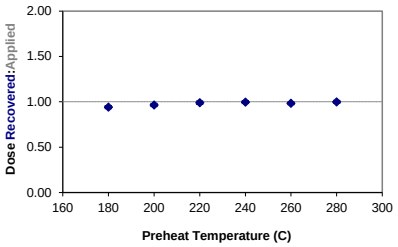

Fig. 4 Signal Analysis

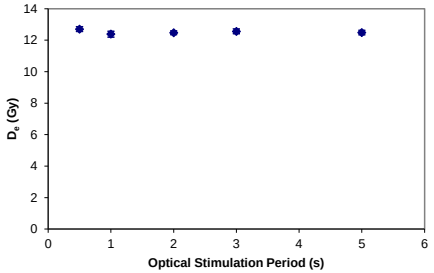

Fig. 3 Inter-aliquot D_e distribution

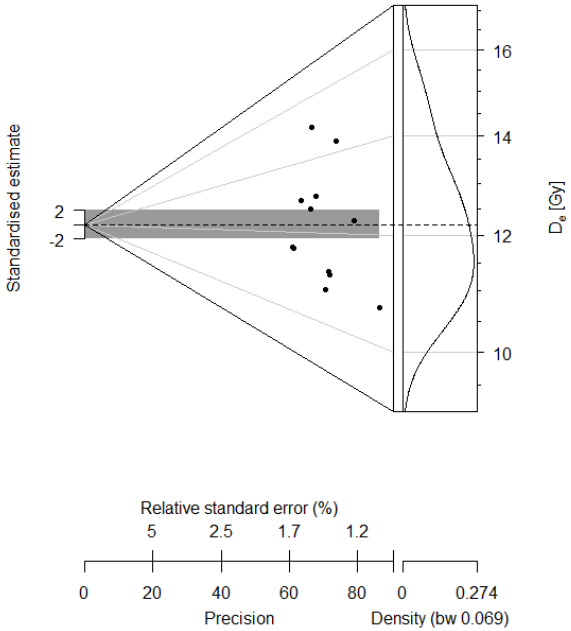

Fig. 5 U Decay Activity

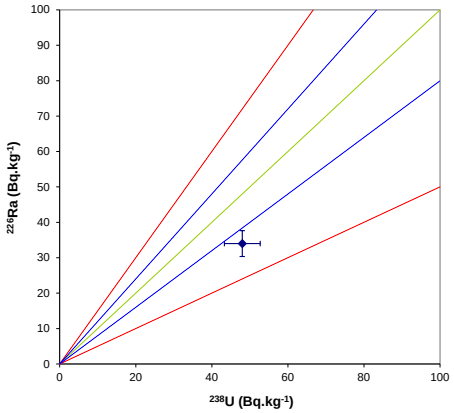

Fig. 6 Age Range

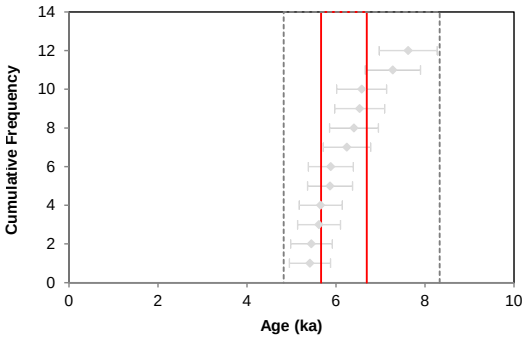

Fig. 1 Signal Calibration Natural blue and laboratory-induced infrared (IR) OSL signals. Detectable IR signal decays are diagnostic of feldspar contamination. Inset, the natural blue OSL signal (open triangle) of each aliquot is calibrated against known laboratory doses to yield equivalent dose (D_e) values. Repeats of low and high doses (open diamonds) illustrate the success of sensitivity correction.

Fig. 2 Dose Recovery The acquisition of D_e values is necessarily predicated upon thermal treatment of aliquots succeeding environmental and laboratory irradiation. The Dose Recovery test quantifies the combined effects of thermal transfer and sensitisation on the natural signal using a precise lab dose to simulate natural dose. Based on this an appropriate thermal treatment is selected to generate the final D_e value.

Fig. 3 Inter-aliquot D_e distribution Abanico plot of inter-aliquot statistical concordance in D_e values derived from **natural** irradiation. Discordant data (those points lying beyond **±2 standardised ln D_e**) reflect heterogeneous dose absorption and/or inaccuracies in calibration.

Fig. 4 Signal Analysis Statistically significant increase in **natural** D_e value with signal stimulation period is indicative of a partially-bleached signal, provided a significant increase in D_e results from **simulated partial bleaching** followed by insignificant adjustment in D_e for simulated **zero** and **full bleach** conditions. Ages from such samples are considered maximum estimates. In the absence of a significant rise in D_e with stimulation time, simulated partial bleaching and zero/full bleach tests are not assessed.

Fig. 5 U Activity Statistical concordance (equilibrium) in the activities of the daughter radioisotope ^{226}Ra with its parent ^{238}U may signify the temporal stability of D_r emissions from these chains. Significant differences (disequilibrium; >50%) in activity indicate addition or removal of isotopes creating a time-dependent shift in D_r values and increased uncertainty in the accuracy of age estimates. A 20% disequilibrium marker is also shown.

Fig. 6 Age Range The Cumulative frequency plot indicates the inter-aliquot variability in age. It also shows the **mean age range**; an estimate of sediment burial period based on mean D_e and D_r values with associated analytical uncertainties. The **maximum influence** of temporal variations in D_r forced by minima-maxima variation in moisture content and overburden thickness is outlined and may prove instructive where there is uncertainty in these parameters. However the combined extremes represented should not be construed as preferred age estimates.

Sample: GL20055

Fig. 1 Signal Calibration

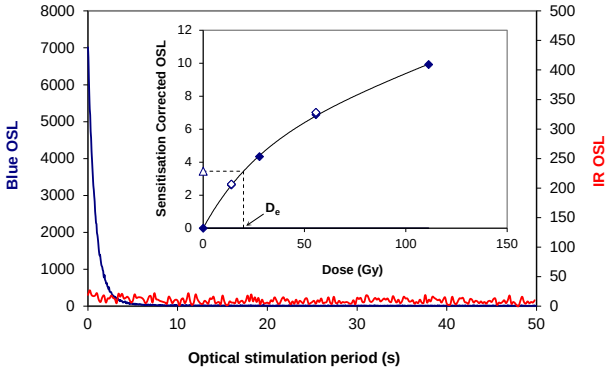

Fig. 2 Dose Recovery

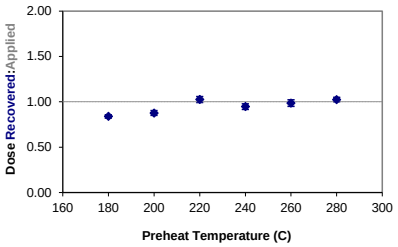

Fig. 4 Signal Analysis

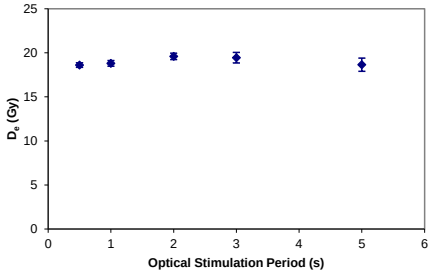

Fig. 3 Inter-aliquot D_e distribution

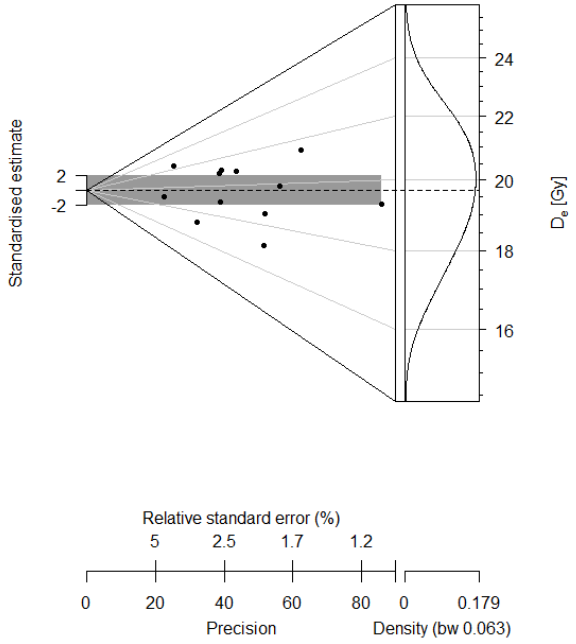

Fig. 5 U Decay Activity

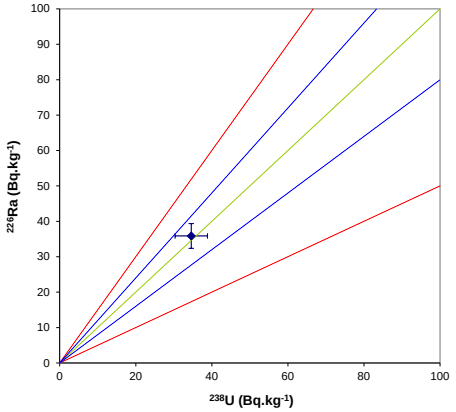

Fig. 6 Age Range

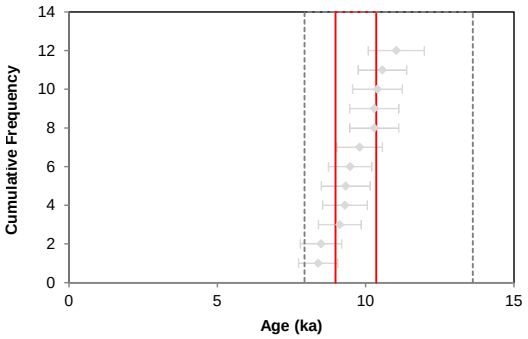

Fig. 1 Signal Calibration Natural blue and laboratory-induced infrared (IR) OSL signals. Detectable IR signal decays are diagnostic of feldspar contamination. Inset, the natural blue OSL signal (open triangle) of each aliquot is calibrated against known laboratory doses to yield equivalent dose (D_e) values. Repeats of low and high doses (open diamonds) illustrate the success of sensitivity correction.

Fig. 2 Dose Recovery The acquisition of D_e values is necessarily predicated upon thermal treatment of aliquots succeeding environmental and laboratory irradiation. The Dose Recovery test quantifies the combined effects of thermal transfer and sensitisation on the natural signal using a precise lab dose to simulate natural dose. Based on this an appropriate thermal treatment is selected to generate the final D_e value.

Fig. 3 Inter-aliquot D_e distribution Abanico plot of inter-aliquot statistical concordance in D_e values derived from **natural** irradiation. Discordant data (those points lying beyond **±2 standardised ln D_e**) reflect heterogeneous dose absorption and/or inaccuracies in calibration.

Fig. 4 Signal Analysis Statistically significant increase in **natural** D_e value with signal stimulation period is indicative of a partially-bleached signal, provided a significant increase in D_e results from **simulated partial bleaching** followed by insignificant adjustment in D_e for simulated **zero** and **full bleach** conditions. Ages from such samples are considered maximum estimates. In the absence of a significant rise in D_e with stimulation time, simulated partial bleaching and zero/full bleach tests are not assessed.

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Fig. 6 Age Range The Cumulative frequency plot indicates the inter-aliquot variability in age. It also shows the **mean age range**; an estimate of sediment burial period based on mean D_e and D_r values with associated analytical uncertainties. The **maximum influence** of temporal variations in D_r forced by minima-maxima variation in moisture content and overburden thickness is outlined and may prove instructive where there is uncertainty in these parameters. However the combined extremes represented should not be construed as preferred age estimates.

Sample: GL20056

Fig. 1 Signal Calibration

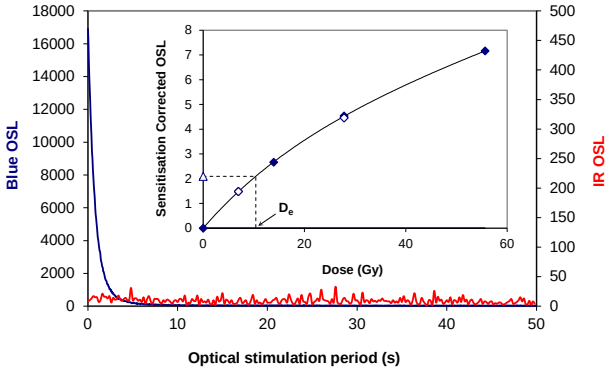

Fig. 2 Dose Recovery

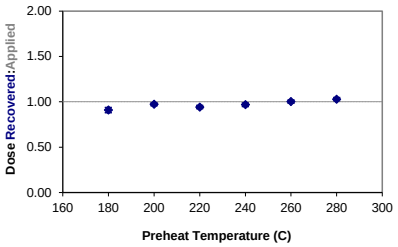

Fig. 4 Signal Analysis

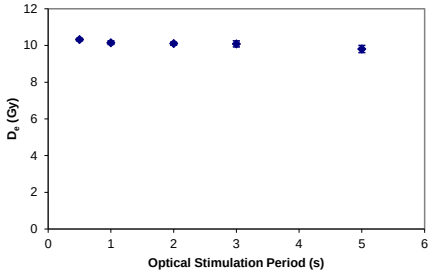

Fig. 3 Inter-aliquot D_e distribution

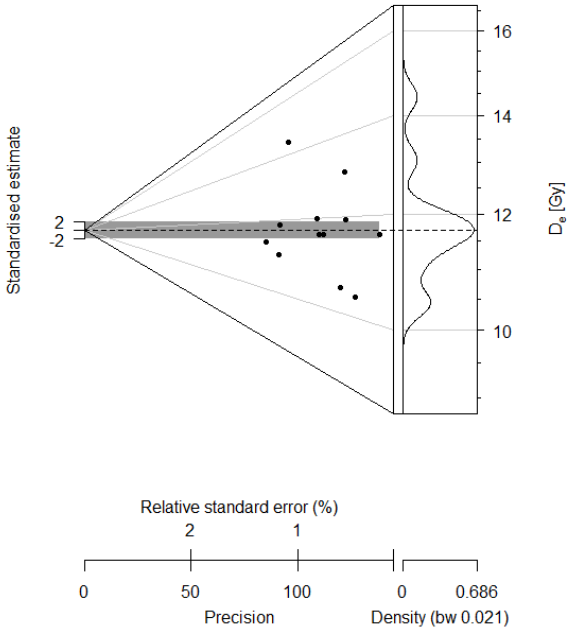

Fig. 5 U Decay Activity

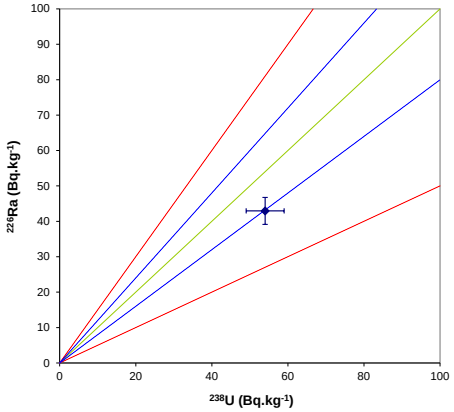

Fig. 6 Age Range

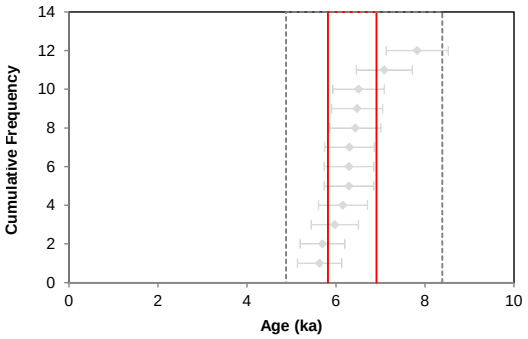

Fig. 1 Signal Calibration Natural blue and laboratory-induced infrared (IR) OSL signals. Detectable IR signal decays are diagnostic of feldspar contamination. Inset, the natural blue OSL signal (open triangle) of each aliquot is calibrated against known laboratory doses to yield equivalent dose (D_e) values. Repeats of low and high doses (open diamonds) illustrate the success of sensitivity correction.

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Fig. 4 Signal Analysis Statistically significant increase in **natural** D_e value with signal stimulation period is indicative of a partially-bleached signal, provided a significant increase in D_e results from **simulated partial bleaching** followed by insignificant adjustment in D_e for simulated **zero** and **full bleach** conditions. Ages from such samples are considered maximum estimates. In the absence of a significant rise in D_e with stimulation time, simulated partial bleaching and zero/full bleach tests are not assessed.

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Fig. 6 Age Range The Cumulative frequency plot indicates the inter-aliquot variability in age. It also shows the **mean age range**; an estimate of sediment burial period based on mean D_e and D_r values with associated analytical uncertainties. The **maximum influence** of temporal variations in D_r forced by minima-maxima variation in moisture content and overburden thickness is outlined and may prove instructive where there is uncertainty in these parameters. However the combined extremes represented should not be construed as preferred age estimates.

Sample: GL20057

Fig. 1 Signal Calibration

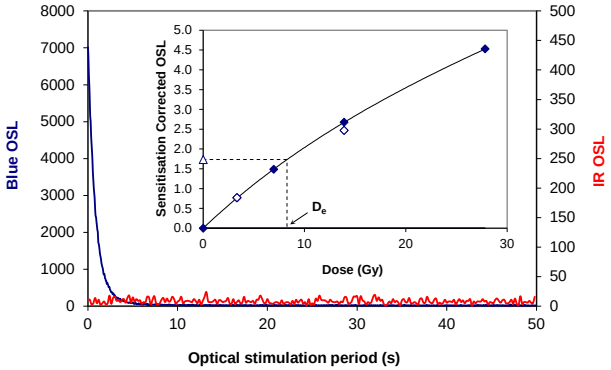

Fig. 2 Dose Recovery

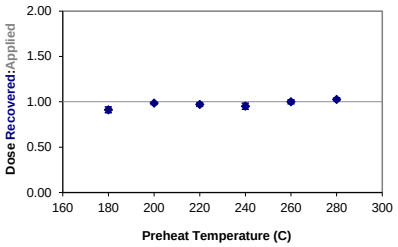

Fig. 4 Signal Analysis

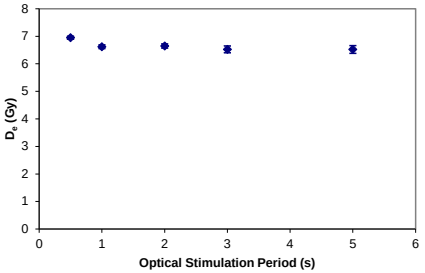

Fig. 3 Inter-aliquot D_e distribution

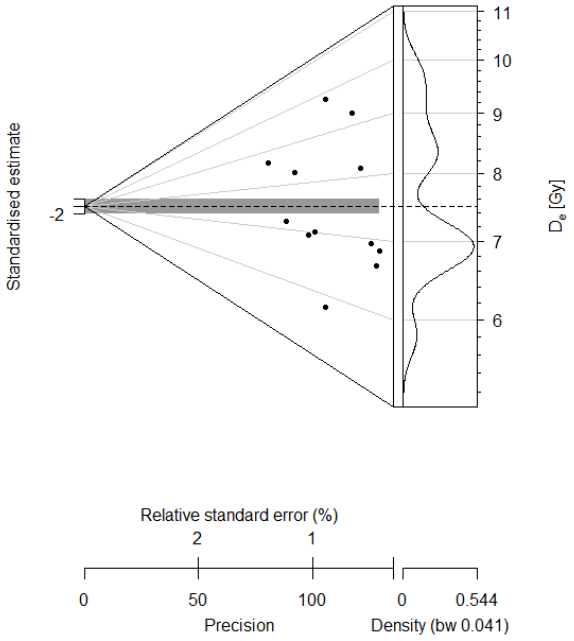

Fig. 5 U Decay Activity

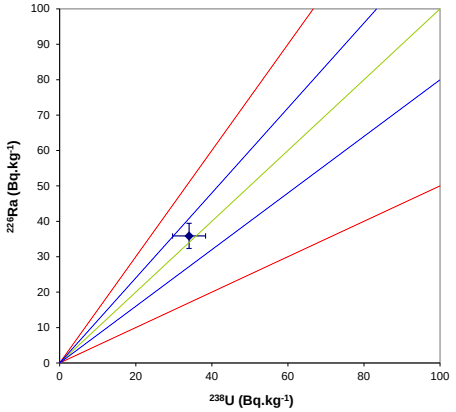

Fig. 6 Age Range

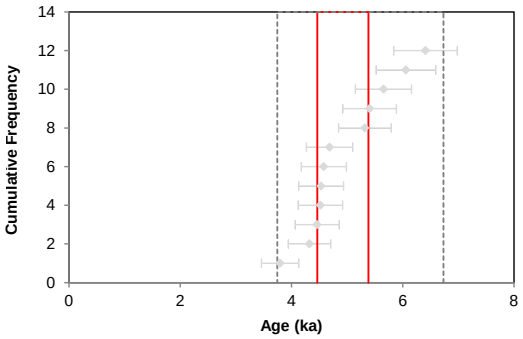

Fig. 1 Signal Calibration Natural blue and laboratory-induced infrared (IR) OSL signals. Detectable IR signal decays are diagnostic of feldspar contamination. Inset, the natural blue OSL signal (open triangle) of each aliquot is calibrated against known laboratory doses to yield equivalent dose (D_e) values. Repeats of low and high doses (open diamonds) illustrate the success of sensitivity correction.

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Fig. 4 Signal Analysis Statistically significant increase in **natural** D_e value with signal stimulation period is indicative of a partially-bleached signal, provided a significant increase in D_e results from **simulated partial bleaching** followed by insignificant adjustment in D_e for simulated **zero** and **full bleach** conditions. Ages from such samples are considered maximum estimates. In the absence of a significant rise in D_e with stimulation time, simulated partial bleaching and zero/full bleach tests are not assessed.

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Sample: GL20058

Fig. 1 Signal Calibration

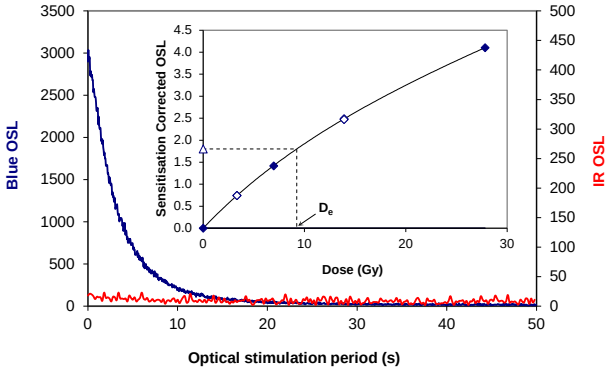


Fig. 2 Dose Recovery

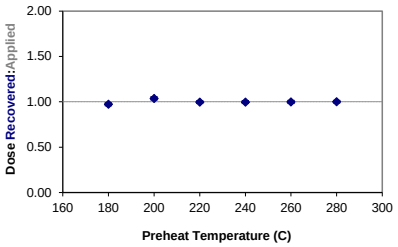


Fig. 4 Signal Analysis

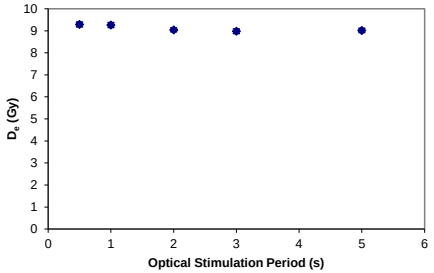


Fig. 3 Inter-aliquot D_e distribution

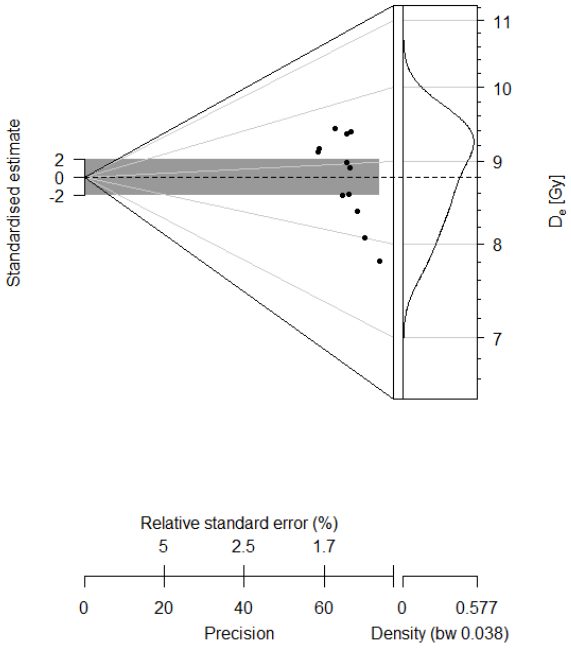


Fig. 5 U Decay Activity

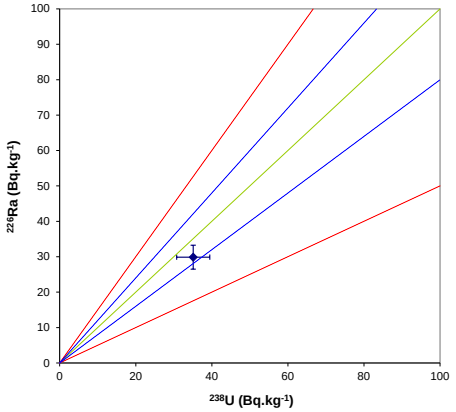
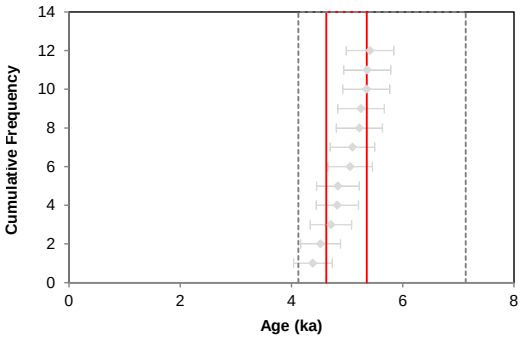


Fig. 6 Age Range



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Sample: GL20059

Fig. 1 Signal Calibration

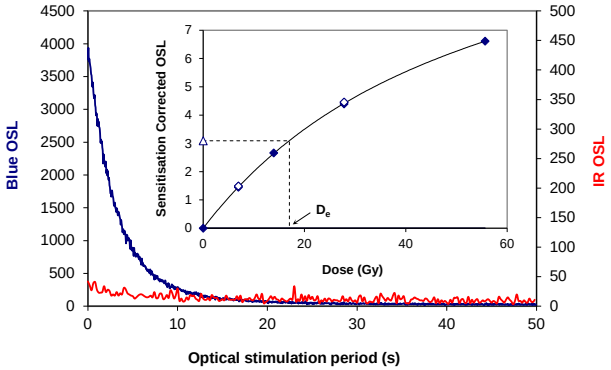


Fig. 2 Dose Recovery

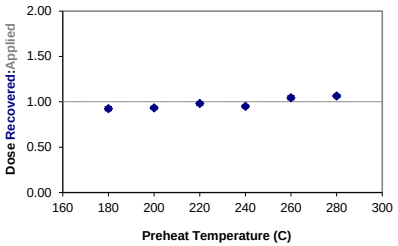


Fig. 4 Signal Analysis

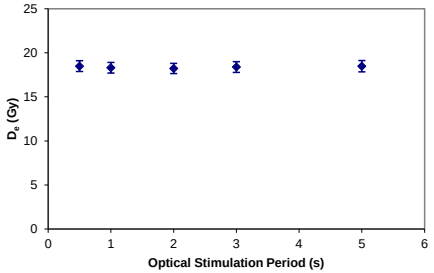


Fig. 3 Inter-aliquot D_e distribution

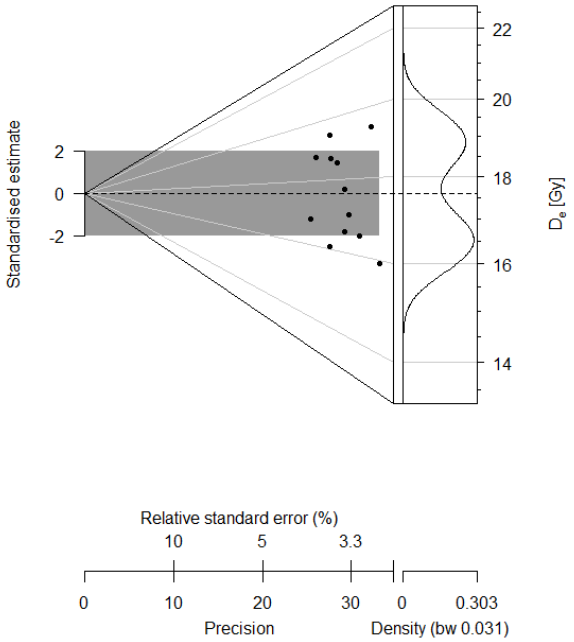


Fig. 5 U Decay Activity

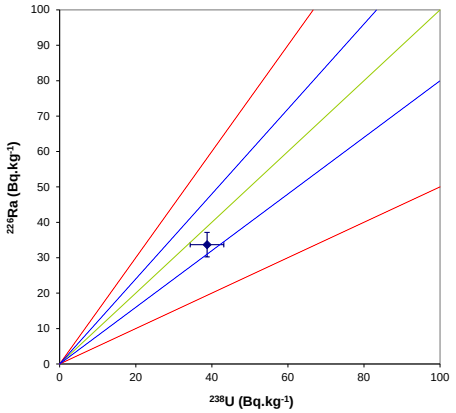
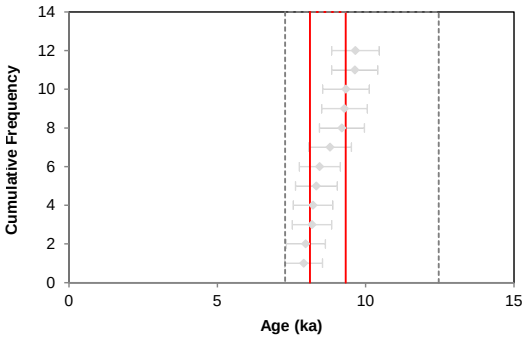


Fig. 6 Age Range



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Sample: GL20060

Fig. 1 Signal Calibration

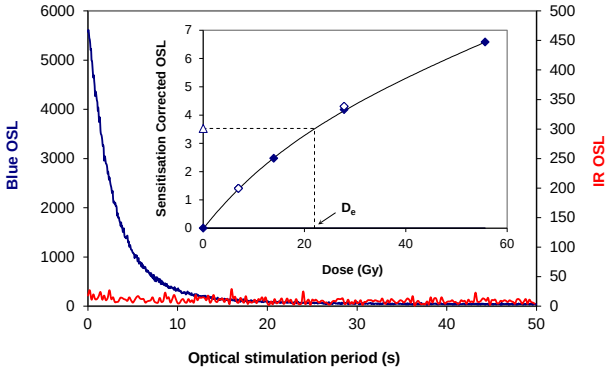

Fig. 2 Dose Recovery

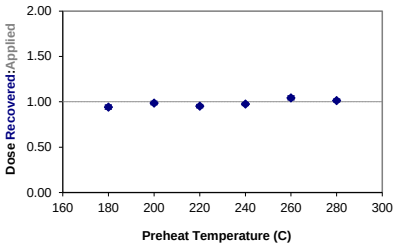

Fig. 4 Signal Analysis

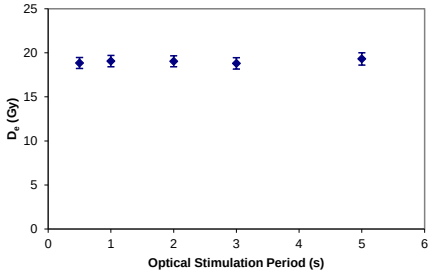

Fig. 3 Inter-aliquot D_e distribution

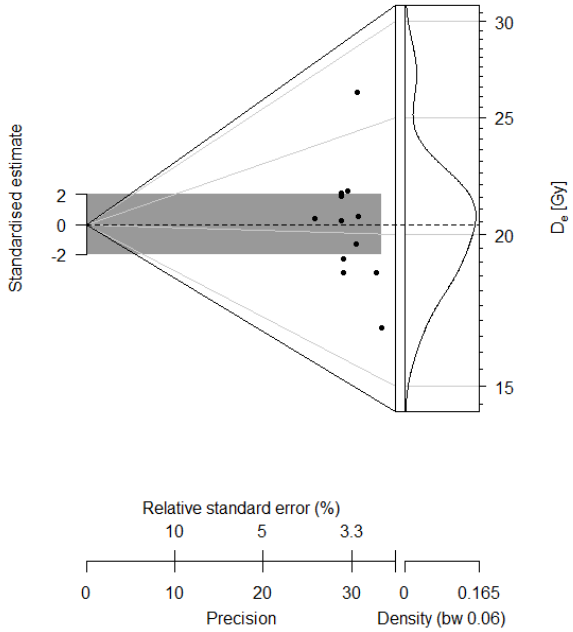

Fig. 5 U Decay Activity

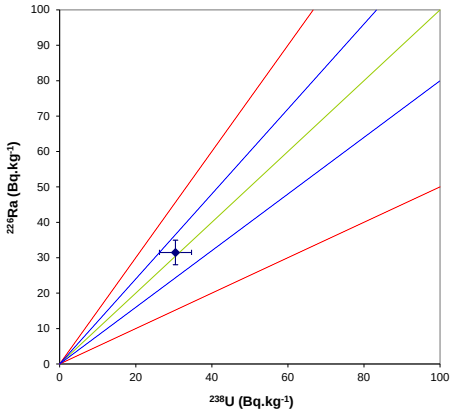

Fig. 6 Age Range

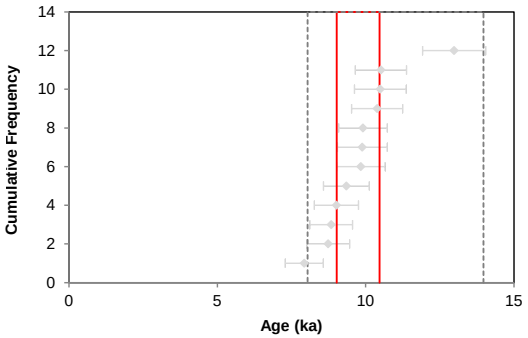

Fig. 1 Signal Calibration Natural blue and laboratory-induced infrared (IR) OSL signals. Detectable IR signal decays are diagnostic of feldspar contamination. Inset, the natural blue OSL signal (open triangle) of each aliquot is calibrated against known laboratory doses to yield equivalent dose (D_e) values. Repeats of low and high doses (open diamonds) illustrate the success of sensitivity correction.

Fig. 2 Dose Recovery The acquisition of D_e values is necessarily predicated upon thermal treatment of aliquots succeeding environmental and laboratory irradiation. The Dose Recovery test quantifies the combined effects of thermal transfer and sensitisation on the natural signal using a precise lab dose to simulate natural dose. Based on this an appropriate thermal treatment is selected to generate the final D_e value.

Fig. 3 Inter-aliquot D_e distribution Abanico plot of inter-aliquot statistical concordance in D_e values derived from **natural** irradiation. Discordant data (those points lying beyond **±2 standardised ln D_e**) reflect heterogeneous dose absorption and/or inaccuracies in calibration.

Fig. 4 Signal Analysis Statistically significant increase in **natural** D_e value with signal stimulation period is indicative of a partially-bleached signal, provided a significant increase in D_e results from **simulated partial bleaching** followed by insignificant adjustment in D_e for simulated **zero** and **full bleach** conditions. Ages from such samples are considered maximum estimates. In the absence of a significant rise in D_e with stimulation time, simulated partial bleaching and zero/full bleach tests are not assessed.

Fig. 5 U Activity Statistical concordance (equilibrium) in the activities of the daughter radioisotope ^{226}Ra with its parent ^{238}U may signify the temporal stability of D_r emissions from these chains. Significant differences (disequilibrium; >50%) in activity indicate addition or removal of isotopes creating a time-dependent shift in D_r values and increased uncertainty in the accuracy of age estimates. A 20% disequilibrium marker is also shown.

Fig. 6 Age Range The Cumulative frequency plot indicates the inter-aliquot variability in age. It also shows the **mean age range**; an estimate of sediment burial period based on mean D_e and D_r values with associated analytical uncertainties. The **maximum influence** of temporal variations in D_r forced by minima-maxima variation in moisture content and overburden thickness is outlined and may prove instructive where there is uncertainty in these parameters. However the combined extremes represented should not be construed as preferred age estimates.

Sample: GL20061

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F.7 Lithic analysis report

ARTEFACT ANALYSIS OF THE DUNGOWAN DAM LITHIC ASSEMBLAGE

Dr Trudy Doelman

Introduction

The analysis of the Dungowan Dam lithic assemblage follows a series of research questions which can broadly be divided into six main categories:

1. **Site occupation/chronology**. When was the area occupied? Was the assemblage the product of repeated occupations or a single event? Do the characteristics of the assemblage change with time seen in the sub-surface excavation? How intensive was the occupation? Is there potential for a Pleistocene occupation?

2. **Lithic Source Procurement**. Which raw material resources were used? What types of raw material sources were used (primary and secondary)? Does a preference for a raw material occur? Can we infer the distance from the sources based on artefact size and the frequency and amount of cortex?

3. **Stone reduction technology**. How were cores prepared and worked? Were systematic core reduction strategies employed? The analysis will be broken down into descriptions of the:

    a. Core attributes
    b. Flake attributes
    c. Tools

4. **Site Function**. What types of activities occurred on-site/s? Do discrete areas of stone working occur? Can site function be related to environmental factors i.e. distance to sources?

    - This analysis includes comparisons of the artefact density by location, the assemblage composition (number of cores, complete flakes, split flakes, broken flakes, tools and other artefact types e.g. grinding stone, axes, hammerstones) and frequencies of artefact types (represented by ratios of cores:complete flakes, complete flakes: broken flakes etc).

5. **Regional Comparisons**. How does this assemblage compare with others in the surrounding region?

6. **Spatial patterning** Data from the technological analysis allows a spatial analysis of the artefact attributes.

7. **Site Disturbance**. A further analysis was undertaken on the excavated assemblage to assess the nature and integrity of the sub-surface deposit.

- What post-depositional influences have impacted on the assemblage (e.g. size-sorting, historical disturbance)?

Analysis Methodology

The selection of the artefact attributes addresses the above research questions. The analysis will follow those relevant to a technological and/or spatial analysis (Table 1).

The attributes recorded for each artefact are dependent on the technological class (i.e. if a complete flake, core or tool etc). Artefacts such as cores and tool generally represent a small fraction of an assemblage but can offer the greatest amount of information. These additional attributes provide further information to examine the types of technological strategies used to prepare and reduce cores, the intensity of core reduction (curation) and can contribute to an understanding of the product/s manufactured, patterns of mobility and the transportation of artefacts (Table 1). For the analysis of raw material types an additional attribute was added to distinguish between clear, translucent and opaque varieties of quartz.

Artefacts were cleaned, sorted, individually analysed and entered into the software program E4 loaded with a configuration file written for this specific purpose. This program prompts the user to record all relevant attributes through a series of menus based on the artefact type (e.g. core, complete flake, complete tool etc) which is then stored in a Microsoft Access database. In this way a comprehensive typological, technological and metrical analysis of the excavated assemblage was undertaken. The location of the excavated artefacts was also recorded by site, spit/depth and excavation square. Analysis was aided by the use of a 10x hand lens and a standard digital vernier calliper. Measurements were made in millimetres to one decimal place (Appendix A). Individual weights of each artefact was also recorded to two decimal places. A definition of the terms used for the artefact types and their attributes can be found in Appendix B of this report.

Attributes	
Technological class	Artefact type (e.g. core, complete flake, longitudinal split, flake fragmentation, retouch, angular fragments/lithic fragments, other (axe, grindstone etc)
Material	Raw Material type (silcrete tuff, chert, quartz, quartzite etc)
Translucency	Clear, translucent, opaque
Colour	Raw material colour
Cortex	Percentage of cortex (if on a flake – amount on the dorsal surface of a flake)
Cortex Type	Type of cortex (rough/terrestrial, water-rolled/tabular)
Platform Type	unifacial, crushing/missing, Flaked (>2 flake scars), Facetted (3 or more small, systematic flake removals), Cortical (with cortex), n/a
Termination Type	Feather, hinge, step, plunge, step, cortical, platform, abrupt
Tool Type	Select the type of tool – usewear, concave scraper, convex scraper, straight scraper, elouera (backed artefact), notched scraper, endscraper, saw, stepped scraper, drill, backed (generic), bondi point, thumbnail scraper, denticulate, burin, geometric microlith, nosed scraper
Maximum Dimension	All artefacts (in size groupings)
Length Complete Flake	Axial length of the complete flake/complete tool (in mm to 1 dp)
Weight	Weight of the artefact in grams to 1dp
Complete and Broken Flakes	
Form	Form of the flake – Indeterminate, Expanding, Block (angular Fragment), Blade, N/A, Platform Rejuvenation Flake (tablet), Bipolar, Errailure, Ridge straightening flake, elongated flake. These attributes reflect core reduction strategies.
Complete Flakes	Showing intensity of retouch or systematic core preparation
Flake Scars	The number of flake scars on the dorsal surface of the flake
Overhang removal	Exterior platform preparation indicates systematic core reduction (complete flakes and proximal flakes)
Scar Direction	The direction of the dorsal flake scars – 1 (initiated from the platform only), 90 (initiated at right angles to the platform), 180 (initiated at the distal end of the flake), radial (initiated from 90 and 270 degrees from the platform)
Complete Tools	(examines measures of curation)
Retouch Edge	The number of retouched quadrants (on complete tools only)
Retouch Type 1, 2, 3, 4	Select the retouch type for quadrants 1, 2, 3 and 4

Cores	Identifying technological strategies and intensity of reduction
Core Type	Uni-, bi-, and multi-platform, prismatic, burin-blade core, test, bipolar, bifacial
Core Body	Core body form – block, flake, nodule, non-diagnostic
Core Section	Core cross section – square, rectangular, lenticular, conical, non-diagnostic
Scar Form	Primary scar form? – elongated, expanding, blade, mixed
Core Platform No.	Number of platforms on the core
Step Termination	Number of step terminations on the core
Hinge Termination	Number of hinge terminations on the core
Core scar Length	Length of the longest core scar
Core scar Width	Width of the longest core scar at maximum
Number of Core Scars	Number of core scars
Metrical Attributes	(in mm to 1 dp)
Maximum length	All artefacts
Length Complete Flake	Axial length of the complete flake/complete tool
Width	Maximum width of the complete flake/tool/core
Thickness	Maximum thickness of the complete flake/tool/core at mid-point
Core Length	Maximum length from the working platform
Platform width	Platform width – proximal and complete flakes and tools
Platform Thickness	Platform thickness – proximal and complete flakes and tools (and complete splits)
Weight	Weight of the artefact in grams to 1dp

Table 1 Artefact Attributes recorded for the Dungowan Dam assemblage

Assemblage Distribution

A series of 105 test pits were excavated along the Dungowan Creek (Table 2). A total of 1662 artefacts were recovered from these locations. Most of the artefacts (n=272, 16.4%) were from the TP12 square. Additional test pits were undertaken to the north, south, east and west of TP12, and a further 68 artefacts were recovered with an artefact density of 68 per m^2. In total 28 test pits had ten or more artefacts and 23 test pits had more than twenty artefacts. The artefact density of these open excavations was 15.8 artefacts per m^2.

SQ	*Count*	*%*	*SQ*	*Count*	*%*	*SQ*	*Count*	*%*	*SQ*	*Count*	*%*	*SQ*	*Count*	*%*
12	272	16.4	**101**	28	1.7	**112**	13	0.8	**114**	5	0.3	**133**	1	0.1
12a	22	1.3	**129**	28	1.7	**125**	12	0.7	**145**	5	0.3	**136**	1	0.1
12b	15	0.9	**64**	28	1.7	**50**	12	0.7	**151**	5	0.3	**34**	1	0.1
12c	16	1.0	**155**	26	1.6	**124**	11	0.7	**157**	5	0.3	**59**	1	0.1
12d	15	0.9	**35**	26	1.6	**128**	11	0.7	**159**	5	0.3	**94**	1	0.1
total	340	20.5	**57**	23	1.4	**118**	10	0.6	**32**	5	0.3	**Total**		1662
138	160	9.6	**152**	22	1.3	**126**	10	0.6	**104**	4	0.2			
105	73	4.4	**56**	20	1.2	**148**	10	0.6	**158**	4	0.2			
90	68	4.1	**117**	19	1.1	**55**	10	0.6	**115**	3	0.2			
153	46	2.8	**13**	18	1.1	**134**	8	0.5	**22**	3	0.2			
143	42	2.5	**106**	17	1.0	**142**	7	0.4	**29**	3	0.2			
41	41	2.5	**150**	16	1.0	**51**	7	0.4	**69**	3	0.2			
120	39	2.3	**156**	16	1.0	**108**	6	0.4	**8**	3	0.2			
63	39	2.3	**47**	16	1.0	**119**	6	0.4	**122**	2	0.1			
110	36	2.2	**97**	16	1.0	**121**	6	0.4	**144**	2	0.1			
77	33	2.0	**154**	15	0.9	**147**	6	0.4	**38**	2	0.1			
14	31	1.9	**28**	15	0.9	**18**	6	0.4	**7**	2	0.1			
127	30	1.8	**149**	14	0.8	**100**	5	0.3	**102**	1	0.1			
80	30	1.8	**19**	14	0.8	**109**	5	0.3	**111**	1	0.1			
130	29	1.7	**93**	13	0.8	**113**	5	0.3	**132**	1	0.1			

Table 2 Counts of Artefacts in the excavated tests pits at Dungowan Dam

Assemblage Disturbance

Most of the excavated artefacts were stone but charcoal (n=1) and European artefacts (glass, ceramic, bone and metal fragments, total=94) were also found. European artefacts were found in 16 test pits and most were recovered from Spit 1 (n=40) and Spit 2 (n=52) (Table 3). One European artefact was found in both Spit 4 of TP105 and in Spit 5 of TP41 indicating a deeper disturbance in some locales. Charcoal was recovered from Spit 2 in TP67. One possible glass artefact was also found in TP113, Spit 1.

Location	*Ceramic*	*Glass*	*Bone*	*Metal*	*Other*
TP117 Spit 1	2	5	2		
TP117 Spit 2		10	6		
TP105 Spit 1	1	10			
TP105 Spit 2	2	2			
TP105 Spit 4		1			
TP112 Spit 1	4	3	3		
TP112 Spit 2	2	1			
TP113 Spit 1		1			
TP113 Spit 2		2			
TP41 Spit 5		1			
TP41 Spit 1		1			
TP155 Spit 1		1			
TP130 Spit 1					1
TP118 Spit 1			1		
TP18 Spit 2				1	
TP136 Spit 1			1		
TP50 Spit 1		1			
TP14 Spit 2		1			
TP13 Spit 2		25			
TP104 Spit 1		1			
TP55 Spit 1		1			
TP109 Spit 1		1			
Total		94			

Table 3 Location of the European artefacts in the Dungowan Dam assemblage

The highest concentration of artefacts occurs in Spits 2 (n=316) and 5 (n=364). Table 4 shows the number of artefacts from each spit and the mean maximum lengths of the complete flakes. No significant difference in the maximum length of the complete flakes occurs between Spits 2 and 5 (t=0.05867, df=197, p=0.9533), Spits 5 and 6 (t=1.36, df=179, p=0.1734) or between Spits 3 and 4 (t=1.151, df=110, p<0.2524). However, there is a significant difference between Spits 2 and 3 (t=10.698, df=140, p<0.0001) with larger complete flakes found in Spit 3. These results may indicate a limited size-sorting of smaller artefacts into Spits 4 and 5 from Spit 3. It is worth noting that conjoins, from a sandy context, were found up to 40cm apart vertically (Richardson 1992). Figure 1 shows the total weight of artefacts by spit and the counts of artefacts. Spit 4 shows a decrease in artefact number and weight which may again indicate some degree of size sorting. However, these differences could also indicate two occupation horizons (see below).

Spit	*Count*	*%*	*Count of Complete Flakes*	*Mean Maximum Length (mm)*	*Std. Dev.*
surface	18	1.1	2	30.3	16.6
1	263	15.8	64	22.2	10.2
1/2	18	1.1			
2	316	19.0	94	24.8	11.3
3	198	11.9	48	27.9	12.0
4	203	12.2	64	24.8	15.5
5	364	21.9	105	24.7	12.6
6	244	14.7	76	21.3	11.9
7	28	1.7	12	20.1	8.9
8	6	0.4	1	33.5	
9	1	0.1	1	33.4	
10	1	0.1	1	19.1	
Unknown	2	0.1	1	40.2	
Total	1662				

Table 4 Artefact counts by spit and maximum length of complete flakes for the Dungowan Dam assemblage

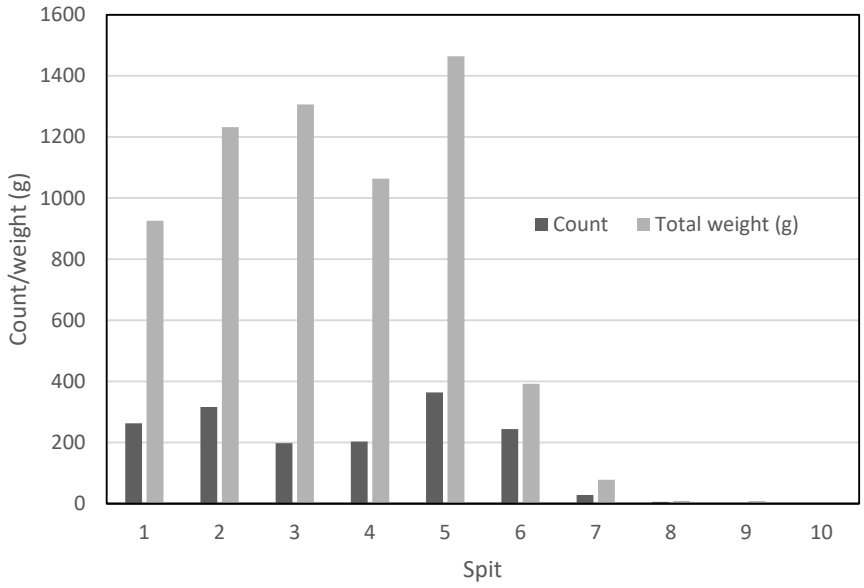

Figure 1 Artefact counts and weight for the Dungowan Dam assemblage

Site Chronology/Occupation

The possibility and timing of the two occupation horizons needs to be assessed prior to the technological analysis. A useful guide for assessing site age is the presence or absence of backed artefacts. These artefacts are typically only found in mid to late Holocene sites (<5000 years bp) throughout most of eastern Australia (Attenbrow 2002: 115-159*,* Hiscock 2008). The presence of backed artefacts is compared with depth to establish the timing of occupation in the project area (Table 5). The results were used to identify whether the assemblage should be analysed as a whole or as a series of discrete occupations discarded over time. Table 5 shows that backed artefacts occur in all spits from 1-7 but concentrate in Spits 1-3 indicating a mid to late Holocene occupation.

Table 6 shows the total weights, mean weight and mean maximum length of all artefacts. The results indicate that most artefactual material by weight occurs in Spits 2 and 5 (Figure 1, Table 6). As already noted, it is possible that artefacts in Spit 5 reflect an older occupation than those artefacts found in Spit 2. To assess these differences the raw materials in Spits 2 and 5 were compared (Table 7). The results show that more jasper artefacts occur in Spit 5 (73.4%) than in Spit 2 (49.7%). In contrast, more milky quartz and chalcedony artefacts occur in Spit 2, while serpentine artefacts concentrate in Spits 1 and 2. An increased use of milky quartz artefacts is generally associated with a late-Holocene occupation (Attenbrow 2002: 115-159). These differences indicate two occupations falling within the mid-late Holocene. It is now important to establish the types and availability of stone sources in the project area.

Spit	*Count*	*%*
Surface	1	2
1	11	22
2	10	20
3	8	16
4	6	12
5	8	16
6	5	10
7	1	2
Total	50	

Table 5 Counts of backed artefacts by spit for the Dungowan Dam assemblage

Spit	*Total Weight (g)*	*%*	*Mean Weight (g)*	*Std Dev.*	*Mean Maximum Length (mm)*	*Std Dev.*
1	925.53	14.3	3.5	8.0	22.4	10.9
2	1232.2	19.0	3.9	11.8	22.8	12.3
3	1306.3	20.2	6.6	34.1	25.0	14.1
4	1063.5	16.4	5.2	14.1	23.9	15.2
5	1464.2	22.6	4.0	18.9	21.6	12.8
6	392.1	6.1	1.6	4.1	19.0	9.7
7	78.0	1.2	2.8	5.8	20.6	12.5
8	8.7	0.1	1.4	2.2	20.5	7.1
9	8.4	0.1	8.4		33.4	
10	1.4	0.0	1.4		19.1	

Table 6 Mean weight, length and total weight of artefacts in the Dungowan Dam assemblage

Material	*Count*	*%*	*Count*	*%*	*Count*	*%*
	Spit 2		Spit 5		Total	
Chalcedony	66	20.9	46	12.6	304	18.3
Crystal quartz	2	0.6			9	0.5
Jasper	157	49.7	267	73.4	1011	60.8
Milky quartz	50	15.8	9	2.5	141	8.5
Plagioclase	6	1.9	30	8.2	82	4.9
Quartzite	10	3.2	2	0.5	22	1.3
Serpentine	17	5.4	6	1.6	50	3.0
Tuff	6	1.9	4	1.1	32	1.9
Volcanic	2	0.6			5	0.3
Silcrete					5	0.3
Glass					1	0.1

Table 7: The counts of artefacts by the raw material types in the excavated assemblages

Stone Procurement

A wide variety of raw materials can be seen in the assemblage. Individual material types were also characterised by colour to potentially distinguish sources and/or individual cobbles. Firstly, a clear geoarchaeological context to establish the availability of raw material types is needed.

On the Tamworth 1:250 000 Geological Sheet (SH/56-13) the wide distribution of the Wooloomin Bed/Group which surrounds the project area is seen (Figure 2). This group incorporates forms of cryptocrystalline quartz (namely jasper) and tuff, material types commonly used to make artefacts in Australia. To the southwest and northwest of the project area is part of the Tamworth Serpentinite Belt. Three exposures of the belt occur nearby at Mt Pleasant, Hanging Rock and near to Chaffey Dam.

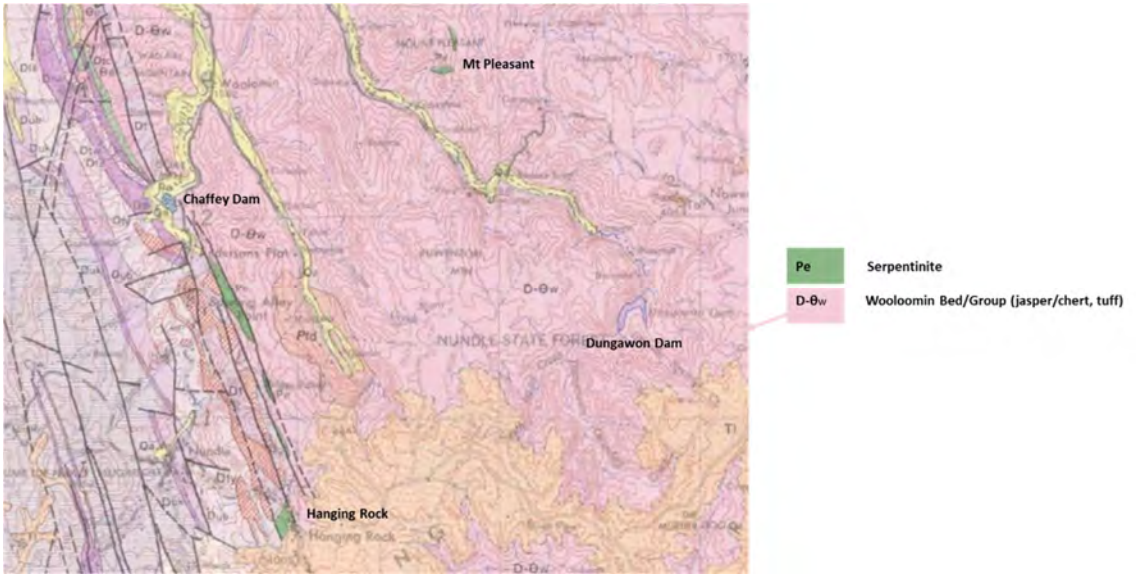

Figure 2. Insert of Tamworth 1:250 000 Geological Sheet SH/56-13

Quartz

Quartz is a mineral composed of silicon dioxide (SiO_2) and is the second most abundant mineral in the Earth's crust (after feldspar); it is common in igneous, metamorphic, and sedimentary rocks (Lapidius 1990:429). Due to its abundance, hardness and often excellent flaking properties, quartz varieties are frequently found in archaeological sites throughout the world (Seong 2004:76-77).

