



RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

Glendell Continued Operations Project

FINAL

August 2021

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Glendell Continued Operations Project

FINAL

Prepared by
Umwelt (Australia) Pty Limited
on behalf of
Department of Planning, Industry and Environment

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1.0 Introduction

It is understood that the Department of Planning, Industry and Environment (DPIE) are progressing their assessment of the Glendell Continued Operations Project (the Project) and has received further feedback from Singleton Council (Council) requesting additional information to complete its consideration of the Project.

In correspondence dated 27 May 2021, DPIE have requested additional information from Glencore to address the following in relation to the Project:

- Realignment of Hebden Road
- Relocation of Ravensworth Homestead
- Voluntary Planning Agreement.

This report provides a response to the request relating to the relocation of Ravensworth Homestead, specifically the Broke Village Square relocation option. Responses to queries relating to the realignment of Hebden Road and Voluntary Planning Agreement (VPA) are provided in separate correspondence to DPIE.

2.0 Response to Request for Additional Information

2.1 Relocation of Ravensworth Homestead

The Department understands that Glencore is considering two locations for the proposed relocation of the Ravensworth Homestead (i.e. relocation to Ravensworth Farm onsite or McNamara Park in Broke). The Department requests further information regarding the proposed relocation to McNamara Park in Broke, including details of:

- the proposed use of the Homestead at McNamara Park, including proposed ownership and permissibility under the Singleton LEP;

The Project necessitates the relocation of the Ravensworth Homestead Complex. As discussed in the EIS, two alternate options are proposed for the relocation of Ravensworth Homestead (Homestead) and are:

- ‘Ravensworth Farm’ (Option 1) – involves the intact relocation of the complex buildings to a new recipient site ‘Ravensworth Farm’ located within the Project Area and within the original Bowman ‘10,000 acre’ land grant. This land is owned by Glencore and the buildings would be adapted for use as administration/office facilities by Glencore.
- ‘Broke Village’ (Option 2) – this is a proposal developed by members from the Broke-Fordwich community that proposes to dismantle and rebuild the buildings at McNamara Park in Broke where the buildings would become the village square. The buildings are proposed for multi-purpose usage and the facility would provide local employment opportunities, communal interaction and encourage enterprise growth (referred to in this response as the ‘Broke Village Square’).

If the Broke Village Square relocation (Option 2) is approved by the consent authority, then it needs to be recognised that:

- land tenure is to be secured for the proposed location or an alternative location; and
- further secondary approvals for the reconstruction and use of the Homestead in this location will be required.

Based on the proposed mining schedule for the Project, all requisite statutory approvals for Option 2 are required to be obtained by the end of Year 2 of the Project. If the requisite approvals cannot be obtained within 2 years of commencement of development under the SSD development consent for the Project (Broke Approval Date) then it is proposed that the Homestead will be relocated to the Ravensworth Farm. The relocation and use of the Homestead at the Ravensworth Farm are therefore part of the development being assessed under the SSD development application to cover the event that the Broke Village Square option is not available and fully approved by the Broke Approval Date. This approval pathway is summarised in **Figure 2.1**.

The following discussion is focussed solely on the Broke Village Square relocation option in response to DPIE’s RFI. Further details on the Ravensworth Farm relocation option can be found in Section 7.8.7.1 of the EIS.

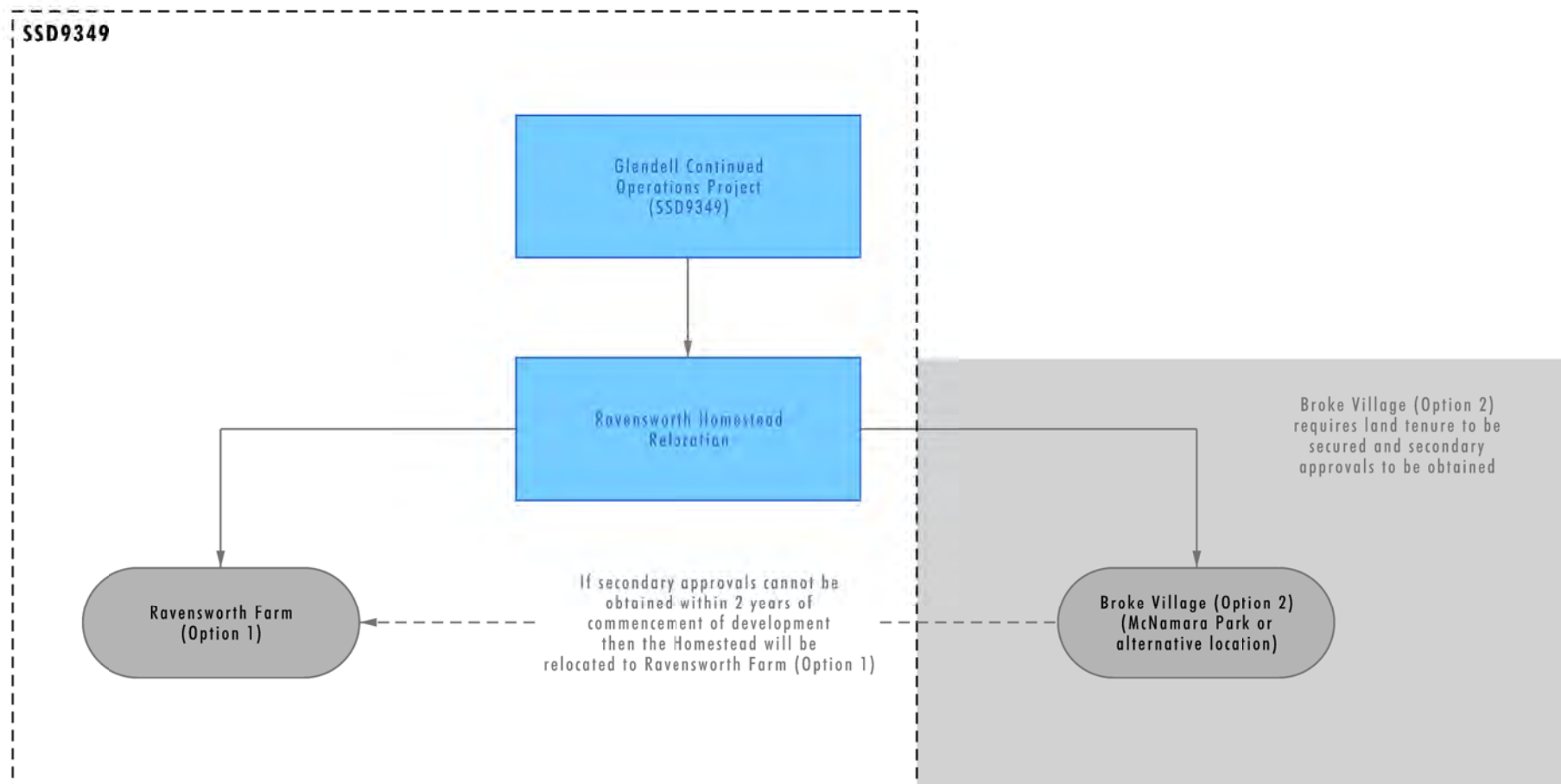


FIGURE 2.1

Ravensworth Homestead
Relocation Approvals Process

Proposed Use

The Broke Village Square relocation option is a proposal by members of the Broke Fordwich community that places the buildings in a publicly accessible location to provide an ongoing community benefit through dismantling and rebuilding the homestead buildings to form the Broke Village Square.

Broke Village Square is proposed for multi-purpose usage. Conceptual plans for the Broke Village Square were developed and included in Appendix 23 of the Project EIS (with the Concept Plan reproduced below in **Figure 2.2**).

The current conceptual proposal for Broke Village Square includes the following uses:

- Cultural Precinct (Main House and Kitchen Wing): offices, exhibition (art) space and interpretation space
- Food Precinct (Men's Quarters and Barn): café/restaurant premises, local produce (cheese, bread, ice creamery)
- Tourism Precinct (Stables): cellar door/wine tasting and micro-brewery, function space
- Market square with markets (monthly) and venue for major events (Broke Fair, Smoke in Broke etc)
- Service and Amenity with toilets, maintenance and greenkeeper.

The use of the site as the Broke Village Square would provide additional local employment opportunities, communal interaction and encourage enterprise growth. The proposed multi-purpose usage of the Broke Village Square assists in the long-term commercial viability of the site as a whole, as it encourages a range of attractions for visitors to the site and improves the economic resilience of the Broke Village Square through the diversity provided.

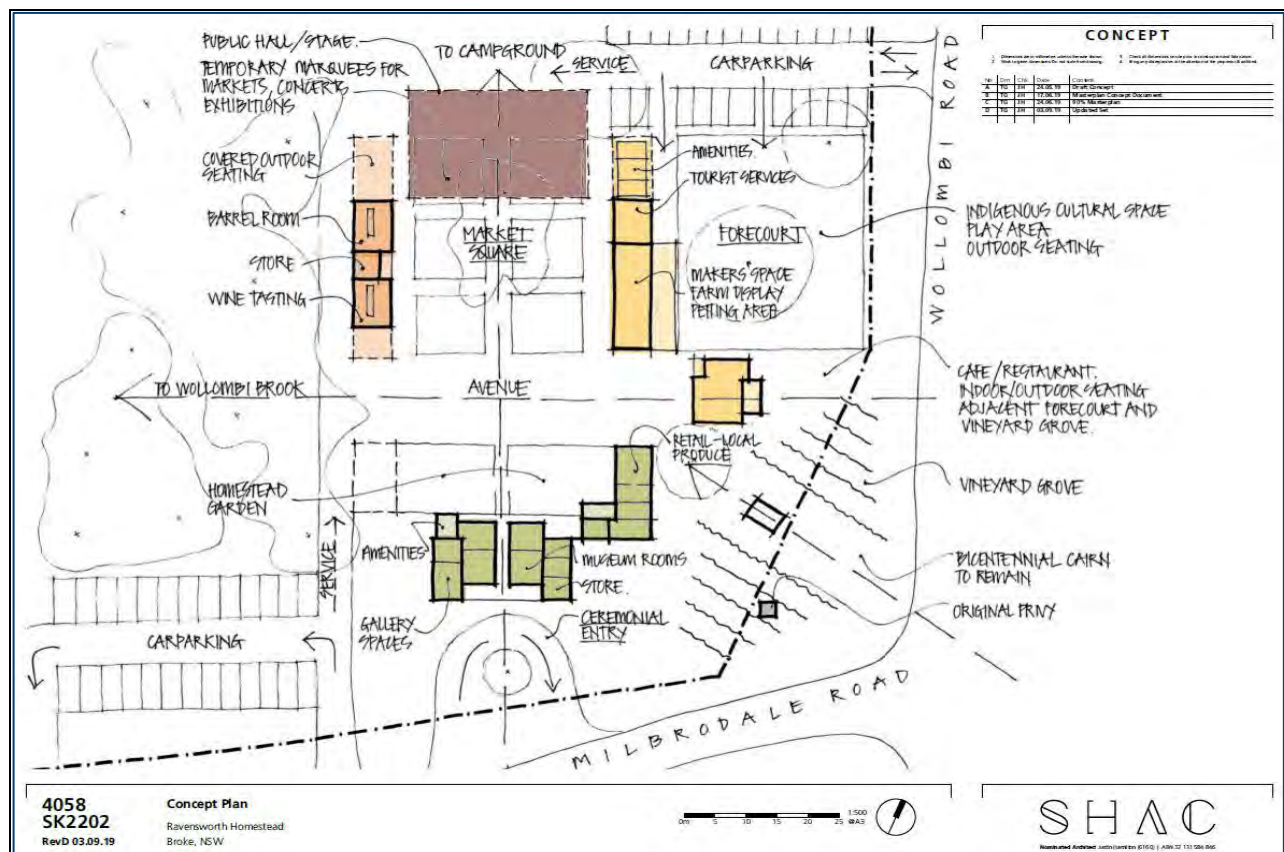


Figure 2.2 Broke Village Square Concept

Further development and refinement of the Broke Village Square conceptual design (as provided in Appendix 23 of the EIS) will be undertaken if the Project SSD Application is approved and the Broke relocation option is chosen as the preferred relocation option by the consent authority. This refinement will be done in consultation with relevant parties and levels of government, including Council.

Further, consideration would also be given to the new facility's integration with other civic facilities within Broke to ensure that the new facility performs its function as the 'village square'. This information will be incorporated into all approval processes.

Proposed Ownership

The preferred site for the Broke Village Square relocation option is in the southern end of McNamara Park (the Site). The Site is currently owned by the Crown and managed by Singleton Council as land manager pursuant to the *Crown Land Management Act 2016* (NSW) (CLM Act) (refer to **Figure 2.3**).

The relocation of the Homestead to the Site would result in the Homestead becoming a 'fixture' on the land, with the result that the ownership of the Homestead would pass to the owner of the land on which it is located.

Based on inquiries made to date, Glencore's current understanding is that Singleton Council does not wish to obtain ownership of the Homestead, nor be responsible for its management.

Broke Village Square Limited (BVSL), a new entity comprising members of the Broke-Fordwich community, has been established for the proposed future ownership and/or management of Broke Village Square. It is proposed that the entity will operate as a trustee with financial benefits generated by the Broke Village Square to be used for funding other community initiatives in the Broke-Fordwich region, such as providing improved infrastructure, services and facilities. Umwelt understands that BVSL has already undertaken extensive consultation with the local Broke community including conducting an open meeting forum in Broke to discuss the proposed use and management of the Site.

There are legal mechanisms available for the Crown to either sell the land on which the Homestead is proposed to be located to BVSL as freehold land, or lease the land to BVSL. As native title exists over part of the Site, the extinguishment of native title will be required to be addressed as part of this process.

BVSL would be the proponent of the separate development application that will be necessary to install and construct the relocated homestead buildings at the proposed Site and also any associated subdivision and/or rezoning of the land.



FIGURE 2.3

Broke Recipient Site

Permissibility under the Singleton LEP

The Site is predominantly zoned RE1 (Public Recreation) under the Singleton Local Environmental Plan 2013 (LEP) with a small section of the Site being zoned RU4 (Primary Production Small Lots).

Zone RE1 Public Recreation

1. Objectives of zone

- *To enable land to be used for public open space or recreational purposes.*
- *To provide a range of recreational settings and activities and compatible land uses.*
- *To protect and enhance the natural environment for recreational purposes.*

2. Permitted without consent

Environmental protection works

3. Permitted with consent

Aquaculture; Boat launching ramps; Boat sheds; Camping grounds; Centre-based child care facilities; Community facilities; Emergency services facilities; Environmental facilities; Flood mitigation works; Information and education facilities; Jetties; Kiosks; Markets; Recreation areas; Recreation facilities (indoor); Recreation facilities (major); Recreation facilities (outdoor); Respite day care centres; Restaurants or cafes; Roads; Signage; Water recreation structures; Water supply systems

4. Prohibited

Any development not specified in item 2 or 3

Zone RU4 Primary Production Small Lots

1. Objectives of zone

- *To enable sustainable primary industry and other compatible land uses.*
- *To encourage and promote diversity and employment opportunities in relation to primary industry enterprises, particularly those that require smaller lots or that are more intensive in nature.*
- *To minimise conflict between land uses within this zone and land uses within adjoining zones.*
- *To recognise Hunter Valley Wine Country and the adjoining environs of Broke-Fordwich as a major viticultural and tourist destination by providing additional opportunities for compatible tourist uses.*

2. Permitted without consent

Extensive agriculture; Home occupations; Intensive plant agriculture

3. Permitted with consent

Airstrips; Animal boarding or training establishments; Aquaculture; Building identification signs; Business identification signs; Cellar door premises; Community facilities; Dual occupancies; Dwelling houses; Environmental facilities; Environmental protection works; Farm buildings; Flood mitigation works; Forestry; Function centres; Helipads; Home-based child care; Home businesses; Home industries; Information and education facilities; Plant nurseries; Recreation areas; Recreation facilities (outdoor); Restaurants or cafes; Roads; Roadside stalls; Rural industries; Sewerage systems; Tourist and visitor accommodation; Turf farming; Viticulture; Water supply systems.

4. Prohibited

Backpackers' accommodation; Intensive livestock agriculture; Livestock processing industries; Sawmill or log processing industries; Serviced apartments; Stock and sale yards; Any other development not specified in item 2 or 3

Under the current zoning applying to the majority of the Site (zone RE1), the proposed uses (under the current conceptual plan for the Site) that may be prohibited include:

- “Offices” or “office premises” being a type of “commercial premise” defined in the LEP
- “Local produce” being categorised as an “artisan food and drink industry” (being a form of “light industry”) or “retail premise” (being a form of “commercial premise” defined in the LEP)
- “Cellar door/wine tasting” being an “artisan food and drink industry” (being a form of “light industry”) or “retail premise” (being a form of “commercial premise” defined in the LEP);
- “Micro-brewery” being an “artisan food and drink industry” (being a form of “light industry” defined in the LEP).

In the event that the final uses proposed for the Site include any of the above listed uses, an amendment of the LEP will be required to allow for the uses to be carried out within the Homestead. This could be achieved through either a rezoning of the Site to B4 (Mixed Use) or an amendment of Schedule 1 of the LEP to add additional permitted uses of “commercial premise” and “artisan food and drink industry” as categories of development permitted with consent on the Site.

Importantly, a planning proposal for an LEP amendment and a DA may run together and a consent authority may consider a DA even if the LEP amendment has not yet occurred (s.3.39, EP&A Act).

The refinement of the Broke Village Square design and layout may change one or more of the currently proposed uses, which in turn may alter any required LEP Amendment.

Heritage listing under the LEP

The Homestead (in its current location) is identified as a local heritage item under the LEP. Clause 5.10 of the LEP relates to heritage conservation and the requirements for consent for development involving heritage items. Clause 5.10(10) provides:

*(10) **Conservation incentives** The consent authority may grant consent to development for any purpose of a building that is a heritage item or of the land on which such a building is erected, or for any purpose on an Aboriginal place of heritage significance, even though development for that purpose would otherwise not be allowed by this Plan, if the consent authority is satisfied that—*

- a) The conservation of the heritage item or Aboriginal place of heritage significance is facilitated by the granting of consent, and*
- b) the proposed development is in accordance with a heritage management document that has been approved by the consent authority, and*
- c) the consent to the proposed development would require that all necessary conservation work identified in the heritage management document is carried out, and*
- d) the proposed development would not adversely affect the heritage significance of the heritage item, including its setting, or the heritage significance of the Aboriginal place of heritage significance, and*
- e) the proposed development would not have any significant adverse effect on the amenity of the surrounding area.*

The above clause provides an alternative mechanism for uses that are otherwise prohibited under the LEP to be carried out on land, however the clause only applies to buildings that are a heritage item or land on which such a building is erected. We understand from the heritage assessment that was conducted for the Project, that whilst the Homestead is a heritage item in its current location, following relocation to a new site it will need to be re-assessed pursuant to the relevant policy documents to determine whether it maintains a level of local heritage significance. If the Homestead is of sufficient local heritage significance after reconstruction in its new location, then it may be listed as a heritage item in its new location, in the LEP.

Importantly, it is understood that the assessment of heritage significance can only be conducted after the Homestead is relocated as it needs to consider both the building as well as the place on which the building is located. However, the development consent for the reconstruction of the Homestead on the Site will be required prior to that assessment being undertaken (if Option 2 is approved under the SSD consent). Therefore clause 5.10(10) will not have any application in this case as the Homestead will not have a heritage listing in the context of the Site at the time that the DA for the reconstruction of the Homestead is made.

Following any relocation of the Homestead (to either Option 1 or Option 2), the LEP should be amended to reflect the updated status of the Homestead in Schedule 5 of the LEP. This would be done as a separate process to a LEP Amendment for the Broke Village Square uses discussed above.

- additional approvals required to be obtained under the Crown Lands Management Act 2016, Biodiversity Conservation Act 2016, Roads Act 1993, Local Government Act 1993 and any other relevant Acts and/or Planning Instruments;

The Project SSD Application (SSD-9349) seeks approval to relocate the Ravensworth Homestead for the purpose of mining of the extended Glendell Pit. The SSD Application seeks approval for the Homestead to be relocated either locally to Ravensworth Farm (Option 1) or alternatively to Broke Village (Option 2). In the event that Ravensworth Farm (Option 1) is preferred by the consent authority, approval for this relocation option will be included as part of the Project SSD consent and no further approvals will be required. However, in the event that Option 2 is preferred by the consent authority, further approvals for the reconstruction and use of the Homestead at the Site will be required.

To enable Option 2 to be carried out a separate development application (DA) under Part 4 of the EP&A Act will need to be lodged for the reconstruction, fit-out and use of the Homestead at the Site. In addition, depending on the final uses proposed to be carried out within the relocated Homestead building, an amendment of the LEP may be required to permit all proposed uses that would subsequently require development consent.

Based on the proposed mining schedule for the Project, and in the event that Option 2 is preferred by the consent authority for the Project, all requisite statutory approvals for the Site are required to be in place within two years. The Project SSD Application states that if the requisite approvals cannot be obtained within two years of commencement of development under the SSD Approval, then the Homestead will be relocated to the Ravensworth Farm (Option 1).

A summary of the additional approvals which may be required to be obtained is provided in **Table 2.1**.

Table 2.1 Summary of Approvals required

Approval Required	Detail
Biodiversity Conservation Act 2016	A biodiversity development assessment report (BDAR) will be required to be prepared as part of DA if the proposed development is likely to significantly affect threatened species, under Part 7 of this Act. Further investigation will be undertaken as part of the assessment process through formal surveys of the site to determine whether a BDAR is required.
Roads Act 1993	Consent under section 138 of the Act is required for undertaking any works that are required to be carried out within a road reserve.
Local Government Act 1993	Approval of the Council may be required under section 68 of the Act, for water supply, sewerage and stormwater drainage work
Heritage Act 1977	Further investigation will be undertaken as part of the assessment process for the relocation to determine if approval under the <i>Heritage Act 1977</i> is required.
National Parks and Wildlife Act 1974 (NPW Act)	Aboriginal Heritage Impact Permits (AHIPs) are required under s87 and s90 of the NPW Act for Aboriginal sites proposed to be impacted by development. Further investigation will be undertaken as part of the assessment process for the relocation to determine if an AHIP is required.
Aboriginal Land Rights Act 1983	There is an active Aboriginal Land Claim (ALC) (No. 43214) over the subject Crown land which is yet to be determined.
Native Title Act 1993 (Cth)	Native Title has not been wholly extinguished over the entire proposed Village site, and therefore any 'future acts' on this land will be subject to the statutory processes contained in the <i>Native Title Act 1993</i> (Cwlth)..

- infrastructure and servicing requirements of the Homestead (e.g. water, electricity, sewage), including identification of the parties responsible for ongoing maintenance; and

Glencore engaged GHD Pty Ltd (GHD) to determine the servicing requirements for the proposed facility if the homestead is relocated to Broke. As part of this scope of work, GHD have undertaken a study of the existing services in Broke to identify any infrastructure works or upgrades necessary to service the proposed facility (GHD, 2021).

In summary, no significant constraints were identified in order to service the proposed facility. A summary of the outcomes of the servicing assessment including servicing requirements is provided below, with further detail provided in **Appendix A**.

Water

The village of Broke is serviced by a reticulated potable water supply network.

The existing network has capacity to supply the proposed facility for general use, however there is insufficient pressure in the existing network to meet fire water requirements in line with Australian Standards. As such, a fire booster system would be required for the facility comprising water tanks (288kL in total) and pumps (capable of delivering 20L/s at 200kPa). These tanks have been sized to provide four hours of continuous flow in the event of a fire.

Connection of the proposed facility to the existing reticulation network would be via the existing DN150 uPVC main that runs along Wollombi Street.

Council would continue to be responsible for maintenance of the supply network up to the metering point as per other residential/commercial developments. BVSL would be responsible for the ongoing maintenance of on-site reticulation associated with the facility including the fire booster system.

Sewer

No sewerage system exists in Broke, with dwellings having individual septic systems (or similar) for the collection and disposal of wastewater. As such, the proposed facility will be required to manage its own wastewater.

Four onsite sewage treatment and disposal options were considered, namely:

- **Option 1** - Minimal treatment plus storage with off-site transport via tanker to a municipal wastewater treatment plant (Kurri Kurri wastewater treatment works)
- **Option 2** - Treatment with onsite discharge through infiltration beds
- **Option 3** – Treatment with onsite discharge through subsurface irrigation
- **Option 4** – Sophisticated treatment with discharge to Wollombi Brook

The use of on-site wastewater treatment with disposal through infiltration beds or sand mounds (Option 2) is the preferred option for the management of wastewater generated by the proposed facility. The infiltration area required for the disposal of treated effluent is approximately 720m² (also requires 70kL tank for storage of effluent during maximum flow events), which can be easily accommodated to the west of the facility and is well beyond 40m from Wollombi Brook. **Figure 2.4** shows the approximate footprint size of the treatment system for Option 2 and the area required for the storage and disposal of effluent.

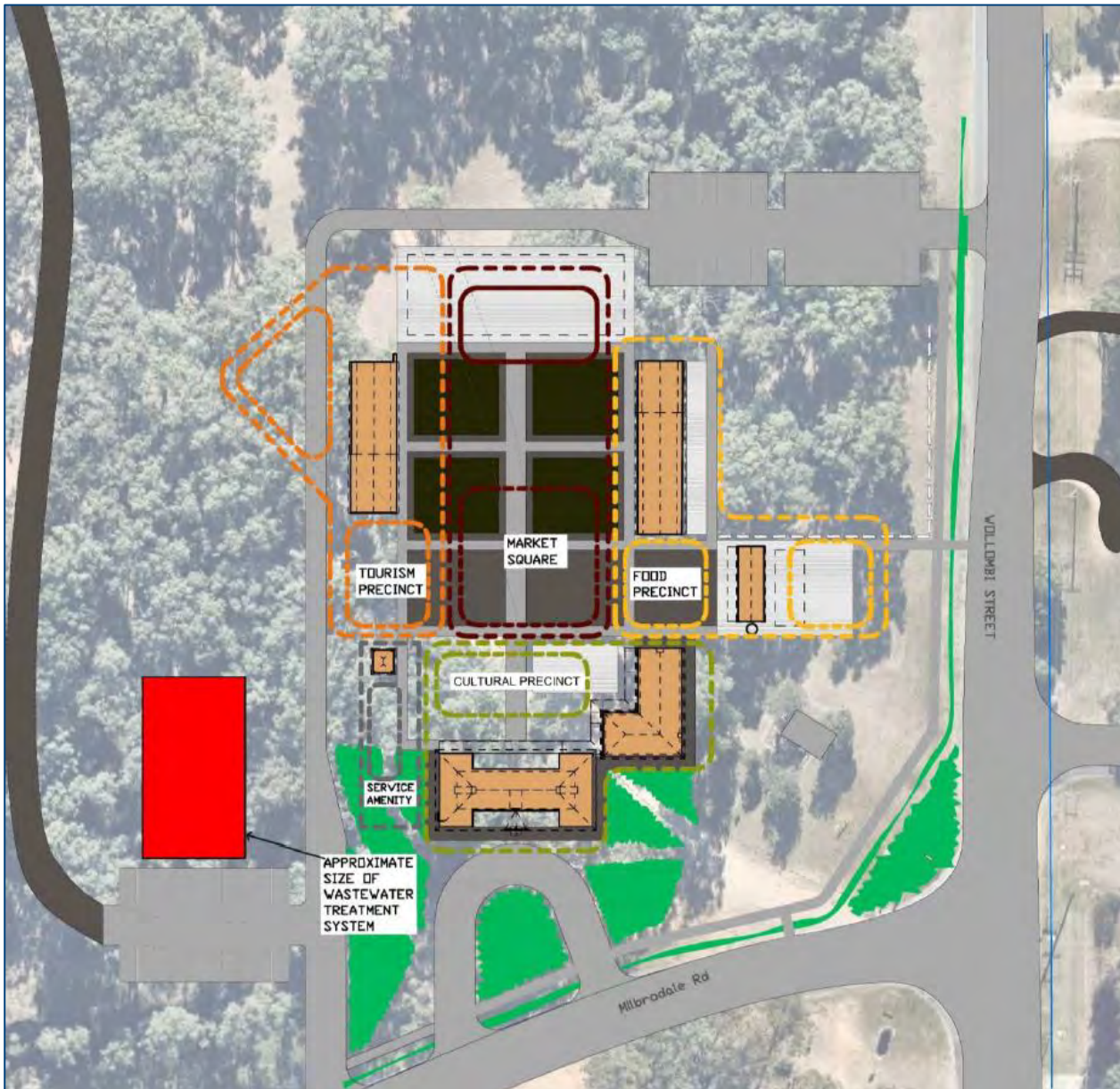


Figure 2.4 Sewage Management - Option 2

Further design development will also consider effluent disposal via subsurface irrigation and the potential for treatment by septic tank, worm farm or similar approaches subject to final sewage loads and sources.

BVSL would be responsible for the operation and maintenance of the on-site sewer system.

Electrical

Broke is supplied with electricity via a single 11kV feeder with power supplied to individual consumers at low voltage of 400V (3 phase) or 230V (single phase) through a series of local pole-top distribution substations and overhead power lines.

The existing power supply network has been assessed and can meet the power demand requirements for the proposed facility. The facility would be connected to the existing network through the installation of a short 11kV branch line from a nearby power pole on Wollombi Street with a new 400kVA pole-top substation installed onsite. Low voltage power would then be reticulated from this new substation to service the proposed facility.

Ausgrid would be responsible for maintenance of the supply network, including the new 400kVA pole-top substation, up to the metering point as per other residential / commercial developments. BVSL would be responsible for maintenance of any low voltage reticulation throughout the facility.

Communications

Broke has phone and internet coverage supplied by the National Broadband Network (NBN) via their Fixed Wireless network, and the proposed facility site is covered by this existing network.

The proposed facility will connect to this existing network through a new NBN outdoor antenna and router/modem. Ethernet cable and/or Wi-Fi would be provided throughout the facility to allow device and appliance connection as required.

NBN would be responsible for maintenance of the supply network up to the on-site point of supply (including NBN outdoor antenna and connection box) as per other residential/commercial developments. BVSL would be responsible for any on-site reticulation.

Separate to the report and services listed above, supply of gas for commercial kitchen operations would be provided as bottle LPG as required with supply and maintenance managed by the BVSL.

- environmental constraints associated with the site, including flooding, biodiversity, heritage and road access.

The preparation of an appropriate environmental impact assessment (EIA) document is required to accompany the DA. The EIA must address all relevant legislation, planning instruments and SC Development Control Plan (DCP) requirements. The content and level of additional technical study requirements will be determined through the assessment process and liaison with SC and DPIE.

Technical studies required to inform the DA, are anticipated to include (not exhaustive):

- An Aboriginal Archaeological Test Pit Program (based on preliminary work undertaken by OzArk)
- Aboriginal Cultural Heritage Assessment Report
- Social Impact Assessment (SIA)
- Biodiversity Development Assessment Report (BDAR)
- Traffic Impact Assessment
- Flooding Impact Assessment

Key site considerations have been addressed in the following sections.

Flooding

The latest published flood study for Wollombi Brook (Wollombi Brook Flood Study, Final Report, R.N2390.001.04; BMT WBM; November 2016) indicates that the proposed recipient site is likely to be flood immune for less than a 1% AEP event but is inundated for the 1% AEP event and above (refer to **Figure 2.5**).

Finished floor levels for the proposed facility will need to take into account the potential flood inundation depth at site with floor levels raised sufficiently above predicted flood levels or as required by the Singleton LEP. This may require localised filling in the order of 1m above current natural levels.

A detailed flood study for the proposed village square site will be completed for the LEP Amendment/DA and will consider the requirements of any relevant standards, guidelines and other planning policies including the NSW Floodplain Development Manual (2005). The flood study will also provide:

- details of any flood management measures that may be required such as flood egress paths and flood refuge areas

- an assessment of the impact of filling the site on existing flood velocities, velocities and flow paths including flood hazard category, and identify appropriate mitigation measures if necessary.

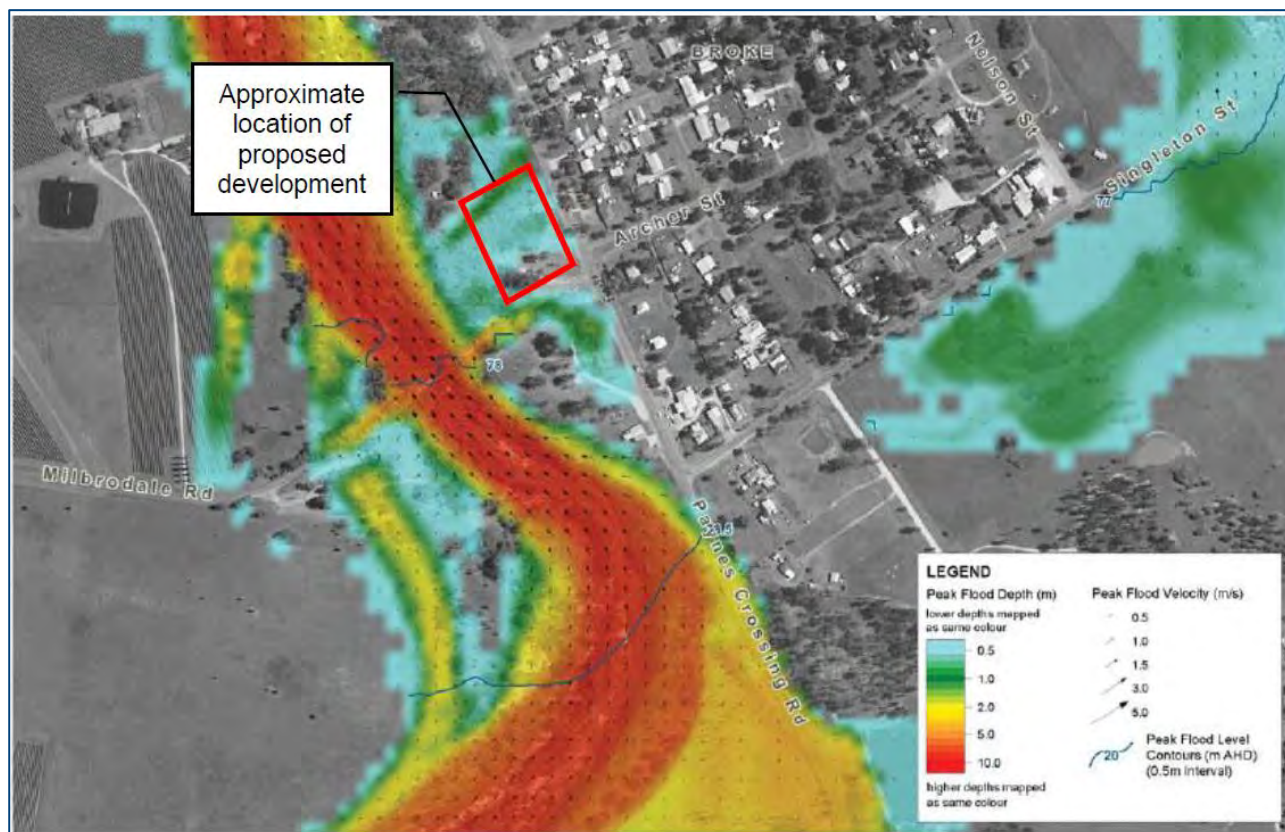


Figure 2.5 Potential Flood Impacts under 1%AEP event at Broke Relocation Site

(Source: Wollombi Brook Flood Study, 2016)

Biodiversity

As part of the process to select a recipient site for the Ravensworth Homestead, Umwelt undertook a literature review and broad-scale ecological constraints assessment associated with the Broke relocation site (Umwelt, 2019). This assessment was provided as part of Appendix 23h of the Project EIS and is attached for reference to this correspondence as **Appendix B**. A summary of the findings is provided below.

The key ecological constraints identified in this assessment (Umwelt, 2019) include one Plant Community Type (PCT) (1594) that conforms to River-flat Eucalypt Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner Bioregion EEC, three potential endangered populations and 14 threatened species that have the potential to occur on the proposed recipient site at Broke.

If Broke is selected as the recipient site as part of the Project development consent, formal surveys of the Site will be required to determine presence or absence of the species and any offsetting requirements as part of the approval. These surveys and offsetting requirements will be subject to the DA process for the Broke Village Square. Such offsets are not part of the current Project for which Glencore is currently seeking approval.

Aboriginal Heritage

An Aboriginal Due Diligence heritage assessment was completed by OzArk in 2019, to determine the likely impacts on Aboriginal objects in the study area if the Ravensworth Homestead was to be relocated to the Broke site. This assessment was provided as part of Appendix 23h of the Project EIS and is attached as **Appendix C** to this correspondence for reference. A summary of the findings is provided below.

The desktop assessment indicated that the study area contains landforms that have potential to contain Aboriginal objects and that these areas could not be avoided. Due to this potential for the presence of Aboriginal objects, a visual inspection was undertaken. No Aboriginal sites were recorded as a result of the field assessment, however, the secondary and tertiary terrace landforms which dominate the study area were confirmed to be a sensitive archaeological landform.

In accordance with recommendations made by OzArk as part of their assessment (2019), further assessment will be undertaken of the study area if Broke is the selected option for relocation of the Ravensworth Homestead. Further investigations including test excavation would be completed in accordance with the *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* under Part 6 *National Parks and Wildlife Act 1974*. These investigations will confirm whether subsurface archaeological deposits are present, and if present, give an indication of their nature, extent and integrity of any deposits. This process will also involve consultation as per the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010*. It is noted that this process would be undertaken as part of the DA for the Broke Village Square, which is separate to the Project.

Historic Heritage

A Heritage Analysis and Statement of Significance for McNamara Park at Broke, the proposed site for relocation, was completed by Lucas Stapleton Johnson (LSJ, 2019). This assessment was provided as part of Appendix 23h of the Project EIS and is attached for reference as **Appendix D** to this correspondence. A summary of the findings is provided below.

The analysis found that McNamara Park, Broke, is of historical significance. This is due to it forming part of the original town plan for the village of Broke, formally surveyed and laid out in the 1830s, and it being in continuous use as a public reserve (either for recreational purposes or as a commonage) since its establishment. McNamara Park also has some significance for its ability to demonstrate colonial town planning practices of providing public reserves for recreation as part of the formal town plan for regional villages. The place has historical associational significance for being named after the former mayor of Singleton Council, Neil McNamara OAM, a noted local councillor and prominent business-person of the district. The place is likely to be held in some regard as the “town common” for the village of Broke and for its usefulness as a camping area and location for regular markets and fairs. Further detail is provided in **Appendix D**.

Road Access

Road access to the site will be provided off both Wollombi Street (to the rear of the development) via a proposed car park, and Milbrodale Road (front of the development). It is noted that there is existing access off Milbrodale Road to the site via an informal “Y” intersection close to the Wollombi Street / Milbrodale Road intersection, and access off Wollombi Street to the site, north of the proposed Broke Village Square development.

If Broke Village Square is selected as the preferred relocation option, a Transport and Traffic Impact Assessment will be completed as part of the development application process and will assess access requirements onto the adjoining roads.

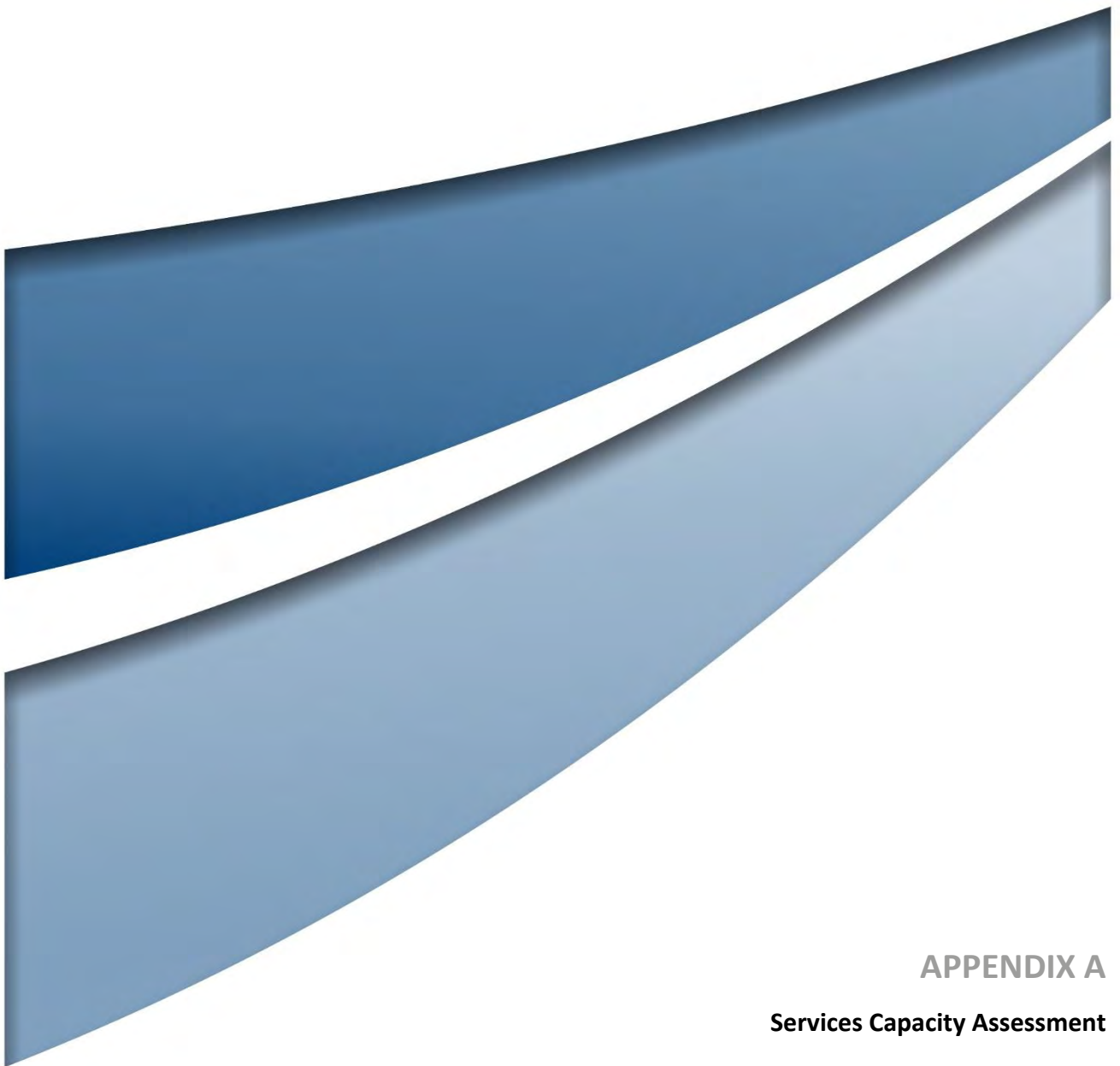
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APPENDIX A

Services Capacity Assessment



Broke Village - Ravensworth Homestead Relocation Option

Services Capacity Assessment

Glencore

25 June 2021

→ **The Power of Commitment**



GHD Pty Ltd | ABN 39 008 488 373


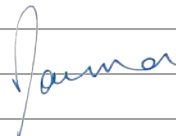
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1. Introduction

1.1 Background

As part of the Glendell Continued Operations project, Glencore are proposing to relocate Ravensworth Homestead from the proposed mine footprint. Two options have been put forward, one of which is to rebuild and repurpose the homestead and related buildings in a new village square development in Broke.

The NSW Department of Planning, Industry and Environment (DPIE) have requested further information in relation to the servicing requirements (water, sewer, electricity and telecommunications) for the new facility, which would be located at the corner of Milbrodale Road and Wollombi Street. Glencore have engaged GHD to determine the servicing requirements for the proposal, undertake a study of the existing services in Broke and identify any infrastructure works or upgrades necessary to service the facility. The discharge of effluent (treated sewage), in the absence of local sewerage infrastructure, considers treatment method options and outlines the area required and potential Wollombi Brook discharge locations.

1.2 Purpose of this report

This report provides assessment and recommendations relating to water, sewer, electrical and communications infrastructure servicing the site specifically as follows:

- Outline of the existing authority infrastructure and identify any major constraints
- Assess the capacity of the existing infrastructure to serve the proposed development
- Provide recommendations for servicing the proposed development including any necessary upgrades to authority supply.

1.3 Scope and limitations

This report: has been prepared by GHD for Glencore and may only be used and relied on by Glencore for the purpose agreed between GHD and the Glencore as set out in Section 1.2 of this report.

GHD otherwise disclaims responsibility to any person other than Glencore arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

Specifically, this Report does not take into account the effects, implications and consequences of or responses to COVID-19, which is a highly dynamic situation and rapidly changing. These effects, implications, consequences of and responses to COVID-19 may have a material effect on the opinions, conclusions, recommendations, assumptions, qualifications and limitations in this Report, and the entire Report must be re-examined and revisited in light of COVID-19. Where this Report is relied on or used without obtaining this further advice from GHD, to the maximum extent permitted by law, GHD disclaims all liability and responsibility to any person in connection with, arising from or in respect of this Report whether such liability arises in contract, tort (including negligence) or under statute.