Quartz can occur in small to very large crystal form (*crystalline)* or as a fine-grained material with crystals invisible to the unaided eye (*microcrystalline/cryptocrystalline quartz).* Crystalline quartz is extremely smooth and reflects enough light to have a vitreous lustre. The surface of microcrystalline quartz scatters more light and has a dull or sub-vitreous lustre. Microcrystalline quartz can be divided into a number of varieties distinguished by colour, banding or degree of translucency. Flint, chert, and jasper are names commonly used for opaque specimens of microcrystalline quartz (Andrefsky 1998: 41; Odell 2004: 19). Other varieties are translucent e.g. agate, prase and carnelian. Chalcedony is a term used collectively to distinguish translucent, monochromatic varieties of microcrystalline quartz. Below is a useful way to classify crystalline and cryptocrystalline quartz varieties at the project area:

A) If it has a vitreous lustre on conchoidal surfaces, it is coarsely crystalline quartz (crystalline quartz)
B) If it has a dull lustre on conchoidal surfaces, it is a variety of microcrystalline/cryptocrystalline quartz.
C) If it is opaque, it is jasper, a microcrystalline/cryptocrystalline quartz.
D) If it is translucent and banded, it is agate, a variety of chalcedony.
E) If it is translucent, and not banded, the name chalcedony is used.

Jasper

The name "jasper" is used to describe an opaque, microcrystalline quartz. It typically has a red colour but can range from black, blue/grey or orange/yellow.

Prominent, continuous parallel ridges of jasper occur in the Woolomin Beds (Ryan and Holmes 1986). The Woolomin Beds can be sub-divided into areas based on prevalence of jasper. The region between the Peel River and Dungowan Creek has a high occurrence of prominent jasper ridges, (several over 500 m in length, 10 m wide and rise vertically several metres), while east of Dungowan Creek the occurrence of jasper decreases (Ryan and Holmes 1986).

Chalcedony

Chalcedony is often used specifically to describe the white, grey, or blue translucent raw material. It has a porous structure which readily accepts impurities giving it a range of colours e.g. carnelian is a red/amber translucent variety of chalcedony.

These forms of crystalline and microcrystalline/cryptocrystalline quartz are formed in veins when SiO_2 carried in solution is precipitated in cracks in the bedrock.

Serpentine

Serpentine minerals form where peridotite, dunite, and other ultramafic rocks undergo hydrothermal metamorphism in contact with seawater. They are metamorphosed at convergent plate boundaries where an oceanic plate is pushed down into the mantle. The most obvious physical properties of serpentine are its green colour, translucency, patterned appearance and slippery feel.

Serpentine is a light to emerald green, transparent to translucent microcrystalline mineral found in association with serpentinite (Figure 2). This raw material is found within the Tamworth Serpentinite Belt (Figure 2). The closest locations to the project area are at Mt Pleasant (14.6 km) and at Hanging Rock (18.4 km).

Duncan's Creek Trondhjemite - White Brecciated-Plagioclase

Trondhjemite is an igneous intrusion of grey coloured rock with plagioclase and quartz predominating (Ryan and Holmes 1986). Plagioclase occurs as medium to coarse grains up to 4 mm in length with small shiny, rectangular flakes of biotite, up to 5 mm in length, scattered throughout the rock. When fresh it appears similar to quartz in appearance. Slightly weathered specimens are white in colour.

The Assemblage at Dungowan Dam

It is important to understand the influence of raw material availability on core reduction. The technological analysis will firstly focus on a comparison of raw materials to identify the types of sources used and their characteristics. Over 60% of the artefacts in the excavated assemblage were made from jasper (Table 7, Figure 3). This raw material type dominates by number and weight (Table 8). Over 94% of the jasper artefacts were red, other colours such as brown, blue/grey, grey, orange and pink, rarely occur. Chalcedony was the second most common raw material accounting for 18.3% of the assemblage (n=304). A white brecciated-plagioclase (n=82) and milky quartz artefacts (n=141) were also identified. Serpentine artefacts account for 50 artefacts.

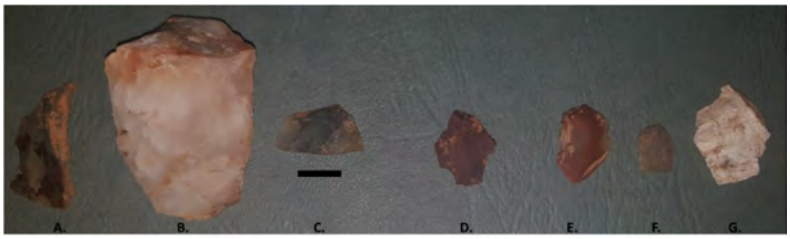

Figure 3 Examples of raw material types in the Dungowan Dam assemblage. A. Serpentine, B. white chalcedony, C. grey/clear chalcedony, D. red jasper, E. brown jasper, F. light grey chalcedony, G. brecciated-plagioclase (scale 1 cm)

Material	*Count*	*%*
Chalcedony	304	18.3
Crystal Quartz	9	0.5
Jasper	1011	60.8
Milky Quartz	141	8.5
Plagioclase	82	4.9
Quartzite	22	1.3
Serpentine	50	3.0
Tuff	32	1.9
Volcanic	5	0.3
Silcrete	5	0.3
Glass	1	0.1
Total	1662	

Table 8 Raw material types in the Dungowan Dam assemblage

The cortex (or weathered exterior of the parent rock) provides information about the type of stone sources used (i.e. a primary or secondary source). Artefacts with a rough (also called terrestrial) cortex were acquired from a primary source (or an *in situ* outcrop). A vein cortex was included in the analysis to account for mineral growth within a vein e.g. jasper, chalcedony and milky quartz. This type of cortex is also considered to be from a primary/terrestrial exposure. Artefacts with a smooth or water-rolled cortex originate from a secondary source (e.g. a cobble from a waterway, having a smoothed surface).

The amount of cortex on an artefact often indicates the distance artefacts were transported from the source (Hiscock and Mitchell 1993:12-17). A high percentage of cortex on an artefact indicates that the source of stone was nearby while artefacts with less cortex or no cortex were typically transported further from the source. Equally, as cores are transported away from the source they are reduced further and the resulting flakes are also smaller.

To understand the use of stone sources in the assemblage the raw material types and their characteristics were compared. A variety of raw material sources were used and 87% of these artefacts have no cortex (Table 9). A comparison of the amount of cortex on artefacts shows that serpentine artefacts have less cortex than jasper or chalcedony artefacts (Table 9). Sources were also compared by cortex type to identify whether differences occur in the place of procurement. Artefacts made from tuff, milky quartz, crystal quartz and volcanic all have a water-rolled or terrestrial cortex. However, higher numbers of jasper and milky quartz artefacts were acquired from a terrestrial source when compared to the chalcedony artefacts (Table 9). The mean axial lengths of the complete flakes for all the raw material types is relatively small with only 92 larger than 30 mm (Table 10). The maximum length of the complete flakes by raw material types does suggest that jasper sources were more immediate than other sources due to the larger size range of the high standard deviation.

Larger jasper artefacts have evidence of multiple types of cortex (rough, vein and water-rolled cortex) on their exterior and angular surfaces with ring cracks. This observation indicates that two additional factors need to be considered. First, the secondary source of jasper is nearby and from a waterway and second, the primary source of jasper is also located nearby but upstream of the project area. An example is seen in Figure 4 which shows the dorsal surface of a large complete tool of jasper (117.3mm) from TP12. This artefact has a water-rolled cortex with battered angular edges yet still retains some terrestrial cortex (Figure 4, B). This observation is based on the underlying premise that a longer the time and the greater distance a cobble travels in a waterway the smaller and more rounded it becomes (Doelman *et al.* 2008).

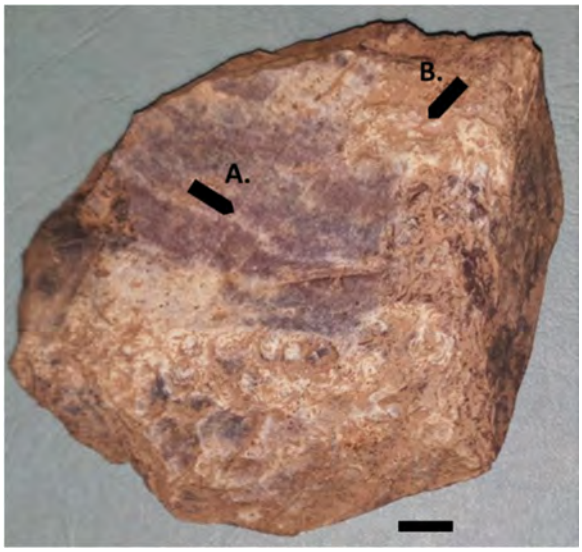

Figure 4 Large complete tool from TP12 showing different cortex types in the Dungowan Dam assemblage. A. Secondary, water-rolled cortex; B. Primary, outcropping cortex (scale 1 cm)

	0%	100%	1-25%	26-50%	51-99%		No Cortex %	Waterborne	Terrestrial
Chalcedony	257	2	30	8	7	304	84.5	32	15
Crystal quartz	9					9	100.0		
Fine silcrete	4					4	100.0		
Medium	1					1	100.0		
Jasper	880	7	80	22	21	1010	87.1	29	101
Milky quartz	122		15	4		141	86.5	2	17
Plagioclase	81		1			82	98.8		1
Quartzite	21		1			22	95.5	1	
Serpentine	40		9	1		50	80.0	3	7
Volcanic	5					5	100.0		
Tuff	27		3	2		32	84.4	2	3

Table 9 Percentage and types of cortex on the artefacts in the Dungowan Dam assemblage

Material	*Count*	*Mean Length (mm)*	*Std. Dev.*	*Maximum Length (mm)*
Chalcedony	90	18.8	10.4	59.0
Fine Silcrete	3	12.3	4.9	17.5
Jasper	292	20.1	12.1	74.3
Milky Quartz	12	15.2	8.1	36.2
Medium Silcrete	1	10.3		10.3
Plagioclase	24	12.2	6.7	34.0
Quartzite	12	19.2	5.4	28.9
Serpentine	25	22.3	9.7	45.5
Tuff	11	18.3	7.9	30.0
Volcanic	1	28.9		28.9

Table 10 Counts and axial length of complete flakes by raw material type for the Dungowan Dam assemblage

To identify whether individual sources or cobbles were exploited the colour of the artefacts by raw material type was compared. As noted, a distinctive red jasper was identified which accounts for 80.2% of this material type. It is likely that that the material type is found nearby as cobbles in waterways and also in outcropping exposures. In TP12 this material type concentrates and appears to be the reduction of a single, large cobble concentrating in Spit 5 (n=108, 39.7%) and Spit 6 (n=153, 56.3%). Other jasper colours include a blue/grey, light and dark grey, brown orange and pink and these also represent individual cobbles obtained from waterways. A brown jasper was found in 35 test pits with small concentrations in TP128 (n=6), TP153 (n=5) and TP155 (n=4) and probably also represents the reduction of a single cobble. In addition, TP117 has seven artefacts of orange/white quartzite in Spits 1-5 from a water-rolled cobble while white plagioclase artefacts concentrates in Spits 5 and 4 of two test pits; TP 41 (n=32) and TP14 (n=26) and represents the reduction of a core obtained from a primary source. Green serpentine and tuff were also distinctive raw material types. Serpentine was obtained from primary and secondary sources in the Tamworth Serpentinite Belt located approximately 14-18 km away. Tuff is found in the same geological context as the jasper but given the low numbers the source is not immediate or preferred. As previously noted changes in the frequency of raw material types also occurs with depth.

Stone Reduction Technology

The types of artefacts and their characteristics are used to establish how sources were worked, used and discarded on-site. Artefacts were classified as cores or flakes, broken or complete and retouched (tools) or non-retouched (Table 11). Artefacts that were shattered through extreme heat/or weathering and could not be identified by type but had a flaked surface were called a heat-fractured artefact (HFA). Heat shattered fragments (HSF) had no identifiable artefact features and cannot be considered artefacts. HSFs and spalls were included in the analysis as they represent post-depositional influences on the assemblage. By-products of flaking also include angular fragments (blocks). However, prior to discussing the technology in the project area it is important to compare the artefacts in Spits 2 and 5 to establish whether any differences in the assemblage occurs with depth.

Chronological Differences in Technology

The stone artefact technology in the project area is collectively known as the Australian Small Tool Tradition (c.f. Gould 1969), associated with the manufacture of backed artefacts (e.g. Bondi points and geometric microliths). Evidence for these artefacts types were found in Spits 1-7 of the project area with artefacts concentrating in Spits 2 and 5. Comparisons between these spits shows some differences in the composition of the assemblages occur with more broken flakes in Spit 5 and more tools and complete splits in Spit 2 (Table 11). Complete splits (or longitudinal spit) only occur during core reduction when the force of the strike against the core during flake removal is too large and splitting the flake splits through the bulb of percussion (Hiscock 1988: 365-366). In contrast there is a similar frequency of cores and complete flakes in both spits. However, the presence of backed artefacts (Table 5) throughout the assemblage indicates that while the technology has not changed the activities which dominant in these spits differs to some extent.

The composition of the assemblage will now be compared followed by an analysis of the cores, flakes and tools.

	Spit 2		*Spit 5*	
	Count	%	Count	%
Core	4	2.5	8	3.0
Complete Flake	47	29.9	77	28.8
Broken Flakes	65	41.4	153	57.3
Tools	16	10.2	8	3.0
Complete Splits	9	5.7	8	3.0

Table 11 Ratios of artefact types by spit in the Dungowan Dam assemblage

Assemblage Composition

As the assemblage is considered mid-late Holocene comparisons will be made by raw material type to establish how quality and availability has influenced manufacture and discard.

Jasper

The excavated assemblage of jasper is dominated by complete, broken and distal flakes (Table 12). Broken flakes (unretouched proximal, broken and distal flakes) account for 49.3% (n=498) of the assemblage. The MNF (Minimum Number of Flakes) is 476 complete flakes of jasper in the assemblage. A total of 21 cores and 74 tools were found (Table 11). The tools account for 7.3% of the jasper assemblage. A high frequency of angular fragments are also present in the assemblage.

Chalcedony

A total of 304 chalcedony artefacts were found in the assemblage. This assemblage was also dominated by complete, broken and distal flakes (Table 12). Broken flakes (unretouched proximal, broken and distal flakes) account for 47.4% (n=144) of the assemblage. The MNF is 145 complete flakes of chalcedony in the assemblage. A total of nine cores and 25 tools were found (Table 12). The tools account for 8.2% of the jasper assemblage. A low frequency of angular fragments are present in the assemblage.

Serpentine

The serpentine assemblage was dominated by complete flakes (50%, n=25). Only one core and four tools were found in this assemblage. The tools account for 8.0% of the serpentine artefacts. There are no angular fragments in the assemblage.

	Jasper		*Chalcedony*		*Serpentine*		*Total*	
	Count	%	Count	%	Count	%	Count	%
Core	21	2.1	9	3.0	1	2	37	2.2
Core Fragment	8	0.8	5	1.6	1	2	15	0.9
Complete flake	292	28.9	90	29.6	25	50	471	28.3
Complete split	48	4.7	23	7.6	5	10	88	5.3
Broken Flakes						0		
Broken flake	229	22.7	60	19.7	3	6	378	22.7
Distal flake	161	15.9	55	18.1	6	12	263	15.8
Proximal flake	108	10.7	29	9.5	5	10	162	9.7
Sub-total	498	49.3	144	47.4	14	28.0	803	48.3
Tools								
Complete tool	46	4.5	11	3.6	2	4	64	3.9
Proximal tool	6	0.6	4	1.3			13	0.8
Distal Tool	6	0.6	7	2.3	2	4	19	1.1
Broken tool	16	1.6	3	1.0			22	1.3
Sub-total	74	7.3	25	8.2	4	8.0	118	7.1
Other								
Angular Fragments	67	6.6	8	2.6			124	7.5
Heat Shattered fragment	1	0.1						
Heat Shattered artefact							2	0.1
Spall	2	0.2					3	0.2
Glass							1	0.1
Total	1011		304		50		1662	

Table 12 Composition of the Dungowan Dam assemblage

Artefact Ratios

In the assemblage recovered from the project area the ratios of cores:complete flakes show that a low frequency of cores occurs in the assemblage (1:31.4) coupled with a higher number of complete splits to complete flakes (1:5.4) (Table 13). These results indicate that while core preparation and reduction occurred on-site, reflected in the high numbers of compete splits, cores were most likely removed for later use. However, as previously noted assemblage differences do occur with depth seen in the intensity of core reduction and tool use (Tables 11 and 13).

Differences in the frequency of artefacts types also occurs between the raw material types. In particular in the chalcedony assemblage there is a higher frequency of tools and cores while more jasper and chalcedony artefacts were broken. These results may suggest that that considerable reduction occurred on-site resulting in a highly fragmented assemblage of these raw material types. Broken flakes result from breakage during manufacture, post-depositional breakage (ploughing, treadage) or the deliberate snapping of complete flakes during the manufacture of particular tools, such as geometric microliths, where the snapped margins are backed (Boot 1987: 10-15; Holdaway and Stern 2004: 133-135). However, jasper is more variable in quality and more likely to shatter along internal fracture lines during core reduction resulting in more breakages This feature of the assemblage is shown in the high frequency of broken flakes of jasper in Spit 5 (n=153, 57.3%). Similar ratios of tools to complete flakes were found in both the jasper and chalcedony assemblage indicating a primary focus on core preparation for these raw material types. Fewer cores and more tools were made from serpentine. The results of this comparative analysis suggests that different processes of discard occurred for different raw material types. These differences will be explored further in the following sections. The technology will be now discussed collectively as a mid-late Holocene assemblage and where appropriate comparisons will be made with depth.

Ratios	*Jasper*	*Chalcedony*	*Serpentine*	*Total*	*Spit 2*	*Spit 5*
cores:complete flakes	1:36.5	1:18	1:25	1:31.4	1:11.8	1:9.6
complete splits:complete flakes	1:6.1	1:3.9	1:5.0	1:5.4	1:5.2	1:9.6
complete flakes:broken flakes	1:1.7	1:1.6	1:0.6	1:1.7	1:1.4	1:2
Tools: complete flakes	1:3.9	1:3.6	1:6.3	1:4.0	1:2.9	1:9.6

Table 13Ratios of artefact types in the Dungowan Dam assemblage

Cores

A total of 37 cores and 15 core fragments were found in the excavated assemblage (Table 14). The highest density of cores (n=4) was found in Spit 5 of TP143. In total 13 cores were found in Spit 5. The majority of the cores were made from jasper (n=19). Chalcedony (n=9), tuff (n=4) milky quartz (n=2) and serpentine (n=1) cores were also present (Table 16). Chalcedony and jasper cores are the largest by length and weight (Table 14).

All of the cores have a relatively large mean size (Table 14). The largest is a chalcedony core with a maximum length of 122.4 mm. Independent of the core body (flake or block) the size of cores are similar. Jasper cores are not significantly different in length when comparing the core body (t=0.6507, df=18, p=0.535). This result may indicate the size of the flake required. The size of elongated flakes is similar to the mean lengths of the cores (Tables 14 and 15). Comparing the size of the expanding and elongated flake scars on the cores indicates a change from expanding to elongated flakes as core reduction continues.

Four jasper cores still retain a water-rolled cortex, from a secondary source, and nine have a terrestrial cortex, from a primary, outcropping source (Table 15). Only one chalcedony core also has a terrestrial cortex. Tuff was obtained from primary and secondary sources.

Material	*Count*	*%*	*Maximum Length (mm)*	*Mean Length (mm)*	*Std Dev.*	*Total Weight (g)*	*Mean Weight (g)*	*Std Dev.*
Chalcedony	9	24.3	122.4	50.7	33.1	832.5	92.5	159.8
Jasper	21	56.8	75.5	48.8	12.9	906.3	43.2	32.2
Milky Quartz	2	5.4	57.0	43.9	18.5	87.4	43.7	42.2
Serpentine	1	2.7	41.2	41.2		38.7	38.7	
Tuff	4	10.8	138.8	74.2	43.2	417.4	104.4	110.3
Total	37							

Table 13 Length and weight of cores in the Dungowan Dam assemblage

Scar Form	*Count*	*Mean Length (mm)*	*Std Dev.*
Elongated	17	46.5	13.4
Expanding	12	65.2	34.5
Mixed	8	41.8	12.6

Table 14 Form of flake scars on the cores in the Dungowan Dam assemblage

Material Type	*Cortex %*	*Count*	*Waterborne*	*Terrestrial*
Chalcedony	0%	8		
	26-50%	1		1
Jasper	0%	12		
	1-25%	7	4	3
	26-50%	2		2
Tuff	0%	1		
	1-25%			2
	26-50%		1	
Milky Quartz	0%	1		
	26-50%			1
Serpentine	0%	1		

Table 15 Types of cortex on the cores by raw material type in the Dungowan Dam assemblage

Systematic Core Reduction Strategies

The analysis of the cores indicates that a number of strategies were employed to systematically prepare and reduce the cores which are represented by six technological strategies.

Evidence of systematic core reduction at the project area is seen by the presence of burin-blade cores, atypical burin–blade cores, a prismatic core and alternate-blade cores (Table 16). These atypical and typical burin-blade cores were made on two forms; block or a flake. The cores show the deliberate removal of flakes along a lateral margin. This technique is one way of manufacturing elongated flakes of the same length and width. Burin-blade cores are generally made on a large flake, typically one margin is prepared as a platform for the removal of flakes, usually across the termination of the original flake (Holdaway and Stern 2004: 205-206). Burin-blade cores have also been called the Redbank A Strategy in Hunter Valley assemblages (Hiscock 1993). The elongated flakes produced are typically retouched as backed artefacts. In contrast, atypical burin-blade cores from were usually made on cortical, angular fragments struck along a lateral margin. Large flakes, flaked in flexible ways, were also used as atypical burin-blade cores. These core types indicate innovations in the manufacture of elongated flakes.

Material Type	*Core Type*	*Core Body*	*Core Platform*	*Exhausted*	*Tool*
Chalcedony	Burin-Blade	Flake	Elongated	Overhang	
	Bi-Directional	Block	Elongated	None	
	Bifacial	Block	Expanding	None	
	Bifacial	Flake	Mixed	Facetted	
	Uni-Directional	Block	Elongated	None	
	Uni-Directional	Flake	Elongated	None	Tool
	Uni-Directional	Flake	Expanding	None	Tool
	Uni-Directional	Flake	Expanding	None	
	Uni-Directional	Flake	Expanding	Overhang	
Jasper	Burin-Blade	Block	Elongated	None	
	Burin-Blade	Flake	Elongated	Facetted	
	Atypical Burin-Blade	Flake	Elongated	Facetted	
	Burin-Blade	Flake	Elongated	Facetted	
	Burin-Blade	Flake	Elongated	None	
	Burin-Blade	Flake	Elongated	None	
	Burin-Blade	Flake	Elongated	Overhang	
	Bi-Directional	Block	Expanding	Facetted	
	Bi-Directional	Block	Mixed	Overhang	
	Radial-Bifacial	Flake	Mixed	Facetted	
	Atypical Burin-Blade	Block	Elongated	None	
Tuff	Multi-Directional	Block	Expanding	Overhang	
	Atypical Burin-Blade	Block	Expanding	Overhang	
	Atypical Burin-Blade	Block	Mixed	Both	
	Multi-Directional	Block	Mixed	Overhang	
	Burin-Blade	Flake	Mixed	Facetted	
	Prismatic	Flake	Elongated	Overhang	
	Uni-Directional	Block	Elongated	None	
	Uni-Directional	Block	Expanding	None	

	Uni-Directional	Flake	Expanding	None
	Uni-Directional	Unknown	Expanding	Facetted
Milky Quartz	Uni-Directional	Block	Elongated	None
	Uni-Directional	Block	Expand	None
Serpentine	Multi-Directional	Block	Mixed	Overhang
Tuff	Atypical Burin-Blade	Block	Elongated	Facetted
	Multi-Directional	Block	Mixed	Facetted
	Uni-Directional	Block	Expanding	None

Table 16 Characteristics of the cores by raw material type in the Dungowan Dam assemblage

- Atypical Burin-Blade Cores (on a flake body). Figure 5 shows two examples of atypical burin-blade cores made on flakes. An atypical burin-blade core of jasper has flakes removed across the original platform was found in TP47, Spit 4 (Figure 5, left). A light grey, chalcedony atypical burin-blade core was found in TP134, Spit 5 (Figure 5, right).

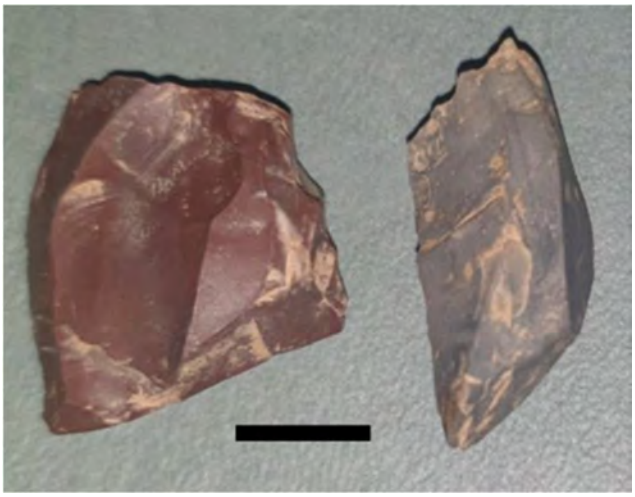

Figure 5 Examples of atypical burin-blade Cores (on a flake body) found in the Dungowan Dam assemblage (scale 1 cm)

- Atypical Burin-Blade Cores (on an angular fragment). Several examples of atypical burin-blade core were found in the excavated assemblage (Figure 6). These cores were made on an angular fragment rather than a flake body. These core types were often anvil rested and flaked using a bipolar technique along one lateral margin allowing the production of elongated flakes. Examples of these cores are made from tuff (TP14, Spit 5; Figure 5, bottom right) and jasper (Figure 6 TP93 Spit 2, top left; TP143 Spit 5, top right; TP106, Spit 1, bottom left).

Figure 6 Examples of atypical burin-blade Cores (on a block fragment) found in the Dungowan Dam assemblage (scale 1 cm)

- Burin-Blade Cores (on a flake body). Typical burin-blade cores were made form chalcedony and jasper. Flakes were removed across the termination (chalcedony TP134, Spit 5, Figure 7, left) or down the lateral margin from the termination (e.g. jasper TP143, Spit 5, figure 7, right).

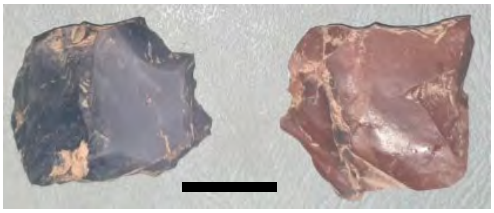

Figure 7 Examples of typical burin-blade Cores (on a flake body) found in the Dungowan Dam assemblage (scale 1 cm)

- Prismatic Core. If cores are flaked from single platform in a radial fashion they become conical/prismatic in profile (Holdaway and Stern 2004:206). As flaking progresses the core shape changes from sub-prismatic to prismatic. These cores typically have blade/elongated flake scars (Figure 8). A prismatic core, made on a large flake, was flaked uni-directionally around the margins of the flake from the ventral surface to remove elongated flakes. (Figure 2).

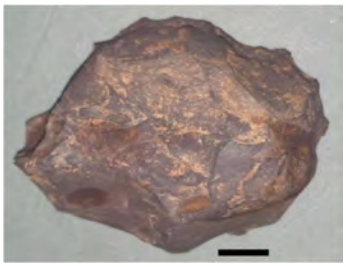

Figure 8 Prismatic blade core (on a flake body) found in the Dungowan Dam assemblage (scale 1 cm)

Radial-bifacial Core. A single core was bifacially flaked in a radial fashion across a flake body (TP149, Spit 2, Figure 9).

Figure 9 Radial-bifacial Core (on a flake body) found in the Dungowan Dam assemblage (scale 1 cm)

Alternative-blade core. The alternate-blade core is defined as have parallel flake removals from opposing platforms showing a 180° core rotation (Figure 10). This strategy extends the uselife of a core and also utilises the prepared core surface from the original platform.

Figure 10 Alternative-blade core found in the Dungowan Dam assemblage (scale 1 cm)

Flakes

The characteristics of the complete flakes are used to support and further enhance the results of the core analysis.

The presence of complete split flakes also shows that core reduction occurred on-site (Tables 9 and 17). These types of flakes usually occur early in core reduction when the aim is to remove a large flake and can be considered a flaking error produced when the force used to strike the core is too great and it is hit at an incorrect angle. Table 17 shows the frequency of complete splits by raw material. Interestingly chalcedony has a higher frequency of complete splits.

	Count	*%*
Chalcedony	23	7.6
Jasper	48	4.7
Milky Quartz	5	3.5
Plagioclase	3	3.7
Quartzite	1	4.5
Serpentine	5	10.0
Tuff	3	9.4

Table 17 The frequency of complete splits by raw material type in the Dungowan Dam assemblage

The form of the complete flakes is used to determine how cores were reduced and what was manufactured on site. Expanding and elongated flakes dominate the jasper assemblage while expanding flakes dominate the chalcedony assemblage (Table 18). These results correlate with the form of the flake scars on the cores which are mainly elongated for jasper and both elongated and expanding for chalcedony. The decreasing size from expanding to elongating complete flakes reflects the full reduction continuum from core preparation to the systematic manufacture of elongated flakes and blades. The presence of 15 platform rejuvenation flakes of jasper and seven of chalcedony indicates that the uselife of cores was extended on-site. Platform rejuvenation flakes (also known as a core rejuvenation flake) were used to both create a new platform and to limit flaking mistakes by reducing the angle of the striking platform thereby extending the life of a core (Odell 2003: 121).

A total of 64 flakes (complete and broken) were defined as having a blade form in the assemblage, 43 (67.2%) of these were made from jasper and 15 made from chalcedony. It is likely that flakes with these forms, blade or elongated, were either manufactured into backed tools or removed from the site for later use as replacement parts. The highest frequency of blocky flakes were also made from jasper. This flake form is typically associated with early stage core reduction. In contrast, chalcedony has more platform rejuvenation flakes and less blocky flakes. These differences may reflect the quality of the raw materials with chalcedony preferred for tool manufacture coupled with techniques employed to extend the uselife of these cores.

Ridge-straightening flakes were both found in four test pits (TPs 138, 47, 108, 28, Figure 11). Most are made from jasper (n=5) and three were made from chalcedony. The majority of ridge-straightening flakes (n=5) were found in TP138. These elongated flakes (also called a crested blades), with previous parallel flake removals from a single platform, were used to establish the parallel ridges on cores needed for blade removal.

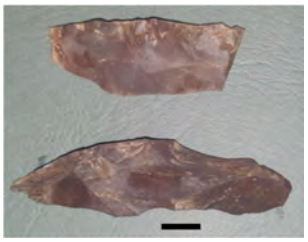

Figure 11 Ridge-straightening flakes from TP138 (scale 1 cm)

Flake Form	*Chalcedony*				*Jasper*				*Serpentine*			
	Count	*%*	*Mean Length*	*Std. Dev.*	*Count*	*%*	*Mean Length*	*Std. Dev.*	*Count*	*%*	*Mean Length*	*Std. Dev.*
Bipolar					1	0.3	38.9					
Blade	3	3.3	16.1	14.6	12	4.1	26.9	15.2				
Block	6	6.7	26.6	11.5	28	9.6	32.1	13.7	7	28	23.8	4.3
Elongating	16	17.8	24.8	12.8	62	21.2	23.2	11.5	2	8	27.7	12.6
Expanding	34	37.8	12.5	6.0	105	36.0	19.1	9.6	7	28	13.6	5.7
Intermediate	22	24.4	18.3	6.9	59	20.2	29.5	10.0	7	28	25.7	12.4
Platform Rejuvenation	7	7.8	26.1	10.1	15	5.1	57.1	24.4	2	8	30.1	8.0
Ridge-Straightening	2	2.2	36.3	2.3	2	0.7	21.5	9.8				
Trim					3	1.0	21.5	9.8				

Flake Form	*Chalcedony*				*Jasper*				*Serpentine*			
	Count	*%*	*Mean Length*	*Std. Dev.*	*Count*	*%*	*Mean Length*	*Std. Dev.*	*Count*	*%*	*Mean Length*	*Std. Dev.*
Errailure					5	1.7	13.1	6.1				
Total	90				292				25			

Table 18 Mean axial length of complete flakes by form and raw material in the Dungowan Dam assemblage

Within the jasper assemblage 40 (13.7%) complete flakes have hinge terminations and 15 have step terminations (Table 19). These types of terminations are usually the result of a steep platform angle generally produced at the end of a core's uselife (Holdaway and Stern 2004:130). Complete flakes with a plunge termination is a technique used to clean a core face. Three examples, made from jasper, were found in TP153, Spit 2 TP156, Spit and TP154, Spit 2. The flakes have evidence of previous blade removals on their dorsal surface. This technique also extends the uselife of a blade core.

Further comparison of chalcedony and jasper complete flakes shows little difference in the characteristics of the flakes with a few exceptions (Tables 19 and 20). More facetted platforms occur on the complete flakes of jasper while more crushed platforms occur on the chalcedony complete flakes. Attempts were made to remove thin flakes (core trimming or blade production) on the chalcedony flakes shown by the platforms that were crushed during removal (Tables 19 and 20).

Some evidence for bipolar reduction on the flakes occurs, seen in the low number of crushed terminations. Bipolar reduction is more commonly seen in an assemblage as the core size decreases.

Termination	*Count*	*%*	*Platform Type*	*Count*	*%*
Abrupt	22	7.5	Cortical	8	2.7
Cortical	3	1.0	Crushed	33	11.3
Crushed	1	0.3	Facetted	30	10.3
Feather	200	68.5	Flaked	38	13.0
Hinge	40	13.7	Missing	22	7.5
n/a	2	0.7	Unifacial	161	55.1
Platform	2	0.7	*Exterior Platform Preparation*		
Plunge	7	2.4	Overhang	48	16.4
Step	15	5.1	Stepped	8	2.7
Cortex %			*No. of Scars*		
0%	251	86.0	0	29	9.9
1-25%	28	9.6	<5	260	89.0
26-50%	3	1.0	>5	3	1.0
51-99%	8	2.7	*Dimensions (mm)*	*Mean*	*STD*
100%	2	0.7	Maximum Length	24.9	12.9
Scar Direction			Axial Length	20.3	11.9
0	149	51.0	Width	17.4	9.2
180	15	5.1	Thickness	4.8	3.7
90	100	34.2	Platform Width	9.9	8.9
NA	25	8.6	Platform Thickness	3.4	3.1
Radial	3	1.0	Weight (g)	3.8	8.1
Total	292				

Table 19 Characteristics of complete flakes made from jasper in the Dungowan Dam assemblage

Scar Direction	*Count*	*%*	*Platform Type*	*Count*	*%*	*Termination*	*Count*	*%*
1	39	43.3	Cortical	1	1.1	Abrupt	1	1.1
180	4	4.4	Crushed	15	16.7	Cortical	3	3.3
90	32	35.6	Facetted	5	5.6	Crush	1	1.1
n/a	11	12.2	Flaked	12	13.3	Feather	68	75.6
Radial	4	4.4	Missing	3	3.3	Hinge	9	10.0
			Unifacial	54	60	Platform	3	3.3
						Plunge	3	3.3
						Step	2	2.2

Table 20 Characteristics of complete flakes made from chalcedony in the Dungowan Dam assemblage

Core rotation is shown by the dorsal scars of the complete flakes (Tables 19 and 20). Rotation is seen in the high frequency of flake scars from 90 and 180 degrees. This result is reflected in the proportion of flaked platform types made from jasper (n=38, 13.0%) and chalcedony (n=12, 13.3%). Considerable platform preparation, indicating systematic core reduction, occurred in the assemblage shown by the presence of overhang removal and facetted platforms (Tables 19 and 20).

Table 21 shows the dimensions of the complete flakes by raw material types. Chalcedony and jasper flakes have similar dimensions. In contrast, serpentine flakes are larger and thicker. The frequency of complete flakes with an elongation index of x2 or greater (length=2x or greater than width) made from jasper is 30.8%. In comparison, for chalcedony only 11.1% of the complete flakes are elongated. These differences suggest that large serpentine and chalcedony flakes were transported to the project area.

Material		*Volcanic*	*Serpentine*	*Chalcedony*	*Quartzite*	*Tuff*	*Milky Quartz*	*Fine Silcrete*	*Plagioclase*	*Medium Silcrete*
	Count	1	25	90	12	11	12	3	24	1
	%	0.2	5.3	19.1	2.5	2.3	2.5	0.6	5.1	0.2
Maximum Length (mm)	Mean	40.6	29.1	23.6	23.1	22.8	20.6	18.3	15.5	14.8
	STD		11.1	12.1	9.1	7.8	10.5	1.0	6.5	
Axial Length	Mean	28.9	22.3	18.8	19.2	18.3	15.2	12.3	12.2	10.3
	STD		9.7	10.4	5.4	7.9	8.1	4.9	6.7	
Width (mm)	Mean	39.8	22.0	17.1	17.2	17.6	16.8	16.0	12.5	11.4
	STD		8.1	10.2	6.9	7.3	9.2	1.8	4.9	
Thickness (mm)	Mean	7.6	7.1	4.6	3.6	4.1	6.2	4.0	2.7	3.4
	STD		4.4	3.6	0.9	2.2	3.4	2.2	1.7	
Platform Width	Mean	25.4	13.7	8.7	9.8	9.2	11.5	9.1	5.8	10.4
	STD		9.1	7.9	9.1	8.7	7.1	8.8	4.9	
Platform Thickness (mm)	Mean	7.8	4.9	3.2	2.9	3.0	5.0	2.7	1.7	3.4
	STD		4.1	3.0	1.4	2.6	2.9	3.2	1.5	
Weight (g)	Mean	15.0	5.7	3.1	1.9	1.7	3.5	1.0	0.7	0.4
	STD		5.5	6.0	3.1	2.0	5.3	0.8	1.0	

Table 21Dimensions of complete flakes by raw material type in the Dungowan Dam assemblage

The size of the complete flakes varies considerably shown by the large standard deviations (Tables 19 and 21; Figure 12). However, most of the complete flakes are between 10-20 mm. Only two complete flakes, of jasper, are larger than 60mm but these indicate the size of the core (the largest flake is 74.3 mm). The maximum size of the complete flakes of chalcedony is 59.0 mm and 45.5 mm for serpentine. The presence of small complete flakes (<15mm) may indicate platform preparation on cores (overhang removal) or are a result of retouching tools.

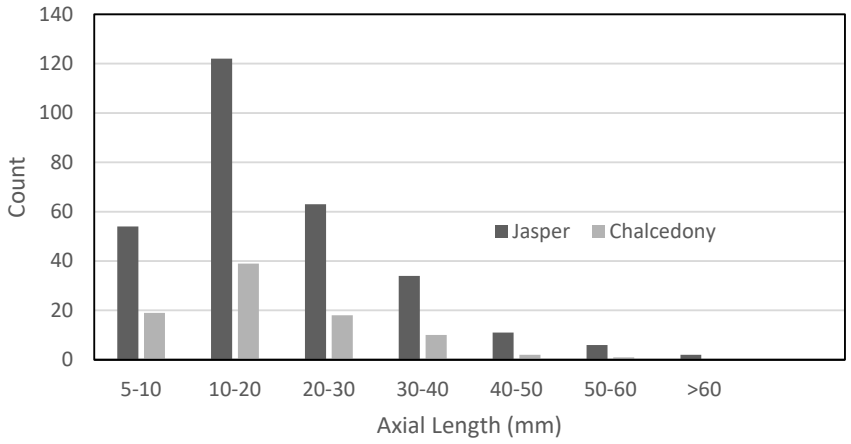

Figure 12 Axial lengths of complete flakes by raw material type in the Dungowan Dam assemblage

Tools

A total of 119 tools were found in the excavated areas (Table 22). Of these 118 are stone artefacts and one was a possible glass artefact. Most of these tools were made on complete flakes (n=64, 54.2%). The complete tools are larger than the unretouched complete flakes indicating a selection for size (complete flakes=19.5±11.1mm, complete tools=26.4±12.2mm; t=4.599, df=533, p<.0001).

Backing was the dominate retouch type (n=50, 42.0**%).** The backed artefacts are complete, broken or unfinished Bondi points and geometric microliths (Figure 4). A relatively high frequency of broken flakes (n=21, 17.6%) occur with backing retouch. The elongated proximal and distal fragments are Bondi points with lateral breaks. One Bondi point has a missing tip, broken during manufacture. There are 13 finished Bondi points which are widely dispersed across 12 test pits (Figure 13). These Bondi points are typically made from jasper (n=10), however, two are made from chalcedony and one from quartzite. Two Bondi points were found in Spit 6 of TP138 (Figure 14). A further backed broken flake (medial) and a proximal end of a Bondi point were found in the same test pit and spit. Given the relatively high frequency of backed artefacts and the appearance of unfinished tools it is likely that these were systematically made on-site, in and possibly around TP138. Further examples of Bondi point manufacture were found in TP105, 14, 13, 101, 93 and 90. Other backed artefacts include 16 finished geometric microliths, which were mostly made from jasper (n=15). The largest concentration of finished geometric microliths (n=2) and unfinished or broken geometric microliths (n=2) occurs in Spit 6 of TP12. These results suggest two main areas of backed artefact manufacture with geometric microliths found in TP12 and Bondi points in TP138.

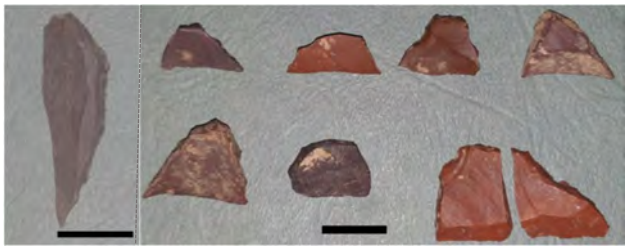

Figure 13 Backed artefacts in the Dungowan Dam assemblage. Left, Bondi point; Right geometric microliths (scale 1 cm)

Material Type	*Tool Type*	*Count*
Tuff	Straight Scraper	1
Quartzite	Bondi	1
Fine Silcrete	Step scraper	1
	Convex scraper	1
Milky Quartz	Convex scraper	1
	Step scraper	1
	Denticulate	1
Plagioclase	Backed Fragment	5
	Thumbnail Scraper	1
Serpentine	Straight Scraper	1
	Usewear	2
	Notch	1
Chalcedony	Backed Fragment	4
	Straight Scraper	4
	Thumbnail Scraper	1
	Usewear	7
	Burin	1
	Bondi	3
	Step scraper	2
	Convex scraper	1
	Notch	2
Jasper	Backed Fragment	12
	Straight Scraper	8
	End Scraper	1
	Usewear	11
	Geometric microlith	15
	Bondi	9
	Step scraper	3
	Convex scraper	5
	Notch	6
	Denticulate	1
	Drill	1
Volcanic	Geometric microlith	1
	Straight Scraper	1

Table 22 Tool types by raw material in the Dungowan Dam assemblage

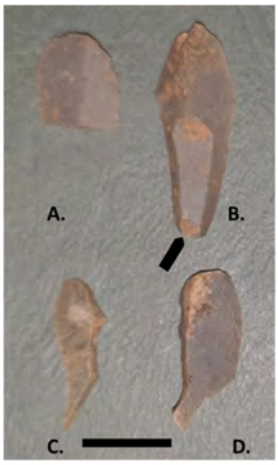

Figure 14 Examples of light grey chalcedony tools in Spit 6, TP138 of the Dungowan Dam assemblage A. Backed proximal flake; B. Burin; C. Backed complete flakes; D. Backed proximal flake. Arrow shows burin scar (scale 1 cm)

Relatively few scrapers (n=34) and notched artefacts (n=13) were found in the assemblage (Table 23). The notched tools generally had only one retouched edge (n=2) or have another edge with usewear. One of the convex scrapers and a step-scraper have two retouched edges. These results indicate that the tools were not intensively used. Both the scraper and notched tools are typically large with a mean maximum length greater than 30 mm and seemingly made from locally available raw materials that were acquired, retouched, used and discarded in the same context. Figure 15 shows examples of large convex-scrapers. Unusual tools, rarely found, include a drill and burin (Figure 14). The presence of tools made from silcrete and serpentine indicates the transport of artefacts to the project area as these raw material types are not located nearby.

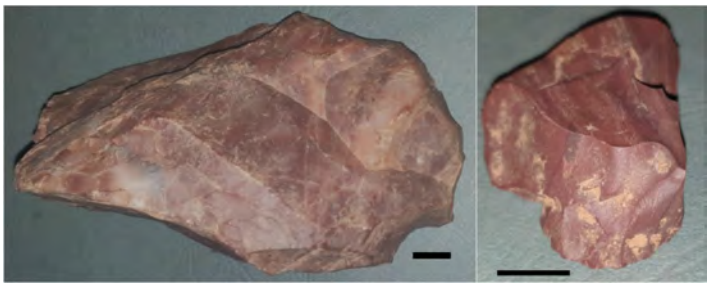

Figure 15 Examples of large scrapers in the Dungowan Dam assemblage (scale 1 cm)

Tool Type		*Count*	*%*	*Maximum Length (mm)*	*Std Dev.*
Backed	Bondi Point	13	10.9	23.0	6.5
	Backed fragment	21	17.6	17.6	4.2
	Geometric microlith	16	13.4	17.2	4.5
	Sub-total	50	42.0		
Scraper	Convex-scraper	6	5.0	48.0	34.8
	Concave-scraper	3	2.5	39.4	19.1
	Step-scraper	7	5.9	38.5	13.8
	End-scraper	1	0.8	18.9	
	Thumbnail-scraper	2	1.7	12.8	4.9
	Straight-scraper	15	12.6	31.2	10.8
	Sub-total	34	28.6		
Denticulate		4	3.4	45.8	17.5
Notch		9	7.6	37.8	13.2
Drill		1	0.8	45.0	
Burin		1	0.8	25.4	
Usewear		20	16.8	37.9	13.6

Table 23 Tool types by dimension in the Dungowan Dam assemblage

Conjoin Analysis (Refitting)

Conjoining (or refitting artefacts) was not systematically undertaken across the assemblage but sometimes recognised during the analysis. This analysis can be used to assess a downward movement of artefacts or reconstruct core reduction. Ten sets of conjoining artefacts were observed in total (Table 24). If conjoins are present in the same spit then there is little evidence of for the downward movement of larger artefacts. In addition, distinctive raw material types and colours across spits can also indicate artefact movement or link individual test pits (Table 25). For example, TP128 (n=6, Spit 4) and TP153 (n=5, Spit 2) have small concentrations of brown jasper artefacts. This distinctive material type is found in 46 dispersed test pits and most are in Spits 1 and 2 (58.6%) – all suggesting some potential commonality in use or timing by people in the past. Plagioclase artefacts concentrate in Spit 5 of TP14 (n=26) and Spit 4 of TP 41 (n=32), while a grey/clear chalcedony concentrates in three test pits (TP47 n=11, TP153 n=7, and TP12 n=6). A smaller concentration of artefacts was found in Spit 2 of TP124. Here six artefacts of pink, fine-silcrete were found. Two concentrations of raw material types occur in TP138 (red jasper from Spits 5 and 6 and light grey chalcedony in Spits 5, 6 and 7, Figure 14). These artefacts include cores, angular fragments, flakes and unfinished backed artefacts and together indicate a working area reflecting an entire reduction sequence. A systematic study of this area may show further conjoins and indicate which artefacts were removed from the site.

Conjoin Locations	Material	Artefact Type
TP114, Spit 2	Red jasper	Proximal/distal flake (manufacturing error, fractured, lateral break)
TP120, Spit 5	Red jasper	Core/complete flake/tool (core reduction set)
TP153, Spit 2	Serpentine	Proximal/medial (lateral break)
TP14, Spit 5	Plagioclase Plagioclase	Complete flake/broken tool (post-depositional) broken tool/broken tool (backed) (lateral break during backing)
TP138, Spit 7 & 8	Chalcedony, light Grey	Complete flake/Complete flake (manufacturing error)
TP12, Spit 5	Red jasper Red jasper	Complete flake/Complete flake (core reduction set) Distal flake/medial flake (manufacturing error)
TP12b, Spit 5	Red jasper Chalcedony, light Grey	Proximal flake/broken tool (lateral break, backing) Proximal/distal flake (lateral break)
TP104, Spit 1	Red jasper	broken tool (backed)/broken tool (backed) Lateral break on geometric microlith

Table 24 Conjoining artefacts by raw material in the Dungowan Dam assemblage

Test Pits	Material
TP41	Plagioclase n=32
TP105	Chalcedony, Grey/clear n=13
TP47	Chalcedony, Grey/clear n=12
TP153	Chalcedony, Grey/clear n=12
TP14	Plagioclase n=26
TP138	Chalcedony, light Grey n=36
TP190	Chalcedony, light Grey n=16
TP117	Quartzite, orange/white n=7

Table 25 Concentrations of raw material types in the Dungowan Dam assemblage

As noted, ten sets of conjoining artefacts were found during the analysis (Table 25). Most of these sets resulted from either post-depositional damage, breakage during manufacture (backed fragments with lateral snaps) or fracturing during manufacture (manufacturing error). Two core reduction sets were also identified in TP120 and TP12. These sets represents refitting artefacts from artefact manufacture. In TP14 is an atypical burin-blade core conjoins with an elongated flake removed from the lateral margin (Figure 16, top left, A & B). Another elongated flake (Figure 16, top left B) was backed to fashion a Bondi point (Figure 16, top left, 15 C). The point can be refitted on to the dorsal surface of the larger elongated flaked (Figure 16, top left B). Another manufacturing set was found in T12, Spit 5 (Figure 16, bottom right). One conjoin set was found between spits in TP138, Spit 7 & 8 (Figure 16, bottom left).

The concentrations of raw material types and the presence of conjoins provides confidence that while smaller artefacts may have been displaced downwards the assemblage is relatively intact.

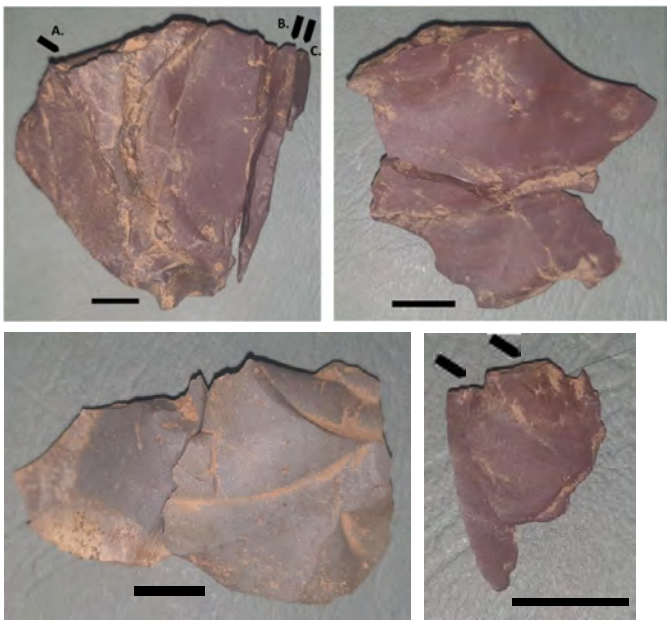

Figure 16 Conjoining artefacts in the Dungowan Dam assemblage. Top left, TP120, Spit 5 A. core, B. elongated flake and C. backed artefact; Top right TP114, Spit 2; Bottom left TP138, Spit 7 & 8; Bottom right, TP12, Spit 5 arrows showing flake platform (scale 1 cm)

Spatial Distribution and Site Occupation

To examine whether spatial differences in reduction activities occur in the project area the location of the cores, tools, raw material colour and flake form were compared. Two areas, TP138 and TP12, have over 100 artefacts. TP12 has the highest density of artefacts (n=272).

TP138 - Specific Core Reduction Activity Area

The artefacts from this area are typified by a higher frequency of cores, backed artefacts and flakes with a blade form in comparison to other test pits. Few flakes with a blocky form were found. Ridge-straightening flakes were also present in the assemblage indicative of blade core preparation. These characteristics indicate an area of backed artefact manufacture. In particular the highest concentration of complete and broken Bondi points were found in this test pit. A variety of raw material types are found in this test pit with 61% of the artefacts made from jasper. Blades are made from both chalcedony and jasper. This test pit can be considered an area of "gearing up" for tool manufacture and maintenance. Often the limited amount of time available to acquire stone prompts a direct, specialised procurement and tool production. The expenditure of time and energy in "gearing-up" suggests a high degree of planning and organisation (Binford 1979).

TP12 Initial to Specific Core Reduction Activity Area

In TP12 most of the artefacts are made from red jasper (95.2%). The assemblage reflects an intensive reduction of possibly a single jasper cobble. Early core reduction is showed by the high frequency of flakes with a blocky form and the size range of the jasper artefacts. Blades and backed artefacts were also found in the assemblage reflecting the entire reduction sequence. This test pit has the highest concentration of geometric microliths. Given the high frequency of jasper artefacts and presence of large, cortical artefacts it seems likely that this assemblage was created in one event, at one time to "gear-up" for the manufacture of geometric microliths showing the entire reduction continuum.

Specific Tool Discard Activity Areas

In several test pits there is a higher frequency of processing tools (scraper, notched and usewear) along the Dungowan Creek (Table 26). These types of tools are usually more indicative of longer-term camp site activity. The size of these tools and the number of tools with notched retouch indicates heavy-duty woodworking possibly associated with haft manufacture that may have been made, used and discarded in the same context and event.

Test Pit	*Processing Tools*	*Total*	*%*
TP90	4	68	5.9
TP105	5	73	6.8
TP130	4	29	13.8
TP80	5	30	16.7
TP101	3	28	10.7
TP127	3	30	10.0
TP12b	3	15	20.0
TP155	3	26	11.5

Table 26 Test pits with higher frequency of processing tools in the Dungowan Dam assemblage

Comparing the frequency of processing tools and backed artefacts with depth as a proportion of the total artefact counts indicates that the frequency of tools increases over time (Table 27). Spits 1-3 have a higher number of processing tools and backed artefacts. These results may indicate a change in activities from primarily the acquisition of stone to a longer-term occupation along the Dungowan

Creek. A comparison of the number of broken flakes (unretouched proximal, distal and medial) shows the highest frequency is in Spit 5 and this is associated with more cortical artefacts, with 16.5% still retaining cortex. In contrast, only 10.6% of the artefacts have cortex in Spit 1. These characteristics indicate that over time cores were reduced more intensively again associated with a longer-term occupation in the upper spits.