GHD does not represent, warrant or guarantee that the project can or will be undertaken at a cost which is the same or less than the opinion of costs.

1.4 Assumptions

The services capacity assessment is based on the proposed conceptual design of the development as outlined in details supplied by Glencore, in particular a series of drawings by SHAC Architects that were included in the State Significant Development application (SSD-9349) as Appendix 23h.

These drawings show the proposed development at Broke is a mixed use facility comprising commercial, tourism and community-based facilities with adaptive re-use of the Ravensworth Homestead central to the site, an extracted perspective from these drawings is shown below in Figure 1.1.



Figure 1.1 *Architectural perspective*

Uses for the site and the general arrangement of buildings has been informed from these architectural drawings with further information provided by Glencore as applicable on potential location of key installations (commercial kitchen, micro-brewery, etc).

Occupation of the facility will vary depending on day and time with large variances between maximum and minimum occupancy. Information regarding this with potential visitor numbers has been provided by Glencore as input into this assessment.

Certain information and data in this report has been rightfully provided by third parties or outside sources, derived from examination of records and from interviews with individuals with information about the issues. No warranties or representations, whether expressed or implied, regarding the accuracy of such information, is accepted or implied, nor is accountability or responsibility in the event of inaccuracy accepted.

Flood studies or modelling have not been considered as part of this report. We note that the latest published study for Wollombi Brook (Wollombi Brook Flood Study, Final Report, R.N2390.001.04; BMT WBM; November 2016) indicates that the site may be immune for less than a 1% AEP event but is inundated for the 1% AEP event and above. Finished floor levels of the development will need to take into account the potential flood inundation depth at site with floor levels raised sufficiently above predicted flood levels or as required by the Singleton LEP; this may require localised filling in the order of 1.0 m towards Wollombi Brook.

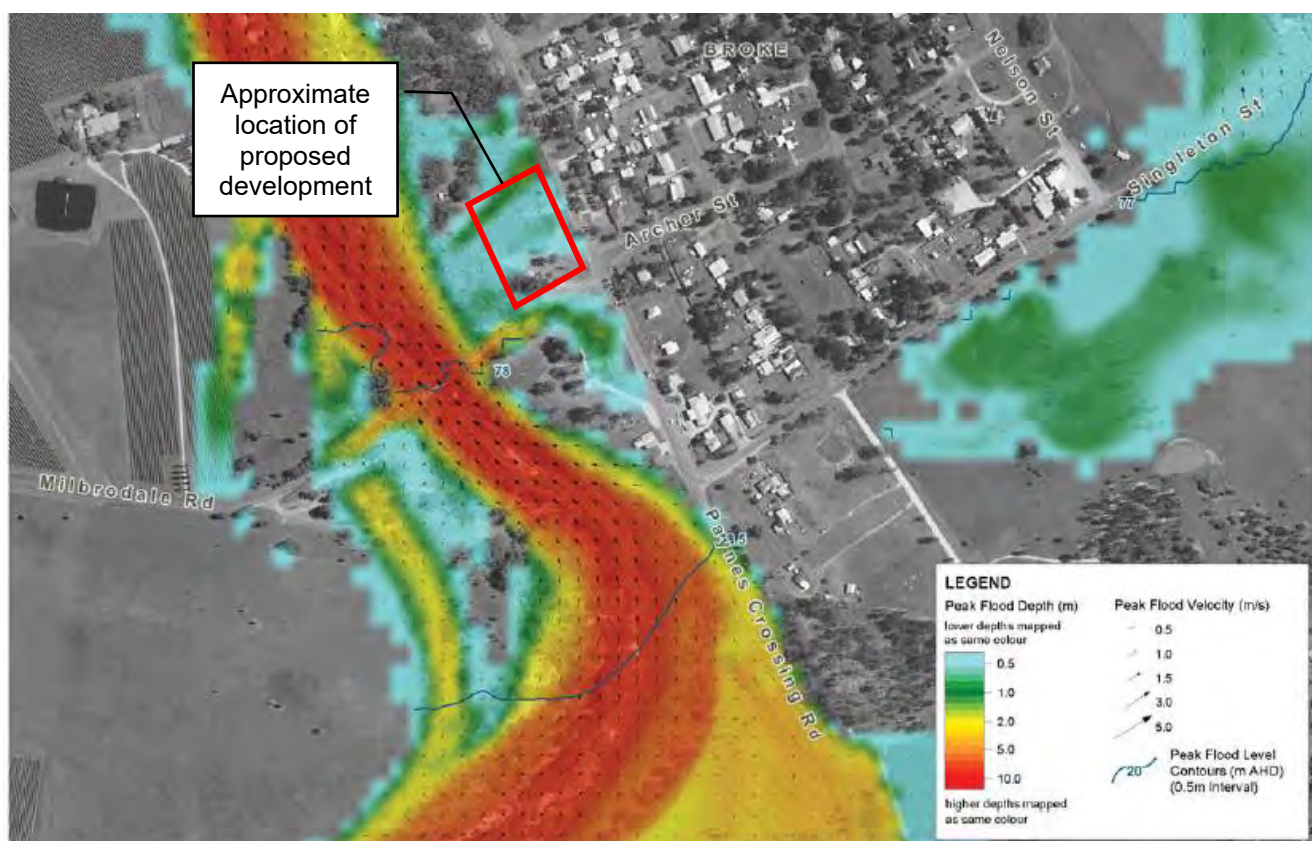


Figure 1.2 Extract from Wollombi Flood Study – Modelled Peak Conditions – 1% AEP (BMT WBM)

Formal communications and gas authority capacity applications or submissions have not been completed as part of this report. Information provided is based on informal or preliminary authority advice.

In the case of the electricity supply, the information in this report is based on a preliminary assessment made by GHD following a review of available information obtained by GHD about the existing Ausgrid electricity network, and Ausgrid's response to a preliminary enquiry.

Design capacities have not been checked nor have performance measurements been taken; where performance or capacities are noted in the report, these are estimates and indicative only.

2. Water

2.1 Network demand scenarios

The water demand for three different scenarios has been calculated; these are as follows:

- **Average day demand** – this is the average demand that can be expected on any given day, it does not include any allowance for coincident fire water demand.
- **Peak day demand** – this is the average flow expected on the maximum demand day of the year, where the most water is consumed, it does not include any allowance for coincident fire water demand.
- **95th percentile demand** – this is the demand at which 95% of all other demands are below. It is used to design the network such that the fire system can receive 20 L/s at 200 kPa (hydrant).

2.2 Demand methodology and assumptions

2.2.1 Data provided

The following data was provided by Glencore:

- Site architectural plans, detailing the water demand users (e.g. the café and micro-brewery), as well as estimate numbers of staff and visitors, refer to Figure 2.1.

The following data has been provided by Singleton Council:

- Statement of Available Pressure (SAP) for the site (tested at 16 Wollombi Street).

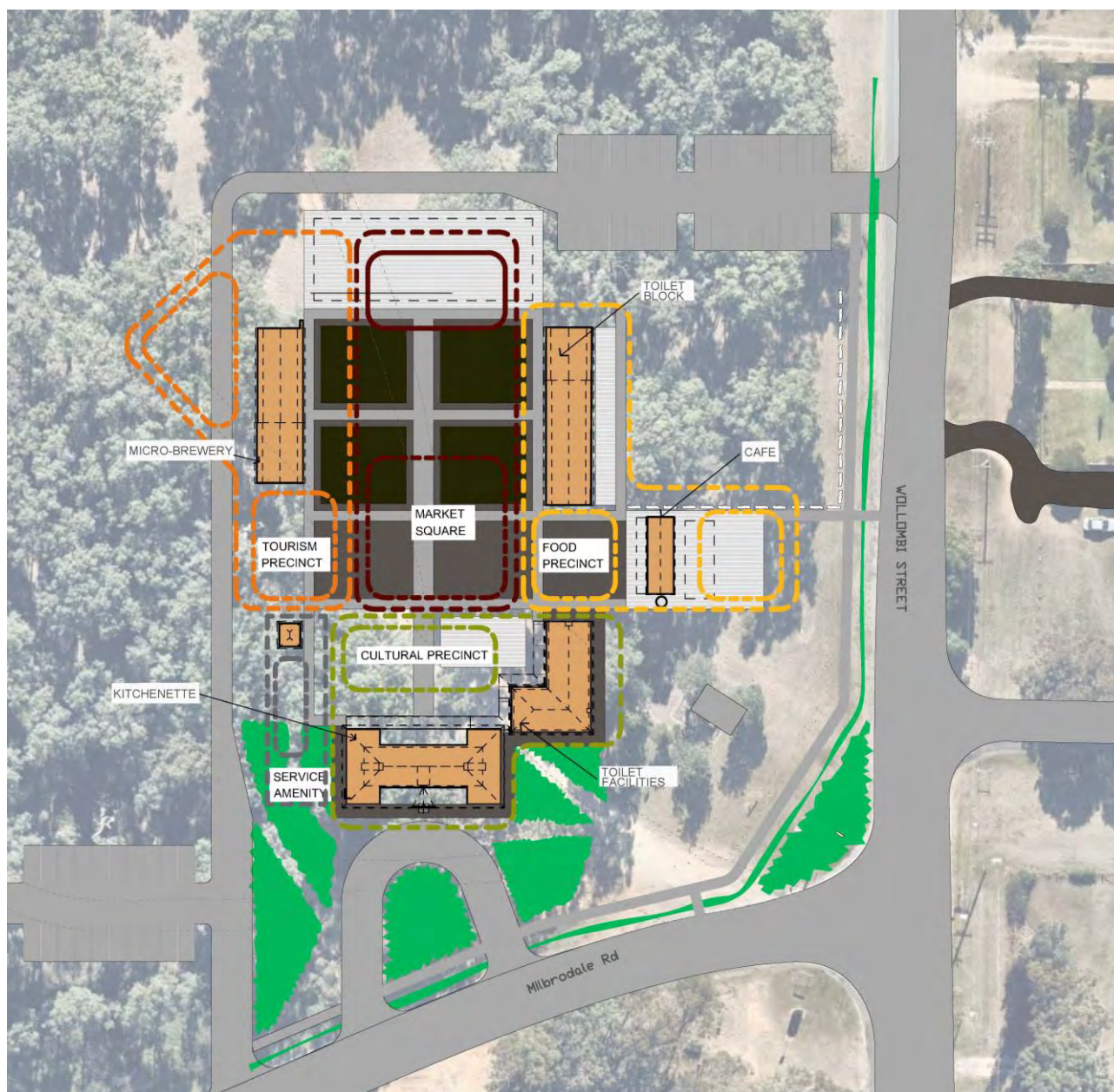


Figure 2.1 Water demand users

2.2.2 Peaking factors

Peaking factors used to calculate the 95th percentile and peak day demands have been taken from Hunter Water's version of WSA03, refer to Table 2.1.

Table 2.1 HW WSA03 water supply peaking factors

Scenario	Peaking factor (commercial)*
Peak day demand	1.20
95 th percentile peak day demand	1.14

* We have assumed that demands for the micro-brewery and water for irrigation does not have a peaking factor and will be constant.

2.2.3 Fire water requirements

For fire water to be supplied via a hydrant, 20 L/s at 200 kPa needs to be provided while still maintaining the 95th percentile peak day demand (AS 2419.1-2005). The received SAP from Council confirms that there is not sufficient pressure currently to support a hydrant (only 150 kPa at 20 L/s). Refer to Table 2.2 for a summary of the SAP results and Appendix E for the pressure statement.

Table 2.2 Summary results for the statement of available pressure (SAP) at the likely connection point

Flow (L/s)	Pressure (kPa)
0	660
5	540
10	400
15	280
20	150

As there is not sufficient available pressure a fire booster system is required, this system would comprise:

- 2x equal sized water tanks with total useable volume of 288 kL (144 kL each) (4 hours of 20 L/s):
 - At least 25 kL of dead storage per tank should be assumed (this number can be fine-tuned during detailed design). The dead storage accounts for volume below the outlet level of the tank, the exact number depends on the tank and the outlet configuration, e.g. conical outlet tank will have little to no dead storage as the outlet is on the bottom of the tank, most tanks however have the outlet on the side wall.
 - The tanks must be capable of refilling 50% of its useable volume in less than 24 hours (i.e. approximately 1.7 L/s refill rate). We believe the reticulation to have this capacity as this instantaneous demand is similar to that being drawn periodically by other customers in Broke.
 - One of the tanks must be full at all times.
 - The system ideally should be located on eastern side of site, near proposed carpark.
- A booster pump set (2x pumps, duty/ standby configuration). The most disadvantaged hydrant requires a minimum pressure of 700 kPa. AS2419.1-2005 states that the maximum pressure loss cannot exceed 150 kPa, therefore, to be conservative each pump should have a minimum duty of 10 L/s at 850 kPa.
- A fire water sprinkler (or hydrant/hose reel) reticulation network with network loss no greater than 150 kPa.

2.2.4 Demands

Refer to Table 2.3 for the average day, peak day, and 95th percentile peak day demand with fire water allowance for the proposed Broke Village Square development.

Table 2.3 Water demand for the proposed Broke Village Square

Scenario	Average day demand (L/metric unit)	Metric unit	Average day demand (L/s)	Peak day demand (L/s)	95 th percentile peak day demand (L/s)
Toilets	3,600*	2 buildings	0.083	0.100	0.950
Café	2.48*	120 m ²	0.003	0.004	0.004
Kitchenette	2.48*	15 m ²	0.0004	0.0005	0.0005
Micro-brewery	438**	1 building	0.005	5	0.005
Wine tasting/ barrel room	2.48*	250 m ²	0.007	0.009	0.008
Wine/ lawn irrigation***	20	4070 m ² /week	0.135	0.135	0.135

Scenario	Average day demand (L/metric unit)	Metric unit	Average day demand (L/s)	Peak day demand (L/s)	95 th percentile peak day demand (L/s)
Fire water (no separate fire water system)	0	-	0	0	20
Fire water tank re-fill rate (separate fire water system)	0	-	0	0	1.8
Total demand (no separate fire water system)	-	-	0.234	5.248	20.247
Total demand (separate fire water system)	-	-	0.234	5.248	1.947

* Demands taken from Sydney Water guidelines, as they are slightly more conservative than values given by Hunter Water guidelines. Water demands will be reviewed and refined as part of the next phase of work.

** Based on existing brewery waste stream of 80 kL/year with an assumed ratio of produced:waste of 1:1, i.e. 160 kL/yr water demand.

*** To reduce potable water demand, connection to the Broke irrigation line will be considered as part of further design development.

2.3 Existing water network

A Dial Before You Dig (DYBD) was conducted for Broke Village, refer to Figure 2.2. The DYBD states that the existing water network for the village has diameter greater than 375 mm, which would be very large for such a small community and appears to be incorrect. As part of our request for the SAP from Singleton Council we have requested confirmation of the main size. The SAP confirmed that the existing reticulation is DN150 uPVC.

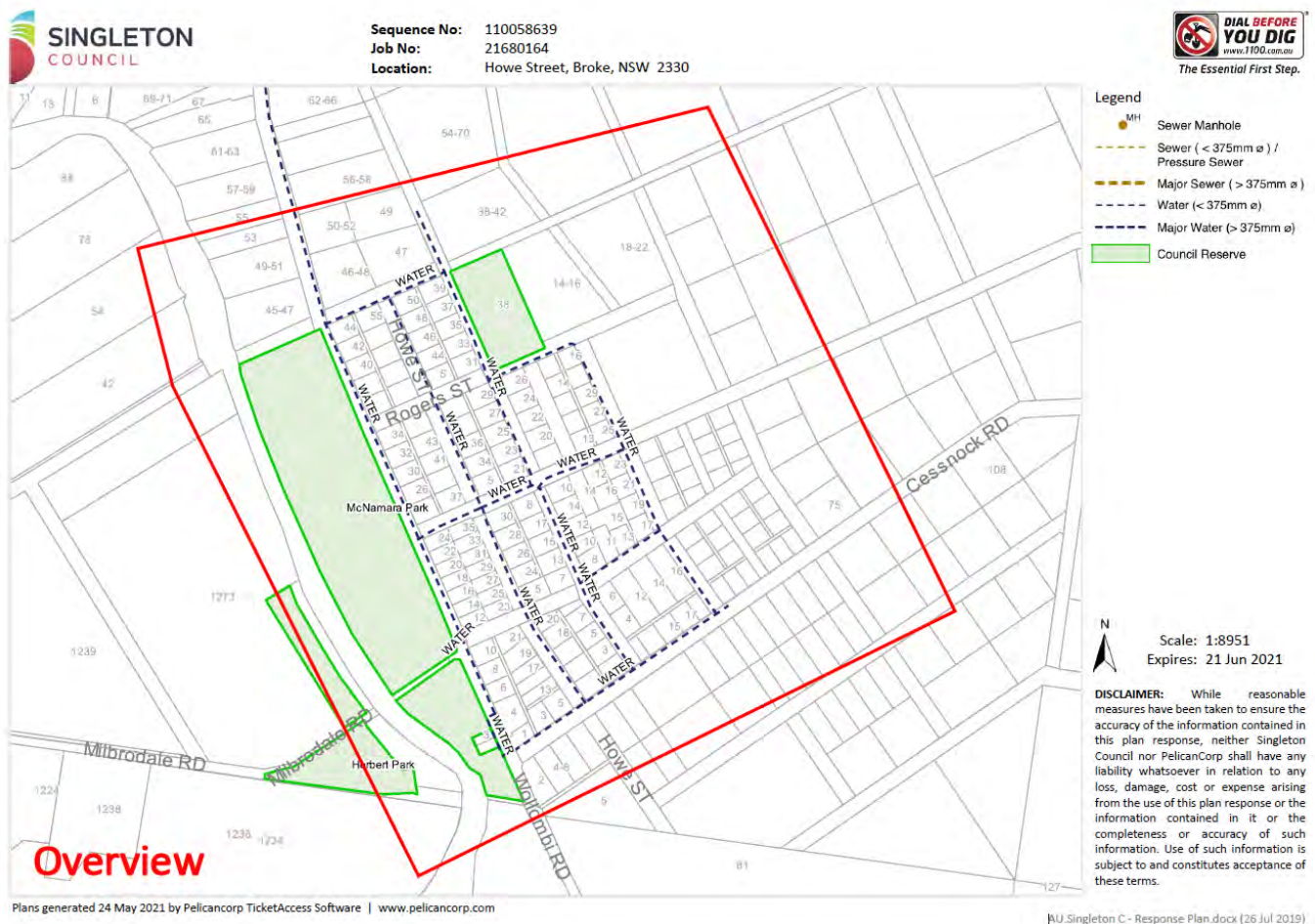


Figure 2.2 Dial Before You Dig (DYBD) - Water services

2.4 Connection to existing network

To be confirmed in detail design, but connection would likely be to existing main on eastern side of Wollombi Street, with a road crossing, north of the car park. Based on the SAP results, onsite fire storage will be required; refer to Figure 2.3 for the proposed location of the tanks and connection point. Further design development should consider connection to the Broke irrigation district line for irrigation requirements.

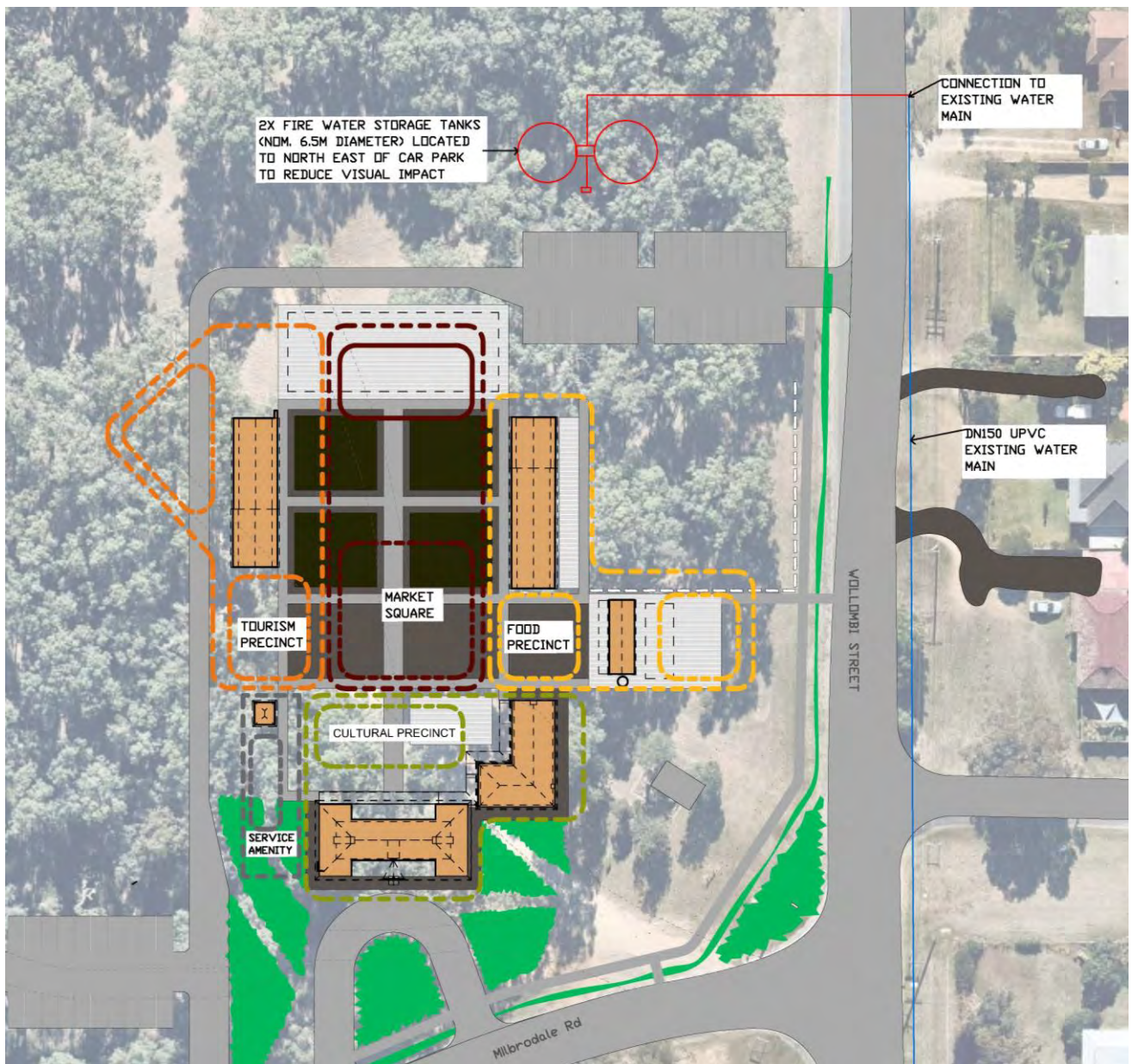


Figure 2.3 Fire water tank and water connection location

3. Sewer

The village of Broke is not provided with sewerage service and an on-site sewage management system is required. This section includes estimates of the quantity of wastewater to be managed and discusses some on-site sewage treatment and disposal options.

3.1 Estimated sewage loadings

Most of the sewage produced at the proposed Broke Village Square development site will be mostly of domestic nature. The quantity of domestic sewage is estimated from the activity types and number of people in each area. There will also be a micro-brewery, which will produce wastewater considerably stronger than domestic wastewater but still require suitable treatment in domestic-type wastewater treatment processes, although some pre-treatment may be required.

Glencore have provided estimates of the numbers of employees and visitors to the site under 'Minimum', 'Average' and 'Maximum' conditions that refer to:

- Minimum: No visitors and minimum staffing only
- Average: Typical weekday with average staffing levels and average predicted guest numbers
- Maximum: A small to medium sized event, such as a wedding (max. 2 consecutive days)

Glencore advised that for large events (e.g. Smoke in Broke) portable toilets will be used to provide additional capacity. The maximum load scenario is the largest load that the permanent on-site sewer management system is intended to receive and treat.

The site population estimates are shown in Table 3.1. The estimates include both the number of concurrent visitors and the total number of visitors over the course of the day.

Table 3.1 *Estimated population at Proposed Broke Village Square*

Area	Conditions	Estimated Concurrent Employees	Estimated Concurrent Visitors	Total Concurrent Employees & Visitors	Total Daily Employees & Visitors
Outdoor seating area	Minimum	2	0	2	2
	Average	2	12	14	74
	Maximum	6	46	52	282
Offices, Function Space & Gallery Space	Minimum	2	0	2	2
	Average	2	6	8	38
	Maximum	6	60	66	366
Café/Restaurants	Minimum	2	0	2	2
	Average	4	12	16	76
	Maximum	6	52	58	318
Retail Space & Tourist Space	Minimum	1	0	1	1
	Average	1	6	7	37
	Maximum	2	20	22	122
General Use & Public Spaces	Minimum	0	0	0	0
	Average	0	2	2	12
	Maximum	0	20	20	120

The quantity of sewage that will be generated for the "Average" and "Maximum" scenarios has been estimated utilising wastewater generation rates given in AS/NZS 1547 and are shown in Table 3.2 and Table 3.3.

The “Minimum” scenario is not used directly in designing the sewage management system but the large difference between the minimum and maximum scenarios is noted. The wastewater treatment system should be selected so that it is capable of adequately treating the wastewater produced during an event held during an otherwise low-season.

Table 3.2 *Sanitary wastewater generation – average day scenario*

	Persons	Sewage generation rate (L/person/d)	Sewage generation (L/d)
Outdoor seating area - employees	2	30	60
Outdoor seating area - visitors	72	20	1,440
Offices, Function Space & Gallery Space – employees	2	30	60
Offices, Function Space & Gallery Space – office and gallery visitors	36	15	540
Offices, Function Space & Gallery Space – function visitors	0	30	0
Café/Restaurants - employees	4	30	120
Café/Restaurants - visitors	72	30	2,160
Retail Space & Tourist Space - employees	1	30	30
Retail Space & Tourist Space - visitors	36	50	1,800
General Use & Public Spaces - employees	0	30	0
General Use & Public Spaces - visitors	12	15	180
Total			6,390

Table 3.3 *Sanitary wastewater generation – maximum day*

	Persons	Sewage generation rate (L/person/d)	Sewage generation (L/d)
Outdoor seating area - employees	4	30	120
Outdoor seating area - visitors	276	20	5,520
Offices, Function Space & Gallery Space – employees	6	30	180
Offices, Function Space & Gallery Space – office and gallery visitors	60	15	900
Offices, Function Space & Gallery Space – function visitors	50	30	1500
Café/Restaurants - employees	6	30	180
Café/Restaurants - visitors	312	30	9,360
Retail Space & Tourist Space - employees	2	30	60
Retail Space & Tourist Space - visitors	120	50	6,000
General Use & Public Spaces - employees	0	30	0
General Use & Public Spaces - visitors	120	15	1800
Total			25,620

The average day scenario is the load expected on typical days when no special events are occurring. GHD assumes that this scenario applies to weekdays during the peak season and higher loads will be experienced during peak season weekend. The estimated average day sanitary wastewater flow is 6.4 kL/d and is consistent with other similar developments we have assessed.

The maximum day scenario is the load expected during special events and functions. Glencore advised that for festivals and similar large events that the on-site sewage management system will be supplemented by portable toilets, the waste from which will be disposed of off-site. The estimated maximum day sanitary wastewater load to the on-site sewage management system is 26 kL/d.

In addition to the sanitary wastewater loads shown above there is the micro-brewery wastewater to be considered. From information provided by Glencore, we understand that the micro-brewery will produce approximately 80 kL/a of beer and that the process produces approximately 1 L of wastewater per litre of beer produced. Most wastewater is generated from cleaning activities.

We assume that half the wastewater will be produced during summer and that wastewater flow is very intermittent, with most of the wastewater produced on single days when fermenters are filled or emptied. We assume that these large wastewater generation events may occur during periods of high occupancy at the site, such as for a brewing demonstration during a festival. For this initial assessment, we have allowed for 3,300 L/wk of brewery wastewater averaged over the peak season and 3,300 L/d maximum daily brewery wastewater flow (worst case assumed between volumes required for cleaning all the packages and packaging equipment before packaging, cleaning brewing equipment and fermenter before brewing, cleaning everything other than the fermenter after filling the fermenter).

The micro-brewery wastewater is expected to contain relatively high amounts of soluble biodegradable matter, which is poorly removed by septic tanks, worm farms or similar primary treatment processes and secondary treatment using an aerobic biological process is required. Separate treatment and disposal of the micro-brewery wastewater was considered but the expected highly intermittent and relatively high strength wastewater flows would be best treated in a pond system, which is not appropriate for this site. For this initial assessment it is assumed that the site wastewater is treated in a single system. GHD expects that the combined sanitary and micro-brewery wastewater flows can be adequately treated in a single secondary wastewater treatment system, particularly one using attached growth (e.g. MBBR) or flat-plate membrane bioreactor (MBR) technology.

Further design development may show that separate treatment of the micro-brewery wastewater is feasible. If the micro-brewery wastewater is treated in a dedicated system, the remainder of the site wastewater may be treated as domestic sewage and primary treatment such as by septic tank or worm farm may be suitable for some effluent disposal options. Such treatment systems produce a poorer quality of treated effluent and may require greater setback distances for on-site disposal.

We assume that stormwater from the site will be collected and disposed of separately from wastewater and no allowance is made in the sewage management system for stormwater.

The maximum daily wastewater flow is used to size the treatment system and is the sum of the maximum day scenario sanitary wastewater and the maximum daily micro-brewery wastewater flows, 29 kL/d.

The average weekly wastewater flow during peak season is estimated as the sum of 7 days of the average day scenario sanitary wastewater and the average peak season average micro-brewery wastewater flows, 48 kL/wk or 6.9 kL/d.

The maximum weekly wastewater flow is relevant to sizing some effluent disposal options where storage can be used to reduce the size of effluent disposal areas. The maximum weekly wastewater flow is estimated as the sum of 2 maximum day scenario sanitary wastewater, 5 average day scenario sanitary wastewater and the peak season average micro-brewery wastewater flows, 87 kL/wk or 12 kL/d.

3.2 Wastewater treatment options

3.2.1 Introduction

The village of Broke does not have sewerage services, so the wastewater produced at this development must be managed by an on-site sewage management system. An on-site sewage management system includes a treatment component and a disposal component. Generally, the treatment approach is selected to provide the appropriate degree of treatment required for the selected disposal approach.

Several potential management strategies were discussed with Glencore during an inception meeting (20 May 2021), which loosely fall into the following categories:

- Off-site disposal by tanker
- On-site disposal by infiltration beds or trenches
- On-site disposal by irrigation or evapotranspiration beds
- Treatment and discharge of treated effluent to nearby Wollombi Brook

Based upon these discussions, the four following options have been shortlisted for investigation to provide Glencore with a range of options for managing on-site wastewater. The options gradually increase in operational complexity and likely associated cost while providing additional discharge pathways.

- Option 1 – Minimal treatment plus storage with off-site transport via tanker
- Option 2 – Treatment with on-site discharge through infiltration beds
- Option 3 – Treatment with on-site discharge through subsurface irrigation
- Option 4 – Sophisticated treatment with discharge to Wollombi Brook

The following sections qualitatively compare the impacts, advantages and disadvantages of each option and provide commentary on each treatment option.

3.2.2 Options discussion

Quality requirements for wastewater treatment vary greatly depending upon the intended end-use or disposal pathway. Effluent quality requirements generally increase as the risk of environmental damage and risk of human exposure become more prominent. While improved effluent quality comes at the cost of increased cost and operational complexity, advantages are regained by allowing the system greater flexibility with regard to discharge options (particularly during unforeseen events).

The proposed Broke Village Square site is at the southern end of McNamara Park, which is used for camping and other public uses. Land used for effluent disposal and associated public health buffer zones will become unavailable for camping and recreation, which is undesirable. Higher degrees of treatment, especially disinfection, and subsurface effluent application reduce public health risks and may allow smaller buffer zones to be used.

The discussion in this section assumes that all the site wastewater, including the micro-brewery wastewater, is managed through a single system. If later design development finds that separate treatment of the micro-brewery wastewater is feasible the remainder of the wastewater may be treated by septic tank, worm farm or similar approaches, for some options.

3.2.2.1 Option 1 - minimal treatment plus storage with off-site transport via tanker

The intent of Option 1 is to provide a minimal degree of treatment to allow effluent to be stored so it can be transported offsite for further treatment and disposal at a municipal wastewater treatment plant such as Hunter Water's Kurri Kurri WWTW (Singleton Council advised they are looking at a septage receival facility at their plant but that it does not currently accept tankered wastewater). Rigid tankers can carry approximately 10 kL of effluent in each trip.

The wastewater should be provided with enough treatment that it does not produce excessive odour during storage. For domestic-type wastewater septic tank, worm farm or other primary treatment would likely be adequate but here secondary (aerobic biological) treatment is necessary to adequately treat the micro-brewery wastewater. Disinfection is not required. The treatment process should be sized to suit the maximum daily wastewater flow of 29 kL/d. The area required for the treatment plant is approximately 150 to 300 m². Suitable package plants are commercially available from reputable suppliers. Depending on the selected package plant, most of the wastewater treatment system may be buried or containerised.

Sufficient effluent storage should be provided such that there is no overflow of effluent from the tank even if effluent collection is delayed. For this initial assessment, the effluent storage volume required is estimated to be the maximum week wastewater flow of 87 kL. Two 45 kL plastic or fibreglass rainwater tanks would likely be suitable and about 150 m² of land would be needed for the tanks and tanker access.

For the estimated peak season average weekly wastewater flow of 48 kL/wk there would be 4 to 5 tanker loads of effluent to be removed each week. Several additional tankers would be required to remove the additional effluent produced during special events. The amount of tanker movements can be feasibly accommodated but this method of effluent disposal is very likely to have much higher operating costs than other options due to the cost of transporting the effluent.

The approximate size of the Option 1 sewage treatment system is shown in Figure 3.1. The area shown corresponds to the greatest expected footprint of the system.

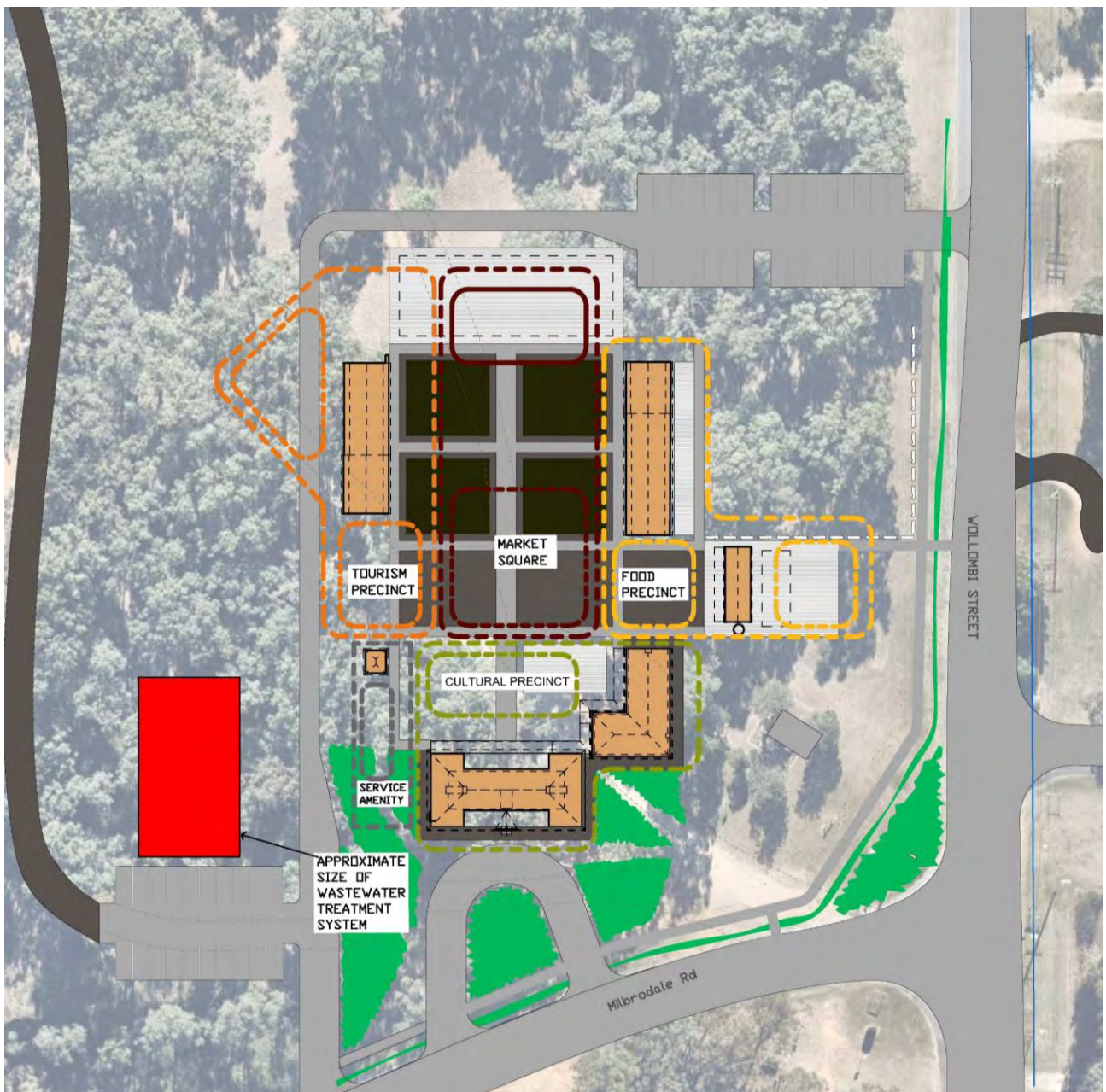


Figure 3.1 Sewage management - Option 1

3.2.2.2 Option 2 - treatment with on-site discharge through infiltration beds

The intent of Option 2 is to treat the wastewater and discharge the treated effluent into the soil using infiltration beds or a similar approach.

For domestic wastewater typically primary treatment such as by septic tank or worm farm would typically be adequate but here, secondary (aerobic biological) treatment is necessary to adequately treat the micro-brewery wastewater. Disinfection is not required. The treatment process requirements are similar to Option 1 with a maximum daily wastewater flow, 29 kL/d and required area of 150 to 300 m².

The size of the infiltration beds is principally determined by the permeability of the soil in which infiltration beds are placed. Glencore have provided a 2007 geotechnical report prepared by Hunter Geotechnics for Singleton Council for the replacement of the Milbrodale Road bridge over Wollombi Brook, adjacent to McNamara Park and near the proposed Ravensworth Homestead site. Borehole data for the eastern side of Wollombi Brook showed the upper 2 m included a layer of clayey silt fill over a thin layer of alluvial silt and then more than 1 m thickness of weathered basalt that transitioned to moderately weathered granite at approximately 1.8 m depth. Alluvial silty sand and sandy silt is common at the surface in the area generally.

Proper selection and design of infiltration bed systems requires site-specific soil profile data. Unfractured or poorly fractured rock close to the surface may force the use of sand mounds rather than conventional infiltration beds but adequately fractured rock can have good hydraulic permeability. For this initial assessment two scenarios are considered:

- Scenario 1 assuming sand or sandy loam soil
- Scenario 2 assuming that the presence of rock materially reduces the overall permeability of the soil profile

Infiltration beds would typically be sized to accept the maximum daily wastewater flow of 29 kL/d. There may be some potential to reduce the infiltration bed design flow to the maximum week flow of 12 kL/d, but effluent storage and more sophisticated pump control would be required. As an initial assessment the maximum daily wastewater flow is adopted for sizing the infiltration beds. An allowance of an additional 40% of the infiltration bed floor area is made for the spacing required between adjacent beds.

For sand or silty sand soils the infiltration bed design loading rate according to AS/NZS 1547:2012 Table L1 is 50 mm/d. The resulting infiltration bed floor area is 580 m² and the gross area of the infiltration beds is 810 m².

For fractured rock sand mounds may be more suitable than infiltration beds. The adopted sand mound design loading rate according to AS/NZS 1547:2012 Table N1 is 24 mm/d. The resulting infiltration bed floor area is 1200 m² and the gross area of the infiltration beds is 1,700 m².

The use of effluent storage to reduce the infiltration area design flow to the estimated maximum week flow reduces the gross infiltration bed area to 350 or 720 m². An additional 100 m² would be required for the effluent storage tanks (~70 kL), so the net reduction in the area of the sewage management system would be modest for silty sand type soil but substantial for fractured rock type soil.

The approximate sizes of the Option 2 sewage treatment system and effluent disposal area are shown in Figure 3.2. The area shown corresponds to the greatest expected footprint if effluent storage is provided (400 m² for treatment and storage, 720 m² for effluent disposal). If effluent storage is not required the effluent disposal area would be larger, thereby occupying the remaining adjacent area bounded by tracks, paths and carpark.

The infiltration beds area needs to be a minimum of 40 m from Wollombi Brook. For this reason, the nominated location is set to the east of the existing track to the camping area, which itself is located over 60 m from the Brook as indicated on Figure 3.3.

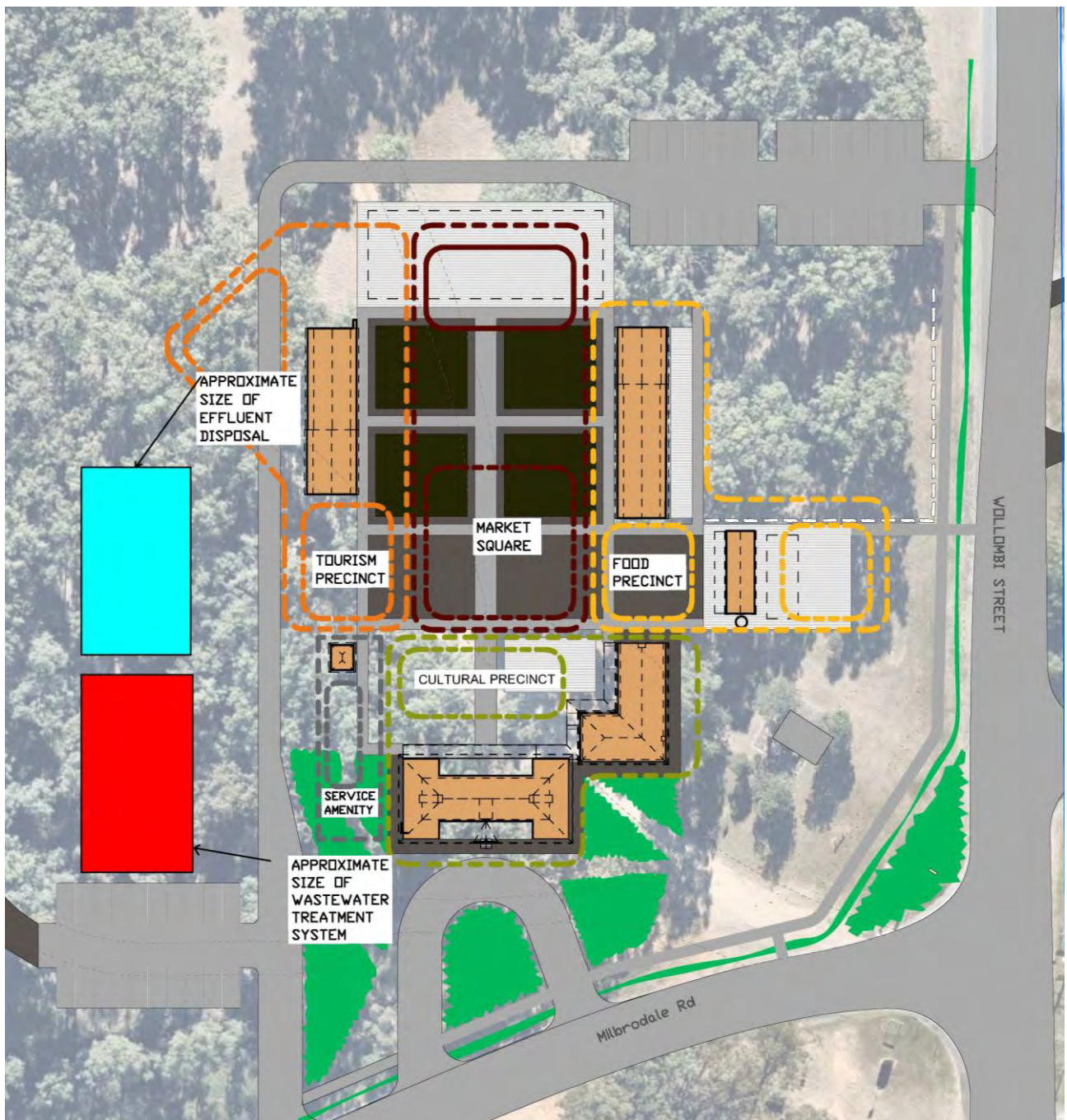


Figure 3.2 Sewage management - Option 2



Figure 3.3 Locations

3.2.2.3 Option 3 - treatment with on-site discharge through subsurface irrigation

The intent of Option 3 is to treat the wastewater and dispose of the treated effluent by irrigation. For this initial assessment it is assumed that subsurface drip irrigation is used.