Spit	*Processing Tools*	*Total Artefacts*	*%*	*Backed artefacts*	*%*	*Broken Flakes*	*%*
1	22	263	8.4	11	4.2	118	44.9
2	16	316	6.1	10	3.2	129	40.8
3	9	198	3.4	8	4.0	94	47.5
4	10	203	3.8	6	3.0	90	44.3
5	3	364	1.1	8	2.2	201	55.2
6	4	244	1.5	5	2.0	133	54.5
7		28		1	3.6	10	35.7

Table 27 Test pits showing the frequency of processing tools and backed artefacts with depth in the Dungowan Dam assemblage

Raw Material Distributions

Numerous test pits have concentrations of different raw material types which may reflect individual knapping events (Table 25).

Archaeological Potential and Comparative Analysis

The results from the excavations are compared against similar sites within the wider region namely those at Chaffey Dam. The aim of this investigation is to better understand the significance of the archaeological deposit recovered from the project. The straight line distance between the proposed Dungowan Dam and Chaffey Dam is ~ 23km. However, its geological context is quite different as the Chaffey Dam is located within the Tamworth Serpentinite Belt.

Initial surface survey at the Chaffey Dam found 33 site locations (e.g. artefact scatters, isolated finds, PADs, a quarry). All, with the exception of one location, were considered of low to moderate archaeological significance. One location was determined to be from moderate to high archaeological significance (Harper et al. 2012). Only 140 surface artefacts were collected in the initial survey. Raw materials types found during the survey include a cherty-argillite, one serpentinite flake, green-banded, red, black and grey “chert” (jasper), grey and green tuff and a grey chalcedony. A possible basalt quarry was also identified. (Macgregor et al. 2015). Later excavation of 40 test pits resulted in a total of 903 artefacts from both excavated and surface contexts. These artefacts concentrate in site CDA54 (Table 28). The identification of the raw material changed with hornfels, a contact metamorphic rock, identified and dominating the assemblage. However, this raw material was not identified on the Tamworth 1:250 000 Geological Sheet SH/56-13.

Differences occur between the Dungowan Dam and Chaffey Dam assemblages (Table 28). In particular, relatively few jasper/FGS (Fine-Grained Siliceous) artefacts were found at Chaffey Dam. These differences in raw material type are most likely associated with their geological location. Overall the frequency of tools and cores is higher in the Dungowan Dam assemblage coupled with a higher artefact density. These results reflect the high availability of sources in the Dungowan Dam catchment both as primary and secondary sources.

CDA54 was a site identified as an area reflecting the manufacture of elongated flakes and backed artefacts. This site has few cores but does have a higher frequency of retouched artefacts than TP12 (a, b, c and d) and TP138 but overall comparisons shows that CDA54 does not have higher frequency of tools than the entire Dungowan Dam assemblage.

	Chaffey Dam		*Dungowan Dam*		
	CDA54	Total	Total	TP12, 12a-d	TP138
Total	504	903	1662	340	160
Test Pits	40	145	108	5	1
Density (artefacts per m^2)	12.6	6.2	15.8	68	160
Jasper/FGS	97	205	1011	296	99
%	19.2	22.7	60.8	87.1	61.8
Retouched tools	5.1	4.3	7.5	4.1	3.8
Cores	2	0.1	2.2	0.9	1.9

Table 28 Comparison of the Chaffey Dam and Dungowan Dam assemblages

Summary

It is now possible to return to the questions posed in the research design.

- ***Site chronology***. When was the site occupied? Was the assemblage the product of repeated occupations or a single event? Does any spatial patterning occur in the assemblage?

The site was occupied between 5000BP to contact based the raw material, core and tool types i.e. the increase in milky quartz artefacts, burin-blade cores and backed artefacts. It is likely that occupation was short-term, single events focusing on raw material procurement, initial reduction and tool manufacture. Different areas of tool use, artefact colours and raw material types are dispersed across the project area. Few processing tools (scrapers, usewear, notched) were found in the assemblage that are typically more indicative of a longer term occupation. However, the frequency of these increases over time, possibly indicating a more intensive occupation in the upper spits. In the area around TP12 the largest concentration of red, jasper artefacts occurs as a single discard event from the reduction of one cobble in Spits 5 and 6. In contrast, higher numbers of artefacts were found especially in Spit 2 of TP153 and TP63 and Spit 1 of TP90. These differences, coupled with a higher number of milky quartz artefacts in the upper spits, indicates two occupation horizons. Generally, a higher frequency of milky quartz artefacts is generally associated with a late-Holocene occupation (Attenbrow 2002: 115-159).

- ***Source Information***. Which raw material resources were used?

The assemblage was dominated by cryptocrystalline quartz artefacts. In particular, jasper represents 60.8% the assemblage. Two types of raw material sources were used: primary, exposures of outcrops (rough and vein cortex) and secondary from a waterway. It is likely a secondary source of raw material, in particular jasper, is from nearby Dungowan Creek. Jasper artefacts with water-rolled cortex and terrestrial cortex were found in the assemblage. These artefacts suggest that the primary source of jasper is located upstream of the study area and relatively close as the cobbles still retain an angular exterior reflecting less time in a waterway. The range in size of the artefacts reflects the close distance from the source but also the reduction strategies employed to remove cortex and prepare the cores.

Differences in the use of raw material sources occurs between Spits 2 and 5. The upper spits have a higher frequency of milky quartz, serpentine and chalcedony artefacts while the lower spits are dominated by jasper artefacts. The presence of different raw material types in the test pits suggests that a wide access to sources and a high mobility. In particular, the large size of the serpentine artefacts indicates the time between acquisition and discard was small. High mobility allows procurement to be embedded in the seasonal round, restricted the amount of material transported and required specialised "gearing-up" strategies to be undertaken (Elston 1990:158).

Small numbers of serpentine and tuff artefacts were found. The low numbers of serpentine artefacts can be associated with the distance from the source (~18 km away) while tuff occurs locally but was not preferred for artefact manufacture given the availability of high quality, cryptocrystalline sources in the immediate area.

- ***Stone reduction technology*.** How was the stone worked and used? Can the function of the site be inferred from the artefact assemblage?

Evidence occurs for initial core acquisition, preparation or reduction is present in the Dungowan Dam assemblage. In particular TP12 has a high number of angular fragments and flakes with a blocky form. Fragmentation of the artefacts during manufacture is also shown by a number of the conjoin sets. These artefact were broken during manufacture along internal fracture lines within the jasper cobbles.

Evidence for 'systematic' reduction of cores occurred on site (i.e. the manufacture of elongated/blade flakes from prepared cores). The presence of atypical burin-blade cores represents a systematic core reduction similar to the Redbank A strategy observed by Hiscock (1993) in the Hunter Valley. This strategy was also indicated by a number of other artefact characteristics e.g. facetted platforms, overhang removal and flakes with a blade/elongated form. Smaller cores represent a late stage failure and discard. Cores were made on flakes, water-rolled cobbles and blocky fragments. Other systematic core types include atypical burin-blade, prismatic, radial-bifacial and alternative-blade cores. These cores were used to make geometric microliths and Bondi points. Few cores of jasper were found relative to the number of complete flakes which may indicate that cores were prepared and curated for later use i.e. transported away.

The tools are dominated by finished geometric microliths, Bondi points and broken, backed fragments. Relatively few processing tools were found in the assemblage but these increase in frequency in Spit 2. A number of large, heavy-duty tools (n=7, >60 cm) were also found which could indicate heavy-duty wood-working. Two cores were also used as tools.

Smaller, complete flakes are expanding in form and are either retouching flakes used to manufacture a working edge of a scraper or from overhang removal on a core.

- ***Site Function***. What types of activities occurred on-site/s? Do discrete areas of stone working occur? Can site function be related to environmental factors i.e. distance to sources?

At Dungowan Dam the characteristics and size range of the artefacts indicates it was an area of raw material procurement. The low frequency of other processing tools types (e.g. usewear, notched and scraper) in Spit 5 suggests that this location was primarily used to "gear-up" i.e. an area used for the manufacture of particular tool types. Tools were made, transported and used when necessary to maintain and replace broken parts of weaponry. It was also important to make time, prior to hunting, to have operational equipment. The area around TP12 represents a single, "gearing-up", event where time was taken to intensively reduce cores, produce elongated flakes and make the tools required. In the upper spits there is more evidence of a more intensive, longer-term occupation (seen in the frequency of processing tools).

- ***Regional Comparative Analysis*.** How does this site compare with others in the surrounding region?

The analysis of this assemblage has added to our understanding of the archaeology of the region. The Dungowan Dam assemblage has a high density of artefacts when compared to Chaffey Dam assemblage. All sites at the Chaffey Dam, with the exception of one (CDA54), were considered of low to moderate archaeological significance. CDA54 was a site identified as an area reflecting the manufacture of elongated flakes and backed artefacts. The Dungowan Dam assemblage is characterised by the procurement and initial preparation of cores. High quality stone sources were readily available and these were used to "gear-up" seen in the presence of systematic cores used to make blades/elongated flakes and backed artefacts broken during manufacture. Prepared cores could be transported away from source areas and used when required to manufacture backed artefacts. In CDA54, TP12 and TP138 of the Dungowan Dam project area backed artefact manufacture concentrated.

- ***Post-depositional influences*.** What post-depositional influences have impacted on the assemblage?

Little evidence was found for size-sorting, i.e. the downward movement of artefacts, as the complete flakes in Spits 5 and 6 are not significantly different. There is a significant different in the maximum lengths of complete flakes between Spits 2 and 3 but the larger artefacts were found in the lower spit. There is a possibility that some downward movement occurred into Spits 4 and 5 from Spit 3 but given the presence of conjoins it seems the assemblage is relatively intact.

A number of European artefacts were also recovered during the excavation of the test pits. These artefacts were found in 16 test pits and mostly in Spit 1 and Spit 2 and show some localised evidence of site disturbance.

Conclusion

The characteristics of the cores, flakes and tools in the assemblage indicates that cores were procured and initial core preparation (i.e. the removal of cortex) occurred in the area prior to cores and tools being transported away from the sites. The large flakes and angular fragments were present in the assemblage, prepared and used as burin-blade, atypical burin-blade, alternate-blade and prismatic cores. The main aim was to manufacture elongated/blades. Block fragments (obtained from primary outcrops) and water-rolled cobbles, from secondary sources, were used as core bodies to manufacture these artefact forms. Large outcrops of jasper are known to occur along the Dungowan Creek. Many elongated flakes and blades were firstly snapped, the platforms removed, and then fashioned into backed, Bondi points or geometric microliths. The presence of backed artefacts suggests that the site was occupied within the last 5000 years.

It is likely that once jasper cores were prepared they were sometimes worked until exhausted but often they were removed from the area for later use. In this way elongated flakes could be manufactured away from sources when needed to make replacement parts for weaponry. The low frequency of other tools types (e.g. usewear, notched and scarper) suggests that this location was primarily used to "gear-up", specifically an area used for the manufacture of particular tool types (e.g. backed artefacts).

Chronological difference in the assemblage is represented by the procurement of raw materials in the lower spits coupled with the manufacture of backed artefacts rather than concentrated places of longer-term occupation. In the upper spits different raw materials are found coupled with a higher frequency of processing tools. These results indicate a transition from task orientated raw material acquisition to longer-term occupation coupled with a wide mobility. In addition, some spatial variation in occupation behaviours occur across the excavations. Of these, TP138 and TP12 are the most variable in terms of the assemblage composition, cores and tool types while more processing tools were found in other squares (e.g. TP105, TP80).

This report provides some understanding of site chronology, raw material selection, core preparation and reduction strategies and tool manufacture that contributes to understanding the archaeology of a region. A number of future research recommendations can now be suggested.

- ***Future research opportunities***

1. Understanding the Stone Sources

This project would benefit from a source survey for primary and secondary sources along the Dungowan Creek to assess variability in the availability of raw materials and more fully understand the geoarchaeological context. For example, are there quarries of jasper? What size range of cobbles are available in the Dungowan Creek? What raw materials are available in the Dungowan Creek?

2. Establishing Areas of Longer-term Occupation

Two tests pits have a relatively high frequency of processing tools coupled with high artefacts density. TP130 (density=29 artefacts) and TP80 (density=30 artefacts, 7 are surface artefacts). TP130 in particular has a higher density of artefacts in Spits 2 and 3 (n=21).

TP138 has a high density of artefacts and most of these are in Spits 6 and 7 (n=87). In these spits, six different raw material types were found including a high frequency of chalcedony artefacts.

Extending both these test pits would help to investigate whether occupation changed over time.

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F.8 Lithic catalogue

SQ	SPIT	CLASS	MATERIAL GROUP	MATERIAL	TRANSLUCENCY	COLOUR	DISTIAL END	CORTEX %	CORTEX TYPE	FORM	PLATFORM TYPE	PLATFORM PREPARATI	SCAR NUMBER	SCAR TYPE	TOOL TYPE	RETOUCHED EDGES	EDGE 1	EDGE 2	EDGE 3	EDGE 4	CORETYPE	CORE BODY	PLATFORM NUMBER	CORE EXHAUSTION?	SCAR FORM	CORE PLATFORMS	STEPS	HINGES	LENGTH	LENGTH AXIA	WIDTH	THICKNESS	CORE FACE LENGTH	PLATFORM WIDTH	PLATFORM THICKNESS	CORE SCAR LENGTH	CORE SCAR WIDTH	NO. CORE SCARS	BURNT?	WEIGHT	COMMENTS
12	6	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	HINGE	1-	VEIN	BLOCK	FLAKED	STEP	<5	1		0										0			40.6	38	34.2	12.9	0	74.74	4.1	0	0		NO	16.4	
12	6	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	HINGE	0%		INDETER	FLAKED	OVERHANG	<5	1		0										0			40.6	26.6	22.2	4.4	0	19.5	7.4	0	0		NO	5.9	
12	6	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		BLOCK	UNI	NONE	<5	1		0										0			43.2	37	24.4	10.6	0	20.2	6.5	0	0		NO	11	
12	6	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	ABRUPT	0%		INDETER	UNI	OVERHANG	<5	1		0										0			38.7	37	23	5.2	0	17.6	4.5	0	0		NO	6.4	
12	6	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		INDETER	UNI	NONE	<5	1		0										0			13.5	13.2	10.8	1.3	0	4.5	0.9	0	0		NO	0.24	
12	6	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		ELONG	UNI	OVERHANG	<5	1		0										0			26.9	26	11.5	3.7	0	6.5	2.3	0	0		NO	1.6	
12	6	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		TRIM	UNI	OVERHANG	<5	90		0										0			43.9	30.7	25.2	5	0	14	2.8	0	0		NO	4.45	
12	6	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		PLATREJUV	UNI	OVERHANG	<5	90		0										0			32.1	31.2	22	7.7	0	11.4	3.6	0	0		NO	5.6	
12	6	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		EXPAND	FLAKED	OVERHANG	<5	90		0										0			25.7	12.6	25.7	4.7	0	19.9	2.6	0	0		NO	1.7	
12	6	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	1-	VEIN	PLATREJUV	MISSING	NONE	<5	90		0										0			41.8	41.8	17	11.6	0	0	0	0	0		NO	7	
12	6	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	STEP	0%		ELONG	UNI	NONE	<5	1		0										0			20.3	20.3	9.2	4	0	7.7	2.1	0	0		NO	0.89	
12	6	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	HINGE	0%		EXPAND	UNI	NONE	<5	1		0										0			17.2	11.2	12.8	2.4	0	11.6	1.6	0	0		NO	0.51	
12	6	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		INDETER	FACET	NONE	<5	90		0										0			19.4	19.4	17.3	3.1	0	7.9	3.7	0	0		NO	1.12	
12	6	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		EXPAND	UNI	NONE	<5	90		0										0			22.1	10.5	22.1	5.3	0	10.2	4.7	0	0		NO	1.6	
12	6	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		ERRAILURE	NA	NONE	0	NA		0										0			14.7	14.7	13.7	1.6	0	0	0	0	0		NO	0.34	
12	6	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	HINGE	0%		ELONG	UNI	NONE	<5	1		0										0			23.1	21.1	9.1	2.1	0	6.5	3.8	0	0		NO	0.62	
12	6	PROXFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER	FLAKED	OVERHANG				0										0			19	0	0	0	0	15.3	4	0	0		NO	1.2	
12	6	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		INDETER	UNI	OVERHANG	<5	90		0										0			20.9	13.3	16.7	3.5	0	11.5	2.6	0	0		NO	1	
12	6	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	ABRUPT	51-	VEIN	BLOCK	UNI	OVERHANG	<5	90		0										0			23.1	19.7	23.3	7.7	0	10.8	3.6	0	0		NO	3.41	
12	6	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		EXPAND	MISSING	NONE	0	90		0										0			17.3	10.2	17.3	2.3	0	0	0	0	0		NO	0.42	
12	6	PROXFLAKE	CCQ	JASPER	OPAQUE	RED		0%		PLATREJUV	UNI	OVERHANG				0										0			39.3	0	0	0	0	20.5	7.9	0	0		NO	8.96	
12	6	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	STEP	0%		BLADE	UNI	NONE	<5	1		0										0			26	26	9.3	2.5	0	3.9	1.9	0	0		NO	0.63	
12	6	PROXFLAKE	CCQ	JASPER	OPAQUE	RED		0%		BLADE	FACET	NONE				0										0			15.5	0	0	0	0	12.8	3.5	0	0		NO	0.85	
12	6	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		INDETER						0										0			15.1	0	0	0	0	0	0	0	0		NO	0.19	
12	6	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	HINGE	0%		INDETER	FACET	NONE	<5	1		0										0			20.2	18	16	4	0	5.1	2.2	0	0		NO	0.99	
12	6	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		INDETER	UNI	NONE	<5	180		0										0			12.7	9.3	9.7	3	0	7.2	2.9	0	0		NO	0.25	
12	6	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		ELONG	FACET	OVERHANG	<5	1		0										0			20.3	19.4	10.9	1.7	0	8.6	3.2	0	0		NO	0.43	
12	6	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	HINGE	0%		EXPAND	CRUSH	NONE	<5	1		0										0			12.4	8.2	12.4	1.1	0	0	0	0	0		NO	0.12	
12	6	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		INDETER	FLAKED	NONE	<5	0		0										0			15.9	14.1	7.8	2.3	0	11.7	2.3	0	0		NO	0.39	
12	6	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		TRIM	CRUSH	NONE	<5	1		0										0			12	11.1	11.9	0.9	0	0	0	0	0		NO	0.12	
12	6	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	ABRUPT	0%		INDETER	FLAKED	NONE	<5	90		0										0			18.2	11.8	15.8	7	0	11.9	4.2	0	0		NO	1.47	
12	6	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	HINGE	0%		EXPAND	CRUSH	NONE	0	NA		0										0			12.6	9.2	12.6	1	0	0	0	0	0		NO	0.12	
12	6	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		EXPAND	UNI	OVERHANG	<5	90		0										0			9.5	8.6	9.3	1.5	0	8.6	1.2	0	0		NO	0.13	
12	6	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		EXPAND						0										0			11.5	0	0	0	0	0	0	0	0		NO	0.19	
12	6	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	HINGE	0%		INDETER	UNI	OVERHANG	<5	1		0										0			8.9	8.2	6.9	2.2	0	6.7	3.8	0	0		NO	0.15	
12	6	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%	VEIN	INDETER						0										0			29.9	0	0	0	0	0	0	0	0		NO	6.45	
12	6	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		INDETER						0										0			33.6	0	0	0	0	0	0	0	0		CRAZED	3.34	possible burining
12	6	PROXFLAKE	CCQ	JASPER	OPAQUE	RED		0%		ELONG	UNI	OVERHANG				0										0			17.5	0	0	0	0	8.3	5.2	0	0		NO	1	
12	6	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	HINGE	0%		TRIM						0										0			20.5	0	0	0	0	0	0	0	0		NO	0.82	
12	6	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		51-	VEIN	ELONG						0										0			24.1	0	0	0	0	0	0	0	0		NO	1	
12	6	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0										0			25	0	0	0	0	0	0	0	0		NO	2.17	
12	6	PROXFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER	FLAKED	NONE				0										0			18.1	0	0	0	0	6.4	4.6	0	0		NO	1.6	
12	6	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		ELONG						0										0			29.2	0	0	0	0	0	0	0	0		NO	1.31	
12	6	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0										0			25	0	0	0	0	0	0	0	0		NO	1.8	
12	6	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		ELONG						0										0			16	0	0	0	0	0	0	0	0		NO	0.33	
12	6	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0										0			16.5	0	0	0	0	0	0	0	0		NO	0.22	
12	6	PROXFLAKE	CCQ	JASPER	OPAQUE	RED		51-	VEIN	ELONG	UNI	NONE				0										0			14.5	0	0	0	0	10.3	5.1	0	0		NO	0.65	
12	6	PROXFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER	FACET	OVERHANG				0										0			19.6	0	0	0	0	12.8	3.6	0	0		NO	0.57	
12	6	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		TRIM						0										0			20.4	0	0	0	0	0	0	0	0		NO	0.45	
12	6	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		INDETER						0										0			20.8	0	0	0	0	0	0	0	0		NO	0.45	
12	6	PROXFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER	UNI	NONE				0										0			20.8	0	0	0	0	14.5	1.7	0	0		NO	0.62	
12	6	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		INDETER	UNI	NONE	<5	1		0										0			16	14	10.4	3.1	0	10.2	3.2	0	0		NO	0.46	
12	6	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	1-	VEIN	EXPAND	FACET	NONE	<5	90		0										0			14.3	11.1	13.1	2.2	0	13.5	2.6	0	0		NO	0.45	
12	6	COMPSPLIT	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		INDETER						0										0			16.8	0	0	3.9	0	0	4.8	0	0		NO	0.45	
12	6	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		1-	VEIN	INDETER						0										0			24.8	0	0	0	0	0	0	0	0		NO	1.57	
12	6	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		1-	VEIN	INDETER						0										0			22.9	0	0	0	0	0	0	0	0		NO	0.38	
12	6	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		TRIM						0										0			21	0	0	0	0	0	0	0	0		NO	0.34	
12	6	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0										0			14.4	0	0	0	0	0	0	0	0		NO	0.19	
12	6	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		TRIM						0										0			19	0	0	0	0	0	0	0	0		NO	0.45	
12	6	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		INDETER						0										0			16.5	0	0	0	0	0	0	0	0		NO	0.25	
12	6	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0										0			14.3	0	0	0	0	0	0	0	0		NO	0.41	
12	6	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		EXPAND	MISSING	NONE	<5	1		0										0			11	10.2	11.5	1.1	0	0	0	0	0		NO	0.14	
12	6	PROXFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER	UNI	OVERHANG				0										0			14.2	0	0	0	0	6.8	2.4	0	0		NO	0.22	
12	6	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0										0			12	0	0	0	0	0	0	0	0		NO	0.31	
12	6	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		EXPAND						0										0			20.8	0	0	0	0	0	0	0	0		NO	0.56	
12	6	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0										0			18.6	0	0	0	0	0	0	0	0		NO	0.53	
12	6	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0										0			18.1	0	0	0	0	0	0	0	0		NO	1.2	
12	6	PROXFLAKE	CCQ	JASPER	OPAQUE	RED		0%		EXPAND	CRUSH	NONE				0										0			13	0	0	0	0	0	0	0	0		NO	0.16	
12	6	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		EXPAND	UNI	NONE	<5	1		0										0			13.1	7.8	12.1	2.3	0	9.6	4.1	0	0		NO	0.26	
12	6	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		INDETER						0										0			11.9	0	0	0	0	0	0	0	0		NO	0.12	
12	6	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		ELONG						0										0			15.2	0	0	0	0	0	0	0	0		NO	0.09	
12	6	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0										0			16.1	0	0	0	0	0	0	0	0		NO	0.13	
12	6	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		ELONG						0										0			17	0	0	0	0	0	0	0	0		NO	0.37	
12	6	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0										0			18.2	0	0	0	0	0	0	0	0		NO	0.38	
12	6	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0										0			13.9	0	0	0	0	0	0	0	0		NO	0.36	
12	6	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0										0			10	0	0	0	0	0	0	0	0		NO	0.16	
12	6	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		EXPAND						0										0			23.7	0	0	0	0	0	0	0	0		NO	1.76	
12	6	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0										0			19.7	0	0	0	0	0	0	0	0		NO	0.16	

SQ	SPIT	CLASS	MATERIAL GROUP	MATERIAL	TRANSLUCENCY	COLOUR	DISTIAL END	CORTEX %	CORTEX TYPE	FORM	PLATFORM TYPE	PLATFORM PREPARATI	SCAR NUMBER	SCAR TYPE	TOOL TYPE	RETOUCHED EDGES	EDGE 1	EDGE 2	EDGE 3	EDGE 4	CORETYPE	CORE BODY	PLATFORM NUMBER	CORE EXHAUSTION?	SCAR FORM	CORE PLATFORMS	STEPS	HINGES	LENGTH	LENGTH AXIAL	WIDTH	THICKNESS	CORE FACE LENGTH	PLATFORM WIDTH	PLATFORM THICKNESS	CORE SCAR LENGTH	CORE SCAR WIDTH	NO. CORE SCARS	BURNT?	WEIGHT	COMMENTS
12	6	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0												18	0	0	0	0	0	0	0	0		NO	0.37	
12	6	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		ELONG						0												18.7	0	0	0	0	0	0	0	0		NO	0.28	
12	6	PROXFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER	UNI	NONE				0												14.4	0	0	0	0	3.7	1.5	0	0		NO	0.18	
12	6	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		ELONG						0												14.5	0	0	0	0	0	0	0	0		NO	0.15	
12	6	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		ELONG						0												14.5	0	0	0	0	0	0	0	0		NO	0.12	
12	6	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0												10.8	0	0	0	0	0	0	0	0		NO	0.25	
12	6	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0												17.1	0	0	0	0	0	0	0	0		NO	0.49	
12	6	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		INDETER						0												12.2	0	0	0	0	0	0	0	0		NO	0.2	
12	6	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0												14.2	0	0	0	0	0	0	0	0		NO	0.3	
12	6	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		INDETER	CRUSH	NONE	<5	90		0												12.1	10.7	8.2	1.3	0	0	0	0	0		NO	0.14	
12	6	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	HINGE	0%		ELONG	CRUSH	NONE	<5	1		0												12.4	12.4	7.9	2.1	0	0	0	0	0		NO	0.2	
12	6	PROXFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER	UNI	NONE				0												12.3	0	0	0	0	9.3	0.7	0	0		NO	0.11	
12	6	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		EXPAND						0												16.3	0	0	0	0	0	0	0	0		NO	0.32	
12	6	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0												8	0	0	0	0	0	0	0	0		NO	0.01	
12	6	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		EXPAND	CRUSH	OVERHANG	<5	1		0												10.4	9.7	10.4	1.9	0	0	0	0	0		NO	0.14	
12	6	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	51-	VEIN	INDETER						0												10.3	0	0	0	0	0	0	0	0		NO	0.12	
12	6	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		EXPAND						0												11.6	0	0	0	0	0	0	0	0		NO	0.13	
12	6	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0												9.9	0	0	0	0	0	0	0	0		NO	0.13	
12	6	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0												15.4	0	0	0	0	0	0	0	0		NO	0.5	
12	6	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0												12.9	0	0	0	0	0	0	0	0		NO	0.25	
12	6	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0												13.4	0	0	0	0	0	0	0	0		NO	0.37	
12	6	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0												9.4	0	0	0	0	0	0	0	0		NO	0.14	
12	6	PROXFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER	UNI	NONE				0												15.5	0	0	0	0	10	2.5	0	0		NO	0.38	
12	6	PROXFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER	UNI	NONE				0												15.6	0	0	0	0	6.4	2.5	0	0		NO	0.43	
12	6	PROXFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER	UNI	NONE				0												10.7	0	0	0	0	8.7	1.8	0	0		NO	0.11	
12	6	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0												9	0	0	0	0	0	0	0	0		NO	0.12	
12	6	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0												12.1	0	0	0	0	0	0	0	0		NO	0.2	
12	6	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		ELONG	FACET	NONE	<5	90		0												11.6	11.6	8.4	1.6	0	5.5	1.8	0	0		NO	0.19	
12	6	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		EXPAND	UNI	NONE	<5	1		0												14.7	8.1	14.6	1.55	0	12.1	1.4	0	0		NO	0.22	
12	6	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	ABRUPT	0%		EXPAND	UNI	NONE	<5	1		0												16.7	8.9	16.5	4.2	0	16.4	2.9	0	0		NO	0.66	
12	6	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0												12.2	0	0	0	0	0	0	0	0		NO	0.19	
12	6	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		EXPAND	CRUSH	NONE	0	1		0												10.7	8.9	10.1	1.8	0	0	0	0	0		NO	0.14	
12	6	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		INDETER						0												10	0	0	0	0	0	0	0	0		NO	0.11	
12	6	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0												8.5	0	0	0	0	0	0	0	0		NO	0.13	
12	6	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		INDETER						0												12.6	0	0	0	0	0	0	0	0		NO	0.18	
12	6	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		INDETER	CRUSH	NONE	<5	1		0												7.8	7.3	7	1.3	0	0	0	0	0		NO	0.07	
12	6	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		INDETER						0												11.5	0	0	0	0	0	0	0	0		NO	0.18	
12	6	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	HINGE	0%		INDETER						0												11.5	0	0	0	0	0	0	0	0		NO	0.13	
12	6	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		ELONG	CRUSH	NONE	<5	1		0												12.5	12.2	5.9	1.4	0	0	0	0	0		NO	0.1	
12	6	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0												11.8	0	0	0	0	0	0	0	0		NO	0.15	
12	6	PROXFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER	UNI	OVERHANG				0												8.6	0	0	0	0	5.9	1.6	0	0		NO	0.13	
12	6	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0												9.7	0	0	0	0	0	0	0	0		NO	0.01	
12	6	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	HINGE	0%		EXPAND	CRUSH	NONE	<5	90		0												10.8	7.1	10.8	1.9	0	0	0	0	0		NO	0.12	
12	6	BLOCK	CCQ	JASPER	OPAQUE	RED		0%								0												52	0	0	0	0	0	0	0	0		NO	15.3	
12	6	BLOCK	CCQ	JASPER	OPAQUE	RED		0%								0												16.9	0	0	0	0	0	0	0	0		NO	0.71	
12	6	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0												14.5	0	0	0	0	0	0	0	0		NO	0.87	
12	6	BLOCK	CCQ	JASPER	OPAQUE	RED		0%								0												19.4	0	0	0	0	0	0	0	0		CRAZED	0.76	
12	6	BLOCK	CCQ	JASPER	OPAQUE	RED		0%								0												19	0	0	0	0	0	0	0	0		NO	0.63	
12	6	BLOCK	CCQ	JASPER	OPAQUE	RED		0%								0												15.3	0	0	0	0	0	0	0	0		NO	0.36	
12	6	BLOCK	CCQ	JASPER	OPAQUE	RED		0%								0												20.2	0	0	0	0	0	0	0	0		CRAZED	0.8	
12	6	BLOCK	CCQ	JASPER	OPAQUE	RED		0%								0												14.7	0	0	0	0	0	0	0	0		NO	0.27	
12	6	BROKFLAKE	CCQ	JASPER	N/A	RED		0%		INDETER						0												11.7	0	0	0	0	0	0	0	0		NO	0.4	
12	6	BLOCK	CCQ	JASPER	OPAQUE	RED		0%								0												13.5	0	0	0	0	0	0	0	0		NO	0.37	
12	6	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	PLATFOR	51-	VEIN	PLATREJUV						0												48.7	0	0	0	0	0	0	0	0		NO	18.2	
12	6	BLOCK	CCQ	JASPER	OPAQUE	RED		0%								0												19.6	0	0	0	0	0	0	0	0		NO	1.77	
12	6	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0												20.2	0	0	0	0	0	0	0	0		NO	1.15	
12	6	BLOCK	CCQ	JASPER	OPAQUE	RED		0%								0												16.1	0	0	0	0	0	0	0	0		NO	1.25	
12	6	BLOCK	CCQ	JASPER	OPAQUE	RED		0%								0												23	0	0	0	0	0	0	0	0		NO	1.24	
12	6	BLOCK	CCQ	JASPER	OPAQUE	RED		0%								0												28.4	0	0	0	0	0	0	0	0		NO	0.76	
12	6	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0												17.9	0	0	0	0	0	0	0	0		NO	1.04	
12	6	BLOCK	CCQ	JASPER	OPAQUE	RED		26-	VEIN							0												34.6	0	0	0	0	0	0	0	0		NO	4.49	
12	6	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	STEP	1-	VEIN	EXPAND						0												35.2	0	0	0	0	0	0	0	0		NO	4.87	
12	6	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0												27.1	0	0	0	0	0	0	0	0		NO	1.64	
12	6	COMPSPLIT	CCQ	JASPER	OPAQUE	RED	FEATHER	51-	WATER-ROLL	INDETER						0												27.2	0	0	8.5	0	0	9	0	0		NO	4.27	
12	6	COMPSPLIT	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		INDETER						0												22.6	0	0	3	0	0	2.7	0	0		NO	1	
12	6	COMPSPLIT	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		INDETER	UNI					0												16.1	0	0	2.3	0	0	2	0	0		NO	0.43	
12	6	COMPTOOL	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		INDETER	NA	NONE	0	NA	GEO	3	BACK	BACK	BACK	N/A								15.3	15.3	10.5	3.9	0	0	0	0	0		NO	0.66	
12	6	COMPSPLIT	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		INDETER						0												10	0	0	1.4	0	0	1.6	0	0		NO	0.09	
12	6	BROKFLAKE	CCQ	JASPER	OPAQUE	BLUEG		0%		INDETER						0												10	0	0	0	0	0	0	0	0		NO	0.15	
12	6	BROKTOOL	CCQ	JASPER	OPAQUE	RED		0%		INDETER					BACK	0												20.8	0	0	0	0	0	0	0	0		NO	1.01	unfinished
12	6	BLOCK	CCQ	JASPER	OPAQUE	RED		26-	VEIN							0												21.6	0	0	0	0	0	0	0	0		NO	1.86	
12	6	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		100	VEIN	INDETER						0												10.3	0	0	0	0	0	0	0	0		NO	0.09	
12	6	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		26-	VEIN	INDETER						0												19.1	0	0	0	0	0	0	0	0		NO	0.46	
12	6	DISTFLAKE	CCQ	CHAL	TRANS	GREYCL	FEATHER	0%		EXPAND						0												12.7	0	0	0	0	0	0	0	0		NO	0.22	
12	6	DISTFLAKE	CCQ	CHAL	TRANS	GREYCL	FEATHER	0%		EXPAND						0												15.4	0	0	0	0	0	0	0	0		NO	0.32	
12	5	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	ABRUPT	0%		EXPAND	FACET	NONE	<5	1		0												34.6	22.3	34.6	6.8	0	20.5	6.7	0	0		NO	5.99	
12	5	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		ELONG	FACET	OVERHANG	<5	1		0												37.1	37.1	14.6	3.1	0	10.3	1.8	0	0		NO	2.39	
12	5	PROXFLAKE	CCQ	JASPER	OPAQUE	RED		1-	VEIN	INDETER	CORTICAL	NONE				0												16.9	0	0	0	0	10.5	5	0	0		NO	1.38	

SQ	SPIT	CLASS	MATERIAL GROUP	MATERIAL	TRANSLUCENCY	COLOUR	DISTIAL END	CORTEX %	CORTEX TYPE	FORM	PLATFORM TYPE	PLATFORM PREPARATI	SCAR NUMBER	SCAR TYPE	TOOL TYPE	RETOUCHED EDGES	EDGE 1	EDGE 2	EDGE 3	EDGE 4	CORETYPE	CORE BODY	PLATFORM NUMBER	CORE EXHAUSTION?	SCAR FORM	CORE PLATFORMS	STEPS	HINGES	LENGTH	LENGTH AXIA	WIDTH	THICKNESS	CORE FACE LENGTH	PLATFORM WIDTH	PLATFORM THICKNESS	CORE SCAR LENGTH	CORE SCAR WIDTH	NO. CORE SCARS	BURNT?	WEIGHT	COMMENTS
12	5	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	STEP	0%		ELONG	MISSING	NONE	<5	1		0										0			19.8	16.9	12.3	1.6	0	0	0	0	0		NO	0.45	
12	5	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	ABRUPT	0%		BLADE	FACET	NONE	0	1		0										0			24	24	14.6	3.2	0	7.5	2.5	0	0		NO	0.96	
12	5	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		ELONG	FACET	OVERHANG	<5	1		0										0			29.7	27.4	6.1	3.6	0	8.6	3.9	0	0		NO	0.97	
12	5	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	ABRUPT	51-	VEIN	ELONG	CORTICAL	NONE	<5	1		0										0			29.2	28	15.2	5.1	0	8	2.4	0	0		NO	2.18	
12	5	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		EXPAND	UNI	NONE	<5	1		0										0			22.6	15.3	16.6	2.1	0	15.7	1.9	0	0		NO	0.77	
12	5	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		ELONG	UNI	NONE	<5	1		0										0			17.9	16.7	7.2	1.4	0	4.7	2.3	0	0		NO	0.3	
12	5	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	51-	VEIN	ELONG	UNI	NONE	<5	1		0										0			17.1	17.1	6.7	2.2	0	3.1	0.8	0	0		NO	0.23	
12	5	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		ELONG	CRUSH	NONE	<5	90		0										0			24.4	19.6	12.4	1.4	0	0	0	0	0		NO	0.54	
12	5	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		EXPAND	UNI	NONE	<5	90		0										0			18	10.6	18	1.8	0	8	2.1	0	0		NO	0.28	
12	5	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	26-	VEIN	EXPAND	CORTICAL	NONE	<5	1		0										0			17.1	17.1	7.1	2.1	0	0	0	0	0		NO	0.22	conjoin to 0.22g
12	5	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		INDETER						0										0			15.2	0	0	0	0	0	0	0	0		NO	0.44	
12	5	PROXFLAKE	CCQ	JASPER	OPAQUE	RED		0%		ELONG	FLAKED	NONE				0										0			13.8	0	0	0	0	6.5	2.6	0	0		NO	0	
12	5	PROXFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER	FACET	NONE				0										0			10.2	0	0	0	0	7.8	1.4	0	0		NO	0.22	
12	5	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	1-	VEIN	ELONG	FACET	NONE	<5	180		0										0			19.4	19.4	9.4	2.4	0	3.3	1.4	0	0		NO	0.61	
12	5	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		INDETER	UNI	NONE	<5	1		0										0			22.1	14.4	12	2.9	0	10.2	2.8	0	0		NO	0.75	
12	5	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	HINGE	0%		BLOCK	FLAKED	NONE	<5	1		0										0			25.1	24	12.2	5.8	0	8.2	6.2	0	0		NO	2.45	
12	5	COMPSPLIT	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		INDETER						0										0			42.3	0	0	5.4	0	0	7	0	0		NO	2.85	
12	5	PROXFLAKE	CCQ	JASPER	OPAQUE	RED		0%		BLOCK	FLAKED	NONE				0										0			30.6	0	0	0	0	26	4.1	0	0		NO	4.52	
12	5	COMPSPLIT	CCQ	JASPER	OPAQUE	RED	FEATHER	26-	VEIN	INDETER						0										0			18.7	0	0	4.6	0	0	2.9	0	0		NO	1	
12	5	COMPSPLIT	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		INDETER						0										0			13.5	0	0	4.5	0	0	3.5	0	0		NO	0.36	
12	5	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		EXPAND						0										0			22.8	0	0	0	0	0	0	0	0		NO	1.54	
12	5	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		EXPAND						0										0			27.5	0	0	0	0	0	0	0	0		NO	0.97	
12	5	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0										0			19	0	0	0	0	0	0	0	0		NO	0.72	
12	5	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	HINGE	0%		INDETER						0										0			20.9	0	0	0	0	0	0	0	0		NO	0.98	
12	5	PROXFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER	UNI	NONE				0										0			18.8	0	0	0	0	12.2	3	0	0		NO	0.56	
12	5	BROKFLAKE	CCQ	JASPER	OPAQUE	BLUEG		0%		INDETER						0										0			12.9	0	0	0	0	0	0	0	0		NO	0.23	
12	5	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		INDETER						0										0			12.3	0	0	0	0	0	0	0	0		NO	0.09	
12	5	PROXFLAKE	CCQ	JASPER	OPAQUE	RED		1-	ROUGH	ELONG	FACET	NONE				0										0			21.8	0	0	0	0	13.2	3.4	0	0		NO	1.68	
12	5	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		EXPAND	UNI	NONE	<5	90		0										0			10.7	5.4	10.6	7.2	0	6.3	2.9	0	0		NO	0.2	
12	5	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		EXPAND	UNI	NONE	<5	1		0										0			20.4	6.4	20.4	1.5	0	17.6	1.4	0	0		NO	0.25	
12	5	PROXFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER	FACET	NONE				0										0			10.4	0	0	0	0	7.9	2.2	0	0		NO	0.2	
12	5	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		EXPAND	UNI	NONE	0	NA		0										0			13.5	5.8	12.9	1.8	0	11.4	2.7	0	0		NO	0.22	
12	5	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		EXPAND						0										0			13.2	0	0	0	0	0	0	0	0		NO	0.11	
12	5	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0										0			22.6	0	0	0	0	0	0	0	0		NO	0.74	
12	5	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	HINGE	1-	VEIN	EXPAND						0										0			17.3	0	0	0	0	0	0	0	0		NO	0.51	
12	5	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	HINGE	0%		ELONG	MISSING	NONE	<5	1		0										0			21.1	19.5	7.7	1.6	0	0	0	0	0		NO	0.3	
12	5	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		INDETER						0										0			13	0	0	0	0	0	0	0	0		NO	0.25	
12	5	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		INDETER						0										0			12	0	0	0	0	0	0	0	0		NO	0.29	
12	5	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	HINGE	0%		BLADE						0										0			13	0	0	0	0	0	0	0	0		NO	0.12	
12	5	PROXFLAKE	CCQ	JASPER	OPAQUE	RED		0%		ELONG	CRUSH	NONE				0										0			9.4	0	0	0	0	0	0	0	0		NO	0.06	
12	5	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		EXPAND						0										0			14.2	0	0	0	0	0	0	0	0		NO	0.27	
12	5	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0										0			9.9	0	0	0	0	0	0	0	0		NO	0.27	
12	5	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		BLADE	UNI	NONE	<5	1		0										0			12.2	12.2	7.6	1.2	0	3.9	1.4	0	0		NO	0.1	
12	5	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		BLADE						0										0			13.9	0	0	0	0	0	0	0	0		NO	0.12	
12	5	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0										0			12.4	0	0	0	0	0	0	0	0		NO	0.19	
12	5	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		ELONG	FLAKED	NONE	0	NA		0										0			12.3	11.6	6.2	0.8	0	6.9	2.2	0	0		NO	0.12	
12	5	PROXFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER	FLAKED	NONE				0										0			10.8	0	0	0	0	9.3	5.3	0	0		NO	0.37	
12	5	PROXFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER	CRUSH	NONE				0										0			10.9	0	0	0	0	0	10.9	0	0		NO	0.18	
12	5	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0										0			16.5	0	0	0	0	0	0	0	0		NO	0.25	
12	5	COMPSPLIT	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		INDETER						0										0			13.7	0	0	1.8	0	0	2	0	0		NO	0.22	
12	5	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0										0			10.1	0	0	0	0	0	0	0	0		NO	0.19	
12	5	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		1-	VEIN	INDETER						0										0			13.6	0	0	0	0	0	0	0	0		NO	0.73	
12	5	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		26-	VEIN	INDETER						0										0			15	0	0	0	0	0	0	0	0		NO	0.38	
12	5	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0										0			10.2	0	0	0	0	0	0	0	0		NO	0.1	
12	5	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		INDETER						0										0			13.5	0	0	0	0	0	0	0	0		NO	0.19	
12	5	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0										0			9.3	0	0	0	0	0	0	0	0		NO	0.17	
12	5	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0										0			13.4	0	0	0	0	0	0	0	0		NO	0.21	
12	5	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		EXPAND						0										0			12.7	0	0	0	0	0	0	0	0		NO	0.12	
12	5	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	STEP	0%		EXPAND	UNI	NONE	0	NA		0										0			10.5	9	9.1	2.1	0	6.4	2.8	0	0		NO	0.16	
12	5	DISTFLAKE	CCQ	JASPER	OPAQUE	BROWN	FEATHER	0%		INDETER						0										0			11.1	0	0	0	0	0	0	0	0		NO	0.13	
12	5	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		INDETER						0										0			6.9	0	0	0	0	0	0	0	0		NO	0.01	
12	5	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		EXPAND						0										0			11.9	0	0	0	0	0	0	0	0		NO	0.1	
12	5	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	51-	VEIN	ELONG						0										0			8.8	0	0	0	0	0	0	0	0		NO	0.01	
12	5	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		EXPAND						0										0			10.7	0	0	0	0	0	0	0	0		NO	0.07	
12	5	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		51-	VEIN	INDETER						0										0			10.7	0	0	0	0	0	0	0	0		NO	0.25	
12	5	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	51-	VEIN	EXPAND	CORTICAL	NONE	<5	1		0										0			15.6	8	15.6	2.7	0	15.1	3.3	0	0		NO	0.35	
12	5	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	100	ROUGH	EXPAND						0										0			14.1	0	0	0	0	0	0	0	0		NO	0.07	
12	5	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		1-	ROUGH	EXPAND						0										0			15.7	0	0	0	0	0	0	0	0		NO	0.28	
12	5	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		INDETER						0										0			8.1	0	0	0	0	0	0	0	0		NO	0.01	
12	5	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		EXPAND						0										0			10.6	0	0	0	0	0	0	0	0		NO	0.12	
12	5	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0										0			13.3	0	0	0	0	0	0	0	0		NO	0.36	
12	5	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0										0			9.9	0	0	0	0	0	0	0	0		NO	0.09	
12	5	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0										0			14.9	0	0	0	0	0	0	0	0		NO	0.29	
12	5	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0										0			10.1	0	0	0	0	0	0	0	0		NO	0.19	
12	5	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0										0			10.5	0	0	0	0	0	0	0	0		NO	0.09	
12	5	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		EXPAND						0										0			23.8	0	0	0	0	0	0	0	0		NO	0.52	
12	5	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0										0			15.8	0	0	0	0	0	0	0	0		NO	0.37	
12	5	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0										0			16.5	0	0	0	0	0	0	0	0		NO	0.45	

SQ	SPIT	CLASS	MATERIAL GROUP	MATERIAL	TRANSLUCENCY	COLOUR	DISTIAL END	CORTEX %	CORTEX TYPE	FORM	PLATFORM TYPE	PLATFORM PREPARATI	SCAR NUMBER	SCAR TYPE	TOOL TYPE	RETOUCHED EDGES	EDGE 1	EDGE 2	EDGE 3	EDGE 4	CORETYPE	CORE BODY	PLATFORM NUMBER	CORE EXHAUSTION?	SCAR FORM	CORE PLATFORMS	STEPS	HINGES	LENGTH	LENGTH AXIAL	WIDTH	THICKNESS	CORE FACE LENGTH	PLATFORM WIDTH	PLATFORM THICKNESS	CORE SCAR LENGTH	CORE SCAR WIDTH	NO. CORE SCARS	BURNT?	WEIGHT	COMMENTS
12	5	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		ELONG	FLAKED	NONE	<5	1		0										0			13.4	13	6.7	3.2	0	7.7	2.6	0	0		NO	0.11	
12	5	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0										0			15.6	0	0	0	0	0	0	0	0		NO	0.06	
12	5	BLOCK	CCQ	JASPER	OPAQUE	RED		26-	VEIN							0										0			17.3	0	0	0	0	0	0	0	0		NO	0.77	
12	5	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		BLOCK						0										0			49	0	0	0	0	0	0	0	0		NO	14.6	
12	5	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0										0			29.1	0	0	0	0	0	0	0	0		FRACTU	2.76	
12	5	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0										0			32.7	0	0	0	0	0	0	0	0		NO	4.74	
12	5	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		INDETER						0										0			41.9	0	0	0	0	0	0	0	0		NO	5.68	cojoin 14.6g shattered impact
12	5	PROXFLAKE	CCQ	JASPER	OPAQUE	RED		1-	VEIN	BLOCK	CORTICAL	NONE				0										0			20	0	0	0	0	10.5	7.1	0	0		NO	2	
12	5	SPALL	CCQ	JASPER	OPAQUE	RED		0%		N/A						0										0			20.1	0	0	0	0	0	0	0	0		NO	1.39	
12	5	BLOCK	CCQ	JASPER	OPAQUE	RED		0%								0										0			29.1	0	0	0	0	0	0	0	0		NO	7.1	
12	5	CORE	CCQ	JASPER	OPAQUE	RED		26-	VEIN							0					UNID	BLOC	NON	NO	ELO	1	0	1	45.9	0	20.9	18.4	29.8	0	0	19.3	10.5	1-2	NO	21.5	
12	5	COREFRAG	CCQ	JASPER	OPAQUE	RED		1-	VEIN							0										0			42.6	0	0	0	0	0	0	0	0		NO	14.7	
12	5	COREFRAG	CCQ	JASPER	OPAQUE	RED		26-	VEIN							0										0			34	0	0	0	0	0	0	0	0		NO	12.4	
12	5	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		EXPAND						0										0			13.2	0	0	0	0	0	0	0	0		NO	0.23	
12	5	BROKTOOL	CCQ	JASPER	OPAQUE	RED		0%		INDETER					BACK	0										0			17.2	0	0	0	0	0	0	0	0		NO	0.75	unfinished geo attempt
12	5	BROKTOOL	CCQ	JASPER	OPAQUE	RED		0%		INDETER					BACK	0										0			12.9	0	0	0	0	0	0	0	0		NO	0.83	lat break geo
12	5	COMPTOOL	CCQ	JASPER	OPAQUE	RED	N/A	0%		INDETER	NA	NONE	0	NA	GEO	3	BACK	BACK	BACK	N/A						0			16.9	16.9	13.1	5.7	0	0	0	0	0		NO	1.04	
12	5	COMPTOOL	CCQ	JASPER	OPAQUE	BLUEG	N/A	0%		INDETER	NA	NONE	0	NA	GEO	3	BACK	BACK	BACK	N/A						0			15	15	11.4	2.6	0	0	0	0	0		NO	0.39	shaped not fully backed margin
12	5	BROKFLAKE	CCQ	CHAL	TRANS	GREYCL		0%		INDETER						0										0			20	0	0	0	0	0	0	0	0		NO	1.03	
12	5	COMPFLAKE	CCQ	CHAL	TRANS	GREYCL	FEATHER	0%		EXPAND	UNI	NONE	0	NA		0										0			13.6	7.6	13.6	1.1	0	7.6	1.1	0	0		NO	0.14	
12	5	BROKFLAKE	CCQ	CHAL	TRANS	GREYCL		0%		INDETER						0										0			14.4	0	0	0	0	0	0	0	0		NO	0.16	
12	5	BROKFLAKE	CCQ	CHAL	TRANS	GREYCL		0%		INDETER						0										0			11.1	0	0	0	0	0	0	0	0		NO	0.09	
12	5	DISTFLAKE	CCQ	CHAL	TRANS	GREYCL	FEATHER	0%		EXPAND						0										0			11.2	0	0	0	0	0	0	0	0		NO	0.2	
12	5	COMPFLAKE	CCQ	JASPER	OPAQUE	ORANG	FEATHER	0%		ELONG	UNI	NONE	<5	1		0										0			9.2	9.2	6.1	1.1	0	2.3	0.8	0	0		NO	0.07	
12	5	BROKFLAKE	CCQ	CHAL	TRANS	GREYCL		0%		INDETER						0										0			17	0	0	0	0	0	0	0	0		NO	0.75	
12	5	COMPFLAKE	CCQ	JASPER	OPAQUE	BLUEG	FEATHER	0%		ERRAILURE	MISSING	NONE	0	NA		0										0			8.1	7.8	7	0.7	0	0	0	0	0		NO	0.06	
12	5	PROXFLAKE	CCQ	SERP	TRANS	GREEN		0%		ELONG	UNI	NONE				0										0			13.9	0	0	0	0	4.3	3.1	0	0		NO	0.38	
13	3	CORE	CCQ	JASPER	OPAQUE	RED		0%								0					MUL	BLOC	OVE	NO	EXPA	3	1	0	42.1	0	34.7	21	35	0	0	16.6	30.2	3-5	NO	38.8	
13	3	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	HINGE	0%		INDETER						0										0			21.2	0	0	0	0	0	0	0	0		NO	1.2	
13	3	PROXFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER	UNI	NONE				0										0			21.4	0	0	0	0	9.3	4.3	0	0		NO	1.41	
13	3	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	ABRUPT	0%		ELONG	UNI	NONE	<5	1		0										0			26.8	23	11.1	4.6	0	11	3.4	0	0		NO	1.64	
13	3	COMPFLAKE	CCQ	JASPER	OPAQUE	DGREY	ABRUPT	0%		BLOCK	UNI	NONE	<5	90		0										0			58.4	43.4	42.7	17.6	0	23.1	13.6	0	0		NO	40.7	quartz vein through it
13	3	COREFRAG	CCQ	CHAL	TRANS	GREYCL		1-	WATER-ROLL							0										0			39	0	0	0	0	0	0	0	0		NO	9	
13	3	BLOCK	MQU	MQUAR	OPAQUE	YELLOW		1-	VEIN							0										0			44.8	0	0	0	0	0	0	0	0		NO	14.3	facets x2
117	1	COMPFLAKE	CCQ	JASPER	OPAQUE	ORANG	FEATHER	0%		BLADE	FACET	NONE	<5	1		0										0			38.1	38.1	13.8	3.7	0	8.4	4.3	0	0		NO	2.25	
117	1	DISTFLAKE	CCQ	JASPER	OPAQUE	ORANG	FEATHER	0%		EXPAND						0										0			16.1	0	0	0	0	0	0	0	0		NO	0.37	
117	1	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	ABRUPT	1-	VEIN	BLOCK	UNI	OVERHANG	<5	1		0										0			41.8	30	32.9	17.3	0	24.2	16.9	0	0		NO	25.3	evidence of prevblade removals on dorsal
117	1	COMPFLAKE	CCQ	CHAL	TRANS	GREYCL	FEATHER	1-	VEIN	INDETER	CORTICAL	NONE	0	NA		0										0			18	16.9	13.9	2.8	0	13	3.1	0	0		NO	0.81	
117	1	DISTFLAKE	QUA	QUARTZI	TRANS	ORANG	FEATHER	0%		EXPAND						0										0			19.1	0	0	0	0	0	0	0	0		NO	0.6	
117	1	PROXFLAKE	QUA	QUARTZI	TRANS	ORANG		0%		PLATREJUV	UNI	NONE				0										0			21.7	0	0	0	0	8.2	4.6	0	0		NO	2.4	
117	1	COMPFLAKE	QUA	QUARTZI	TRANS	ORANG	FEATHER	0%		EXPAND	UNI	NONE	0	NA		0										0			14.2	11.7	13.4	3.2	0	13.1	3.8	0	0		NO	0.48	x3 artefatcts orange/whiteclear
13	2	COMPFLAKE	QUA	QUARTZI	TRANS	ORANG	FEATHER	0%		ELONG	UNI	NONE	<5	1		0										0			15.9	12.2	16.2	3.4	0	8.5	2.2	0	0		NO	0.64	orange/white same in 117
13	2	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	1-	VEIN	BLOCK	UNI	NONE	<5	1		0										0			32.1	30.1	23.3	8.2	0	14.4	7.9	0	0		NO	4.26	
13	2	BLOCK	CCQ	JASPER	OPAQUE	RED		0%								0										0			26.2	0	0	0	0	0	0	0	0		NO	3.89	
13	2	PROXTOOL	CCQ	JASPER	OPAQUE	RED		0%		ELONG	NA	NONE			BACK	0										0			21.6	0	0	0	0	0	0	0	0		NO	0.86	lateral break bondi from dorsal
13	2	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	HINGE	0%		INDETER						0										0			12.3	0	0	0	0	0	0	0	0		NO	0.13	
13	2	DISTTOOL	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		EXPAND					STRA	0										0			10.4	0	0	0	0	0	0	0	0		NO	0.19	
13	2	COMPFLAKE	CCQ	CHAL	TRANS	GREYCL	FEATHER	1-	VEIN	INDETER	UNI	NONE	0	NA		0										0			26.2	21.1	18.3	6	0	9.7	5	0	0		NO	3.26	same material as 117
13	2	BLOCK	CCQ	JASPER	OPAQUE	LGREY		1-	VEIN							0										0			42.4	0	0	0	0	0	0	0	0		NO	9.49	blue grey tuff
13	2	PROXFLAKE	CCQ	JASPER	OPAQUE	RED		0%		ELONG	UNI	NONE				0										0			14.9	0	0	0	0	3.9	2.3	0	0		NO	0.42	
12	3	COMPTOOL	CCQ	JASPER	OPAQUE	PINK	N/A	0%		ELONG	UNI	NONE	<5	1	BON	2	N/A	BACK	BACK	N/A						0			29.2	28.2	14.9	4.4	0	11.7	4.6	0	0		NO	2.61	
12	3	COMPTOOL	CCQ	JASPER	OPAQUE	RED	FEATHER	51-	WATER-ROLL	BLOCK	UNI	NONE	0	NA	CON	2	N/A	STEP	SCALA	N/A						0			117	77.6	113	29.3	0	86.7	36.2	0	0		NO	467	impact points from waterway
41	2	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		EXPAND	FLAKED	NONE	<5	1		0										0			29.2	20.5	28.9	5.4	0	27.9	8.9	0	0		NO	4.17	
41	2	PROXFLAKE	CCQ	JASPER	OPAQUE	BLUEG		0%		INDETER	FACET	NONE				0										0			14.1	0	0	0	0	11.4	3.6	0	0		NO	0.61	
41	4	BROKFLAKE	PLAG	PLAG	OPAQUE	WHITE		0%		INDETER						0										0			36.8	0	0	0	0	0	0	0	0		NO	4.99	
41	4	PROXFLAKE	PLAG	PLAG	OPAQUE	WHITE		0%		INDETER	UNI	NONE				0										0			33	0	0	0	0	8.5	2.1	0	0		NO	3.04	
41	4	COMPFLAKE	PLAG	PLAG	OPAQUE	WHITE	ABRUPT	0%		ELONG	FACET	NONE	<5	1		0										0			34	34	15.9	6.6	0	9.7	2.1	0	0		NO	3.39	
41	4	DISTFLAKE	PLAG	PLAG	OPAQUE	WHITE	HINGE	0%		ELONG						0										0			30.7	0	0	0	0	0	0	0	0		NO	1.38	
41	4	COMPFLAKE	PLAG	PLAG	OPAQUE	WHITE	FEATHER	0%		EXPAND	UNI	NONE	<5	1		0										0			19.2	18.1	19.1	3.7	0	5.6	3.1	0	0		NO	1.2	
41	4	DISTFLAKE	PLAG	PLAG	OPAQUE	WHITE	FEATHER	0%		INDETER						0										0			20	0	0	0	0	0	0	0	0		NO	0.45	
41	4	COMPFLAKE	PLAG	PLAG	OPAQUE	WHITE	FEATHER	0%		INDETER	UNI	NONE	<5	1		0										0			24.5	19.2	15.3	3.5	0	11.4	4.6	0	0		NO	1.35	
41	4	PROXFLAKE	PLAG	PLAG	OPAQUE	WHITE		0%		BLOCK	UNI	NONE				0										0			21	0	0	0	0	10.2	3.4	0	0		NO	2.25	
41	4	COMPFLAKE	PLAG	PLAG	OPAQUE	WHITE	FEATHER	0%		ELONG	UNI	NONE	0	NA		0										0			13.4	11.9	12.5	2.1	0	5.9	2.1	0	0		NO	0.32	
41	4	BROKFLAKE	PLAG	PLAG	OPAQUE	WHITE		0%		INDETER						0										0			15.6	0	0	0	0	0	0	0	0		NO	0.42	
41	4	COMPFLAKE	PLAG	PLAG	OPAQUE	WHITE	FEATHER	0%		EXPAND	CRUSH	NONE	<5	1		0										0			15	10.5	14.6	1.5	0	0	0	0	0		NO	0.25	
41	4	COMPFLAKE	PLAG	PLAG	N/A	WHITE	HINGE	0%		PLATREJUV	CRUSH	NONE	<5	90		0										0			16.8	15.3	10	3.4	0	0	0	0	0		NO	0.65	
41	4	COMPFLAKE	PLAG	PLAG	OPAQUE	WHITE	FEATHER	0%		INDETER	CRUSH	NONE	<5	1		0										0			13.8	9.8	9.9	1.2	0	0	0	0	0		NO	0.19	
41	4	PROXFLAKE	PLAG	PLAG	OPAQUE	WHITE		0%		BLADE	CRUSH	NONE				0										0			12.1	0	0	0	0	0	0	0	0		NO	0.38	
41	4	COMPFLAKE	PLAG	PLAG	OPAQUE	WHITE	FEATHER	0%		INDETER	CRUSH	NONE	<5	1		0										0			11	9.1	7.6	1.4	0	0	0	0	0		NO	0.12	
41	4	COMPFLAKE	PLAG	PLAG	OPAQUE	WHITE	FEATHER	0%		EXPAND	UNI	NONE	<5	1		0										0			9.4	6.2	8.8	0.8	0	7.8	0.6	0	0		NO	0.08	
41	4	COMPFLAKE	PLAG	PLAG	OPAQUE	WHITE	FEATHER	0%		EXPAND	UNI	NONE	<5	1		0										0			8.9	6.7	8.9	2.3	0	6.1	1.8	0	0		NO	0.16	
41	4	BROKFLAKE	PLAG	PLAG	OPAQUE	WHITE		0%		INDETER						0										0			13.5	0	0	0	0	0	0	0	0		NO	0.17	
41	4	DISTFLAKE	PLAG	PLAG	OPAQUE	WHITE	FEATHER	0%		INDETER						0										0			9.2	0	0	0	0	0	0	0	0		NO	0.11	
41	4	BROKFLAKE	PLAG	PLAG	OPAQUE	WHITE		0%		INDETER						0										0			14.1	0	0	0	0	0	0	0	0		NO	0.17	
41	4	BROKFLAKE	PLAG	PLAG	OPAQUE	WHITE		0%		INDETER						0										0			10	0	0	0	0	0	0	0	0		NO	0.14	
41	4	BROKFLAKE	PLAG	PLAG	OPAQUE	WHITE		0%		INDETER						0										0			112	0	0	0	0	0	0	0	0		NO	0.18	
41	4	COMPSPLIT	PLAG	PLAG	OPAQUE	WHITE	FEATHER	0%		INDETER						0										0			11.3	0	0	2.2	0	0	2.7	0	0		NO	0.21	
41	4	PROXFLAKE	PLAG	PLAG	OPAQUE	WHITE		0%		BLADE	UNI	NONE				0										0			12.7	0	0	0	0	3.4	1.2	0	0		NO	0.15	

SQ	SPIT	CLASS	MATERIAL GROUP	MATERIA	TRANSLUCENCY	COLOUR	DISTIAL END	CORTEX %	CORTEX TYPE	FORM	PLATFORM TYPE	PLATFORM PREPARATI	SCAR NUMBER	SCAR TYPE	TOOL TYPE	RETOUCHED EDGES	EDGE 1	EDGE 2	EDGE 3	EDGE 4	CORETYPE	CORE BODY	PLATFORM NUMBER	CORE EXHAUSTION?	SCAR FORM	CORE PLATFORMS	STEPS	HINGES	LENGTH	LENGTH AXIAL	WIDTH	THICKNESS	CORE FACE LENGTH	PLATFORM WIDTH	PLATFORM THICKNESS	CORE SCAR LENGTH	CORE SCAR WIDTH	NO. CORE SCARS	BURNT?	WEIGHT	COMMENTS
41	4	BROKFLAKE	PLAG	PLAG	OPAQUE	WHITE		0%		INDETER						0										0			10.3	0	0	0	0	0	0	0	0		NO	0.12	
41	4	COMPFLAKE	CCQ	JASPER	OPAQUE	BROWN	HINGE	0%		EXPAND	CRUSH	NONE	<5	90		0										0			7.2	7.2	7.5	0.91	0	0	0	0	0		NO	0.08	
41	4	BROKFLAKE	PLAG	PLAG	OPAQUE	WHITE		0%		INDETER						0										0			11.2	0	0	0	0	0	0	0	0		NO	0.07	
41	4	COMPFLAKE	PLAG	PLAG	OPAQUE	WHITE	FEATHER	0%		EXPAND	MISSING	NONE	<5	1		0										0			8.5	5.1	8.5	1.1	0	0	0	0	0		NO	0.08	
41	4	BROKFLAKE	PLAG	PLAG	OPAQUE	WHITE		0%		INDETER						0										0			17.5	0	0	0	0	0	0	0	0		NO	0.4	
41	4	COMPFLAKE	PLAG	PLAG	OPAQUE	WHITE	FEATHER	0%		PLATREJUV	UNI	NONE	<5	90		0										0			10.3	9.4	8.2	5.2	0	5	3.1	0	0		NO	0.29	
41	4	BROKTOOL	PLAG	PLAG	OPAQUE	WHITE		0%		ELONG					BACK	0										0			13	0	0	0	0	0	0	0	0		NO	0.3	lateral break on geo
41	4	DISTFLAKE	PLAG	PLAG	OPAQUE	WHITE	HINGE	0%		INDETER						0										0			13.7	0	0	0	0	0	0	0	0		NO	0.57	
41	4	BROKTOOL	PLAG	PLAG	OPAQUE	WHITE		0%		BLADE					BACK	0										0			19.9	0	0	0	0	0	0	0	0		NO	1.66	lateral snap with backing
41	4	BROKFLAKE	TUFF	TUFF	OPAQUE	WHITE		26-	ROUGH	INDETER						0										0			23.7	0	0	0	0	0	0	0	0		CRENAT	2.11	weathered cortex
41	4	BROKFLAKE	TUFF	TUFF	OPAQUE	WHITE		0%		INDETER						0										0			24	0	0	0	0	0	0	0	0		NO	1.8	white/cream colour x2
41	4	COMPFLAKE	CCQ	JASPER	OPAQUE	WHITE	STEP	0%		BLADE	UNI	NONE	<5	1		0										0			14.2	14.2	5.9	2.3	0	2.3	1.7	0	0		NO	0.22	
41	4	CORE	CCQ	CHAL	TRANS	GREEN		0%								0					UNID	FLAK	OVE	YES	EXPA	1	3	0	35.2	0	30.6	16.3	33	0	0	16.7	24.5	3-5	NO	19.3	
41	4	CORE	TUFF	TUFF	OPAQUE	GREEN		0%								0					ALTB	BLOC	NON	YES	ELO	2	3	1	49.2	0	26.3	22.5	49.2	0	0	25.7	16.1	3-5	NO	35.8	
138	5	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	1-	ROUGH	ELONG	CORTICAL	NONE	<5	90		0										0			47.8	47.4	26.3	8.9	0	13.6	5.8	0	0		NO	12.5	
138	5	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		ELONG	FACET	NONE	<5	1		0										0			47.4	47.4	21.1	5.6	0	12.8	4.2	0	0		NO	5.53	
138	5	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		ELONG	UNI	OVERHANG	<5	1		0										0			48.2	48.2	13	2.2	0	4.1	3.6	0	0		NO	1.61	
138	5	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		ELONG						0										0			70	0	0	0	0	0	0	0	0		NO	5.15	
138	5	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		ELONG	UNI	OVERHANG	<5	1		0										0			35	35	16	3.2	0	5	2.3	0	0		NO	2.31	
138	5	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	CORTICAL	1-	VEIN	ELONG	FLAKED	NONE	<5	1		0										0			42.1	39.9	19.6	5.4	0	8.2	1.9	0	0		NO	4.86	
138	5	COMPFLAKE	CCQ	JASPER	OPAQUE	BROWN	FEATHER	0%		INDETER	UNI	NONE	<5	1		0										0			31.6	27	21.4	5.3	0	16.1	4.7	0	0		NO	3.57	
138	5	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	HINGE	0%		ELONG	FLAKED	NONE	<5	1		0										0			20.4	20	13.1	4.3	0	10.2	4.3	0	0		NO	1.03	
138	5	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		EXPAND	CRUSH	NONE	<5	90		0										0			20.8	18	19.7	2.7	0	0	0	0	0		NO	0.83	trimming of core face
138	5	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		EXPAND						0										0			19.4	0	0	0	0	0	0	0	0		NO	0.76	
138	5	PROXFLAKE	CCQ	JASPER	OPAQUE	RED		0%		ELONG	FLAKED	NONE				0										0			26.6	0	0	0	0	4.9	3	0	0		NO	2.57	
138	5	PROXFLAKE	CCQ	JASPER	OPAQUE	RED		0%		BLADE	UNI	NONE				0										0			22	0	0	0	0	7.13	2.8	0	0		NO	0.6	
138	5	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		EXPAND	CRUSH	NONE	<5	90		0										0			15.7	13.9	14.1	3.9	0	0	0	0	0		NO	0.71	
138	5	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		EXPAND	MISSING	NONE	<5	90		0										0			25.7	15.9	25.4	5.4	0	0	0	0	0		NO	1.74	
138	5	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		ELONG	UNI	NONE	0	NA		0										0			17.9	16.3	9.3	2.3	0	7.4	3.3	0	0		NO	0.32	
138	5	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0										0			13.5	0	0	0	0	0	0	0	0		NO	0.17	
138	5	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		EXPAND						0										0			17.3	0	0	0	0	0	0	0	0		NO	0.52	
138	5	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		EXPAND	CRUSH	NONE	<5	90		0										0			18.8	8.8	18.8	2.6	0	0	0	0	0		NO	0.34	
138	5	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		INDETER						0										0			12.3	0	0	0	0	0	0	0	0		NO	0.22	
138	5	PROXFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER	FACET	NONE				0										0			13.6	0	0	0	0	0	0	0	0		NO	0.65	
138	5	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		INDETER						0										0			10.5	0	0	0	0	0	0	0	0		NO	0.11	
138	5	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		EXPAND	MISSING	NONE	<5	180		0										0			15.4	12	12.1	2.4	0	0	0	0	0		NO	0.39	
138	5	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0										0			15.4	0	0	0	0	0	0	0	0		NO	0.25	
138	5	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		BLADE	UNI	NONE	<5	1		0										0			12	12	5.2	0.96	0	3.2	0.69	0	0		NO	0.08	
138	5	PROXFLAKE	CCQ	JASPER	OPAQUE	RED		0%		ELONG	UNI	NONE				0										0			12.3	0	0	0	0	5	0.7	0	0		NO	0.14	
138	5	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		EXPAND						0										0			14.1	0	0	0	0	0	0	0	0		NO	0.41	
138	5	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0										0			15.5	0	0	0	0	0	0	0	0		NO	0.22	
138	5	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0										0			15.7	0	0	0	0	0	0	0	0		NO	0.28	
138	5	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		1-	VEIN	INDETER						0										0			13	0	0	0	0	0	0	0	0		NO	0.3	
138	5	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		ELONG	CRUSH	NONE	<5	90		0										0			12.7	11.1	7.4	1.6	0	0	0	0	0		NO	0.14	
138	5	PROXFLAKE	CCQ	JASPER	OPAQUE	RED		0%		ELONG	FACET	NONE				0										0			9.6	0	0	0	0	6.4	2.3	0	0		NO	0.12	
138	5	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		EXPAND	UNI	NONE	<5	1		0										0			22.2	13.7	21	4.9	0	14.2	6.7	0	0		NO	2	
138	5	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0										0			13.8	0	0	0	0	0	0	0	0		NO	0.73	
138	5	COMPSPLIT	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		INDETER						0										0			16.9	0	0	2.1	0	0	2.9	0	0		NO	0.37	
138	5	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		INDETER						0										0			10.3	0	0	0	0	0	0	0	0		NO	0.07	
138	5	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0										0			11.1	0	0	0	0	0	0	0	0		NO	0.21	
138	5	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0										0			10.3	0	0	0	0	0	0	0	0		NO	0.25	
138	5	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	1-	ROUGH	ELONG	CORTICAL	NONE	<5	90		0										0			60	55	22.2	9.6	0	20.6	6.4	0	0		NO	14.6	
138	5	COREFRAG	CCQ	JASPER	OPAQUE	RED		0%								0										0			25.3	0	0	0	0	0	0	0	0		NO	4.16	
138	5	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		ELONG						0										0			13.4	0	0	0	0	0	0	0	0		NO	0.08	
138	5	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		RIDGESTRAT						0										0			53	0	0	0	0	0	0	0	0		NO	9.76	
138	5	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		RIDGESTRAT	UNI	NONE	>5	90		0										0			75	74.3	19.2	7.1	0	6.8	1.6	0	0		NO	11.3	
138	5	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		INDETER						0										0			9	0	0	0	0	0	0	0	0		NO	0.09	
138	5	BROKFLAKE	CCQ	CHAL	TRANS	GREYCL		0%		EXPAND						0										0			18.5	0	0	0	0	0	0	0	0		NO	0.39	
138	5	DISTFLAKE	CCQ	CHAL	TRANS	GREYCL	FEATHER	0%		EXPAND						0										0			9.6	0	0	0	0	0	0	0	0		NO	0.07	
138	5	DISTFLAKE	TUFF	TUFF	OPAQUE	GREEN	FEATHER	0%		INDETER						0										0			12.5	0	0	0	0	0	0	0	0		NO	0.14	
138	5	BROKFLAKE	CCQ	JASPER	OPAQUE	BLUEG		0%		ELONG						0										0			17.9	0	0	0	0	0	0	0	0		NO	0.45	
138	5	PROXFLAKE	PLAG	PLAG	OPAQUE	WHITE	ABRUPT	0%		EXPAND	FLAKED	NONE	<5	90		0										0			20.3	17.1	19.1	4.5	0	14.8	3.4	0	0		NO	1.6	
138	5	BROKFLAKE	PLAG	PLAG	OPAQUE	WHITE		0%		INDETER						0										0			18.2	0	0	0	0	0	0	0	0		NO	0.52	
138	5	BROKFLAKE	CCQ	CHAL	TRANS	LGREY		0%		ELONG						0										0			36.2	0	0	0	0	0	0	0	0		NO	1.25	
138	5	COMPFLAKE	CCQ	CHAL	TRANS	LGREY	FEATHER	1-	VEIN	EXPAND	UNI	NONE	<5	90		0										0			18.8	15.2	18.5	4.2	0	5	1.5	0	0		NO	0.86	
138	5	COMPFLAKE	CCQ	CHAL	TRANS	LGREY	FEATHER	1-	VEIN	INDETER	UNI	NONE	<5	1		0										0			17.4	13.1	10.9	1.6	0	3.7	1.5	0	0		NO	0.32	
138	5	COMPFLAKE	CCQ	CHAL	TRANS	LGREY	FEATHER	26-	VEIN	ELONG	CRUSH	NONE	<5	1		0										0			22.3	22.3	10.1	2.3	0	0	0	0	0		NO	0.61	
138	5	COMPFLAKE	CCQ	CHAL	TRANS	LGREY	FEATHER	1-	VEIN	EXPAND	FLAKED	NONE	<5	1		0										0			20.3	15.9	13.2	2.7	0	14	4.2	0	0		NO	0.89	
138	5	COMPFLAKE	CCQ	CHAL	TRANS	GREYCL	FEATHER	0%		INDETER	UNI	NONE	<5	1		0										0			13.1	9	10	1.3	0	6.9	1.3	0	0		NO	0.14	
138	5	BROKFLAKE	CCQ	CHAL	TRANS	LGREY		100	VEIN	INDETER						0										0			23.1	0	0	0	0	0	0	0	0		NO	0.98	
138	5	COMPFLAKE	CCQ	JASPER	OPAQUE	LGREY	FEATHER	0%		ELONG	UNI	NONE	<5	180		0										0			24.9	24.9	12.5	2.1	0	3.4	2.1	0	0		NO	0.77	
138	5	COMPFLAKE	CCQ	CHAL	TRANS	LGREY	HINGE	0%		EXPAND	MISSING	NONE	<5	1		0										0			11.9	10.3	9.6	1.4	0	0	0	0	0		NO	0.17	
138	5	DISTFLAKE	CCQ	CHAL	TRANS	GREYCL	FEATHER	0%		EXPAND						0										0			13.5	0	0	0	0	0	0	0	0		NO	0.12	
138	5	CORE	CCQ	JASPER	OPAQUE	RED		1-	WATER-ROLL							0					BBLA	FLAK	NON	NO	ELO	1	2	0	57	0	46.1	17.5	34.9	0	0	10.3	7.6	1-2	NO	48.6	ring impacts
138	5	CORE	CCQ	JASPER	OPAQUE	RED		1-	WATER-ROLL							0					UNID	NON	FACE	NO	EXPA	1	1	0	55.2	0	35.7	16.5	32.8	0	0	28.5	21.4	1-2	NO	34.7	
138	5	BLOCK	CCQ	JASPER	OPAQUE	RED		0%								0										0			40.1	0	0	0	0	0	0	0	0		NO	13.2	
138	6	COMPTOOL	CCQ	JASPER	OPAQUE	RED	ABRUPT	0%		RIDGESTRAT	FACET	NONE	<5	90	USE	1	N/A	N/A	N/A	USE						0			64.6	63.9	19.1	8.9	0	12.2	5.1	0	0		NO	14	
138	6	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	1-	ROUGH	INDETER	FLAKED	NONE	<5	90		0										0			42.2	35.4	34.7	6.8	0	19.3	7.9	0	0		NO	12.5	more a chal

SQ	SPIT	CLASS	MATERIAL GROUP	MATERIAL	TRANSLUCENCY	COLOUR	DISTAL END	CORTEX %	CORTEX TYPE	FORM	PLATFORM TYPE	PLATFORM PREPARATI	SCAR NUMBER	SCAR TYPE	TOOL TYPE	RETOUCHED EDGES	EDGE 1	EDGE 2	EDGE 3	EDGE 4	CORETYPE	CORE BODY	PLATFORM NUMBER	CORE EXHAUSTION?	SCAR FORM	CORE PLATFORMS	STEPS	HINGES	LENGTH	LENGTH AXIAL	WIDTH	THICKNESS	CORE FACE LENGTH	PLATFORM WIDTH	PLATFORM THICKNESS	CORE SCAR LENGTH	CORE SCAR WIDTH	NO. CORE SCARS	BURNT?	WEIGHT	COMMENTS
138	6	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		INDETER						0										0			40.6	0	0	0	0	0	0	0	0		NO	5.26	
138	6	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		INDETER	UNI					0										0			31.5	0	0	0	0	0	0	0	0		NO	2.5	
138	6	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		EXPAND	UNI	NONE	<5	90		0										0			36.3	25.8	35.9	10.6	0	12.8	8.3	0	0		NO	9.56	
138	6	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		EXPAND	FLAKED	OVERHANG	<5	1		0										0			30.3	26	27.3	3.6	0	25.3	3.1	0	0		NO	2.87	
138	6	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	HINGE	0%		EXPAND	UNI	NONE	<5	90		0										0			32	18.8	24.3	8.4	0	18.7	11.9	0	0		NO	6.3	
138	6	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	HINGE	0%		BLADE	FACET	NONE	<5	1		0										0			27.5	26.9	8.6	2	0	5.9	2	0	0		NO	0.5	
138	6	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0										0			21.4	0	0	0	0	0	0	0	0		NO	2	
138	6	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		INDETER						0										0			25.3	0	0	0	0	0	0	0	0		NO	1.3	
138	6	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	HINGE	0%		INDETER						0										0			22.6	0	0	0	0	0	0	0	0		NO	1.63	
138	6	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0										0			20.5	0	0	0	0	0	0	0	0		NO	1.28	
138	6	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		INDETER						0										0			21.1	0	0	0	0	0	0	0	0		NO	1	
138	6	BLOCK	CCQ	JASPER	OPAQUE	RED		0%								0										0			17.1	0	0	0	0	0	0	0	0		NO	1.02	
138	6	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0										0			19.3	0	0	0	0	0	0	0	0		NO	0.28	
138	6	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		ELONG	CRUSH	NONE	<5	1		0										0			16	16	5.4	1.4	0	0	0	0	0		NO	0.11	
138	6	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		EXPAND	UNI	NONE	<5	180		0										0			9.6	8.6	9.8	1.7	0	4.1	1.3	0	0		NO	0.12	
138	6	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		ELONG	CRUSH	NONE	<5	1		0										0			15.6	15.6	4.4	1.7	0	0	0	0	0		NO	0.08	
138	6	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0										0			10.1	0	0	0	0	0	0	0	0		NO	0.16	
138	6	COMPSPLIT	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		INDETER						0										0			10.3	0	0	1.9	0	0	2.4	0	0		NO	0.14	
138	6	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0										0			13	0	0	0	0	0	0	0	0		NO	0.21	
138	6	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		INDETER	UNI	NONE	<5	90		0										0			11	10.3	8.3	1.1	0	6.4	2.3	0	0		NO	0.12	
138	6	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0										0			8.2	0	0	0	0	0	0	0	0		NO	0.16	
138	6	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0										0			10.3	0	0	0	0	0	0	0	0		NO	0.1	
138	6	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0										0			10	0	0	0	0	0	0	0	0		NO	0.2	
138	6	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0										0			6.7	0	0	0	0	0	0	0	0		NO	0.01	
138	6	BROKFLAKE	CCQ	JASPER	OPAQUE	LGREY		0%		INDETER						0										0			19.5	0	0	0	0	0	0	0	0		NO	0.65	
138	6	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0										0			14.6	0	0	0	0	0	0	0	0		NO	0.36	
138	6	BROKFLAKE	CCQ	CHAL	TRANS	GREYCL		0%		INDETER						0										0			16.3	0	0	0	0	0	0	0	0		NO	0.8	
138	6	COMPFLAKE	CCQ	CHAL	TRANS	LGREY	HINGE	0%		BLADE	UNI	NONE	<5	1		0										0			19.6	19.6	10.3	2.8	0	4.2	1.7	0	0		NO	0.51	
138	6	COMPFLAKE	CCQ	CHAL	TRANS	LGREY	FEATHER	0%		ELONG	UNI	NONE	<5	1		0										0			34.4	34.4	10.2	3.1	0	4.4	1.6	0	0		NO	1	banded
138	6	COMPFLAKE	CCQ	CHAL	TRANS	LGREY	FEATHER	1-	ROUGH	RIDGESTRAT	UNI	NONE	<5	90		0										0			37.9	37.9	14	6.1	0	10.3	4.4	0	0		NO	2.89	banded
138	6	COMPFLAKE	CCQ	CHAL	TRANS	LGREY	FEATHER	0%		INDETER	UNI	NONE	<5	90		0										0			27.5	25.1	18.9	5.3	0	13	5.5	0	0		NO	2.88	banded
138	6	COMPFLAKE	CCQ	CHAL	TRANS	LGREY	FEATHER	1-	VEIN	EXPAND	UNI	NONE	<5	1		0										0			16.5	9.2	14.8	3.9	0	13.9	3.9	0	0		NO	0.81	
138	6	COMPFLAKE	CCQ	CHAL	TRANS	LGREY	FEATHER	0%		BLADE	UNI	OVERHANG	<5	1		0										0			26.9	25	13.6	4.4	0	8.8	4	0	0		NO	1.72	banded
138	6	DISTFLAKE	CCQ	CHAL	TRANS	LGREY	FEATHER	0%		INDETER						0										0			19.3	0	0	0	0	0	0	0	0		NO	1.12	banded
138	6	COMPFLAKE	CCQ	CHAL	TRANS	LGREY	CORTICAL	1-	VEIN	EXPAND	UNI	NONE	<5	1		0										0			17	11.2	15.6	2.2	0	3.8	1.1	0	0		NO	0.44	
138	6	BROKFLAKE	CCQ	CHAL	TRANS	LGREY		0%		BLADE						0										0			21.5	0	0	0	0	0	0	0	0		NO	0.53	
138	6	COMPFLAKE	CCQ	CHAL	TRANS	LGREY	FEATHER	0%		EXPAND	CRUSH	NONE	<5	1		0										0			9.6	8.1	9.5	1.5	0	0	0	0	0		NO	0.08	
138	6	COMPFLAKE	CCQ	CHAL	TRANS	LGREY	FEATHER	0%		EXPAND	UNI	NONE	<5	90		0										0			12.8	12	11.4	1	0	7.7	1.3	0	0		NO	0.13	
138	6	COMPFLAKE	CCQ	CHAL	TRANS	LGREY	FEATHER	0%		EXPAND	CRUSH	NONE	<5	1		0										0			9.5	8.8	9.5	1.8	0	0	0	0	0		NO	0.12	
138	6	COMPFLAKE	CCQ	CHAL	TRANS	LGREY	FEATHER	0%		ELONG	CRUSH	NONE	<5	1		0										0			15.4	15.4	7.4	1.1	0	0	0	0	0		NO	0.14	
138	6	COMPFLAKE	CCQ	CHAL	TRANS	LGREY	FEATHER	1-	ROUGH	EXPAND	UNI	NONE	<5	1		0										0			16.8	13.6	16.9	3.6	0	2.8	1.6	0	0		NO	0.56	
138	6	COMPSPLIT	CCQ	CHAL	TRANS	LGREY	FEATHER	1-	ROUGH	INDETER						0										0			13.2	0	0	1.3	0	0	1.8	0	0		NO	0.14	
138	6	COMPSPLIT	CCQ	CHAL	TRANS	LGREY	FEATHER	1-	ROUGH	INDETER						0										0			11.5	0	0	1.3	0	0	1.1	0	0		NO	0.14	conjoin to cs 0.14g
138	6	COMPFLAKE	CCQ	CHAL	TRANS	LGREY	FEATHER	0%		ELONG	UNI	NONE	<5	1		0										0			11.9	11.6	8.1	1.8	0	6.4	0.8	0	0		NO	0.44	
138	6	COMPFLAKE	CCQ	CHAL	TRANS	LGREY	CORTICAL	1-	ROUGH	EXPAND	MISSING	NONE	<5	1		0										0			11.3	8.7	11.1	1.8	0	0	0	0	0		NO	0.19	
138	6	BROKFLAKE	CCQ	CHAL	TRANS	LGREY		0%		INDETER						0										0			8.2	0	0	0	0	0	0	0	0		NO	0.11	
138	6	COMPFLAKE	CCQ	JASPER	OPAQUE	LGREY	FEATHER	0%		EXPAND	UNI	NONE	<5	1		0										0			19.9	10.4	19.7	3.7	0	18.9	5.3	0	0		NO	0.89	banded
138	6	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0										0			23.1	0	0	0	0	0	0	0	0		NO	0.86	
138	6	BLOCK	MQU	MQUAR	TRANS	WHITE		0%								0										0			24.8	0	0	0	0	0	0	0	0		NO	1.28	
138	6	PROXFLAKE	MQU	MQUAR	TRANS	WHITE		0%		INDETER	CRUSH	NONE				0										0			12.6	0	0	0	0	0	0	0	0		NO	0.58	
138	6	BROKFLAKE	MQU	MQUAR	TRANS	WHITE		0%		INDETER						0										0			10.4	0	0	0	0	0	0	0	0		NO	0.17	
138	6	DISTFLAKE	PLAG	PLAG	OPAQUE	WHITE	FEATHER	0%		INDETER						0										0			9.2	0	0	0	0	0	0	0	0		NO	0.08	breccia
138	6	DISTFLAKE	PLAG	PLAG	TRANS	WHITE	FEATHER	0%		EXPAND						0										0			13.1	0	0	0	0	0	0	0	0		NO	0.23	breccia
138	6	BROKFLAKE	PLAG	PLAG	TRANS	WHITE		0%		INDETER						0										0			12.1	0	0	0	0	0	0	0	0		NO	0.16	breccia
138	6	COMPFLAKE	PLAG	PLAG	OPAQUE	WHITE	FEATHER	0%		INDETER	UNI	NONE	<5	1		0										0			10.4	9.6	8.2	1.2	0	6.1	2.7	0	0		NO	0.12	breccia
138	6	DISTFLAKE	CCQ	CHAL	TRANS	LGREY	HINGE	0%		INDETER						0										0			20.7	0	0	0	0	0	0	0	0		NO	0.55	
138	6	BROKFLAKE	CCQ	JASPER	OPAQUE	BROWN		0%		BLADE						0										0			20.4	0	0	0	0	0	0	0	0		NO	0.26	
138	6	COMPFLAKE	TUFF	TUFF	OPAQUE	GREEN	FEATHER	0%		INDETER	CRUSH	NONE	<5	1		0										0			16	14.4	11.1	3	0	0	0	0	0		NO	0.38	
138	6	PROXFLAKE	TUFF	TUFF	OPAQUE	GREEN		0%		BLOCK	UNI	NONE				0										0			16.7	0	0	0	0	2.8	1.8	0	0		NO	1.18	
138	6	DISTFLAKE	CCQ	CHAL	TRANS	LGREY	FEATHER	0%		INDETER						0										0			19.1	0	0	0	0	0	0	0	0		NO	1.14	banded
138	6	COMPFLAKE	CCQ	JASPER	OPAQUE	LGREY	FEATHER	0%		INDETER	UNI	NONE	<5	1		0										0			9.7	9	2.8	1.3	0	2.7	1.2	0	0		NO	0.08	
138	6	PROXFLAKE	CCQ	JASPER	OPAQUE	LGREY		0%		INDETER	UNI	NONE				0										0			9.5	0	0	0	0	5.5	0.8	0	0		NO	0.11	
138	6	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0										0			15.4	0	0	0	0	0	0	0	0		NO	1.03	
138	6	PROXTOOL	CCQ	CHAL	TRANS	LGREY		0%		BLADE	NA	NONE			BACK	0										0			13.1	0	0	0	0	0	0	0	0		NO	0.41	prox bondi baced plt and lm
138	6	PROXTOOL	CCQ	CHAL	TRANS	LGREY		0%		ELONG	NA	NONE			BON	0										0			19.1	0	0	0	0	0	0	0	0		NO	0.47	backed pltform and rm
138	6	COMPTOOL	CCQ	JASPER	OPAQUE	LGREY	FEATHER	0%		ELONG	NA	NONE	0	NA	BON	3	BACK	BACK	BACK	N/A						0			17.6	17.6	6	1.7	0	0	0	0	0		NO	0.12	banded
138	6	COMPTOOL	CCQ	CHAL	TRANS	LGREY	PLATFOR	0%		BLADE	CRUSH	NONE	<5	180	BURI	1	N/A	N/A	STEP	N/A						0			25.4	25.4	9.7	4.5	0	0	0	0	0		NO	0.84	
143	5	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	HINGE	0%		INDETER	FLAKED	NONE	<5	1		0										0			24.7	12.5	17.6	3.7	0	17.6	4.1	0	0		NO	1.47	
143	5	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	ABRUPT	0%		EXPAND	UNI	OVERHANG	<5	1		0										0			23.1	15	22.9	5.2	0	8	1.9	0	0		NO	1.82	
143	5	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0										0			15.1	0	0	0	0	0	0	0	0		NO	0.46	
143	5	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0										0			13.2	0	0	0	0	0	0	0	0		NO	0.36	
143	5	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0										0			20.7	0	0	0	0	0	0	0	0		NO	1	
143	5	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		EXPAND	UNI	OVERHANG	<5	1		0										0			23.7	13.8	23.9	2.2	0	12.8	3	0	0		NO	0.86	
143	5	PROXFLAKE	CCQ	JASPER	OPAQUE	RED		0%		ELONG	UNI	NONE				0										0			18.3	0	0	0	0	3.1	1.7	0	0		NO	0.97	
143	5	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0										0			18.4	0	0	0	0	0	0	0	0		NO	0.61	
143	5	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0										0			18	0	0	0	0	0	0	0	0	0	NO	0.5	
143	5	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0										0			21.6	0	0	0	0	0	0	0	0	0	NO	0.57	
143	5	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0										0			14	0	0	0	0	0	0	0	0	0	NO	0.39	

SQ	SPIT	CLASS	MATERIAL GROUP	MATERIAL	TRANSLUCENCY	COLOUR	DISTIAL END	CORTEX %	CORTEX TYPE	FORM	PLATFORM TYPE	PLATFORM PREPARATI	SCAR NUMBER	SCAR TYPE	TOOL TYPE	RETOUCHED EDGES	EDGE 1	EDGE 2	EDGE 3	EDGE 4	CORETYPE	CORE BODY	PLATFORM NUMBER	CORE EXHAUSTION?	SCAR FORM	CORE PLATFORMS	STEPS	HINGES	LENGTH	LENGTH AXIAL	WIDTH	THICKNESS	CORE FACE LENGTH	PLATFORM WIDTH	PLATFORM THICKNESS	CORE SCAR LENGTH	CORE SCAR WIDTH	NO. CORE SCARS	BURNT?	WEIGHT	COMMENTS
143	5	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		EXPAND	UNI	NONE	<5	1		0										0			13.4	10.2	12.4	1.6	0	8.8	0.98	0	0		NO	0.23	
143	5	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		EXPAND						0										0			14.2	0	0	0	0	0	0	0	0		NO	0.14	
143	5	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		INDETER						0										0			10.1	0	0	0	0	0	0	0	0		NO	0.12	
143	5	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0										0			12.9	0	0	0	0	0	0	0	0		NO	0.31	
143	5	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		ELONG						0										0			11.6	0	0	0	0	0	0	0	0		NO	0.06	
143	5	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		ELONG						0										0			13.6	0	0	0	0	0	0	0	0		NO	0.12	
143	5	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0										0			12.3	0	0	0	0	0	0	0	0		NO	0.23	
143	5	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		BLADE						0										0			8.6	0	0	0	0	0	0	0	0		NO	0.09	
143	5	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		EXPAND	UNI	NONE	<5	90		0										0			25.1	9.9	25.3	2.5	0	18.1	2	0	0		NO	0.77	
143	5	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		ELONG	UNI	NONE	<5	1		0										0			21.5	20.8	13.7	3	0	6.2	3.1	0	0		NO	1.04	
143	5	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		INDETER						0										0			10.7	0	0	0	0	0	0	0	0		NO	0.2	
143	5	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0										0			23.7	0	0	0	0	0	0	0	0		NO	1.28	
143	5	PROXFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER	MISSING	NONE				0										0			9.3	0	0	0	0	0	0	0	0		NO	0.09	
143	5	BLOCK	CCQ	JASPER	OPAQUE	RED		0%								0										0			9.8	0	0	0	0	0	0	0	0		NO	0.3	
143	5	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0										0			14.4	0	0	0	0	0	0	0	0		NO	0.5	
143	5	PROXFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER	FLAKED	NONE				0										0			18.1	0	0	0	0	14.4	6.1	0	0		NO	1.97	
143	5	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0										0			8.8	0	0	0	0	0	0	0	0		NO	0.07	
143	5	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	STEP	1-	VEIN	EXPAND	UNI	NONE	<5	1		0										0			13.4	8.3	13.3	3.7	0	6.6	3.6	0	0		NO	0.44	
143	5	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		INDETER						0										0			13.6	0	0	0	0	0	0	0	0		NO	0.25	
143	5	PROXFLAKE	CCQ	JASPER	OPAQUE	RED		0%		ELONG	CRUSH	NONE				0										0			23.6	0	0	0	0	0	0	0	0		NO	0.75	
143	5	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		ELONG	FACET	NONE	<5	1		0										0			12.1	11.2	6.7	1.9	0	7.8	3.3	0	0		NO	0.17	
143	5	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0										0			8.1	0	0	0	0	0	0	0	0		NO	0.07	
143	5	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0										0			25.9	0	0	0	0	0	0	0	0		NO	1.75	
143	5	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	CRUSH	0%		BIPOLAR	FLAKED	NONE	<5	1		0										0			38.9	38.9	14.7	4.3	0	8.5	3.2	0	0		NO	2.61	
143	5	CORE	CCQ	JASPER	OPAQUE	RED		0%								0					BBLA	FLAK	OVE	YES	ELO	1	2	0	75.5	0	55.6	17.7	26.8	0	0	13.3	7.4	3-5	NO	73	
143	5	CORE	CCQ	JASPER	OPAQUE	RED		0%								0					UNID	FLAK	NON	YES	EXPA	1	2	0	51	0	30	18.4	18.9	0	0	9	9.8	1-2	NO	26.2	failed attempts x2
143	5	CORE	CCQ	JASPER	OPAQUE	RED		1-	ROUGH							0					MUL	BLOC	OVE	YES	EXPA	3	1	3	57.2	0	45.2	24.2	37.4	0	0	19.2	13.6	3-5	NO	71	atypical bblade failed internal flaws
143	5	CORE	CCQ	JASPER	OPAQUE	RED		0%								0					BBLA	FLAK	FACE	YES	ELO	2	3	0	32.4	0	24.9	18	33.8	0	0	20.9	10.7	3-5	NO	16.5	bifacial platform with prep
143	5	COMPSPLIT	CCQ	JASPER	OPAQUE	RED	N/A	0%		INDETER						0										0			32.1	0	0	3.2	0	0	4	0	0		NO	2.24	
143	5	PROXFLAKE	CCQ	CHAL	TRANS	LGREY		0%		BLADE	FACET	NONE				0										0			28.2	0	0	0	0	8.6	4.3	0	0		NO	3	
138	4	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	CORTICAL	1-	ROUGH	INDETER	FLAKED	NONE	<5	180		0										0			58.3	56	33.1	11.6	0	13.9	4.2	0	0		NO	16.3	
138	4	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	HINGE	0%		INDETER						0										0			13.6	0	0	0	0	0	0	0	0		NO	0.21	
138	4	DISTFLAKE	CCQ	CHAL	TRANS	LGREY	PLUNGE	1-	VEIN	INDETER						0										0			21.2	0	0	0	0	0	0	0	0		NO	1.23	
22	3	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0										0			41.2	0	0	0	0	0	0	0	0		NO	9.22	
142	1	COMPTOOL	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		EXPAND	FACET	NONE	<5	90	CON	1	N/A	N/A	SCALA	N/A						0			23.2	16.6	23.4	4	0	15.1	2.2	0	0		NO	1.19	
18	4	COMPFLAKE	CCQ	JASPER	OPAQUE	ORANG	FEATHER	0%		EXPAND	FLAKED	OVERHANG	<5	1		0										0			25.2	17.9	25.5	4.2	0	15.1	3	0	0		NO	1.81	same materal orange/brn jasper
18	4	BROKFLAKE	CCQ	CHAL	TRANS	LGREY		0%		INDETER						0										0			15.4	0	0	0	0	0	0	0	0		NO	0.59	
143	4	COMPSPLIT	TUFF	TUFF	OPAQUE	GREEN	FEATHER	0%		INDETER						0										0			36.3	0	0	7.9	0	0	11	0	0		NO	6.29	
142	4	COMPSPLIT	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		INDETER						0										0			15	0	0	2.8	0	0	2.7	0	0		NO	0.55	
142	4	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		EXPAND						0										0			14.5	0	0	0	0	0	0	0	0		NO	0.32	
142	4	COMPFLAKE	CCQ	JASPER	OPAQUE	LGREY	HINGE	0%		EXPAND	UNI	NONE	<5	90		0										0			13.5	7.9	13.6	1.8	0	6.2	1.4	0	0		NO	0.26	
142	4	COMPSPLIT	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		INDETER						0										0			11.5	0	0	4.1	0	0	3	0	0		NO	0.26	
142	4	CORE	CCQ	JASPER	OPAQUE	RED		0%								0					BBLA	FLAK	FACE	YES	ELO	2	1	0	36.8	0	28.4	13.1	25.5	0	0	15.1	13.5	1-2	NO	12.5	atyp bblade across platform gone
142	4	DISTFLAKE	CCQ	CHAL	TRANS	GREYCL	FEATHER	0%		EXPAND						0										0			12.9	0	0	0	0	0	0	0	0		NO	0.19	
127	3	COMPSPLIT	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		BLOCK						0										0			57	0	0	17.3	0	0	20.7	0	0		NO	24.2	
127	3	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	ABRUPT	0%		BLOCK	UNI	NONE	<5	90		0										0			44.8	19.9	41.3	16.6	0	29	11.2	0	0		NO	17.5	
127	3	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0										0			41.2	0	0	0	0	0	0	0	0		NO	5.51	
127	3	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		BLOCK	UNI	NONE	<5	180		0										0			25	24	12.6	10.5	0	6.7	3.8	0	0		NO	2.34	
127	3	BLOCK	CCQ	JASPER	OPAQUE	RED		1-	VEIN							0										0			23.6	0	0	0	0	0	0	0	0		NO	2.81	
127	3	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		EXPAND						0										0			13.6	0	0	0	0	0	0	0	0		NO	0.44	
127	3	DISTFLAKE	MQU	MQUAR	TRANS	WHITE	FEATHER	0%		EXPAND						0										0			16.5	0	0	0	0	0	0	0	0		NO	0.65	
127	3	BROKFLAKE	PLAG	PLAG	OPAQUE	WHITE		0%		INDETER						0										0			14.9	0	0	0	0	0	0	0	0		NO	0.46	
127	3	PROXFLAKE	CCQ	CHAL	TRANS	LGREY	FEATHER	0%		INDETER	FACET	NONE				0										0			9.6	0	0	0	0	5.9	1.8	0	0		NO	0.1	
127	3	BLOCK	TUFF	TUFF	OPAQUE	YELLOW		0%								0										0			25.6	0	0	0	0	0	0	0	0		NO	4.18	meta sandstone
127	3	BROKFLAKE	CCQ	CHAL	TRANS	GREYCL		0%		EXPAND						0										0			24.2	0	0	0	0	0	0	0	0		NO	1.18	
127	3	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0										0			28.3	0	0	0	0	0	0	0	0		NO	0.6	
127	3	COMPFLAKE	CCQ	JASPER	OPAQUE	BROWN	HINGE	0%		PLATREJUV	UNI	NONE	<5	90		0										0			39.7	39.5	26.8	6.3	0	8.2	2.1	0	0		NO	9.68	
129	2	COMPSPLIT	CCQ	CHAL	TRANS	ORANG	HINGE	0%		INDETER						0										0			18.8	0	0	7.2	0	0	0	0	0		NO	0.59	orange/white
129	2	DISTFLAKE	CCQ	CHAL	TRANS	GREYCL	FEATHER	0%		EXPAND						0										0			30.1	0	0	0	0	0	0	0	0		NO	2.01	
129	2	BROKFLAKE	PLAG	PLAG	OPAQUE	WHITE		0%		INDETER						0										0			18.2	0	0	0	0	0	0	0	0		NO	1	
129	2	BROKFLAKE	CCQ	CHAL	TRANS	GREYCL		1-	ROUGH	INDETER						0										0			10.7	0	0	0	0	0	0	0	0		NO	0.19	
129	2	BROKFLAKE	CCQ	CHAL	TRANS	LGREY		0%		INDETER						0										0			23.5	0	0	0	0	0	0	0	0		NO	0.71	
129	2	COMPFLAKE	QUA	QUARTZI	TRANS	LGREY	FEATHER	0%		EXPAND	UNI	NONE	<5	1		0										0			23	16.5	22.9	2.7	0	4.1	2.5	0	0		NO	0.89	
129	2	BLOCK	CCQ	JASPER	OPAQUE	PINK		0%								0										0			30.6	0	0	0	0	0	0	0	0		NO	7.15	
129	2	COMPFLAKE	CCQ	JASPER	OPAQUE	BLUEG	ABRUPT	1-	VEIN	BLOCK	UNI	NONE	<5	90		0										0			43.8	37.5	32.6	12	0	12	7.7	0	0		NO	18.4	
129	2	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	PLATFOR	0%		PLATREJUV	UNI	NONE	<5	180		0										0			34	32.7	18.6	10.8	0	14.7	10.4	0	0		NO	7.37	
129	2	PROXFLAKE	CCQ	JASPER	OPAQUE	RED		0%		ELONG	FACET	NONE				0										0			21.4	0	0	0	0	7.5	3.9	0	0		NO	1.53	
129	2	DISTFLAKE	CCQ	JASPER	OPAQUE	BLUEG	FEATHER	0%		INDETER						0										0			21.2	0	0	0	0	0	0	0	0		NO	2.18	
129	2	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		INDETER						0										0			17.7	0	0	0	0	0	0	0	0		NO	0.66	
129	2	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		INDETER	UNI	NONE	<5	90		0										0			26.5	23	23.9	7.8	0	15.9	5.3	0	0		NO	4.76	lustre
129	2	BROKFLAKE	CCQ	JASPER	OPAQUE	BLUEG		0%		INDETER						0										0			22.8	0	0	0	0	0	0	0	0		NO	1.98	
124	1	COMPTOOL	CCQ	JASPER	OPAQUE	BLUEG	FEATHER	0%		BLOCK	UNI	NONE	<5	90	USE	1	N/A	N/A	USEWE	N/A						0			45.9	25.6	44.9	7.8	0	16	2.5	0	0		NO	10.9	
124	1	COMPSPLIT	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		EXPAND						0										0			25.8	0	0	6.1	0	0	3.6	0	0		NO	3.03	
124	1	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0										0			37.8	0	0	0	0	0	0	0	0		NO	5.28	
124	1	BROKFLAKE	CCQ	JASPER	OPAQUE	BLUEG		0%		INDETER						0										0			20.7	0	0	0	0	0	0	0	0		NO	1.33	
124	1	BROKFLAKE	MQU	MQUAR	OPAQUE	WHITE		0%		INDETER						0										0			17.9	0	0	0	0	0	0	0	0		NO	0.97	
124	1	BROKFLAKE	MQU	MQUAR	OPAQUE	WHITE		0%		INDETER						0										0			16.6	0	0	0	0	0	0	0	0		NO	0.72	
129	3	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		EXPAND	UNI	OVERHANG	<5	1		0										0			38.4	26.4	31.3	5.8	0	25.9	3.3	0	0		NO	5.47	trimming