Secondary treatment is required for subsurface drip irrigation. It is assumed that disinfection is required to reduce the risk to members of the public that gain unauthorised access to the irrigation area. The treatment process should be sized to suit the maximum daily wastewater flow of 29 kL/d. The area required for the treatment plant is approximately 150 to 300 m², UV disinfection systems have very a small footprint. Suitable package plants are commercially available from reputable suppliers. Depending on the selected package plant, most of the wastewater treatment system may be buried or containerised.

The sizing of the irrigation area is heavily influenced by the type and permeability of the topsoil. Aerial photography of McNamara Park shows many trees, so it is likely that even if the weathered rock discussed for Option 2 extends into McNamara Park there is a topsoil layer of alluvial sand and silt. For this initial assessment it is assumed that the topsoil is similar to sandy loam and, following AS/NZS 1547:2012 Table M1, the adopted design irrigation rate is 5 mm/d.

Some effluent storage is desirable so that irrigation can be reduced or halted during wet weather. Additional storage volume can also be used to equalise high flows from special events. For this initial assessment, it is assumed that the irrigation area is sized for the maximum week wastewater flow and that effluent storage is provided for 7 days of the maximum week wastewater flow for wet weather and two days of the excess effluent produced at the maximum day wastewater flow for flow balancing. An allowance of an additional 20% of the irrigation area is made for unused area, such as buffers and access paths.

The gross area of the irrigation area is 3,000 m². The entire irrigation area should be planted with water-hungry plant to promote evapotranspiration. Turf is often used but other plants would likely be more suitable here to discourage public access. Garden beds, grapevines and other non-trafficable landscaping would be suitable for irrigation but the gross area required would increase due to the area occupied by paths and other non-irrigable landscaping.

The estimated volume of the effluent storage tank is 120 kL, which would occupy approximately 120 m².

The approximate sizes of the Option 3 sewage treatment system and effluent disposal area are shown in Figure 3.4. The effluent disposal area shown is for irrigation area without public access. A greater area would be required for irrigation of garden beds, grapevines or other non-trafficable landscaping due to the area occupied by paths and non-irrigable landscaping. The irrigation area is located east of the track to the camping ground to provide more than the minimum 40 m offset to Wollombi Brook similar to Option 2, and indicated on Figure 3.3.

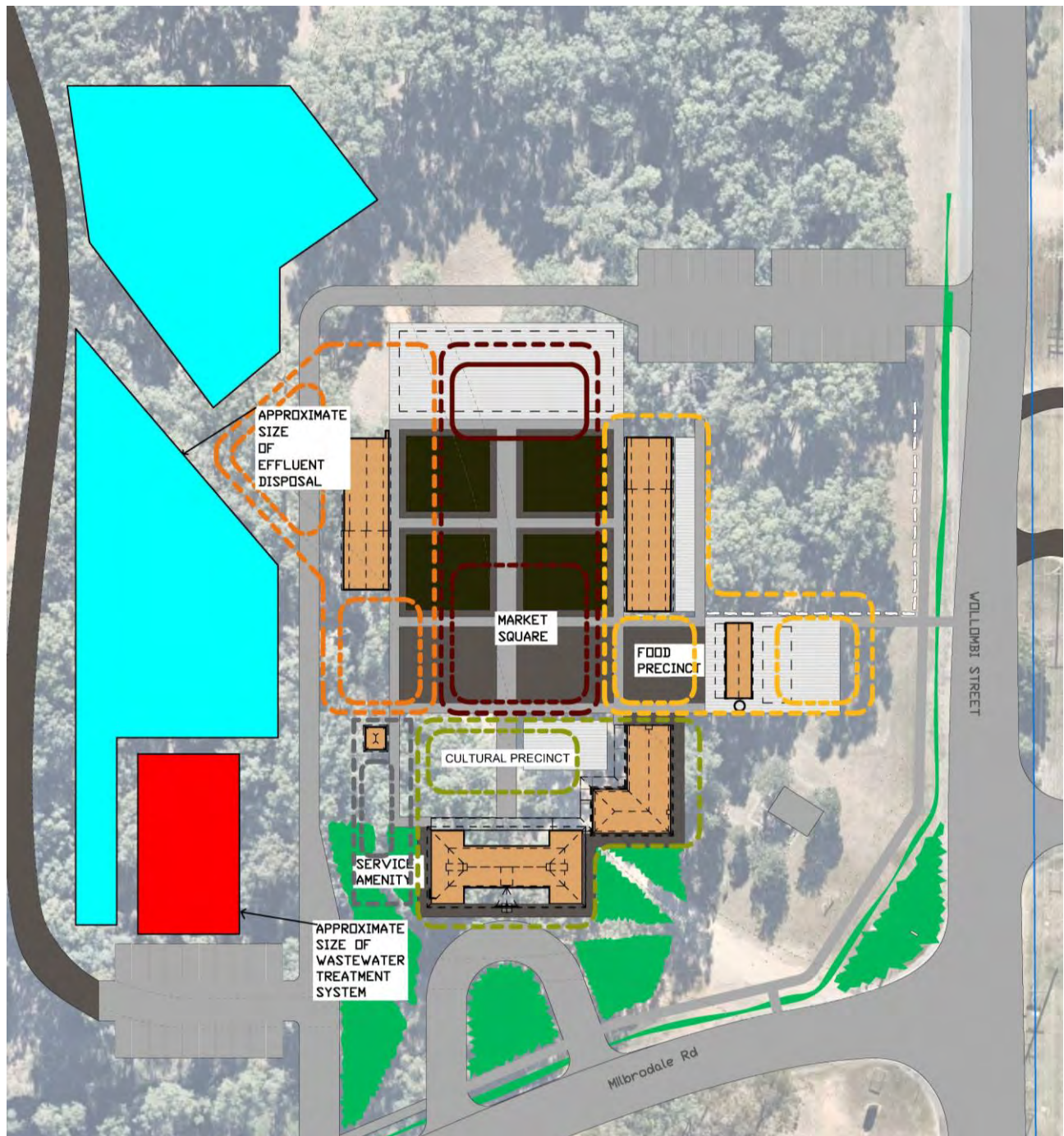


Figure 3.4 Sewage management - Option 3

3.2.2.4 Option 4 - sophisticated treatment with discharge to Wollombi Brook

The intent of Option 4 is to treat the wastewater such that it can be discharged to Wollombi Brook. GHD expects that the effluent quality required for discharge to Wollombi Brook is secondary treatment with biological nitrogen removal, moderate phosphorus removal and disinfection. Site-specific investigation is required to support the selection of detailed effluent quality requirements.

The treatment process should be sized to suit the maximum daily wastewater flow of 29 kL/d. The area required for the treatment plant is approximately 300 to 500 m². Suitable package plants are commercially available from reputable suppliers but there are fewer good providers of these more sophisticated treatment systems than of the more common and simpler secondary treatment systems.

Works would be required in Wollombi Brook and the adjacent riparian zone to build the effluent discharge pipe and an outlet structure. The alignment of the approach to the old Milbrodale Road bridge is adjacent to the southern edge of McNamara Park and may provide access to Wollombi Brook with the least disturbance to the riparian zone.

The treated effluent would also be suitable for landscape irrigation using subsurface drip irrigation.

An Environmental Protection Licence (EPL) is not required because the sewage treatment system is smaller than the scheduled activity threshold under the POEO Act. The regulatory agency would instead be Singleton Council.

The approximate size of the Option 4 sewage treatment system is shown in Figure 3.5.

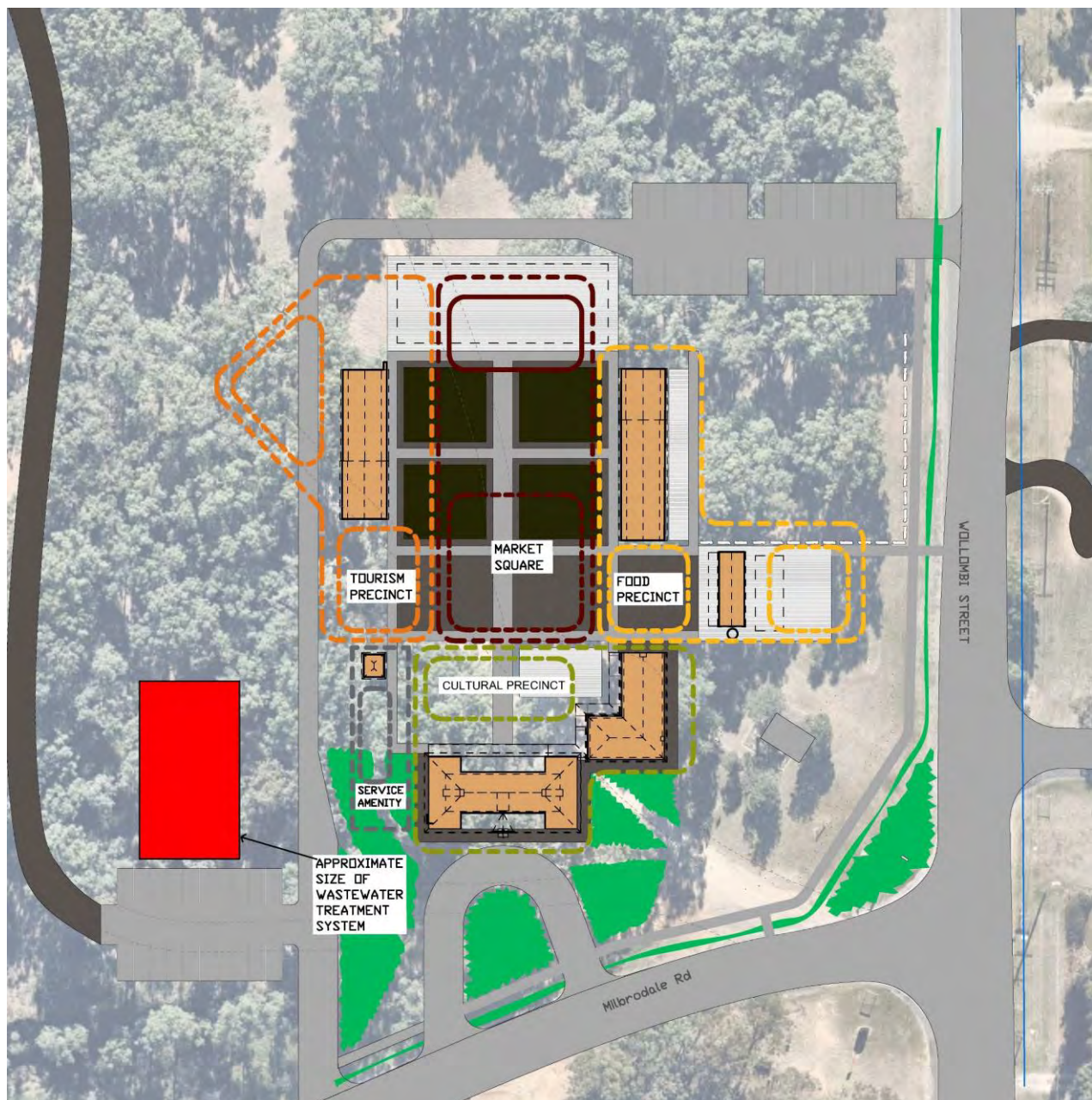


Figure 3.5 Sewage management - Option 4

3.2.3 Options summary

Key features of the several sewage management options are summarised in Table 3.4.

Table 3.4 Sewage management options summary

	Option 1	Option 2	Option 3	Option 4
Treatment type	Secondary with storage	Secondary with storage	Secondary with disinfection and storage	Secondary with nitrogen removal, phosphorus removal and disinfection
Effluent disposal type	Tanker to off-site disposal	Infiltration beds or sand mounds	On-site irrigation	Discharge to Wollombi Brook
Gross area, treatment system	300 to 450 m ²	250 to 400 m ²	270 to 420 m ²	300 to 500 m ²
Gross area, on-site effluent disposal	N/A	350 to 720 m ² (up to 1700 m ² without storage)	3,000 m ² (no public access)	N/A
Gross area, total	300 to 450 m ²	600 to 1,100 m ² (up to 2,000 m ² without storage)	3,300 to 3,400 m ²	300 to 500 m ²
Capital cost	Low	Medium	Medium	High
Operating and maintenance cost	High	Low	Low	Medium

Note that the requirement for secondary treatment for Option 1 and Option 2 is to adequately treat the expected micro-brewery wastewater load. In the absence of the micro-brewery wastewater septic tank, worm farm or other primary treatment would be adequate.

The area required for Option 2 ranges from approximately 600 m² to 1,100 m² depending on existing soils. Geotechnical information for the nearby Milbrodale Road bridge indicates that the upper 2 m of soil may include either mostly sand and silt (higher loading rate, infiltration beds) or mostly weathered rock (lower loading rate, sand mounds). Further site investigations to develop soil profile data are required to inform the selection of infiltration beds or sand mounds and the appropriate design loading rate and therefore the area required for the sewage management system.

3.2.4 Conclusion and recommendation

GHD recommends that Option 2 (infiltration beds or sand mounds) be pursued as the preferred sewage management option because of its balance of costs, land requirement and absence of discharge to Wollombi Brook. Site investigations to understand the insitu soils and develop a soil profile as described in AS/NZS 1547:2012 should be carried out to inform selection of infiltration beds or sand mounds and to refine the selection of design loading rate and calculations of the land requirement.

Options 3 and 4 are both also feasible but involve either greater land use for irrigation (Option 3) or discharge to Wollombi Brook (Option 4). Consultation with Singleton Council is suggested. For example, Option 3 may be more desirable if the irrigation is incorporated into publicly accessible gardens but the gross area required for the irrigation area would increase due to the non-irrigable features required, such as hard landscaping and paving. For Option 4 further investigations and discussion with Singleton Council would be required to define the effluent quality requirements, which are critically important to the selection and design of an appropriate treatment system involving discharge to a waterway.

Option 1 (off-site disposal) of the wastewater is not recommended due to the expected high cost of road tanker transport, particularly during the peak season.

The treatment component of each option can be provided by a package wastewater treatment plant, which are available in various configurations from several reputable suppliers. Most package plants providers are also capable of designing the associated effluent disposal system. Further design development may allow separate treatment of the micro-brewery wastewater permitting the remainder of the wastewater to be treated by septic tank, worm farm or similar approaches.

4. Electrical

This section of the report covers electrical power demand for the development and how this can be supplied, including discussion about possible upgrades to the local electricity network to supply sufficient power for the development.

The maximum power demand has been estimated based on the sizes of the buildings and other features at the development, combined with specific power allocations for special uses such as the proposed micro-brewery and market stalls.

The design of any amendment or augmentation of the Ausgrid electrical network will need to be completed by a *Level 3 Accredited Service Provider (ASP3)* designer as part of the Ausgrid *Contestable Works* process, including a *Preliminary Enquiry* to confirm the assumption in this section of the report. A Preliminary Enquiry was lodged with Ausgrid and Ausgrid's response is attached in Appendix F.

A summary flowchart describing Ausgrid's Contestable Works process is included in Appendix D. This provides a handy outline of the key steps in the process during design and construction and estimated times for each step.

4.1 Site electrical power demand

Some of the estimated power demand can be estimated based on the Maximum Demand estimate tables provided in AS/NZS 3000 (Electrical wiring rules) Appendix C. Table C3 of the standard provides estimated demand values for different building and area types, as summarised in Table 4.1.

Table 4.1 Maximum demand for building and outdoor areas

Space	Type	Area (m ²)	Non-cooling (VA/m)	Cooling (VA/m)	Misc - Lights (kVA)	Misc - PA (kVA)	Total Load (kVA)	Total Load (Amps 3P)
Buildings								
Homestead main house	Taverns, licenced clubs	225	0	80		0.2	18	26.38
Kitchen wing	Retail shop	111	70	30			11	16.09
Men's quarters	Retail shop	84	70	30			8	12.17
Barn	Taverns, licenced clubs	145	0	40			6	8.41
Stables (excludes micro-brewery)	Taverns, licenced clubs	125	0	80			10	14.49
Outdoor Areas								
Public Stage	-	400			3	0.5	4	5.07
Market Square - lights (excludes market stalls)	-	1450			2		2	2.90
North-carpark	Carpark (Open air)	640	2.5				2	2.32
South-carpark	Carpark (Open air)	430	2.5				1	1.56
TOTAL	-						62 kVA	90 Amps

While some components of demand are not covered in the AS/NZS 3000 Appendix C estimates, these special loads can be estimated in other ways, as discussed below.

Market stalls

We note that the current monthly markets held in Broke do not have power supply. However, an allowance for the powering of some stalls has been made as part of this servicing study. The demand allocation for the market stalls can be estimated as follows:

- Based on the assumption that each stall will be allocated a sub-metered 15 Amp single phase power outlet from distribution panels installed in the market square.
 - This way, each stall operator can be charged for the energy they use each market day.
 - Limiting each stall's energy to less than 15 Amps still provides them with the opportunity to consume up to 3.6 kVA of power each.
 - On average it is assumed that stall operators would only consume half of this amount (50% diversity).
- Assuming that there are 36 stall spaces in the market square, the total demand allowance for market stalls equates to another 62 kVA (90 Amps over 3 phases).

Micro-brewery

A specific process such as the proposed micro-brewery has a level of demand nominated by the process designers:

- In the case of the micro-brewery, GHD has been advised that the process requires a 3 phase 100 Amp supply.
- The specific power demand patterns for the micro-brewery in operation is not available so at this stage, it has been assumed that the micro-brewery demand could reach the supply capacity for significant periods of operation.

Wastewater treatment plant

A demand allowance of 20 kVA (3 phase 30 Amp) has been allocated to cater for the recommended package wastewater treatment plants discussed in Section 3.

Other special loads

Other special loads may need to be included when allocating the total demand for the development, as part of the detailed design. Other special loads could include electric vehicle charging:

- Single phase 7 kVA chargers require 32 Amp (1 phase) sub-mains
- Three phase 22 kVA chargers require 32 Amp (3 phase) sub-mains

Festivals/Concerts

- It is assumed that any additional power demand for festivals or concerts above what is provided in the assumptions in this report would be able to be catered for using rented portable generators.

4.2 Ausgrid network infrastructure

Ausgrid owns and operates the electricity network that supplies Broke and the surrounding district. It feeds power to the town via a single 11 kV feeder, then distributes power to individual consumers at low voltage of 400 V (3 phase) or 230 V (single phase), via a series of local pole-top distribution substations and overhead powerlines.

4.2.1 Existing high voltage network

A single 11 kV feeder called 'Feeder 515:35192' supplies Broke and the surrounding district via a network of overhead (aerial) conductors. This feeder supplies electricity from the Ausgrid Mount Thorley Zone Substation, located 20 km north of Broke. The backbone of this feeder runs along Wollombi Street as it passes through Broke, with one of several radial branch lines splitting off the main powerline at Milbrodale Road, to supply properties on the western side of Wollombi Brook.

The main 3 phase 11 kV powerline running along Wollombi Street is strung using 6/4.75 ACSR/GZ¹ (“Cherry”) conductor, which has a nominal maximum current carrying capacity of 364 Amps² per phase. The branch line running along Milbrodale Road is strung using a smaller 3/2.50 ACSR/GZ (“Raisin”) conductor, nominally rated to carry up to 131 Amps per phase. The actual rating for these Ausgrid feeder sections is much less than the current carrying capacity values, based on the network size and length of the feeder plus the condition of the overhead conductor. The feeder has a total length of over 88 km, radiating out in various directions between Mount Thorley and Broke then heading another 10 km further south to supply consumers in the area. The powerline has been in service for several decades and been subjected to aging which affects the rating of the feeder.

There is a pole top recloser circuit breaker located in Wollombi Street opposite the proposed development. According to Ausgrid network schematics, this 11 kV recloser is set to limit current flowing through it to under 80 Amps per phase.

Features of the local HV network near the proposed development can be seen in the following geo-schematic diagram. Further detail of Feeder 515:35192 is provided in Appendix B.

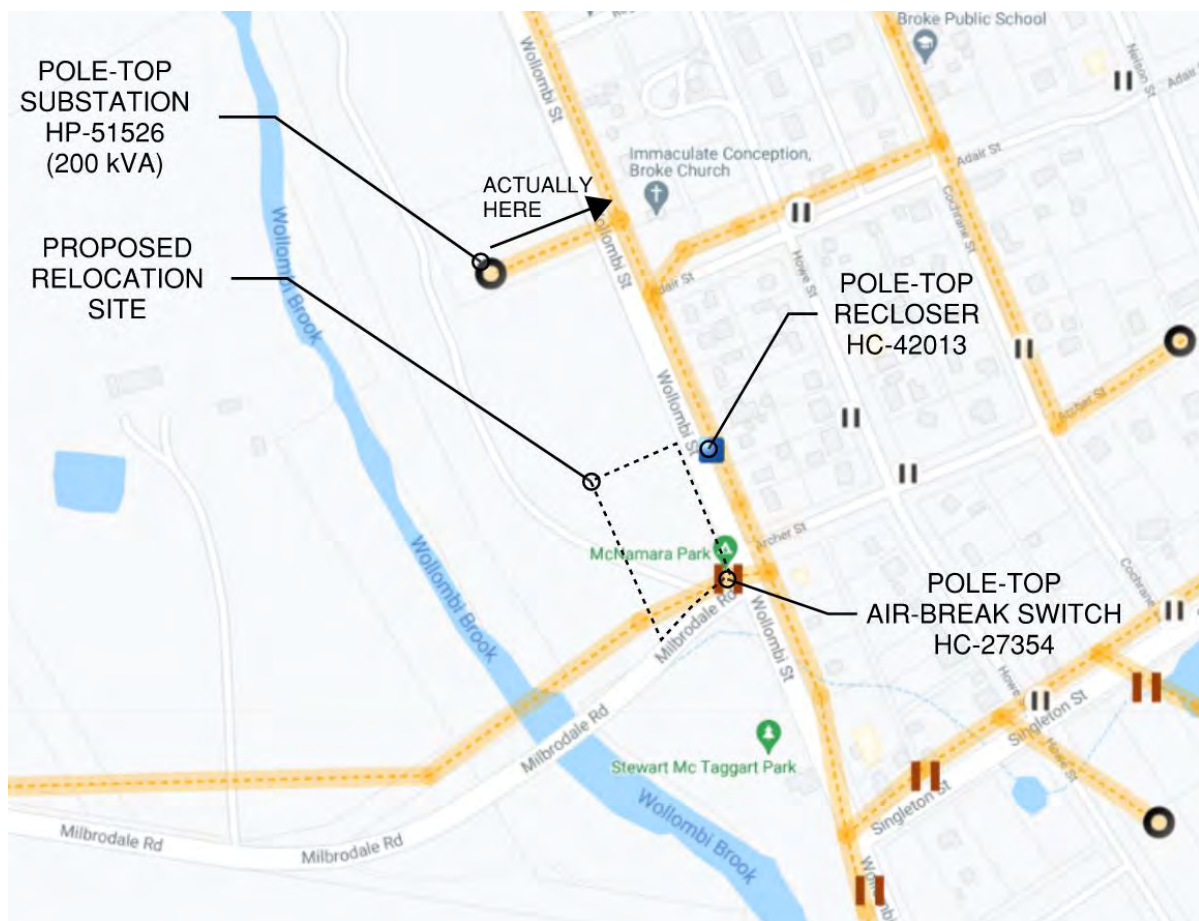


Figure 4.1 Ausgrid HV network near the proposed development

A pole top substation located approximately 400 m north and upstream of the recloser is the most likely local source from where a limited amount of power for the proposed development could be drawn from the existing HV network. This substation has a rated capacity of 200 kVA and supplies existing consumers in Broke. The substation’s remaining spare capacity could be allocated to upgrade supplies to existing consumers or new consumers.

This substation is called “HP-51526” and colloquially named “Broke Village” on the Ausgrid network schematics. As a 200 kVA transformer, it could draw up to 10 Amps from the Ausgrid 11 kV network or converting this to 400 V on the low voltage side of the transformer, it can distribute up to 288 Amps to local consumers via the connected 3 phase distributor.

¹ ACSR/GZ - Aluminium conductors, galvanised steel reinforced manufactured to AS 3607

² Continuous current carrying capacity, for rural weathered conductor under summer noon conditions (wind speed of 1 m/s)

4.2.2 Existing low voltage distribution

There are two low voltage circuits feeding local consumers north and south of substation HP-51526:

- The northern circuit called Distributor 51526R supplies 12 local consumers:
 - One customer is a three-phase consumer.
 - All others are supplied with single phase power.
 - This LV circuit is strung using 95AL ABC³ aerial conductor, rated to carry up to 200 Amps per phase.
- The southern circuit is called Distributor 51526L and supplies 20 existing local consumers:
 - All of whom appear to be supplied with single phase power.
 - This LV circuit is also strung using 95AL ABC aerial conductor, rated for 200 Amps per phase.

Distributor 51526L is the logical source of supply for the proposed development, provided there is sufficient spare capacity to supply the required demand for the development. Consumers currently fed from this distributor appear to be limited to the following:

- 18 residences
- The Broke Immaculate Conception Catholic Church
- the Stewart McTaggart Park electric BBQs

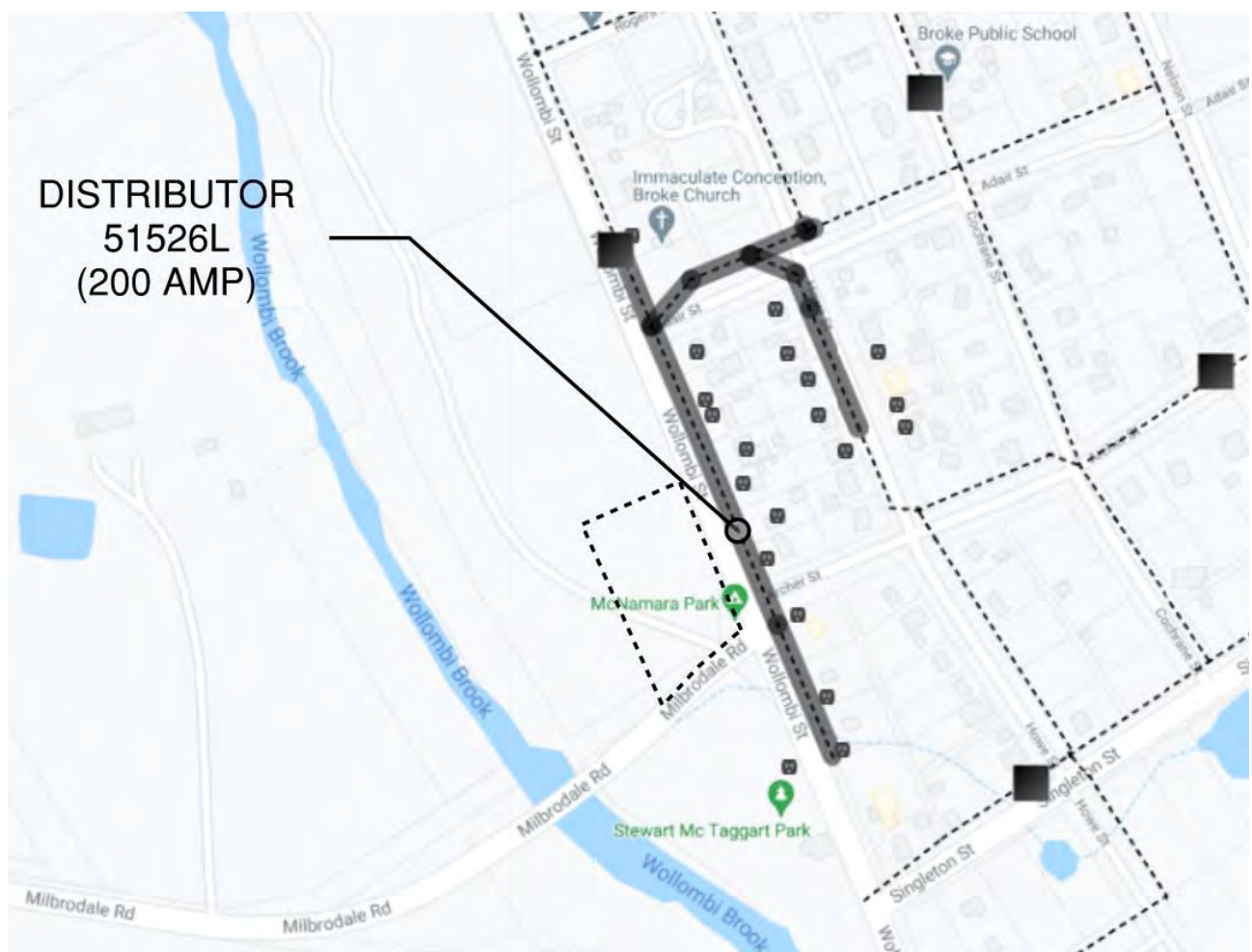


Figure 4.2 Ausgrid LV distributor opposite the proposed development (small squares represent individual consumers)

³ 95AL ABC – 95 mm² 4 core hard drawn aluminium conductors with XLPE (X-90) insulation, aerial bundled cables to AS/NZS 3560.1.

Ausgrid may be able to accommodate the proposed development without upgrading the 200 kVA pole top substation or increasing the capacity of this LV distributor. Ausgrid's network planning team would assess this once the development's Application for Connection is lodged.

If Ausgrid consider the existing LV infrastructure unable to carry the additional development load, it is likely that Ausgrid would allow the 200 kVA transformer to be replaced with a 400 kVA pole top substation and duplicate the 95AL ABC aerial conductor running along Wollombi Street. This is discussed further in Section 4.3 below.

4.2.3 Existing Ausgrid electrical infrastructure on or near site

In addition to the 11 kV and low voltage Ausgrid infrastructure discussed above, it should be noted that there is an existing 11 kV feeder pole on Milbrodale Road, in front of the proposed main entrance to the development. This pole is designated DB-40131 and it carries the air break switch (ABL-27354). This air break switch (ABS) is used to isolate the HV branch line supplying properties on the western side of Wollombi Brook. Removal or relocation of this pole mounted ABS to clear the development frontage for aesthetics is feasible; however, this would likely prove to be a complex and costly exercise.



Figure 4.3 Air Break Switch 'ABL-27354' on pole 'DB-40131' at the intersection of Wollombi St and Milbrodale Rd

4.3 Concept design – electricity supply

The level of power demand for the proposed development will depend on the proposed arrangement and how it is decided to be operated. These details are yet to be finalised with further investigation and design. A conservative estimate of power requirements for the proposed facility has been made as part of this servicing assessment. The power requirements will be further refined as the design development progresses.

- Considering the power demand requirements for the basic building interiors and surrounding spaces alone, if the facility is used primarily as a reception facility, operating on weekends, the level of demand and energy usage may be quite low and easy to accommodate. Even with the lightly loaded commercial spaces requiring some power for cooking and catering, the development should be able to operate from a 100 Amp 3 phase service. For this arrangement it could be possible to connect to the existing Ausgrid LV distributor running alongside the development on Wollombi Street, without needing to augment the Ausgrid network infrastructure further.
- At the other extreme, the power demand of the development could be much higher:
 - A micro-brewery running continuously could require a 3 phase 100 Amp demand allocation.
 - The packaged wastewater treatment plant would need a 3 phase 30 Amp demand allocation.
 - Coupled with this is a potential need to provide power for supplying power to market stalls during monthly events. Assuming 36 stalls where each stall is allocated their own sub-metered single phase 15 Amp supply and assuming these may consume power with a diversity of 50%; this would require a further 3 phase 90 Amp demand allocation.
 - These above loads would be in addition to the demand allocation required in the basic case for the building interior and surrounding spaces mentioned earlier, needing a 3 phase 100 Amp allocation.

- Finally, other loads that may also need to run simultaneously need to have a contingency allowance of demand allocated. These loads include the proposed entertainment stage, additional after dark lighting, and potential electric vehicle charging.

In this case, the development would require its own new dedicated substation to supply the development. This would need to either be a 200 kVA or 400 kVA pole-top substation or possibly even a kiosk substation if the finalised maximum demand is sufficiently large.

4.3.1 Options on how to supply the development

4.3.1.1 Using existing HV and LV infrastructure

For a basic 80 Amp 3 phase service, the development could connect to the existing Ausgrid LV distributor 51526L at pole DR-40127, supplying power to the development's Main Switchboard (MSB), as shown below.

The LV service conductor used for this connection would typically be rated to carry up to 100 Amps and could either be an overhead aerial conductor or an underground cable.

The revenue metering at the MSB in this case would be a directly connected meter, without the need for current transformers. Given the number of sub-mains required to distribute power to various buildings, the MSB would most likely be based on an off-the-shelf arrangement with a main busbar rated to carry up to 250 Amps.

It is likely that this arrangement would not be classified by Ausgrid as contestable works since none of Ausgrid's HV or LV infrastructure would appear to need modifying. This means that no ASP3 design or ASP1 installation works would be required. The LV service could be connected to LV distributor 51526L by an ASP2 technician, in conjunction with electrical installation works being done on site by a licensed electrical contractor.

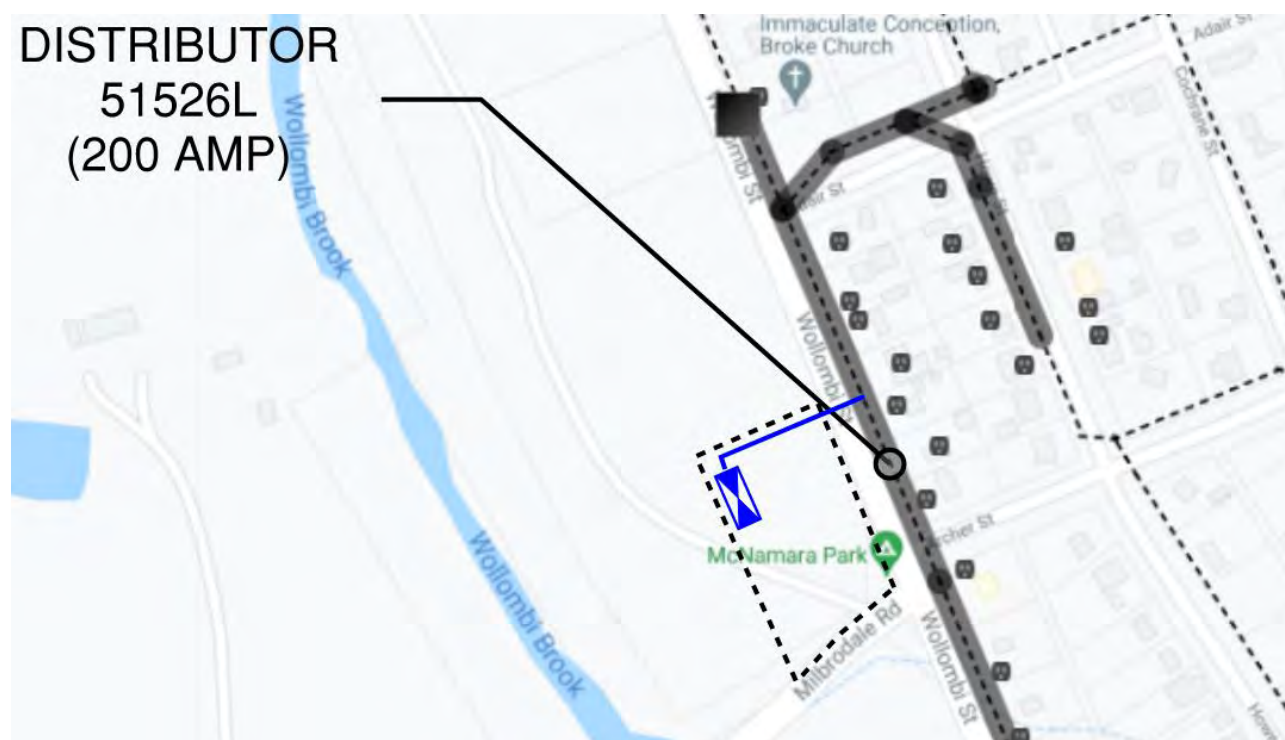


Figure 4.4 Basic 80 Amp 3 phase LV connection

4.3.1.2 Upgrading the PT substation from 200 kVA to 400 kVA

The existing HP-51526 pole-top (PT) substation assembly could have its 200 kVA transformer replaced with a larger 400 kVA transformer to provide the development with more power if warranted. Depending on the age and condition, the existing pole supporting the PT substation may need to be replaced and upgraded to suit the larger transformer and comply with Ausgrid's latest network standards.

The existing Ausgrid LV distributor 51526L that is fed from this PT substation could be upgraded from a capacity of 200 Amps to 400 Amps, by duplicating the LV ABC aerial conductor running south along this section of the distributor. The development could connect to one of these two LV ABC aerial conductors at pole DR-40127. This service connection could provide the development's MSB with a 200 Amp 3 phase supply, as shown below.

The LV service conductor used for this connection would typically be rated to carry up to 200 Amps and again could either be an overhead aerial conductor or underground cable.

The revenue metering at the MSB in this case would need current transformers included, as directly connected revenue meters (without CTs) carrying above 100 Amps are not permitted. Again, the MSB would most likely be based on an off-the shelf arrangement with a main busbar rated to carry up to 250 Amps.

This arrangement would be classified by Ausgrid as contestable because both HV and LV infrastructure would need to be modified for this arrangement. An ASP3 design would need to be prepared then certified by Ausgrid for an ASP1 installation contractor used these to complete the works. The service connection works would still need to be completed by an ASP2 technician, in conjunction with electrical installation works on site by the licensed electrical contractor.

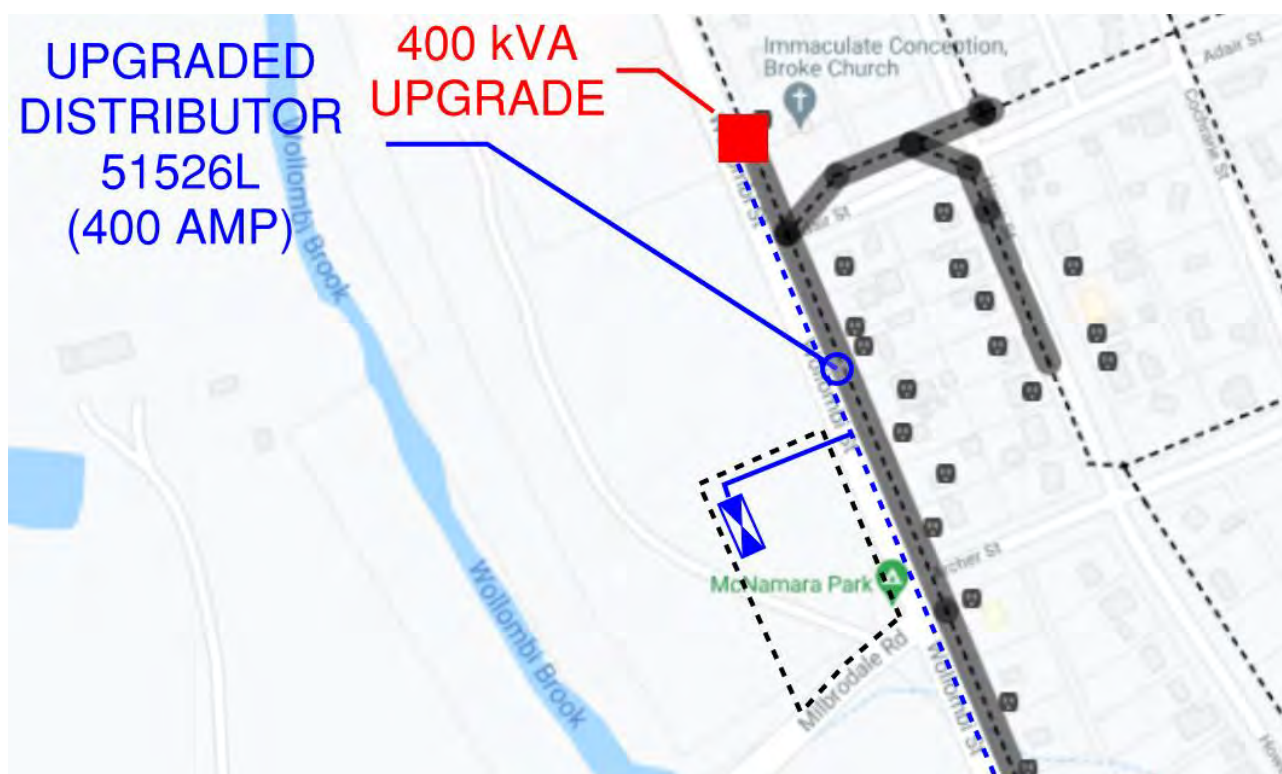


Figure 4.5 200 A 3 phase LV connection

4.3.1.3 Extra 400 kVA PT substation

Rather than upgrading the pole-top substation HP-51526 from 200 kVA to 400 kVA, a totally new Ausgrid 400 kVA pole top substation could be added to the Ausgrid network to provide the development with even more capacity.

This could be done by adding a short 11 kV branch line at pole DR-40127 to bring spans of HV aerial conductors across to the western side of Wollombi Street, where a new 400 kVA pole top substation could be installed, as shown below. This pole top substation would be able to provide a 400 Amp supply for the development. Ausgrid 400 kVA PT substations are usually equipped with two 400 Amp LV distributors to share the transformer's total capacity; however, in the case of this substation only one distributor circuit would be needed to supply the development.

The LV service conductor used for this connection would typically be rated to carry up to 400 Amps and would be an underground cable. This cable may not be able to be connected directly to the PT sub pole, since Ausgrid network standards don't permit such a large cable UGOH on a PT substation pole. A second pole would be required nearby to carry the service's UGOH assembly.

The revenue metering at the MSB in this case would again require current transformers included. The MSB would most likely be a custom-built switchboard with a main busbar rated to carry up to 400 Amps or possibly 630 Amps. A 630 Amp MSB could be equipped with a 400 kW back-up portable generator connection to allow a generator to connect up if needed for extra power during special events.

This new 400 kVA PT substation arrangement would be classified by Ausgrid as contestable because the Ausgrid HV infrastructure is going to need to be modified. An ASP3 design for the pole top substation would need to be installed by an ASP1 installation contractor. The site connection works would again need to be completed by an ASP2 technician, in conjunction with the ASP1 works and the electrical installation works done on site by the licensed electrical contractor.

Schematically the sketch below shows the new PT substation installed at the edge of the development property. Ausgrid would prefer that room is found to install this new Ausgrid pole on the road reserve to avoid the need for establishing any easements on private property.

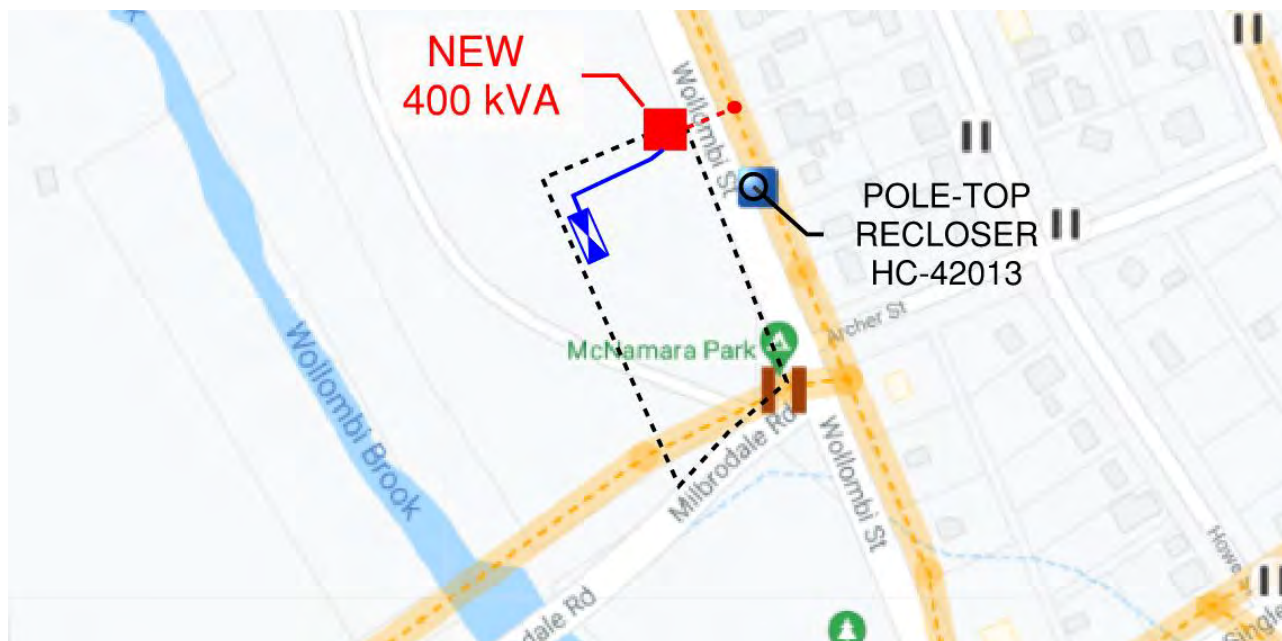


Figure 4.6 400 A 3-Phase LV connection via new 400 kVA pole top substation

4.3.1.4 Upgrades above 400 kVA – kiosk substations

In the unlikely scenario that the development demand regularly exceeds the 400 Amps that could be supplied from a 400 kVA PT substation, then the next option would be to supply the development via a new Ausgrid pad-mounted kiosk substation. Ausgrid kiosks come in a variety of sizes, starting at 400 kVA, and running up to 1,500 kVA.

If the development power demand is high enough to require a kiosk substation, there is an increased risk that the existing Ausgrid network may not have sufficient capacity without requiring more extensive upgrades to the Ausgrid network. This additional upgrade could include installing additional high voltage equipment such as regulators or reclosers elsewhere on the feeder network to strengthen the feeder, re-assign other consumers to other feeders or change the feeder protection scheme. Such modifications would need to be paid for by the developer to compensate for gaining access to a greater amount of the feeder's capacity.

4.3.2 Proposed LV service

The sketch below shows how a typical LV service could be installed at the northern end of the development. This sketch is included in Appendix A.

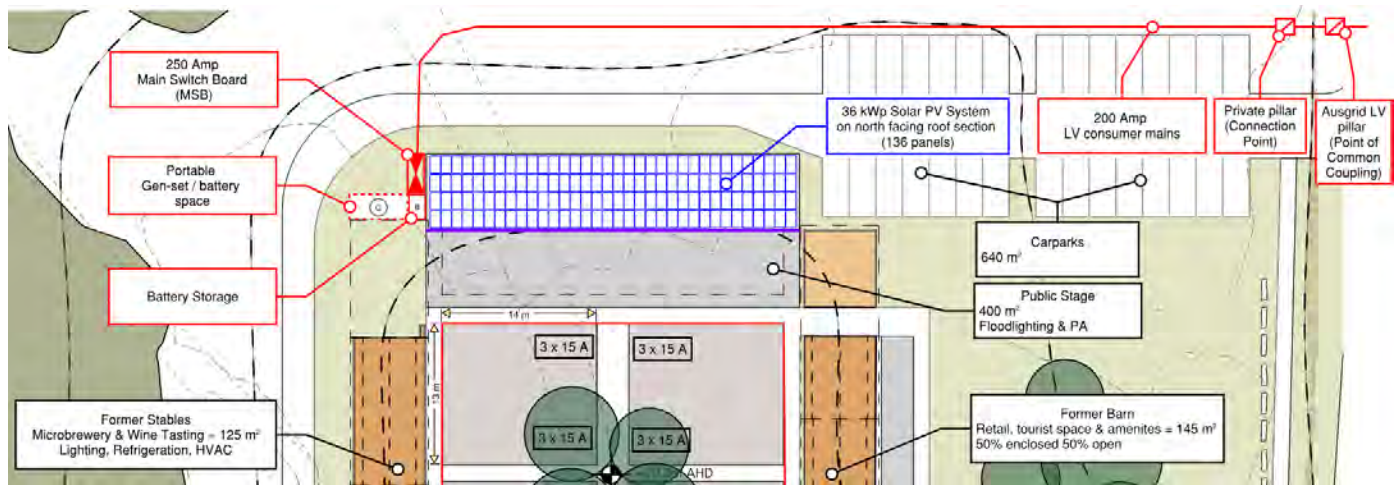


Figure 4.7 LV service and MSB concept layout

- The LV service cable enters the site off Wollombi Street, via an Ausgrid LV pillar and private service pillar.
- The service/consumer mains cable skirts around the north side of the proposed northern carparks, heading towards the development's main switchboard (MSB) and would be installed in a conduit between the private service pillar and the MSB.
- The MSB location shown is conveniently located out of site to regular patrons, while being adjacent to the public stage area and relatively close to the micro-brewery which is potentially one of the main energy-using areas on site.
- The public stage is proposed to have a pitched roof with one side of the roof facing north. This has enough room to carry approximately 136 solar PV panels to produce up to 34 kW of electric power (50 Amps 3 phase).
- Space for an LV battery storage unit is shown beside the MSB. The batteries would enable excess power from the solar PV system to be stored at times of low demand then used later in the day or night as required.
- Space is also allocated near the MSB to install a rented portable generator if needed.

4.4 Electricity supply recommendation

It is likely that the estimated maximum demand for the development will include the following components:

- 90 Amps (3-phase) to cover the power use by the basic buildings and surrounding areas.
- 90 Amps (3 phase) provision for market stall power demand.
- 100 Amps (3 phase) allocation for the micro-brewery process.
- 30 Amps (3 phase) allocated for the packaged wastewater treatment plant.
- A contingency allowance of 50 Amps (3 phase) would cover other potential special loads such as the entertainment stage, after dark lighting and electric vehicle charging.

A 400 Amp 3 phase service would therefore be required to cover this level of demand; a new Ausgrid 400 kVA pole top substation would need to be installed to supply this load from the existing Ausgrid network.

It is recommended to install a short 11 kV branch line at pole DR-40127 to bring spans of HV aerial conductors across to the western side of Wollombi Street, where this new 400 kVA pole top substation could be installed, along with a second pole to support the 400 Amp service underground to overhead (UGOH) assembly from where a 240 mm² 4 core aluminium service/consumer mains cable would link up with the Main Switchboard.

It would be possible to scale down the size of the service to 200 Amp (3 phase) or possibly 100 Amp (3 phase) if some or all the proposed features like the micro-brewery, market stall power or other special services were removed from the scope.

Further work would be required as part of detailed design development, including confirming final power requirements to determine if the larger service is required as well as additional consultation with Ausgrid regarding point of connection and their requirements.

4.5 Ausgrid Preliminary Enquiry

GHD lodged a Preliminary Enquiry with Ausgrid on 11 June 2021. This enquiry was based on the estimated power demand of 360 Amps (3 phase) for the development, as outlined in the recommendation above.

Ausgrid's response is attached to the report in Appendix F. The response confirms that the new development's demand could be accommodated by the existing Ausgrid HV feeder supplying Broke.

- The Ausgrid HV network would require the addition of a new Ausgrid PT substation dedicated to supply the development.
 - While not stated in the response, the proposed pole top substation would need to have a 400 kVA transformer to supply the required demand.
- This new PT substation would be fed off a small branch extension off the existing 11kV overhead powerline running past the development site, crossing over Wollombi Street onto the western (development) side.
 - The HV overhead conductor proposed in the response is 6/3.00 ACSR/GZ ('Apple') bare conductor.

Ausgrid advised in the response that the pole top substation would need to be installed on the customer property, covered by an easement. GHD suggests that there should be adequate room on the nature strip road-side verge on the western side of Wollombi Street within the road reserve to locate the PT substation. Installing the PT substation in the road reserve would avoid the need for installing the pole on private property and therefore avoid any easements. This aspect could be resolved during the ASP3 design period.

5. Communications

5.1 NBN coverage

Broke has phone and internet coverage supplied by the National Broadband Network (NBN), via their *Fixed Wireless* network. This coverage, includes the proposed development, as seen in the NBN availability map below.

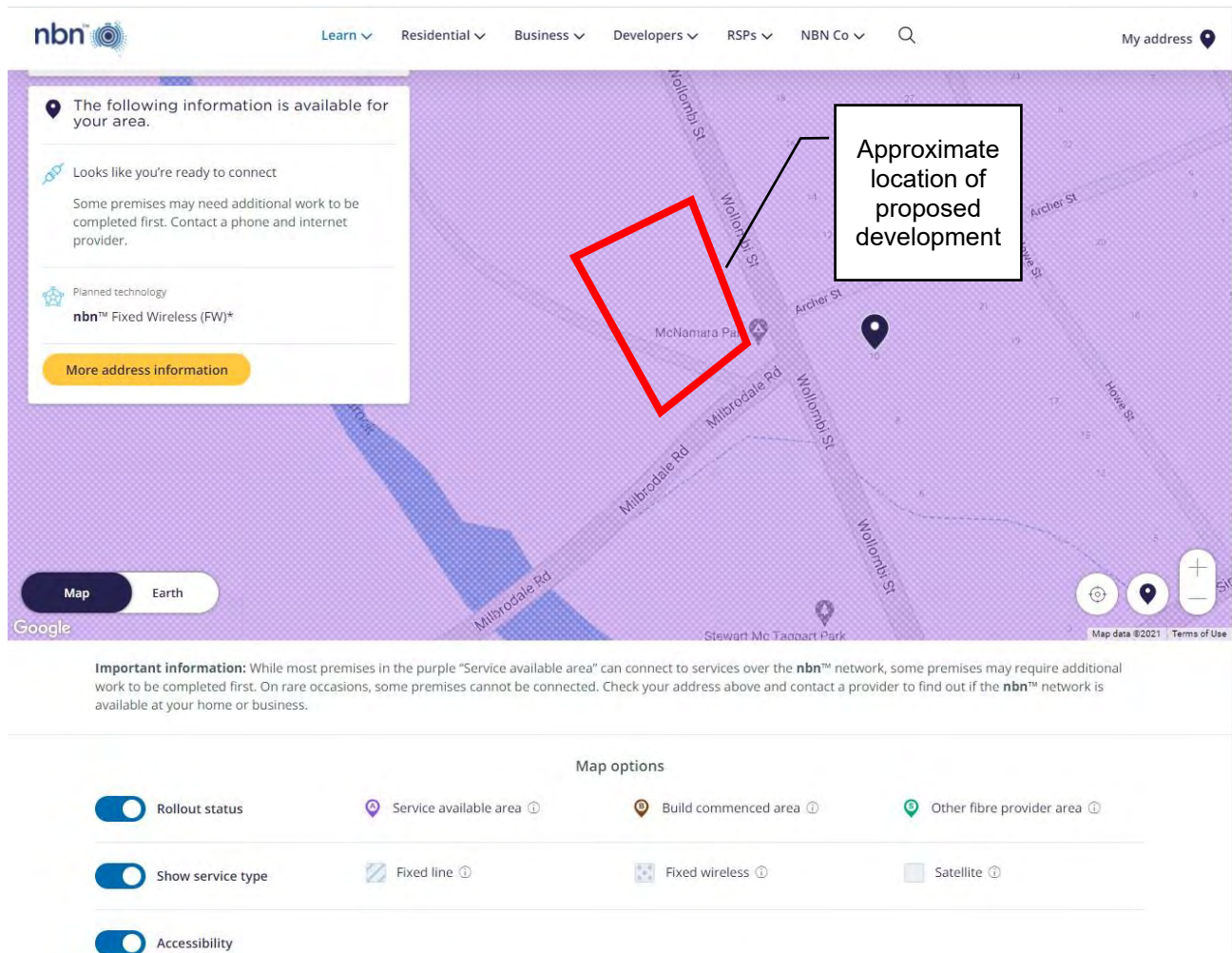


Figure 5.1 NBN Fixed Wireless coverage at Broke

5.2 NBN fixed wireless

An NBN Fixed Wireless transmits data over radio signals to connect a development to the NBN network.

This connection is typically used in circumstances where the distance between customers can be several kilometres or for small communities like Broke. Data travels from a transmission tower located as far as 14 km away from customers, to an NBN outdoor antenna that is installed at a customer's property, normally installed on the roof, wall, or gutter of a building. Alternately, it may be some other non-standard mounting arrangement (i.e., a pole).

Fixed Wireless connections require an NBN connection box to be installed at the point where the cable from the NBN outdoor antenna enters a building, usually installed at the same building as the main electricity switchboard (i.e., not in a separate detached building or outhouse). This device requires 230 V ac power to operate and connects to a gateway (router/modem) via an Ethernet cable and then onwards using Wi-Fi or Ethernet to connect separate devices and appliances as required throughout the property.

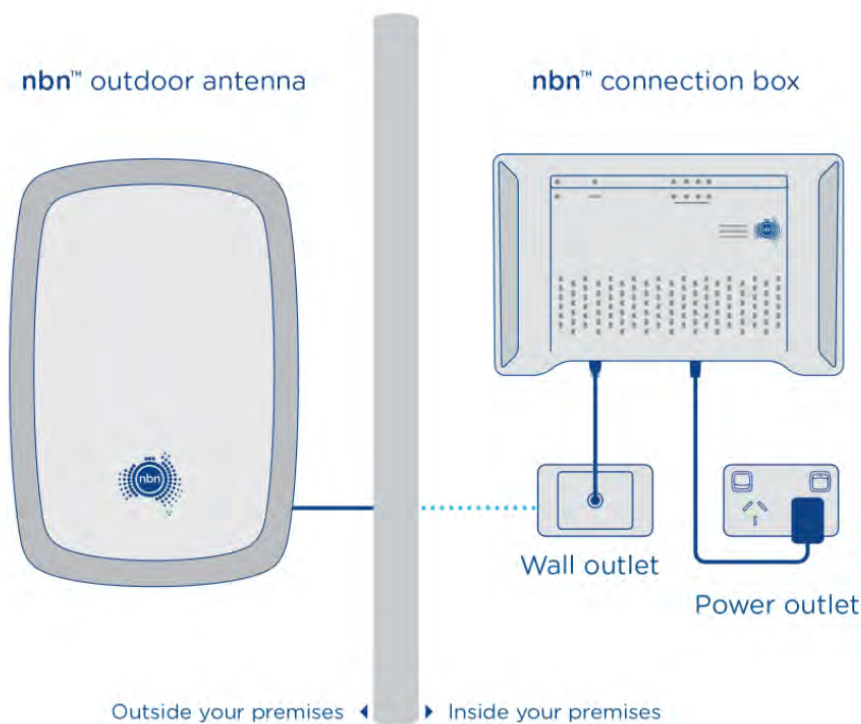


Figure 5.2 NBN Fixed Wireless installation at a typical the development

New installations such as this development could have their phone service connected to a VoIP (Voice over Internet Protocol) service on the NBN access network through the preferred phone and internet provider, connecting the development's new phone via the NBN-supplied equipment.

The following map shows the locations of the NBN Fixed Wireless towers located in the Hunter Valley, including the tower located at Broke itself.

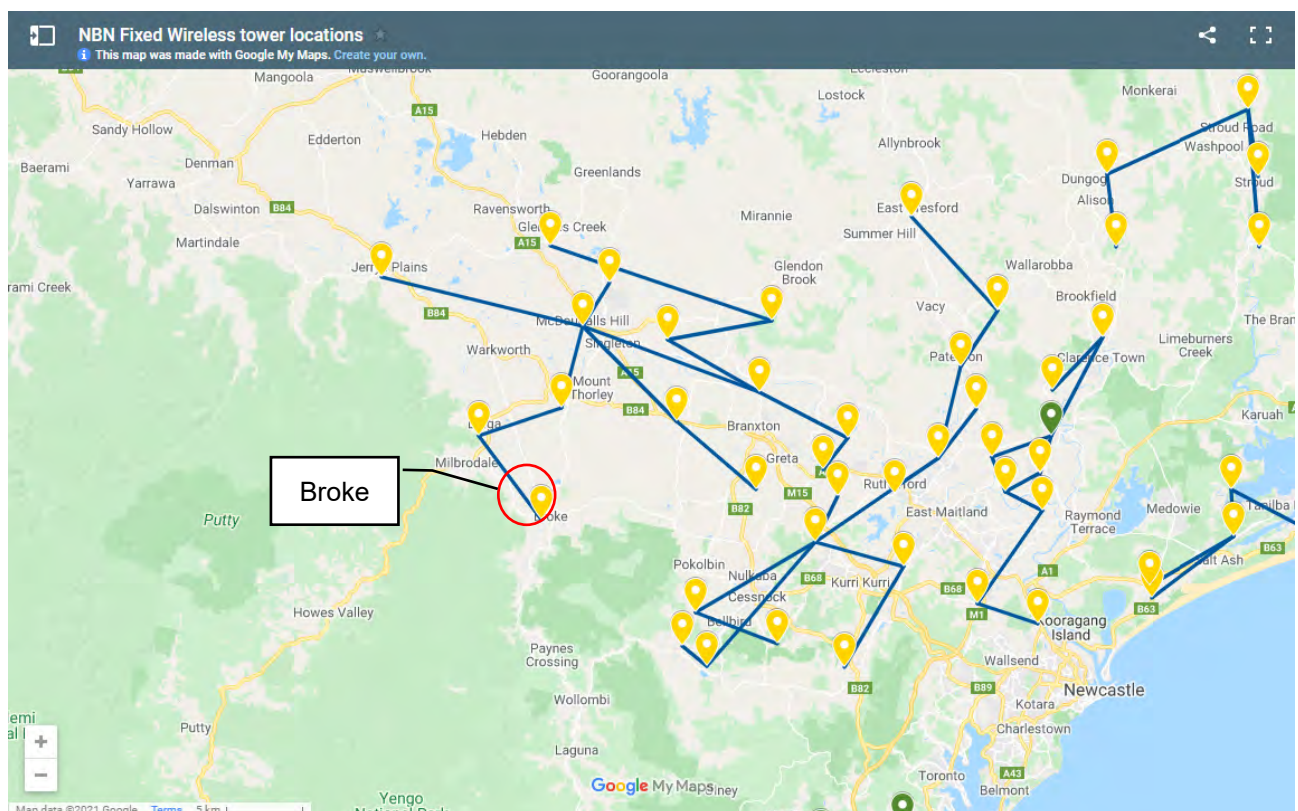


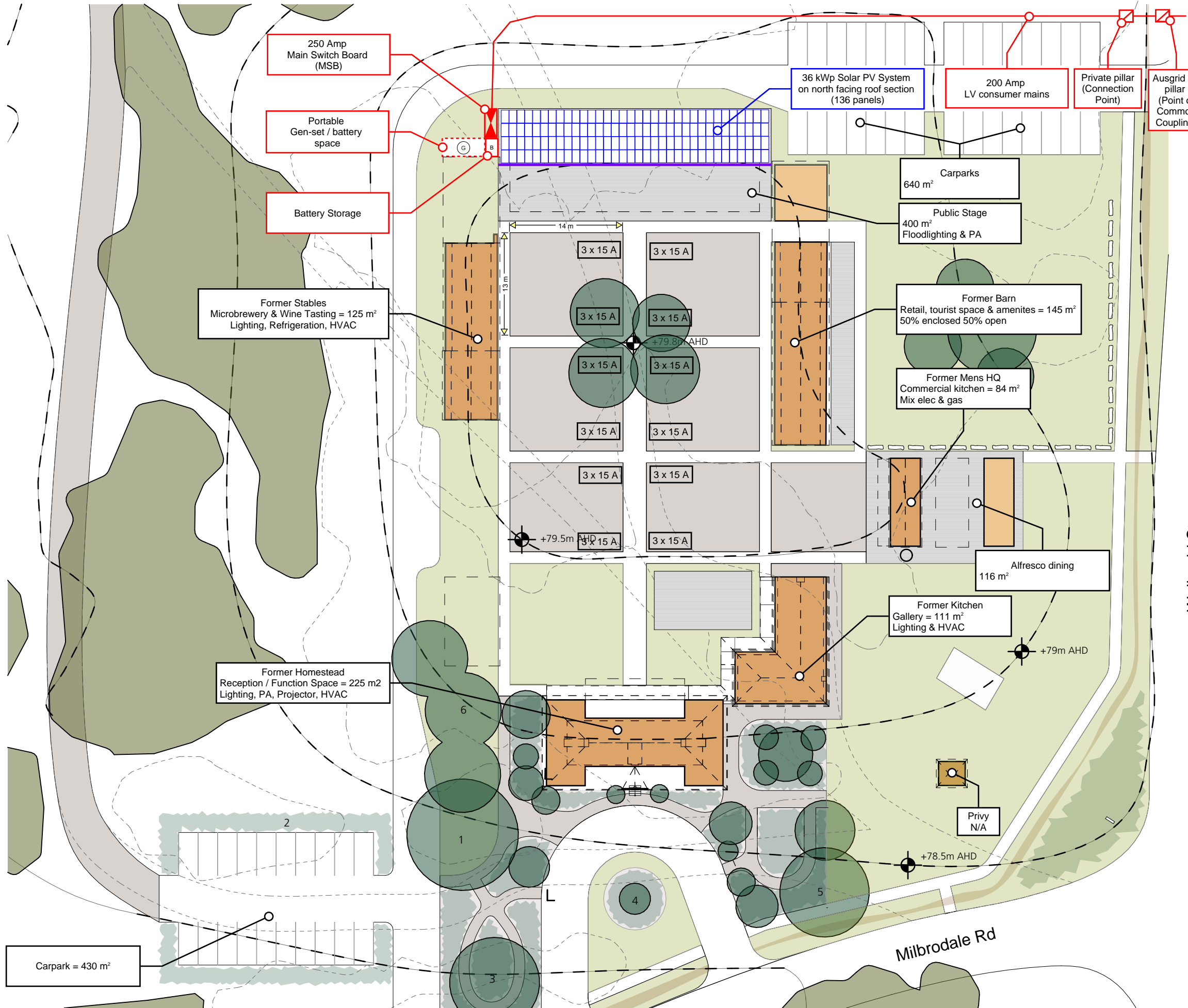
Figure 5.3 The network of NBN Fixed Wireless towers in the Hunter Valley

Appendices

Appendix A

**Development building areas and LV
service concept**

Drawing and design © SHAC Pty Ltd. The signed control copy of this drawing is held by SHAC Pty Ltd. | Ref: Volume/Projects/40004058 Broke House Relocation/500 CAD Graphics and Models/512 Feasibility/4058 512 04 Broke Relocation.pln date:5/09/2019 time: 1:11 PM



CONCEPT

1. Dimensions are in millimeters unless otherwise shown.
2. Work to given dimensions. Do not scale from drawing.
3. Check all dimensions on site prior to construction and fabrication.
4. Bring any discrepancies to the attention of the proprietor & architect.

No	Drn	Chk	Date	Content
A	TG	JH	10.07.19	Site Plan
B	TG	JH	16.07.19	Site Plan
C	TG	JH	12.08.19	Potential Alterations
D	TG	JH	03.09.19	Updated Set

Notes - Landscape

Notes:

- Refer to Concept Landscape Plan by Geoffery Britton for full concept.

Preliminary Selection

1. Moreton Bay Fig Tree
2. Plumbago Hedge
3. Hoop Pile
4. Relocated Old Oleander
5. Aleppo Pine + Ligularia
6. New Eucalypts

Electrical Legend

- 3 x 15 A 3 x 15 A SPOs for market stalls
- LV Pillar
- Main Switchboard
- 250 W Solar PV Panel
- Battery Storage
- Portable Generator Space

GHD GLENCORE RAVENSWORTH HOMESTEAD RELOCATION - BROKE NSW ELECTRICAL INSTALLATION SUMMARY

GHD Tower, Level 3
24 Honeysuckle Drive, Newcastle NSW 2300 Australia
PO Box 5403 Hunter Rgn Mail Cent. NSW 2310
T 61 2 4979 9999 F 61 2 4979 9988
E ntlmail@ghd.com W www.ghd.com

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scale NTS for A1 job no. 12552069
date 31/05/2021 rev no. 00

approved MRC SK 001

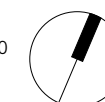
4058
SK2204

RevD 03.09.19

Preliminary Earthworks Plan

Ravensworth Homestead
Broke, NSW

0m 5 10 15 20 25 1:500
@A3



SHAC

Nominated Architect Justin Hamilton (6160) | ABN 32 131 584 846

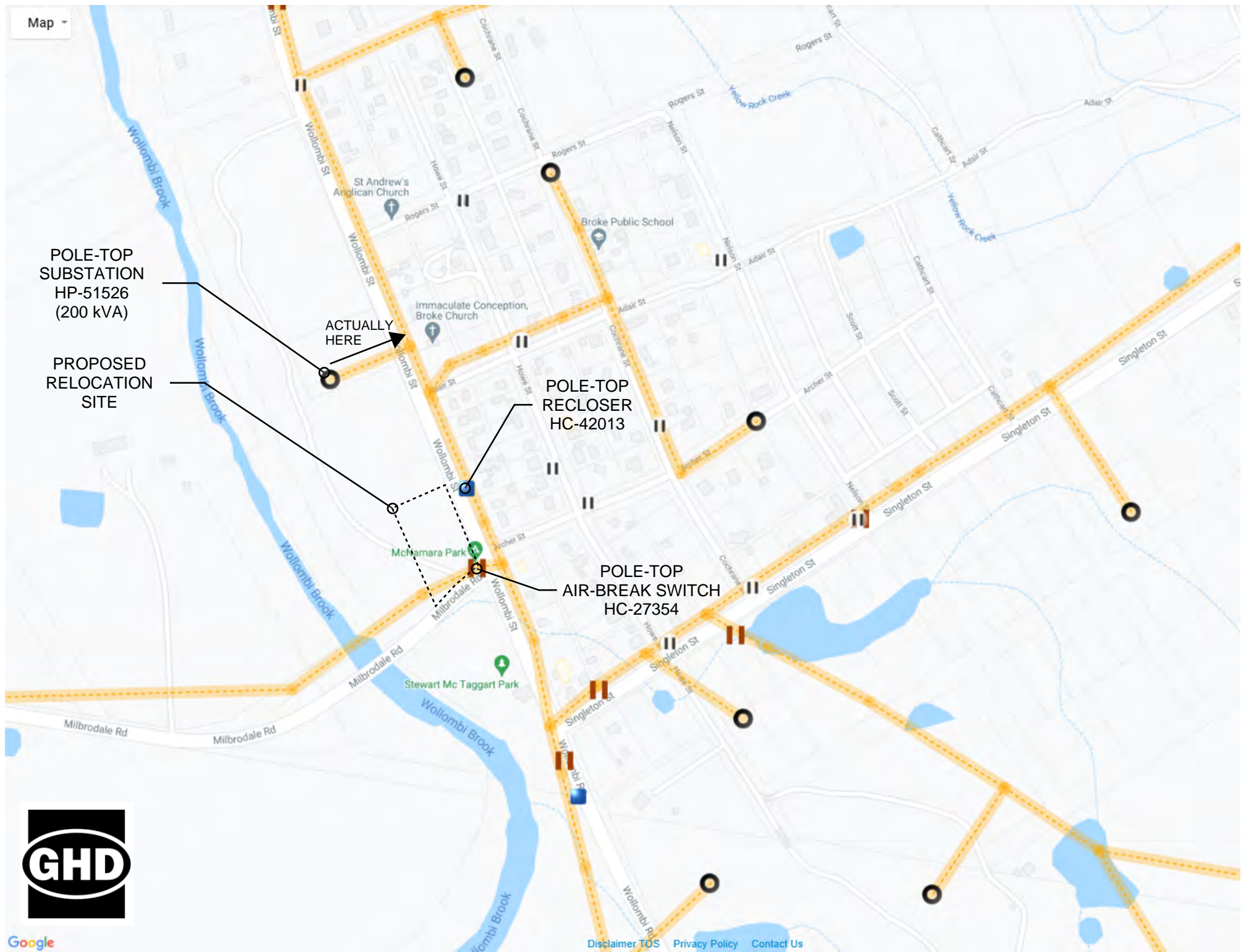
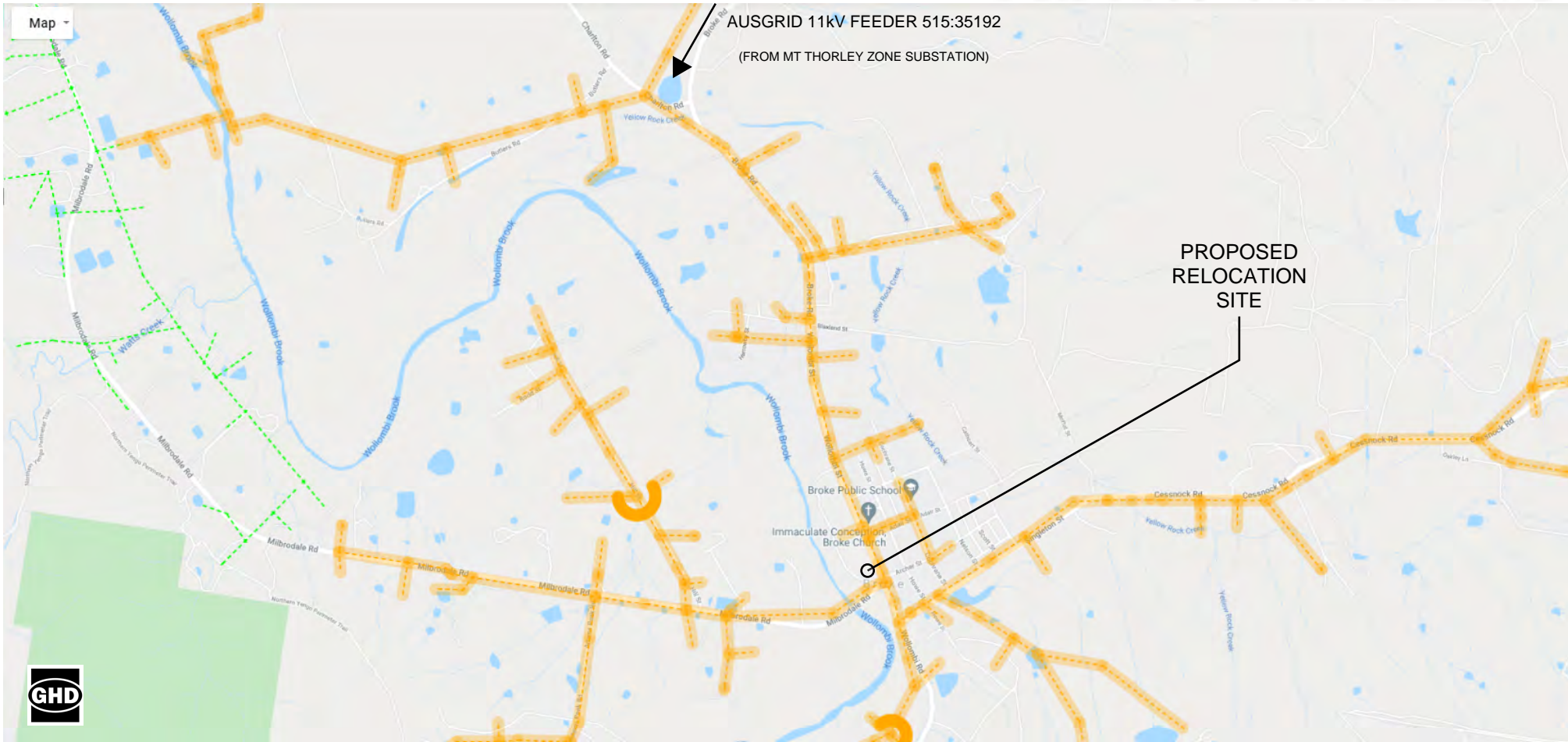
Appendix B

**Existing Ausgrid high voltage feeder
network**

Ausgrid HV Network Ravensworth Homestead Relocation Broke - NSW



→ The Power of Commitment



→ ghd.com

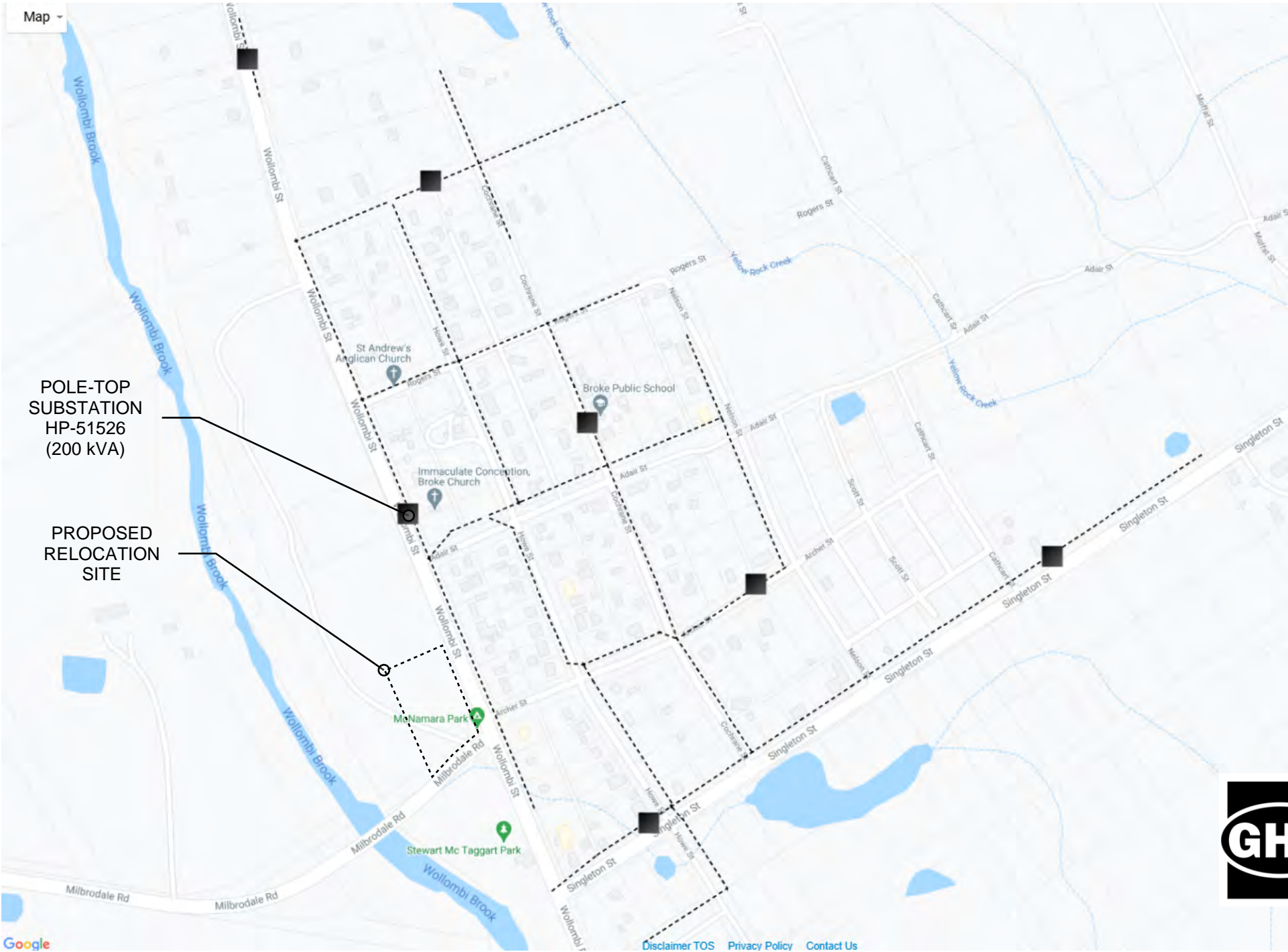
Appendix C

Existing Ausgrid low voltage distribution

Ausgrid LV Distribution Ravensworth Homestead Relocation Broke - NSW



→ The Power of Commitment

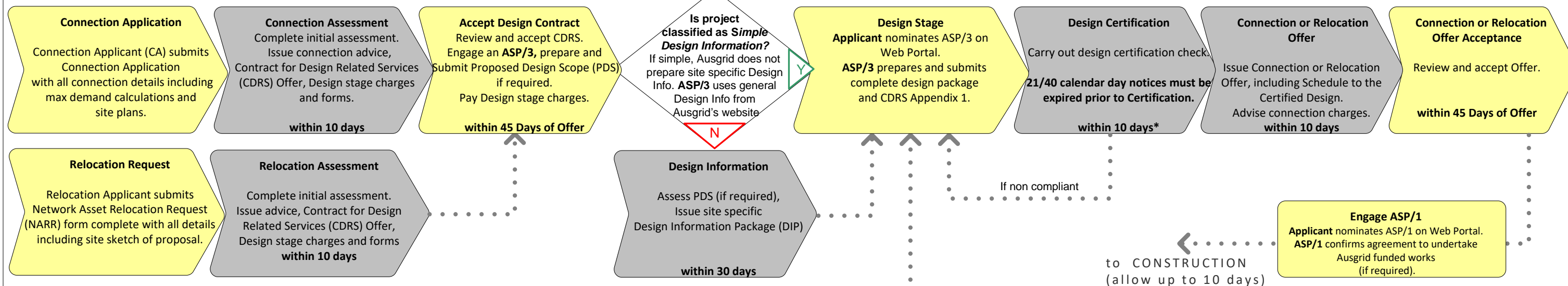


Appendix D

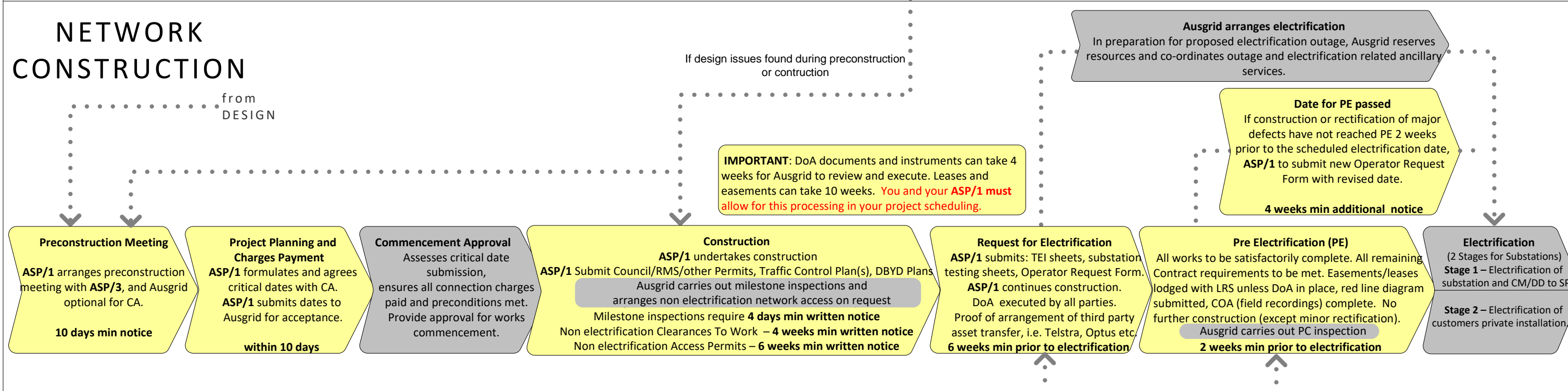
Ausgrid contestability process

NETWORK DESIGN

NETWORK CONNECTION OR RELOCATION PROCESS - APPLIES TO STANDARD DISTRIBUTION PROJECTS ONLY -



NETWORK CONSTRUCTION



PRIVATE INSTALLATION

* indicates best endeavour timeframe

Note: All days refer to business days unless noted otherwise.

Customer action

Ausgrid action

Engage Electrical Contractor (EC)
Applicant nominates EC on Web Portal.

Connection Applicant's Private Installation and Metering

Connection Applicant's private electrical installation design and construction are not part of the **ASP/1** connection process.

However, electrification of the **ASP/1** works and connection of the premises requires the Connection Applicant to address all private installation technical and safety requirements

Private Installation requirements and documentation review

At least 6 weeks prior to proposed electrification date the following private installation items must be submitted to Ausgrid for initial review:

- Main-switchboard (MSB) installed in final location on site
- Preliminary MSB drawings and site diagram
- Preliminary Private installation protection grading curves and circuit breaker settings
- Preliminary ISMP and Operating Protocol (for HV connections)
- Preliminary Hazard Dossier for private installation (if applicable).

Submitted min 6 weeks prior to electrification

Private Installation – ready for connection

At least 2 weeks prior to proposed electrification date the following private installation items must be **complete and finalised** to Ausgrid's satisfaction:

- Final Main-switchboard (MSB) drawings and site diagram
- Final Private installation protection grading curves and circuit breaker settings
- MSB and con-mains installation complete and terminated on site, ready for inspection and energisation (Ausgrid substations will not be energised without an MSB connected).
- Final ISMP and Operating Protocol (for HV connections)
- Valid CT Metering form(s)
- Valid CCEW and NOSW forms (as applicable)
- Final Hazard Dossier for private installation (if applicable)
- Retailer in place.

Finalised min 2 weeks prior to electrification

Appendix E

Pressure Statement

DN80/Pillar/Landing - AS2419 Fire Fighting Compliance Test Report

Report No:

Select serial from list

Customer: GHD Pty Ltd

Contact/Position: David Dean

Phone: 4979 9972

Fax:

Email: David.Dean@ghd.com

Site location: 16 Wollombi Road Broke

Description: Hydrant at front of property

Testing was carried out on:

Tested by: Paul McKoy 17/06/2021

Description of Test		Recorded Values		Calculated Results			
		Maximum Flow Rate L/S [MFR]	Maximum Static Pressure kPa [SPR]	Theoretical Maximum Flow Rate [L/S] expected at Maximum Static Pressure. Note [D]	Recorded Max Flow Rate [L/S] at full flow	Calculated Hydrant Performance Percent %	Calculated Hydrant Performance Descriptive
Fire Fighting AS2419.1		20.0 L/S	660 kPa	31.9 L/S	20.0 L/S	62.72%	Average
Hydrant Test Point [Select State >>]			NSW	Required Performance:	10 L/S @	150 kPa	NSW/ACT Feed Fire Hydrant [F.H]
Mains ID [MD] [mm]	150	Flow Rate	Residual Pressure	AS 2419.1 Table 2.2 - Fire Fighting Compliance Performance [Residual Pressure kPa >150/250 [NSW/ACT], [Vic,SA,Qld,WA,Tas,NT] >200/350 at a Minimum Flow Rate of 10 L/S]			
Input the Residual Pressure reading from the list at a Flow Rate of 10 Ltrs/Sec:		10.0 L/S	400 kPa	This Fire Hydrant has			
Note: Only select this kPa if the Maximum Flow Rate recorded is less than 10 Ltrs/Sec		20.0 L/S	150 kPa	the AS 2419 compliance test for NSW.			
Supplementary results:				Interactive graph >>			
Tests were conducted in accordance with the following Standards and client specifications.							
[A]	AS 2419.1	Tester should only fill blue fields					
[B]	Council Guidelines						

AS 2429.1 Fire Hydrant Compliance

Category	Pressure kPa
AS 2419.1 Standard	150
Hydrant Under Test	400

Comparison between AS 2419 and Test Results Achieved

Explanatory Notes:

- [A] The tests referred to in this report have been conducted in accordance with the relevant listed Australian Standards, State Government Legislation, and Local Government Regulations in effect at the date of this report.
- [B] All tests have been conducted using test equipment specifically designed to conduct such tests and in accordance with the manufacturers recommended operating procedures. Further, the test equipment used has been certified by the manufacturers/suppliers to be accurate and directly traceable to a NATA certified standard.
- [C] The test results referred to in this report were derived from values recorded at the actual time of the tests only. There are known diurnal variations in reticulation systems that are not measurable in single event tests and both pressure and flow variations can be considerable. Users of this data should therefore view the data as indicative performance results only, and if in doubt to the user, further testing should be considered.
- [D] The Theoretical Maximum Flow Rate expected is calculated by formula based on known values [1] Flow Rate [MFR], [2] Static Pressure [SPR] and [3] Nominal Main Size [MD]. Except for controlled closed mains, live water mains under test have an inherent background consumption demand that is not measurable but can be approximated by calculation and therefore should be taken into account in theoretical modelling. Variable [4] Background Demand Flow Rate [BFR] is calculated by formula from values [1 - 3].

Appendix F

Preliminary Enquiry Response Letter

Preliminary Enquiry – Response Letter



24 June 2021

Webform ref: 243447

GHD Pty Ltd
Attention: Michael Cook
Via email: michael.cook@ghd.com

Premises address: WOLLOMBI STREET, BROKE

Ausgrid AE Reference: 700007290

Dear Michael

I refer to your preliminary enquiry regarding the electricity connection at the above address and provide the following information.

- ☐ The Ausgrid network does not have the capacity to connect the proposed 380amp 3 phase low voltage electricity connection. An extension/augmentation of the Ausgrid network is required. Following is the likely work(s) required to provide the request capacity.
 - Installation of a pole substation on the customer property covered by an easement.
 - 11kV extension to new pole substation to use minimum Apple conductor.
- ☐ An extension/augmentation of the Ausgrid network is Contestable and requires the customer to engage accredited service providers to undertake the design and construction of the required works. Information on how to connect to the Ausgrid network can be found on our website at the following link: <https://www.ausgrid.com.au/Connections>
- ☐ Ausgrid is unable to provide costs or timeframes for Contestable works. However, accredited service providers may be able to provide the information.
- ☐ The electrical connection will require Ausgrid to provide auxiliary services that only Ausgrid can provide. The auxiliary services and the associated fee are detailed in the Ausgrid document *Alternative control services fee schedule*. The document is available on our website at the following link: <https://www.ausgrid.com.au/Connections/charges>
- ☐ Alterations to the existing Ausgrid network (ie relocation works) is also Contestable as detailed above and is fully funded by the applicant.
- ☐ To proceed further in obtaining a new or altered electrical connection to the property a Connection Application will need to be submitted. The various application forms are available on our website at the following link: <https://www.ausgrid.com.au/Connections>

It should be noted that the above advice is based on Ausgrid's policies and network status as of today and are subject to change.