SQ	SPIT	CLASS	MATERIAL GROUP	MATERIAL	TRANSLUCENCY	COLOUR	DISTIAL END	CORTEX %	CORTEX TYPE	FORM	PLATFORM TYPE	PLATFORM PREPARATI	SCAR NUMBER	SCAR TYPE	TOOL TYPE	RETOUCHED EDGES	EDGE 1	EDGE 2	EDGE 3	EDGE 4	CORETYPE	CORE BODY	PLATFORM NUMBER	CORE EXHAUSTION?	SCAR FORM	CORE PLATFORMS	STEPS	HINGES	LENGTH	LENGTH AXIAL	WIDTH	THICKNESS	CORE FACE LENGTH	PLATFORM WIDTH	PLATFORM THICKNESS	CORE SCAR LENGTH	CORE SCAR WIDTH	NO. CORE SCARS	BURNT?	WEIGHT	COMMENTS
129	3	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		EXPAND						0										0			26.1	0	0	0	0	0	0	0	0		NO	1.26	trimming
129	3	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		EXPAND						0										0			18.3	0	0	0	0	0	0	0	0		NO	0.4	
129	3	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		ELONG	FACET	NONE	<5	1		0										0			37.4	37.4	12.5	5.2	0	8.8	4.2	0	0		NO	2.89	
129	3	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0										0			10.6	0	0	0	0	0	0	0	0		NO	0.15	
129	3	COMPSPLIT	CCQ	JASPER	OPAQUE	BLUEG	HINGE	0%		INDETER						0										0			23.5	0	0	4.6	0	0	5.1	0	0		NO	1.3	
129	3	COMPFLAKE	CCQ	JASPER	OPAQUE	BLUEG	FEATHER	0%		EXPAND	UNI	NONE	<5	1		0										0			22.9	15.7	17.9	3.9	0	15.2	3.9	0	0		NO	1.5	
129	3	BLOCK	CCQ	JASPER	OPAQUE	RED		0%								0										0			24.7	0	0	0	0	0	0	0	0		NO	1.8	
129	3	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0										0			9.3	0	0	0	0	0	0	0	0		NO	0.12	
129	3	BROKFLAKE	CCQ	CHAL	TRANS	GREYCL		0%		INDETER						0										0			8.5	0	0	0	0	0	0	0	0		NO	0.01	
129	3	COMPTOOL	CCQ	JASPER	OPAQUE	RED	N/A	0%		INDETER	NA	NONE	<5	1	GEO	3	BACK	BACK	BACK	N/A						0			13.5	13.5	9.3	5.2	0	0	0	0	0		NO	0.83	
129	3	COMPSPLIT	CCQ	CHAL	TRANS	GREYCL	N/A	0%		INDETER						0										0			31.3	0	0	8	0	0	7.1	0	0		NO	4.54	
129	3	COMPFLAKE	CCQ	CHAL	TRANS	LGREY	FEATHER	0%		INDETER	CRUSH	NONE	<5	180		0										0			21.4	18.9	14.3	2.8	0	0	0	0	0		NO	0.82	
129	3	COMPTOOL	QUA	QUARTZI	TRANS	LGREY	N/A	0%		ELONG	NA	NONE	<5	90	BON	3	BACK	BACK	BACK	N/A						0			19	19	0	7.4	0	0	0	0	0		NO	0.57	
130	4	COMPFLAKE	CCQ	CHAL	TRANS	GREYCL	FEATHER	0%		INDETER	UNI	NONE	<5	1		0										0			26.3	14.7	2.9	2.9	0	19.5	7.4	0	0		NO	1.59	
130	4	PROXFLAKE	CCQ	JASPER	OPAQUE	BLUEG		0%		INDETER	UNI	NONE				0										0			18.4	0	0	0	0	8.8	5.6	0	0		NO	0.74	
130	4	BROKFLAKE	QUA	QUARTZI	OPAQUE	WHITE		0%		INDETER						0										0			13.3	0	0	0	0	0	0	0	0		NO	0.22	
130	4	PROXTOOL	CCQ	JASPER	OPAQUE	RED		0%		BLOCK	UNI	OVERHANG			USE	0										0			39.2	0	0	0	0	17.5	10.2	0	0		NO	16.8	attempt at platform prep for core
130	4	BLOCK	CCQ	CHAL	TRANS	ORANG		1-	WATER-ROLL							0										0			69.2	0	0	0	0	0	0	0	0		NO	22	orange/dark grey
130	4	DISTFLAKE	CCQ	JASPER	OPAQUE	ORANG	FEATHER	0%		EXPAND						0										0			24.6	0	0	0	0	0	0	0	0		NO	1.17	
130	4	COMPFLAKE	QUA	QUARTZI	TRANS	WHITE	FEATHER	0%		EXPAND	MISSING	NONE	<5	180		0										0			16.2	14.8	15.2	4	0	0	0	0	0		NO	0.99	
128	4	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		EXPAND	UNI	NONE	<5	90		0										0			55.5	31.9	51	12	0	36.4	13.8	0	0		NO	23.4	
128	4	COMPTOOL	CCQ	JASPER	OPAQUE	RED	N/A	0%		INDETER	NA	NONE	0	NA	GEO	3	BACK	BACK	BACK	N/A						0			20.8	20.8	10.1	2.3	0	0	0	0	0		NO	0.54	
128	4	BROKFLAKE	CCQ	JASPER	OPAQUE	BROWN		0%		INDETER						0										0			9.8	0	0	0	0	0	0	0	0		NO	0.11	
128	4	PROXFLAKE	CCQ	JASPER	OPAQUE	BROWN		1-	VEIN	BLOCK	FLAKED	NONE				0										0			22.3	0	0	0	0	12.9	4.8	0	0		NO	2.15	
128	4	BLOCK	CCQ	JASPER	OPAQUE	RED		1-	WATER-ROLL							0										0			36.2	0	0	0	0	0	0	0	0		NO	11.5	
128	4	BROKFLAKE	CCQ	JASPER	OPAQUE	BROWN		0%		INDETER						0										0			13.6	0	0	0	0	0	0	0	0		NO	0.2	
128	4	COMPFLAKE	CCQ	JASPER	OPAQUE	BROWN	FEATHER	0%		ELONG	MISSING	NONE	<5	1		0										0			14.2	14.2	6	1.4	0	0	0	0	0		NO	0.14	
128	4	COMPFLAKE	CCQ	JASPER	OPAQUE	BROWN	STEP	0%		ELONG	FACET	NONE	<5	1		0										0			13.5	13.5	7.2	2.1	0	6	1.3	0	0		NO	0.19	
128	4	DISTTOOL	CCQ	JASPER	OPAQUE	BROWN	FEATHER	0%		INDETER					USE	0										0			17.9	0	0	0	0	0	0	0	0		NO	0.75	
128	4	BROKFLAKE	CCQ	CHAL	TRANS	ORANG		0%		INDETER						0										0			13.4	0	0	0	0	0	0	0	0		NO	0.28	
128	4	DISTFLAKE	MQU	MQUAR	TRANS	WHITE	CRUSH	0%		INDETER						0										0			18.2	0	0	0	0	0	0	0	0		NO	0.49	
127	2	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	HINGE	0%		INDETER						0										0			16	0	0	0	0	0	0	0	0		NO	0.22	
127	2	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		INDETER	UNI	OVERHANG	<5	1		0										0			14.7	14.5	10.6	3.3	0	6.2	2.7	0	0		NO	0.37	
127	2	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		EXPAND						0										0			14.6	0	0	0	0	0	0	0	0		NO	0.17	
127	2	BROKFLAKE	QUA	QUARTZI	OPAQUE	PINK		0%		INDETER						0										0			16.4	0	0	0	0	0	0	0	0		NO	0.17	
130	2	COMPTOOL	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		EXPAND	UNI	OVERHANG	<5	90	USE	1	N/A	N/A	USEWE	N/A						0			32.7	23.8	28.4	7.1	0	21.4	4.3	0	0		NO	6.12	
130	2	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	ABRUPT	0%		EXPAND	UNI	NONE	0	NA		0										0			18.7	8.9	18.7	2.9	0	15	2.6	0	0		NO	0.57	
130	2	DISTFLAKE	PLAG	PLAG	TRANS	WHITE	FEATHER	0%		INDETER						0										0			21.3	0	0	0	0	0	0	0	0		NO	0.86	
130	2	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		EXPAND	UNI	NONE	<5	1		0										0			16.5	12.9	15.4	3.5	0	6.5	3.7	0	0		NO	0.88	
130	2	COMPFLAKE	QUA	QUARTZI	TRANS	PINK	FEATHER	1-	WATER-ROLL	ELONG	CORTICAL	NONE	<5	1		0										0			21.3	18.4	9.1	3.1	0	7.4	5.4	0	0		NO	0.7	
130	2	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0										0			14.3	0	0	0	0	0	0	0	0		NO	0.25	
130	2	BROKFLAKE	MQU	MQUAR	OPAQUE	WHITE		0%		INDETER						0										0			16.7	0	0	0	0	0	0	0	0		NO	0.31	
130	2	COREFRAG	CCQ	JASPER	OPAQUE	BROWN		0%								0										0			17.9	0	0	0	0	0	0	0	0		NO	0.55	
130	2	PROXFLAKE	CCQ	CHAL	TRANS	ORANG		0%		ELONG	UNI	NONE				0										0			19.5	0	0	0	0	8.5	1.5	0	0		NO	0.51	black waves
130	2	COMPFLAKE	CCQ	CHAL	TRANS	ORANG	HINGE	0%		INDETER	FLAKED	NONE	<5	90		0										0			15.7	15.7	10.3	2.6	0	6.8	3.1	0	0		NO	0.44	black waves
134	4	COMPFLAKE	CCQ	SERP	TRANS	GREEN	FEATHER	1-	VEIN	BLOCK	UNI	OVERHANG	<5	90		0										0			39.7	27.8	27.3	10.3	0	24.4	10.4	0	0		NO	11	grey with green trans
134	4	COMPFLAKE	CCQ	SERP	TRANS	GREEN	FEATHER	0%		EXPAND	FLAKED	OVERHANG	<5	1		0										0			24	19.2	18.9	3.1	0	20.2	3.3	0	0		NO	1.24	
134	4	DISTFLAKE	CCQ	CHAL	TRANS	LGREY	FEATHER	0%		INDETER						0										0			20.4	0	0	0	0	0	0	0	0		NO	0.64	
94	1	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		EXPAND	UNI	NONE	<5	90		0										0			25.8	19	25.9	4.1	0	21.1	4.4	0	0		NO	2.38	
126	3	COMPSPLIT	CCQ	JASPER	OPAQUE	BLUEG	FEATHER	0%		INDETER						0										0			25.2	0	0	4.5	0	0	8.5	0	0		NO	3.14	
126	3	COMPTOOL	CCQ	JASPER	OPAQUE	RED	N/A	0%		ELONG	FACET	OVERHANG	0	NA	BON	1	N/A	BACK	N/A	N/A						0			14.2	14.2	6.1	3	0	5.1	2.5	0	0		NO	0.3	backed from ventral
126	3	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	STEP	0%		BLADE	FACET	NONE	<5	1		0										0			17.1	17.1	5	1.7	0	4.6	1.8	0	0		NO	0.22	
126	3	BROKFLAKE	MQU	MQUAR	TRANS	WHITE		0%		INDETER						0										0			12	0	0	0	0	0	0	0	0		NO	0.24	
126	3	PROXFLAKE	CCQ	JASPER	OPAQUE	RED		0%		ELONG	UNI	NONE				0										0			15.8	0	0	0	0	4.5	1.6	0	0		NO	0.59	
126	3	PROXFLAKE	CCQ	JASPER	OPAQUE	BLUEG		0%		BLADE	FACET	NONE				0										0			13	0	0	0	0	5.2	2.7	0	0		NO	0.43	
130	3	DISTFLAKE	CCQ	CHAL	TRANS	GREYCL	FEATHER	0%		BLADE						0										0			27.1	0	0	0	0	0	0	0	0		NO	1.02	
130	3	BROKFLAKE	CCQ	CHAL	TRANS	GREYCL		0%		INDETER						0										0			21.5	0	0	0	0	0	0	0	0		NO	1.36	
130	3	DISTFLAKE	CCQ	CHAL	TRANS	GREYCL	FEATHER	0%		EXPAND						0										0			12.5	0	0	0	0	0	0	0	0		NO	0.12	
130	3	COMPFLAKE	CCQ	JASPER	OPAQUE	ORANG	ABRUPT	0%		BLOCK	FACET	NONE	<5	RADI		0										0			60	50.9	17.7	9.6	0	11.9	3.3	0	0		NO	12.1	banded black
130	3	COMPTOOL	CCQ	CHAL	TRANS	LGREY	ABRUPT	0%		ELONG	UNI	NONE	<5	90	USE	1	N/A	USEWE	N/A	N/A						0			36.7	34.3	14.5	6.5	0	9.2	2.6	0	0		NO	2.6	
130	3	COMPFLAKE	CCQ	JASPER	OPAQUE	LGREY	FEATHER	0%		INDETER	UNI	NONE	<5	90		0										0			28.1	19.2	18.5	7.8	0	11.1	4.4	0	0		NO	3.02	
130	3	COMPFLAKE	CCQ	CHAL	TRANS	LGREY	FEATHER	0%		PLATREJUV	UNI	NONE	>5	RADI		0										0			40.6	37	31.6	11.9	0	9.6	5.6	0	0		NO	15.2	
130	3	COMPFLAKE	PLAG	PLAG	OPAQUE	WHITE	CORTICAL	1-	ROUGH	EXPAND	MISSING	STEP	<5	1		0										0			27.9	24.6	26.3	7.2	0	0	0	0	0		NO	4	
130	3	BLOCK	PLAG	PLAG	OPAQUE	WHITE		0%								0										0			16.6	0	0	0	0	0	0	0	0		NO	0.83	
130	3	COMPFLAKE	PLAG	PLAG	OPAQUE	WHITE	FEATHER	0%		ELONG	UNI	NONE	<5	1		0										0			14.1	13	8	1.8	0	8.3	2.2	0	0		NO	0.19	
130	3	COMPTOOL	CCQ	JASPER	OPAQUE	BLUEG	N/A	N/A	N/A	INDETER	NA	NONE	0	NA	GEO	3	BACK	BACK	BACK	N/A						0			12.1	12.1	9.7	2.9	0	0	0	0	0		NO	0.19	
153	2	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	PLUNGE	1-	VEIN	BLOCK	UNI	NONE	>5	90		0										0			50	49	21.2	10.3	0	10.1	5.6	0	0		NO	14.5	blade removals, cleaning core face
153	2	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		ELONG	UNI	NONE	<5	180		0										0			21.6	20.3	11.1	2	0	4.4	1.5	0	0		NO	0.46	
153	2	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0										0			13.4	0	0	0	0	0	0	0	0		NO	0.29	
153	2	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0										0			15.2	0	0	0	0	0	0	0	0		NO	0.2	
153	2	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0										0			11.6	0	0	0	0	0	0	0	0		NO	0.18	
153	2	COMPSPLIT	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		INDETER						0										0			18.9	0	0	5.26	0	0	5.3	0	0		NO	1.12	
153	2	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		EXPAND						0										0			99	0	0	0	0	0	0	0	0		NO	0.13	
153	2	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		ELONG						0										0			25.7	0	0	0	0	0	0	0	0		NO	4.5	
153	2	COMPFLAKE	CCQ	JASPER	OPAQUE	BROWN	FEATHER	0%		INDETER	UNI	NONE	<5	90		0										0			32.6	25.9	27.1	6.3	0	8.5	4.3	0	0		NO	6.18	
153	2	BROKFLAKE	CCQ	JASPER	OPAQUE	BROWN		0%		ELONG						0										0			21.3	0	0	0	0	0	0	0	0		NO	0.69	
153	2	BROKFLAKE	CCQ	JASPER	OPAQUE	BROWN		0%		INDETER						0										0			20	0	0	0	0	0	0	0	0		NO	0.21	
153	2	BLOCK	CCQ	JASPER	OPAQUE	BROWN		0%								0										0			11.7	0	0	0	0	0	0	0	0		NO	0.29	

SQ	SPIT	CLASS	MATERIAL GROUP	MATERIAL	TRANSLUCENCY	COLOUR	DISTIAL END	CORTEX %	CORTEX TYPE	FORM	PLATFORM TYPE	PLATFORM PREPARATI	SCAR NUMBER	SCAR TYPE	TOOL TYPE	RETOUCHED EDGES	EDGE 1	EDGE 2	EDGE 3	EDGE 4	CORETYPE	CORE BODY	PLATFORM NUMBER	CORE EXHAUSTION?	SCAR FORM	CORE PLATFORMS	STEPS	HINGES	LENGTH	LENGTH AXIA	WIDTH	THICKNESS	CORE FACE LENGTH	PLATFORM WIDTH	PLATFORM THICKNESS	CORE SCAR LENGTH	CORE SCAR WIDTH	NO. CORE SCARS	BURNT?	WEIGHT	COMMENTS
153	2	COMPFLAKE	CCQ	JASPER	OPAQUE	BROWN	FEATHER	0%		INDETER	MISSING	NONE	<5	1		0										0			23.5	21.7	16.1	3.8	0	0	0	0	0		NO	1.41	
153	2	BROKTOOL	CCQ	JASPER	OPAQUE	BLUEG		51-	VEIN	INDETER					BACK	0										0			26.7	0	0	0	0	0	0	0	0		NO	4.03	
153	2	BROKFLAKE	CCQ	JASPER	OPAQUE	BLUEG		0%		INDETER						0										0			16.5	0	0	0	0	0	0	0	0		NO	0.28	
153	2	DISTFLAKE	CQU	CQUART	CLEAR	CLEAR	FEATHER	0%		INDETER						0										0			16.7	0	0	0	0	0	0	0	0		NO	0.73	
153	2	BROKFLAKE	CCQ	SERP	TRANS	GREEN		0%		INDETER						0										0			21.8	0	0	0	0	0	0	0	0		NO	2.29	green to clear/grey
153	2	PROXFLAKE	CCQ	SERP	TRANS	GREEN		0%		ELONG	FLAKED	STEP				0										0			19.4	0	0	0	0	11.04	2.2	0	0		NO	1.15	conjoin with 2.29g
153	2	COMPFLAKE	CCQ	SERP	TRANS	GREEN	FEATHER	26-	ROUGH	EXPAND	CRUSH	NONE	<5	90		0										0			19.3	13.6	19.2	4.6	0	0	0	0	0		NO	1.16	
153	2	COMPFLAKE	CCQ	SERP	TRANS	GREEN	FEATHER	0%		INDETER	MISSING	NONE	<5	90		0										0			17.9	17.9	10.2	2.7	0	0	0	0	0		NO	0.56	
153	2	DISTFLAKE	CCQ	SERP	TRANS	GREEN	FEATHER	1-	ROUGH	INDETER						0										0			26	0	0	0	0	0	0	0	0		NO	2.19	
153	2	COMPFLAKE	CCQ	SERP	TRANS	GREEN	FEATHER	0%		EXPAND	FLAKED	NONE	<5	1		0										0			25	19.2	21	4.1	0	17	4.9	0	0		NO	1.79	
153	2	COMPFLAKE	CCQ	SERP	TRANS	GREEN	ABRUPT	0%		BLOCK	UNI	NONE	<5	1		0										0			30.3	24	22.1	8.2	0	12.3	4.1	0	0		NO	5.11	
153	2	COMPFLAKE	CCQ	SERP	TRANS	GREEN	FEATHER	0%		EXPAND	FLAKED	NONE	<5	90		0										0			21.1	9.4	19.2	4.9	0	21.1	6.8	0	0		NO	1.21	
153	2	PROXFLAKE	CCQ	CHAL	TRANS	GREYCL		0%		ELONG	FACET	NONE				0										0			25.1	0	0	0	0	7.6	2.4	0	0		NO	1.62	
153	2	BROKFLAKE	CCQ	CHAL	TRANS	GREYCL		0%		INDETER						0										0			25.2	0	0	0	0	0	0	0	0		NO	1.5	
153	2	BROKFLAKE	CCQ	CHAL	TRANS	GREYCL		0%		INDETER						0										0			14.4	0	0	0	0	0	0	0	0		NO	0.44	
153	2	BROKFLAKE	CCQ	CHAL	TRANS	GREYCL		0%		ELONG						0										0			15.8	0	0	0	0	0	0	0	0		NO	0.47	
153	2	COMPFLAKE	CCQ	CHAL	TRANS	GREYCL	FEATHER	0%		INDETER	UNI	NONE	<5	1		0										0			16.8	16	12.5	2.7	0	8.7	5.3	0	0		NO	0.56	
153	2	PROXFLAKE	CCQ	CHAL	TRANS	GREYCL		0%		INDETER	UNI	NONE				0										0			7.9	0	0	0	0	4.9	1.2	0	0		NO	0.06	
153	2	COMPFLAKE	CCQ	CHAL	TRANS	WHITE	FEATHER	0%		INDETER	CRUSH	NONE	<5	1		0										0			10.9	9.3	7.1	0.87	0	0	0	0	0		NO	0.09	
153	2	COMPTOOL	CCQ	CHAL	TRANS	GREYCL	FEATHER	51-	WATER-ROLL	INDETER	UNI	OVERHANG	<5	1	USE	1	N/A	N/A	USEWE	N/A						0			24.7	24.7	6.6	6.6	0	0	6.1	0	0		NO	3.62	compsplit
153	2	DISTFLAKE	TUFF	TUFF	OPAQUE	GREEN	FEATHER	0%		INDETER						0										0			12.4	0	0	0	0	0	0	0	0		NO	0.19	
153	2	DISTFLAKE	TUFF	TUFF	OPAQUE	GREEN	FEATHER	0%		INDETER						0										0			20.7	0	0	0	0	0	0	0	0		NO	0.36	
153	2	COMPSPLIT	CCQ	JASPER	OPAQUE	LGREY	HINGE	0%		INDETER						0										0			31.8	0	0	3.7	0	0	3.9	0	0		NO	3.77	banded
153	2	CORE	TUFF	TUFF	OPAQUE	GREEN		1-	ROUGH							0					MUL	BLOC	FACE	NO	MIXE	3	2	0	51.6	0	30.3	28.2	41.7	0	0	12.2	13.5	3-5	NO	62.5	
156	3	COMPFLAKE	CCQ	SERP	TRANS	GREEN	PLUNGE	1-	WATER-ROLL	PLATREJUV	UNI	STEP	<5	90		0										0			32.3	24.4	35.1	9.4	0	9.9	3.6	0	0		NO	6.75	
156	3	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	PLUNGE	0%		PLATREJUV	UNI	NONE	>5	180		0										0			39.4	39.4	14.9	10.4	0	4.3	3.7	0	0		NO	4.59	q3 old platform with blades cleaning cor
156	3	BLOCK	CCQ	JASPER	OPAQUE	RED		1-	ROUGH							0										0			15.2	0	0	0	0	0	0	0	0		NO	0.68	
156	3	HF	CCQ	JASPER	OPAQUE	RED		26-	WATER-ROLL	N/A						0										0			41.8	0	0	0	0	0	0	0	0		FRACTU	19.4	
156	2	COMPFLAKE	CCQ	SERP	TRANS	GREEN	ABRUPT	1-	WATER-ROLL	BLOCK	UNI	NONE	<5	RADI		0										0			35.4	18.9	19.8	8.3	0	15.7	2	0	0		NO	5.69	
156	2	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	HINGE	0%		EXPAND	FLAKED	STEP	<5	1		0										0			46	29.1	43.7	9.6	0	19.7	3.4	0	0		NO	10.8	
156	2	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		BLOCK						0										0			20.2	0	0	0	0	0	0	0	0		NO	20.2	
156	2	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		EXPAND						0										0			20.9	0	0	0	0	0	0	0	0		NO	0.5	
156	2	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0										0			15.1	0	0	0	0	0	0	0	0		NO	0.31	
156	2	COMPFLAKE	CCQ	JASPER	OPAQUE	BLUEG	FEATHER	0%		EXPAND	CRUSH	NONE	<5	1		0										0			19.6	11.6	19.6	1.6	0	0	0	0	0		NO	0.44	
156	2	BROKFLAKE	CCQ	JASPER	OPAQUE	BROWN		0%		INDETER						0										0			15.9	0	0	0	0	0	0	0	0		NO	0.37	
156	2	COMPFLAKE	PLAG	PLAG	OPAQUE	WHITE	FEATHER	0%		EXPAND	FLAKED	NONE	<5	1		0										0			11.6	8.2	10.1	2.1	0	9.6	1.9	0	0		NO	0.19	
156	2	BROKFLAKE	CCQ	CHAL	TRANS	GREYCL		51-	ROUGH	INDETER						0										0			14.9	0	0	0	0	0	0	0	0		NO	0.57	
156	2	DISTFLAKE	CCQ	CHAL	TRANS	GREYCL	FEATHER	0%		ELONG						0										0			24.9	0	0	0	0	0	0	0	0		NO	1.77	
158	1	BLOCK	CCQ	JASPER	OPAQUE	RED		0%								0										0			35	0	0	0	0	0	0	0	0		NO	10.4	
158	1	DISTFLAKE	CCQ	CHAL	TRANS	GREYCL	FEATHER	0%		INDETER						0										0			15.7	0	0	0	0	0	0	0	0		NO	0.54	
158	1	DISTFLAKE	CCQ	CHAL	TRANS	WHITE	FEATHER	0%		INDETER						0										0			28.7	0	0	0	0	0	0	0	0		NO	0.6	
158	1	BLOCK	CCQ	JASPER	OPAQUE	RED		0%								0										0			19.7	0	0	0	0	0	0	0	0		COLOUR	2	
154	3	DISTFLAKE	CCQ	SERP	TRANS	GREEN	FEATHER	1-	VEIN	INDETER						0										0			24.3	0	0	0	0	0	0	0	0		NO	2.96	
154	3	COMPSPLIT	QUA	QUARTZI	TRANS	WHITE	FEATHER	0%		BLOCK	UNI	NONE	<5			0										0			20.3	0	0	8.5	0	0	4.8	0	0		NO	1.48	
154	3	PROXFLAKE	CCQ	CHAL	TRANS	GREYCL		0%		INDETER	FLAKED	NONE				0										0			12.8	0	0	0	0	12.3	3.9	0	0		NO	0.29	
154	5	COREFRAG	CCQ	SERP	TRANS	GREEN		1-	VEIN							0										0			18	0	0	0	0	0	0	0	0		NO	2.18	
154	5	BROKFLAKE	PLAG	PLAG	OPAQUE	WHITE		0%		INDETER						0										0			30.8	0	0	0	0	0	0	0	0		NO	6.43	
155	2	COMPFLAKE	CCQ	JASPER	OPAQUE	BROWN	FEATHER	0%		INDETER	FLAKED	NONE	<5	90		0										0			19.6	15.9	15.1	3.9	0	7.7	5.8	0	0		NO	0.99	
155	2	COMPSPLIT	CCQ	JASPER	OPAQUE	RED	FEATHER	100	ROUGH	INDETER						0										0			15.3	0	0	3.7	0	0	5.4	0	0		NO	0.33	
155	2	COMPFLAKE	CCQ	CHAL	TRANS	BROWN	ABRUPT	0%		BLOCK	FLAKED	OVERHANG	<5	90		0										0			41.9	33.5	25.1	9.7	0	23.9	8.2	0	0		NO	10.5	carn/jasper/chal seen before
155	2	COMPFLAKE	CCQ	CHAL	TRANS	BROWN	FEATHER	0%		EXPAND	UNI	NONE	0	NA		0										0			10	7.6	9	1.7	0	9.3	3.7	0	0		NO	0.18	
154	1	COMPFLAKE	CCQ	JASPER	OPAQUE	BROWN	FEATHER	0%		EXPAND	UNI	NONE	0	NA		0										0			11.4	8.2	11.4	1.7	0	8.7	2.2	0	0		NO	0.16	
155	3	COMPFLAKE	CCQ	JASPER	OPAQUE	BROWN	PLUNGE	0%		ELONG	UNI	OVERHANG	<5	90		0										0			25.1	24.1	10.9	4	0	7.1	3	0	0		NO	1.65	
155	3	BROKFLAKE	MQU	MQUAR	TRANS	WHITE		0%		INDETER						0										0			14.1	0	0	0	0	0	0	0	0		NO	0.64	
157	1	COMPFLAKE	CCQ	CHAL	TRANS	GREYCL	FEATHER	0%		EXPAND	UNI	NONE	<5	90		0										0			24	15.5	21.5	4.6	0	14.8	5.1	0	0		NO	2.02	
157	1	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0										0			18.7	0	0	0	0	0	0	0	0		NO	0.76	
157	1	PROXFLAKE	CCQ	CHAL	TRANS	LGREY		0%		INDETER	UNI	NONE				0										0			11.7	0	0	0	0	6.6	1.8	0	0		NO	0.3	
157	1	COMPTOOL	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		BLOCK	UNI	NONE	<5	90	NOT	1	N/A	N/A	N/A	NOT						0			31.8	29.7	25	7.7	0	6	2.5	0	0		NO	4.77	
157	1	BROKFLAKE	CQU	CQUART	CLEAR	CLEAR		0%		INDETER						0										0			14.9	0	0	0	0	0	0	0	0		NO	0.74	
151	4	DISTFLAKE	VOL	VOL	OPAQUE	DGREY	ABRUPT	0%		EXPAND						0										0			44.6	0	0	0	0	0	0	0	0		NO	6.96	
110	5	PROXFLAKE	CCQ	JASPER	OPAQUE	RED		0%		ELONG	FLAKED	OVERHANG				0										0			25.7	0	0	0	0	20.4	9	0	0		NO	5.03	
110	5	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		ELONG	UNI	NONE	<5	90		0										0			42.2	37.2	30.9	8.2	0	12.6	5.9	0	0		NO	6.77	
110	5	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		BLOCK	UNI	NONE	<5	90		0										0			25.2	19.5	20.9	8.9	0	9.8	9.4	0	0		NO	5.21	
110	5	BLOCK	CCQ	JASPER	OPAQUE	RED		0%								0										0			24.3	0	0	0	0	0	0	0	0		NO	2.1	
110	5	DISTFLAKE	CCQ	JASPER	OPAQUE	BROWN	FEATHER	0%		ELONG						0										0			24.5	0	0	0	0	0	0	0	0		NO	1.61	chal/jasper/greycl
110	5	BROKFLAKE	CCQ	JASPER	OPAQUE	BLUEG		0%		INDETER						0										0			16.1	0	0	0	0	0	0	0	0		NO	0.4	
110	5	COMPFLAKE	CCQ	CHAL	TRANS	LGREY	FEATHER	0%		BLOCK	UNI	NONE	<5	RADI		0										0			20.9	11.7	19.8	8.9	0	16.2	7.7	0	0		NO	2.51	
110	5	DISTFLAKE	CCQ	CHAL	TRANS	LGREY	FEATHER	0%		INDETER						0										0			21.4	0	0	0	0	0	0	0	0		NO	1.36	
110	5	COMPFLAKE	CCQ	CHAL	TRANS	LGREY	STEP	1-	ROUGH	BLOCK	FLAKED	STEP	<5	1		0										0			27.8	26	26.7	13	0	14.2	4.8	0	0		NO	6.03	
110	5	COMPSPLIT	CCQ	CHAL	TRANS	LGREY	HINGE	0%		EXPAND						0										0			16.2	0	0	2.3	0	0	1.9	0	0		NO	0.34	
110	5	COMPFLAKE	CCQ	CHAL	TRANS	LGREY	FEATHER	0%		INDETER	UNI	NONE	<5	1		0										0			19.7	12.8	13	1.4	0	6.8	2.3	0	0		NO	0.35	banded
110	5	COMPFLAKE	CCQ	CHAL	TRANS	LGREY	FEATHER	0%		EXPAND	CRUSH	NONE	<5	90		0										0			20.3	13.3	19.8	2.4	0	0	0	0	0		NO	0.58	banded
47	4	COMPFLAKE	CCQ	CHAL	TRANS	GREYCL	PLUNGE	1-	ROUGH	RIDGESTRAT	CRUSH	NONE	<5	90		0										0			34.7	34.7	18.5	11.4	0	0	0	0	0		NO	5.27	
47	4	BROKFLAKE	CCQ	CHAL	TRANS	GREYCL		0%		INDETER						0										0			20	0	0	0	0	0	0	0	0		NO	0.3	
47	4	BROKFLAKE	CCQ	CHAL	TRANS	GREYCL		0%		INDETER						0										0			13.3	0	0	0	0	0	0	0	0		NO	0.3	
47	4	COMPFLAKE	CCQ	CHAL	TRANS	GREYCL	HINGE	0%		INDETER	UNI	NONE	<5	1		0										0			16.1	14	13.2	1.4	0	3.2	1.9	0	0		NO	0.34	
47	4	COMPFLAKE	CCQ	CHAL	TRANS	GREYCL	FEATHER	0%		EXPAND	CRUSH	NONE	<5	90		0										0			18.1	13	17.9	4.7	0	0	0	0	0		NO	1.24	
47	4	PROXFLAKE	CCQ	CHAL	TRANS	GREYCL		0%		INDETER	UNI	NONE				0										0			15.4	0	0	0	0	6.5	2.3	0	0		NO	0.36	

SQ	SPIT	CLASS	MATERIAL GROUP	MATERIAL	TRANSLUCENCY	COLOUR	DISTIAL END	CORTEX %	CORTEX TYPE	FORM	PLATFORM TYPE	PLATFORM PREPARATI	SCAR NUMBER	SCAR TYPE	TOOL TYPE	RETOUCHED EDGES	EDGE 1	EDGE 2	EDGE 3	EDGE 4	CORETYPE	CORE BODY	PLATFORM NUMBER	CORE EXHAUSTION?	SCAR FORM	CORE PLATFORMS	STEPS	HINGES	LENGTH	LENGTH AXIAL	WIDTH	THICKNESS	CORE FACE LENGTH	PLATFORM WIDTH	PLATFORM THICKNESS	CORE SCAR LENGTH	CORE SCAR WIDTH	NO. CORE SCARS	BURNT?	WEIGHT	COMMENTS
47	4	COMPSPLIT	CCQ	CHAL	TRANS	GREYCL	FEATHER	0%		INDETER						0												19.9	0	0	2.9	0	0	0	0		NO	0.7	
47	4	BROKFLAKE	CCQ	CHAL	TRANS	GREYCL		0%		INDETER						0												14.9	0	0	0	0	0	0	0		NO	0.47	
47	4	COREFRAG	CCQ	CHAL	TRANS	GREYCL		0%								0												13.6	0	0	0	0	0	0	0		NO	0.55	
47	4	BROKFLAKE	CCQ	CHAL	TRANS	GREYCL		0%		BLADE						0												10.5	0	0	0	0	0	0	0		NO	0.11	
47	4	COMPSPLIT	CCQ	CHAL	TRANS	GREYCL	FEATHER	0%		EXPAND						0												11.7	0	0	2.4	0	0	2.1	0	0	NO	0.13	
47	4	CORE	CCQ	JASPER	OPAQUE	RED		0%								0					MUL	FLAK	FACE	YES	MIXE	3	1	1	25.9	0	25.8	12.8	24.9	0	0	17.8	15.2	3-5	NO	9.28	bbcore then flaked altern on ventral
97	2	COMPFLAKE	CCQ	JASPER	OPAQUE	BROWN	FEATHER	0%		INDETER	UNI	OVERHANG	<5	90		0										0			30.2	30.2	20.1	3.8	0	11	7	0	0	NO	3.01	bending
97	2	BLOCK	CCQ	JASPER	OPAQUE	PINK		0%								0										0			50.9	0	0	0	0	0	0	0	0	NO	37.1	
97	2	BLOCK	CCQ	JASPER	OPAQUE	PINK		0%								0										0			24.4	0	0	0	0	0	0	0	0	NO	1.31	
50	3	COMPFLAKE	CCQ	SERP	TRANS	GREEN	FEATHER	0%		INDETER	UNI	STEP	<5	1		0										0			24.2	21.2	16.5	4.6	0	15.1	4.3	0	0	NO	1.96	
50	3	COMPFLAKE	CCQ	SERP	TRANS	GREEN	FEATHER	0%		EXPAND	UNI	NONE	<5	1		0										0			11.1	6.5	11.1	1.8	0	4.6	1.1	0	0	NO	0.1	
50	3	COMPFLAKE	CCQ	JASPER	OPAQUE	BLUEG	FEATHER	0%		ELONG	CRUSH	NONE	<5	1		0										0			22.2	22.2	6.9	4.2	0	0	0	0	0	NO	0.64	
50	3	BROKFLAKE	CCQ	JASPER	OPAQUE	BLUEG		0%		INDETER						0										0			22	0	0	0	0	0	0	0	0	NO	1.47	
50	3	COMPFLAKE	CCQ	JASPER	OPAQUE	BLUEG	FEATHER	0%		EXPAND	UNI	NONE	<5	90		0										0			12.1	6.6	12.1	2.4	0	4.9	2.4	0	0	NO	0.21	
50	3	BROKFLAKE	CCQ	CHAL	TRANS	WHITE		0%		INDETER						0										0			20.9	0	0	0	0	0	0	0	0	NO	1.73	
50	3	BROKFLAKE	CCQ	CHAL	TRANS	PINK		0%		INDETER						0										0			13.5	0	0	0	0	0	0	0	0	NO	0.55	
47	2	DISTFLAKE	CCQ	SERP	TRANS	GREEN	FEATHER	0%		INDETER						0										0			19.9	0	0	0	0	0	0	0	0	NO	1.43	
47	2	COMPFLAKE	CCQ	JASPER	OPAQUE	GREEN	FEATHER	0%		ELONG	FACET	NONE	<5	1		0										0			18.5	18.5	12.6	4.3	0	12.2	3.3	0	0	NO	0.96	tuff?
47	2	BROKFLAKE	MQU	MQUAR	OPAQUE	WHITE		0%		INDETER						0										0			14.4	0	0	0	0	0	0	0	0	NO	0.38	
47	2	COMPFLAKE	CCQ	CHAL	TRANS	GREYCL	FEATHER	0%		EXPAND	CRUSH	NONE	<5	1		0										0			11.5	9.9	9.9	1.8	0	0	0	0	0	NO	0.15	
110	4	COMPFLAKE	CCQ	SERP	TRANS	GREEN	ABRUPT	0%		ELONG	UNI	NONE	<5	180		0										0			48.1	36.6	25.5	7.4	0	16.7	5.9	0	0	NO	7.86	
110	4	COMPSPLIT	CCQ	CHAL	TRANS	LGREY	FEATHER	26-	ROUGH	INDETER						0										0			28.8	0	0	6.2	0	0	4.6	0	0	NO	3.66	
110	4	COMPFLAKE	CCQ	SERP	TRANS	GREEN	FEATHER	0%		INDETER	UNI	NONE	<5	1		0										0			15.1	15.1	10.5	2.8	0	4.2	2.3	0	0	NO	0.4	
110	4	DISTFLAKE	CCQ	JASPER	OPAQUE	LGREY	FEATHER	0%		BLADE						0										0			30.6	0	0	0	0	0	0	0	0	NO	2.27	banded
110	4	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		INDETER						0										0			27.9	0	0	0	0	0	0	0	0	NO	1.6	
110	4	COMPFLAKE	CCQ	SERP	TRANS	GREEN	FEATHER	0%		ELONG	UNI	NONE	<5	1		0										0			21.2	18.8	12.6	3.1	0	9.6	3.1	0	0	NO	1	
110	4	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	ABRUPT	0%		EXPAND	UNI	OVERHANG	<5	90		0										0			45.1	34.5	42	10	0	24.2	10.3	0	0	NO	18.3	
110	4	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		BLADE						0										0			13	0	0	0	0	0	0	0	0	NO	0.19	
110	4	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		EXPAND	UNI	NONE	<5	90		0										0			14.8	7.2	14.8	2	0	5.7	2.7	0	0	NO	0.32	
110	4	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		EXPAND	UNI	NONE	0	NA		0										0			8.9	6.3	8.9	2.3	0	4.1	2.5	0	0	NO	0.12	
110	4	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		EXPAND						0										0			13.3	0	0	0	0	0	0	0	0	NO	0.17	
110	4	PROXFLAKE	CCQ	JASPER	OPAQUE	RED		0%		ELONG	UNI	NONE				0										0			18.6	0	0	0	0	6.6	2.6	0	0	NO	0.85	
110	4	DISTFLAKE	CCQ	SERP	TRANS	GREEN	FEATHER	0%		ELONG						0										0			16	0	0	0	0	0	0	0	0	NO	0.34	
110	4	PROXFLAKE	CCQ	CHAL	TRANS	GREYCL	FEATHER	0%		BLADE	MISSING	OVERHANG				0										0			9	0	0	0	0	0	0	0	0	NO	0.01	
110	4	PROXFLAKE	PLAG	PLAG	OPAQUE	WHITE		0%		ELONG	FLAKED	OVERHANG				0										0			12.1	0	0	0	0	7.2	5	0	0	NO	0.53	
110	4	BLOCK	MQU	MQUAR	OPAQUE	WHITE		0%								0										0			22.4	0	0	0	0	0	0	0	0	NO	0.99	
110	4	BLOCK	MQU	MQUAR	OPAQUE	WHITE		0%								0										0			11.6	0	0	0	0	0	0	0	0	NO	0.14	
110	4	BROKFLAKE	CCQ	JASPER	OPAQUE	YELLOW		0%		INDETER						0										0			9.7	0	0	0	0	0	0	0	0	NO	0.21	
110	4	BLOCK	PLAG	PLAG	OPAQUE	WHITE		0%								0										0			12	0	0	0	0	0	0	0	0	NO	0.21	
110	4	COMPFLAKE	FSILC	FSILCRET	OPAQUE	PINK	HINGE	0%		EXPAND	UNI	OVERHANG	<5	1		0										0			19.2	17.5	17.7	6.2	0	17.5	6.2	0	0	NO	1.88	
106	1	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		INDETER	MISSING	NONE	<5	90		0										0			20.1	16.5	16.1	3.3	0	0	0	0	0	NO	0.81	
106	1	COREFRAG	CCQ	JASPER	OPAQUE	RED		0%								0										0			16.4	0	0	0	0	0	0	0	0	NO	0.37	
106	1	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		EXPAND						0										0			10.1	0	0	0	0	0	0	0	0	NO	0.11	
106	1	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		INDETER						0										0			9.6	0	0	0	0	0	0	0	0	NO	0.1	
106	1	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0										0			39.2	0	0	0	0	0	0	0	0	NO	6.15	
106	1	CORE	CCQ	JASPER	OPAQUE	BROWN		1-	WATER-ROLL							0					MUL	BLOC	BOT	YES	MIXE	4	2	0	42.2	0	39	20.1	36.2	0	0	29.3	9.3	6-10	NO	44.9	atyp blade core
93	1	COMPFLAKE	CCQ	JASPER	OPAQUE	BROWN	FEATHER	0%		INDETER	FLAKED	NONE	<5	1		0										0			23.3	22.1	18.6	2.9	0	14	3.7	0	0	NO	1.54	
93	1	BLOCK	MQU	MQUAR	TRANS	WHITE		1-	ROUGH							0										0			25.6	0	0	0	0	0	0	0	0	NO	5.76	facet
93	1	BLOCK	MQU	MQUAR	OPAQUE	WHITE		0%								0										0			0	0	0	0	0	0	0	0	0	NO	8.96	
93	1	BLOCK	CQU	CQUART	TRANS	CLEAR		0%								0										0			16.3	0	0	0	0	0	0	0	0	NO	1.74	single crystal with facets
93	1	COMPFLAKE	MQU	MQUAR	OPAQUE	WHITE	FEATHER	0%		INDETER	CRUSH	NONE	<5	90		0										0			16.5	14.7	12.2	4.7	0	0	0	0	0	NO	0.86	
93	1	BLOCK	CQU	CQUART	TRANS	CLEAR		0%								0										0			11.3	0	0	0	0	0	0	0	0	NO	0.7	
93	1	DISTFLAKE	MQU	MQUAR	TRANS	WHITE	FEATHER	0%		INDETER						0										0			13.7	0	0	0	0	0	0	0	0	NO	0.5	
93	1	DISTFLAKE	TUFF	TUFF	OPAQUE	GREEN	STEP	0%		INDETER						0										0			10.4	0	0	0	0	0	0	0	0	NO	0.18	
93	1	COMPFLAKE	TUFF	TUFF	OPAQUE	GREEN	FEATHER	0%		EXPAND	UNI	NONE	<5	90		0										0			13.5	5.9	13.7	2.3	0	10.4	3.3	0	0	NO	0.26	
93	1	CORE	MQU	MQUAR	OPAQUE	WHITE		0%								0					UNID	BLOC	NON	NO	EXPA	1	1	0	57	0	37.7	28.5	36.2	0	0	24.2	20	1-2	NO	73.5	
50	1	PROXFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER	UNI	NONE				0										0			35.8	0	0	0	0	14.7	7.2	0	0	NO	5.99	
97	3	PROXFLAKE	CCQ	SERP	TRANS	GREEN		0%		BLADE	FLAKED	NONE				0										0			21	0	0	0	0	7.1	3.1	0	0	NO	0.65	grades to a green tuff
97	3	BROKFLAKE	CCQ	JASPER	OPAQUE	LGREY		0%		INDETER						0										0			14.1	0	0	0	0	0	0	0	0	NO	0.45	
97	3	PROXFLAKE	MQU	MQUAR	OPAQUE	WHITE		0%		INDETER	CRUSH	NONE				0										0			20.4	0	0	0	0	0	0	0	0	NO	1.86	
97	3	BLOCK	MQU	MQUAR	OPAQUE	WHITE		0%								0										0			19.3	0	0	0	0	0	0	0	0	NO	0.88	
97	3	BROKFLAKE	MQU	MQUAR	TRANS	WHITE		0%		INDETER						0										0			16.2	0	0	0	0	0	0	0	0	NO	0.42	
97	3	BLOCK	CQU	CQUART	CLEAR	CLEAR		0%								0										0			10	0	0	0	0	0	0	0	0	NO	0.32	
97	3	BROKFLAKE	MQU	MQUAR	OPAQUE	WHITE		0%		INDETER						0										0			32.9	0	0	0	0	0	0	0	0	NO	2.87	
117	2	BLOCK	CCQ	JASPER	OPAQUE	RED		1-	VEIN							0										0			26.4	0	0	0	0	0	0	0	0	NO	4.22	
117	2	PROXFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER	CRUSH	OVERHANG				0										0			14.8	0	0	0	0	0	0	0	0	NO	0.42	
117	2	COMPFLAKE	MQU	MQUAR	OPAQUE	WHITE	FEATHER	0%		INDETER	FLAKED	NONE	<5	90		0										0			15	15	10.5	3	0	5.9	3.3	0	0	NO	0.56	
117	2	COMPFLAKE	QUA	QUARTZI	TRANS	ORANG	N/A	0%		ELONG	UNI	OVERHANG	<5	1		0										0			25	24.3	12.9	5	0	10.8	2.9	0	0	NO	1.57	orange/white
117	2	COMPFLAKE	QUA	QUARTZI	TRANS	ORANG	FEATHER	0%		ELONG	UNI	OVERHANG	<5	1		0										0			20.7	19.9	14.9	3.3	0	10.2	1.7	0	0	NO	1	orange/white
117	2	COMPFLAKE	QUA	QUARTZI	TRANS	ORANG	FEATHER	0%		EXPAND	UNI	NONE	<5	1		0										0			18.5	13.6	18.5	2.9	0	4.6	3.5	0	0	NO	0.57	orange/white
117	2	BROKFLAKE	QUA	QUARTZI	TRANS	ORANG		0%		INDETER						0										0			18.2	0	0	0	0	0	0	0	0	NO	1.22	orange/white
117	2	COMPSPLIT	CCQ	SERP	TRANS	GREEN	FEATHER	0%		INDETER						0										0			23.1	0	0	2.4	0	0	5	0	0	NO	1.8	
117	2	COMPSPLIT	CCQ	CHAL	TRANS	LGREY	FEATHER	0%		INDETER						0										0			28.5	0	0	9.3	0	0	7.3	0	0	NO	3.26	
117	2	COMPFLAKE	CCQ	CHAL	TRANS	GREYCL	FEATHER	0%		INDETER	FACET	NONE	<5	1		0										0			13.5	12.2	9.4	2	0	9	2.2	0	0	NO	0.35	
117	2	COMPSPLIT	CCQ	CHAL	TRANS	GREYCL	N/A	0%		INDETER						0										0			11.8	0	0	3.6	0	0	3.1	0	0	NO	0.33	
117	2	DISTFLAKE	CCQ	CHAL	TRANS	GREYCL	PLUNGE	0%		ELONG						0										0			21.5	0	0	0	0	0	0	0	0	NO	1.79	
150	2	PROXFLAKE	CCQ	JASPER	OPAQUE	RED		0%		ELONG	FLAKED	NONE				0										0			18.3	0	0	0	0	6.4	2.6	0	0	NO	0.78	
150	2	PROXFLAKE	CCQ	JASPER	OPAQUE	RED		0%		ELONG	CRUSH	NONE				0										0			20.3	0	0	0	0	0	0	0	0	NO	0.98	

SQ	SPIT	CLASS	MATERIAL GROUP	MATERIAL	TRANSLUCENCY	COLOUR	DISTIAL END	CORTEX %	CORTEX TYPE	FORM	PLATFORM TYPE	PLATFORM PREPARATI	SCAR NUMBER	SCAR TYPE	TOOL TYPE	RETOUCHED EDGES	EDGE 1	EDGE 2	EDGE 3	EDGE 4	CORETYPE	CORE BODY	PLATFORM NUMBER	CORE EXHAUSTION?	SCAR FORM	CORE PLATFORMS	STEPS	HINGES	LENGTH	LENGTH AXIAL	WIDTH	THICKNESS	CORE FACE LENGTH	PLATFORM WIDTH	PLATFORM THICKNESS	CORE SCAR LENGTH	CORE SCAR WIDTH	NO. CORE SCARS	BURNT	WEIGHT	COMMENTS
150	2	COMPTOOL	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		ELONG	MISSING	NONE	<5	1	USE	1	N/A	N/A	N/A	USE						0			30.3	30.3	10.7	4	0	0	0	0	0		NO	1.15	
150	2	PROXFLAKE	CCQ	JASPER	OPAQUE	RED		0%		ELONG	UNI	NONE				0									0			13.2	0	0	0	0	4.7	1.9	0	0		NO	0.32	
150	2	COMPFLAKE	CCQ	JASPER	OPAQUE	BROWN	HINGE	0%		EXPAND	CRUSH	OVERHANG	<5	1		0									0			11.3	9.7	11.8	1.8	0	0	0	0	0		NO	0.21	
150	2	DISTFLAKE	CCQ	CHAL	TRANS	GREYCL	FEATHER	0%		INDETER						0									0			17.1	0	0	0	0	0	0	0	0		NO	0.34	
149	1	COMPSPLIT	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		EXPAND						0									0			19.4	0	0	2.7	0	0	0	0	0		NO	0.89	
149	1	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		INDETER						0									0			22.2	0	0	0	0	0	0	0	0		NO	0.88	
149	1	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		ELONG	MISSING	NONE	<5	1		0									0			28.7	28.7	15.8	4.9	0	0	0	0	0		NO	1.87	
149	1	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0									0			13.2	0	0	0	0	0	0	0	0		NO	0.32	
149	1	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		EXPAND	CRUSH	NONE	<5	1		0									0			9.8	5.8	9.7	1.4	0	0	0	0	0		NO	0.12	
149	1	COMPFLAKE	CCQ	JASPER	OPAQUE	BROWN	FEATHER	0%		ELONG	UNI	NONE	<5	1		0									0			11.7	11.7	7.4	2.8	0	0.8	0	0	0		NO	0.09	
149	1	COMPFLAKE	TUFF	TUFF	OPAQUE	LGREY	FEATHER	0%		INDETER	UNI	NONE	<5	1		0									0			27.2	21.5	17.4	4.9	0	19	6.4	0	0		NO	0.63	
149	1	BROKFLAKE	CCQ	SERP	TRANS	GREEN		0%		INDETER						0									0			11.7	0	0	0	0	0	0	0	0		NO	0.34	
152	2	COMPTOOL	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		ELONG	FACET	NONE	<5	1	CON	1	N/A	N/A	SCALA	N/A						0			30	28.8	17.7	4.1	0	10	2.2	0	0		NO	2.25	
152	2	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0									0			13.9	0	0	0	0	0	0	0	0		NO	0.19	
152	2	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	STEP	0%		INDETER	FLAKED	NONE	<5	1		0									0			29.7	28.3	18.7	8	0	12.7	7.1	0	0		NO	3.77	
152	2	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0									0			14.1	0	0	0	0	0	0	0	0		NO	0.24	
152	2	PROXFLAKE	CCQ	JASPER	OPAQUE	BLUEG		0%		INDETER	UNI	NONE				0									0			26.2	0	0	0	0	18	7.5	0	0		NO	3.47	
152	2	BLOCK	CCQ	JASPER	OPAQUE	RED		0%								0									0			11	0	0	0	0	0	0	0	0		NO	0.28	
152	2	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		EXPAND						0									0			13.6	0	0	0	0	0	0	0	0		NO	0.27	
152	2	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0									0			13	0	0	0	0	0	0	0	0		NO	0.57	
152	2	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0									0			8.7	0	0	0	0	0	0	0	0		NO	0.13	
152	2	COMPFLAKE	CCQ	SERP	TRANS	GREEN	STEP	0%		EXPAND	FLAKED	NONE	<5	1		0									0			31.1	19.1	29.8	6.2	0	26.8	6.9	0	0		NO	4.77	
152	2	COMPFLAKE	CCQ	JASPER	OPAQUE	BROWN	FEATHER	0%		INDETER	UNI	NONE	<5	90		0									0			18.8	18.8	15.7	3.9	0	9.6	3.7	0	0		NO	0.89	
152	2	COMPSPLIT	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		INDETER						0									0			16.8	0	0	3.3	0	0	0	0	0		NO	0.38	
152	2	BROKFLAKE	MQU	MQUAR	TRANS	LGREY		0%		INDETER						0									0			10.9	0	0	0	0	0	0	0	0		NO	0.25	
152	2	COMPTOOL	CCQ	JASPER	OPAQUE	RED	N/A	0%		INDETER	NA	NONE	0	NA	GEO	3	BACK	BACK	BACK	N/A						0			13.4	13.4	6.9	3.5	0	0	0	0	0		NO	0.27	
152	3	COMPTOOL	CCQ	CHAL	TRANS	LGREY	FEATHER	0%		INDETER	UNI	NONE	<5	1	NOT	1			NOTCH						0			39.2	25.9	33.6	7.7	0	26.5	10.6	0	0		NO	0	
152	3	COMPFLAKE	CCQ	CHAL	TRANS	LGREY	FEATHER	0%		EXPAND	UNI	OVERHANG	<5	90		0									0			19.6	12.3	16.2	6.6	0	14.7	5.9	0	0		NO	1.56	
152	3	PROXFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER	FLAKED	NONE				0									0			19.3	0	0	0	0	18.4	3.9	0	0		NO	0.52	
152	3	PROXFLAKE	CCQ	JASPER	OPAQUE	RED		0%		ELONG	FACET	NONE				0									0			10.1	0	0	0	0	7.5	2.5	0	0		NO	0.17	
153	1	COMPFLAKE	CCQ	SERP	TRANS	GREEN	FEATHER	0%		INDETER	FACET	NONE	<5	1		0									0			44.6	40.8	31.2	9.4	0	16.8	5.6	0	0		NO	14.9	
153	1	BROKFLAKE	CCQ	CHAL	TRANS	RED		1-	VEIN	ELONG						0									0			38.7	0	0	0	0	0	0	0	0		NO	5.1	chert/chal/jasper
153	1	PROXFLAKE	CCQ	CHAL	TRANS	GREYCL	FEATHER	0%		EXPAND	FACET	NONE				0									0			16.5	0	0	0	0	12.4	4.1	0	0		NO	0.98	
153	1	COMPSPLIT	CCQ	CHAL	TRANS	WHITE	FEATHER	0%		INDETER						0									0			10.1	0	0	2.1	0	0	0.12	0	0		NO	0.12	
153	1	BROKFLAKE	CCQ	CHAL	TRANS	GREYCL		0%		INDETER						0									0			10.6	0	0	0	0	0	0	0	0		NO	0.11	
153	1	COMPTOOL	CCQ	JASPER	OPAQUE	RED	N/A	0%		INDETER	NA	NONE	0	NA	GEO	3	BACK	BACK	BACK	N/A						0			13.6	13.6	10	3.9	0	0	0	0	0		NO	0.53	
153	1	COMPTOOL	CCQ	JASPER	OPAQUE	RED	N/A	0%		INDETER	NA	NONE	0	NA	GEO	2	BACK	N/A	BACK	N/A						0			15.5	15.5	6.9	3.8	0	0	0	0	0		NO	0.35	backed in q1 and 3 not needed q2
150	1	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0									0			82.7	0	0	0	0	0	0	0	0		NO	17	
150	1	PROXFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER	CRUSH	NONE				0									0			11.4	0	0	0	0	0	0	0	0		NO	0.13	
150	1	BROKFLAKE	CCQ	JASPER	OPAQUE	BLUEG		0%		INDETER						0									0			8.6	0	0	0	0	0	0	0	0		NO	0.1	
150	1	COMPFLAKE	CCQ	CHAL	TRANS	LGREY	PLATFOR	0%		PLATREJUV	UNI	STEP	<5	180		0									0			49.1	36.2	45.4	9.9	0	9.3	2.6	0	0		NO	14.4	
149	2	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		INDETER	UNI	OVERHANG	<5	RADI		0									0			28.2	27.2	20.5	4.9	0	3.9	2.1	0	0		NO	2.67	
149	2	PROXFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER	UNI	OVERHANG				0									0			19.6	0	0	0	0	7.7	2	0	0		NO	0.67	
149	2	PROXFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER	UNI	OVERHANG				0									0			11.9	0	0	0	0	5.3	2.6	0	0		NO	0.24	
149	2	DISTFLAKE	CCQ	CHAL	TRANS	WHITE	FEATHER	0%		INDETER						0									0			13.1	0	0	0	0	0	0	0	0		NO	0.38	
149	2	CORE	CCQ	JASPER	OPAQUE	RED		0%								0					BIFA	FLAK	FACE	YES	MIXE	4	1	0	27.1	0	22	8.2	24.2	0	0	21.4	13.5	3-5	NO	6.45	radial biacial on flake
149	2	COMPFLAKE	CCQ	SERP	TRANS	GREEN	ABRUPT	0%		PLATREJUV	UNI	NONE	<5	RADI		0									0			36.3	35.7	25.4	18.8	0	9.1	3.7	0	0		NO	16.8	blocky fragment
151	3	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0									0			13.4	0	0	0	0	0	0	0	0		NO	0.37	
148	1	COREFRAG	CCQ	JASPER	OPAQUE	RED		0%								0									0			20.4	0	0	0	0	0	0	0	0		NO	6.74	
148	1	PROXFLAKE	CCQ	JASPER	OPAQUE	RED		0%		ELONG	FACET	NONE				0									0			18.3	0	0	0	0	5.7	2.5	0	0		NO	0.98	
148	1	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0									0			15.9	0	0	0	0	0	0	0	0		NO	0.48	
148	1	PROXTOOL	CCQ	CHAL	TRANS	PINK		0%		ELONG	NA	NONE			BON	0									0			13.3	0	0	0	0	0	0	0	0		NO	0.42	broken bondi
148	1	BROKFLAKE	CCQ	CHAL	TRANS	WHITE		0%	ROUGH	ELONG						0									0			9.2	0	0	0	0	0	0	0	0		NO	0.22	
148	1	BROKTOOL	CCQ	JASPER	OPAQUE	RED		0%		INDETER					STRA	0									0			19.5	0	0	0	0	0	0	0	0		NO	1.27	
154	2	COMPFLAKE	CCQ	JASPER	OPAQUE	BLUEG	PLUNGE	0%		ELONG	FACET	OVERHANG	<5	1		0									0			35	35	8.2	9.2	0	7	2.6	0	0		NO	2.15	cleaning core face
154	2	BLOCK	CCQ	JASPER	OPAQUE	RED		0%								0									0			24.9	0	0	0	0	0	0	0	0		NO	2	
154	2	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		EXPAND	MISSING	NONE	0	NA		0									0			18.3	14.3	18.7	1.7	0	0	0	0	0		NO	0.49	
154	2	COMPFLAKE	CCQ	CHAL	TRANS	PINK	FEATHER	0%		EXPAND	CRUSH	NONE	<5	90		0									0			9.7	8.3	9.5	1.3	0	0	0	0	0		NO	0.12	
154	2	COMPFLAKE	CCQ	CHAL	TRANS	LGREY	CRUSH	0%		ELONG	FLAKED	NONE	<5	90		0									0			33.4	33.4	10.7	5.1	0	5.4	2.3	0	0		NO	2	
154	2	DISTTOOL	CCQ	CHAL	TRANS	LGREY	FEATHER	0%		INDETER					BACK	0									0			14.4	0	0	0	0	0	0	0	0		NO	0.54	lateral break geo?
154	2	DISTFLAKE	QUA	QUARTZI	TRANS	LGREY	FEATHER	0%		EXPAND						0									0			19.2	0	0	0	0	0	0	0	0		NO	0.46	
154	2	COMPSPLIT	CCQ	SERP	TRANS	GREEN	FEATHER	0%		INDETER						0									0			30.6	0	0	4.1	0	0	12.3	0	0		NO	1.58	
154	2	COMPFLAKE	CCQ	SERP	TRANS	GREEN	CORTICAL	1-	ROUGH	BLOCK	UNI	NONE	<5	1		0									0			38.4	22.2	19.4	9.4	0	22	8	0	0		NO	8.67	
150	3	COMPFLAKE	CCQ	CHAL	TRANS	LGREY	FEATHER	0%		INDETER	UNI	NONE	<5	180		0									0			18.5	18.5	12.9	2.3	0	2.8	0.9	0	0		NO	0.41	
150	3	PROXFLAKE	CCQ	CHAL	TRANS	LGREY		0%		INDETER	UNI	NONE				0									0			10.5	0	0	0	0	5.9	1.6	0	0		NO	0.12	
150	3	COMPFLAKE	CCQ	CHAL	TRANS	GREYCL	FEATHER	0%		EXPAND	CRUSH	NONE	<5	1		0									0			15.1	10.6	15.1	2.7	0	0	0	0	0		NO	0.38	
150	3	COMPFLAKE	CCQ	JASPER	OPAQUE	BROWN	FEATHER	0%		INDETER	UNI	NONE	<5	1		0									0			18.7	14.8	18.5	5.1	0	11.5	3.8	0	0		NO	1.31	
150	3	DISTFLAKE	CCQ	CHAL	TRANS	PINK	FEATHER	0%		INDETER						0									0			11.7	0	0	0	0	0	0	0	0		NO	0.12	
150	3	COMPTOOL	PLAG	PLAG	OPAQUE	WHITE	FEATHER	0%		EXPAND	NA	NONE	<5	90	THU	2	SCALAR	SCALAR	N/A	N/A						0			9.4	7.9	9.4	3.2	0	0	0	0	0		NO	0.23	or tiny geo
152	1	COMPFLAKE	CCQ	CHAL	TRANS	LGREY	FEATHER	0%		PLATREJUV	FLAKED	OVERHANG	<5	90		0									0			40.3	29	21.6	7.4	0	22.3	6.3	0	0		NO	6.99	
152	1	BLOCK	CCQ	JASPER	OPAQUE	PINK		1-	ROUGH							0									0			25.8	0	0	0	0	0	0	0	0		NO	4.51	
152	1	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0									0			19.7	0	0	0	0	0	0	0	0		NO	0.37	
152	1	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0									0			11.1	0	0	0	0	0	0	0	0		NO	0.09	
153	3	DISTFLAKE	CCQ	CHAL	TRANS	GREYCL	STEP	0%		EXPAND						0									0			20.2	0	0	0	0	0	0	0	0		NO	0.83	
153	3	PROXFLAKE	CCQ	CHAL	TRANS	LGREY		0%		INDETER	UNI	NONE				0									0			14.5	0	0	0	0	8.7	2.9	0	0		NO	0.79	
153	3	COMPFLAKE	FSILC	FSILCRET	OPAQUE	LGREY	FEATHER	0%		EXPAND	UNI	NONE	0	NA		0									0			18.3	7.7	16.2	3.8	0	9.9	1.9	0	0		POT	0.82	dorsal is a potlid
151	2	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	HINGE	0%		EXPAND						0									0			18.7	0	0	0	0	0	0	0	0		NO	0.46	
151	2	BROKFLAKE	CCQ	JASPER	OPAQUE	BLUEG		0%		INDETER						0									0			22.9	0	0	0	0	0	0	0	0		NO	1.32	