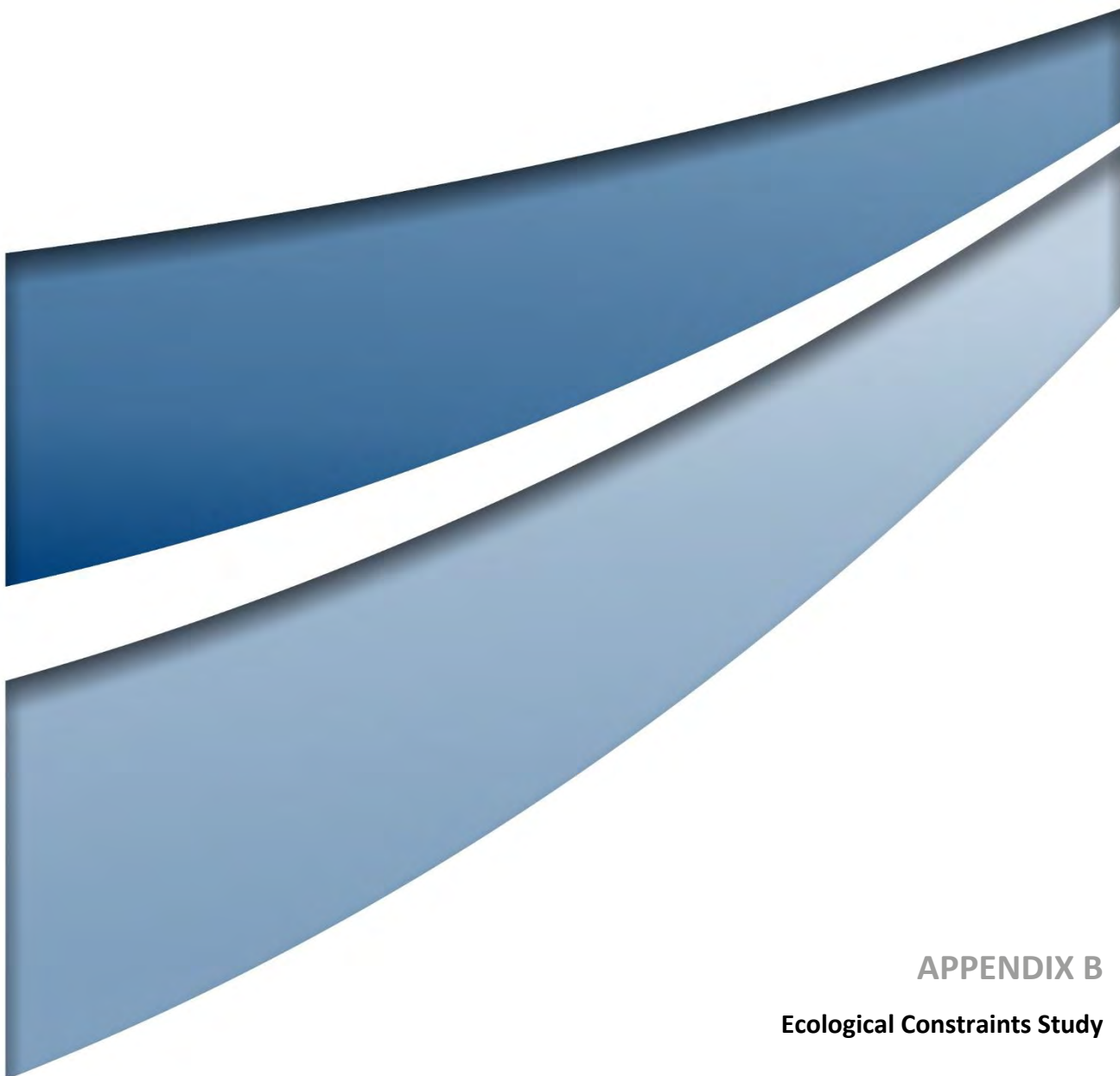
Connections to the Ausgrid network are governed by a set of laws and rules referred to as the National Energy Customer Framework (NECF). Included in the NECF is the National Electricity Rules (NER). Under these rules, a binding contract may only be formed after a connection application is lodged and Ausgrid has made a connection offer in response to that application. Accordingly, to make arrangements for the electricity connection of the development to the Ausgrid network you should lodge a completed connection application.

Should you require any further information please contact me.

Yours sincerely,

Brian Mottley
Ausgrid

Direct Telephone Number: 0249101411
Email: brian.mottley@ausgrid.com.au



APPENDIX B

Ecological Constraints Study

Our Ref: 4166/R14/AR/SC/18062019

18 June 2019

Shane Scott
Coal Assets Australia
Glencore

Shane.Scott@glencore.com.au

Dear Shane

Re: Ecological Constraints – Stuart McTaggart and McNamara Parks, Broke, NSW.

Umwelt (Australia) Pty Ltd (Umwelt) was engaged by Glendell to undertake a literature review and broad-scale ecological constraints assessment associated with potential homestead recipient sites at Broke. Stewart McTaggart Park and McNamara Park are Crown Land reserves in Broke and have been touted as potential recipient sites of the Ravensworth Homestead.

This letter documents the ecological literature reviewed and the results of database searches undertaken for the potential recipient sites and provides a summary of the key ecological constraints. The letter also contains commentary around the potential approval requirements and documents the preliminary results of a calculator assessment undertaken in accordance with the BAM assessment which includes the likely credits generated from impacts on biodiversity.

Literature review and Database Searches

A search of the Office of Environment and Heritage (OEH) Atlas of NSW Wildlife Database (OEH 2019a) and the Commonwealth Department of the Environment and Energy (DoEE) Protected Matters Search Tool (PMST) (DoEE 2019) was completed for the potential recipient sites, with the search also including areas within a 10 km of the site.

A review of the Bulga Biodiversity Certification Assessment Report prepared for the Upper Hunter Strategic Assessment (Umwelt 2015) was also undertaken. Areas along Wollombi Brook, north of the potential recipient sites, were surveyed as part of that assessment and the data collected has been used for this constraints document.

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Dedicated Team
Quality Outcomes

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Brisbane QLD 4000

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Office 1
3 Hampden Avenue
Orange NSW 2800

T | 1300 793 267
E | info@umwelt.com.au
www.umwelt.com.au

Results

Vegetation

One Plant Community Type (PCT) occurs across the potential recipient sites, being PCT 1594 Cabbage Gum – Rough-barked Apple Grassy Woodland on Alluvial Floodplains of the Lower Hunter. It appears, from aerial photography and satellite imagery, that two condition classes of this PCT occur across the sites, being woodland and derived native grasslands.

PCT 1594, in its woodland state, conforms to the Biodiversity Conservation Act (BC Act) listed endangered ecological community; *River-flat Eucalypt Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner Bioregion*. PCT1594 does not conform to any EPBC Act listed threatened ecological communities.

Threatened Species

92 threatened flora and fauna species have been recorded within 10 km of the potential recipient sites. In accordance with the BAM (if required), additional surveys would be required for any species-credit species that is considered likely to occur and where habitat for the species occurs within the sites. The species considered to likely require further assessment include:

- Regent honeyeater (potential important habitat area)
- Southern myotis (habitat within 200 m from waterbodies)
- Pale-headed snake (hollow bearing trees)
- Brush-tailed phascogale (hollow bearing trees)
- Green-thighed frog (potential habitat)
- Koala (recorded within the local area)
- Singleton mint bush (recorded within the wider area)
- Illawarra greenhood (recorded within the wider area)
- Broken back ironbark (recorded within the wider area)
- White-flowered wax plant (recorded within the wider area)
- Slaty red gum (recorded within the wider area).

In addition to these species, other threatened species are predicted by the biodiversity assessment calculator used in the BAM which also require additional surveys. These are:

- Green-thighed frog (potential habitat)
- Green and golden bell frog (potential habitat).

Endangered Populations

Three endangered populations listed under the BC Act are predicted to occur. These are:

- *Acacia pendula* population in the Hunter catchment (recorded within the wider area)
- *Cymbidium canaliculatum* population in the Hunter Catchment (recorded within the local area)
- *Eucalyptus camaldulensis* population in the Hunter catchment (floodplains of watercourses).

Migratory Species

No migratory species listed under the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) are known or predicted to occur.

Impacts Requiring Offsetting

A calculator assessment was undertaken in accordance with the BAM assessment to identify the likely credits generated from impacts on biodiversity and the likely offsetting requirements. Whilst the final development footprint and exact locations are still uncertain (see attached sketch), for the purposes of this document we have assumed a development footprint of one hectare and that complete clearing would be required. For the purpose of calculating the required offsets, the Vegetation Integrity Scores (VIS) entered into the calculator were based on the benchmark data for the PCT. So, it must be noted that these values are the upper limit of a PCT's condition and may not be representative of VIS calculated from on-ground surveys.

Additionally, the species-credit species listed above have assumed to be present on the potential recipient site. The preliminary results of the calculator assessment reveals that one PCT and 14 species-credit species are considered to require offsetting in accordance with the BAM (OEI 2017a). The preliminary results of the calculator assessment are provided in **Table 1** below.

Table 1 - Credits Required to Offset the Project

PCT/Species-credit	Estimate Number of Credits
Ecosystem Credits	
River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	50
Species Credits	
<i>Acacia pendula</i> population in the Hunter catchment (<i>Acacia pendula</i> - endangered population)	25
regent honeyeater (<i>Anthochaera phrygia</i>)	75
<i>Cymbidium canaliculatum</i> population in the Hunter Catchment (<i>Cymbidium canaliculatum</i> - endangered population)	1
white-flowered wax plant (<i>Cynanchum elegans</i>)	50
<i>Eucalyptus camaldulensis</i> population in the Hunter catchment (<i>Eucalyptus camaldulensis</i> – endangered population)	50
broken back ironbark (<i>Eucalyptus fracta</i>)	75
slaty red gum (<i>Eucalyptus glaucina</i>)	2
pale-headed snake (<i>Hoplocephalus bitorquatus</i>)	50
green and golden bell frog (<i>Litoria aurea</i>)	50
green-thighed frog (<i>Litoria brevipalmata</i>)	38
southern myotis (<i>Myotis macropus</i>)	50
brush-tailed phascogale (<i>Phascogale tapoatafa</i>)	50
koala (<i>Phascolarctos cinereus</i>)	50
Singleton mint bush (<i>Prostanthera cineolifera</i>)	50
Illawarra greenhood (<i>Pterostylis gibbosa</i>)	50

Constraints and Options

Based on the number of species-credit species likely to require offsetting, we recommend undertaking formal surveys (in accordance with relevant guidelines) to determine presence/absence. Using this method, we can satisfy that candidate species-credit species are unlikely to occur within the proposed recipient site and therefore reduce the total cost of offsetting the required credits. The species that require targeted survey in accordance with the BAM are shown in **Table 2**.

Table 2 - Species-credit species requiring targeted survey and the survey period requirements

Species-credit Species	Potential habitat	Required Survey Period											
		J	F	M	A	M	J	J	A	S	O	N	D
<i>Acacia pendula</i> population in the Hunter catchment (<i>Acacia pendula</i> - endangered population)	Yes												
regent honeyeater (<i>Anthochaera phrygia</i>)	Yes												
<i>Cymbidium canaliculatum</i> population in the Hunter Catchment (<i>Cymbidium canaliculatum</i> - endangered population)	Yes												
white-flowered wax plant (<i>Cynanchum elegans</i>)	Yes												
<i>Eucalyptus camaldulensis</i> population in the Hunter catchment (<i>Eucalyptus camaldulensis</i> – endangered population)	Yes												
broken back ironbark (<i>Eucalyptus fracta</i>)	Yes												
slaty red gum (<i>Eucalyptus glaucina</i>)	Yes												
pale-headed snake (<i>Hoplocephalus bitorquatus</i>)	Yes												
green and golden bell frog (<i>Litoria aurea</i>)	Unlikely												
green-thighed frog (<i>Litoria brevipalmata</i>)	Unlikely												
southern myotis (<i>Myotis macropus</i>)	Yes												
brush-tailed phascogale (<i>Phascogale tapoatafa</i>)	Yes												
koala (<i>Phascolarctos cinereus</i>)	Yes												
Singleton mint bush (<i>Prostanthera cineolifera</i>)	Yes												
Illawarra greenhood (<i>Pterostylis gibbosa</i>)	Unlikely												

In addition, VIS plots are required within each PCT of the proposed recipient site (which would be one considering the results of the database searches). Approximately two VIS plots would be required to sample (in accordance with the BAM) the potential recipient site.

The survey results will determine the final credit generation (i.e. if the species isn't recorded then credits will not be generated). Following formal surveys, there are several options available to fulfil the offset requirements of those candidate species-credit species that are recoded or cannot be ruled out as not likely to occur within the proposed recipient site.

Offsetting Requirements

Fulfilling offset requirements under the *BC Act 2016* can be undertaken using one or a combination of the following offset strategies:

- In-perpetuity conservation through the establishment of a Stewardship site achieved and the retirement of credits.
- Securing required credits through the open credit market and/or
- Payments to the Biodiversity Conservation Fund.

Summary

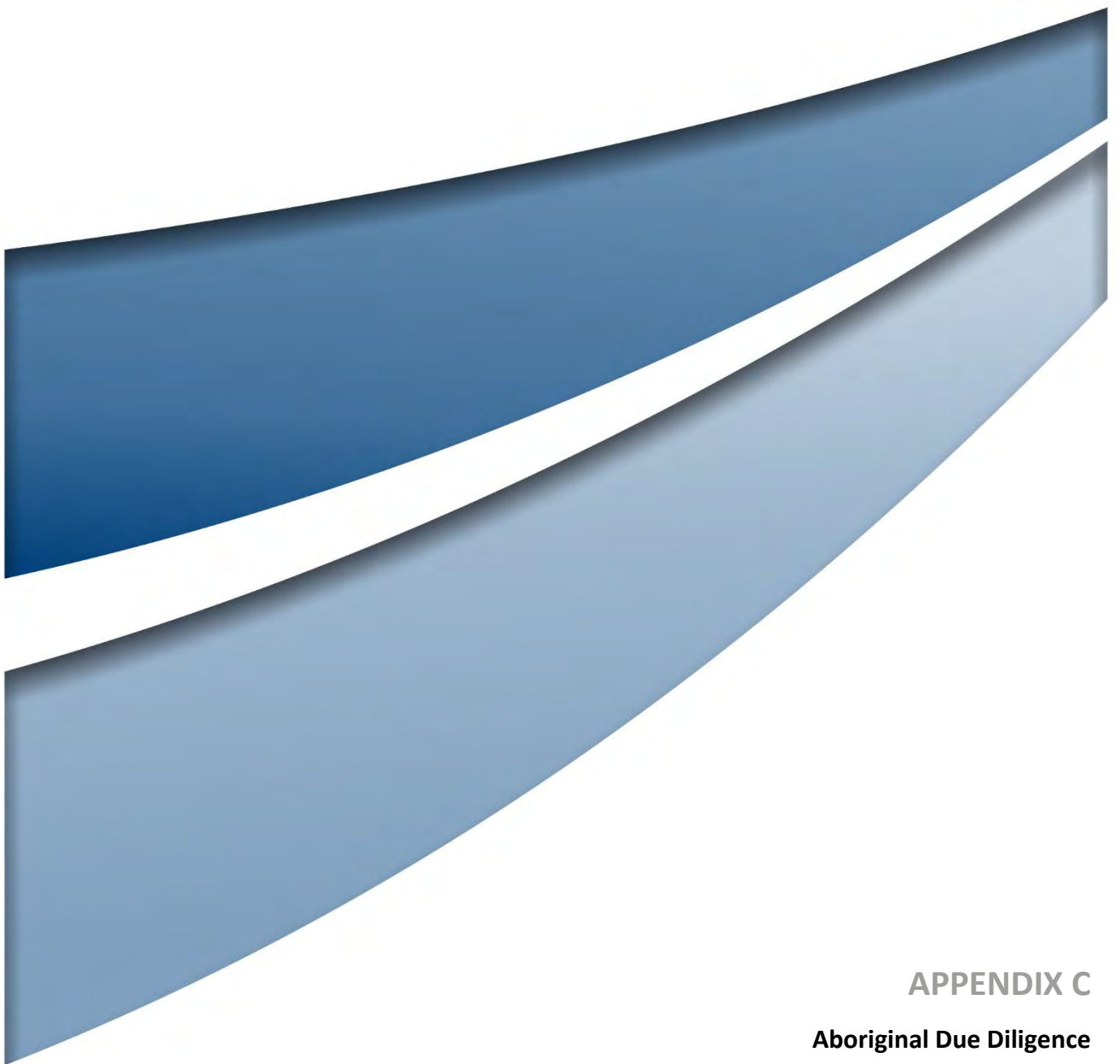
The key ecological constraints identified in this review include one PCT (1594) that conforms to *River-flat Eucalypt Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner Bioregion* EEC, three potential endangered populations and 14 threatened species that have the potential to occur on the proposed recipient site.

We trust this information meets with your current requirements. Please do not hesitate to contact the undersigned on 1300 793 267 should you require clarification or further information.

Yours sincerely

A handwritten signature in black ink, appearing to read 'SC', is positioned above the printed name.

Shaun Corry
Principal Ecologist / Accredited BAM Accessor



APPENDIX C
Aboriginal Due Diligence



View of the woodland within the study area.

ABORIGINAL DUE DILIGENCE ASSESSMENT REPORT

PROPOSED RELOCATION AREA FOR RAVENSWORTH HOMESTEAD

LOT 701 DP9363 AT BROKE, NSW

AUGUST 2019

Report prepared by
OzArk Environment & Heritage
for Glendell Tenements Pty Limited

OzArk

**OzArk
Environment & Heritage**

145 Wingewarra St
(PO Box 2069)
Dubbo NSW 2830

Phone: (02) 6882 0118

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enquiry@ozarkehm.com.au

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DOCUMENT CONTROLS

Proponent	Glendell Tenements Pty Limited	
Client		
Document Description	Aboriginal Heritage Due Diligence Assessment: Proposed Relocation Area for Ravensworth Homestead, Lot 701 DP9363 at Broke, NSW.	
File Location	OzArk Job No.	
S:\OzArk EHM Data\Clients\Glencore-Xstrata Coal\Mount Owen	2394	
Document Status V3.1 FINAL		Date 30 August 2019
Draft V1.0 Author to editor OzArk 1 st internal (Series V1 = OzArk internal edits)		V1.0 SR author 26/8/19 V1.1 BC edit 27/8/19 V1.2 SR update 28/8/19
Draft V2.0 Report Draft for release to client (Series V2 = OzArk and client edits)		V2.0 JB to client 29/8/19 V2.1 SR incorporate client comments 30/8/19
FINAL V3.0 = Final report		V3.0 OzArk to client 30/8/19 V3.1 OzArk to client 30/8/19
Prepared For		Prepared By
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Acknowledgement

OzArk acknowledge Traditional Owners of the area on which this assessment took place and pay respect to their beliefs, cultural heritage and continuing connection with the land. We also acknowledge and pay respect to the post-contact experiences of Aboriginal people with attachment to the area and to the elders, past and present, as the next generation of role models and vessels for memories, traditions, culture and hopes of local Aboriginal people.

EXECUTIVE SUMMARY

OzArk Environment & Heritage (OzArk) has been engaged by Glendell Tenements Pty Limited (the proponent) to complete an Aboriginal Due Diligence heritage assessment of Lot 701 DP93631 at Broke, NSW (the study area). The study area has potential to be impacted by the proposed relocation of the Ravensworth Homestead (the proposal). The proposal is in the Singleton Local Government Area.

The desktop assessment indicated that the study area contains landforms that have the potential to contain Aboriginal objects and that these areas cannot be avoided. As such, a visual inspection of the study area was undertaken by OzArk Director and Principal Archaeologist, Dr Jodie Benton, on 8 August 2019.

No Aboriginal sites were recorded as a result of the field assessment. However, the secondary and tertiary terrace landforms which dominate the study area were confirmed to be a sensitive archaeological landform (SAL).

While all areas of archaeological sensitivity were physically inspected, poor ground surface visibility conditions meant that these locations could not be fully assessed. Further, the relatively intact nature of the soil profile indicates the potential for archaeological material to be present at depth, and if present, such deposits may potentially have good integrity. Therefore, further investigation is required.

Further investigation should take the form of test excavation over the area shown on **Figure 2-7** following the *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* under Part 6 *National Parks and Wildlife Act 1974*. This investigation would confirm whether subsurface archaeological deposits are present, and if present, give an indication of their nature, extent and integrity. Such excavations must be preceded by Aboriginal community consultation as per the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (ACHCRs).

An *Aboriginal Cultural Heritage Assessment Report* (ACHAR), as a prerequisite to an application for an Aboriginal Heritage Impact Permit (AHIP), will be required should this investigation indicate that there are Aboriginal objects within the study area that may be harmed. All AHIP applicants must demonstrate adherence to the ACHCRs.

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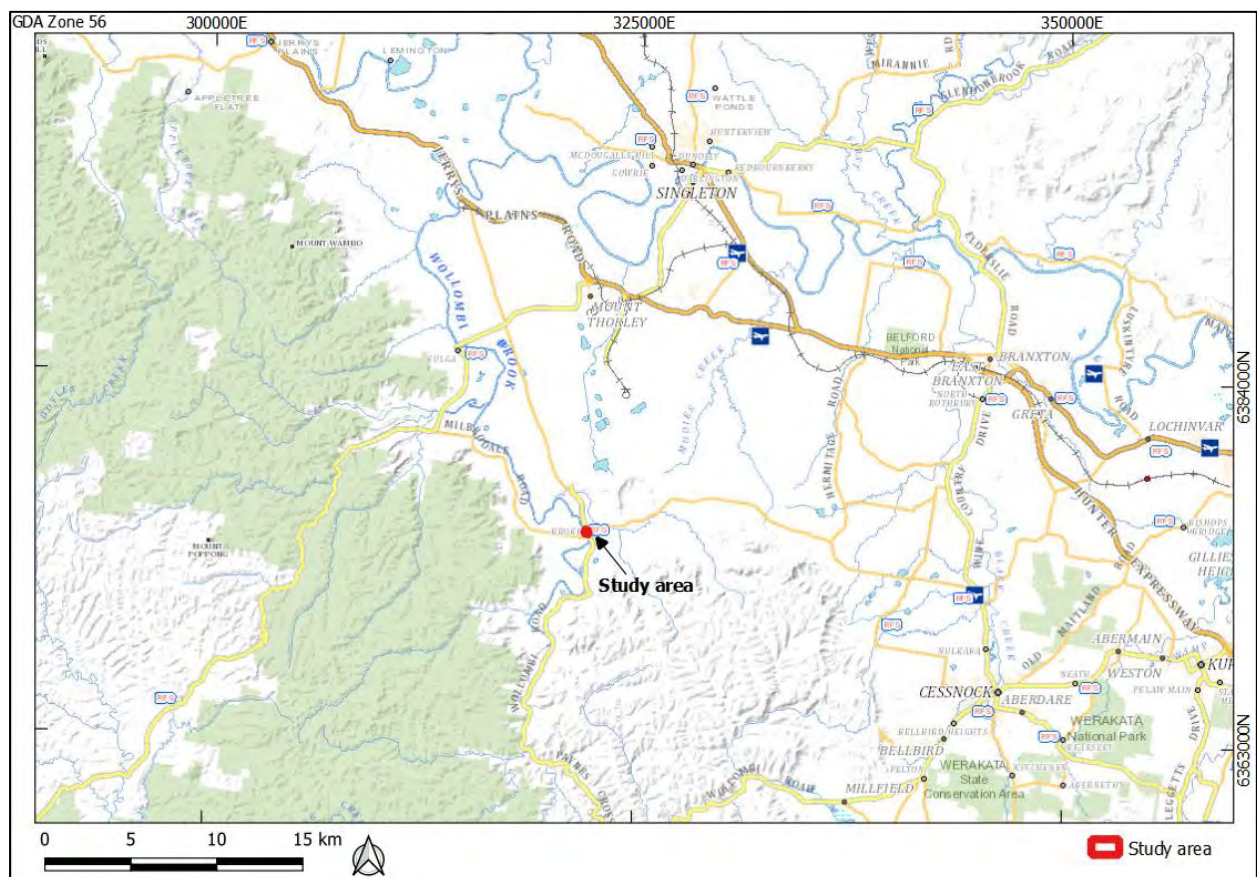
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1 INTRODUCTION

1.1 BRIEF DESCRIPTION OF THE PROPOSAL

OzArk Environment & Heritage (OzArk) has been engaged by Glendell Tenements Pty Limited (the proponent) to complete an Aboriginal Due Diligence heritage assessment of Lot 701 DP93631 at Broke, NSW (the study area). The study area has potential to be impacted by the proposed relocation of the Ravensworth Homestead (the proposal). The proposal is in the Singleton Local Government Area (LGA) (**Figure 1-1**).

Figure 1-1. Map showing the location of the study area in relation to Singleton.



1.2 BACKGROUND

An Environmental Impact Statement is currently being prepared under Part 4, Division 4.7 of the *Environmental Planning and Assessment Act 1979* for the proposed Glendell Continued Operations Project (GCOP). GCOP will include the extension of the Glendell Mine to expand open-cut mining. The Ravensworth Homestead complex¹ is located within the GCOP boundary, and as such, it is proposed the Ravensworth Homestead and associated structures will be relocated.

¹ Ravensworth Homestead is listed as I41 on Schedule 5 of the Singleton Local Environmental Plan.

The current assessment assesses one of the locations being considered as a proposed relocation area.

1.3 STUDY AREA

The study area encompasses 5.5 hectares (ha) of land within Lot 701 DP93631 at Broke, NSW (**Figure 1-2**). The study area is part of McNamara Park and is bounded to the east by Wollombi Street; south by Milbrodale Road and west by Wollombi Brook.

1.4 ASSESSMENT APPROACH

The desktop and visual inspection component for the study area follows the *Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales* (Due Diligence; DECCW 2010). The field inspection followed the *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in New South Wales* (OEH 2011).

Figure 1-2: Aerial showing the study area.



2 ABORIGINAL DUE DILIGENCE ASSESSMENT

2.1 INTRODUCTION

The National Parks and Wildlife Regulation 2009 (NPW Regulation) made under the *National Parks and Wildlife Act 1974* (NPW Act) advocates a Due Diligence process to determining likely impacts on Aboriginal objects. Carrying out Due Diligence provides a defence to the offence of harming Aboriginal objects and is an important step in satisfying Aboriginal heritage obligations in NSW.

2.2 DEFENCES UNDER THE NPW REGULATION 2009

2.2.1 Low impact activities

The first step before application of the Due Diligence process itself is to determine whether the proposed activity is a “low impact activity” for which there is a defence in the NPW Regulation. The exemptions are listed in Section 80B (1) of the NPW Regulation (DECCW 2010a: 6).

The activities of the proponent are not considered a ‘low impact activity’. As such, the Due Diligence process must be applied.

2.2.2 Disturbed lands

Relevant to this process is the assessed levels of previous land-use disturbance.

The NPW Regulation Section 80B (4) (DECCW 2010a: 18) define disturbed land as follows:

Land is disturbed if it has been the subject of a human activity that has changed the land’s surface, being changes that remain clear and observable.

Examples include ploughing, construction of rural infrastructure (such as dams and fences), construction of roads, trails and tracks (including fire trails and tracks and walking tracks), clearing vegetation, construction of buildings and the erection of other structures, construction or installation of utilities and other similar services (such as above or below ground electrical infrastructure, water or sewerage pipelines, stormwater drainage and other similar infrastructure) and construction of earthworks.

No portions of the study area are considered to be “disturbed land” as per the Due Diligence guidelines and therefore the Due Diligence process must be applied. Several vehicle tracks traverse the study area, however, it cannot be determined at a desktop level whether these access tracks has been graded.

In summary, it is determined that the proposal must be assessed under the Due Diligence Code. The reasoning for this determination is set out in **Table 2-1**.

Table 2-1: Determination of whether Due Diligence Code applies.

Item	Reasoning	Answer
Is the activity a Part 3A project declared under section 75B of the EP&A Act?	The proposal will be assessed as part of a new development application ² .	No
Is the activity exempt from the NPW Act or NPW Regulation?	The proposal is not exempt under this Act or Regulation.	No
Will the activity involve harm that is trivial or negligible?	The activity will not involve harm that is trivial or negligible.	No
Do either or both of these apply: Is the activity in an Aboriginal place? Have previous investigations that meet the requirements of this Code identified Aboriginal objects?	The activity will not occur in an Aboriginal place. No previous investigations have been conducted within the study area.	No
Is the activity a low impact one for which there is a defence in the NPW Regulation?	The proposal is not a low impact activity for which there is a defence in the NPW Regulation.	No
Do you want to use an industry-specific code of practice, adopted by the NPW Regulation or other Due Diligence process?	No	No
The Due Diligence Code of Practice applies		

2.3 APPLICATION OF THE DUE DILIGENCE CODE OF PRACTICE TO THE PROPOSAL

To follow the generic Due Diligence process, a series of steps in a question/answer flowchart format (DECCW 2010a: 10) are applied to the proposed impacts and the study area, and the responses documented.

2.3.1 Step 1

Will the activity disturb the ground surface or any culturally modified trees?

Yes, the proposal will impact the ground surface and may impact culturally modified trees if present.

The exact nature of the proposed impacts has not yet been finalised. Impacts associated with the proposal will include vegetation clearing, regrading (including filling) and trenching for footings and services. These impacts could occur anywhere within the study area.

The study area is densely vegetated and therefore the proposal may impact culturally modified trees if they are present.

2.3.2 Step 2a

Are there any relevant confirmed site records or other associated landscape feature information on AHIMS?

No, there are no previously recorded sites within the study area.

² This development application would be separate to GCOP.

A search of the Department of Premier and Cabinet administered Aboriginal Heritage Information Management System (AHIMS) database completed on 19 August 2019 returned 82 records for Aboriginal heritage sites within a 10 by 10 kilometre (km) search area that includes the study area (GDA Zone 56, Eastings: 317000–327000, Northings: 6370000–6380000) (**Appendix 1**).

The AHIMS results show two sites near the study area, 37-3-2729 and 37-6-2730 (**Figure 2-1**). 37-3-2729 (Broke Bridge PAD1) is listed as an artefact with potential archaeological deposit (PAD), located 95 metres (m) southwest of the study area. The PAD extent is 70 m in length and varies in width from 1 m where it joins Milbrodale Road in the west and up to 15 m wide adjacent to Wollombi Brook (McCardle Cultural Heritage 2011). Site 37-6-2730 (Broke Bridge PAD2) is listed as a PAD, 12 m south of the study area. This PAD is 50 m in length and varies in width from 1 m where it joins Milbrodale Road in the east up to 15 m adjacent to Wollombi Brook (McCardle Cultural Heritage 2011). Based on the provided extent of 37-6-2730, the site PAD does not extend into the study area, however, the landform (elevated terrace) assessed as having PAD does. Both sites are listed as ‘valid’ on AHIMS, however, the archaeological assessment which records the sites recommended test excavations be completed prior to the construction of the bridge and road approaches. **Section 2.3.3.4** further outlines the archaeological assessment for these PADs, which was completed for bridge upgrade works over Wollombi Brook on Milbrodale Road.

Figure 2-1: Location of 37-3-2729 and 37-6-2730 in relation to the study area.



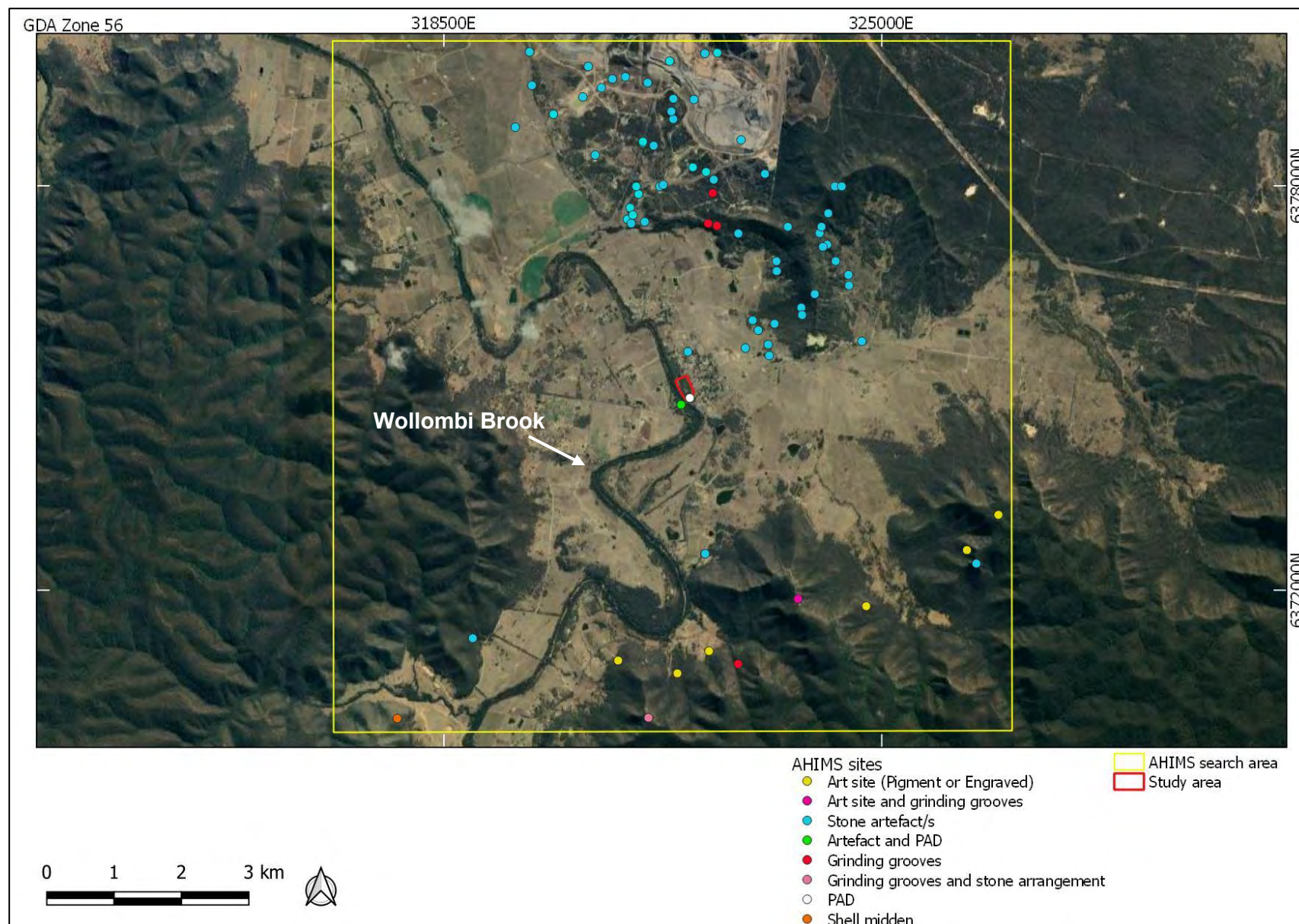
Isolated finds and artefact scatters together form 82% of recorded AHIMS sites in the search area, suggesting that these are the most likely site types to be encountered in the landscape. A variety of other site types are recorded in the local area, albeit at a low frequency. Such site types include art sites, grinding grooves, shell middens, PADs and a stone arrangement. Artefact sites have been recorded on a variety of landforms including flat ground, slopes, and crests and ridges. However, many of the other site types such as art sites and grinding grooves are located within the surrounding escarpment landforms where geological features such as outcropping sandstone is more dominant.

The concentration of sites to the north of the study area is the result of a large amount of assessment associated with the Bulga Coal Complex. This level of assessment has skewed the evidence of Aboriginal occupation in the region. If the same level of assessment was applied to other portions of the AHIMS search area, it is likely that the concentration of sites in the north would not be so predominant.

Figure 2-2 shows all previously recorded sites in relation to the study area and **Table 2-2** shows the types of sites that are close to the study area.

Table 2-2: Site types and frequencies of AHIMS sites near the study area.

Site Type	Number	% Frequency
Stone artefact/s	67	82%
Art site (pigment or engraved)	6	7%
Grinding grooves	4	5%
Grinding grooves and stone arrangement	1	1.2%
Shell midden	1	1.2%
Art site and grinding grooves	1	1.2%
Artefact with PAD	1	1.2%
PAD	1	1.2%
Total	82	100%

Figure 2-2: Previously recorded sites in relation to the study area.

2.3.3 Step 2b

Are there any other sources of information of which a person is already aware?

Yes, there are sources of information that would indicate the presence of Aboriginal objects in the study area.

Ethno-historic sources

The study area is located in the Wonnarua tribal area of the upper Hunter River Valley.

Tocomwall (2017: 49) notes that ethnographic accounts and anthropological notes written in the mid-to late-19th century indicate that the traditional territory of the Wonnarua people extended over a two thousand square mile area of land that included the Hunter River and all its tributaries from within ten miles of Maitland to the apex of the Liverpool Ranges. This interpretation is challenged by the Wonnarua Local Aboriginal Land Council (Tocomwall 2017: 482) who state that there is much debate about the tribal boundaries and that the dividing line between the Wonnarua and the Kamilaroi may have been much further south in the area of 'Jerrys Plains'.

The Wonnarua people, and their Kamilaroi neighbours, lived in an environment rich in food resources. Freshwater fish, shellfish, reptiles, mammals, birds and plant food provide a diverse diet (see Brayshaw 1981). Brayshaw (1986: 82) suggests that inland groups visited the coast during the summer when marine resources were plentiful, and coastal groups travelled inland to participate in the winter kangaroo hunts. Trade and/or exchange also occurred between the coastal and inland groups including visiting by coastal and inland groups for initiations and ceremonies seemed to occur. These were conducted within earthen circles. Carved trees were associated with these sites (Brayshaw 1981: 12). Reed spears and shells were traded inland for possum skin rugs and fur cord (Brayshaw 1986: 41).

Aboriginal cultural values

Connect for Effect Pty Limited (Connect for Effect) were engaged by Bulga Coal Management (BCM) to undertake Aboriginal community consultation for the Bulga Optimisation Project (BOP) assessment and to author the Aboriginal Cultural Heritage Assessment Report (ACHAR) (Connect for Effect 2013). Also contributing to the ACHAR were confidential cultural values assessments authored by two Wonnarua Knowledge Holder groups, the Plains Clans of the Wonnarua People (PCWP) and the Wonnarua Nation Aboriginal Corporation (WNAC).

The BOP consultation recorded several cultural values associated with the immediate area surrounding the study area (Connect for Effect 2013: 147–149):

- Some Registered Aboriginal Parties (RAPs) stated that they believe the Broke and Bulga area is sacred as it is surrounded by features linked to spiritual Creation stories

- The interaction between connections to Country and cultural identity is highly important especially as the traces of the past and their memories contributed to maintaining distinctive Wonnarua and other Aboriginal people's culture, spirituality and cultural interaction with the landscape
- The pathways and water systems to and from Creation places and places of ceremony are of high cultural value. All waterways, creek lines and tributaries in the local area were identified as culturally important as they were believed to be part of the essential spiritual meaning of the place and the people. Nine Mile and Loders Creeks, Wollombi Brook, Monkey Place Creek and more broadly the Hunter and Goulburn Rivers are important parts of the pathways to and from ceremony and to and from sacred Creation places and as such have immeasurable cultural values
- Ethnobotanical knowledge identified indigenous flora and fauna as important cultural resources
- Most RAPs expressed high levels of emotion regarding landscape transformation and fragmented cultural and archaeological sites.

Key cultural values identified in the cultural values assessment in the local area include the now-relocated Loders Creek grinding grooves, Baiame Cave, Lizard Rock (also known as Yellow Rock) and the site of the Bulga Bora Ground (**Figure 2-3**).

The Loders Creek grinding groove site consists of 49 grooves (Dyall 1981) or 55 grooves (Brayshaw on the 1991 site card for #37-6-0148) located in three groups (Dyall 1981) or four groups (Brayshaw 1991 site card). The site was located on sandstone shelves and broken boulders in the western arm of Loders Creek, located 9 km north of the study area. As part of BOP, the grinding grooves were relocated further north along Loders Creek due to the extension of approved mining activities in this area (OzArk 2017).

Baiame Cave is located approximately 10.8 km northwest of the study area near Milbrodale. It consists of a large sandstone shelter containing the figure of the creator Baiame who is depicted with wide, all-seeing, eyes and outstretched arms. The Wonnarua dreaming holds that the Hunter Valley was created by the great spirit, Baiame, and before this, there was no life (Australian Museum 2012). Wonnarua dreamtime stories explain how the region came into being and identify Creation Places and Dreaming tracks (paths of Ancestor beings, or songlines) within the landscape (Miller 1985). The figure is red and outlined in white ochre. Seven stripes in white ochre are shown beneath the arms (three on one side, four on the other). Below and surrounding the figure are negative stencils of hands, axes and boomerangs executed primarily in white ochre (often indicating 'family caves': Jones 2009). There does not appear to be any over-painting at the site and the art work remains reasonably fresh, although anecdotal evidence suggests that the paint has faded with time³. The painting style and form of the art is indicative of other examples

³ <http://lindseyofoz.blogspot.com.au/2007/10/aboriginal-culture-trip.html>

in the greater Sydney Basin and while no date on the art work has been suggested, similar work in the region suggests it may be up to 1,500 years old⁴. This site is a major feature in the local landscape for present-day Aboriginal people, as it must also have been for past Aboriginal people.

Lizard Rock is also important to the local Aboriginal people. This escarpment (not a rock as such) is located in State Forest adjoining Yengo National Park and it dominates the skyline to the south of Broke. Its outline is suggestive of a lizard and it holds strong spiritual connections for Aboriginal people of the area (OzArk 2013). The story of Lizard Rock is part of the Wonnarua dreaming and is explained in story and song:

A great lizard (or goanna) wended its way across the land from the coast creating valleys and mountains. As it made its way towards the plains country it was met by the warriors there who commanded it to stop. It resisted, and the warriors killed it and smashed its head. It can be seen to this day petrified as Yellow Rock at Broke. To ensure that it stays that way, to the left of the road at Broke lies a line of rock formations which are said to be warriors who stand guard, just in case it chooses to revive itself and continue its journey.

Eric Taggart to W.J. Needham (*University of Newcastle Archives*)

In 1852 the people of Broke witnessed the last recorded Bora held in the Hunter Valley. The Bora was an Aboriginal ceremony which amongst other rites included the initiation of young males into manhood. The Bora Ground was located further north on Wollombi Brook. Sadly, nothing remains of this ceremonial ground today.

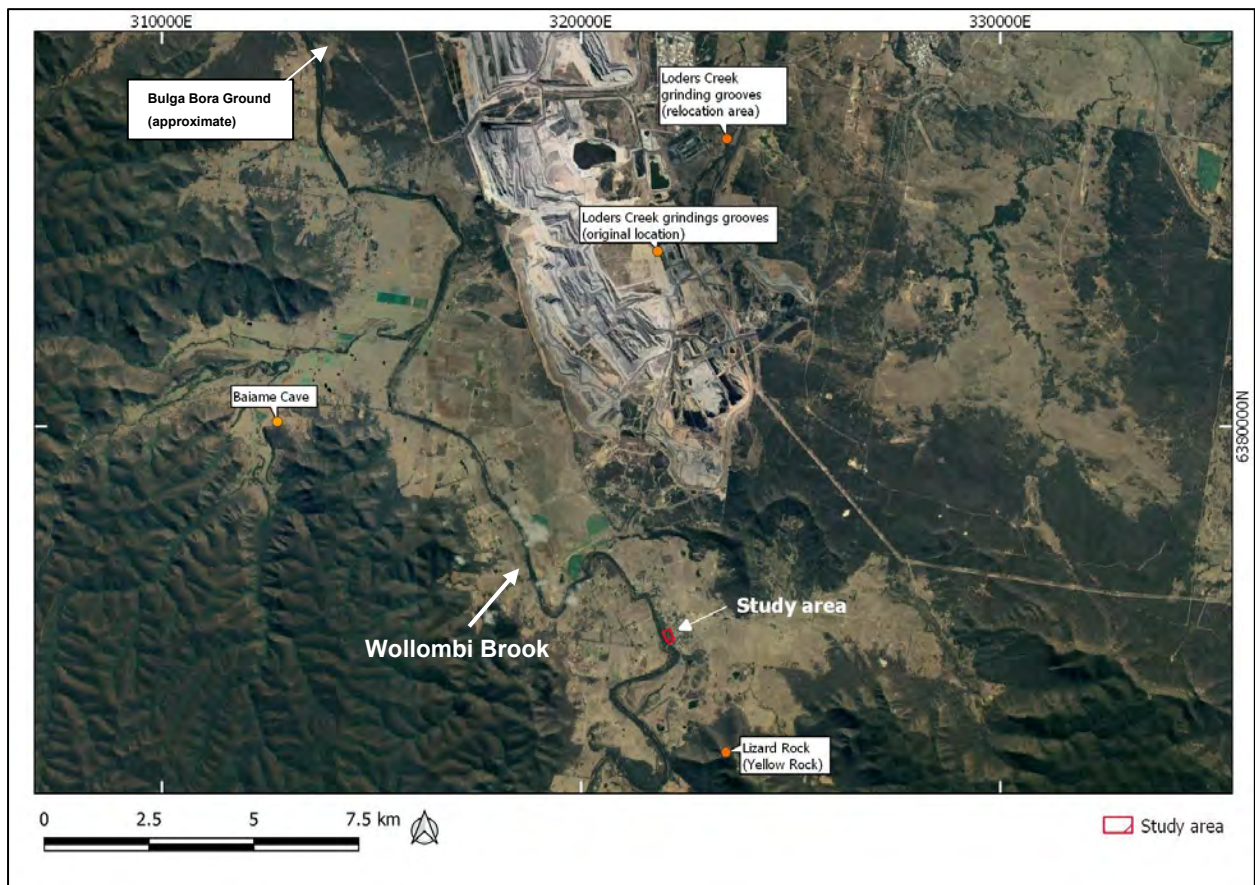
Here also is to be seen the remains of an ancient Bora ground with its sacred circles still defined by small mounds of earth and a being of carved trees still bearing the curious emblematical devices which marked this strange and mystical ceremony of initiation of the young men of the tribe to tribal rites...

This Bora ceremony was held in the year 1852. On reliable authority of residents of the locality it was attended by between 500 and 600 Aboriginal people from the various tribes from as far as Mudgee and Goulburn...

Alexander Eather of Bulga (1921)

There are no known cultural values or Aboriginal sites pertaining directly to the location of the proposed work, although during consultation for BOP it was noted that Wollombi Brook, which is adjacent to the study area, is believed to be a pathway to creation places (Connect for Effect 2013).

⁴ Jillian Huntley, Australian Geographic [October 13, 2011]. Jillian from the University of New England has used an X-ray gun to analyse the chemical makeup of rock art at Biamie Cave, without destroying the sample. This process was to characterise the artwork, not to date the pigment.

Figure 2-3: Location of sites with high cultural values in relation to the study area.

Regional archaeological context

Within the upper Hunter Valley, Aboriginal site types such as isolated finds and artefact scatters are the most common. They are generally identified through erosional processes, which also act to remove the stratified and datable context of archaeological sites. Where datable materials such as charcoal are identified at an archaeological site, the association between the dated sample and cultural materials may not be provable, unless the features comprise an intact feature such as a hearth (Dean-Jones and Mitchell 1993). Although, very few archaeological sites within the Hunter Valley have been directly dated by either radiocarbon or thermoluminescence dating, the erosional nature of many of the open sites means there are limitations in applying this technology.

Stone artefacts exposed on the ground surface may result from a single visit or from discard events from repeated visits. Such visits could span time periods from 10s to 1000s of years. Notable archaeological investigations in the Hunter Valley have provided dates of occupation for a number of sites that contribute to our understanding of the antiquity of Aboriginal occupation of the region, these include:

- Glennies Creek (Falbrook), north of Singleton, where a hearth located on a burial alluvial terrace provided radiocarbon dates between 13020 ± 360 BP (years before present) and 34580 ± 650 BP (Koettig 1986)

- Wollombi Brook, outside of the study area, where artefacts identified on a terrace in a clay Horizon were dated to late Pleistocene (between 18,000 and 30,000 BP) by a geomorphologist (reported in Kuskie and Kamminga 2000: 215).

Several studies and theories have been surmised regarding how Aboriginal people used the landscape in which they lived. These theories attempt to explain or interpret the location and nature of the archaeological record in any region. It is generally assumed that the environment, and implicitly resource distribution, was a major factor influencing patterns of occupation.

Previous assessments in the vicinity of the study area

An investigation undertaken in the vicinity of the study area has been summarised below.

2.3.3.1 *Salvage of Aboriginal Sites within Beltana No.1 Mine, near Broke, NSW (Umwelt 2007)*

This project spanned over several years, with several different Aboriginal Heritage Impact Permits (AHIPs). The survey results led Umwelt to a conclusion that traditional Aboriginal people frequented the project area and a salvage of surface artefacts was proposed. The salvage area for this project was 3 km north of the current study area.

A total of 205 artefacts were collected in the first phase of salvage, early 2003, that yielded the following conclusions:

- Majority of the artefacts collected were manufactured from mudstone at 68% with the second most popular material collected being silcrete (23%). Other raw materials included tuff, chert, volcanic rock, quartzite, chalcedony, glass and fine grained siliceous
- The raw material found were in line with expected sources known in the geology of the area
- Majority of the artefacts were made by a knapping technique known as freehand percussion resulting in flakes
- The higher order tributary systems were subject to more intensive occupation than other landforms in the area
- The high portion of heat shattered artefacts from bushfires suggests that the artefacts may have been exposed on the surface for an extended period of time
- The Hunter River was the source of a variety of raw materials found during the collection
- One of the sites (BMU19) was still occupied after European settlement of the area and perhaps as much as 20 years after occupation. This conclusion was made from the finding of a base of a hand-blown glass bottle. This type of bottle was commonly used in 1860s, it also displayed multiple flake scars
- Camping appeared to focus near a tributary of Wollombi Brook

The next surface collection spanned over four days and occurred seven months later in November 2003. A total of 20 areas beside the unnamed tributary of Wollombi Brook (noted as being the northern drainage) were known to have artefacts. A total of 2,223 artefacts were salvaged. The following are the field results and conclusions:

- 39 grinding grooves were located in sandstone on a creek bed of the northern drainage (BMU1)
- It was also noted that many artefacts would have been lost in the area through creek bank instability and flooding events
- Majority of the sites found were located within 200 m of the northern drainage near sandstone outcrops or on the tributary confluence, with isolated finds appearing on other landforms such as ridge crests or gentle slopes within close proximity to a road or gully erosions
- Grader scrapes at BMU2 were used to test areas with low ground surface visibility as results of the finding of surface artefacts was biased towards larger more visible artefacts. The scrapes yielded the following results and conclusions:
 - 47 artefacts were recovered in total, with the majority of the distribution being in the area with the gentlest gradient near the tributary channel
 - Hearths and ovens are almost certain to be present, however, due to geomorphic processes, they would have been destroyed. Other evidences of Aboriginal occupation may have been lost as well due to channel widening.

In total, flakes and broken flakes made up the bulk (78.6%) of the total assemblage. The artefacts were mainly manufactured from mudstone, with silcrete being the next most popular material used. Other raw materials included tuff, chert and quartz. Various types of artefacts found came to several conclusions:

- The recovery and location of bondi points, backed blades, geometric microliths and an elouera indicate that a portion of the assemblage was in the Holocene age. This could date anywhere from 7000 BP
- Grindstones and anvils were located mainly on the main channel of the northern drainage. This suggests food processing and the presence of women
- Raw materials located at the site would have been sourced from the Hunter River. The raw materials found at the site were not uncommon of the previous findings in the Hunter River
- Some artefacts were found to be heat treated, however, due to the lack of evidence to suggest that thermal pre-treatment was occurring on site, the artefacts was probably subject to the heat post-discard.

2.3.3.2 South Bulga Colliery South-east Extension (ERM 2000)

In 2000, ERM completed an archaeological assessment for the South Bulga Colliery South-East Extension project, located at its closest 900 m east of the study area. 31 sites were recorded

during the assessment, including 16 artefact scatters, 13 isolated finds, two rock shelters. Characteristics of the site types recorded are listed below:

- Artefact sites:
 - Sites largely contained <27 artefacts, with most containing <10
 - Largest were SBU 10 (26 artefacts, low spur just beyond flats, distinct concentration, ants' nest & gravels) and SBU 25 (200 artefacts, 20 m from small tributary of Monkey Place Creek, exposed by sheet wash, possibly extends further)
 - Artefact density: generally low (range: 0.02 / sq. m to 1.1 / sq. m. It was noted that SBU30 (1.1 / sq. m) was a very small site with only an ants' nest exposure)
 - Raw materials: Mudstone (51%), Silcrete (39%), Quartz (3%), Chert (4%), Quartzite (2%), Igneous (1%), Unidentified (<1%). Broadly consistent with regional distribution
 - Artefact typology: fragment (n=193, 61%), flake (n=95, 30%), core (n=18, 6%), blade (n=6, 2%), scraper (n=3, 1%), microlith (n=1, <1%). Survey Unit 1 contained all artefact types, Survey Unit 3 was most limited in range (only flakes and fragments), Survey Unit 4 had lowest numbers (eight artefacts only). Survey Unit 1 was largest overall (266 artefacts), followed by Survey Unit 2 (31 artefacts), Survey Unit 3 (11 artefacts)
 - Modified artefacts: most artefacts with no retouch (n=299, 94%). 17 had retouch, all from Unit 1, mostly at SBU25. 55% of retouched pieces were flakes
 - Artefact length: most between 20 mm and 50 mm. Largely consistent across landforms
 - Cortex: Most had no cortex (79%). Mean cortex % across Survey Units ranged from 17.5 to 40.
- Rock shelters:
 - Weathered conglomerate. No rock art, small disturbed artefact scatters. 10 very small overhangs on southern side of Vere⁵ (determined to be too small for habitation). SBU 28 & 29 were on eastern side of Vere. Possible depth of deposit. Evidence of recent usage / disturbance. Soot covered ceilings.

2.3.3.3 Bulga Optimisation Project

The assessment area for the BOP covered approximately 3615 ha located at its closest 2 km north of the study area.

Archaeological survey (OzArk 2013)

⁵ The Vere is the escarpment north of Monkey Place Creek and Broke.

The survey undertaken for the BOP identified 14 site complexes⁶ covering an area of approximately 198 ha, nine open sites and six isolated finds within the BOP disturbance area. The two grinding groove sites at Loders Creek and BMU1 were included within the site complexes.

A further 42 previously recorded sites were located outside these areas but within the BOP disturbance area making, in total, 71 sites that were partially or totally impacted by the BOP. The majority of these sites were low density artefact scatters or isolated finds.

Test excavation program (OzArk 2013)

The test excavation program for the BOP undertaken by OzArk in 2012 included the excavation of 196 0.5 m x 0.5 m excavation squares (or 49 m²) resulting in an assemblage of 235 artefacts recovered from BOP SC-1 with PAD, BOP SC-6 with PAD and BOP SC-10 with PAD.

Analysis of the soils and stratigraphy recorded showed that all sites had a very shallow A-Horizon soil profile that was lacking in archaeological stratigraphy. At BOP SC-6 with PAD on Nine Mile Creek, soil profiles indicated that some of the present A-Horizon soils had been redeposited, probably at some time in the modern period. At BOP SC-10 with PAD (on 'Swan Lake'), the A-Horizon soils were very thin in the areas investigated. At BOP SC-1 with PAD, A-Horizon soil loss and riparian erosion had previously affected the area, however, the A-Horizon soil depth was deeper, and evidence of disturbance was less.

The distribution of artefacts showed the following features from each site:

- BOP SC-1 with PAD. In several instances it was seen that exposed artefact scatters on the current erosion edge of the northeast drainage did not extend with any sort of artefact density into the non-eroded portions of the site. However, at several locations, clusters of artefacts were recorded up to 50 m from the erosion edge and so there remained the possibility of further undetected clusters within 50 m of the creek, particularly on the western bank. Some of these clusters, such as at TP23, showed evidence of being *in situ* knapping floors with possibly associated features (a cracked stone feature). No artefacts were recorded in any of the test excavation squares on the eastern bank.
- BOP SC-6 with PAD. Artefacts in the area investigated did not display any observable patterning but were present on both banks of Nine Mile Creek without any evidence of substantial clustering. As noted above, some of the A-Horizon soils at this site had been redeposited and any observed distribution could be entirely coincidental.
- BOP SC-10 with PAD. In several instances it was seen that exposed artefact scatters on the current erosion edge of Swan Lake did not extend with any sort of artefact density into the non-eroded portions of the site (on the eastern bank). Very low artefact densities were recorded in the non-eroded portions of the site on the eastern bank of Swan Lake.

⁶ The approach taken by OzArk to site recording was that individual sites considered to be linked by geographical proximity were grouped into a broader site complex

BOP salvage program (OzArk 2017)

A total of 6,525 artefacts were recovered from the surface collection across the 59 sites and site complexes salvaged. Characteristics of these artefacts are as follows:

- Unmodified flakes dominated the assemblage (68%) followed by unmodified blades and pieces of shatter (both averaging 10%)
- Materials identified included mudstone (58%) and silcrete (37%). Chert, quartz, quartzite, tuff, petrified wood, basalt, volcanics and other materials including glass made up the remaining assemblage
- Over 75% of the surface assemblage displayed no cortex and were recorded to be at a tertiary stage of reduction
- Most artefacts recorded in the surface assemblage were complete (62%) with the most-common break type being the loss of the proximal end of the flake (distal fragments)
- The most common size category for artefacts in the surface assemblage was Category 2 (20–40 mm) followed by Category 1 artefacts (0–20 mm)
- 168 artefacts displayed some form of retouch (2.57% of the surface assemblage).

6,359 artefacts were recovered from archaeological excavations at 12 sites. These excavations showed that the most-common artefact:

- Is likely to be an unmodified flake
- Is likely to be sourced from silcrete
- Has been struck from a core reduced without rotation (i.e. either a single or an opposed platform core)
- Is 10–20 mm in size
- Has a feather termination
- Has a small (up to c. 3 mm) platform
- Has a simple platform where the artefact has been removed from a core prepared by first removing a flake at right-angles to the flake that has been removed
- At a tertiary stage of reduction.

The most noticeable variation between the surface and excavation assemblages was found in the raw materials used for artefact manufacture. Comparisons of the raw materials shows that within the surface assemblage indurated mudstone is 58.28% of the assemblage and 37.21% is silcrete while the excavation assemblage has silcrete at 50.68% and indurated mudstone at 41.52%. When looking at the three site complexes that recorded the most excavation artefacts (BOP SC-1 with PAD, BOP SC-8 with PAD and BOP SC-9 with PAD), the following statistics can be determined:

- These three complexes recorded a total of 5,712 artefacts or 90% of the total excavation assemblage.
- BOP SC-1 with PAD recorded 223 mudstone artefacts (34.5%) and 306 silcrete artefacts (47%); a 12.5 point difference in favour of silcrete (total artefacts = 646)
- BOP SC-8 with PAD recorded 715 mudstone artefacts (53.5%) and 549 silcrete artefacts (41%); a 12.5 point difference in favour of mudstone (total artefacts = 1,336)
- BOP SC-9 with PAD recorded 1,511 mudstone artefacts (40.5%) and 1,954 silcrete artefacts (52.3%); a 12 point difference in favour of silcrete (total artefacts = 3,730).

2.3.3.4 New Dual Lane Concrete Bridge Over Wollombi Brook at Broke (McCardle Cultural Heritage 2011)

In 2011, McCardle Cultural Heritage completed an archaeological assessment for a proposed bridge over Wollombi Brook, located directly south of the current study area. Two PADs were identified on either side of Wollombi Brook (37-3-2729 and 37-6-2730) within elevated landforms adjacent to Wollombi Brook (**Section 2.3.2** and **Figure 2-1**). However, there are discrepancies in the site recordings, for example, PAD 1 is described in the report as being located on the eastern side of Wollombi Brook, however, the AHIMS location for PAD 1 is on the western side of Wollombi Brook and vice versa for PAD 2.

The archaeological assessment recommended test excavation be completed on the eastern side of Wollombi Brook only as the western side would not be impacted by the project. Despite efforts by OzArk to gain a copy the test excavation report from the consultant, AHIMS and the Singleton Council, it has not been able to be obtained. As such, the archaeological nature of the PAD is unknown. We will continue to attempt to source this report as it would give an indication as the potential of subsurface deposits extending into the proposed homestead relocation study area at Broke.

Aboriginal community involvement

No Aboriginal community members accompanied the current visual inspection. This assessment was completed initially to understand the archaeological and cultural context of the study area.

Aboriginal community consultation is not a formal requirement of the Due Diligence process (DECCW 2010a Section 5).

2.3.4 Step 2c

Are there any landscape features that are likely to indicate presence of Aboriginal objects?

Yes, the study area contains landforms with identified archaeological sensitivity.

The Due Diligence Code (DECCW 2010) specifies several landscape features which are most associated with the likely presence of Aboriginal objects and which therefore require further

assessment if present. These are areas that are: within 200 m of waters; located within a sand dune system; located on a ridge top, ridge line or headland; located within 200 m below or above a cliff face; within 20 m of or in a cave, rock shelter, or a cave mouth.

The study area includes primary, secondary and tertiary terrace landforms within 200 m of Wollombi Brook (**Figure 2-4**). Wollombi Brook is a north-flowing, permanent water source which drains directly into the Hunter River. As such, the study area is noted in the Due Diligence Code as having heightened archaeological sensitivity.

The study area consists of both the Saxonvale and Wollombi Soil Landscapes (Kovac and Laurie 1991) (**Figure 2-5**). Wollombi Soil Landscapes are associated with floodplains of Wollombi Brook and consists of alluvial sandy soils which can have a depth greater than 1 m. Soils include brown to brownish-black or yellowish-brown loamy sand and dark reddish-brown loam with fine sand. The Saxonvale Soil Landscape is associated with ridges and upper slopes as well as lower gradient footslopes. Soils generally comprise brownish-black sandy loam.

The study area is comprised of open woodland with mature and regenerating vegetation. Species present include box and gum trees.

Through examination of the landscape features present and previous assessments completed in close proximity to the study area, it is predicted that there is a high potential for Aboriginal sites to be present. This is due to the presence of elevated landforms adjacent to a permanent water source (Wollombi Brook). Based on the landforms present, if new sites are recorded, artefact scatters and isolated finds are expected to be the most likely site types encountered. Artefacts are most likely to have been manufactured from silcrete or mudstone and consist mostly of unmodified flakes. PADs may be present and relatively *in situ*, especially at depth, due to the overall low levels of prior ground surface disturbance and soil type present. Scarred trees are possible as the study area is densely vegetated and its proximity to a permanent watercourse increases the likelihood of such a site being present. While art sites within rock shelters and grinding groove sites are common in the surrounding area, these site types are not expected due to an absence of necessary geological formations.

2.3.5 Step 3

Can harm to Aboriginal objects listed on AHIMS or identified by other sources of information and/or can the carrying out of the activity at the relevant landscape features be avoided?

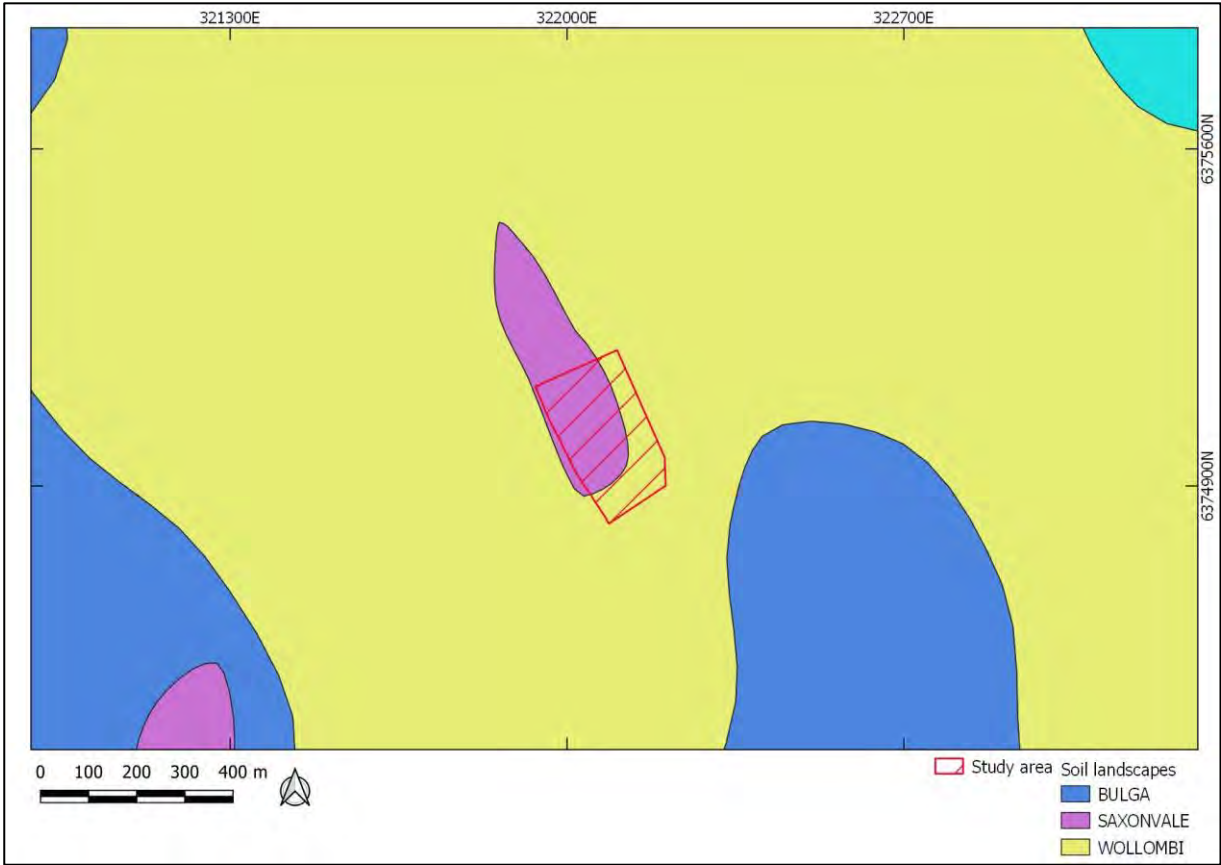
No. Landforms with identified archaeological sensitivity may be impacted by the proposal.

As it is not possible to avoid landforms within 200 m of the Wollombi Creek, the Due Diligence process advances to Step 4.

Figure 2-4: The study area in relation to waterways.



Figure 2-5: Soil landscapes of the study area.



2.3.6 Step 4

Does a desktop assessment and visual inspection confirm that there are Aboriginal objects or that they are likely?

Yes, the visual inspection of the study area confirmed that Aboriginal objects are likely to be present.

The visual inspection of the study area was undertaken by OzArk Director and Principal Archaeologist, Dr Jodie Benton, on 8 August 2019. Standard archaeological field survey and recording methods were employed (Burke and Smith 2004). All landforms within the study area were inspected, however, landforms identified as having greater Aboriginal archaeological sensitivity, i.e. the upper terraces, were inspected in greater detail (**Figure 2-6**). Emphasis was placed upon inspecting any remnant mature trees deemed of sufficient age to contain Aboriginal scarring or carving. **Plates 1 to 9** shows the overall environmental context of the study area.

Ground surface visibility (GSV) across the secondary and tertiary terrace landforms of the study area was generally low due to thick leaf litter and grass cover. Exposures were afforded by natural bare patches, vehicle tracks and erosive features along the edge of the terraces. No GSV was present on the primary terrace due to dense vegetation cover. Disturbances within the study area were identified as being minimal overall and limited to a graded access track with imported fill, picnic tables and foundations from the Blaxland Homestead (**Plates 7 and 8**).

No Aboriginal sites were identified during the visual inspection. Small quartz pebbles and fragments were present mostly across vehicle tracks, however, no pieces of material displayed any flaking characteristics consistent with tool manufacturing. Despite a lack of surface manifestations, the secondary and tertiary terraces which extend across most of the study area were confirmed as being archaeologically sensitive landforms (SAL). These landforms were identified as being a SAL as they comprise flat, elevated, well drained landforms adjacent to Wollombi Brook (**Plate 1 to 4**). The landforms have also been subject to low levels of disturbance and comprise sandy soils which in this context can have a depth greater than 1 m (**Plate 5**). The tertiary terrace has been assessed as having high potential for archaeological subsurface deposits as it is the most elevated landform with less disturbance, while the secondary terrace has been assessed as having moderate to high potential (**Figure 2-7**). Areas of disturbance within these landforms, i.e. the graded access track, building foundations do form part of the SAL. The transition zone between the secondary and tertiary terrace is higher in the north of the study area, approximately 1 to 2 m and gradually becomes lower towards the south (**Plates 3 and 4**). The profile in the transition zone highlights the sandy nature of the soils present.

A 'yes' answer to Step 4 requires that 'further investigation and impact assessment' of the study area be undertaken.

Figure 2-6: Survey coverage within the study area.

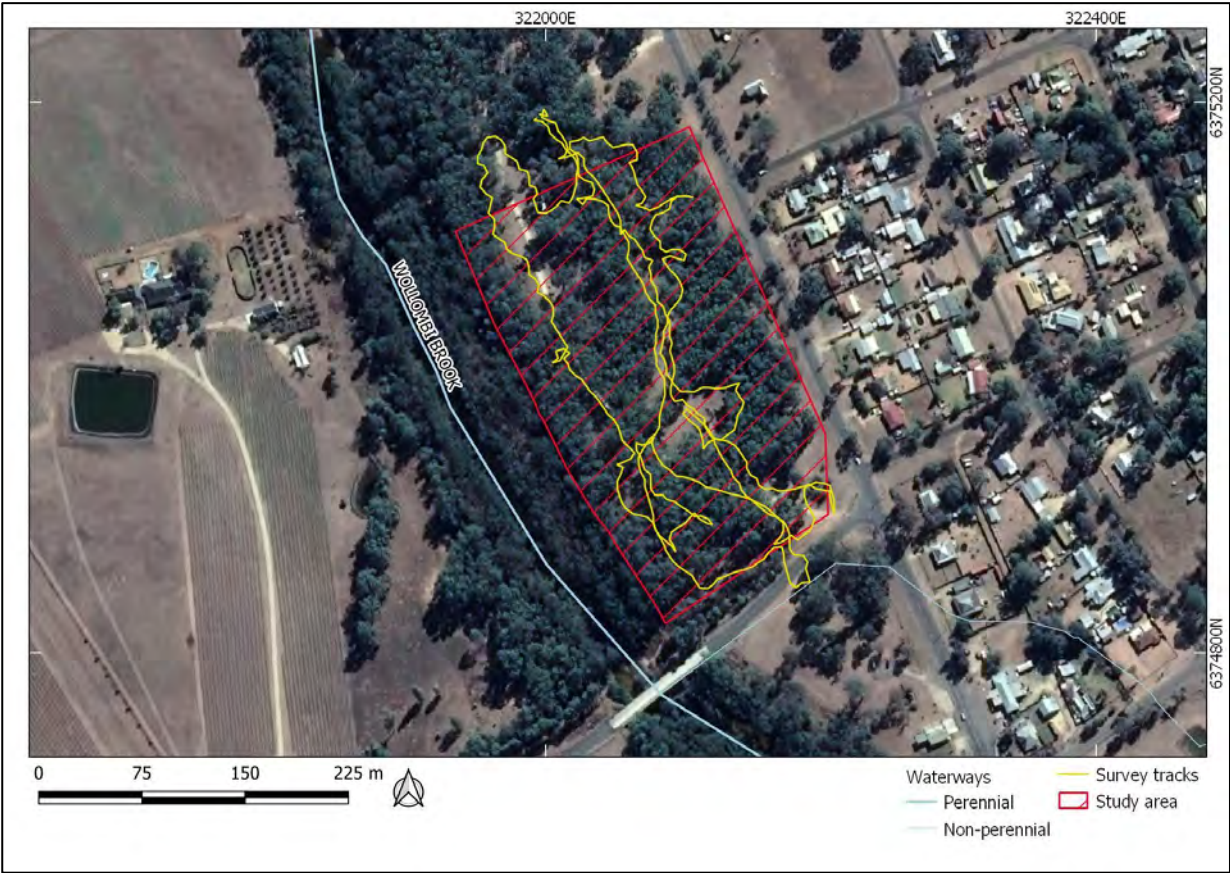
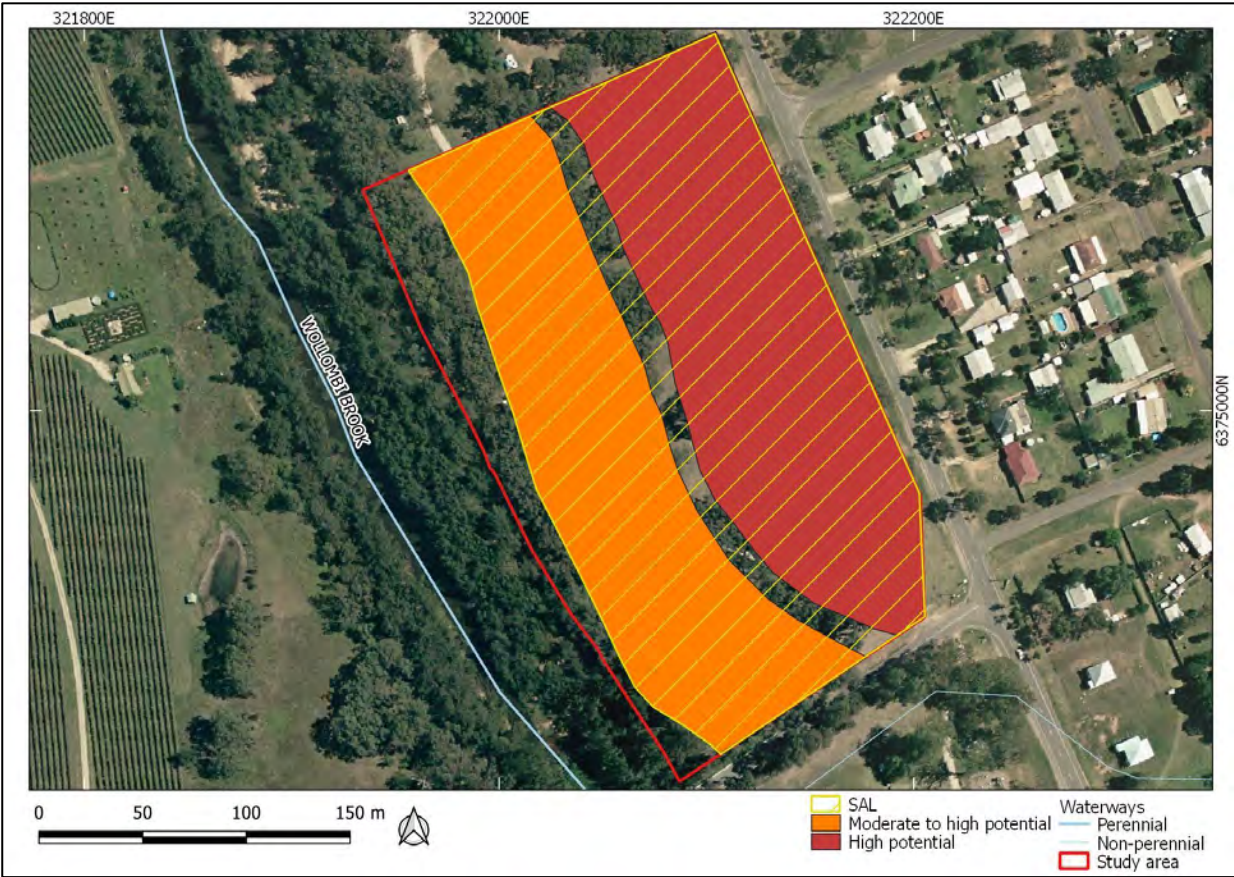


Figure 2-7: Areas of potential within the SAL.



2.4 CONCLUSION

The Due Diligence process has resulted in the outcome that further investigation is required. The reasoning behind this determination is discussed below and summarised in **Table 2-3**.

While the upper terrace landforms were physically inspected, poor GSV conditions meant the sensitive landform could not be fully assessed. Further, the relatively intact nature of much of the soil profile indicates potential for archaeological material to be present at depth, and if present, such deposits may have potentially good integrity.

Table 2-3: Due Diligence Process application.

Item	Reasoning	Answer
Will the activity disturb the ground surface or any culturally modified trees?	The proposed works would disturb the ground surface through excavation for the construction of foundations. The proposal would involve the disturbance of woodland. No culturally modified trees were identified during the visual inspection within the study area.	Yes
Are there any relevant records of Aboriginal heritage on site (AHIMS or from other sources), or landscape features that are likely to indicate presence of Aboriginal objects?	AHIMS indicated no Aboriginal sites within the study area, however, the visual inspection resulted in a SAL being identified and therefore Aboriginal objects are likely to be present subsurface.	Yes
Can harm to Aboriginal objects or relevant landscape features be avoided?	The study area encompasses an elevated terrace adjacent to Wollombi Brook which is intact. As such, a sensitive landform feature cannot be avoided by the proposal.	No
Does a desktop assessment and visual assessment confirm that there are Aboriginal objects or that they are likely?	Desktop searches and the visual inspection identified a SAL within the study area. It is assessed that there is a high likelihood of there being subsurface archaeological deposits within the study area.	Yes
Further investigation required		

3 MANAGEMENT RECOMMENDATIONS

The undertaking of the Due Diligence process resulted in the conclusion that landforms are present which have potential to contain archaeological subsurface deposits. This moves the proposal to the following outcome:

Further investigation and impact assessment required.

It is recommended that this further investigation take the form of test excavation in the areas of proposed impact within the sensitive landform following the *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (DECCW 2010b) under Part 6 of the NPW Act. This would confirm whether subsurface archaeological deposits are present, and if present, give an indication of their nature, extent and integrity. Such excavations must be preceded by Aboriginal community consultation as per the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (ACHCRs; DECCW 2010c).

An ACHAR, as a prerequisite to an application for an AHIP, will be required should this investigation indicate that there are Aboriginal objects within the study area that may be harmed. All AHIP applicants must demonstrate adherence to the ACHCRs.

Conversely, should the test excavation reveal that there are no subsurface Aboriginal objects within areas liable to be impacted by the proposal, an AHIP would not be required for the proposal to proceed. Under such a scenario, an ACHAR would also not be required and this report, in conjunction with the test excavation report, would be considered to be sufficient documentation to assess the likely harm to Aboriginal objects.

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PLATES



Plate 1: View south across the tertiary terrace with open woodland.



Plate 2: View north showing the transition between the tertiary and secondary terrace.



Plate 3: View from the secondary terrace to the tertiary in the north of the study area where the transition is more distinct.



Plate 4: View from the secondary terrace to the tertiary in the south of the study area where the transition is less distinct.



Plate 5: Detail of the sandy deposit at the transition of the tertiary and secondary terrace.



Plate 6: View across the tertiary terrace showing the graded access track in the background.



Plate 7: View of the foundations from the Blaxland Homestead.




Plate 8: View along the graded access track with imported fill that traverses the secondary terrace.



Plate 9: View west towards the primary terrace (floodplain).


APPENDIX 1: AHIMS SEARCH RESULTS

 Office of Environment & Heritage		AHIMS Web Services (AWS)							Your Ref/PO Number : 2394 Client Service ID : 442662	
		Extensive search - Site list report								
SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
37-6-1047	BC02	GDA	56	320125	6379061	Open site	Valid	Artefact : 3		102076
	Contact	Recorders						Permits		
37-6-1048	BC03	GDA	56	319558	6378870	Open site	Valid	Artefact : -		102076
	Contact	Recorders						Permits		
37-6-0926	SBU29	AGD	56	324085	6376935	Closed site	Valid	Artefact : -		
	Contact	Recorders						Permits		
37-6-1740	Broke Pipeline ?	AGD	56	321117	6377311	Open site	Partially Destroyed	Artefact : 19		
	Contact	Recorders						Permits		
37-6-2229	YK3	GDA	56	321305	6377565	Open site	Valid	Artefact : 5		
	Contact	Recorders						Permits		
37-6-0884	Bulga Open Cut IP1 (A1)	GDA	56	321524	6379529	Open site	Destroyed	Artefact : -		102074, 102075
	Contact	Recorders						Permits		
37-6-0885	Bulga Open Cut IP2 (a1)	GDA	56	321193	6379617	Open site	Destroyed	Artefact : -		102074, 102075
	Contact	Recorders						Permits		
37-6-0804	Broke Rd 1	GDA	56	321850	6379850	Open site	Valid	Artefact : 3		Open Camp Site
	Contact	Recorders						Permits		
37-6-2729	Broke Bridge PAD1	GDA	56	322020	6374750	Open site	Valid	Artefact : - Potential Archaeological Deposit (PAD) : -		3301
	Contact	Recorders						Permits		
37-6-2730	Broke Bridge PAD2	GDA	56	322150	6374850	Open site	Valid	Potential Archaeological Deposit (PAD) : -		3427
	Contact	Recorders						Permits		
37-6-0917	SBU20	AGD	56	323323	6376541	Open site	Valid	Artefact : -		Open Camp Site
	Contact	Recorders						Permits		
37-6-0918	SBU18	AGD	56	324085	6376935	Open site	Valid	Artefact : -		Open Camp Site
	Contact	Recorders						Permits		
37-6-0919	SBU19	AGD	56	324600	6375500	Open site	Valid	Artefact : -		Open Camp Site
	Contact	Recorders						Permits		
37-6-0920	SBU21	AGD	56	323331	6376688	Open site	Valid	Artefact : -		Open Camp Site
	Contact	Recorders						Permits		
37-6-0921	SBU22	AGD	56	323972	6377105	Open site	Valid	Artefact : -		Isolated Find
	Contact	Recorders						Permits		

Report generated by AHIMS Web Service on 19/08/2019 for Stephanie Rudden for the following area at Datum : GDA, Zone : 56, Eastings : 317000 - 327000, Northings : 6370000 - 6380000 with a Buffer of 0 meters. Additional Info : Survey, Number of Aboriginal sites and Aboriginal objects found is 82

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 Office of Environment & Heritage		AHIMS Web Services (AWS)							Your Ref/PO Number : 2394 Client Service ID : 442662	
		Extensive search - Site list report								
SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
37-6-0922	SBU23	AGD	56	324400	6376486	Open site	Valid	Artefact : -		Isolated Find
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37-6-0923	SBU24	GDA	56	324515	6376520	Open site	Valid	Artefact : -		Isolated Find
	Contact	Recorders						Permits		
37-6-0924	SBU25	AGD	56	323224	6375298	Open site	Valid	Artefact : -		Open Camp Site
	Contact	Recorders						Permits		
37-6-0925	SBU26	AGD	56	324021	6376902	Closed site	Valid	Artefact : -		Shelter with Deposit
	Contact	Recorders						Permits		
37-6-0927	SBU30	AGD	56	323208	6375452	Open site	Valid	Artefact : -		Open Camp Site
	Contact	Recorders						Permits		
37-6-0928	SBU33	AGD	56	323303	6375760	Open site	Valid	Artefact : -		Isolated Find
	Contact	Recorders						Permits		
37-6-0929	SBU31	AGD	56	323060	6375663	Open site	Valid	Artefact : -		Isolated Find
	Contact	Recorders						Permits		
37-6-0930	SBU32	AGD	56	322978	6375812	Open site	Valid	Artefact : -		Open Camp Site
	Contact	Recorders						Permits		
37-6-0911	SBU14	AGD	56	324200	6377800	Open site	Valid	Artefact : -		Isolated Find
	Contact	Recorders						Permits		
37-6-0912	SBU13	AGD	56	324100	6377400	Open site	Valid	Artefact : -		Open Camp Site
	Contact	Recorders						Permits		
37-6-0913	SBU12	AGD	56	324000	6377200	Open site	Valid	Artefact : -		Open Camp Site
	Contact	Recorders						Permits		
37-6-0914	SBU16	AGD	56	323700	6376000	Open site	Valid	Artefact : -		Isolated Find
	Contact	Recorders						Permits		
37-6-0915	SBU15	AGD	56	324300	6377800	Open site	Valid	Artefact : -		Isolated Find
	Contact	Recorders						Permits		
37-6-0916	SBU17	AGD	56	323900	6376200	Open site	Valid	Artefact : -		Open Camp Site
	Contact	Recorders						Permits		
37-6-0902	SBU3	AGD	56	321800	6379100	Open site	Valid	Artefact : -		Open Camp Site
	Contact	Recorders						Permits		
37-6-0903	SBU4	GDA	56	321905	6378990	Open site	Destroyed	Artefact : -		Isolated Find
	Contact	Recorders						Permits		
37-6-0904	SBU5	GDA	56	321705	6377990	Open site	Destroyed	Artefact : -		Open Camp Site
	Contact	Recorders						Permits		

Report generated by AHIMS Web Service on 19/08/2019 for Stephanie Rudden for the following area at Datum : GDA, Zone : 56, Eastings : 317000 - 327000, Northings : 6370000 - 6380000 with a Buffer of 0 meters. Additional Info : Survey, Number of Aboriginal sites and Aboriginal objects found is 82

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AHIMS Web Services (AWS) Extensive search - Site list report

Your Ref/PO Number : 2394
Client Service ID : 442662

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
37-6-0905	Contact SBU6	Recorders AGD	56	322400	6377900	Open site	Valid	Artefact : -	3301	
	Contact	Recorders	Unknown Author,OzArk Environmental and Heritage Management,Mr Ben Church					Permits	Isolated Find	
37-6-0906	Contact SBU8	Recorders AGD	56	322105	6379090	Open site	Destroyed	Artefact : -	3301	
	Contact	Recorders	Unknown Author,Ms.Morgan Wilcox					Permits	Isolated Find	
37-6-0907	Contact SBU7	Recorders AGD	56	322805	6378490	Open site	Destroyed	Artefact : -	3301	
	Contact	Recorders	Unknown Author,Ms.Morgan Wilcox					Permits	Open Camp Site	
37-6-0908	Contact SBU9	Recorders GDA	56	321876	6379103	Open site	Valid	Artefact : -	3301	
	Contact	Recorders	Unknown Author,OzArk Environmental and Heritage Management,Mr Ben Church					Permits	Isolated Find	
37-6-0909	Contact SBU10	Recorders AGD	56	322765	6377100	Open site	Valid	Artefact : -	3301	
	Contact	Recorders	Megan Mebberson					Permits	Open Camp Site	
37-6-0910	Contact SBU11	Recorders AGD	56	323500	6377200	Open site	Valid	Artefact : -	3301	
	Contact	Recorders	Megan Mebberson					Permits	Isolated Find	
37-6-1224	Contact HB2/ Site B	Recorders AGD	56	322870	6375400	Open site	Valid	Artefact : -	1999,3072	99012,102178
	Contact	Recorders						Permits		
37-6-1225	Contact HB2/ Site A	Recorders AGD	56	322016	6375344	Open site	Partially Destroyed	Artefact : -		99012,102178
	Contact	Recorders	MCH - McCordle Cultural Heritage Pty Ltd					Permits		
37-6-1394	Contact BC01	Recorders AGD	56	320894	6379395	Open site	Destroyed	Artefact : -	3301	102076
	Contact	Recorders	Umwelt (Australia) Pty Limited,Leila McAdam					Permits		
37-6-1395	Contact BC02 - duplicate of 37-6-1047	Recorders AGD	56	320020	6379871	Open site	Deleted	Artefact : -	3301	102076
	Contact	Recorders	Lower Wonnarua Tribal Council,Upper Hunter Wonnarua Council Inc					Permits		
37-6-1396	Contact BC04	Recorders GDA	56	320745	6378457	Open site	Destroyed	Artefact : -	3301	102076
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	Contact	Recorders	Umwelt (Australia) Pty Limited,Wanaruah LALC,Lower Wonnarua Tribal Council,U					Permits		
37-6-1399	Contact BC08	Recorders AGD	56	320536	6379581	Open site	Destroyed	Artefact : -	3301	102076
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	Contact	Recorders	Janice Wilson,OzArk Environmental and Heritage Management,John Mathews,Mr.B					Permits		
37-6-1419	Contact BC027	Recorders AGD	56	324210	6376690	Open site	Valid	Artefact : -	3301	102076
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37-6-1420	Contact BC028	Recorders AGD	56	323712	6375090	Open site	Valid	Artefact : -		102076