SQ	SPIT	CLASS	MATERIAL GROUP	MATERIAL	TRANSLUCENCY	COLOUR	DISTAL END	CORTEX %	CORTEX TYPE	FORM	PLATFORM TYPE	PLATFORM PREPARATI	SCAR NUMBER	SCAR TYPE	TOOL TYPE	RETOUCHED EDGES	EDGE 1	EDGE 2	EDGE 3	EDGE 4	CORETYPE	CORE BODY	PLATFORM NUMBER	CORE EXHAUSTION?	SCAR FORM	CORE PLATFORMS	STEPS	HINGES	LENGTH	LENGTH AXIAL	WIDTH	THICKNESS	CORE FACE LENGTH	PLATFORM WIDTH	PLATFORM THICKNESS	CORE SCAR LENGTH	CORE SCAR WIDTH	NO. CORE SCARS	BURNT?	WEIGHT	COMMENTS
151	2	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	1-	VEIN	EXPAND	CORTICAL	NONE	<5	1		0										0			18.5	8.2	16.2	4.1	0	12.1	3.5	0	0		NO	0.79	
138	7	COMPSPLIT	CCQ	CHAL	TRANS	RED	FEATHER	0%		INDETER						0										0			23.1	0	0	1.7	0	0	0.8	0	0		NO	0.71	chert/chal/jasper
138	7	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		EXPAND	UNI	NONE	<5	90		0										0			18.4	9.5	18.4	3.1	0	8.6	1.6	0	0		NO	0.51	
138	7	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		ELONG	UNI	NONE	<5	1		0										0			17.5	17.5	9.5	4.3	0	4.6	1	0	0		NO	0.56	
138	7	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		EXPAND						0										0			9.6	0	0	0	0	0	0	0	0		NO	0.09	
138	7	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0										0			14.5	0	0	0	0	0	0	0	0		NO	0.29	
138	7	COMPFLAKE	FSILC	FSILCRET	OPAQUE	LGREY	CRUSH	0%		INDETER	CRUSH	NONE	<5	1		0										0			17.3	11.6	14.1	1.9	0	0	0	0	0		NO	0.32	
138	7	DISTFLAKE	CCQ	CHAL	TRANS	GREYCL	FEATHER	0%		INDETER						0										0			12	0	0	0	0	0	0	0	0		NO	0.32	
138	7	PROXFLAKE	CCQ	CHAL	TRANS	GREYCL	FEATHER	0%		ELONG	UNI	NONE				0										0			9.5	0	0	0	0	8	1.8	0	0		NO	0.14	
138	7	COMPFLAKE	CCQ	CHAL	TRANS	GREYCL	HINGE	0%		EXPAND	UNI	OVERHANG	0	NA		0										0			12.5	7.8	12	2.4	0	4.2	3.4	0	0		NO	0.17	
138	7	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0										0			22.8	0	0	0	0	0	0	0	0		NO	0.34	
138	7	BROKFLAKE	CCQ	CHAL	TRANS	LGREY		0%		RIDGESTRAT						0										0			15.3	0	0	0	0	0	0	0	0		NO	0.15	
138	7	COMPFLAKE	CCQ	JASPER	OPAQUE	LGREY	FEATHER	0%		EXPAND	UNI	OVERHANG	<5	1		0										0			26.6	13.9	12.4	4.9	0	13.4	5.4	0	0		NO	2.2	
138	7	DISTFLAKE	CCQ	JASPER	OPAQUE	LGREY	FEATHER	0%		INDETER						0										0			11.6	0	0	0	0	0	0	0	0		NO	0.12	
138	7	BROKFLAKE	CCQ	JASPER	OPAQUE	LGREY		0%		INDETER						0										0			10.8	0	0	0	0	0	0	0	0		NO	0.11	
138	7	COMPFLAKE	CCQ	JASPER	OPAQUE	LGREY	FEATHER	0%		EXPAND	UNI	NONE	0	NA		0										0			12.6	7.9	12.6	2.1	0	8.1	1.8	0	0		NO	0.15	
138	7	COMPFLAKE	CCQ	CHAL	TRANS	RED	FEATHER	0%		BLOCK	UNI	NONE	<5	90		0										0			44.2	22.8	0	17.6	0	23.9	15.4	0	0		NO	16.3	
138	7	CORE	CCQ	CHAL	TRANS	LGREY		26-	ROUGH							0					BIFA	FLAK	FACE	YES	MIXE	3	0	1	32.4	0	27.5	11.2	31.4	0	0	17.7	10.2	3-5	NO	13.5	
138	7	BROKTOOL	CCQ	JASPER	OPAQUE	RED		0%		BLADE					BACK	0										0			13.9	0	0	0	0	0	0	0	0		NO	0.24	attempt at bondi
138	8	DISTFLAKE	CCQ	CHAL	TRANS	LGREY	FEATHER	0%		ELONG						0										0			23.3	0	0	0	0	0	0	0	0		NO	0.4	
138	8	COMPFLAKE	CCQ	CHAL	TRANS	LGREY	FEATHER	51-	ROUGH	INDETER	UNI	NONE	0	NA		0										0			33.5	21.6	28	8.7	0	9.9	5.5	0	0		NO	5.86	conjoin to tp138 7 core 13.49g
138	8	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0										0			14.6	0	0	0	0	0	0	0	0		NO	0.23	
138	8	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		EXPAND						0										0			19.4	0	0	0	0	0	0	0	0		NO	1.13	
138	8	DISTFLAKE	CCQ	CHAL	TRANS	WHITE	PLUNGE	0%		ELONG						0										0			17.4	0	0	0	0	0	0	0	0		NO	0.54	breccia reworked
148	2	BROKTOOL	CCQ	JASPER	OPAQUE	RED		0%		INDETER					STRA	0										0			28.1	0	0	0	0	0	0	0	0		NO	2.02	
148	2	BLOCK	CCQ	JASPER	OPAQUE	BLUEG		0%								0										0			13.1	0	0	0	0	0	0	0	0		NO	0.66	
148	2	PROXFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER	UNI	NONE				0										0			10.5	0	0	0	0	4.4	2.3	0	0		NO	0.17	
148	2	BROKFLAKE	CCQ	CHAL	TRANS	LGREY		0%		INDETER						0										0			12.4	0	0	0	0	0	0	0	0		NO	0.15	
145	1	COMPFLAKE	CCQ	SERP	TRANS	GREEN	FEATHER	1-	VEIN	INDETER	UNI	NONE	<5	1		0										0			29.2	23.8	24.9	6.5	0	14.8	6.1	0	0		NO	4.28	
145	1	COMPSPLIT	CCQ	SERP	TRANS	GREEN	FEATHER	0%		INDETER						0										0			20.9	0	0	4.7	0	0	9.6	0	0		NO	1.21	
145	1	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		EXPAND	FLAKED	OVERHANG	<5	1		0										0			17.5	14.9	17.8	3.1	0	9.9	2.5	0	0		NO	0.99	
138	3	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0										0			16.6	0	0	0	0	0	0	0	0		NO	0.61	
138	3	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		INDETER						0										0			13.7	0	0	0	0	0	0	0	0		NO	0.23	
138	3	BROKFLAKE	CCQ	CHAL	TRANS	GREYCL		0%		INDETER						0										0			8.6	0	0	0	0	0	0	0	0		NO	0.08	
147	1	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	1-	VEIN	EXPAND	UNI	NONE	<5	90		0										0			30.7	17.7	30.7	6.2	0	14.2	8	0	0		NO	3.88	
147	1	DISTTOOL	CCQ	SERP	TRANS	GREEN	FEATHER	0%		INDETER					STRA	0										0			26.2	0	0	0	0	0	0	0	0		NO	1.74	
147	1	COMPSPLIT	PLAG	PLAG	OPAQUE	WHITE	HINGE	0%		BLOCK						0										0			23.6	0	0	7.4	0	0	11	0	0		NO	3.8	
147	1	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	HINGE	0%		INDETER	UNI	NONE	<5	1		0										0			12.3	11.4	10.4	1.8	0	7.5	0.82	0	0		NO	0.28	
144	1	BLOCK	CCQ	JASPER	OPAQUE	RED		0%								0										0			18	0	0	0	0	0	0	0	0		NO	2.21	
144	1	DISTFLAKE	CCQ	JASPER	OPAQUE	BROWN	PLUNGE	0%		PLATREJUV					BACK	0										0			16.3	0	0	0	0	0	0	0	0		NO	0.32	
22	1	DISTTOOL	CCQ	SERP	TRANS	GREEN	FEATHER	0%		BLADE					USE	0										0			32.3	0	0	0	0	0	0	0	0		NO	2	
22	1	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		INDETER						0										0			33.3	0	0	0	0	0	0	0	0		NO	4.62	
133	1	COMPFLAKE	CCQ	CHAL	TRANS	GREYCL	FEATHER	0%		ELONG	UNI	NONE	<5	90		0										0			17.3	16.9	12.6	1.8	0	5.8	2.4	0	0		NO	0.41	
147	2	COMPFLAKE	CCQ	CHAL	TRANS	BROWN	FEATHER	100	ROUGH	INDETER	UNI	NONE	0	NA		0										0			28.6	25.3	24.3	7.1	0	13.7	6.9	0	0		NO	3.75	
147	2	COMPFLAKE	CCQ	CHAL	TRANS	WHITE	HINGE	0%		ELONG	UNI	NONE	<5	1		0										0			15	14.7	10.5	1.3	0	3	2.2	0	0		NO	0.26	
145	3	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0										0			11.6	0	0	0	0	0	0	0	0		NO	0.42	
145	3	PROXFLAKE	CCQ	CHAL	TRANS	WHITE		0%		INDETER	UNI	NONE				0										0			22.1	0	0	0	0	10.1	3.6	0	0		NO	0.79	
38	5	BROKFLAKE	CCQ	JASPER	OPAQUE	BROWN		0%		INDETER						0										0			17.8	0	0	0	0	0	0	0	0		NO	0.71	
38	5	DISTFLAKE	MQU	MQUAR	OPAQUE	WHITE	CRUSH	1-	ROUGH	BIPOLAR						0										0			16.8	0	0	0	0	0	0	0	0		NO	0.69	
111	4	BROKTOOL	CCQ	JASPER	OPAQUE	BROWN		0%		INDETER					NOT	0										0			22	0	0	0	0	0	0	0	0		NO	1.21	usewear and notch
113	2	BROKFLAKE	MQU	MQUAR	OPAQUE	WHITE		0%		INDETER						0										0			27.5	0	0	0	0	0	0	0	0		NO	2.28	
113	2	BROKFLAKE	CCQ	CHAL	TRANS	BROWN		0%		INDETER						0										0			29.6	0	0	0	0	0	0	0	0		NO	1.87	
113	2	BLOCK	CCQ	CHAL	TRANS	BROWN		0%								0										0			16.1	0	0	0	0	0	0	0	0		NO	0.78	grey/brown
97	1	PROXFLAKE	CCQ	CHAL	TRANS	GREYCL		0%		INDETER	UNI	NONE				0										0			9.2	0	0	0	0	5.4	1.5	0	0		NO	0.09	
97	1	COMPFLAKE	TUFF	TUFF	OPAQUE	LGREY	HINGE	0%		EXPAND	UNI	STEP	<5	90		0										0			34.7	26	34.7	6.5	0	18.3	5.3	0	0		NO	6.17	
97	1	DISTTOOL	MQU	MQUAR	TRANS	WHITE	FEATHER	0%		INDETER					CON	0										0			27.3	0	0	0	0	0	0	0	0		NO	2.98	
97	1	BLOCK	CCQ	JASPER	OPAQUE	PINK		0%								0										0			26.6	0	0	0	0	0	0	0	0		NO	1.16	
97	1	BLOCK	CCQ	JASPER	OPAQUE	PINK		0%								0										0			35.9	0	0	0	0	0	0	0	0		NO	2.34	pink/grey
97	1	BLOCK	MQU	MQUAR	OPAQUE	WHITE		0%								0										0			14.6	0	0	0	0	0	0	0	0		NO	0.44	
41	1	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		INDETER						0										0			9.5	0	0	0	0	0	0	0	0		NO	0.05	
14	5	PROXFLAKE	PLAG	PLAG	OPAQUE	WHITE		0%		ELONG	UNI	NONE				0										0			24.9	0	0	0	0	12.1	1.2	0	0		NO	1.22	pinky
14	5	DISTFLAKE	PLAG	PLAG	OPAQUE	WHITE	FEATHER	0%		ELONG						0										0			14	0	0	0	0	0	0	0	0		NO	0.27	pinky
14	5	COMPFLAKE	PLAG	PLAG	OPAQUE	WHITE	FEATHER	0%		EXPAND	UNI	NONE	0	NA		0										0			11.6	6.2	6.4	1.8	0	9	2.5	0	0		NO	0.12	pinky
14	5	COMPFLAKE	PLAG	PLAG	OPAQUE	WHITE	FEATHER	0%		EXPAND	UNI	NONE	<5	90		0										0			13.3	7.7	13.3	1.6	0	6.6	1.8	0	0		NO	0.16	pinky
14	5	BROKTOOL	PLAG	PLAG	OPAQUE	WHITE		0%		INDETER					BACK	0										0			12.6	0	0	0	0	0	0	0	0		NO	0.39	conjoin latbreak blade 0.32g
14	5	DISTTOOL	PLAG	PLAG	OPAQUE	WHITE	FEATHER	0%		INDETER					BACK	0										0			13.6	0	0	0	0	0	0	0	0		NO	0.4	conjoin to 0.32g attempt at geo
14	5	COMPFLAKE	PLAG	PLAG	OPAQUE	WHITE	HINGE	0%		EXPAND	UNI	NONE	<5	90		0										0			17.2	14.7	14.4	2.7	0	8.1	1.6	0	0		NO	0.62	
14	5	DISTFLAKE	PLAG	PLAG	OPAQUE	WHITE	FEATHER	0%		INDETER						0										0			14.2	0	0	0	0	0	0	0	0		NO	0.46	
14	5	COREFRAG	PLAG	PLAG	OPAQUE	WHITE		0%								0										0			18.7	0	0	0	0	0	0	0	0		NO	0.38	
14	5	BLOCK	PLAG	PLAG	OPAQUE	WHITE		0%								0										0			19.2	0	0	0	0	0	0	0	0		NO	1.49	
14	5	BROKFLAKE	PLAG	PLAG	OPAQUE	WHITE	FEATHER	0%		INDETER						0										0			14.5	0	0	0	0	0	0	0	0		NO	0.19	
14	5	COMPSPLIT	PLAG	PLAG	OPAQUE	WHITE	FEATHER	0%		INDETER						0										0			13.2	0	0	1.7	0	0	2.7	0	0		NO	0.1	
14	5	BLOCK	PLAG	PLAG	OPAQUE	WHITE		0%								0										0			10	0	0	0	0	0	0	0	0		NO	0.29	
14	5	BROKFLAKE	PLAG	PLAG	OPAQUE	WHITE		0%		INDETER						0										0			15.7	0	0	0	0	0	0	0	0		NO	0.42	
14	5	PROXFLAKE	PLAG	PLAG	TRANS	WHITE		0%		INDETER	CRUSH	NONE				0										0			10.5	0	0	0	0	0	0	0	0		NO	0.13	
14	5	DISTFLAKE	PLAG	PLAG	TRANS	WHITE	FEATHER	0%		EXPAND						0										0			11	0	0	0	0	0	0	0	0		NO	0.11	
14	5	PROXFLAKE	PLAG	PLAG	OPAQUE	WHITE		0%		INDETER	UNI	NONE				0										0			10.2	0	0	0	0	8.9	1.3	0	0		NO	0.14	
14	5	DISTFLAKE	TUFF	TUFF	OPAQUE	WHITE	FEATHER	0%		ELONG						0										0			9.3	0	0	0	0	0	0	0	0		NO	0.08	

SQ	SPIT	CLASS	MATERIAL GROUP	MATERIA	TRANSLUCENCY	COLOUR	DISTAL END	CORTEX %	CORTEX TYPE	FORM	PLATFORM TYPE	PLATFORM PREPARATI	SCAR NUMBER	SCAR TYPE	TOOL TYPE	RETOUCHED EDGES	EDGE 1	EDGE 2	EDGE 3	EDGE 4	CORETYPE	CORE BODY	PLATFORM NUMBER	CORE EXHAUSTION?	SCAR FORM	CORE PLATFORMS	STEPS	HINGES	LENGTH	LENGTH AXIA	WIDTH	THICKNESS	CORE FACE LENGTH	PLATFORM WIDTH	PLATFORM THICKNESS	CORE SCAR LENGTH	CORE SCAR WIDTH	NO. CORE SCARS	BURNT?	WEIGHT	COMMENTS
14	5	COMPFLAKE	PLAG	PLAG	OPAQUE	WHITE	FEATHER	0%		EXPAND	UNI	NONE	0	NA		0										0			8.9	4.9	8.9	1.3	0	3.6	1.7	0	0		NO	0.07	
14	5	BROKFLAKE	PLAG	PLAG	OPAQUE	WHITE		0%		INDETER						0										0			5.5	0	0	0	0	0	0	0	0		NO	0.01	
14	5	BROKFLAKE	PLAG	PLAG	OPAQUE	WHITE		0%		INDETER						0										0			16	0	0	0	0	0	0	0	0		NO	0.41	
14	5	BROKFLAKE	PLAG	PLAG	OPAQUE	WHITE		0%		INDETER						0										0			12.2	0	0	0	0	0	0	0	0		NO	0.17	
14	5	COMPFLAKE	PLAG	PLAG	TRANS	WHITE	FEATHER	0%		EXPAND	CRUSH	NONE	<5	90		0										0			13.5	8.8	13.5	1.6	0	0	0	0	0		NO	0.15	
14	5	DISTFLAKE	PLAG	PLAG	TRANS	WHITE	FEATHER	0%		ELONG						0										0			8.7	0	0	0	0	0	0	0	0		NO	0.1	
14	5	PROXTOOL	PLAG	PLAG	OPAQUE	WHITE		0%		ELONG	UNI	NONE			BACK	0										0			13.5	0	0	0	0	7.7	3.6	0	0		NO	0.59	lateral break atempt at bondi?
14	5	COMPFLAKE	PLAG	PLAG	OPAQUE	WHITE	FEATHER	0%		INDETER	UNI	NONE	0	NA		0										0			24.2	14.7	19.2	4.2	0	15.5	5.7	0	0		NO	1.84	conjoin with 0.42g
14	5	DISTFLAKE	PLAG	PLAG	OPAQUE	WHITE	HINGE	0%		INDETER						0										0			15.7	0	0	0	0	0	0	0	0		NO	0.38	
14	5	COMPFLAKE	CCQ	SERP	TRANS	GREEN	FEATHER	0%		BLOCK	UNI	OVERHANG	<5	90		0										0			39.8	31.2	26.5	10.7	0	15.1	7.8	0	0		NO	10.8	
14	5	COMPFLAKE	CCQ	CHAL	TRANS	GREYCL	FEATHER	0%		INDETER	UNI	NONE	<5	1		0										0			41.3	32.2	24.3	6.8	0	29.4	8.2	0	0		NO	5.29	
14	5	CORE	CCQ	SERP	TRANS	GREEN		0%								0					MUL	BLOC	OVE	YES	MIXE	3	3	0	41.2	0	25.9	25.4	27.8	0	0	27.3	25.8	6-10	NO	38.7	
14	5	CORE	TUFF	TUFF	OPAQUE	GREEN		1-	VEIN							0					BBLA	BLOC	FACE	YES	ELO	2	0	1	57.1	0	34.1	20.8	54.6	0	0	34.2	13	3-5	NO	50.1	atypical bblade on cortical block
114	2	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		INDETER						0										0			18.1	0	0	0	0	0	0	0	0		NO	0.57	
114	2	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		EXPAND	UNI	STEP	<5	1		0										0			28.7	27.1	28.7	4.4	0	12.4	2.6	0	0		NO	2.52	
114	2	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	HINGE	0%		INDETER						0										0			20.1	0	0	0	0	0	0	0	0		NO	1.53	conjoin with prox 2.57g
114	2	PROXFLAKE	CCQ	JASPER	OPAQUE	RED		0%		ELONG	UNI	OVERHANG				0										0			24.4	0	0	0	0	11.2	4.3	0	0		NO	2.56	conjoin with 1.5 finial break
114	2	COMPSPLIT	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		INDETER						0										0			10.8	0	0	1.8	0	0	2.6	0	0		NO	0.15	
112	2	COMPFLAKE	CCQ	CHAL	TRANS	LGREY	FEATHER	0%		INDETER	UNI	STEP	<5	1		0										0			26.8	20.5	25.5	5.9	0	16.1	3.6	0	0		NO	3.3	
112	2	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		EXPAND	UNI	NONE	<5	1		0										0			13.4	9	13	2.5	0	4.7	3.6	0	0		NO	0.3	
112	2	DISTFLAKE	CCQ	CHAL	TRANS	GREYCL	FEATHER	0%		TRIM						0										0			22.2	0	0	0	0	0	0	0	0		NO	0.87	
112	2	DISTFLAKE	MQU	MQUAR	TRANS	WHITE	FEATHER	0%		INDETER						0										0			19.5	0	0	0	0	0	0	0	0		NO	0.82	
112	2	BROKFLAKE	CCQ	JASPER	OPAQUE	BLUEG		0%		INDETER						0										0			14.3	0	0	0	0	0	0	0	0		NO	0.69	
112	2	BROKFLAKE	PLAG	PLAG	OPAQUE	WHITE		0%		INDETER						0										0			18.5	0	0	0	0	0	0	0	0		NO	0.3	
113	1	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	HINGE	0%		INDETER	FACET	OVERHANG	<5	90		0										0			24.2	24.2	19.6	5.3	0	9.7	2.9	0	0		NO	3.72	
113	1	GLASS	glass	glass	TRANS	GREEN		0%		INDETER						0										0			21.5	0	0	0	0	0	0	0	0		NO	3.53	retouch on x2 edges?
115	3	COMPFLAKE	CCQ	JASPER	OPAQUE	BLUEG	FEATHER	0%		BLOCK	UNI	OVERHANG	<5	1		0										0			25.8	21.2	19.1	7	0	18.8	5.9	0	0		NO	4.19	
115	3	COMPTOOL	TUFF	TUFF	OPAQUE	YELLOW	N/A	0%		BLOCK	UNI	NONE	<5	90	STEP	1	N/A	N/A	STEP	N/A						0			35.8	25.9	35	13	0	13.1	11	0	0		NO	15.2	
115	4	COMPFLAKE	CCQ	JASPER	OPAQUE	BLUEG	FEATHER	51-	ROUGH	INDETER	UNI	STEP	<5	1		0										0			42.6	29.7	25.4	10.6	0	17.3	6.9	0	0		NO	9.49	
12	4	BROKFLAKE	MQU	MQUAR	OPAQUE	WHITE		0%		INDETER						0										0			10.4	0	0	0	0	0	0	0	0		NO	0.18	
12	4	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		EXPAND	FLAKED	NONE	<5	1		0										0			12.9	6.7	12.9	1.2	0	11.6	1.9	0	0		NO	0.07	
12	4	BROKFLAKE	MQU	MQUAR	OPAQUE	WHITE		0%		INDETER						0										0			10.6	0	0	0	0	0	0	0	0		NO	0.14	
12	4	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		EXPAND	CRUSH	NONE	0	NA		0										0			10.7	9.6	8.8	2.4	0	0	0	0	0		NO	0.08	
12	4	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	HINGE	51-	VEIN	INDETER	UNI	NONE	<5	90		0										0			11.9	9.9	9.4	2	0	9.1	1.8	0	0		NO	0.23	
12	4	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0										0			10.4	0	0	0	0	0	0	0	0		NO	0.09	
12	4	COMPFLAKE	MQU	MQUAR	OPAQUE	WHITE	CRUSH	0%		BLOCK	FLAKED	NONE	0	NA		0										0			45.7	36.2	33.7	14.7	0	24.1	9.2	0	0		NO	19	
112?	0	COMPFLAKE	CCQ	SERP	TRANS	GREEN	FEATHER	0%		INDETER	UNI	NONE	<5	90		0										0			17.3	15.6	15.1	2.9	0	2.7	1.3	0	0		NO	0.65	
112?	0	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		EXPAND	UNI	NONE	<5	90		0										0			23.8	14.3	20.2	2.8	0	16.4	5	0	0		NO	1.46	
112?	0	DISTFLAKE	CCQ	JASPER	OPAQUE	BLUEG	FEATHER	0%		ELONG						0										0			38.4	0	0	0	0	0	0	0	0		NO	4	
112?	0	BROKFLAKE	MQU	MQUAR	OPAQUE	WHITE		0%		INDETER						0										0			14.5	0	0	0	0	0	0	0	0		NO	0.55	
112?	0	BROKFLAKE	MQU	MQUAR	OPAQUE	WHITE		0%		INDETER						0										0			9.1	0	0	0	0	0	0	0	0		NO	0.26	
112?	0	BROKFLAKE	MQU	MQUAR	OPAQUE	WHITE		0%		INDETER						0										0			7.9	0	0	0	0	0	0	0	0		NO	0.12	
112?	0	BROKFLAKE	MQU	MQUAR	OPAQUE	WHITE		0%		INDETER						0										0			7.8	0	0	0	0	0	0	0	0		NO	0.12	
136	1	COMPFLAKE	CCQ	JASPER	OPAQUE	BROWN	HINGE	0%		ELONG	UNI	OVERHANG	<5	1		0										0			15.2	15.2	8.6	1.6	0	5.3	1	0	0		NO	0.3	
130	1	COMPTOOL	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		BLOCK	FLAKED	NONE	<5	180	CON	1	N/A	N/A	SCALA	N/A						0			31.2	30.8	23.4	9.8	0	14.7	13.1	0	0		NO	0.86	
18	5	COMPFLAKE	PLAG	PLAG	OPAQUE	WHITE	FEATHER	0%		EXPAND	FLAKED	OVERHANG	<5	1		0										0			19.5	12.1	19	3.7	0	17	2.9	0	0		NO	0.97	
18	5	BROKFLAKE	QUA	QUARTZI	TRANS	ORANG		0%		INDETER						0										0			15	0	0	0	0	0	0	0	0		NO	0.45	orange/white
18	5	DISTFLAKE	CCQ	CHAL	TRANS	LGREY	FEATHER	1-	ROUGH	INDETER						0										0			32	0	0	0	0	0	0	0	0		NO	2.58	
18	5	COMPFLAKE	CCQ	CHAL	TRANS	BROWN	CORTICAL	1-	ROUGH	PLATREJUV	UNI	OVERHANG	<5	90		0										0			31.4	27.8	23	8.3	0	12	3.5	0	0		NO	6.43	chal/chert/jasper
35	3	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		BLOCK						0										0			39.3	0	0	0	0	0	0	0	0		NO	8.58	
35	3	BLOCK	CCQ	JASPER	OPAQUE	RED		1-	ROUGH							0										0			32.3	0	0	0	0	0	0	0	0		NO	7.17	
35	3	PROXFLAKE	CCQ	JASPER	OPAQUE	BROWN		0%		INDETER	UNI	OVERHANG				0										0			30	0	0	0	0	12.9	4.9	0	0		NO	2.22	
35	3	COMPSPLIT	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		EXPAND						0										0			29.9	0	0	4.4	0	0	0	0	0		NO	1.32	
35	3	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		INDETER						0										0			16.5	0	0	0	0	0	0	0	0		NO	0.66	
35	3	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0										0			17.3	0	0	0	0	0	0	0	0		NO	0.51	
35	3	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0										0			9.1	0	0	0	0	0	0	0	0		NO	0.05	
35	3	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		EXPAND						0										0			66.6	0	0	0	0	0	0	0	0		NO	13.6	
35	3	BLOCK	CCQ	JASPER	OPAQUE	RED		0%								0										0			40.1	0	0	0	0	0	0	0	0		NO	21.3	fractured conjoin 7.13g
35	3	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	ABRUPT	0%		PLATREJUV	UNI	OVERHANG	<5	90		0										0			46.5	25	46	9.5	0	33.6	7.9	0	0		NO	11	
35	3	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	STEP	1-	WATER-ROLL	BLOCK	CORTICAL	NONE	<5	90		0										0			44.4	42	42.1	15.1	0	40.2	13.7	0	0		NO	27.5	
35	3	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		EXPAND						0										0			49.9	0	0	0	0	0	0	0	0		NO	9.45	
35	3	BLOCK	CCQ	CHAL	TRANS	LGREY		0%								0										0			20.2	0	0	0	0	0	0	0	0		NO	3.73	jasper/chert/chal
28	3	COMPSPLIT	CCQ	JASPER	OPAQUE	RED	FEATHER	26-	WATER-ROLL	BLOCK						0										0			45.4	0	0	13	0	0	13	0	0		NO	21.7	
28	3	COMPFLAKE	CCQ	CHAL	TRANS	GREYCL	STEP	1-	WATER-ROLL	ELONG	UNI	NONE	<5	1		0										0			39.3	31.9	26.3	7.5	0	12.3	7.2	0	0		NO	7.2	
28	3	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	1-	VEIN	EXPAND	FLAKED	OVERHANG	<5	1		0										0			27.3	23.3	26	3.7	0	11.1	2	0	0		NO	2.14	
28	3	COMPSPLIT	CCQ	JASPER	OPAQUE	BLUEG	FEATHER	0%		INDETER						0										0			30	0	0	5.7	0	0	6.5	0	0		NO	3.19	
28	3	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		INDETER	UNI	NONE	<5	90		0										0			22.3	20	10.5	2.8	0	6.9	3.3	0	0		NO	0.53	
28	3	COMPFLAKE	CCQ	CHAL	TRANS	GREYCL	HINGE	0%		EXPAND	UNI	NONE	0	NA		0										0			15.3	9.1	15.3	1.7	0	8.9	2.3	0	0		NO	0.27	
28	3	PROXFLAKE	CCQ	JASPER	OPAQUE	RED		0%		BLADE	CRUSH	NONE				0										0			24.3	0	0	0	0	0	0	0	0		NO	0.46	
28	3	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		INDETER						0										0			28.9	0	0	0	0	0	0	0	0		NO	1.97	
28	3	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	ABRUPT	0%		RIDGESTRAT	FACET	NONE	<5	90		0										0			42.5	39.8	13.2	7.2	0	7.6	3.4	0	0		NO	4.39	
28	3	PROXFLAKE	CCQ	JASPER	OPAQUE	RED		0%		ELONG	MISSING	NONE				0										0			10.2	0	0	0	0	0	0	0	0		NO	0.08	
28	3	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	ABRUPT	0%		PLATREJUV	UNI	NONE	<5	90		0										0			40	20.5	22.7	11.6	0	10.9	5.4	0	0		NO	9.35	
28	3	COMPSPLIT	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		INDETER						0										0			34.1	0	0	9.3	0	0	10	0	0		NO	4.33	
28	3	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		ELONG						0										0			27.5	0	0	0	0	0	0	0	0		NO	0.96	
28	3	CORE	CCQ	JASPER	OPAQUE	RED		0%								0					MUL	BLOC	OVE	YES	MIXE	3	4	0	56	0	44.2	31	49.7	0	0	17.9	11.2	6-10	NO	76.2	refitting core and flakes
28	3	COMPTOOL	CCQ	JASPER	OPAQUE	RED	N/A	0%		ELONG	NA	NONE	<5	1	BON	3	BACK	BACK	BACK	N/A						0			30.1	30.1	9	9	0	0	0	0	0		NO	1.03	
126	1	COMPFLAKE	CCQ	JASPER	OPAQUE	BROWN	HINGE	0%		EXPAND	FLAKED	OVERHANG	<5	1		0										0			26.4	21.2	21.7	4.5	0	12.2	4.3	0	0		NO	2.88	

SQ	SPIT	CLASS	MATERIAL GROUP	MATERIA	TRANSLUCENCY	COLOUR	DISTIAL END	CORTEX %	CORTEX TYPE	FORM	PLATFORM TYPE	PLATFORM PREPARATI	SCAR NUMBER	SCAR TYPE	TOOL TYPE	RETOUCHED EDGES	EDGE 1	EDGE 2	EDGE 3	EDGE 4	CORETYPE	CORE BODY	PLATFORM NUMBER	CORE EXHAUSTION?	SCAR FORM	CORE PLATFORMS	STEPS	HINGES	LENGTH	LENGTH AXIAL	WIDTH	THICKNESS	CORE FACE LENGTH	PLATFORM WIDTH	PLATFORM THICKNESS	CORE SCAR LENGTH	CORE SCAR WIDTH	NO. CORE SCARS	BURNT?	WEIGHT	COMMENTS
127	1	BROKFLAKE	MQU	MQUAR	OPAQUE	WHITE		0%		INDETER						0												18.5	0	0	0	0	0	0	0	0		NO	0.7	
127	1	COMPFLAKE	CCQ	JASPER	OPAQUE	BROWN	FEATHER	0%		ELONG	UNI	NONE	<5	1		0										0			20.1	16	11	3.2	0	10.5	2.5	0	0		NO	0.67	
127	1	BROKFLAKE	MQU	MQUAR	TRANS	WHITE		0%		INDETER						0										0			14.9	0	0	0	0	0	0	0	0		NO	0.47	
127	1	COMPFLAKE	QUA	QUARTZI	TRANS	ORANG	HINGE	0%		ELONG	UNI	NONE	<5	1		0										0			24.2	24.2	12.7	3.4	0	6.5	1.6	0	0		NO	1.22	
127	1	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0										0			19.4	0	0	0	0	0	0	0	0		NO	0.56	
127	1	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		INDETER						0										0			13.7	0	0	0	0	0	0	0	0		NO	0.14	
127	1	BROKFLAKE	CCQ	CHAL	TRANS	GREYCL		0%		INDETER						0										0			10.2	0	0	0	0	0	0	0	0		NO	0.15	
127	1	COMPFLAKE	TUFF	TUFF	OPAQUE	GREEN	FEATHER	0%		EXPAND	CRUSH	NONE	<5	1		0										0			14	7.9	14	1.4	0	0	0	0	0		NO	0.14	
127	1	COMPFLAKE	CCQ	CHAL	TRANS	GREYCL	FEATHER	0%		EXPAND	CRUSH	NONE	<5	90		0										0			11.9	7	11.5	2.3	0	0	0	0	0		NO	0.16	
127	1	BROKFLAKE	MQU	MQUAR	OPAQUE	WHITE		0%		INDETER						0										0			13.9	0	0	0	0	0	0	0	0		NO	0.88	
127	1	DISTTOOL	CCQ	JASPER	OPAQUE	RED	FEATHER	51-	WATER-ROLL	BLOCK					DEN	0										0			63	0	0	0	0	0	0	0	0		NO	63.5	
127	1	COMPTOOL	CCQ	CHAL	TRANS	GREYCL	ABRUPT	0%		INDETER	FACET	OVERHANG	<5	1	STRA	1	N/A	N/A	SCALA	N/A						0			34.9	28.5	31.4	8.1	0	16.7	8.2	0	0		NO	7.87	
127	1	COMPTOOL	CCQ	CHAL	TRANS	LGREY	FEATHER	0%		ELONG	CRUSH	NONE	<5	1	STRA	1	N/A	N/A	SCALA	N/A						0			21.2	20.9	10.7	2.3	0	0	0	0	0		NO	0.47	
35	4	PROXFLAKE	CCQ	JASPER	OPAQUE	BROWN		0%		BLADE	FACET	NONE				0										0			21	0	0	0	0	12.3	5.1	0	0		NO	1.22	
35	4	DISTFLAKE	MQU	MQUAR	OPAQUE	WHITE	FEATHER	0%		EXPAND						0										0			14.3	0	0	0	0	0	0	0	0		NO	0.53	
35	4	COMPFLAKE	CCQ	JASPER	OPAQUE	BROWN	FEATHER	0%		EXPAND	UNI	NONE	<5	90		0										0			18.9	9.8	19	2.4	0	5.3	3	0	0		NO	0.43	
35	4	BROKFLAKE	CCQ	SERP	TRANS	GREEN		0%		INDETER						0										0			40.3	0	0	0	0	0	0	0	0		NO	3.97	
35	4	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		EXPAND						0										0			16.4	0	0	0	0	0	0	0	0		NO	0.33	
35	4	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		ELONG						0										0			11.3	0	0	0	0	0	0	0	0		NO	0.18	
35	4	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		EXPAND	UNI	NONE	<5	90		0										0			17.3	7	17.3	4.4	0	15.4	5.9	0	0		NO	0.85	
35	4	COMPTOOL	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		BLOCK	UNI	STEP	<5	1	DEN	2	N/A	N/A	NOTCH	NOT						0			51.4	46.3	37.9	14.3	0	16	7.5	0	0		NO	30.4	
121	2	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		EXPAND	UNI	NONE	<5	90		0										0			28	13.8	26.4	6.7	0	9.2	5.2	0	0		NO	3.3	
121	2	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0										0			29.2	0	0	0	0	0	0	0	0		NO	1	
121	1	COMPTOOL	CCQ	CHAL	TRANS	WHITE	N/A	0%		INDETER	NA	NONE	<5	1	THU	3	STEP	STEP	STEP	N/A						0			16.3	16.3	13.5	6.8	0	0	0	0	0		NO	1.66	
121	3	COMPSPLIT	CCQ	CHAL	TRANS	GREYCL	N/A	0%		INDETER						0										0			9.7	0	0	2.4	0	0	2.3	0	0		NO	0.15	
121	3	DISTFLAKE	CCQ	CHAL	TRANS	GREYCL	FEATHER	0%		EXPAND						0										0			15.2	0	0	0	0	0	0	0	0		NO	0.4	
121	3	DISTFLAKE	CCQ	CHAL	TRANS	PINK	FEATHER	0%		INDETER						0										0			13.2	0	0	0	0	0	0	0	0		NO	0.23	
124	3	DISTFLAKE	CCQ	CHAL	TRANS	GREYCL	ABRUPT	0%		ELONG						0										0			28.4	0	0	0	0	0	0	0	0		NO	2.62	
124	3	PROXFLAKE	CCQ	JASPER	OPAQUE	RED		0%		EXPAND	FLAKED	NONE				0										0			45.3	0	0	0	0	18.4	3.9	0	0		NO	3.58	
124	3	PROXFLAKE	CCQ	JASPER	OPAQUE	RED		0%		ELONG	UNI	NONE				0										0			18.8	0	0	0	0	15.9	3.5	0	0		NO	1.41	
126	2	DISTFLAKE	CCQ	CHAL	TRANS	GREYCL	FEATHER	1-	WATER-ROLL	EXPAND						0										0			24.3	0	0	0	0	0	0	0	0		NO	2.03	
126	2	DISTFLAKE	CCQ	JASPER	OPAQUE	DGREY	FEATHER	0%		ELONG						0										0			19.5	0	0	0	0	0	0	0	0		NO	1.1	
126	2	BLOCK	CCQ	CHAL	TRANS	GREYCL		1-	WATER-ROLL							0										0			70.9	0	0	0	0	0	0	0	0		NO	69.9	serp/chal
125	3	BROKFLAKE	CCQ	CHAL	TRANS	LGREY		0%		BLADE						0										0			14.6	0	0	0	0	0	0	0	0		NO	0.22	
125	3	COMPTOOL	CCQ	JASPER	OPAQUE	DGREY	N/A	1-	ROUGH	ELONG	UNI	NONE	<5	1	DRIL	1	N/A	N/A	STEP	N/A						0			45	44.3	16.5	7.2	0	7.6	5.6	0	0		NO	5.14	tip of drill lat break
35	5	PROXFLAKE	MQU	MQUAR	OPAQUE	WHITE		0%		BLOCK	FLAKED	NONE				0										0			33.3	0	0	0	0	17.7	8.6	0	0		NO	8.24	
35	5	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0										0			18.6	0	0	0	0	0	0	0	0		NO	1.26	
35	5	BROKFLAKE	MQU	MQUAR	OPAQUE	WHITE		0%		INDETER						0										0			14.4	0	0	0	0	0	0	0	0		NO	0.29	
35	5	COMPFLAKE	MQU	MQUAR	TRANS	WHITE	FEATHER	1-	WATER-ROLL	BLOCK	CORTICAL	NONE	<5	1		0										0			24.4	15.4	19.9	8	0	19	9.9	0	0		NO	3.37	
35	5	COMPFLAKE	MQU	MQUAR	OPAQUE	WHITE	FEATHER	1-	WATER-ROLL	EXPAND	CORTICAL	NONE	0	NA		0										0			14	10.3	14	5	0	8.9	6.4	0	0		NO	0.83	
29	5	PROXFLAKE	CCQ	JASPER	OPAQUE	RED		1-	WATER-ROLL	INDETER	CORTICAL	NONE				0										0			17.3	0	0	0	0	8.8	3.3	0	0		NO	1.14	
124	1	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0										0			17	0	0	0	0	0	0	0	0		NO	0.78	
124	1	DISTFLAKE	CCQ	CHAL	TRANS	BROWN	HINGE	0%		EXPAND						0										0			40.8	0	0	0	0	0	0	0	0		NO	5.32	chal/jasper/chert
134	5	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	STEP	0%		BLOCK						0										0			30.2	0	0	0	0	0	0	0	0		NO	6.02	
134	5	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		INDETER						0										0			27.6	0	0	0	0	0	0	0	0		NO	1.59	
134	5	DISTFLAKE	CCQ	CHAL	TRANS	PINK	FEATHER	0%		INDETER						0										0			26	0	0	0	0	0	0	0	0		NO	2.03	
134	5	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0										0			16.2	0	0	0	0	0	0	0	0		NO	0.4	
134	5	CORE	CCQ	CHAL	TRANS	LGREY		0%								0					BBLA	FLAK	OVE	YES	ELO	2	1	0	29.5	0	15.7	11.1	25.9	0	0	11.1	10.1	1-2	NO	5.96	platform across term banded lgrey
125	2	COMPTOOL	CCQ	JASPER	OPAQUE	RED	FEATHER	1-	ROUGH	BLOCK	UNI	NONE	<5	1	NOT	1	N/A	NOTCH	N/A	N/A						0			55.4	44	0	12.4	0	0	12.6	0	0		NO	23	compsplit tool
34	1	COMPSPLIT	CCQ	JASPER	OPAQUE	RED	N/A	0%		INDETER						0										0			23.5	0	0	5	0	0	5.1	0	0		NO	2.44	
29	2	PROXFLAKE	CCQ	JASPER	OPAQUE	RED		0%		ELONG	FACET	NONE				0										0			18.1	0	0	0	0	10.9	2.7	0	0		NO	0.77	
29	2	COMPSPLIT	CCQ	JASPER	OPAQUE	RED	N/A	0%		INDETER						0										0			41.1	0	0	5.5	0	0	2.8	0	0		NO	5.53	
122	3	COMPTOOL	CCQ	JASPER	OPAQUE	RED	ABRUPT	0%		EXPAND	UNI	NONE	<5	1	USE	3	SCALAR	SCALAR	N/A	USE						0			30.1	15.5	30.2	6.1	0	19.5	5.7	0	0		NO	4.55	
122	3	PROXFLAKE	CCQ	CHAL	TRANS	GREYCL		0%		INDETER	FLAKED	NONE				0										0			25.2	0	0	0	0	20.9	6.9	0	0		NO	2.34	
125	1	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		BLOCK						0										0			33.6	0	0	0	0	0	0	0	0		NO	4.84	
125	1	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		BLOCK	FLAKED	NONE	<5	1		0										0			21.4	7.5	16.5	6.3	0	20.9	9.2	0	0		NO	0.65	
125	1	COMPFLAKE	CCQ	CHAL	TRANS	GREYCL	FEATHER	0%		INDETER	FACET	NONE	<5	90		0										0			19.3	17.9	13.8	2.9	0	15	3.2	0	0		NO	0.7	
125	1	DISTTOOL	CCQ	CHAL	TRANS	GREYCL	N/A	0%		BLADE					BON	0										0			22.1	0	0	0	0	0	0	0	0		NO	0.7	
125	1	PROXFLAKE	CCQ	JASPER	OPAQUE	BLUEG		0%		EXPAND	FLAKED	NONE				0										0			40.4	0	0	0	0	40.4	9.8	0	0		NO	7.6	
125	1	COREFRAG	CCQ	CHAL	TRANS	LGREY		0%								0										0			33.1	0	0	0	0	0	0	0	0		NO	6.37	on flake
125	1	PROXFLAKE	CCQ	CHAL	TRANS	GREYCL		0%		INDETER	UNI	NONE				0										0			28.2	0	0	0	0	14	4.1	0	0		NO	2.44	
125	1	COMPTOOL	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		INDETER	FLAKED	NONE	<5	90	USE	1	N/A	N/A	N/A	USE						0			27.6	22.6	19.1	7.1	0	14.7	7.5	0	0		NO	3.5	
125	1	CORE	CCQ	CHAL	TRANS	GREYCL		0%								0					UNID	BLOC	NON	NO	ELO	1	0	0	33.8	0	25.6	22.9	28.7	0	0	28.7	20.4	1-2	NO	13.8	
32	4	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	1-	WATER-ROLL	BLOCK	UNI	NONE	<5	1		0										0			87.7	70	47.1	16.9	0	34.9	14.5	0	0		NO	75.3	
32	4	DISTFLAKE	CCQ	JASPER	OPAQUE	BLUEG	FEATHER	0%		ELONG						0										0			21.1	0	0	0	0	0	0	0	0		NO	0.6	
19	5	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		INDETER	UNI	NONE	<5	1		0										0			32.4	32.4	23.1	4.1	0	6.5	3.7	0	0		NO	3.24	
19	5	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		INDETER	UNI	OVERHANG	<5	1		0										0			25.5	16.5	16.7	5.3	0	16.3	8.5	0	0		NO	2.73	
19	5	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		INDETER	FACET	NONE	<5	90		0										0			21	18	7.9	5.1	0	6.8	4	0	0		NO	1.12	
19	5	DISTFLAKE	CCQ	JASPER	OPAQUE	BLUEG	FEATHER	1-	ROUGH	INDETER						0										0			18.3	0	0	0	0	0	0	0	0		NO	0.72	
19	5	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		EXPAND						0										0			29.3	0	0	0	0	0	0	0	0		NO	1.6	
19	5	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		ELONG	MISSING	NONE	<5	1		0										0			18	18	4.3	2.1	0	0	0	0	0		NO	0.22	
19	5	SPALL	CCQ	JASPER	OPAQUE	RED		0%		N/A						0										0			19.6	0	0	0	0	0	0	0	0		NO	0.8	
19	5	BLOCK	CCQ	JASPER	OPAQUE	RED		1-	VEIN							0										0			19	0	0	0	0	0	0	0	0		NO	2.61	
19	5	PROXTOOL	CCQ	JASPER	OPAQUE	BLUEG		0%		INDETER	FLAKED	NONE			STRA	0										0			36.9	0	0	0	0	25.8	4.1	0	0		NO	7.4	
19	5	DISTFLAKE	CCQ	JASPER	OPAQUE	BLUEG	FEATHER	0%		INDETER						0										0			23.8	0	0	0	0	0	0	0	0		NO	1.14	
119	3	BLOCK	MQU	MQUAR	OPAQUE	WHITE		0%								0										0			22.8	0	0	0	0	0	0	0	0		NO	2.56	
119	3	COMPFLAKE	CCQ	JASPER	OPAQUE	BLUEG	FEATHER	0%		EXPAND	UNI	NONE	<5	90		0										0			21.7	14.4	21.8	3.2	0	12.8	3.6	0	0		NO	1.49	
119	3	DISTFLAKE	CCQ	CHAL	TRANS	GREYCL	FEATHER	0%		INDETER						0										0			11.3	0	0	0	0	0	0	0	0		NO	0.12	