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37-6-1421	Contact BC029	Recorders AGD	56	323336	6376542	Open site	Valid	Artefact : -		102076
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37-6-0977	Contact BP-2	Recorders AGD	56	319700	6379300	Open site	Valid	Artefact : -		4742,97831
	Contact	Recorders	Victor Perry					Permits		
37-6-1931	Contact Drews Creek Lot 44 Parish Dalton	Recorders AGD	56	317700	6369900	Closed site	Valid	Shell : 2		
	Contact	Recorders	Mr.Richard Harris					Permits		
37-6-2832	Contact BOP - IFS	Recorders GDA	56	322196	6378274	Open site	Valid	Artefact : 1		
	Contact	Recorders	OzArk Environmental and Heritage Management,Mr Ben Churcher					Permits		
37-6-2843	Contact BOP-OS9	Recorders GDA	56	322559	6379974	Open site	Destroyed	Artefact : 1		
	Contact	Recorders	OzArk Environmental and Heritage Management,Mr Ben Churcher					Permits		
37-6-2844	Contact BOP-OS10	Recorders GDA	56	322393	6378205	Open site	Partially Destroyed	Artefact : 1		
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37-6-3222	Contact GOAF-GG01	Recorders GDA	56	322423	6377441	Open site	Valid	Grinding Groove : -		
	Contact	Recorders	Ms.Morgan Wilcox					Permits		
37-6-3223	Contact GOAF-GG02	Recorders GDA	56	322554	6377406	Open site	Valid	Grinding Groove : -		
	Contact	Recorders	Ms.Morgan Wilcox					Permits		
37-6-3879	Contact BEESNEST RIDGE TRAIL CHARCOALS SWA	Recorders GDA	56	326733	6373114	Closed site	Valid	Art (Pigment or Engraved) : -		
	Contact	Recorders	Ms.Collette Douchkov					Permits		
37-6-0563	Contact Goodwin Gully;	Recorders AGD	56	322330	6370900	Closed site	Valid	Art (Pigment or Engraved) : -	Shelter with Art	1333
	Contact	Recorders	Warren Bluff					Permits		
37-6-0565	Contact Broken Back;	Recorders AGD	56	321860	6370570	Closed site	Valid	Art (Pigment or Engraved) : -	Shelter with Art	1333
	Contact	Recorders	Warren Bluff					Permits		
37-6-0534	Contact Arrogant Matley;	Recorders AGD	56	320980	6370760	Closed site	Valid	Art (Pigment or Engraved) : -	Shelter with Art	1333,2159
	Contact	Recorders	Warren Bluff					Permits		
37-6-0139	Contact Saxovale A	Recorders GDA	56	320562	6379319	Open site	Destroyed	Artefact : -	Open Camp Site	311
	Contact	Recorders	Len Dyal					Permits	3301	
37-6-0141	Contact Saxovale ;	Recorders GDA	56	322373	6379964	Open site	Destroyed	Artefact : -	Open Camp Site	311,1357,1978, 2121,102170
	Contact	Recorders	Helen Brayshaw					Permits	252	
37-6-0149	Contact Saxovale GG	Recorders GDA	56	322491	6377891	Open site	Valid	Grinding Groove : -	Axe Grinding Groove	311,1455

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SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
37-6-0695	Bees Nest Ridge;	Records AGD	56	326160	6372400	Closed site	Valid	Art (Pigment or Engraved) : - Permits	Shelter with Art	1333
37-6-0001	YELLOW ROCK A	Records GDA	56	323759	6371967	Open site	Valid	Art (Pigment or Engraved) : - Grinding Groove : - Permits	Rock Engraving	
37-6-0003	Broke;	Records AGD	56	322273	6372345	Open site	Valid	Artefact : - Permits	Open Camp Site	
37-6-0009	Owendale Site 4;	Records AGD	56	318821	6371091	Closed site	Valid	Artefact : - Permits	Shelter with Deposit	
37-6-0096	Yellow Rock;	Records AGD	56	324665	6371567	Closed site	Valid	Art (Pigment or Engraved) : - Permits	Shelter with Art	
37-6-0097	Yellow Rock;	Records AGD	56	322761	6370708	Open site	Valid	Grinding Groove : - Permits	Axe Grinding Groove	
37-6-0691	near Bees Nest Ridge;	Records AGD	56	326300	6372200	Open site	Valid	Artefact : - Permits	Isolated Find	
37-6-0960	BM08	Records GDA	56	319770	6379988	Open site	Destroyed	Artefact : - Permits		98044,100135, 100603,100608 0
37-6-1609	Broken Back	Records AGD	56	321430	6369910	Open site	Valid	Grinding Groove : 1, Stone Arrangement : - Permits	1621,1748	
37-6-1663	BP L2 - duplicate of 37-6-1664	Records AGD	56	321283	6377685	Open site	Valid	Artefact : 26 Permits		100153
37-6-1664	BP L3	Records AGD	56	321283	6377685	Open site	Valid	Artefact : 23 Permits	2575,3301	100153
37-6-1659	BPL5	Records GDA	56	321454	6379634	Open site	Valid	Artefact : 8 Permits	2575,3301	100153
37-6-1660	BPL6	Records GDA	56	321454	6379655	Open site	Valid	Artefact : 6 Permits	2575,3301	100153
37-6-1661	BPL4	Records AGD	56	321158	6377484	Open site	Valid	Artefact : 25 Permits	2575,3301	100153

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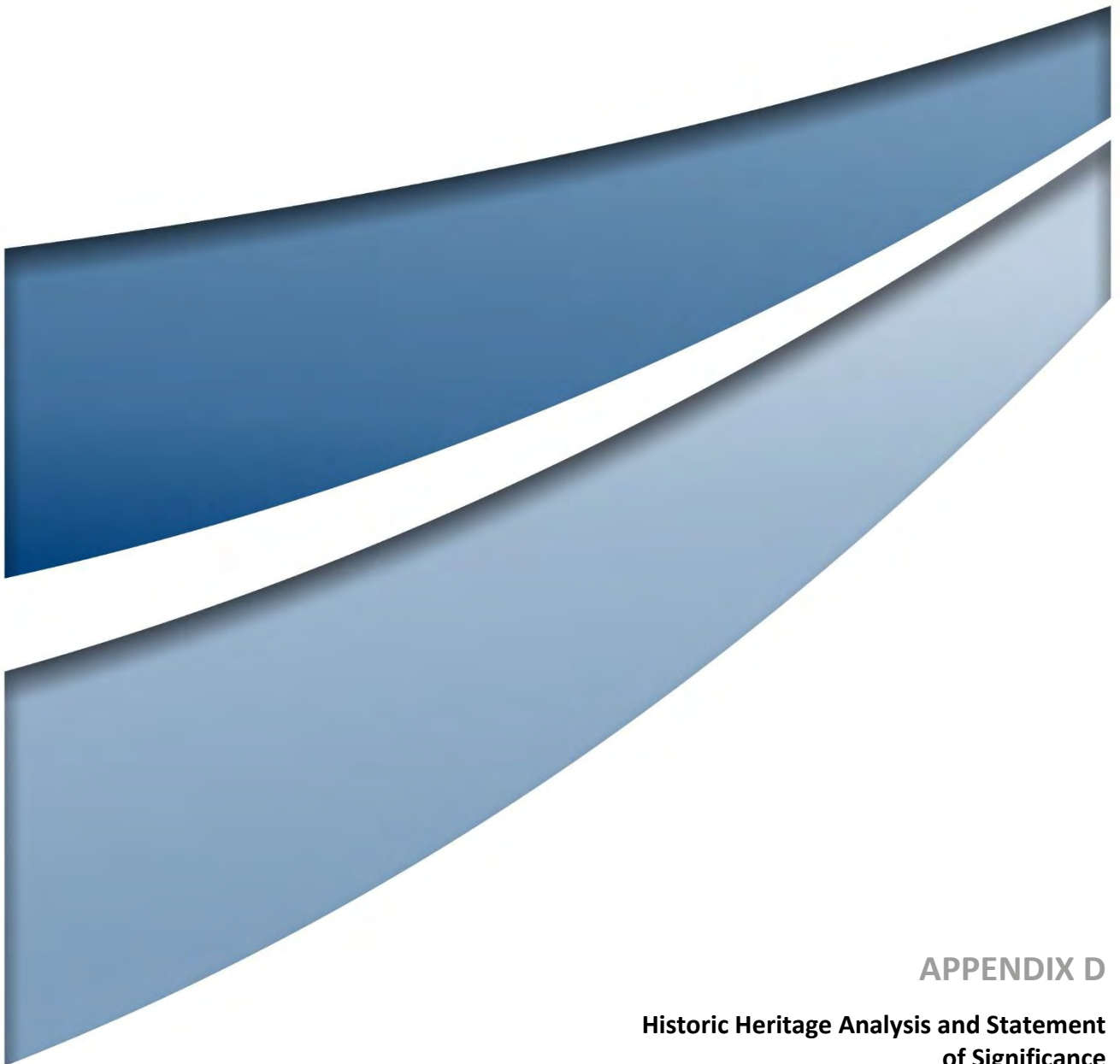
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37-6-1662	<u>Contact</u>	Searle	<u>Recorders</u>	Mrs.Angela Besant						
	BPL1	GDA	56	321355	6377990	Open site	Destroyed	Artefact : 26	2575,3301	100153
37-6-2957	<u>Contact</u>	Searle	<u>Recorders</u>	Mrs.Angela Besant,OzArk Environmental and Heritage Management,Mr.Ben Church						
	YR1	GDA	56	321280	6377440	Open site	Valid	Artefact : -	2575,3301	
37-6-2959	<u>Contact</u>		<u>Recorders</u>	Navin Officer Heritage Consultants Pty Ltd						
	YR2	GDA	56	321480	6377465	Open site	Valid	Artefact : -		
37-6-3660	<u>Contact</u>		<u>Recorders</u>	Navin Officer Heritage Consultants Pty Ltd						
	Bulga IF1	GDA	56	323266	6379177	Open site	Valid	Artefact : -		
	<u>Contact</u>		<u>Recorders</u>	OzArk Environmental and Heritage Management,Mr.Ben Churchier						

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APPENDIX D

Historic Heritage Analysis and Statement of Significance

McNamara Park, Broke NSW

Heritage Analysis and Statement of Significance



Prepared for:
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Date: 22nd November 2019

Report Issue	Date	Review
Draft	October 2019	LSJ
Final	22 nd October 2019	LSJ
Minor corrections	22 nd November 2019	Glencore/LSJ

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1. Introduction

1.1. Background

This report is a Heritage Analysis and Statement of Significance for McNamara Park, Broke, NSW and has been commissioned by Glencore, Glendell Tenements Pty Ltd.

This report forms part of a Statement of Heritage Impact that provides an analysis of a proposal to extend the existing Glendell Mine, referred to as the Glendell Continued Operations (GCO) Project. The Glendell Mine forms part of the Mount Owen Complex located in the Upper Hunter Valley of New South Wales.

The land into which the open cut coal mine is to be extended forms part of the former Ravensworth Estate, an historic pastoral property located in the Upper Hunter Valley of NSW established in 1824 by Dr. James Bowman, the colony's principal surgeon. The historic focus of the Ravensworth Estate lands is the c1832 homestead, the Ravensworth Homestead Complex. In 1997 Glendell Tenements Pty Ltd acquired the homestead complex and surrounding lands.

As part of the proposed extension to the Glendell Mine it is also proposed to relocate the Ravensworth Homestead Complex located within the former Ravensworth Estate lands to one of two possible recipient sites: Ravensworth Farm, Ravensworth or McNamara Park, Broke.

This report provides an analysis of the documentary and physical evidence of McNamara Park, Broke Recipient Site, leading to a considered assessment of the cultural significance of the place and its individual components.

McNamara Park, Broke is not identified as a heritage item and is not located within a recognised heritage conservation area.

1.1.1. Methodology

The form and methodology of this report follows the general guidelines for statements of heritage impact outlined in the following documents:

Australia ICOMOS Charter for Places of Cultural Significance (The Burra Charter), Australia ICOMOS Inc. 2013

Assessing Heritage Significance, NSW Heritage Office, 2001

Statements of Heritage Impact, NSW Heritage Office, 2002

NSW Heritage Manual, NSW Heritage Office, 1996

1.1.2. Exclusions

This report does not include a detailed assessment of the ecological values of the place. Refer to *Appendix 20: Biodiversity Development Assessment Report* accompanying the SSD application.

1.1.3. Author Identification

This report has been prepared by Kate Denny and Ian Stapleton of Lucas Stapleton Johnson & Partners Pty Ltd. Dr. Terry Kass, historian, prepared the history of the place for the purposes of this report.

1.1.4. Acknowledgements

The authors wish to acknowledge the assistance of the following:

- Shane Scott, Bradly Snedden, Catherine Fenton of Glencore
- Bret Jenkins, Bridie McWhirter of Umwelt
- Tim Duddy, heritage consultant

1.1.5. Copyright of Images

This commissioned report is copyright © Glendell Tenements Pty Ltd. Apart from any fair dealing for the purposes of private study, research, criticism or review as permitted under the *Copyright Act 1879*, no part may be reproduced by any process without written permission from Council.

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1.2. Description of the Place

McNamara Park is located within the village of Broke, NSW, in the parish of Broke, county of Northumberland, within the local government area of Singleton Council. Broke is located within the lower Hunter Valley Region, approximately 157 kms northwest of Sydney, 85 km west of Newcastle and 29 km south of Singleton.

McNamara Park is situated along the southwestern edge of the village on the western side of Wollombi Street (the main street in the village) and at the intersection with Milbrodale Road. The public reserve is approximately 12.5 ha in area. The real property definition of the place is Lot 701 of DP 93631.

McNamara Park is a relatively level area running north-south along the southwestern edge of the village and is bounded by Wollombi Street (the main street) on the east, Milbrodale Road on the south, Wollombi Brook on the west and residential allotments on the north. The southern portion of the park is covered with an open wood of native trees growing in grassland, with some mature, eucalypt trees. The northern portion of the park is open grassed areas. Adjacent to Wollombi Brook, the land falls steeply to the creek bed which is possibly 10 or 15 meters below the general level of the park. At the southern end there is a modern concrete bridge crossing the Brook, on Milbrodale Road.

The public reserve is used as a free camping ground and for occasional markets and festivals. The park is accessed by a gravel track from both the northern and southern ends of the park. Smaller dirt tracks lead off this main access road into the open areas of the reserve where camping occurs. Some facilities are provided throughout the camping grounds including an amenities block, car parking areas, picnic shelters, garbage bins, power outlets and the like.

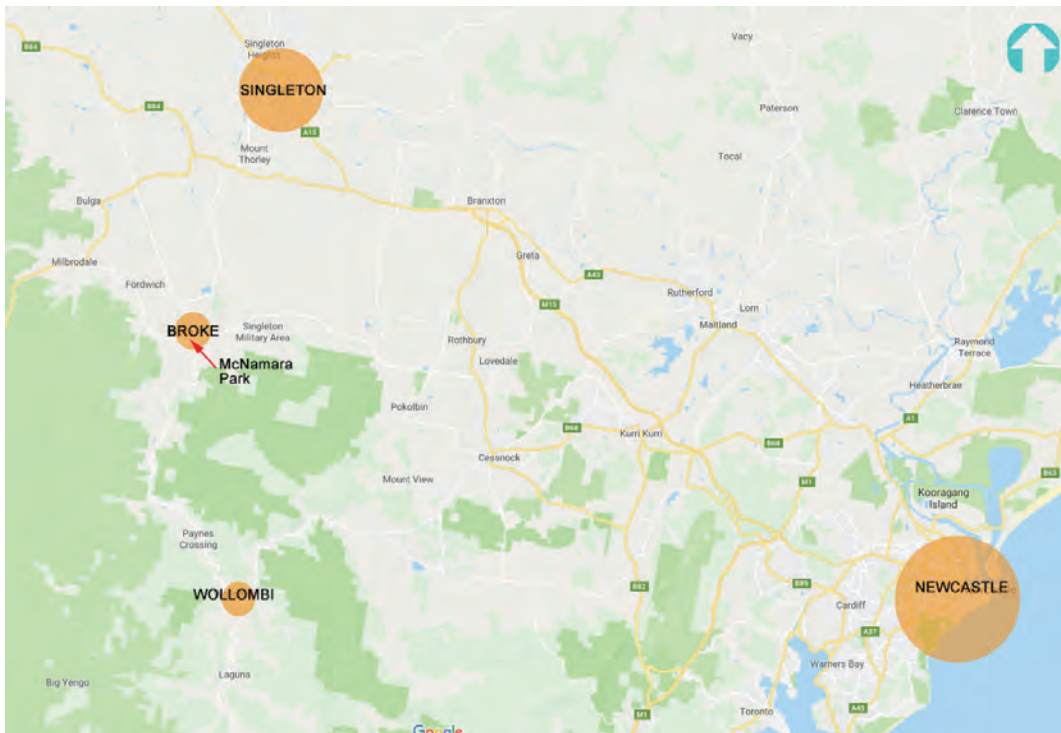


Figure 1. 1: Location plan showing the location of the village of Broke in context of the Lower Hunter Valley region. Source: GoogleMaps, 2019



Figure 1. 2: Aerial view of the village of Broke showing the subject property, McNamara Park (outlined in orange). The real property definition is Lot 701 DP 93631. Source: SixMaps, 2019

1.3. Terms, Abbreviations & Nomenclature

Terms

This report adheres to the use of terms as defined in the Australia ICOMOS *Burra Charter* 2013, together with the following definitions:

<i>Archaeological potential</i>	is here used and defined as a site's potential to contain archaeological relics which fall under the provisions of the <i>Heritage Act</i> 1977 (amended). This potential is identified through historical research and by judging whether current building or other activities have removed all evidence of known previous land use.
<i>Archaeological Site/Item</i>	A place that contains evidence of past human activity. Below ground sites include building foundations, occupation deposits, features and artefacts. Above-ground archaeological sites include buildings, works, industrial structures and relics that are intact or ruined.
<i>Place</i>	means a geographically defined area that may include elements, objects, spaces and views. Place may have tangible and intangible dimensions. The term place is defined under the Burra Charter and is used to refer to sites and areas of cultural significance.

Abbreviations

c	Circa
CMP	Conservation Management Plan
CT	Certificate of Title
DP	Deposited Plan
EIS	Environmental Impact Statement
Fol.	Folio
LEP	Local Environmental Plan
No.	Number
SHR	State Heritage Register
SOHI	Statement of Heritage Impact
Vol.	Volume

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2. History of the Place

2.1. Introduction

The following outlines the history of a site in the Village of Broke identified as a possible alternative location for the Ravensworth Homestead Complex. This history has been prepared by Dr. Terry Kass, historian for the purposes of this heritage analysis and statement of significance report.

2.2. Aboriginal Occupation of the Broke area

The following information regarding Aboriginal cultural values has been extracted from the *Aboriginal Due Diligence Assessment Report: Proposed Relocation Area for Ravensworth Homestead* prepared by OzArk Environmental & Heritage Management Pty Ltd, dated August 2019 (*Appendix 23h*).

The village of Broke is located in the Wonnarua tribal area of the upper Hunter River Valley. Tocomwall¹ notes that ethnographic accounts and anthropological notes written in the mid-to late-19th century indicate that the traditional territory of the Wonnarua people extended over a two thousand square mile area of land that included the Hunter River and all its tributaries from within ten miles of Maitland to the apex of the Liverpool Ranges. This interpretation is challenged by the Wonnarua Local Aboriginal Land Council² who state that there is much debate about the tribal boundaries and that the dividing line between the Wonnarua and the Kamilaroi may have been much further south in the area of 'Jerrys Plains'.

In 2013, Aboriginal community consultation was undertaken for the Bulga Optimisation Project (BOP) assessment resulting in the Bulga Optimisation Project: Aboriginal Cultural Heritage Assessment (ACHAR).³ This report also included confidential cultural values assessments authored by two Wonnarua Knowledge Holder groups, the Plains Clans of the Wonnarua People (PCWP) and the Wonnarua Nation Aboriginal Corporation (WNAC).

The BOP consultation recorded several cultural values associated with the immediate area surrounding the study area:⁴

- Some Registered Aboriginal Parties (RAPs) stated that they believe the Broke and Bulga area is sacred as it is surrounded by features linked to spiritual Creation stories.
- The interaction between connections to Country and cultural identity is highly important especially as the traces of the past and their memories contributed to maintaining distinctive Wonnarua and other Aboriginal people's culture, spirituality and cultural interaction with the landscape.

¹ Tocomwall Pty Ltd. 2017; *Hillcrest Aboriginal Cultural Values Assessment Report*. Report to Glencore Coal Assets Australia, p. 49

² Ibid. p. 482

³ Connect for Effect. 2013. *Bulga Optimisation Project: Aboriginal Cultural heritage Assessment*. Report to Bulga Coal Management Pty Ltd.

⁴ Connect for Effect 2013; pp.147–149

- The pathways and water systems to and from Creation places and places of ceremony are of high cultural value. All waterways, creek lines and tributaries in the local area were identified as culturally important as they were believed to be part of the essential spiritual meaning of the place and the people. Nine Mile and Loders Creeks, Wollombi Brook, Monkey Place Creek and more broadly the Hunter and Goulburn Rivers are important parts of the pathways to and from ceremony and to and from sacred Creation places and as such have immeasurable cultural values.
- Ethnobotanical knowledge identified indigenous flora and fauna as important cultural resources.
- Most RAPs expressed high levels of emotion regarding landscape transformation and fragmented cultural and archaeological sites.

Key cultural values identified in the cultural values assessment in the local area include the now-relocated Loders Creek grinding grooves, Baime Cave, Lizard Rock (also known as Yellow Rock) and the site of the Bulga Bora Ground.

Of particular relevance to the village of Broke is Lizard Rock (Yellow Rock), as the escarpment located in the Pokolbin State Forest, is the focus of dramatic landscape views from the town to the south.

Lizard Rock is important to the local Aboriginal people. Its outline is suggestive of a lizard and it holds strong spiritual connections for Aboriginal people of the area.⁵ The story of Lizard Rock is part of the Wonnarua dreaming and is explained in story and song:

“A great lizard (or goanna) wended its way across the land from the coast creating valleys and mountains. As it made its way towards the plains country it was met by the warriors there who commanded it to stop. It resisted, and the warriors killed it and smashed its head. It can be seen to this day petrified as Yellow Rock at Broke. To ensure that it stays that way, to the left of the road at Broke lies a line of rock formations which are said to be warriors who stand guard, just in case it chooses to revive itself and continue its journey.”⁶

There are no known cultural values or Aboriginal sites pertaining directly to the location of the McNamara Park, although during consultation for BOP it was noted that Wollombi Brook, which is adjacent to the park, is believed to be a pathway to creation places.⁷

⁵ OzArk Environment and Heritage Management. 2013. *Aboriginal archaeological values assessment: Bulga Optimisation Project near Broke NSW*. Report to Bulga Coal Management Pty Limited.

⁶ Eric Taggart to W.J. Needham (*University of Newcastle Archives*)

⁷ Connect for Effect, 2013

2.3. Accessing the Hunter Valley

In 1801, Governor King despatched a party to explore the Hunter River, followed later the same year by the Surveyor General Charles Grimes and Francis Barraillier. A settlement as a place of secondary punishment for re-offending convicts was established shortly afterwards at the mouth of the Hunter River, named King's Town (now known as Newcastle).

In the following decades, emancipated convicts and young Australian born men explored northwards from the Hawkesbury River region, finding a trafficable route to the Hunter River. John Howe, the Chief Constable from Windsor, explored north from the Hawkesbury River in October and November 1818, reaching the Hunter River. In March 1820, Howe found a second shorter route with the assistance of Aboriginal guides. Howe was accompanied in the 1820s expedition by Benjamin Singleton, a miller, and together then named the plains they traversed when descending Mount Thorley, the Patrick's Plains (the town of Singleton is named for Benjamin Singleton).

The second route to the Hunter River was known as the Bulga Road and officially opened in 1823 and is now known as the Putty Road. Howe's overland track through Bulga allowed free settlers to enter the Hunter Valley, which had previously been restricted to open settlement due to the site of secondary punishment for convicts at Newcastle.

Figure 2. 1 (right): Detail from 1825 map entitled *A chart of part of the interior of New South Wales* by John Oxley, Surveyor-General showing "Howe's track from Windsor to Paterson River" (the original name for this part of the Hunter River). Source: NLA Map T 940



Surveyor-General Thomas Mitchell envisaged a road system modelled on the 'Great Roads' of England. He developed and systematised convict work-gangs in 1826 and work began on the Great North Road, the first of three 'Great Roads' planned for the colony. It connected Sydney to the fertile rural lands of the Hunter Valley. At Wollombi it followed two branches, one of which ran northwest through the Village Reserve that would become the village of Broke and further north to the Upper Hunter region.⁸

Large area grants were allocated to various individuals near the site of the future village of Broke. John Blaxland senior was authorised in 1825 to purchase 4,280 acres at Patricks Plains.⁹ He received a formal grant on 8 March 1831. Other large grants near the village site included 1,200 acres plus an adjoining 560 acres granted to Thomas Walker on 17 May 1838 and 2,560 acres granted to Archibald Mosman on 27 November 1838.

⁸ A Dunne, *From Brook to Broke: A History of Broke Fordwich*, Xstrata coal, Singleton, 2012, p 19

⁹ A Dunne, *From Brook to Broke*, p 29

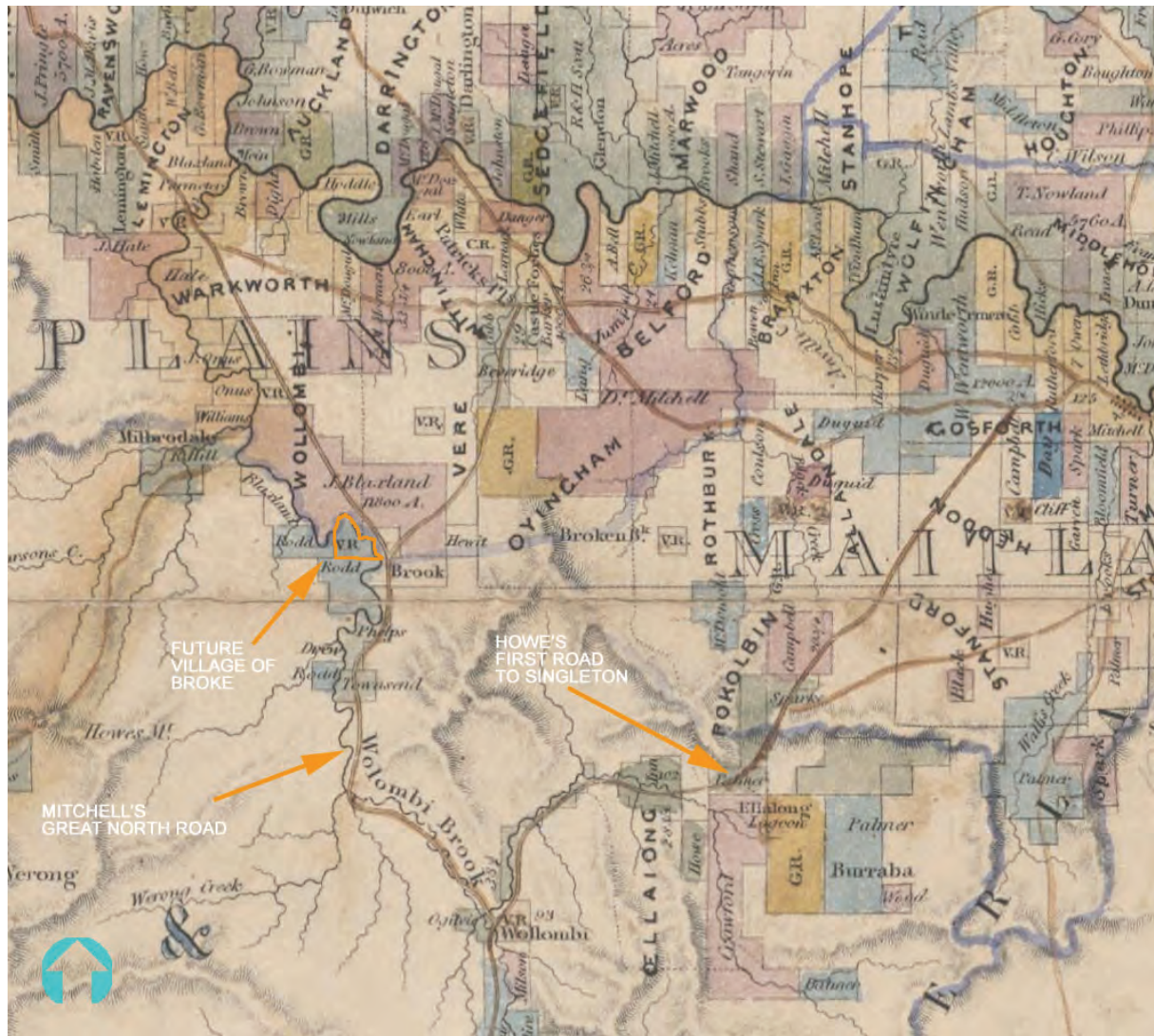


Figure 2. 2: Detail from 1846 map of the colony of NSW by Robert Dixon showing the location of the Village Reserve (outlined in orange on the southern side of the Wollombi Brook) to become the village of Broke.
Source: NLA Map Rm 831b

2.4. The Village of Broke

The village reserve of Broke is located on the traditional land of the Wonnarua people.

In 1828, Assistant Surveyor Henry Dangar set aside land as a Village Reserve. On 27 November 1831, Surveyor General Thomas L Mitchell named it Broke after Major-General Sir Charles Broke Vere, Bart.¹⁰

The boundaries of the Reserve were laid out by Macleod and Assistant Surveyor Felton Mathew in February 1830. Felton Mathew's journal noted on 9th February 1830:

Left the Station and arrived at the Reserve of Broke on the Wollombi – country similar to that we passed through yesterday. – Shot a large brown eagle measuring upwards of seven feet across the wings.

¹⁰ A Dunne, *From Brook to Broke*, p 54

On 10th February 1830, his journal reported:

*Assisted Mr Macleod in measuring the government Reserve of Broke, on the Wollombi.. country picturesque, but great part of the land very poor & (though flat) abounding in Iron Bark – & in some parts with Apple and Gum –*¹¹

By 1839, an inn was operating on Wollombi Road south of the village site.¹² Though agricultural and pastoral settlement proceeded across the district, there was little call for a village. Singleton served most of the needs of the district. On 12 July 1858, R.A. Rodd of Minimbah, Singleton requested that lots in the Village Reserve of Broke be put up for sale. The Executive Council approved that request and orders were issued to formally measure the Village.¹³

Even though an accident had nearly cost Licensed Surveyor John Rogers the use of a finger in his right hand, he was able to send in a plan of the site and letter on 23 December 1858 describing the village site. He reported that the site on either side of the river was “one entire flat, the site for Town Allotments being placed between the two main Roads leading to Singleton and the Upper Hunter respectively”. He also noted that “Any portion it may be considered advisable to leave for recreation or extension should be at the West end.”¹⁴ Rogers’ plan of the Village Reserve dated December 1858 showed no detail of the site.¹⁵

On 14 November 1859, Surveyor General Alexander Grant McLean minuted that he would call the village ‘Broke’ since the Reserve had been known by that name for some time.¹⁶ A fair copy of the Town Design produced in 1859 by Bennett showed the study area as “Reserve for Recreation and Access to Water”.¹⁷ (Refer to Figure 2.3 below.)

Licensed Surveyor John Rogers plan for the extension of the Reserve dated 14 October 1860 showed similar detail.¹⁸

The press complained on 14 July 1860 that the Village of Broke had been surveyed by government but was still a ‘waste’ even though people are ready to buy and build.¹⁹ On 2 November 1860, another press article complained that purchasers of lots in the newly sold village of Broke were unable to build due to the lack of a good road.²⁰ By 1862, the village had progressed.

¹¹ F Mathew, Diary, transcription by B Jones, <http://www.cafewaratah.info/feltonmathew/journal.htm>, Accessed 26 June 2019

¹² A Dunne, *From Brook to Broke*, p 55

¹³ LdsPW59/4752, in NRS 7933, Lands and Public Works, Correspondence, SANSW 5/3605

¹⁴ LdsPW59/4752, in NRS 7933, Lands and Public Works, Correspondence, SANSW 5/3605

¹⁵ Broke, Reserve for Village (Rogers) (B.1715), Dec 1858, SA Map 1553

¹⁶ LdsPW59/4752, in NRS 7933, Lands and Public Works, Correspondence, SANSW 5/3605

¹⁷ Broke, Fair plan of Reserve (Bennett) (B.1715.a), 1859, SA Map 1554

¹⁸ Broke, Reserve and Design for Village (Rogers) (B.1715.b), 14 Oct 1860, SA Map 1555

¹⁹ *Maitland Mercury*, 14 July 1860, p 6

²⁰ *Empire*, 2 Nov 1860, p 2



Figure 2. 3: Village Design Plan for Village of Broke, 1859. Source: SA Map 1554

In April 1862 the *Maitland Mercury* reported that a hotel, a store and blacksmith's shop were being built.²¹ The 'picturesque' village of Broke was showing signs of development on 11 February 1864 with a timber building being erected for the Church of England as a church and school. A house was being built for the schoolmistress. Broke was described as:

*... a charming locality, situated on the banks of the Wollombi, on a lightly timbered flat, and surrounded by the Yellow Rock and other high and precipitous mountains-not a more lovely spot can possibly be found in the whole of the Hunter River district.*²²

However, Broke's location on Wollombi Brook was not always an advantage. Significant damage and property loss were felt along Wollombi Brook in June 1867 due to flood, especially by Joseph Clark, wheelwright and postmaster at Broke who lost his dwelling, post office, wheelwright's shop, stores, furniture, tools and a large quantity of wheat.²³

The 1871 Census recorded the village population as 117.²⁴ A provisional school operated from 1871 to 1872. It was followed by a public school established in 1878. During the nineteenth century, large numbers of livestock passed through Broke on the way south along the Great North Road.²⁵

A detailed press report of 29 March 1873 described the settlement:

²¹ *Maitland Mercury*, 1 April 1862, p 3

²² *Maitland Mercury*, 11 February 1864, p 3

²³ *Maitland Mercury*, 27 June 1867, p 2

²⁴ A Dunne, *From Brook to Broke*, p 59

²⁵ A Dunne, *From Brook to Broke*, p 63

*The prettily situated village of Broke has recently made several signs of impending progress. There is now a first-class country inn in the township, kept by Mr Francis Dorrington, which we can recommend to all who visit the locality, the host and hostess being civil and obliging, and the accommodation very good. A neat and substantial church is now in course of erection, for our Roman Catholic friends residing in that locality. It is to be built of weatherboards on sleepers, with a shingled roof.*²⁶

During the 1870s, the village population increased due to the subdivision of large rural properties in the surrounding area.²⁷ A police constable was stationed at Broke in 1873 and a courthouse and lock-up were completed by the Department of Public Works by 19 June 1879.²⁸ In August 1878, T.T. Arndell of Oakley recommended that the name of the Post Office be altered from Fordwich to Broke. Postal officials agreed with the change.²⁹ The change of name was officially gazetted on 3 September 1878.³⁰

Another press report on 17th June 1879 provided more details of Broke,

*This thriving and picturesque village is making considerable headway and not having seen it for several months, we were quite surprised the other day in noticing the great improvements that had taken place in the interval. The principal improvement is that the main street of the village (Wollombi-street) has been graveled throughout its entire length, and the work appears to have been done in a very creditable manner, the greater portion of the road being thoroughly consolidated, and as firm as any roadway in Singleton, which is saying a good deal in its praise. Amongst the new buildings the most conspicuous is the new court house and lockup, a neat weatherboard building at the corner of Wollombi and Singleton streets. It is built on rising ground, out of flood reach, on a reserve of some two acres. A substantial stable, with quarters for the resident constable (Mr. Netterfield), who, by the by, is a very efficient police officer, give the building a very complete appearance, the only thing needed being the fencing, which we learn will shortly be proceeded with. The other most noticeable building of a public character which has of late been completed, is the Public School and teacher's residence, a substantial brick building. Broke has also two neat weatherboard churches, belonging to the Protestant and Roman Catholic, Episcopalian denominations; and it can boast of a nice recreation ground, some three acres in extent, surrounded by a neat painted fence, and provided with gates, etc., where we presume the Brokite lovers of the willow display their skill occasionally. Besides the convenient residence, store, post and telegraph office, and wheelwright shops belonging to Mr. Joseph Clark, who may be regarded as the "King of Broke," there are two excellent hostelrys, conducted by Messrs. Francis Dorrington and Isaac Frith, several other stores, blacksmith shops, and numerous neat private residences, several of which have been erected during the last few months.....*³¹

A new brick Anglican Church St Andrew's replacing the original one was dedicated on 9 November 1889.³² A site for a School of Arts was granted on 1879 though there was no building on the site until 1898 and it was officially opened on 17th March 1898.³³

²⁶ *Maitland Mercury*, 29 March 1873, p 3

²⁷ A Dunne, *From Brook to Broke*, p 61

²⁸ A Dunne, *From Brook to Broke*, p 60

²⁹ Letter GPO 78/6407, SP32/1 Post Office File, Broke Part 1, 1878-1885 (Barcode 315382), NAA

³⁰ NSWGG, 3 Sept 1878, p 3521

³¹ *Maitland Mercury*, 19 June 1879, p 3

³² A Dunne, *From Brook to Broke*, p 61

³³ A Dunne, *From Brook to Broke*, p 62

During the 1890s, dairying became a popular activity in farms across the district providing a more secure income than agriculture. A butter factory was set up in Singleton in 1897.³⁴ In 1892, an attempt to set up a creamery at Broke was unsuccessful though a creamery operated by James Moore and Co. Ltd was later operating there.³⁵

Tenders were accepted to build a new brick police station for £685 in November 1898.³⁶ A new brick Roman Catholic church named Immaculate Conception of Our Blessed Lady was dedicated on 11 September 1904.³⁷

The NSW Parliament approved the purchase of 4,080 acres of the Fordwich Estate near Broke for Soldier Settlement in December 1918. It became Soldiers Group Purchase Area No 50 with 12 farms. Even though it was one of the more successful soldier settlement schemes in the Hunter, conditions were still basic on the farms.³⁸ Some of the soldier settlers planted grapes but lacked the expertise to become successful winemakers.³⁹

During the twentieth century, Broke gradually declined. It had lost its hotel, police station and various businesses by 1945.⁴⁰ Electricity was switched on in the village on 29 August 1957.⁴¹ In 1959, the Prescott family who operated a local milk run built a small petrol station and a new village store. It gradually grew during the 1960s followed in the late 1980s by further extensions including a take away food service. A 50 seat restaurant (since closed) was added after 1998 so that the complex eventually included a shop, takeaway, newsagency, post office and bottle shop.⁴²

During the 1950s, there were still numerous dairy farms around Broke.⁴³ From the 1960s onwards, the entry of Britain into the European Economic Community deprived dairy farmers of a major market. Coupled with reduced government assistance, that ensured that the number of dairy farms declined markedly. By the 2010s, there was only one dairy farm near Broke.⁴⁴

Other industries grew in importance. From the 1960s onwards, the demand for coal to feed power stations being constructed in the Hunter lead to BHP acquiring a licence to prospect for coal near Broke. Mining rights were granted to a multi-national consortium in 1976 to mine for coal at Warkworth and later Mount Thorley.⁴⁵ In 1981 BHP commenced mining coal at Saxonvale near Broke producing 5,000 tonnes daily in June 1982.⁴⁶ Underground coal mining commenced near Bulga in 1994.⁴⁷

The expansion of mining in the vicinity of Broke in the 1970s brought an influx of miners resulting in subdivision and building near the village.⁴⁸ On 25th February 1977, Registered Surveyor Geoffrey Rex Bailey completed the subdivision of land between Wollombi, Archer, Howe and Adair Streets. It

³⁴ A Dunne, *From Brook to Broke*, p 75

³⁵ A Dunne, *From Brook to Broke*, p 75-6

³⁶ A Dunne, *From Brook to Broke*, p 62

³⁷ A Dunne, *From Brook to Broke*, p 63

³⁸ A Dunne, *From Brook to Broke*, p 73-4

³⁹ A Dunne, *From Brook to Broke*, p 83

⁴⁰ A Dunne, *From Brook to Broke*, p 64

⁴¹ A Dunne, *From Brook to Broke*, p 69

⁴² A Dunne, *From Brook to Broke*, p 68

⁴³ A Dunne, *From Brook to Broke*, p 77

⁴⁴ A Dunne, *From Brook to Broke*, p 79-81

⁴⁵ A Dunne, *From Brook to Broke*, p 87

⁴⁶ A Dunne, *From Brook to Broke*, p 87

⁴⁷ A Dunne, *From Brook to Broke*, p 88

⁴⁸ A Dunne, *From Brook to Broke*, p 70

created 33 building lots in the former reserve for public buildings in the village opposite the Water and Recreation Reserve.⁴⁹

Another industry also emerged on former dairy farms. From the late 1980s onwards, a number of former dairy farms were planted with grapes. Various successful wineries emerged.⁵⁰ Today there are at least 10 wineries within the immediate vicinity of Broke including two that claim to be organic or biodynamic.⁵¹

2.5. Section 29 Water Reserve Village of Broke

Section 29 was an integral part of the design of the Village of Broke. As early as 23rd December 1858 when Licensed Surveyor John Rogers described the village site, he noted that ‘Any portion it may be considered advisable to leave for recreation or extension should be at the West end.’⁵² The 1859 fair copy of the Town Design showed this area as ‘Reserve for Recreation and Access to Water’ (see Figure 2.4 below).⁵³

On 24 December 1861, all land in villages and towns laid out by government were reserved from being selected by settlers as Conditional Purchases.⁵⁴ These restrictions were re-gazetted on 3 February 1862.⁵⁵ The Reserve appears to have lain largely anonymous for decades.