SQ	SPIT	CLASS	MATERIAL GROUP	MATERIA	TRANSLUCENCY	COLOUR	DISTAL END	CORTEX %	CORTEX TYPE	FORM	PLATFORM TYPE	PLATFORM PREPARATI	SCAR NUMBER	SCAR TYPE	TOOL TYPE	RETOUCHED EDGES	EDGE 1	EDGE 2	EDGE 3	EDGE 4	CORETYPE	CORE BODY	PLATFORM NUMBER	CORE EXHAUSTION?	SCAR FORM	CORE PLATFORMS	STEPS	HINGES	LENGTH	LENGTH AXIAL	WIDTH	THICKNESS	CORE FACE LENGTH	PLATFORM WIDTH	PLATFORM THICKNESS	CORE SCAR LENGTH	CORE SCAR WIDTH	NO. CORE SCARS	BURNT?	WEIGHT	COMMENTS
119	3	DISTFLAKE	CCQ	CHAL	TRANS	GREYCL	FEATHER	0%		EXPAND						0									0			11.5	0	0	0	0	0	0	0	0		NO	0.17	
119	3	BROKFLAKE	CCQ	CHAL	TRANS	LGREY		0%		INDETER						0									0			10.7	0	0	0	0	0	0	0	0		NO	0.12	
119	3	BLOCK	CCQ	JASPER	OPAQUE	RED		1-	ROUGH							0									0			64.3	0	0	0	0	0	0	0	0		NO	31.5	
19	4	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		INDETER						0									0			23.4	0	0	0	0	0	0	0	0		NO	2.23	
19	4	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	HINGE	0%		INDETER	UNI	OVERHANG	<5	1		0									0			31.1	24	22.1	5	0	15.4	6.1	0	0		NO	3.97	
19	4	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		EXPAND	CRUSH	NONE	<5	1		0									0			16.6	17.2	16.7	4.8	0	0	0	0	0		NO	1.21	
19	4	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	1-	ROUGH	BLOCK	UNI	OVERHANG	<5	90		0									0			57.1	48.1	41	18.6	0	28	9.2	0	0		NO	42.8	
120	5	PROXFLAKE	CCQ	JASPER	OPAQUE	RED		0%		ELONG	UNI	NONE				0									0			17.7	0	0	0	0	4.3	3.3	0	0		NO	0.54	
120	5	BROKFLAKE	CCQ	CHAL	TRANS	WHITE		0%		INDETER						0									0			11.4	0	0	0	0	0	0	0	0		NO	0.14	
120	5	DISTFLAKE	CCQ	CHAL	TRANS	YELLOW	FEATHER	0%		INDETER						0									0			11.5	0	0	0	0	0	0	0	0		NO	0.13	
118	3	DISTFLAKE	CCQ	CHAL	TRANS	PINK	FEATHER	0%		EXPAND						0									0			41.8	0	0	6.4	0	0	0	0	0		NO	5.71	
118	3	COMPSPLIT	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		INDETER						0									0			20.3	0	0	3.8	0	0	3	0	0		NO	1.02	
118	3	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		ELONG						0									0			20.3	0	0	0	0	0	0	0	0		NO	0.25	
118	3	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		ELONG	UNI	NONE	<5	1		0									0			15.4	14.4	10	3.1	0	10.2	3.8	0	0		NO	0.36	
118	3	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	1-	ROUGH	INDETER						0									0			12.2	0	0	0	0	0	0	0	0		NO	0.2	
118	3	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		INDETER						0									0			10	0	0	0	0	0	0	0	0		NO	0.13	
118	3	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		EXPAND						0									0			16.8	0	0	0	0	0	0	0	0		NO	0.64	
118	3	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0									0			13.7	0	0	0	0	0	0	0	0		NO	0.26	
118	3	DISTFLAKE	MQU	MQUAR	TRANS	WHITE	FEATHER	0%		INDETER						0									0			9.3	0	0	0	0	0	0	0	0		NO	0.23	
118	3	COMPTOOL	CCQ	JASPER	OPAQUE	RED	N/A	0%		ELONG	NA	NONE	<5	1	GEO	2	BACK	N/A	BACK	N/A						0			12.7	12.7	6.9	2.9	0	0	0	0	0		NO	0.31	geo backed only on lateral ends
13	3	COMPSPLIT	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		INDETER						0									0			17.8	0	0	5.3	0	0	4.5	0	0		NO	1.1	
13	3	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		ERRAILURE	CRUSH	NONE	0	NA		0									0			8.4	8.4	7.7	0.7	0	0	0	0	0		NO	0.06	
32	2	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0									0			20.2	0	0	0	0	0	0	0	0		NO	0.76	
32	2	COMPFLAKE	CCQ	JASPER	OPAQUE	BLUEG	FEATHER	0%		INDETER	UNI	NONE	<5	1		0									0			13.1	8.8	9.2	2.1	0	9.9	2.8	0	0		NO	0.22	
32	2	DISTFLAKE	CCQ	CHAL	TRANS	WHITE	FEATHER	0%		INDETER						0									0			11	0	0	0	0	0	0	0	0		NO	0.16	
120	4	DISTFLAKE	MQU	MQUAR	OPAQUE	WHITE	FEATHER	0%		EXPAND						0									0			11.4	0	0	0	0	0	0	0	0		NO	0.19	
120	4	BROKFLAKE	MQU	MQUAR	TRANS	WHITE		0%		INDETER						0									0			13.1	0	0	0	0	0	0	0	0		NO	0.24	
120	4	COMPFLAKE	MQU	MQUAR	OPAQUE	WHITE	FEATHER	0%		INDETER	UNI	NONE	0	NA		0									0			30.8	22.7	25.2	7.7	0	21	5	0	0		NO	6	
120	5	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	STEP	0%		BLOCK	UNI	NONE	<5	90		0									0			16.5	15.3	15	6.9	0	6.8	2.7	0	0		NO	1.35	
120	5	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	ABRUPT	0%		PLATREJUV	FLAKED	NONE	<5	90		0									0			55.6	49.1	37.7	16.1	0	17.5	9.8	0	0		NO	32.6	
120	5	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	PLUNGE	0%		BLADE	UNI	NONE	<5	1		0									0			58.4	58.4	9.8	3.6	0	3.5	1.4	0	0		NO	3	
120	5	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	HINGE	0%		EXPAND	UNI	OVERHANG	<5	90		0									0			35.3	15.2	34.2	4.1	0	31.1	3.4	0	0		NO	3.02	
120	5	PROXFLAKE	CCQ	JASPER	OPAQUE	RED		0%		BLOCK	FLAKED	NONE				0									0			36	0	0	0	0	16	7.8	0	0		NO	6	
120	5	COMPFLAKE	CCQ	JASPER	OPAQUE	BLUEG	FEATHER	100	WATER-ROLL	EXPAND	FLAKED	NONE	0	NA		0									0			36.1	13.7	34.7	5.7	0	25.2	13.2	0	0		NO	6.02	
120	5	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0									0			24.4	0	0	0	0	0	0	0	0		NO	3.5	
120	5	DISTFLAKE	CCQ	JASPER	OPAQUE	BLUEG	FEATHER	0%		EXPAND						0									0			27.8	0	0	0	0	0	0	0	0		NO	1.03	
120	5	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		EXPAND						0									0			30.5	0	0	0	0	0	0	0	0		NO	3.17	
120	5	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		ELONG						0									0			15.7	0	0	0	0	0	0	0	0		NO	0.52	
120	5	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	STEP	0%		BLOCK	UNI	NONE	<5	1		0									0			22.7	13.5	20.7	7.4	0	13.5	8.1	0	0		NO	2.03	
120	5	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0									0			22.3	0	0	0	0	0	0	0	0		NO	0.43	
120	5	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		ELONG	FACET	NONE	<5	1		0									0			17.4	16.7	8.1	4.5	0	7.7	4	0	0		NO	0.51	
120	5	BROKFLAKE	CCQ	JASPER	OPAQUE	BLUEG		0%		INDETER						0									0			16.3	0	0	0	0	0	0	0	0		NO	0.5	
120	5	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0									0			15.4	0	0	0	0	0	0	0	0		NO	0.51	
120	5	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		ELONG						0									0			16.4	0	0	0	0	0	0	0	0		NO	0.23	
120	5	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		EXPAND	UNI	NONE	<5	1		0									0			13.9	9.3	12.9	2.4	0	9.9	1.5	0	0		NO	0.31	
120	5	BLOCK	CCQ	JASPER	OPAQUE	RED		1-	VEIN							0									0			15.9	0	0	0	0	0	0	0	0		NO	1.15	
120	5	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	N/A	0%		ELONG	UNI	NONE	<5	1		0									0			22.3	22.3	10.9	3.3	0	4.3	3	0	0		NO	0.82	
120	5	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		51-	WATER-ROLL	INDETER						0									0			12.4	0	0	0	0	0	0	0	0		NO	0.47	
120	5	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	STEP	0%		INDETER						0									0			14.9	0	0	0	0	0	0	0	0		NO	0.49	
120	5	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		1-	WATER-ROLL	INDETER						0									0			17.8	0	0	0	0	0	0	0	0		NO	1.29	
120	5	PROXFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER	FACET	OVERHANG				0									0			15.7	0	0	0	0	11.5	1.8	0	0		NO	0.39	
120	5	BLOCK	CCQ	JASPER	OPAQUE	BROWN		0%								0									0			19.1	0	0	0	0	0	0	0	0		NO	1.01	
120	5	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0									0			12.8	0	0	0	0	0	0	0	0		NO	0.33	
120	5	PROXFLAKE	CCQ	JASPER	OPAQUE	RED		0%		ELONG	CRUSH	OVERHANG				0									0			12.3	0	0	0	0	0	0	0	0		NO	0.19	
120	5	DISTFLAKE	CCQ	JASPER	OPAQUE	BLUEG	HINGE	0%		INDETER						0									0			13.4	0	0	0	0	0	0	0	0		NO	0.41	
120	5	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0									0			14.9	0	0	0	0	0	0	0	0		NO	0.47	
120	5	BROKFLAKE	CCQ	JASPER	OPAQUE	BLUEG		0%		INDETER						0									0			41	0	0	0	0	0	0	0	0		NO	4.96	
120	5	DISTFLAKE	CCQ	SERP	TRANS	GREEN	STEP	0%		INDETER						0									0			14.1	0	0	0	0	0	0	0	0		NO	0.28	
120	5	COMPTOOL	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		ELONG	NA	NONE	0	NA	BON	3	BACK	BACK	BACK	N/A						0			18.9	18.9	5.9	4.3	0	0	0	0	0		NO	0.48	
120	5	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		BLADE	FLAKED	OVERHANG	<5	1		0									0			53.2	51.8	18.7	5.5	0	13.4	5.6	0	0		NO	6.71	conjoin with core 100.5g
120	5	CORE	CCQ	JASPER	OPAQUE	RED		1-	WATER-ROLL							0					BBLA	BLOC	NON	NO	ELO	3	0	1	62.4	0	54.6	28.2	55.8	0	0	50.1	14.6	3-5	NO	101	conjoin with 6.72g cf
12c	1	COMPTOOL	CCQ	JASPER	OPAQUE	RED	HINGE	1-	VEIN	BLOCK	UNI	STEP	>5	1	NOT	2	N/A	NOTCH	N/A	USE						0			53.4	40.3	53.6	12.9	0	16.9	5.5	0	0		NO	28.4	
12c	1	DISTFLAKE	CCQ	CHAL	TRANS	LGREY	PLUNGE	0%		ELONG						0									0			17.5	0	0	0	0	0	0	0	0		NO	0.96	
12c	1	PROXFLAKE	CCQ	CHAL	TRANS	WHITE		0%		ELONG	UNI	NONE				0									0			9.7	0	0	0	0	4	2.6	0	0		NO	0.22	
12c	1	COMPFLAKE	CCQ	CHAL	TRANS	GREYCL	FEATHER	0%		ELONG	UNI	NONE	0	NA		0									0			12	10.2	8	1.3	0	4.1	2.1	0	0		NO	0.16	
12c	1	COREFRAG	CCQ	JASPER	OPAQUE	BROWN		0%								0									0			13.9	0	0	0	0	0	0	0	0		NO	0.64	
12c	1	DISTFLAKE	CCQ	JASPER	OPAQUE	LGREY	FEATHER	0%		INDETER						0									0			10.4	0	0	0	0	0	0	0	0		NO	0.2	
12c	1	COREFRAG	CCQ	JASPER	OPAQUE	PINK		0%								0									0			35.3	0	0	0	0	0	0	0	0		NO	8.83	brok bbcore on flake bladex2
12c	1	BROKFLAKE	MQU	MQUAR	TRANS	WHITE		0%		INDETER						0									0			9.8	0	0	0	0	0	0	0	0		NO	0.12	
12d	7	COMPSPLIT	CCQ	CHAL	TRANS	LGREY	FEATHER	0%		BLOCK						0									0			50.9	0	0	16.2	0	0	12.4	0	0		NO	17.6	
12d	7	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		EXPAND	UNI	OVERHANG	<5	90		0									0			26.8	10.8	26.9	4.1	0	10.9	3	0	0		NO	1.11	
12d	7	BLOCK	CCQ	JASPER	OPAQUE	RED		0%								0									0			16.3	0	0	0	0	0	0	0	0		NO	1	
12d	7	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		ERRAILURE	UNI	NONE	0	NA		0									0			16.1	14.9	12.4	1.6	0	5.4	1.3	0	0		NO	0.34	
12d	7	COMPFLAKE	CCQ	CHAL	TRANS	GREYCL	FEATHER	0%		EXPAND	UNI	OVERHANG	<5	1		0									0			15.4	7.1	15.4	2.9	0	14	3.4	0	0		NO	0.32	
12d	7	COMPFLAKE	CCQ	CHAL	TRANS	WHITE	FEATHER	0%		ELONG	UNI	NONE	<5	1		0									0			18.8	17.4	9.6	2.6	0	6.3	1.3	0	0		NO	0.47	
12d	7	COMPFLAKE	MSIL	MSILCRE	OPAQUE	WHITE	FEATHER	0%		INDETER	UNI	NONE	<5	90		0									0			14.8	10.3	11.4	3.4	0	10.4	3.4	0	0		NO	0.45	
12a	5	PROXFLAKE	CCQ	JASPER	OPAQUE	RED		1-	ROUGH	ELONG	FLAKED	NONE				0									0			25.9	0	0	0	0	14	8.8	0	0		NO	4.69	
12a	5	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		ELONG	MISSING	NONE	<5	1		0									0			51.9	51.9	12.4	5.8	0	0	0	0	0		NO	4.68	

SQ	SPIT	CLASS	MATERIAL GROUP	MATERIAL	TRANSLUCENCY	COLOUR	DISTIAL END	CORTEX %	CORTEX TYPE	FORM	PLATFORM TYPE	PLATFORM PREPARATI	SCAR NUMBER	SCAR TYPE	TOOL TYPE	RETOUCHED EDGES	EDGE 1	EDGE 2	EDGE 3	EDGE 4	CORETYPE	CORE BODY	PLATFORM NUMBER	CORE EXHAUSTION?	SCAR FORM	CORE PLATFORMS	STEPS	HINGES	LENGTH	LENGTH AXIAL	WIDTH	THICKNESS	CORE FACE LENGTH	PLATFORM WIDTH	PLATFORM THICKNESS	CORE SCAR LENGTH	CORE SCAR WIDTH	NO. CORE SCARS	BURNT?	WEIGHT	COMMENTS
12a	5	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		26-	VEIN	INDETER						0												19.1	0	0	0	0	0	0	0	0		NO	0.7	
12a	5	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	51-	ROUGH	INDETER	FLAKED	NONE	<5	90		0										0			32.3	20.3	20.4	5.1	0	19.5	5.1	0	0		NO	3.42	
12a	5	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		ELONG						0										0			14.6	0	0	0	0	0	0	0	0		NO	0.25	
12a	5	COMPSPLIT	CCQ	JASPER	OPAQUE	RED	FEATHER	1-	ROUGH	INDETER						0										0			16.5	0	0	2.3	0	0	1.6	0	0		NO	0.82	
12a	5	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		51-	ROUGH	INDETER						0										0			15.8	0	0	0	0	0	0	0	0		NO	0.31	
12a	5	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		26-	VEIN	INDETER						0										0			9.5	0	0	0	0	0	0	0	0		NO	0.13	
12a	5	BROKFLAKE	MQU	MQUAR	OPAQUE	WHITE		0%		INDETER						0										0			14.1	0	0	0	0	0	0	0	0		NO	0.34	
12a	5	PROXFLAKE	CCQ	CHAL	TRANS	GREYCL		0%		INDETER	UNI	STEP				0										0			38.2	0	0	0	0	14.2	3.8	0	0		NO	7.78	greenish
12a	5	CORE	CCQ	CHAL	TRANS	GREYCL		0%								0					BIFA	BLOC	NON	NO	EXPA	2	2	0	92	0	63.5	62.8	44.7	0	0	17.1	24.2	1-2	NO	315	
12d	6	COMPFLAKE	CCQ	JASPER	OPAQUE	BLUEG	FEATHER	0%		EXPAND	UNI	NONE	<5	90		0										0			29.2	16.2	23.4	4	0	18.3	8.4	0	0		NO	2.99	
12d	6	PROXFLAKE	CCQ	JASPER	OPAQUE	RED		0%		ELONG	FACET	NONE				0										0			24.8	0	0	0	0	6.4	2.6	0	0		NO	1.4	
12d	6	DISTFLAKE	CCQ	JASPER	OPAQUE	BROWN	HINGE	0%		INDETER						0										0			10	0	0	0	0	0	0	0	0		NO	0.12	
12b	5	COMPFLAKE	CCQ	SERP	TRANS	GREEN	STEP	0%		BLOCK	UNI	NONE	0	NA		0										0			26.9	22.3	27.8	7.8	0	5	2	0	0		NO	3.67	
12b	5	DISTFLAKE	CCQ	CHAL	TRANS	GREYCL	FEATHER	0%		INDETER						0										0			20.9	0	0	0	0	0	0	0	0		NO	1.13	
12b	5	PROXFLAKE	CCQ	CHAL	TRANS	GREYCL		0%		EXPAND	UNI	NONE				0										0			23.8	0	0	0	0	7.9	3	0	0		NO	0.77	conjoin with 1.13g
12b	5	COMPFLAKE	CCQ	JASPER	OPAQUE	BROWN	N/A	1-	ROUGH	ELONG	UNI	STEP	<5	1		0										0			37.2	34.5	19.2	5.4	0	18.5	3	0	0		NO	5.26	
12b	5	BROKTOOL	CCQ	JASPER	OPAQUE	RED		0%		BLADE					STRA	0										0			28.9	0	0	0	0	0	0	0	0		NO	2.65	
12b	5	PROXFLAKE	CCQ	JASPER	OPAQUE	RED		0%		BLADE	FACET	NONE				0										0			29.3	0	0	0	0	8.8	3.3	0	0		NO	2.69	conjoin with tool 2.66g
12b	5	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		INDETER						0										0			16.5	0	0	0	0	0	0	0	0		NO	0.64	
12b	5	COMPTOOL	CCQ	JASPER	OPAQUE	RED	N/A	0%		BLOCK	FLAKED	NONE	<5	1	END	1	N/A	N/A	SCALA	N/A						0			18.9	12.4	12.2	4.9	0	9.8	6.9	0	0		NO	1.1	
12b	5	COMPFLAKE	QUA	QUARTZI	TRANS	ORANG	STEP	0%		INDETER	UNI	NONE	<5	90		0										0			26	23.8	19.5	2.9	0	8.8	2.9	0	0		NO	1.8	orange/white
12b	5	PROXFLAKE	CCQ	JASPER	OPAQUE	BLUEG		0%		ELONG	UNI	NONE				0										0			15.5	0	0	0	0	8.3	3.1	0	0		NO	0.7	
12b	5	DISTFLAKE	MQU	MQUAR	TRANS	CLEAR	FEATHER	0%		INDETER						0										0			11	0	0	0	0	0	0	0	0		NO	0.12	
12b	5	BROKFLAKE	CCQ	JASPER	OPAQUE	BLUEG		0%		INDETER						0										0			18.1	0	0	0	0	0	0	0	0		NO	0.96	
12b	5	CORE	CCQ	CHAL	TRANS	WHITE		0%		BLOCK	UNI	OVERHANG				0					UNID	FLAK	NON	NO	EXPA	1	1	0	36.6	0	18.4	13.6	35.1	0	0	9.6	18.1	1-2	NO	10.2	pink tinge
12b	5	COMPTOOL	CCQ	CHAL	TRANS	WHITE	FEATHER	51-	WATER-ROLL	BLOCK	FLAKED	NONE	<5	90	STEP	1	N/A	STEP	N/A	N/A						0			47	37.4	30.2	15.3	0	32.6	15.2	0	0		NO	23.1	
12b	2	BROKFLAKE	CCQ	CHAL	TRANS	LGREY		0%		INDETER						0										0			15.6	0	0	0	0	0	0	0	0		NO	0.53	
12a	6	PROXFLAKE	CCQ	CHAL	TRANS	GREYCL		0%		INDETER	UNI	NONE				0										0			18.5	0	0	0	0	17.4	3.6	0	0		NO	0.78	
12a	6	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		100	VEIN	INDETER						0										0			23.1	0	0	0	0	0	0	0	0		NO	0.45	
12a	6	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		1-	VEIN	INDETER						0										0			15.3	0	0	0	0	0	0	0	0		NO	0.98	
12a	6	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		1-	ROUGH	INDETER						0										0			16.2	0	0	0	0	0	0	0	0		NO	0.43	
12a	6	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	26-	VEIN	INDETER						0										0			9.9	0	0	0	0	0	0	0	0		NO	0.06	
12a	6	COMPSPLIT	CCQ	SERP	TRANS	GREEN	ABRUPT	0%		INDETER						0										0			23.7	0	0	4.8	0	0	3.5	0	0		NO	0.79	
12a	6	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0										0			6	0	0	0	0	0	0	0	0		NO	0.01	
12d	1	PROXFLAKE	CCQ	JASPER	OPAQUE	BROWN		0%		INDETER	UNI	NONE				0										0			11.1	0	0	0	0	6.3	1.6	0	0		NO	0.26	
12d	1	DISTFLAKE	CCQ	CHAL	TRANS	GREYCL	FEATHER	0%		EXPAND						0										0			19.8	0	0	0	0	0	0	0	0		NO	0.48	
12d	1	COMPTOOL	CCQ	JASPER	OPAQUE	RED	FEATHER	26-	VEIN	BLOCK	UNI	NONE	<5	180	NOT	2	N/A	USEWE	NOTCH	N/A						0			37.5	35	22.1	13.5	0	7.9	5.8	0	0		NO	11.2	
12a	4	COMPSPLIT	MQU	MQUAR	TRANS	WHITE	FEATHER	0%		INDETER						0										0			17.3	0	0	6.6	0	0	4.2	0	0		NO	0.42	
12a	4	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		BLADE						0										0			14.9	0	0	0	0	0	0	0	0		NO	0.25	
12a	4	BROKFLAKE	CCQ	CHAL	TRANS	WHITE		0%		INDETER						0										0			9.2	0	0	0	0	0	0	0	0		NO	0.08	
105	4	PROXFLAKE	CCQ	JASPER	OPAQUE	RED		0%		ELONG	UNI	NONE				0										0			19.4	0	0	0	0	10	3.3	0	0		NO	1.15	
105	4	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		PLATREJUV	UNI	NONE	<5	RADI		0										0			37.4	15.1	37.9	6	0	13.7	6.3	0	0		NO	4.24	
105	4	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0										0			45.7	0	0	0	0	0	0	0	0		NO	2.69	elongated ridge removal
105	4	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		EXPAND	UNI	NONE	<5	1		0										0			31.3	23.5	27	9.3	0	21.3	8.1	0	0		NO	7.65	
105	4	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	PLUNGE	0%		BLOCK	UNI	NONE	<5	1		0										0			34.2	31.1	25.6	10.4	0	11.3	5.1	0	0		NO	7	
105	4	BLOCK	CCQ	JASPER	OPAQUE	RED		0%								0										0			28.5	0	0	0	0	0	0	0	0		NO	8	
105	4	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	HINGE	0%		ELONG	MISSING	STEP	<5	1		0										0			34.6	34.3	12	5.8	0	0	0	0	0		NO	2.01	
105	4	BLOCK	CCQ	JASPER	OPAQUE	RED		26-	WATER-ROLL							0										0			41.3	0	0	0	0	0	0	0	0		NO	10.3	
105	4	COMPFLAKE	CCQ	JASPER	OPAQUE	BLUEG	FEATHER	0%		INDETER	FACET	NONE	<5	1		0										0			32.3	27.8	21.1	6.9	0	16.7	6.3	0	0		NO	5.46	
105	4	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		INDETER						0										0			15.4	0	0	0	0	0	0	0	0		NO	0.18	
105	4	BROKFLAKE	CCQ	JASPER	OPAQUE	RED	PLUNGE	0%		INDETER						0										0			27.3	0	0	0	0	0	0	0	0		NO	3.12	
105	4	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0										0			15.2	0	0	0	0	0	0	0	0		NO	0.15	
105	4	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		ELONG						0										0			8.7	0	0	0	0	0	0	0	0		NO	0.12	
105	4	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		ELONG	FACET	NONE	0	NA		0										0			16.9	16.9	9.4	2.3	0	4.7	2	0	0		NO	0.43	
105	4	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		ELONG	CRUSH	NONE	<5	1		0										0			17.3	17.3	8.1	2.4	0	0	0	0	0		NO	0.21	
105	4	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	HINGE	0%		PLATREJUV	UNI	NONE	<5	90		0										0			15.1	15.1	7.5	3.1	0	5	2.2	0	0		NO	0.38	
105	4	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		EXPAND						0										0			14.9	0	0	0	0	0	0	0	0		NO	0.23	
105	4	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	HINGE	0%		INDETER						0										0			9.6	0	0	0	0	0	0	0	0		NO	0.16	
105	4	COMPSPLIT	CCQ	CHAL	TRANS	GREYCL	STEP	0%		INDETER						0										0			23	0	0	3.5	0	0	4.1	0	0		NO	2.21	
105	4	DISTFLAKE	CCQ	CHAL	TRANS	GREYCL	FEATHER	0%		INDETER						0										0			32.6	0	0	0	0	0	0	0	0		NO	2.43	
105	4	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		EXPAND	UNI	NONE	<5	90		0										0			17.6	10.5	17.6	2.4	0	5.3	2.1	0	0		NO	0.53	
105	4	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0										0			22.5	0	0	0	0	0	0	0	0		NO	0.55	
105	4	COMPSPLIT	CCQ	CHAL	TRANS	GREYCL	N/A	0%		INDETER						0										0			20.1	0	0	6.8	0	0	5.3	0	0		NO	1.38	
105	4	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		ELONG						0										0			19.1	0	0	0	0	0	0	0	0		NO	0.74	
105	4	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0										0			13.3	0	0	0	0	0	0	0	0		NO	0.24	
105	4	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0										0			17.6	0	0	0	0	0	0	0	0		NO	1	
105	4	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		EXPAND	UNI	NONE	<5	90		0										0			11.9	8	11.9	3.8	0	6.7	2.6	0	0		NO	0.34	
105	4	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		INDETER						0										0			13.2	0	0	0	0	0	0	0	0		NO	0.16	
105	4	PROXFLAKE	CCQ	CHAL	TRANS	GREYCL		0%		EXPAND	UNI	NONE				0										0			24.1	0	0	0	0	9.6	4	0	0		NO	1.53	5 flakes same mat blue/gy jasper
105	4	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		BLADE						0										0			28.9	0	0	0	0	0	0	0	0		NO	0.59	
105	4	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		EXPAND	CRUSH	NONE	0	NA		0										0			19.6	6.7	19.8	2.3	0	0	0	0	0		NO	0.25	
105	4	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0										0			16.1	0	0	0	0	0	0	0	0		NO	0.42	
105	4	BLOCK	CCQ	JASPER	OPAQUE	RED		0%								0										0			18.9	0	0	0	0	0	0	0	0		NO	1.11	
105	4	COMPTOOL	CCQ	JASPER	OPAQUE	BLUEG	N/A	0%		BLOCK	UNI	STEP	<5	1	STEP	2	N/A	STEP	N/A	STEP						0			63.5	44	63	19.7	0	37	10	0	0		NO	74.5	jasper blue/grey
105	4	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		BLOCK						0										0			35.8	0	0	0	0	0	0	0	0		NO	7.18	
105	4	PROXTOOL	CCQ	JASPER	OPAQUE	RED		0%		BLOCK	FACET	NONE			STRA	0										0			52	0	0	0	0	28	15.5	0	0		NO	46.8	
105	4	CORE	CCQ	JASPER	OPAQUE	RED		0%								0					BIDI	BLOC	FACE	NO	EXPA	2	0	0	60.9	0	41.3	23	30.1	0	0	30.1	55.7	1-2	NO	62.6	
105	4	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		PLATREJUV	UNI	STEP	<5	90		0										0			37.8	33.3	20.1	12	0	10.3	3.2	0	0		NO	7.99	

SQ	SPIT	CLASS	MATERIAL GROUP	MATERIAL	TRANSLUCENCY	COLOUR	DISTIAL END	CORTEX %	CORTEX TYPE	FORM	PLATFORM TYPE	PLATFORM PREPARATI	SCAR NUMBER	SCAR TYPE	TOOL TYPE	RETOUCHED EDGES	EDGE 1	EDGE 2	EDGE 3	EDGE 4	CORETYPE	CORE BODY	PLATFORM NUMBER	CORE EXHAUSTION?	SCAR FORM	CORE PLATFORMS	STEPS	HINGES	LENGTH	LENGTH AXIAL	WIDTH	THICKNESS	CORE FACE LENGTH	PLATFORM WIDTH	PLATFORM THICKNESS	CORE SCAR LENGTH	CORE SCAR WIDTH	NO. CORE SCARS	BURNT	WEIGHT	COMMENTS
105	4	BROKFLAKE	QUA	QUARTZI	TRANS	ORANG		0%		INDETER						0										0			13.4	0	0	0	0	0	0	0	0		NO	0.31	orange/white
105	4	BLOCK	CCQ	JASPER	OPAQUE	PINK		0%								0										0			21.7	0	0	0	0	0	0	0	0		NO	1.16	
105	4	DISTTOOL	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		BLADE					BACK	0										0			22.8	0	0	0	0	0	0	0	0		NO	0.27	attempt to make bondi
105	4	COMPTOOL	CCQ	JASPER	OPAQUE	RED	N/A	0%		BLADE	NA	NONE	<5	1	BON	3	BACK	BACK	BACK	N/A						0			30.9	30.9	11.2	3.9	0	0	0	0	0		NO	1.51	
105	4	BROKTOOL	CCQ	JASPER	OPAQUE	RED		0%		INDETER					USE	0										0			23.5	0	0	0	0	0	0	0	0		NO	1.01	or old plat prep
105	5	COMPFLAKE	CCQ	JASPER	OPAQUE	DGREY	FEATHER	1-	ROUGH	PLATREJUV	UNI	NONE	<5	90		0										0			25.5	29.2	20.5	15.6	0	10.1	6.4	0	0		NO	8.98	chert/jasper banded
105	5	COMPFLAKE	CCQ	JASPER	OPAQUE	BLUEG	FEATHER	0%		INDETER	UNI	OVERHANG	<5	90		0										0			23.3	12.3	14.6	3.4	0	12.7	8.3	0	0		NO	1.73	
105	5	COMPSPLIT	CCQ	CHAL	TRANS	GREYCL	FEATHER	0%		INDETER						0										0			20.2	0	0	2.7	0	0	2.2	0	0		NO	0.68	
105	5	BROKFLAKE	CCQ	JASPER	OPAQUE	BLUEG		0%		INDETER						0										0			16.2	0	0	0	0	0	0	0	0		NO	0.51	
105	5	COMPSPLIT	CCQ	CHAL	TRANS	GREYCL	FEATHER	0%		INDETER						0										0			24.4	0	0	3.3	0	0	3.7	0	0		NO	0.84	
105	5	COMPSPLIT	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		INDETER						0										0			21	0	0	5.6	0	0	1.5	0	0		NO	1.2	
105	5	DISTTOOL	MQU	MQUAR	TRANS	WHITE	FEATHER	0%		BLOCK					STEP	0										0			20.2	0	0	0	0	0	0	0	0		NO	2.18	
105	5	BROKFLAKE	CCQ	JASPER	OPAQUE	BLUEG		0%		INDETER						0										0			13.8	0	0	0	0	0	0	0	0		NO	0.52	x3 chal/jasper blue/gy with green
105	5	BROKFLAKE	CCQ	CHAL	TRANS	GREYCL		0%		INDETER						0										0			52.9	0	0	0	0	0	0	0	0		NO	45.8	
108	1	PROXFLAKE	CCQ	JASPER	OPAQUE	RED		0%		RIDGESTRAT	FACET	NONE				0										0			17.4	0	0	0	0	8.4	3.7	0	0		NO	0.45	
108	2	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0										0			22.4	0	0	0	0	0	0	0	0		NO	1.26	
108	2	COMPSPLIT	CCQ	JASPER	OPAQUE	RED	N/A	0%		INDETER						0										0			13	0	0	3	0	0	2.5	0	0		NO	0.33	
108	2	COMPFLAKE	CCQ	JASPER	OPAQUE	BLUEG	ABRUPT	1-	VEIN	BLOCK	FLAKED	NONE	<5	90		0										0			49.6	40.6	45	14	0	44.7	19.2	0	0		NO	49.4	chal/jasper/chert greenish
108	4	PROXFLAKE	CCQ	JASPER	OPAQUE	RED		0%		ELONG	FACET	NONE				0										0			13.4	0	0	0	0	4.2	2.5	0	0		NO	0.28	
108	4	COMPSPLIT	CCQ	JASPER	OPAQUE	BLUEG	FEATHER	0%		INDETER						0										0			37.1	0	0	5.1	0	0	9.8	0	0		NO	6.43	
106	2	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0										0			16	0	0	0	0	0	0	0	0		NO	0.15	
106	2	PROXFLAKE	CCQ	JASPER	OPAQUE	RED		0%		BLADE	CRUSH	NONE				0										0			17.6	0	0	0	0	0	0	0	0		NO	0.45	
106	2	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	1-	ROUGH	INDETER	FACET	NONE	<5	1		0										0			14.7	12	10.7	2.7	0	9.7	3.8	0	0		NO	0.43	
106	2	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	HINGE	0%		INDETER	UNI	NONE	<5	90		0										0			19	16.5	13.7	2.7	0	8.1	2.4	0	0		NO	0.96	
106	2	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		EXPAND	UNI	OVERHANG	<5	180		0										0			10.3	8.6	9.1	4.1	0	4.1	2.8	0	0		NO	0.31	
106	2	COMPFLAKE	CCQ	JASPER	OPAQUE	BROWN	FEATHER	0%		EXPAND	CRUSH	NONE	<5	1		0										0			11.5	8.3	11.7	1.7	0	0	0	0	0		NO	0.15	
106	2	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		ELONG						0										0			8.7	0	0	0	0	0	0	0	0		NO	0.06	
106	2	COMPTOOL	VOL	VOL	OPAQUE	DGREY	N/A	0%		INDETER	NA	NONE	<5	1	GEO	3	BACK	BACK	BACK	N/A						0			20.2	20.2	10.7	2.4	0	0	0	0	0		NO	0.72	
155	1	COMPTOOL	CCQ	SERP	TRANS	GREEN	FEATHER	0%		INDETER	UNI	NONE	<5	90	USE	1	N/A	N/A	USEWE	N/A						0			32.9	28.7	25.1	5.9	0	9.2	5.1	0	0		NO	5.53	
155	1	PROXFLAKE	MQU	MQUAR	TRANS	WHITE		0%		INDETER	UNI	OVERHANG				0										0			13.9	0	0	0	0	9.7	1.8	0	0		NO	0.28	
155	1	BROKFLAKE	CCQ	JASPER	OPAQUE	BROWN		26-	WATER-ROLL	BLOCK						0										0			29.6	0	0	0	0	0	0	0	0		NO	5.01	chal/chert/jasper red/brn
155	1	BLOCK	CCQ	JASPER	OPAQUE	RED		0%								0										0			47	0	0	0	0	0	0	0	0		NO	11.1	
155	1	BLOCK	CCQ	JASPER	OPAQUE	BROWN		0%								0										0			20.8	0	0	0	0	0	0	0	0		NO	2.01	
155	1	COMPTOOL	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		BLADE	NA	NONE	<5	1	BON	2	N/A	N/A	BACK	BACK						0			24	24	8.9	3.9	0	0	0	0	0		NO	0.81	elongated geo?
155	1	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		1-	VEIN	BLOCK						0										0			18.3	0	0	0	0	0	0	0	0		NO	1.23	
155	1	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		EXPAND	MISSING	NONE	<5	90		0										0			15.9	8.1	15.9	2.4	0	0	0	0	0		NO	0.25	
155	1	BROKFLAKE	CCQ	JASPER	OPAQUE	BLUEG		0%		BLOCK						0										0			33.3	0	0	0	0	0	0	0	0		NO	9	blue grey with greenish
155	1	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		INDETER	CRUSH	NONE	<5	1		0										0			7.7	5.6	5.1	2.1	0	0	0	0	0		NO	0.01	
8	2	COMPTOOL	CCQ	SERP	TRANS	GREEN	ABRUPT	0%		EXPAND	FLAKED	NONE	<5	1	NOT	2	N/A	NOTCH	N/A	NOT						0			51.5	44.5	50.5	11.2	0	31.5	6.5	0	0		NO	31	
8	2	CORE	CCQ	JASPER	OPAQUE	BROWN		1-	ROUGH							0					BIDI	BLOC	OVE	NO	MIXE	2	2	0	57.6	0	34.8	29.4	34.7	0	0	29.4	14.3	3-5	NO	64.3	jasp/chert/chal greeneish
12a	7	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		INDETER						0										0			13.8	0	0	0	0	0	0	0	0		NO	0.2	
12c	2	COMPFLAKE	MQU	MQUAR	TRANS	WHITE	FEATHER	0%		EXPAND	UNI	NONE	<5	90		0										0			31.7	19.4	31.7	7.5	0	13.4	5.9	0	0		NO	5.1	
12c	2	BROKFLAKE	PLAG	PLAG	OPAQUE	PINK		0%		INDETER						0										0			19.1	0	0	0	0	0	0	0	0		NO	1.53	
12c	2	COMPFLAKE	CCQ	CHAL	TRANS	LGREY	FEATHER	26-	ROUGH	ELONG	FACET	OVERHANG	<5	1		0										0			29.7	29.5	19.2	6.7	0	10.1	4.5	0	0		NO	4	
12c	2	PROXFLAKE	CCQ	JASPER	OPAQUE	DGREY		0%		BLOCK	UNI	NONE				0										0			28.2	0	0	0	0	15.4	7.1	0	0		NO	8.5	
12c	2	COMPTOOL	VOL	VOL	OPAQUE	DGREY	FEATHER	0%		PLATREJUV	FACET	OVERHANG	<5	90	STRA	1	N/A	SCALAR	N/A	N/A						0			41.3	24.4	37.1	9.4	0	20.2	9.6	0	0		NO	10.8	
12c	2	COMPFLAKE	CCQ	CHAL	TRANS	BROWN	FEATHER	1-	WATER-ROLL	INDETER	UNI	OVERHANG	<5	90		0										0			41.8	36.8	31.1	6.7	0	14.4	4.9	0	0		NO	8.83	
12c	2	DISTFLAKE	CCQ	CHAL	TRANS	RED	HINGE	0%		EXPAND						0										0			28.8	0	0	0	0	0	0	0	0		NO	3.37	jasper/chal/chert same 8.83g
8	1	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		INDETER	UNI	NONE	<5	90		0										0			17.8	17.4	12.8	4.2	0	5.7	2.9	0	0		NO	0.78	
7	4	DISTFLAKE	CCQ	JASPER	OPAQUE	BROWN	FEATHER	0%		INDETER						0										0			16.6	0	0	0	0	0	0	0	0		NO	0.3	
155	4	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	HINGE	0%		BLADE	CRUSH	NONE	<5	1		0										0			17.7	17.7	4.3	2.4	0	0	0	0	0		NO	0.14	
155	4	DISTFLAKE	CCQ	JASPER	OPAQUE	YELLOW	FEATHER	1-	VEIN	INDETER						0										0			22.6	0	0	0	0	0	0	0	0		NO	0.64	
155	4	COMPSPLIT	TUFF	TUFF	OPAQUE	WHITE	FEATHER	0%		INDETER						0										0			27.6	0	0	8.1	0	0	10.3	0	0		NO	2.58	
155	4	BLOCK	CCQ	JASPER	OPAQUE	RED		1-	WATER-ROLL							0										0			40.4	0	0	0	0	0	0	0	0		NO	14.8	
155	4	PROXTOOL	CCQ	CHAL	TRANS	LGREY		26-	ROUGH	BLOCK	FLAKED	NONE			USE	0										0			67.1	0	0	0	0	39.9	18.1	0	0		NO	31	
155	4	CORE	CCQ	JASPER	OPAQUE	RED		0%								0					PRIS	FLAK	OVE	NO	ELO	1	3	1	64.6	0	49.9	36.5	35.5	0	0	33.2	20.7	6-10	NO	123	
12c	5	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		EXPAND	FACET	NONE	<5	1		0										0			32.5	15.6	32.5	5.4	0	19.7	5	0	0		NO	3.43	
12d	2	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	STEP	0%		INDETER	MISSING	NONE	<5	90		0										0			11.9	11.9	8.5	2.5	0	0	0	0	0		NO	0.26	
12d	3	SPALL	MQU	MQUAR	OPAQUE	WHITE		0%		N/A						0										0			18.3	0	0	0	0	0	0	0	0		NO	0.54	
159	3	COMPFLAKE	CCQ	JASPER	OPAQUE	BLUEG	FEATHER	26-	WATER-ROLL	INDETER	UNI	NONE	0	1		0										0			41	30.7	22.4	8	0	10.8	7.1	0	0		NO	6.54	
155	5	BROKFLAKE	CCQ	CHAL	TRANS	GREYCL		0%		BLADE						0										0			22	0	0	0	0	0	0	0	0		NO	1.1	
155	5	COMPSPLIT	CCQ	CHAL	TRANS	GREYCL	FEATHER	0%		INDETER						0										0			21.3	0	0	4.7	0	0	4	0	0		NO	1.03	
155	5	PROXFLAKE	CCQ	JASPER	OPAQUE	BLUEG		0%		INDETER	FLAKED	OVERHANG				0										0			22	0	0	0	0	10.8	2.4	0	0		NO	1.15	blue/gry chert/jasper/chal
155	5	COMPFLAKE	MQU	MQUAR	TRANS	WHITE	ABRUPT	0%		BLOCK	UNI	NONE	<5	1		0										0			16.9	11.6	16.9	8.5	0	6.2	3.8	0	0		NO	4.45	
159	2	COMPSPLIT	CCQ	CHAL	TRANS	PINK	FEATHER	0%		BLOCK						0										0			39.1	0	0	8.3	0	0	9	0	0		NO	8	
159	2	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	HINGE	0%		BLOCK						0										0			18.1	0	0	0	0	0	0	0	0		NO	0.75	
159	2	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		ELONG	UNI	NONE	<5	90		0										0			21.3	21.3	12	3.8	0	6.2	1.7	0	0		NO	0.8	
159	2	DISTTOOL	TUFF	TUFF	OPAQUE	DGREY	FEATHER	0%		BLOCK					CON	0										0			60.5	0	0	0	0	0	0	0	0		NO	21.3	
156	4	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	26-	WATER-ROLL	BLOCK	UNI	NONE	<5	90		0										0			53.6	36.2	44.5	22.7	0	10.9	4.7	0	0		NO	53.6	
156	4	COMPSPLIT	CCQ	JASPER	OPAQUE	BROWN	N/A	0%		BLOCK						0										0			27.9	0	0	9.8	0	0	5.2	0	0		NO	2.45	
7	2	DISTFLAKE	CCQ	CHAL	TRANS	GREYCL	FEATHER	1-	ROUGH	BLOCK						0										0			96	0	0	0	0	0	0	0	0		NO	158	
12	n/a	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0										0			15	0	0	0	0	0	0	0	0		NO	0.52	
12	n/a	COMPFLAKE	CCQ	SERP	TRANS	GREEN	HINGE	0%		BLOCK	FLAKED	NONE	<5	RADI		0										0			40.2	20.3	36.6	17.1	0	39.3	20	0	0		NO	15.7	
77	1	COMPSPLIT	CCQ	JASPER	OPAQUE	RED	N/A	0%		INDETER						0										0			18.2	0	0	5.5	0	0	3	0	0		NO	1.25	
77	1	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		BLADE	CRUSH	NONE	<5	1		0										0			24.9	24.9	12.7	3.4	0	0	0	0	0		NO	1.11	
77	1	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0										0			25.7	0	0	0	0	0	0	0	0		NO	1.47	
77	1	DISTTOOL	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		ELONG					BACK	0										0			14.8	0	0	0	0	0	0	0	0		NO	0.39	attempt at geo back on lat break
77	1	COMPSPLIT	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		INDETER						0										0			22.5	0	0	3.2	0	0	3.2	0	0		NO	1.53	

SQ	SPIT	CLASS	MATERIAL GROUP	MATERIAL	TRANSLUCENCY	COLOUR	DISTIAL END	CORTEX %	CORTEX TYPE	FORM	PLATFORM TYPE	PLATFORM PREPARATI	SCAR NUMBER	SCAR TYPE	TOOL TYPE	RETOUCHED EDGES	EDGE 1	EDGE 2	EDGE 3	EDGE 4	CORETYPE	CORE BODY	PLATFORM NUMBER	CORE EXHAUSTION?	SCAR FORM	CORE PLATFORMS	STEPS	HINGES	LENGTH	LENGTH AXIAL	WIDTH	THICKNESS	CORE FACE LENGTH	PLATFORM WIDTH	PLATFORM THICKNESS	CORE SCAR LENGTH	CORE SCAR WIDTH	NO. CORE SCARS	BURNT?	WEIGHT	COMMENTS
77	1	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	HINGE	0%		EXPAND	FACET	NONE	<5	1		0										0			30.3	20	23	3	0	17.2	3.5	0	0		NO	2.16	
77	1	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	51-	VEIN	BLOCK	UNI	NONE	<5	1		0										0			38.9	29.1	31.7	16.4	0	9.7	8.4	0	0		NO	17.3	
77	1	COMPSPLIT	CCQ	JASPER	OPAQUE	BLUEG	FEATHER	0%		BLOCK						0										0			39.6	0	0	11.3	0	0	10.7	0	0		NO	15.3	jasper/chal/chert
77	1	COMPFLAKE	CCQ	JASPER	OPAQUE	BLUEG	FEATHER	0%		EXPAND	UNI	NONE	<5	90		0										0			28.8	16.4	28.9	4.8	0	10.8	3.2	0	0		NO	2.2	
77	1	COMPFLAKE	CCQ	JASPER	OPAQUE	LGREY	FEATHER	0%		PLATREJUV	UNI	NONE	<5	90		0										0			28.3	24.9	12.6	5.1	0	8.5	4.4	0	0		NO	1.78	banded grey chert/jasper
77	1	DISTFLAKE	CCQ	JASPER	OPAQUE	LGREY	FEATHER	0%		BLOCK	UNI	NONE	<5	1		0										0			23.4	0	0	0	0	0	0	0	0		NO	1.15	
77	1	COMPSPLIT	CCQ	JASPER	OPAQUE	BLUEG	FEATHER	0%		INDETER						0										0			18.3	0	0	3.9	0	0	2.9	0	0		NO	0.99	
77	1	COMPFLAKE	CCQ	CHAL	TRANS	GREYCL	FEATHER	0%		EXPAND	FLAKED	NONE	<5	1		0										0			40.7	28.6	34.9	9.5	0	35.3	10.3	0	0		NO	13.2	
77	1	BROKFLAKE	CCQ	CHAL	TRANS	GREYCL		26-	ROUGH	INDETER						0										0			37.7	0	0	0	0	0	0	0	0		NO	8.72	
77	1	BROKTOOL	CCQ	CHAL	TRANS	GREYCL		51-	ROUGH	INDETER					USE	0										0			43.3	0	0	0	0	0	0	0	0		NO	6.21	
77	1	BLOCK	PLAG	PLAG	OPAQUE	WHITE		0%								0										0			30.1	0	0	0	0	0	0	0	0		NO	3.67	
77	1	COMPTOOL	CCQ	JASPER	OPAQUE	BLUEG	ABRUPT	1-	WATER-ROLL	BLOCK	UNI	NONE	<5	1	DEN	1	N/A	NOTCH	N/A	N/A						0			47.2	38.3	33.7	19.6	0	19.4	7.7	0	0		NO	32	
64	3	BROKFLAKE	MQU	MQUAR	OPAQUE	WHITE		0%		INDETER						0										0			19.2	0	0	0	0	0	0	0	0		NO	1.15	
64	3	BROKFLAKE	MQU	MQUAR	OPAQUE	WHITE		0%		INDETER						0										0			20.2	0	0	0	0	0	0	0	0		NO	1.02	
64	3	BROKFLAKE	MQU	MQUAR	OPAQUE	WHITE	FEATHER	0%		INDETER						0										0			14	0	0	0	0	0	0	0	0		NO	0.38	
64	3	BROKFLAKE	MQU	MQUAR	TRANS	WHITE		0%		INDETER						0										0			16.1	0	0	0	0	0	0	0	0		NO	0.62	
64	3	BROKFLAKE	MQU	MQUAR	OPAQUE	WHITE		0%		INDETER						0										0			19.1	0	0	0	0	0	0	0	0		NO	1.11	
64	3	BROKFLAKE	MQU	MQUAR	TRANS	WHITE		1-	ROUGH	INDETER						0										0			14.9	0	0	0	0	0	0	0	0		NO	0.52	
64	3	BROKFLAKE	MQU	MQUAR	TRANS	WHITE		0%		INDETER						0										0			10.8	0	0	0	0	0	0	0	0		NO	0.28	
64	3	COMPSPLIT	MQU	MQUAR	OPAQUE	WHITE	FEATHER	0%		INDETER						0										0			23	0	0	3	0	0	3.3	0	0		NO	0.72	
64	3	CORE	MQU	MQUAR	OPAQUE	WHITE		26-	ROUGH							0					UNID	BLOC	NON	NO	ELO	1	0	0	30.8	0	28.8	16.3	19	0	0	19	15.8	1-2	NO	13.9	
100	3	BLOCK	CCQ	CHAL	TRANS	BLUEG		1-	VEIN							0										0			56.7	0	0	0	0	0	0	0	0		NO	49.8	jasper/chert/chal bluegry bands
77	2	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		BLOCK	UNI	NONE	<5	90		0										0			43.7	40	33.7	17.1	0	15.9	6	0	0		NO	11	
77	2	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	HINGE	0%		ELONG	UNI	NONE	<5	180		0										0			38.3	36.3	14.3	3.5	0	5.5	4.9	0	0		NO	2.56	
77	2	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		TRIM	UNI	OVERHANG	<5	90		0										0			24.6	22.6	22.4	3	0	9.1	1.9	0	0		NO	1.2	
77	2	PROXFLAKE	CCQ	JASPER	OPAQUE	RED		0%		ELONG	UNI	NONE				0										0			28.2	0	0	0	0	5.5	4.4	0	0		NO	0.98	ridge removal elongated
77	2	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		EXPAND	UNI	NONE	0	NA		0										0			14.7	10	17.7	3.1	0	7.9	3.3	0	0		NO	0.62	
77	2	COMPFLAKE	CCQ	SERP	TRANS	GREEN	HINGE	0%		INDETER	UNI	NONE	<5	90		0										0			48.7	45.5	35.2	10.9	0	14.7	5.3	0	0		NO	15.6	
77	2	COMPFLAKE	TUFF	TUFF	OPAQUE	LGREY	FEATHER	0%		POINT	FLAKED	NONE	<5	1		0										0			28.9	28.9	11.2	2.2	0	9.2	4	0	0		NO	1.15	
77	2	DISTFLAKE	CCQ	CHAL	TRANS	GREYCL	FEATHER	0%		EXPAND						0										0			17	0	0	0	0	0	0	0	0		NO	0.57	
77	2	BLOCK	CCQ	JASPER	OPAQUE	BLUEG		0%								0										0			50.1	0	0	0	0	0	0	0	0		NO	12.3	
101	7	BROKFLAKE	PLAG	PLAG	OPAQUE	WHITE		0%		INDETER						0										0			18.4	0	0	0	0	0	0	0	0		NO	1	
101	7	DISTTOOL	CCQ	CHAL	TRANS	GREYCL	FEATHER	1-	WATER-ROLL	ELONG					USE	0										0			60.9	0	0	0	0	0	0	0	0		NO	19.3	
59	1	PROXFLAKE	CCQ	SERP	TRANS	GREEN		0%		INDETER	FLAKED	OVERHANG				0										0			22.7	0	0	0	0	12.2	3.7	0	0		NO	1.12	
64	surfa	CORE	TUFF	TUFF	OPAQUE	LGREY		26-	WATER-ROLL							0					UNID	BLOC	NON	NO	EXPA	1	0	0	139	0	68.7	28.6	27.9	0	0	27.9	47.2	1-2	NO	269	
77	3	DISTFLAKE	CCQ	CHAL	TRANS	LGREY	FEATHER	0%		BLOCK						0										0			32.6	0	0	0	0	0	0	0	0		NO	4.56	
77	3	COMPFLAKE	TUFF	TUFF	OPAQUE	LGREY	FEATHER	0%		EXPAND	MISSING	NONE	<5	90		0										0			25.2	19.1	25.2	5.2	0	0	0	0	0		NO	1.96	
77	3	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		EXPAND	UNI	NONE	0	NA		0										0			17	10.5	17	2.2	0	3.8	2.6	0	0		NO	0.45	
77	3	PROXFLAKE	CCQ	JASPER	OPAQUE	RED		0%		ELONG	UNI	OVERHANG				0										0			19.2	0	0	0	0	8.7	2.4	0	0		NO	1	
77	3	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0										0			28.4	0	0	0	0	0	0	0	0		NO	1.04	
77	3	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		INDETER						0										0			18.4	0	0	0	0	0	0	0	0		NO	0.29	
77	3	PROXFLAKE	CCQ	JASPER	OPAQUE	RED		0%		ELONG	UNI	NONE				0										0			19.5	0	0	0	0	5.1	1.9	0	0		NO	1	
101	3	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		BLADE						0										0			25.8	0	0	0	0	0	0	0	0		NO	2.86	
101	3	COMPSPLIT	CCQ	JASPER	OPAQUE	RED	N/A	0%		EXPAND						0										0			30.1	0	0	1.9	0	0	1.9	0	0		NO	2.23	
101	3	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	HINGE	0%		ELONG	FLAKED	NONE	0	NA		0										0			19.3	18.3	13.5	3.8	0	8	1.3	0	0		NO	1.02	
101	3	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		INDETER	FLAKED	NONE	<5	90		0										0			27.4	23.9	19.3	6.1	0	15.6	8.4	0	0		NO	3.27	
101	3	BROKFLAKE	CCQ	CHAL	TRANS	GREYCL		0%		INDETER						0										0			12.2	0	0	0	0	0	0	0	0		NO	0.17	
101	3	PROXFLAKE	CCQ	SERP	TRANS	GREEN		1-	WATER-ROLL	ELONG	UNI	STEP				0										0			24.4	0	0	0	0	10.8	4.1	0	0		NO	2.28	
101	3	COMPFLAKE	TUFF	TUFF	OPAQUE	LGREY	HINGE	0%		EXPAND	UNI	NONE	<5	1		0										0			19.9	13.6	18.3	3.2	0	11.1	3	0	0		NO	1	
101	3	PROXFLAKE	CCQ	JASPER	OPAQUE	YELLOW		0%		ELONG	UNI	NONE				0										0			34.7	0	0	0	0	17.2	6.5	0	0		NO	6.11	chert/chal/jasper
101	3	COMPTOOL	CCQ	JASPER	OPAQUE	RED	N/A	0%		BLADE	FACET	NONE	<5	1	BON	1	N/A	N/A	N/A	BACK						0			30.4	29.1	10	3.1	0	7.4	4.8	0	0		NO	1.46	missing tip, break during manufacture
101	3	BROKTOOL	CCQ	JASPER	OPAQUE	RED	N/A	0%		BLOCK					CON	0										0			48.8	0	0	0	0	0	0	0	0		NO	29.3	possible coretool
101	2	BLOCK	MQU	MQUAR	OPAQUE	WHITE		0%								0										0			18.6	0	0	0	0	0	0	0	0		NO	2.96	
101	2	BLOCK	MQU	MQUAR	OPAQUE	WHITE		0%								0										0			10.6	0	0	0	0	0	0	0	0		NO	0.38	
101	2	BLOCK	MQU	MQUAR	OPAQUE	WHITE		0%								0										0			13.7	0	0	0	0	0	0	0	0		NO	1.02	
101	2	BLOCK	MQU	MQUAR	OPAQUE	WHITE		0%								0										0			10.6	0	0	0	0	0	0	0	0		NO	0.33	
101	2	PROXFLAKE	MQU	MQUAR	OPAQUE	WHITE		0%		BLOCK	UNI	NONE				0										0			14.3	0	0	0	0	11.4	5	0	0		NO	0.98	
101	2	BROKFLAKE	MQU	MQUAR	OPAQUE	WHITE		0%		INDETER						0										0			13.8	0	0	0	0	0	0	0	0		NO	0.72	
101	2	COMPFLAKE	MQU	MQUAR	OPAQUE	WHITE	FEATHER	0%		ELONG	UNI	NONE	<5	1		0										0			14.3	12.1	7.8	4.9	0	8.6	6.9	0	0		NO	0.53	
101	2	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		PLATREJUV	UNI	NONE	<5	90		0										0			23	20.6	17.2	3.7	0	10.6	2.3	0	0		NO	1.55	
101	2	COMPSPLIT	CCQ	JASPER	OPAQUE	BROWN	FEATHER	0%		INDETER						0										0			15.7	0	0	4.8	0	0	5.4	0	0		NO	0.78	
101	2	PROXTOOL	CCQ	JASPER	OPAQUE	RED		0%		ELONG	FLAKED	NONE			BACK	0										0			20	0	0	0	0	9	4.1	0	0		NO	1.27	attempt at bondi lat break
101	2	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0										0			11.4	0	0	0	0	0	0	0	0		NO	0.29	
101	2	BLOCK	CCQ	JASPER	OPAQUE	RED		0%								0										0			12.1	0	0	0	0	0	0	0	0		FRACTU	0.55	
80	1	PROXFLAKE	CCQ	JASPER	OPAQUE	BLUEG		0%		BLADE	CRUSH	OVERHANG				0										0			21	0	0	0	0	0	0	0	0		NO	1.38	
80	1	DISTTOOL	CCQ	CHAL	TRANS	GREYCL	PLUNGE	0%		BLADE					STRA	0										0			32.1	0	0	0	0	0	0	0	0		NO	2.15	endscraper
80	1	COMPFLAKE	CCQ	CHAL	TRANS	LGREY	HINGE	0%		PLATREJUV	UNI	NONE	<5	90		0										0			19.9	19.9	13	7.9	0	2.6	1.8	0	0		NO	1.6	
80	1	COMPFLAKE	CCQ	CHAL	TRANS	LGREY	PLATFOR	0%		PLATREJUV	UNI	OVERHANG	<5	180		0										0			10.5	7.8	10.6	3.2	0	8.6	3.2	0	0		NO	0.25	backing flake
80	1	CORE	CCQ	JASPER	OPAQUE	RED		0%								0					BBLA	FLAK	NON	NO	ELO	1	1	0	50.1	0	24.7	13.3	38.1	0	0	38.1	3.9	3-5	NO	24.7	flakes down lateral margin
80	2	DISTFLAKE	CCQ	JASPER	OPAQUE	BLUEG	FEATHER	0%		INDETER						0										0			20.5	0	0	0	0	0	0	0	0		NO	1.5	
80	2	PROXFLAKE	CCQ	CHAL	TRANS	GREYCL		0%		INDETER	FACET	NONE				0										0			16.6	0	0	0	0	13.1	2.3	0	0		NO	0.59	
80	2	BROKFLAKE	CCQ	CHAL	TRANS	GREYCL		0%		INDETER						0										0			18.8	0	0	0	0	0	0	0	0		NO	0.77	
80	2	BLOCK	CCQ	JASPER	OPAQUE	RED		0%								0										0			24.6	0	0	0	0	0	0	0	0		NO	1.72	
80	2	COMPSPLIT	CCQ	JASPER	OPAQUE	BROWN	FEATHER	0%		INDETER						0										0			24.8	0	0	4.1	0	0	5.3	0	0		NO	0.55	
80	2	BROKTOOL	CCQ	JASPER	OPAQUE	BLUEG		0%		BLADE					USE	0										0			32	0	0	0	0	0	0	0	0		NO	2.18	
80	2	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	HINGE	0%		INDETER	MISSING	NONE	<5	90		0										0			31	28.4	22.8	5.6	0	0	0	0	0		NO	3.6	
80	2	COMPTOOL	CCQ	CHAL	TRANS	LGREY	FEATHER	0%		EXPAND	FLAKED	STEP	<5	1	CON	1	N/A	SCALAR	USEWE	N/A						0			34.4	25.6	31	7.6	0	11.1	6.4	0	0		NO	8	
80	2	CORE	CCQ	CHAL	TRANS	LGREY		0%								0					UNID	FLAK	NON	YES	ELO	1	0	1	33.8	0	25.6	13.5	33.3	0	0	23.2	13.7	1-2	NO	13.9	x2 notch prior to core