On 11 May 1897, Licensed Surveyor Worters R. Pulver surveyed Section 29. One of his fieldbook sketches showed the Reserve boundaries and his survey marks. The Section was described as having ‘Open apple’ [vegetation] and ‘Sandy soil’ (see Figure 2.5). He also carried out a traverse of Wollombi Brook adjoining the Section on the west. On the sketch of his traverse, he showed a ‘cutting’ on the creek bank plus ‘Watts track’ and another ‘track’ on the Reserve (see Figure 2.6).⁵⁶

⁴⁹ DP 260008, LRS

⁵⁰ A Dunne, *From Brook to Broke*, p 85

⁵¹ <http://www.brokefordwich.com.au/hunter-valley-cellar-doors/>. Accessed 1 July 2019

⁵² LdsPW59/4752, in NRS 7933, Lands and Public Works, Correspondence, SANSW 5/3605

⁵³ Broke, Fair plan of Reserve (Bennett) (B.1715.a), 1859, SA Map 1554

⁵⁴ NSWGG, 24 Dec 1861, p 2747

⁵⁵ NSWGG, 3 Feb 1862, p 251

⁵⁶ NRS 13889, Surveyor General, Surveyors Field Book, No 7107, W Pulver, SANSW, p 23-24



Figure 2. 4: Detail of the 1859 Village Design plan showing the Recreation and Water Reserve. Source: SA Map 1554



Figure 2. 5: Licensed Surveyor Worters R Pulver's fieldbook sketch of the Reserve boundaries. Source: NRS 13889, Surveyor General, Surveyors Field Book, No 7107, W Pulver, SANSW, p 23

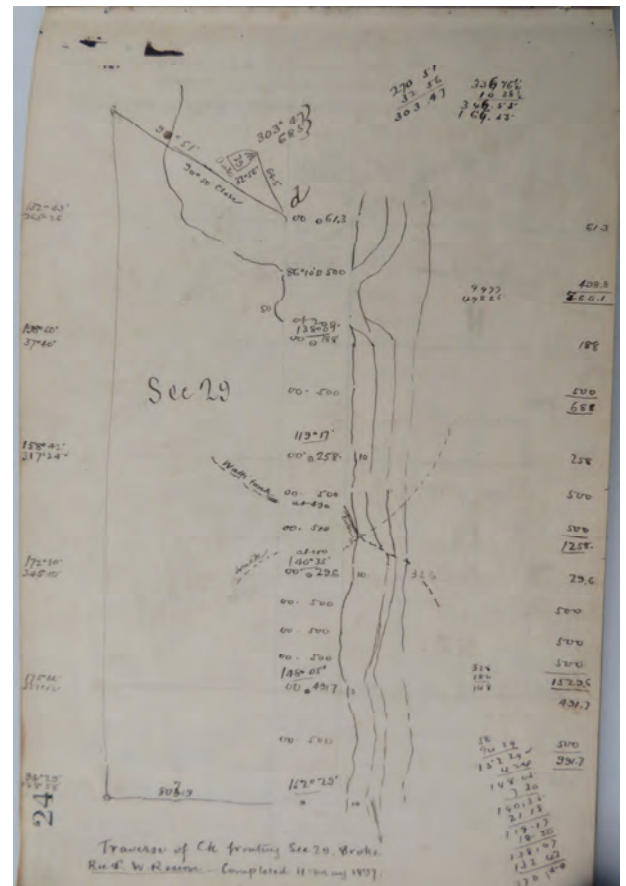


Figure 2. 6: Licensed Surveyor Worters R. Pulver's traverse of Wollombi Brook. Source: NRS 13889, Surveyor General, Surveyors Field Book, No 7107, W Pulver, SANSW, p 24

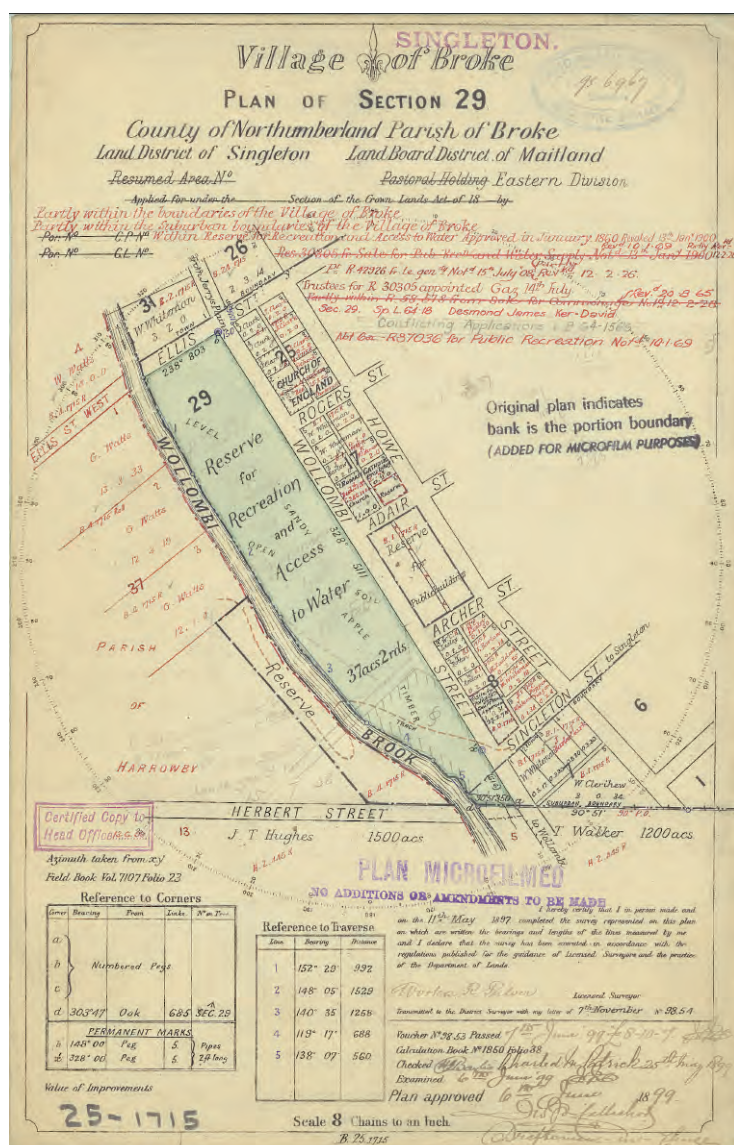


Figure 2. 7: Licensed Surveyors W R
Pulver's Crown Plan of the Reserve
surveyed on 11 May 1897. Source:
B.25.1715, Crown Plan

The formal survey plan of Section 29 by Licensed Surveyor Worters R. Pulver recorded the date of survey as 11th May 1897. The area of the reserve was 37 acres 2 roods. It was described as consisting of ‘Level Sandy Soil’ with ‘Open Apple Timber’ (i.e. angophoras). There were no improvements. A dashed red line showed a ‘Track’ across the Reserve. A later road across the southern part was pencilled in in later years (see Figure 2.7 above).⁵⁷

A.C. Arthur of Glendon Brook wrote to Albert John Gould, Member of the Legislative Assembly for Singleton on 18th May 1897 requesting assistance in obtaining a Special Lease over 2 acres of the Water Reserve in Broke as a site for a creamery. Arthur wrote that he had approached the citizens of Broke to see if they objected. Rather than objecting they were very supportive. Gould wrote to the Under Secretary for Lands on 31st May asking if the application could be considered favourably. The Miscellaneous Lease Branch of the Department sent an application form for a Special Lease to Arthur on 14th June. Arthur did not respond with an application. On 10th November 1897, Constable E. Rowe of Broke Police Station reported that Arthur had abandoned the idea of leasing the Water Reserve and had leased private land instead.⁵⁸

⁵⁷ B.25.1715, Crown Plan

⁵⁸ MsLs97/14026, NRS 8315, Miscellaneous Lease Branch, Correspondence, SANSW 10/11250

On 13th January 1900, the unmeasured Reserve 30305 for recreation and access to water as notified in 1861 and 1862 was revoked.⁵⁹ Instead, on the same day, Reserve 30305 for recreation and access to water was proclaimed as measuring 37 acres 2 roods in lieu of unmeasured R 30305.⁶⁰ The Shire of Patricks Plains was appointed as trustees of R 30305 on 7th July 1910.⁶¹ Thereafter, subsequent groups of trustees were periodically appointed.⁶²

Reserve 30305 was revoked on 12th February 1926 in lieu of Reserve 58578 for commonage.⁶³ Reserve 58578 with an area about 29 acres was reserved as commonage the same day. It was described as bounded on the north-east by Wollombi Street, 39 ½ chains, on the south west by a 4-wire fence on the south west by Wollombi Brook and on the north east by Ellis Street.⁶⁵

A later notation on the Crown Plan survey recorded that Sp. L 64.18 [Special Lease 1964 No 18 Singleton Land District] was given to Desmond James Ker-David.⁶⁶ No other record of this Special Lease has been found.

A road was surveyed across the southern part of Section 29 by Registered Surveyor Geoffrey Rex Bailey of Muswellbrook on 10th November 1968. His plan showed Section 29 as 'Vacant Crown Land'.⁶⁷ This recorded a crossing of Wollombi Brook by a low-level timber bridge/causeway. This road (now Milbrodale Road) was shown on topographic maps as early as 1927, when Wollombi Brook was crossed in this location by a ford.⁶⁸ In 1931, the ford over Wollombi Brook was supplemented by a flying fox by which a permanent route to Milbrodale was established. In 1965, the ford was replaced by a low-lying timber bridge as noted in the 1968 plan and in 2012, this was replaced by the existing concrete bridge.⁶⁹ The southern portion of the public reserve separated from the remainder of the original Section 29 is now Stewart McTaggart Park.

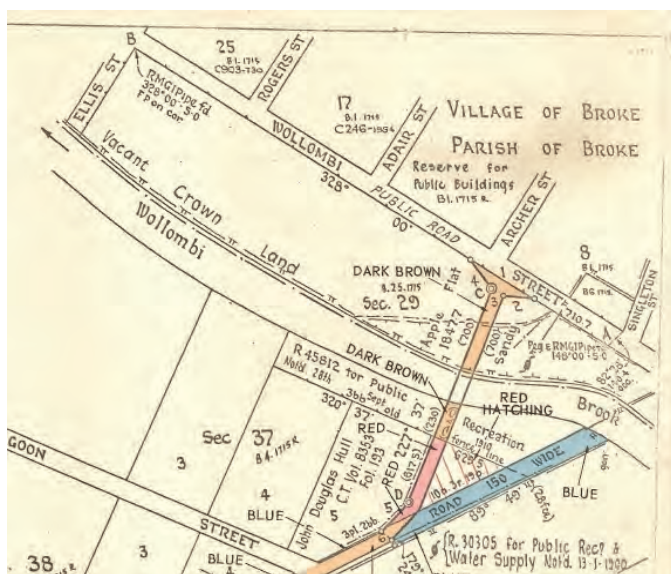


Figure 2. 8: Detail from Registered Surveyor Geoffrey R Bailey's plan of the road that cut off the southern section of the Reserve.
Source: R.30055.1603, Crown Plan

⁵⁹ NSWGG, 13 Jan 1900, p 331

⁶⁰ NSWGG, 13 Jan 1900, p 337

⁶¹ NSWGG, 27 July 1910, p 4021

⁶² For example, NSWGG, 14 July 1915, p 4131

⁶³ NSWGG, 12 Feb 1926, p 796

⁶⁴ Commonage refers to common land used for the shared pasturing of livestock

⁶⁵ NSWGG, 12 Feb 1926, p 799

⁶⁶ B.25.1715, Crown Plan

⁶⁷ R.30055.1603, Crown Plan

⁶⁸ Australia – Army, Topo. Map 1:63360, ML Map M Ser 3 804 3, Cessnock, 1927, Zone 8 Sheet 395

⁶⁹ Interpretation sign at Stewart McTaggart Park, "History of Broke Bridge", Singleton Council and Broke Fordwich Wine and Tourism Association.



Figure 2. 9: The 1927 Topographical Map showed a ford across Wollombi Brook where a track crossed the Reserve. Source: Australia – Army, Topo Map 1:63360, ML Map M Ser 3 804 3, Cessnock, 1927, Zone 8 Sheet 395

The remainder of R 30305 south of the newly measured road measuring about 6 acres 3 roods was revoked on 10th January 1969.⁷⁰ On 18th August 1978 Reserve from sale Number 91229 measuring about 1 hectare in the Village of Broke was gazetted for a rubbish depot. A plan with the gazettal notice depicted its location and approximate boundaries.⁷¹

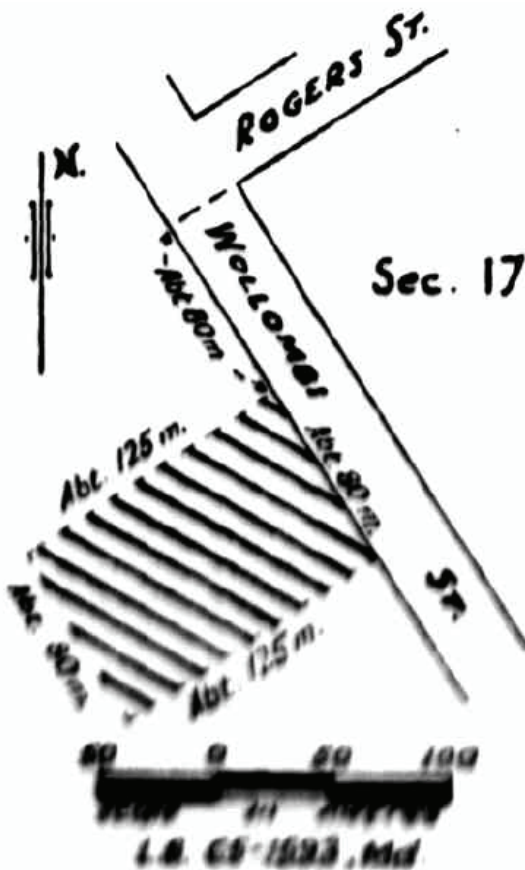


Figure 2. 10: The boundaries of the rubbish depot established on part of the Reserve. Source: NSWGG, 18 Aug 1978, p 3482

⁷⁰ NSWGG, 10 Jan 1969, p 75

⁷¹ NSWGG, 18 Aug 1978, p 3482

The Regional Charting Lands Department map of the Village of Broke recorded two Permissive Occupancies over the Reserve. These were PO 69/4 to J.D. Hall and PO 72/2 to J.R. Dempsey. The Permissive Occupancy Tenure Cards were searched for details of the Permissive Occupancies. Only the one for PO 69/4 to J.D. Hall was found. It noted that John D. Hall of Broke had a Permissive Occupancy from 1st July 1969 in the Village of Broke. The Occupancy terminated on 27th September 1971.⁷²



Figure 2. 11: The Lands Department Regional Charting map of the Village of Broke recorded more recent Permissive Occupancies on the Reserve. Source: HLRV, LRS

The Reserve is currently named McNamara Park. That name is not recorded on the Geographical Names Register, however it appears likely that the park is named for former mayor of Singleton Neil McNamara.

Neil McNamara, dairy farmer of Broke started his career being elected to Patrick Plains Shire Council in 1956 and went on to become Patrick Plains Shire president in 1971. McNamara led the way for the amalgamation of Singleton Municipal and Patrick Plains Shire Councils in 1976, for which Singleton Council won the Bluett Memorial award for the most progressive council in the state. Neil retired from public service in 1998.

McNamara also held other several roles including chairman of the Singleton Cooperative Society Store, director of Singleton Dairy Cooperative, a Councillor and chairman of Shortland County Council and chairman of Hunter Region Councils.

His work has been recognised by the awarding of the Order of Australia Medal in 1984 and the title of Freeman of the Singleton Shire in 2000 and he was inducted into the Wambo Hall of Fame in 2014.⁷³



Figure 2. 12: Neil McNamara in 2014. Source: *Singleton Argus*, 16th December 2014

⁷² NRS 20761, Tenure Cards, Permissive Occupancy, Singleton LD, Box 28995, SANSW

⁷³ "Our heart and soul" by Declan Martin, *Singleton Argus*, 16th December 2014

3. Physical Evidence

3.1. Introduction

The following descriptions of the built fabric, setting, views, landscape and site features aim to summarise the physical composition of the place.

The place and its setting were inspected by Ian Stapleton and Kate Denny of Lucas, Stapleton, Johnson and Partners in August 2019 and the current configuration of the landscape and buildings noted. Unless otherwise stated, the images used in this chapter have been produced by the authors of this report.

3.2. Description of the Place Generally

3.2.1. Wollombi Brook Catchment

McNamara Park at Broke, NSW is located within the lower portion of the Wollombi Brook catchment area. Wollombi Brook is one of the eight major tributaries of the Hunter River and its catchment drains an area of approximately 1870 square kilometres. The Wollombi Brook flows in a general south-north direction from its source in the Watagan Ranges to its confluence with the Hunter River near Warkworth, approximately 16 kilometres upstream of Singleton.

Located on the eastern bank of the Wollombi Brook, within the alluvial plains of the river, the village of Broke is surrounded by the Broken Back Range to the south and south-west with a prominent view of Yellow Rock to the south. To the east of the village is Mount Eyre. Located to the southwest is the Yengo National Park and to the south and south east is the Pokolbin State Forest. To the north east is the Singleton Military Base.

The lands surrounding the village of Broke are generally smaller allotment mixed farming with a number of commercial vineyards to the west along Milbrodale Road and to the south along Wollombi Road. In 1873, an article in *The Sydney Mail and New South Wales Advertiser* described the journey between Broke and Wollombi (to the south) as thus:

*“My road now lay along the Wollombi Brook, through a pretty farming county, with homesteads dotted along at every mile or so, and very pretty homesteads some of them are. The road follows the creek, which winds its way through hills. The flats on either side of the stream widen out at parts, and furnish the fine alluvial flats for cultivation. The hills are well timbered; the wattle grows abundantly.”*⁷⁴

⁷⁴ “The Tourist”, *The Sydney Mail and New South Wales Advertiser*, Saturday 24th May 1873, p.664

3.2.2. Village of Broke

The village of Broke is a small township laid out on a grid to the east of Wollombi Brook. The principal street is Wollombi Street, which runs north-south along the western boundary of the township. Along Wollombi Street is located St Andrew's Anglican Church, the Maria Immaculate Roman Catholic Church and the former Police Station/Policeman's residence (at the intersection of Singleton Street). A public school (dated 1876) is located on the eastern side of the town on Cochrane Street and the town cemetery is to the north of the village, at the corner of Butlers Road and Charleton Road. Although the initial town plan for Broke indicated an area set aside for public buildings between Adair and Archer Street (see Figure 2.8 above), this town block was not developed for this purpose.

McNamara Park is located to the west of the village, between Wollombi Street and Wollombi Brook.

Directly to the south of McNamara Park, across Milbrodale Road is a second public park, Stewart McTaggart Park, which is generally open grassed areas with a children's playground and picnic tables. The Broke Bridge interpretation display is located adjacent to Milbrodale Road. At the southern end of this park is located the Broke War Memorial and the shed for the Broke Rural Fire Brigade.

The remainder of the town consists of large residential allotments with mostly single storey houses dating from the late 20th century.



Figure 3. 1: Village store and former Police Station building on Wollombi Street at southern end of the village of Broke.



Figure 3. 2: St. Andrew's Anglican Church, Wollombi Street, Broke



Figure 3. 3: Maria Immaculate Roman Catholic Church, Wollombi Street, Broke.



Figure 3. 4: Broke Public School, Cochrane Street, Broke.



Figure 3. 5: General view of the village of Broke looking west along Adair Street with McNamara Park in the background.



Figure 3. 6: Stewart McTaggart Park, at the intersection of Wollombi Street and Milbrodale Road, Broke.



Figure 3. 7: Interpretation display for the Broke Bridge in Stewart McTaggart Park.



Figure 3. 8: Interpretation sign with history of the Broke Bridge.



Figure 3. 9: Broke Rural Fire Service sheds south of Stewart McTaggart Park.



Figure 3. 10: Broke War Memorial located south of Stewart McTaggart Park.



Figure 3. 11: Anzac Centenary Memorial planting



Figure 3. 12: View looking south down Wollombi Street with McNamara Park on the right.

3.2.3. McNamara Park

McNamara Park is located on the eastern bank of the Wollombi Brook, on the western edge of the village, adjacent to Wollombi Street, on a north-south alignment. The public reserve is managed by Singleton Council and is used as free camping ground and occasional location for festivals and fairs (e.g. the Broke Village Fair and vintage car display).

The park covers an area of approximately 11 hectares and is generally lightly forested with open grassed areas and contains a number of mature eucalypt species.

The park is accessed via Milbrodale Road to the south and Wollombi Street to the east via a number of dirt and gravel tracks that traverse the park providing access to camping areas.

The landform of McNamara Park is terraced to the west, leading to the adjacent brook, with a formed terrace at the top of the river bank providing a lower camping area that is relatively open.

Wollombi Brook is located below a steep and high embankment and is well vegetated. Views of the waterway are not readily available from the western edge of McNamara Park.

Vegetation of McNamara Park

According to the Department of Planning, Industry and Environment, McNamara Park consists of the Hunter-Macleay Dry Sclerophyll Forest vegetation class, while the vegetation class of Wollombi Brook is identified as Eastern Riverine Forest (see Figure 3.13 below).⁷⁵

The Hunter-Macleay Dry Sclerophyll forest is a dry open eucalypt forest to 30 metres tall with a mixed shrub stratum and semi-continuous grassy ground cover. This forest type is found at foothills and undulating terrain in rain shadow valleys below 400 metres elevation, on well-drained soil and are associated with the major coastal river valleys along the NSW coast.

⁷⁵ *Greater Hunter Native Vegetation Mapping* v4.0. VIS ID 3855, State Government of NSW and Department of Planning, Industry and Environment 2012; <https://datasets.seed.nsw.gov.au/dataset/greater-hunter-native-vegetation-mapping-v4-0-vis-id-3855d41f5>

Typical trees include spotted gum (*Corymbia maculata*), narrow-leaved ironbark (*Eucalyptus crebra*), grey box (*E. moluccana*), grey gum (*E. propinqua*), grey ironbark (*E. siderophloia*) and turpentine (*Syncarpia glomulifera*).⁷⁶

The Eastern Riverine Forest is an open casuarina forest, 10 to 40 metres tall, dominated by river oak (*Casuarina cunninghamiana*). The forest is found along riparian corridors in open terrain of coastal hinterland and tablelands up to 700 metres elevation.⁷⁷



Figure 3. 13: Extract from Greater Hunter Native Vegetation Mapping v4.0 showing vegetation classes identified at McNamara Park, Broke. Source NSW Government SEED web map; <https://geo.seed.nsw.gov.au/>; annotated by LSJ, Oct 2019

Camping Facilities and Site Features of McNamara Park

As discussed above, McNamara Park currently operates as a free camping ground and occasional location for festivals and fetes and is managed by Singleton Council.

The main entry to the park is at the southern end at the intersection of Wollombi Street and Milbrodale Road. A cluster of signs is located at the intersection, including the timber name sign for the park.

Immediately to the rear (north) of the signs is a bicentennial memorial structure consisting of a sandstone sundial and sandstone plinth with plaque. The sundial was unveiled by Cr. Neil W. McNamara OAM, President of Singleton Shire Council on 26th January 1988. The plaque notes that the memorial is erected on stone from the original convict-built Blaxland Homestead.

⁷⁶ Hunter-Macleay Dry Sclerophyll Forest; NSW Environment Energy and Science; <https://www.environment.nsw.gov.au/threatenedspeciesapp/VegClass.aspx?vegClassName=Hunter-Macleay%20Dry%20Sclerophyll%20Forests>

⁷⁷ Eastern Riverine Forest; NSW Environment Energy and Science; <https://www.environment.nsw.gov.au/threatenedspeciesapp/VegClass.aspx?vegClassName=Eastern%20Riverine%20Forests>

The plaque attached to the sandstone plinth reads:

Broke

The village of Broke is on the Great North Road. The area was first discovered by John Blaxland in 1818 and later settled by him, George Blaxland and Robert Rodd on land granted to them in 1824. Major Thomas Mitchell, the Surveyor General, named Broke in honour of his friend Sir Charles Broke Vere of Suffolk, England.

In the late 1800s, the main stock route to Sydney via Windsor passed through Broke and the settlement supported a flour mill, several hotels, a public school, police station, two churches, a post office, brick kiln, butcher shop, bakery and blacksmith and was a welcome stopover for travellers and drivers

A gravel and dirt track runs through the length of the reserve exiting at the northern end onto Wollombi Street and there are other dirt tracks throughout the park providing access to open grassed areas suitable for camping. Other access points from Wollombi Street are located along the eastern edge of the reserve, one of which provides access into the area of land that is set aside as a “rubbish depot”, although it is not used for this purpose.

Located in the centre of the park are the main camping facilities including an amenities block, car parking areas, power outlets and signage. In addition, there is evidence of incidental camping sites scattered throughout the park with stone ringed camp fire sites.

The lower camping area running alongside the Wollombi Brook also has a small number of picnic shelters.

Not all minor features such as service installations, infrastructure, signs, bollards, log barriers, cultural plantings etc, have been recorded.

Features of note are detailed below. Refer to Figure 3.14 for location of the principal components of McNamara Park.

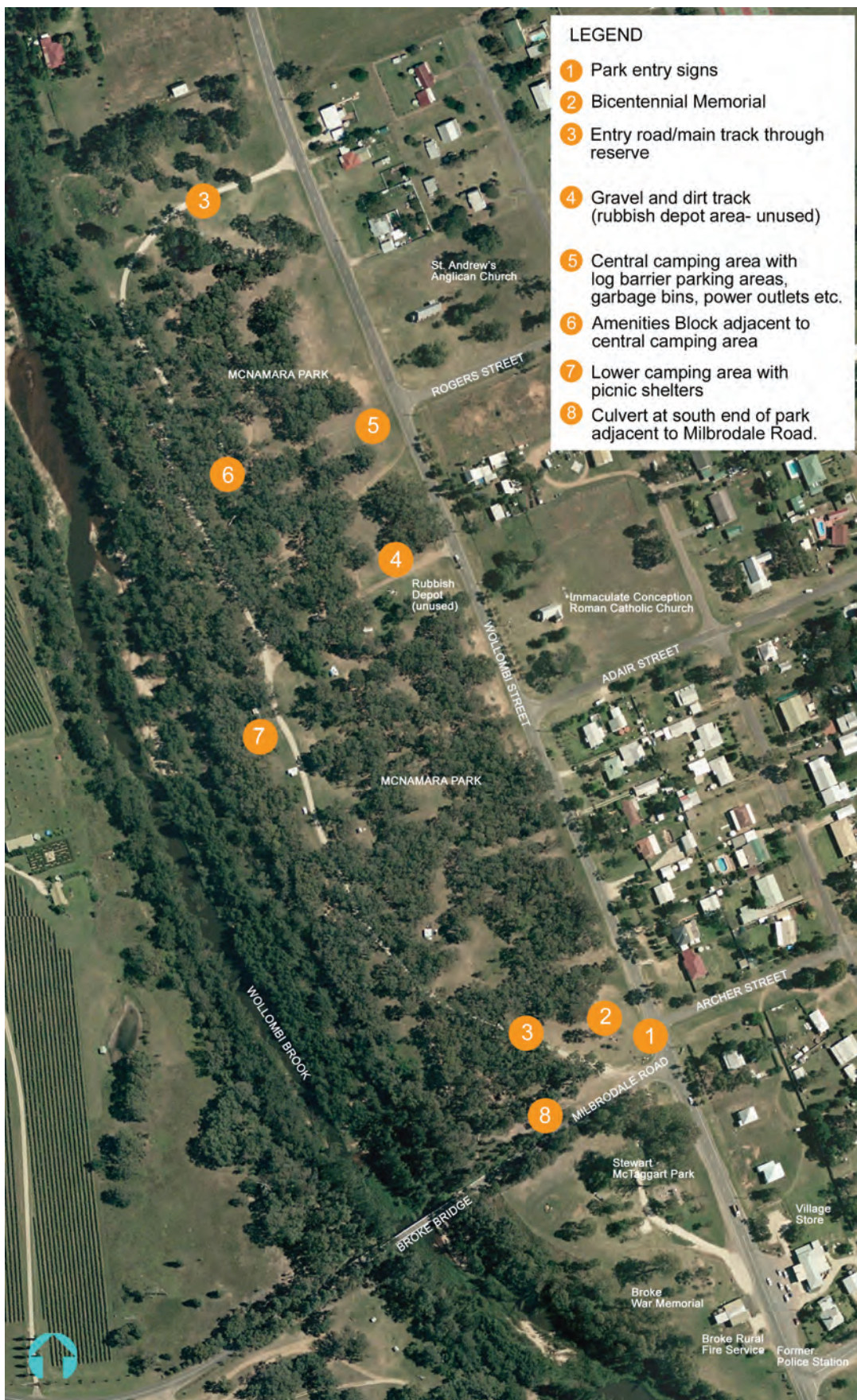


Figure 3. 14: Aerial view of McNamara Park indicating principal components of the public reserve and key features of the village of Broke adjacent.

Recent Photographs of the Vegetation of McNamara Park

Figure 3. 15: Open forest with grass understorey in McNamara Park



Figure 3. 16: Open forest with grass understorey in McNamara Park



Figure 3. 17: Typical open grassland with scattered trees and open forest.



Figure 3. 18: Open grassed area (car parking) with open forested land behind.



Figure 3. 19: View looking along internal dirt track through forested area to open grassed area.



Figure 3. 20: View of vegetation and service poles on top of embankment leading down to Wollombi Brook.



Figure 3. 21: One of several mature Eucalypts located throughout the park.



Figure 3. 22: Example of council sign attached to mature trees in the park.

Recent Photographs of Camping Grounds and Site Features of McNamara Park



Figure 3. 23: Casual camping area in grassed open area with swale.



Figure 3. 24: Formal carparking area with log barriers and signage.



Figure 3. 25: The lower camping grounds running alongside Wollombi Brook.



Figure 3. 26: Incidental camping area with camp fire



Figure 3. 27: **Site Feature 1**- Collection of signs at entry to McNamara Park at the intersection of Milbrodale Road and Wollombi Street, including timber park sign, metal winery directional sign, bush fire warning sign and other council signs.



Figure 3. 28: **Site Feature 2** - Bicentennial memorial of sandstone and metal with sundial and stone plinth on sandstone and concrete base with surrounding native and exotic plantings.



Figure 3. 29: Upright stone plinth (eroded) with plaque.



Figure 3. 30: Sandstone and metal sun dial erected as a memorial to the Australian Bicentenary.



Figure 3. 31: **Site Feature 3** - Gravel entry road into McNamara Park from Milbrodale Road at the southern end of the park.



Figure 3. 32: View of open grassed area and embankment along the western side of Wollombi Street defining the eastern edge of the park.



Figure 3.33: Culvert running under Wollombi Street and exiting into McNamara Park.



Figure 3.34: **Site Feature 4** - Unformed gravel and dirt road leading into the park from Wollombi Street. This area is designated as a rubbish depot although is not used for this purpose.



Figure 3.35: **Site Feature 4** - Dirt entry road leading into the park from Wollombi Street near intersection with Adair Street with council signs.



Figure 3.36: **Site Feature 5** - Mature Eucalypt with log car barriers in central camping area.



Figure 3.37: Continuation of entry road into camping area with telegraph pole and power lines crossing Wollombi Brook.



Figure 3.38: **Site Feature 5**- Camping area with facilities.



Figure 3.39: **Site Feature 6** - Amenities block



Figure 3.40: Garbage bins in central camping area.



Figure 3.41: Line of painted timber and concrete vehicle barriers on bank leading down to lower camping area and picnic sites.



Figure 3.42: **Site Feature 7** - Lower camping area adjacent to Wollombi Brook.



Figure 3.43: **Site Feature 3** - Gravel road leading south towards Milbrodale Road.



Figure 3.44: **Site Feature 8** - View of Broke Bridge from southern end of park with deep culvert leading down to Wollombi Brook.

3.2.4. Analysis of Views

McNamara Park is located along the western edge of the village of Broke between Wollombi Street (the main street) and Wollombi Brook. As such views of the public reserve are available from along Wollombi Street and looking west down the cross streets of Archer, Adair and Rogers Streets. The park is also clearly visible from Milbrodale Street at the intersection with Wollombi Street.

However, as McNamara Park is essentially an undeveloped stretch of land with few structures and little infrastructure, the place generally appears as natural woodlands adjacent to the village.

Views from McNamara Park from the periphery of the reserve lands are generally of the village of Broke to the east, northeast and southeast and Stewart McTaggart Park located to the south. From the northern end of the park views of Yellow Rock to the south are also available, but only from the edge of the reserve adjacent to Wollombi Street.

Within the park lands views are limited due to the density of the vegetation, although glimpse views through the trees of buildings on the east side of Wollombi Street are available. Views from the lower camping areas along Wollombi Brook are restricted to the immediate vicinity of the park lands and vegetation lining the river bank.

Table 3. 1: Views to and from McNamara Park, Broke. Refer to Figure 3.45 below for location of views.

View No.	Description
1	View of Stewart McTaggart Park and the Broke Village Store on Wollombi Street from the southern entry of McNamara Park.
2	Glimpse views through trees of the village of Broke and residences on east side of Wollombi Street.
3	Glimpse views through trees of the catholic church on Wollombi Street.
4	Internal park views from lower camping grounds adjacent to Wollombi Brook.
5	Views north and south along Wollombi Street taking in the village of Broke and McNamara Park. Some views to the south from the periphery of McNamara Park take in Yellow Rock (Lizard Rock).
6	Views into McNamara Park from entry track leading from Wollombi Street.
7	Views into central camping area of McNamara Park from entry track leading from Wollombi Street.
8	Views into McNamara Park from main entry road from the intersection of Wollombi Street and Milbrodale Road.
9	Views looking west down cross streets in the village of Broke with McNamara Park in the background.



Figure 3. 45: Aerial view of McNamara Park identifying main views to and from the reserve.

Recent Views of Available Views to and from McNamara Park



Figure 3. 46: View looking south down Wollombi Street with Yellow Rock (Lizard Rock) in background. McNamara Park is on the right.



Figure 3. 47: View of McNamara Park from Stewart McTaggart Park located to the south across Milbrodale Road.



Figure 3. 48: View of McNamara Park as seen from grounds of the catholic church, looking northwest.



Figure 3. 49: View from south end of McNamara Park looking south to Stewart McTaggart Park across Milbrodale Road.



Figure 3. 50: View from McNamara Park looking through woodlands to buildings on Wollombi Street in Broke.



Figure 3. 51: View from McNamara Park looking through woodlands to the catholic church on Wollombi Street.

3.3. Aboriginal Archaeology

The following information regarding Aboriginal archaeology has been extracted from the *Aboriginal Due Diligence Assessment Report: Proposed Relocation Area for Ravensworth Homestead* prepared by OzArk Environmental & Heritage Management Pty Ltd, dated August 2019 (*Appendix 23h*). For detailed information relating to the methodology, analysis and results, the original report should be referred to in the first instance.

The desktop assessment indicated that the study area (the southern portion of McNamara Park) contains landforms that have the potential to contain Aboriginal objects. Based on this information a visual inspection of the study area was undertaken by OzArk Director and Principal Archaeologist, Dr Jodie Benton, on 8 August 2019.

The desktop and visual inspection component for the study followed the *Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales* (Due Diligence; DECCW 2010). The field inspection component followed the *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in New South Wales* (OEH 2011).

Desktop Assessment

A search of the Department of Premier and Cabinet administered Aboriginal Heritage Information Management System (AHIMS) database returned 82 records for Aboriginal heritage sites within a 10 by 10 kilometre (km) search area that includes McNamara Park, Broke.

The AHIMS results show two sites near the study area, 37-3-2729 and 37-6-2730 (Figure 3.52).

Site 37-3-2729 (Broke Bridge PAD1) is listed as an artefact with potential archaeological deposit (PAD), located 95 metres (m) southwest of the study area. The PAD extent is 70m in length and varies in width from 1m where it joins Milbrodale Road in the west and up to 1m wide adjacent to Wollombi Brook (McCardle Cultural Heritage 2011).

Site 37-6-2730 (Broke Bridge PAD2) is listed as a PAD, 12m south of the study area. This PAD is 50m in length and varies in width from 1m where it joins Milbrodale Road in the east up to 15m adjacent to Wollombi Brook (McCardle Cultural Heritage 2011).

Visual Inspection

While all areas of archaeological sensitivity were physically inspected, poor ground surface visibility conditions meant that these locations could not be fully assessed. Further, the relatively intact nature of the soil profile indicates the potential for archaeological material to be present at depth, and if present, such deposits may potentially have good integrity.

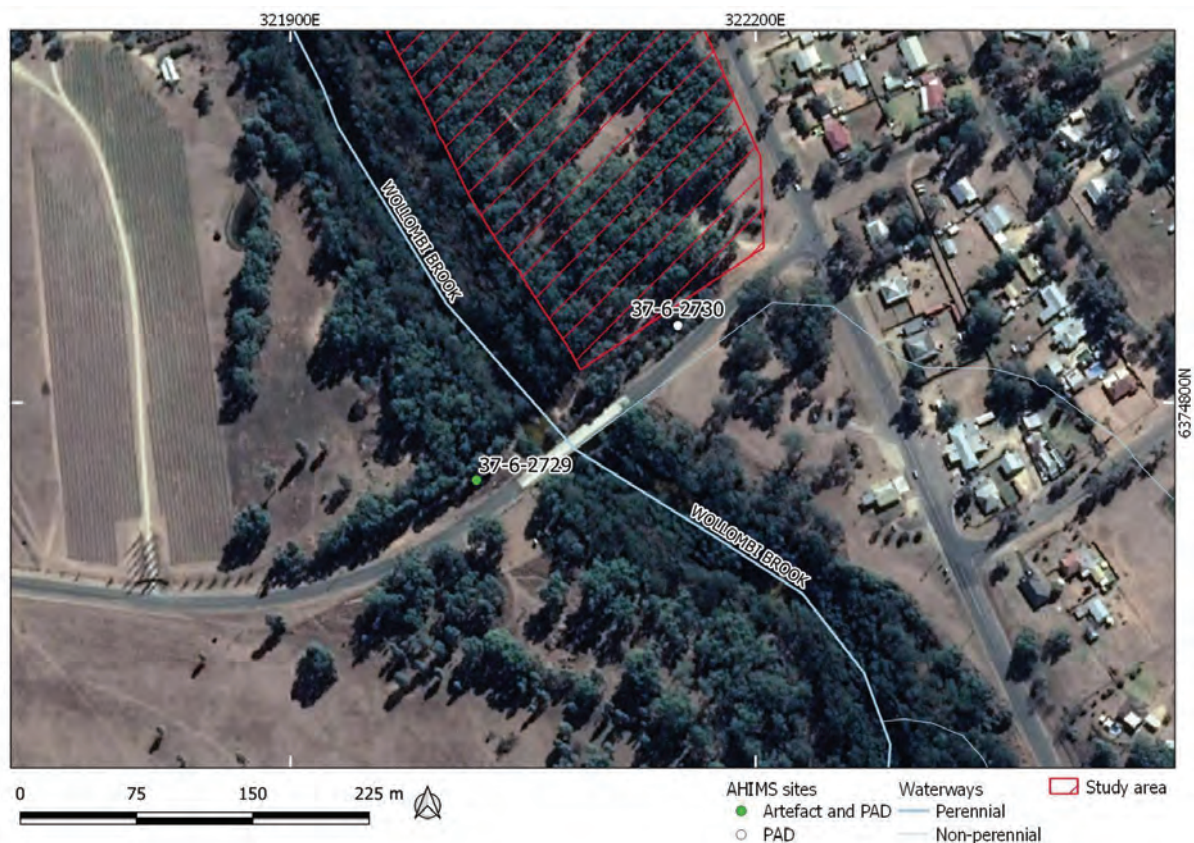


Figure 3. 52: Location of 37-3-2729 and 37-6-2730 in relation to the study area. Source: Figure 2-1 in *Aboriginal Due Diligence Assessment Report: Proposed Relocation Area for Ravensworth Homestead*, OzArk, 2019; p. 5

4. Assessment of Significance

4.1. Introduction

An assessment of the cultural significance of McNamara Park, Broke has been undertaken as follows.

4.1.1. Existing Heritage Listings

McNamara Park, Broke is located within the local government area of Singleton Council. McNamara Park is not identified as a heritage item and is not located within a recognised heritage conservation area.

Three local heritage items are located within the vicinity of McNamara Park as identified in Schedule 5 of the *Singleton Local Environmental Plan 2013*:

- Item No. I5: War Memorial, Stewart McTaggart Park, Broke
- Item No. I6: Maria Immaculate Roman Catholic Church, 26-28 Wollombi Street, Broke
- Item No. I7: St Andrew's Anglican Church, 36 Wollombi Street, Broke

4.2. Heritage Assessment Criteria

The Australia ICOMOS *Burra Charter* (see Appendix 1) defines cultural significance as *aesthetic, historic, scientific, social or spiritual value for past, present or future generations*. Cultural significance is embodied in the *place* itself, its *fabric, setting, use, associations, meanings*, records, *related places* and *related objects*. Places may have a range of values for different individuals or groups. (*Burra Charter*, Article 1.2).

The assessment of the significance of a place requires an evaluation of the fabric, uses, associations and meanings relating to the place, from which a detailed statement of significance can be formulated.

4.2.1. NSW Heritage Assessment Criteria

The NSW heritage assessment criteria, as set out in the NSW Heritage Office and Planning NSW's publication, *Heritage Assessments* (2002) encompasses the five types of significance expressed in a more detailed form by the following criteria:

- | | |
|---------------|---|
| Criterion (a) | An item is important in the course, or pattern, of NSW's cultural or natural history (or the cultural or natural history of the local area). |
| Criterion (b) | An item has strong or special association with the life or works of a person, or group of persons, of importance in NSW's cultural or natural history (or the cultural or natural history of the local area). |
| Criterion (c) | An item is important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement in NSW (or in local area). |

- Criterion (d) An item has strong or special association with a particular community or cultural group in NSW (or local area) for social, cultural or spiritual reasons.
- Criterion (e) An item has potential to yield information that will contribute to an understanding of NSW's cultural or natural history (or the cultural or natural history of the local area).
- Criterion (f) An item possesses uncommon, rare or endangered aspects of NSW's cultural or natural history (or the cultural or natural history of the local area).
- Criterion (g) An item is important in demonstrating the principal characteristics of a class of NSW's cultural or natural places or environments (or a class of the local area's cultural or natural places or environments).

The NSW Heritage Division recommends that all criteria be referred to when assessing the significance of an item, even though only complex items will be significant under all criteria.

4.3. Heritage Assessment of McNamara Park, Broke

The following statement of significance based on the foregoing analysis in this report has been prepared in accordance with the guidelines set out in the NSW Heritage Office and Planning NSW's publication, *Heritage Assessments* (2002).

4.4.1 Criterion (a) Historical Significance

An item is important in the course, or pattern, of NSW's (or the local area's) cultural or natural history.

The land on which McNamara Park is located is of historical significance as forming part of the land of the Wonnarua, which was vast and stretched over much of the Hunter Valley; and physical evidence of the past lives of the Wonnarua people remains in the vicinity of the park lands.

McNamara Park is of historical significance for being laid out in 1830 as part of the Village Reserve of Broke located on the former Great North Road (now Wollombi Street), initially surveyed by Assistant Survey Henry Dangar in 1828 and formally named Broke by Survey General Thomas Mitchell after Sir Charles Broke Vere, Bart. in 1831. The land has been a public reserve for either recreational purposes or as commonage since its initial laying out.

4.4.2 Criterion (b) Historical Associational Significance

An item has strong or special association with the life or works of a person, or group of persons, of importance in NSW's (or the local area's) cultural or natural history.

McNamara Park has historical associational significance with former Singleton mayor, Neil McNamara, for whom the park is named after. Neil McNamara OAM was a noted councillor and a prominent business person in the Singleton district and started life as a dairy farmer at Broke.

4.4.3 Criterion (c) Aesthetic Significance

An item is important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement in NSW (or in local area).

As a relatively undeveloped stretch of land located adjacent to Wollombi Brook, McNamara Park has no more aesthetic significance than other areas of dry sclerophyll woodlands located throughout the Lower Hunter Region.

Available views of Yellow Rock from along the eastern edge of McNamara Park are of high aesthetic significance, as Yellow Rock is a distinctive geological feature in the locality.

4.4.4 Criterion (d) Social Significance

An item has strong or special association with a particular community or cultural group in NSW (or local area) for social, cultural or spiritual reasons.

McNamara Park would have some social significance for the residents of Broke as the main public reserve on the main street of the village (possibly thought of as the town common), well as for tourists and visitors who use the park as a camping and picnic ground and attend markets and fairs held at the place.

There are no known cultural values or Aboriginal sites pertaining directly to the location of the McNamara Park, although Wollombi Brook, which is adjacent to the park, is believed to be a pathway to creation places and Yellow Rock (Lizard Rock) is important to local Aboriginal people and holds strong spiritual connections for Aboriginal people of the area.

4.4.5 Criterion (e) Research Potential

An item has potential to yield information that will contribute to an understanding of NSW's cultural or natural history (or the cultural or natural history of the local area).

Based on the history of use of McNamara Park as a public reserve since the 1830s, it is unlikely that historical archaeology of significance would be uncovered at the place. However, there is high potential for Aboriginal archaeological relics to survive which may be of good integrity.

4.4.6 Criterion (f) Rarity

An item possesses uncommon, rare or endangered aspects of NSW's cultural or natural history (or the cultural or natural history of the local area).

As a public reserve associated with the colonial settlement of the Lower Hunter region, McNamara Park is one of a number of similar land parcels found throughout NSW and is not considered to be rare.

4.4.7 Criterion (g) Representativeness

An item is important in demonstrating the principal characteristics of a class of NSW's cultural or natural places or environments (or a class of the local area's cultural or natural places or environments).

McNamara Park is representative of colonial town planning practices demonstrating the approach to the laying out of regional villages in NSW in the 1830s which included public reserves for recreational uses as part of the formal town plan.

4.4.8 Summary Statement of Significance

McNamara Park, Broke, is of historical significance as forming part of the original town plan for the village of Broke, formally surveyed and laid out in the 1830s and in continuous use as a public reserve (either for recreational purposes or as a commonage) since its establishment. The park also has some significance for its ability to demonstrate colonial town planning practices of providing public reserves for recreation as part of the formal town plan for regional villages.

The place has historical associational significance for being named for former mayor of Singleton Council, Neil McNamara OAM, a noted local councillor and prominent business person of the district.

The place is likely to be held in some regard as the "town common" for the village of Broke and for its usefulness as a camping area and location for regular markets and fairs.

4.4. Grading of Significance

4.4.1. Grades of Significance for Components of the Place

The components of the place can be ranked in accordance with their relative significance as a tool to planning. *Heritage Assessments* (NSW Heritage Branch, 2000) identifies the following grades of significance:

Grade	Justification	Status
High	High degree of original fabric. Demonstrates a key element of the item's significance. Alterations do not detract from significance.	Fulfils criteria for local or state listing.
Moderate	Altered or modified elements. Elements with little heritage value, but which contribute to the overall significance of the item.	Fulfils criteria for local or state listing.
Little	Alterations detract from significance. Difficult to interpret.	Does not fulfil criteria for local or state listing.
Intrusive	Damaging to the item's heritage significance	Does not fulfil criteria for local or state listing.

4.4.2. Grades of Significance for Components of McNamara Park, Broke

The principal elements and features of McNamara Park have been grouped together and graded below in relation to their contribution to the place's overall cultural significance. Generally, the grades of significance applied relate to the historical phases of development, contribution to the overall cultural significance of the place and/or their rarity, as per the following:

- High (H)**
 - Original and early addition features of historic and aesthetic interest
 - Later features critical to the appreciation of the place
- Moderate (M)**
 - Later features important to the appreciation of the place
 - Recent features critical to the appreciation of the place
- Little (L)**
 - Other recent features
- Intrusive (I)**
 - Features that detract from the significance or appreciation of the place.

Table 4. 1: Gradings of Significance for components of McNamara Park, Broke

Component/Feature	Significance Grading
The public reserve of McNamara Park, located adjacent to the village of Broke on the former Great North Road (Wollombi Street)	Little
Use of McNamara Park as public reserve, town common, camping area and market locale	Moderate
Bicentennial Memorial with cultural plantings	Moderate
Vegetation of the Hunter-Macleay Dry Sclerophyll Forest and the Eastern Riverine Forest including mature trees.	Little
Signage: directional, warning and naming	Little
Camping facilities including amenities block, car parking areas, bollards, signage, power outlets, picnic shelters etc.	Little
Roads and tracks through the reserve	Little
Aboriginal archaeological potential	High ⁷⁸

⁷⁸ *Aboriginal Due Diligence Assessment Report: Proposed Relocation Area for Ravensworth Homestead*, OzArk, 2019; p. 22

Appendix

Bibliography

The following sources were consulted in the preparation of this report. See also the captions to the figures included in this report.

Maps and Plans

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