SQ	SPIT	CLASS	MATERIAL GROUP	MATERIAL	TRANSLUCENCY	COLOUR	DISTAL END	CORTEX %	CORTEX TYPE	FORM	PLATFORM TYPE	PLATFORM PREPARATI	SCAR NUMBER	SCAR TYPE	TOOL TYPE	RETOUCHED EDGES	EDGE 1	EDGE 2	EDGE 3	EDGE 4	CORETYPE	CORE BODY	PLATFORM NUMBER	CORE EXHAUSTION?	SCAR FORM	CORE PLATFORMS	STEPS	HINGES	LENGTH	LENGTH AXIAL	WIDTH	THICKNESS	CORE FACE LENGTH	PLATFORM WIDTH	PLATFORM THICKNESS	CORE SCAR LENGTH	CORE SCAR WIDTH	NO. CORE SCARS	BURNT?	WEIGHT	COMMENTS
80	surfa	COMPSPLIT	CCQ	JASPER	OPAQUE	RED	FEATHER	51-	VEIN	INDETER						0									0			35.4	0	0	7.7	0	0	3.5	0	0		NO	9.56	
80	surfa	COMPTOOL	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		INDETER	UNI	NONE	<5	1	STRA	1	N/A	SCALAR	N/A	N/A						0			37.6	30.6	0	8.3	0	0	2.8	0	0		NO	5.82	split flake
80	surfa	COMPTOOL	CCQ	JASPER	OPAQUE	RED	N/A	0%		BLADE	NA	NONE	<5	1	GEO	3	BACK	BACK	BACK	N/A						0			18.9	18.9	14.3	3.9	0	0	0	0	0		NO	1.14	unfinished geo
80	surfa	COMPSPLIT	CCQ	CHAL	TRANS	GREYCL	FEATHER	0%		INDETER						0									0			17.3	0	0	2.8	0	0	2.3	0	0		NO	0.42	
80	surfa	PROXFLAKE	CQU	CQUART	CLEAR	CLEAR		0%		INDETER	UNI	NONE				0									0			12.7	0	0	0	0	8.5	1.7	0	0		NO	0.22	
80	surfa	COMPFLAKE	CCQ	CHAL	TRANS	GREYCL	FEATHER	0%		INDETER	UNI	NONE	<5	90		0									0			18.6	19.1	14.7	4.4	0	4.2	3	0	0		NO	0.99	
80	surfa	CORE	CCQ	CHAL	TRANS	PINK		0%								0					UNID	FLAK	NON	NO	EXPA	1	0	0	122	0	76.1	56.3	57	0	0	57	78	1-2	NO	425	larger convex scraper and core
57	3	COMPFLAKE	CCQ	CHAL	TRANS	GREYCL	FEATHER	0%		BLADE	FLAKED	NONE	<5	1		0									0			30.7	28.6	18.6	2.9	0	14.5	3.1	0	0		NO	2.12	
57	3	PROXFLAKE	CCQ	JASPER	OPAQUE	BLUEG		0%		INDETER	UNI	OVERHANG				0									0			21.1	0	0	0	0	5.3	2.1	0	0		NO	1.16	
57	3	PROXFLAKE	CCQ	CHAL	TRANS	GREYCL		0%		INDETER	UNI	NONE				0									0			21.1	0	0	0	0	13.8	4.8	0	0		NO	1.64	
57	3	DISTFLAKE	CCQ	JASPER	OPAQUE	BLUEG	HINGE	0%		ELONG						0									0			22.4	0	0	0	0	0	0	0	0		NO	2.6	
57	3	COMPFLAKE	CCQ	JASPER	OPAQUE	BLUEG	FEATHER	0%		INDETER	UNI	NONE	<5	1		0									0			30.7	25.9	26	8.2	0	22.1	4	0	0		NO	5	greenish tinge
105	3	BROKTOOL	CCQ	JASPER	OPAQUE	BLUEG	CORTICAL	1-	ROUGH	BLOCK					USE	0									0			50.1	0	0	0	0	0	0	0	0		NO	18	
105	3	COMPSPLIT	CCQ	JASPER	OPAQUE	RED	ABRUPT	0%		INDETER						0									0			56.4	0	0	9.8	0	0	9.5	0	0		NO	17.8	
105	3	BLOCK	CCQ	JASPER	OPAQUE	RED		1-	WATER-ROLL							0									0			25.8	0	0	0	0	0	0	0	0		NO	3.63	
105	3	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		ELONG						0									0			20.3	0	0	0	0	0	0	0	0		NO	0.85	
105	3	COMPSPLIT	CCQ	JASPER	OPAQUE	RED	N/A	0%		INDETER						0									0			14.5	0	0	2.6	0	0	2.5	0	0		NO	0.36	
93	2	COMPFLAKE	PLAG	PLAG	OPAQUE	WHITE	PLUNGE	0%		EXPAND	UNI	NONE	<5	1		0									0			14.4	12.9	14.4	2.7	0	4.8	0.9	0	0		NO	0.48	
93	2	COMPTOOL	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		ELONG	FLAKED	NONE	<5	90	BACK	1	N/A	BACK	N/A	N/A						0			23.1	20	10.7	4	0	9.6	2.5	0	0		NO	1.15	attempt at bondi
93	2	CORE	CCQ	JASPER	OPAQUE	BROWN		1-	ROUGH							0					MUL	BLOC	NON	YES	ELO	3	4	1	46.2	0	31.4	15.1	44.6	0	0	35.9	13.2	6-10	NO	23.5	atypical bblade
57	4	BLOCK	MQU	MQUAR	OPAQUE	WHITE		0%								0									0			51.2	0	0	0	0	0	0	0	0		NO	24.3	
57	4	BLOCK	MQU	MQUAR	OPAQUE	WHITE		0%								0									0			33.6	0	0	0	0	0	0	0	0		NO	10.3	
57	1	DISTFLAKE	CCQ	JASPER	OPAQUE	BROWN	FEATHER	0%		BLADE						0									0			19.8	0	0	0	0	0	0	0	0		NO	0.5	
57	1	COMPTOOL	CCQ	JASPER	OPAQUE	BLUEG	FEATHER	0%		ELONG	NA	NONE	0	1	GEO	2	BACK	N/A	BACK	N/A						0			17	17	7.7	4.4	0	0	0	0	0		NO	0.36	backed on 2 lat margins
56	9	COMPFLAKE	CCQ	JASPER	OPAQUE	BLUEG	HINGE	1-	WATER-ROLL	EXPAND	CORTICAL	STEP	<5	1		0									0			33.4	23.7	32.2	9.5	0	33.3	7.5	0	0		NO	8.4	weathered surface
104	1	DISTTOOL	CCQ	JASPER	OPAQUE	RED	N/A	0%		ELONG					BACK	0									0			20.4	0	0	0	0	0	0	0	0		NO	0.79	lat break of geo conjoin with 0.84g
104	1	BROKTOOL	CCQ	JASPER	OPAQUE	RED		0%		INDETER					GEO	0									0			17.8	0	0	0	0	0	0	0	0		NO	0.84	lat break of geo conjoin 0.79g
104	1	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0									0			7.9	0	0	0	0	0	0	0	0		NO	0.05	
104	1	CORE	CCQ	CHAL	TRANS	LGREY		0%								0					BIDI	BLOC	NON	YES	ELO	2	0	2	40.6	0	25.1	23.9	31	0	0	21.4	9	1-2	NO	15.9	
56	10	COMPFLAKE	TUFF	TUFF	OPAQUE	LGREY	FEATHER	0%		BLOCK	UNI	NONE	<5	90		0									0			19.1	17.1	11.5	8.7	0	8.7	4.5	0	0		NO	1.36	
105	2	BROKFLAKE	CCQ	CHAL	TRANS	GREYCL		0%		INDETER						0									0			21.5	0	0	0	0	0	0	0	0		NO	1.87	
105	2	BLOCK	MQU	MQUAR	OPAQUE	WHITE		1-	ROUGH							0									0			30	0	0	0	0	0	0	0	0		NO	3.84	
57	5	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		ERRAILURE	CRUSH	NONE	0	NA		0									0			10.2	10.2	7.6	1.5	0	0	0	0	0		NO	0.12	
57	2	BLOCK	MQU	MQUAR	OPAQUE	WHITE		0%								0									0			29.3	0	0	0	0	0	0	0	0		NO	4.61	
57	2	COMPSPLIT	MQU	MQUAR	OPAQUE	WHITE	FEATHER	0%		INDETER						0									0			13.2	0	0	3	0	0	0	0	0		NO	0.27	
57	2	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	ABRUPT	0%		BLOCK	FLAKED	NONE	<5	90		0									0			39.4	14.7	39.4	8.4	0	38.7	6.4	0	0		NO	6.98	
57	2	COMPFLAKE	CCQ	CHAL	TRANS	GREYCL	HINGE	0%		EXPAND	UNI	NONE	0	NA		0									0			9.3	6.2	8.5	1.4	0	5.6	1.9	0	0		NO	0.08	
57	2	COMPFLAKE	CCQ	CHAL	TRANS	GREYCL	FEATHER	0%		EXPAND	CRUSH	NONE	0	NA		0									0			11.4	8.2	11.6	1.7	0	0	0	0	0		NO	0.14	
57	2	PROXFLAKE	CCQ	JASPER	OPAQUE	RED		0%		BLOCK	UNI	NONE				0									0			15	0	0	0	0	7.5	3.1	0	0		NO	1.15	
57	2	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	HINGE	0%		INDETER						0									0			15.2	0	0	0	0	0	0	0	0		NO	0.4	
57	2	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	STEP	0%		INDETER	UNI	OVERHANG	<5	1		0									0			17.4	14.3	15	3.9	0	10.9	2.5	0	0		NO	1.11	
57	2	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	PLATFOR	0%		PLATREJUV	UNI	NONE	<5	180		0									0			27.3	25.3	16.5	10.6	0	8.3	2.3	0	0		NO	3.68	
57	2	COMPTOOL	CCQ	JASPER	OPAQUE	BLUEG	ABRUPT	0%		BLOCK	UNI	OVERHANG	<5	90	STEP	1	N/A	N/A	N/A	STEP						0			34.8	25.6	21.5	11.4	0	18.7	4.1	0	0		NO	8.87	
57	2	PROXFLAKE	CCQ	CHAL	TRANS	RED		0%		INDETER	FACET	NONE				0									0			34.6	0	0	0	0	27.1	9.5	0	0		NO	5.96	chal/chert/jasper
57	2	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		EXPAND						0									0			26.8	0	0	0	0	0	0	0	0		NO	2	
57	2	BROKTOOL	CCQ	CHAL	TRANS	GREYCL		0%		INDETER					BACK	0									0			21.3	0	0	0	0	0	0	0	0		NO	0.53	
90	4	BROKTOOL	CCQ	JASPER	OPAQUE	RED		0%		INDETER					STRA	0									0			24.7	0	0	0	0	0	0	0	0		NO	2.21	
90	4	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	1-	WATER-ROLL	INDETER						0									0			18	0	0	0	0	0	0	0	0		NO	1.34	
90	4	BLOCK	CCQ	CHAL	TRANS	LGREY		0%								0									0			23.9	0	0	0	0	0	0	0	0		NO	5.68	
90	4	COMPFLAKE	CCQ	JASPER	OPAQUE	BLUEG	PLUNGE	0%		EXPAND	CRUSH	NONE	<5	180		0									0			20.2	17	20.2	3.1	0	0	0	0	0		NO	1.61	
90	4	DISTTOOL	CCQ	CHAL	TRANS	LGREY	FEATHER	0%		INDETER					STRA	0									0			46.5	0	0	0	0	0	0	0	0		NO	7.34	banded
90	4	COMPFLAKE	CCQ	CHAL	TRANS	LGREY	FEATHER	0%		EXPAND	FLAKED	NONE	<5	90		0									0			29	18.9	28.9	3.4	0	8.2	1.9	0	0		NO	1.51	
90	4	DISTFLAKE	CCQ	JASPER	OPAQUE	LGREY	FEATHER	0%		EXPAND						0									0			22.8	0	0	0	0	0	0	0	0		NO	1.52	
90	4	COMPTOOL	CCQ	JASPER	OPAQUE	PINK	N/A	0%		BLADE	NA	NONE	<5	1	GEO	3	BACK	N/A	BACK	USE						0			27.3	27.3	10.5	3.3	0	0	0	0	0		NO	0.99	backed in 2 lat quads
55	3	COMPSPLIT	CCQ	SERP	TRANS	GREEN	N/A	0%		INDETER						0									0			18.9	0	0	4.2	0	0	4.8	0	0		NO	1.36	
56	2	BLOCK	CQU	CQUART	CLEAR	WHITE		0%								0									0			22.1	0	0	0	0	0	0	0	0		NO	1.85	
55	2	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	1-	VEIN	INDETER	UNI	NONE	<5	180		0									0			29.9	23.1	18.7	6.9	0	11.5	2.6	0	0		NO	4.12	
55	2	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	CORTICAL	100	WATER-ROLL	BLOCK	FLAKED	NONE	0	NA		0									0			38	28.1	24.5	9.2	0	14.8	6.3	0	0		NO	11.3	cortex vein, rough wrolled
55	2	BROKFLAKE	CCQ	CHAL	TRANS	GREYCL		0%		INDETER						0									0			13.9	0	0	0	0	0	0	0	0		NO	0.28	
55	2	COMPTOOL	CCQ	JASPER	OPAQUE	RED	N/A	0%		BLADE	NA	NONE	<5	1	GEO	3	BACK	BACK	BACK	N/A						0			25.9	25.9	12.1	3.8	0	0	0	0	0		NO	1.35	elongated geo?
56	1	COMPFLAKE	QUA	QUARTZI	TRANS	ORANG	HINGE	0%		ELONG	FLAKED	NONE	<5	1		0									0			23.3	23.3	15.6	3.7	0	7.6	3.6	0	0		NO	1.31	orange/white
56	1	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		INDETER						0									0			7	0	0	0	0	0	0	0	0		NO	0.06	
56	1	PROXFLAKE	CCQ	JASPER	OPAQUE	RED		0%		ELONG	CRUSH	NONE				0									0			7.9	0	0	0	0	0	0	0	0		NO	0.07	recent break with 0.05g
56	1	BROKFLAKE	VOL	VOL	OPAQUE	DGREY		0%		INDETER						0									0			18.5	0	0	0	0	0	0	0	0		NO	0.8	
56	3	BROKFLAKE	MQU	MQUAR	CLEAR	CLEAR		0%		INDETER						0									0			14.8	0	0	0	0	0	0	0	0		NO	0.84	
56	3	DISTFLAKE	CQU	CQUART	CLEAR	CLEAR	FEATHER	0%		INDETER						0									0			9.6	0	0	0	0	0	0	0	0		NO	0.14	
55	1	COMPFLAKE	CCQ	CHAL	TRANS	LGREY	FEATHER	0%		ELONG	UNI	OVERHANG	<5	90		0									0			17.7	17.7	8.9	1.4	0	5.1	1.8	0	0		NO	0.29	
55	1	PROXFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER	MISSING	NONE				0									0			12.6	0	0	0	0	0	0	0	0		NO	0.26	
55	1	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		INDETER						0									0			18.1	0	0	0	0	0	0	0	0		NO	0.28	
55	1	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		EXPAND	UNI	NONE	<5	90		0									0			14.1	11	11.5	2.4	0	9.8	2.8	0	0		NO	0.36	
55	1	COMPFLAKE	CCQ	SERP	TRANS	GREEN	FEATHER	0%		EXPAND	UNI	NONE	<5	90		0									0			10.8	8	9.3	2.8	0	6	2.8	0	0		NO	0.22	
80	5	COMPFLAKE	CCQ	CHAL	TRANS	GREYCL	FEATHER	0%		EXPAND	FLAKED	NONE	<5	90		0									0			38.7	26.7	35.5	5.2	0	16.9	3	0	0		NO	6.03	flaked flake
80	5	COMPFLAKE	CCQ	CHAL	TRANS	GREYCL	FEATHER	0%		ELONG	FACET	OVERHANG	<5	1		0									0			19	18.4	11.4	4.1	0	11.4	1.9	0	0		NO	0.83	green tinge in trans
80	5	BROKFLAKE	CCQ	CHAL	TRANS	LGREY		0%		INDETER						0									0			39.2	0	0	0	0	0	0	0	0		NO	4.76	
80	5	HF	TUFF	TUFF	OPAQUE	LGREY		1-	WATER-ROLL	N/A						0									0			71.2	0	0	0	0	0	0	0	0		NO	23	weather HSF
80	6	COMPFLAKE	TUFF	TUFF	OPAQUE	LGREY	HINGE	0%		INDETER	FLAKED	NONE	<5	1		0									0			34.7	30	22.1	5.5	0	24.7	6.61	0	0		NO	5.03	
80	6	BROKTOOL	CCQ	CHAL	TRANS	GREYCL		0%		EXPAND					USE	0									0			33.1	0	0	0	0	0	0	0	0		NO	4	
80	6	COMPFLAKE	CCQ	CHAL	TRANS	LGREY	FEATHER	26-	WATER-ROLL	BLOCK	FLAKED	NONE	<5	90		0									0			72.9	45.1	74.6	15.6	0	32.3	8.9	0	0		NO	46.5	

SQ	SPIT	CLASS	MATERIAL GROUP	MATERIAL	TRANSLUCENCY	COLOUR	DISTIAL END	CORTEX %	CORTEX TYPE	FORM	PLATFORM TYPE	PLATFORM PREPARATI	SCAR NUMBER	SCAR TYPE	TOOL TYPE	RETOUCHED EDGES	EDGE 1	EDGE 2	EDGE 3	EDGE 4	CORETYPE	CORE BODY	PLATFORM NUMBER	CORE EXHAUSTION?	SCAR FORM	CORE PLATFORMS	STEPS	HINGES	LENGTH	LENGTH AXIA	WIDTH	THICKNESS	CORE FACE LENGTH	PLATFORM WIDTH	PLATFORM THICKNESS	CORE SCAR LENGTH	CORE SCAR WIDTH	NO. CORE SCARS	BURNT?	WEIGHT	COMMENTS
80	6	COMPFLAKE	VOL	VOL	OPAQUE	DGREY	FEATHER	0%		EXPAND	UNI	STEP	<5	1		0										0			40.6	28.9	39.8	7.6	0	25.4	7.8	0	0		NO	15	
63	4	PROXFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER	FACET	OVERHANG				0										0			22.5	0	0	0	0	20	3.7	0	0		NO	1.96	
63	4	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		EXPAND						0										0			30.5	0	0	0	0	0	0	0	0		NO	3.6	
63	4	COMPFLAKE	MQU	MQUAR	TRANS	CLEAR	FEATHER	0%		INDETER	UNI	NONE	<5	90		0										0			12.4	5.7	10.8	3.3	0	12.5	5	0	0		NO	0.31	
101	1	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0										0			37.1	0	0	0	0	0	0	0	0		NO	3.51	
101	1	COMPFLAKE	CCQ	CHAL	TRANS	WHITE	FEATHER	0%		BLOCK	UNI	NONE	<5	RADI		0										0			40	20.3	39	9.8	0	33.1	13.7	0	0		NO	12.7	
101	1	BROKFLAKE	CCQ	CHAL	TRANS	GREYCL		0%		INDETER						0										0			28.5	0	0	0	0	0	0	0	0		NO	2.8	
101	1	BROKTOOL	CCQ	JASPER	OPAQUE	RED		0%		INDETER					NOT	0										0			20.7	0	0	0	0	0	0	0	0		NO	0.17	
63	6	BROKFLAKE	CCQ	CHAL	TRANS	GREYCL		0%		INDETER						0										0			19	0	0	0	0	0	0	0	0		NO	0.63	
63	6	DISTFLAKE	CCQ	CHAL	TRANS	GREYCL	FEATHER	0%		INDETER						0										0			12.9	0	0	0	0	0	0	0	0		NO	0.26	
63	6	COMPTOOL	CCQ	JASPER	OPAQUE	BLUEG	N/A	26-	ROUGH	BLOCK	UNI	OVERHANG	<5	1	CON	2	N/A	N/A	SCALA	SCAL						0			33.2	24.8	32.5	8.4	0	27.6	9.3	0	0		NO	10.4	light blue/grey
80	4	BROKFLAKE	MQU	MQUAR	TRANS	YELLOW		0%		INDETER						0										0			23.8	0	0	0	0	0	0	0	0		NO	1.87	
63	2	BLOCK	MQU	MQUAR	OPAQUE	WHITE		1-	ROUGH							0										0			26.4	0	0	0	0	0	0	0	0		NO	3.31	
63	2	BLOCK	MQU	MQUAR	OPAQUE	WHITE		1-	ROUGH							0										0			24.2	0	0	0	0	0	0	0	0		NO	3.73	
63	2	BLOCK	MQU	MQUAR	OPAQUE	WHITE		26-	ROUGH							0										0			33.2	0	0	0	0	0	0	0	0		NO	7.99	
63	2	BLOCK	MQU	MQUAR	OPAQUE	WHITE		1-	ROUGH							0										0			18.6	0	0	0	0	0	0	0	0		NO	1.45	
63	2	BLOCK	MQU	MQUAR	OPAQUE	WHITE		0%								0										0			16.1	0	0	0	0	0	0	0	0		NO	1.76	
63	2	BLOCK	MQU	MQUAR	OPAQUE	WHITE		1-	ROUGH							0										0			19.6	0	0	0	0	0	0	0	0		NO	2.22	
63	2	BLOCK	MQU	MQUAR	OPAQUE	WHITE		1-	ROUGH							0										0			18.2	0	0	0	0	0	0	0	0		NO	2.28	
63	2	BLOCK	MQU	MQUAR	OPAQUE	WHITE		0%								0										0			12.3	0	0	0	0	0	0	0	0		NO	0.71	
63	2	BLOCK	MQU	MQUAR	OPAQUE	WHITE		0%								0										0			10.2	0	0	0	0	0	0	0	0		NO	0.43	
63	2	BLOCK	MQU	MQUAR	OPAQUE	WHITE		0%								0										0			8.1	0	0	0	0	0	0	0	0		NO	0.2	
63	2	BLOCK	MQU	MQUAR	OPAQUE	WHITE		0%								0										0			9.3	0	0	0	0	0	0	0	0		NO	0.26	
63	2	BLOCK	MQU	MQUAR	OPAQUE	WHITE		1-	ROUGH							0										0			12.8	0	0	0	0	0	0	0	0		NO	0.99	
63	2	BLOCK	MQU	MQUAR	OPAQUE	WHITE		0%								0										0			8.9	0	0	0	0	0	0	0	0		NO	0.22	
63	2	BLOCK	MQU	MQUAR	OPAQUE	WHITE		0%								0										0			12.2	0	0	0	0	0	0	0	0		NO	0.43	
63	2	BROKFLAKE	MQU	MQUAR	OPAQUE	WHITE		0%		INDETER						0										0			12.3	0	0	0	0	0	0	0	0		NO	0.62	
63	2	BROKFLAKE	MQU	MQUAR	OPAQUE	WHITE		0%		INDETER						0										0			18.4	0	0	0	0	0	0	0	0		NO	0.67	
63	2	BROKFLAKE	MQU	MQUAR	OPAQUE	WHITE		0%		INDETER						0										0			10.7	0	0	0	0	0	0	0	0		NO	0.27	
63	2	BROKFLAKE	MQU	MQUAR	OPAQUE	WHITE		0%		INDETER						0										0			13.5	0	0	0	0	0	0	0	0		NO	0.37	
63	2	BROKFLAKE	MQU	MQUAR	OPAQUE	WHITE		0%		INDETER						0										0			9.4	0	0	0	0	0	0	0	0		NO	0.24	
63	2	DISTFLAKE	MQU	MQUAR	OPAQUE	WHITE	FEATHER	0%		ELONG						0										0			8.3	0	0	0	0	0	0	0	0		NO	0.11	
63	2	BLOCK	MQU	MQUAR	OPAQUE	WHITE		0%								0										0			10.6	0	0	0	0	0	0	0	0		NO	0.22	
63	2	DISTFLAKE	MQU	MQUAR	OPAQUE	WHITE	FEATHER	0%		INDETER						0										0			7.6	0	0	0	0	0	0	0	0		NO	0.12	
63	2	BROKFLAKE	MQU	MQUAR	OPAQUE	WHITE		0%		INDETER						0										0			12.6	0	0	0	0	0	0	0	0		NO	0.26	
63	2	DISTFLAKE	MQU	MQUAR	OPAQUE	WHITE	FEATHER	0%		INDETER						0										0			7.5	0	0	0	0	0	0	0	0		NO	0.11	
63	2	COMPFLAKE	MQU	MQUAR	OPAQUE	WHITE	FEATHER	0%		INDETER	UNI	NONE	<5	1		0										0			10.8	8.1	4.8	3.5	0	5.8	2.8	0	0		NO	0.18	
63	2	BROKFLAKE	MQU	MQUAR	OPAQUE	WHITE		0%		INDETER						0										0			15.8	0	0	0	0	0	0	0	0		NO	1	
63	2	BROKFLAKE	MQU	MQUAR	OPAQUE	WHITE		0%		INDETER						0										0			9.9	0	0	0	0	0	0	0	0		NO	0.25	
63	2	PROXFLAKE	MQU	MQUAR	OPAQUE	WHITE		0%		INDETER	UNI	NONE				0										0			13.9	0	0	0	0	4	3.8	0	0		NO	0.37	
63	2	BROKFLAKE	MQU	MQUAR	OPAQUE	WHITE		26-	ROUGH	INDETER						0										0			14.7	0	0	0	0	0	0	0	0		NO	0.38	
63	2	COMPSPLIT	MQU	MQUAR	OPAQUE	WHITE	ABRUPT	0%		BLOCK						0										0			24.8	0	0	7.6	0	0	7.1	0	0		NO	4.17	
63	2	COMPFLAKE	MQU	MQUAR	OPAQUE	WHITE	ABRUPT	1-	ROUGH	EXPAND	CORTICAL	NONE	<5	1		0										0			14.2	11.3	14	3.4	0	12.3	2.1	0	0		NO	0.61	quartz poor quality very frag
63	2	BROKFLAKE	CCQ	JASPER	OPAQUE	PINK		0%		INDETER						0										0			14	0	0	0	0	0	0	0	0		NO	0.61	
63	2	BLOCK	CCQ	JASPER	OPAQUE	PINK		0%								0										0			23.7	0	0	0	0	0	0	0	0		NO	3.37	
51	2	COMPFLAKE	CCQ	JASPER	OPAQUE	BLUEG	FEATHER	1-	WATER-ROLL	BLOCK	MISSING	NONE	<5	1		0										0			42.6	37	20.4	10.2	0	10.2	5.9	0	0		NO	8.62	
51	2	COMPTOOL	CCQ	CHAL	TRANS	WHITE	FEATHER	0%		INDETER	FLAKED	NONE	<5	90	USE	1	N/A	USEWE	N/A	N/A						0			33.5	20.6	21.2	3.1	0	16.2	5	0	0		NO	2.7	
51	2	COREFRAG	CCQ	CHAL	TRANS	LGREY		0%								0										0			34.1	0	0	0	0	0	0	0	0		NO	7.7	usewear
51	2	BROKFLAKE	CCQ	CHAL	TRANS	PINK		0%		BLOCK	FACET	NONE				0										0			23.8	0	0	0	0	10.8	6.4	0	0		NO	3.32	
51	4	COMPFLAKE	CCQ	CHAL	TRANS	GREYCL	PLUNGE	0%		PLATREJUV	UNI	NONE	<5	RADI		0										0			27.7	25.3	18.2	8.8	0	6.3	4.3	0	0		NO	2.59	
51	4	DISTFLAKE	CCQ	CHAL	TRANS	GREYCL	HINGE	0%		EXPAND						0										0			18.5	0	0	0	0	0	0	0	0		NO	0.99	
56	1	PROXFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER	UNI	OVERHANG				0										0			28.2	0	0	0	0	9.7	3.6	0	0		NO	2.35	
56	1	PROXFLAKE	CCQ	CHAL	TRANS	BROWN		0%		INDETER	FLAKED	NONE				0										0			26.6	0	0	0	0	23	7	0	0		NO	3.3	brown/blue grey banded
56	1	BLOCK	CCQ	JASPER	OPAQUE	RED		0%								0										0			15.6	0	0	0	0	0	0	0	0		NO	1.28	
56	1	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		EXPAND						0										0			10.9	0	0	0	0	0	0	0	0		NO	0.11	
56	1	BROKFLAKE	CCQ	CHAL	TRANS	GREYCL		0%		BLOCK						0										0			21.4	0	0	0	0	0	0	0	0		NO	1.97	green tinge
56	1	PROXFLAKE	MQU	MQUAR	TRANS	CLEAR		0%		INDETER	UNI	NONE				0										0			18.5	0	0	0	0	5.5	3.6	0	0		NO	2.03	
56	1	DISTFLAKE	CCQ	SERP	TRANS	GREEN	FEATHER	0%		EXPAND						0										0			13.2	0	0	0	0	0	0	0	0		NO	0.12	
56	1	COMPFLAKE	CCQ	CHAL	TRANS	LGREY	FEATHER	0%		EXPAND	CRUSH	NONE	<5	1		0										0			10.5	7	10.4	1.1	0	0	0	0	0		NO	0.07	
56	1	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		INDETER						0										0			11.5	0	0	0	0	0	0	0	0		NO	0.12	
56	1	PROXFLAKE	CCQ	JASPER	OPAQUE	BLUEG		0%		ELONG	UNI	NONE				0										0			17.7	0	0	0	0	3.7	2.7	0	0		NO	0.48	
56	1	PROXTOOL	MQU	MQUAR	OPAQUE	WHITE		0%		BLOCK	UNI	NONE			DEN	0										0			21.6	0	0	0	0	12.9	5.1	0	0		NO	3.56	
110	1	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		EXPAND	FLAKED	NONE	<5	1		0										0			24.3	13.1	19.2	4.1	0	18.8	4	0	0		NO	2	
110	1	CORE	CCQ	JASPER	OPAQUE	BROWN		26-	ROUGH							0					UNID	BLOC	NON	NO	EXPA	1	0	0	34.4	0	26.4	15.3	26.9	0	0	16.2	18.6	1-2	NO	17.1	
110	1	BLOCK	CCQ	JASPER	OPAQUE	RED		1-	ROUGH							0										0			23.2	0	0	0	0	0	0	0	0		NO	3.03	
109	1	DISTFLAKE	CCQ	JASPER	OPAQUE	BROWN	FEATHER	1-	ROUGH	INDETER						0										0			22.7	0	0	0	0	0	0	0	0		NO	0.97	
109	1	COMPFLAKE	CCQ	JASPER	OPAQUE	BLUEG	FEATHER	1-	WATER-ROLL	EXPAND	MISSING	NONE	0	NA		0										0			19.7	15.6	19	3.1	0	0	0	0	0		NO	1.01	
109	1	BROKFLAKE	CCQ	JASPER	OPAQUE	BLUEG		0%		INDETER						0										0			23	0	0	0	0	0	0	0	0		NO	1.41	
109	1	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0										0			15	0	0	0	0	0	0	0	0		NO	0.66	
109	1	BROKFLAKE	MQU	MQUAR	TRANS	WHITE		0%		INDETER						0										0			11.7	0	0	0	0	0	0	0	0		NO	0.33	
105	8	DISTFLAKE	TUFF	TUFF	OPAQUE	GREEN	FEATHER	0%		EXPAND						0										0			14.8	0	0	0	0	0	0	0	0		NO	0.5	
105	1	COMPSPLIT	CCQ	JASPER	OPAQUE	BLUEG	N/A	0%		INDETER						0										0			27.1	0	0	4.8	0	0	2.8	0	0		NO	3.74	
105	1	PROXFLAKE	CCQ	CHAL	TRANS	GREYCL		0%		INDETER	UNI	NONE				0										0			14.1	0	0	0	0	3.2	1.1	0	0		NO	0.35	
105	1	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		ELONG						0										0			15.5	0	0	0	0	0	0	0	0		NO	0.34	
105	1	PROXFLAKE	CCQ	JASPER	OPAQUE	BROWN		0%		INDETER	MISSING	NONE				0										0			12.7	0	0	0	0	0	0	0	0		NO	0.19	
105	1	BROKFLAKE	CCQ	CHAL	TRANS	LGREY		0%		INDETER						0										0			10.3	0	0	0	0	0	0	0	0		NO	0.25	green tinge
105	1	BROKFLAKE	CCQ	CHAL	TRANS	LGREY		0%		INDETER						0										0			11.3	0	0	0	0	0	0	0	0		NO	0.33	green tinge
105	1	BROKFLAKE	MQU	MQUAR	TRANS	WHITE		0%		INDETER						0										0			15.8	0	0	0	0	0	0	0	0		NO	0.51	

SQ	SPIT	CLASS	MATERIAL GROUP	MATERIA	TRANSLUCENCY	COLOUR	DISTAL END	CORTEX %	CORTEX TYPE	FORM	PLATFORM TYPE	PLATFORM PREPARATI	SCAR NUMBER	SCAR TYPE	TOOL TYPE	RETOUCHED EDGES	EDGE 1	EDGE 2	EDGE 3	EDGE 4	CORETYPE	CORE BODY	PLATFORM NUMBER	CORE EXHAUSTION?	SCAR FORM	CORE PLATFORMS	STEPS	HINGES	LENGTH	LENGTH AXIAL	WIDTH	THICKNESS	CORE FACE LENGTH	PLATFORM WIDTH	PLATFORM THICKNESS	CORE SCAR LENGTH	CORE SCAR WIDTH	NO. CORE SCARS	BURNT?	WEIGHT	COMMENTS
105	1	BLOCK	CCQ	JASPER	OPAQUE	PINK		0%								0										0			16.2	0	0	0	0	0	0	0	0		NO	0.29	
50	2	BLOCK	MQU	MQUAR	OPAQUE	WHITE		0%								0										0			19.6	0	0	0	0	0	0	0	0		NO	3.21	
50	2	PROXTOOL	CCQ	JASPER	OPAQUE	BLUEG		0%		EXPAND	UNI	OVERHANG			STEP	0										0			39.5	0	0	0	0	28.6	9.3	0	0		NO	8.13	
50	2	COMPFLAKE	QUA	QUARTZI	OPAQUE	RED	HINGE	0%		EXPAND	UNI	NONE	<5	1		0										0			49.3	27.6	35.8	5.8	0	36.5	4.2	0	0		NO	11.6	
50	2	BLOCK	MQU	MQUAR	OPAQUE	WHITE		0%								0										0			29.4	0	0	0	0	0	0	0	0		NO	5.6	
106	3	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	HINGE	0%		EXPAND	UNI	NONE	<5	90		0										0			20.1	15.4	20.6	5.3	0	11.8	2.8	0	0		NO	1.7	
110	2	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	HINGE	0%		INDETER						0										0			22	0	0	0	0	0	0	0	0		NO	1.02	
51	3	COMPSPLIT	TUFF	TUFF	OPAQUE	GREEN	FEATHER	0%		INDETER						0										0			12	0	0	2	0	0	0	0	0		NO	0.2	
105	6	COMPFLAKE	CCQ	CHAL	TRANS	GREYCL	FEATHER	0%		EXPAND	UNI	NONE	<5	90		0										0			33.6	28.6	33.8	7.9	0	9.8	4.9	0	0		NO	7.98	green tinge
105	6	PROXFLAKE	CCQ	CHAL	TRANS	GREYCL		0%		INDETER	UNI	NONE				0										0			14	0	0	0	0	5.2	2.4	0	0		NO	0.34	
105	6	DISTFLAKE	MQU	MQUAR	OPAQUE	WHITE	CRUSH	0%		INDETER						0										0			12.6	0	0	0	0	0	0	0	0		NO	0.36	
105	6	DISTFLAKE	CCQ	CHAL	TRANS	GREYCL	FEATHER	0%		EXPAND						0										0			15.8	0	0	0	0	0	0	0	0		NO	0.56	
105	6	COMPSPLIT	CCQ	CHAL	TRANS	GREYCL	FEATHER	0%		INDETER						0										0			35.4	0	0	9	0	0	8.8	0	0		NO	5.6	
64	1/2	BROKFLAKE	MQU	MQUAR	OPAQUE	WHITE		0%		EXPAND						0										0			21.6	0	0	0	0	0	0	0	0		NO	1.35	
64	1/2	BROKFLAKE	MQU	MQUAR	OPAQUE	WHITE		0%		INDETER						0										0			15.5	0	0	0	0	0	0	0	0		NO	0.38	
64	1/2	BROKFLAKE	MQU	MQUAR	OPAQUE	WHITE		0%		INDETER						0										0			14.5	0	0	0	0	0	0	0	0		NO	0.64	
64	1/2	PROXFLAKE	MQU	MQUAR	OPAQUE	WHITE		0%		INDETER	UNI	NONE				0										0			12.8	0	0	0	0	8.5	3.1	0	0		NO	0.32	
64	1/2	DISTFLAKE	MQU	MQUAR	OPAQUE	WHITE	FEATHER	0%		INDETER						0										0			16.9	0	0	0	0	0	0	0	0		NO	0.53	
64	1/2	DISTFLAKE	MQU	MQUAR	OPAQUE	WHITE	FEATHER	0%		INDETER						0										0			16.6	0	0	0	0	0	0	0	0		NO	0.46	
64	1/2	BROKFLAKE	MQU	MQUAR	OPAQUE	WHITE		0%		INDETER						0										0			16	0	0	0	0	0	0	0	0		NO	0.44	
64	1/2	BLOCK	MQU	MQUAR	OPAQUE	WHITE		0%								0										0			10.4	0	0	0	0	0	0	0	0		NO	0.35	
64	1/2	BROKFLAKE	MQU	MQUAR	OPAQUE	WHITE		0%		INDETER						0										0			13.9	0	0	0	0	0	0	0	0		NO	0.29	
64	1/2	DISTFLAKE	MQU	MQUAR	OPAQUE	WHITE	FEATHER	0%		INDETER						0										0			11.8	0	0	0	0	0	0	0	0		NO	0.12	
64	1/2	BROKFLAKE	MQU	MQUAR	OPAQUE	WHITE		0%		INDETER						0										0			13.2	0	0	0	0	0	0	0	0		NO	0.12	
64	1/2	BLOCK	MQU	MQUAR	OPAQUE	WHITE		26-	ROUGH							0										0			14.1	0	0	0	0	0	0	0	0		NO	0.66	
64	1/2	BROKFLAKE	MQU	MQUAR	OPAQUE	WHITE		1-	ROUGH	INDETER						0										0			11.3	0	0	0	0	0	0	0	0		NO	0.5	
64	1/2	BROKFLAKE	MQU	MQUAR	OPAQUE	WHITE		0%		INDETER						0										0			23.3	0	0	0	0	0	0	0	0		NO	1.23	
64	1/2	BROKFLAKE	MQU	MQUAR	OPAQUE	WHITE		0%		INDETER						0										0			11.9	0	0	0	0	0	0	0	0		NO	0.26	
64	1/2	BLOCK	MQU	MQUAR	OPAQUE	WHITE		0%								0										0			14	0	0	0	0	0	0	0	0		NO	0.47	
64	1/2	BROKFLAKE	MQU	MQUAR	OPAQUE	WHITE		0%		EXPAND						0										0			26.6	0	0	0	0	0	0	0	0		NO	2.77	
64	1/2	DISTFLAKE	MQU	MQUAR	OPAQUE	WHITE	FEATHER	0%		INDETER						0										0			20.1	0	0	0	0	0	0	0	0		NO	0.79	high quality quartz spits 1/2
90	2	COMPFLAKE	CCQ	CHAL	TRANS	LGREY	FEATHER	51-	WATER-ROLL	ELONG	UNI	STEP	<5	1		0										0			59	59	19.9	7.4	0	7	3.6	0	0		NO	9.79	
90	2	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		INDETER						0										0			20.9	0	0	0	0	0	0	0	0		NO	1.13	
90	2	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0										0			15.7	0	0	0	0	0	0	0	0		NO	1.13	
90	2	DISTFLAKE	CCQ	JASPER	OPAQUE	BLUEG	FEATHER	0%		BLOCK						0										0			30	0	0	0	0	0	0	0	0		NO	5.17	
90	2	COMPFLAKE	CCQ	CHAL	TRANS	LGREY	FEATHER	0%		INDETER	UNI	NONE	<5	90		0										0			17.1	11.4	11.7	3	0	7.6	2.2	0	0		NO	0.64	green tinge
90	2	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		ELONG						0										0			24	0	0	0	0	0	0	0	0		NO	2	
90	2	COMPFLAKE	CCQ	CHAL	TRANS	LGREY	FEATHER	0%		EXPAND	FLAKED	NONE	<5	90		0										0			22.2	9.7	20	3.4	0	15.6	3.2	0	0		NO	0.72	green tinge
90	2	BROKFLAKE	CCQ	JASPER	OPAQUE	BLUEG		0%		INDETER						0										0			25.8	0	0	0	0	0	0	0	0		FRACTU	3.11	
90	2	COMPTOOL	CCQ	CHAL	TRANS	LGREY	FEATHER	0%		INDETER	UNI	NONE	<5	1	STEP	1	N/A	STEP	N/A	N/A						0			28.8	28.4	19.2	5	0	16.4	6.5	0	0		NO	3.36	
90	2	COMPFLAKE	CCQ	CHAL	TRANS	GREYCL	FEATHER	0%		EXPAND	UNI	OVERHANG	<5	1		0										0			18.1	13.6	18.1	2.6	0	14.3	1.5	0	0		NO	0.69	
90	2	COMPFLAKE	CCQ	CHAL	TRANS	GREYCL	FEATHER	0%		EXPAND	MISSING	NONE	<5	1		0										0			19.1	18.4	14.4	3.1	0	0	0	0	0		NO	1	
90	2	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER						0										0			20.4	0	0	0	0	0	0	0	0		NO	1.14	
90	2	BLOCK	CCQ	JASPER	OPAQUE	RED		0%								0										0			14	0	0	0	0	0	0	0	0		NO	0.23	
90	2	CORE	CCQ	JASPER	OPAQUE	YELLOW		0%								0					BBLA	FLAK	FACE	NO	ELO	1	0	0	45.3	0	17.3	8.7	17.5	0	0	15.4	5.4	3-5	NO	11.2	
90	2	BLOCK	CCQ	CHAL	TRANS	GREYCL		1-	WATER-ROLL							0										0			36.4	0	0	0	0	0	0	0	0		NO	6.55	
90	2	COMPTOOL	CCQ	JASPER	OPAQUE	BLUEG	N/A	0%		BLADE	MISSING	NONE	<5	1	BON	0	BACK	BACK	BACK	N/A						0			30.2	30.2	11.7	3.6	0	0	0	0	0		NO	1.5	
90	2	DISTFLAKE	TUFF	TUFF	OPAQUE	LGREY	FEATHER	0%		EXPAND						0										0			27.2	0	0	0	0	0	0	0	0		NO	2.03	
90	1	PROXFLAKE	CCQ	JASPER	OPAQUE	RED		1-	ROUGH	BLOCK	CORTICAL	OVERHANG				0										0			33.8	0	0	0	0	28.2	9.3	0	0		NO	9.82	
90	1	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		INDETER	UNI	NONE	<5	1		0										0			0	18.1	18.1	4.5	0	8.2	4.2	0	0		NO	1.52	
90	1	PROXFLAKE	CCQ	JASPER	OPAQUE	RED		1-	ROUGH	ELONG	FLAKED	OVERHANG				0										0			39	0	0	0	0	25	3.7	0	0		NO	6.34	
90	1	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		EXPAND	UNI	NONE	<5	90		0										0			14.5	9.6	14.6	3	0	14	4.4	0	0		NO	0.56	
90	1	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		BLADE						0										0			21	0	0	0	0	0	0	0	0		NO	1.58	
90	1	PROXFLAKE	CCQ	JASPER	OPAQUE	RED		0%		EXPAND	UNI	OVERHANG				0										0			24	0	0	0	0	9.5	2.2	0	0		NO	1.35	
90	1	PROXFLAKE	CCQ	JASPER	OPAQUE	BROWN		0%		BLADE	UNI	OVERHANG				0										0			24.6	0	0	0	0	12.6	3	0	0		NO	1.53	
90	1	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	STEP	0%		INDETER	FLAKED	OVERHANG	<5	1		0										0			31.2	26.6	27.9	8	0	13.1	4.3	0	0		NO	7.73	
90	1	PROXFLAKE	CCQ	JASPER	OPAQUE	RED		0%		EXPAND	CRUSH	NONE				0										0			25.6	0	0	0	0	0	0	0	0		NO	1.23	
90	1	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		ELONG	FACET	NONE	<5	1		0										0			24.3	24.3	10.9	3.2	0	5.9	2.2	0	0		NO	0.84	
90	1	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		INDETER						0										0			18.5	0	0	0	0	0	0	0	0		NO	0.33	
90	1	PROXFLAKE	CCQ	JASPER	OPAQUE	RED		0%		INDETER	UNI	NONE				0										0			16	0	0	0	0	7.9	1.4	0	0		NO	0.35	
90	1	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	PLUNGE	0%		ELONG						0										0			16	0	0	0	0	0	0	0	0		NO	0.51	
90	1	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	0%		EXPAND	UNI	NONE	0	NA		0										0			10.3	7.4	10.2	1.5	0	6.5	2.1	0	0		NO	0.16	
90	1	COMPFLAKE	CCQ	JASPER	OPAQUE	RED	HINGE	0%		EXPAND	FLAKED	NONE	<5	1		0										0			26	13.7	24	4.5	0	20.3	3.6	0	0		NO	1.77	
90	1	BROKFLAKE	CCQ	JASPER	OPAQUE	PINK		0%		INDETER						0										0			20.6	0	0	0	0	0	0	0	0		NO	0.63	
90	1	DISTFLAKE	CCQ	JASPER	OPAQUE	RED	FEATHER	100	WATER-ROLL	EXPAND						0										0			16.4	0	0	0	0	0	0	0	0		NO	0.96	
90	1	DISTFLAKE	CCQ	CHAL	TRANS	LGREY	FEATHER	0%		ELONG						0										0			27.7	0	0	0	0	0	0	0	0		NO	2.7	green tinge
90	1	COMPFLAKE	CCQ	CHAL	TRANS	LGREY	PLATFOR	0%		ELONG	FACET	NONE	<5	90		0										0			24.4	23.3	10.6	3.1	0	5.9	2.6	0	0		NO	0.84	green tinge
90	1	COMPFLAKE	CCQ	JASPER	OPAQUE	BLUEG	FEATHER	0%		ELONG	UNI	NONE	<5	1		0										0			7.1	33.5	6.5	1	0	9.4	6.5	0	0		NO	8.14	
69	1	COMPSPLIT	MQU	MQUAR	OPAQUE	WHITE	CRUSH	0%		INDETER						0										0			29	0	0	4.1	0	0	5.3	0	0		NO	1.76	
69	1	BLOCK	MQU	MQUAR	OPAQUE	WHITE		0%								0										0			10.9	0	0	0	0	0	0	0	0		NO	0.43	
69	1	PROXFLAKE	CCQ	JASPER	OPAQUE	RED		0%		ELONG	UNI	NONE				0										0			16.8	0	0	0	0	3.5	1.7	0	0		NO	0.67	
100	1	COMPSPLIT	CCQ	CHAL	TRANS	LGREY	FEATHER	0%		BLOCK						0										0			42.9	0	0	13.2	0	0	10.8	0	0		NO	29.4	
100	1	DISTFLAKE	CCQ	CHAL	TRANS	GREYCL	FEATHER	0%		INDETER						0										0			15.4	0	0	0	0	0	0	0	0		NO	0.61	green tinge
100	1	BLOCK	CQU	CQUART	CLEAR	CLEAR		0%								0										0			13.3	0	0	0	0	0	0	0	0		NO	0.25	
100	1	BLOCK	CCQ	JASPER	OPAQUE	BLUEG		1-	ROUGH							0										0			23	0	0	0	0	0	0	0	0		NO	7.58	
102	5	BLOCK	CCQ	CHAL	TRANS	ORANG		26-	WATER-ROLL							0										0			22.3	0	0	0	0	0	0	0	0		NO	2.38	
132	surfa	PROXTOOL	FSILC	FSILCRET	OPAQUE	WHITE		0%		BLADE	FLAKED	NONE			STRA	0										0			27.5	0	0	0	0	16.3	8.5	0	0		NO	6.3	quartzite/silcrete
106	surfa	COMPFLAKE	CCQ	CHAL	TRANS	RED	PLUNGE	0%		ELONG	UNI	NONE	<5	90		0										0			42.1	40.6	18.3	7.2	0	5.2	3	0	0		NO	4.63	

SQ	SPIT	CLASS	MATERIAL GROUP	MATERIAL	TRANSLUCENCY	COLOUR	DISTIAL END	CORTEX %	CORTEX TYPE	FORM	PLATFORM TYPE	PLATFORM PREPARATI	SCAR NUMBER	SCAR TYPE	TOOL TYPE	RETOUCHED EDGES	EDGE 1	EDGE 2	EDGE 3	EDGE 4	CORETYPE	CORE BODY	PLATFORM NUMBER	CORE EXHAUSTION?	SCAR FORM	CORE PLATFORMS	STEPS	HINGES	LENGTH	LENGTH AXIAL	WIDTH	THICKNESS	CORE FACE LENGTH	PLATFORM WIDTH	PLATFORM THICKNESS	CORE SCAR LENGTH	CORE SCAR WIDTH	NO. CORE SCARS	BURNT?	WEIGHT	COMMENTS
106	surfa	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		0%		EXPAND						0																								NO	6.32	
90	1	DISTFLAKE	CCQ	CHAL	TRANS	LGREY	FEATHER	0%		ELONG						0													18.4	0	0	0	0	0	0	0	0		NO	0.32	
90	1	COREFRAG	CCQ	CHAL	TRANS	LGREY		1-	WATER-ROLL							0													23.7	0	0	0	0	0	0	0	0		NO	2.16	
90	1	BROKFLAKE	CCQ	CHAL	TRANS	LGREY		0%		INDETER						0													17.1	0	0	0	0	0	0	0	0		NO	0.99	
90	1	COMPFLAKE	CCQ	CHAL	TRANS	BLUEG	FEATHER	0%		EXPAND	UNI	NONE	<5	90		0													30.1	17.8	30.4	5	0	6.1	2.3	0	0		NO	2.4	
90	1	PROXFLAKE	CCQ	JASPER	OPAQUE	BLUEG		0%		INDETER	UNI	NONE				0													21.6	0	0	0	0	17	3.1	0	0		NO	2.02	
90	1	COMPFLAKE	CCQ	JASPER	OPAQUE	BLUEG	HINGE	0%		EXPAND	UNI	NONE	<5	90		0													23.8	16.3	21.7	4.4	0	19.2	4.6	0	0		NO	2.01	light blue grey
90	1	COMPFLAKE	TUFF	TUFF	OPAQUE	LGREY	FEATHER	0%		INDETER	MISSING	NONE	<5	1		0													17.9	16.9	14.8	2.2	0	0	0	0	0		NO	0.53	
90	1	PROXFLAKE	CCQ	JASPER	OPAQUE	BLUEG		0%		INDETER	CRUSH	NONE				0													16	0	0	0	0	0	0	0	0		NO	0.38	
90	1	PROXFLAKE	CCQ	JASPER	OPAQUE	BROWN		0%		ELONG	FACET	NONE				0													19	0	0	0	0	9	5.3	0	0		NO	1.11	ridge removal
90	1	DISTFLAKE	CCQ	CHAL	TRANS	GREYCL	FEATHER	0%		ELONG						0													21.9	0	0	0	0	0	0	0	0		NO	0.53	
90	1	BROKFLAKE	CCQ	CHAL	TRANS	BLUEG		0%		INDETER						0													15.4	0	0	0	0	0	0	0	0		NO	0.4	
90	1	DISTTOOL	CCQ	CHAL	TRANS	LGREY	FEATHER	51-	WATER-ROLL	PLATREJUV					NOT	0													28.8	0	0	0	0	0	0	0	0		NO	2.7	
90	1	BROKFLAKE	CCQ	CHAL	TRANS	GREYCL		0%		ELONG						0													18.1	0	0	0	0	0	0	0	0		NO	0.57	
90	1	PROXFLAKE	CCQ	CHAL	TRANS	GREYCL		0%		INDETER	CRUSH	NONE				0													17.7	0	0	0	0	0	0	0	0		NO	0.6	
90	1	BROKFLAKE	CCQ	CHAL	TRANS	GREYCL		0%		INDETER						0													13.8	0	0	0	0	0	0	0	0		NO	0.41	
90	1	DISTFLAKE	CCQ	CHAL	TRANS	LGREY	FEATHER	0%		INDETER						0													19.7	0	0	0	0	0	0	0	0		NO	0.76	green tinge
90	1	BROKFLAKE	CCQ	CHAL	TRANS	LGREY		0%		INDETER						0													21.6	0	0	0	0	0	0	0	0		NO	0.99	green tinge
90	1	BROKFLAKE	CCQ	CHAL	TRANS	LGREY		0%		INDETER						0													12.1	0	0	0	0	0	0	0	0		NO	0.25	
90	1	BLOCK	CCQ	JASPER	OPAQUE	BLUEG		0%								0													28.3	0	0	0	0	0	0	0	0		NO	1.21	
90	1	BLOCK	CCQ	JASPER	OPAQUE	RED		0%								0													21.1	0	0	0	0	0	0	0	0		NO	1.55	
90	1	BLOCK	CCQ	JASPER	OPAQUE	RED		0%								0													29.8	0	0	0	0	0	0	0	0		NO	1.47	
90	1	BROKFLAKE	CCQ	JASPER	OPAQUE	RED		26-	ROUGH	EXPAND						0													19.1	0	0	0	0	0	0	0	0		NO	1.8	
90	1	DISTTOOL	CCQ	CHAL	TRANS	WHITE	FEATHER	0%		BLADE					BACK	0													17.8	0	0	0	0	0	0	0	0		NO	0.56	attempt to make bondi

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