



A view of the Assessment Boundary within the Underground Extraction Area.

ABORIGINAL AND HISTORIC HERITAGE IMPACT ASSESSMENT

LONGWALL EXTENSION MODIFICATION

INTEGRA UNDERGROUND MINE

NOVEMBER 2017

Report Prepared by

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for Hansen Bailey on behalf of HV Coking Coal Pty Limited



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EXECUTIVE SUMMARY

OzArk Environmental & Heritage Management (OzArk) has been engaged by Hansen Bailey (the Client), on behalf of HV Coking Coal Pty Limited (the Proponent) to complete an Aboriginal and Historic Heritage Impact Assessment for the proposed Modification to Project Approval 08_0101 for the Integra Underground Mine. The proposed Modification involves adjustments to the approved mine plan for the Middle Liddell Seam, and the construction and operation of ancillary surface infrastructure. The proposed Modification is situated within the Singleton Local Government Area.

The fieldwork component of this assessment was undertaken by Ben Churcher of OzArk on 6 July 2017.

The majority of the Assessment Boundary is within, or in close proximity to, the Mount Owen Complex. Large and representative portions of the Assessment Boundary were subject to survey by archaeologists and Aboriginal community members for the Mount Owen Continued Operations project that was undertaken from 2012 to 2013. This project involved extensive Aboriginal community engagement; both in the participation with the survey and test excavation program, as well as in the investigation of the area's Aboriginal cultural values.

As a result of these investigations, there are five previously recorded Aboriginal sites located within the Assessment Boundary for the proposed Modification. One of the sites will require avoidance measures to be implemented during construction activities, whilst the remaining four sites will form part of a site condition monitoring program. No additional Aboriginal sites were recorded during the field survey.

There is one historic heritage site (MOH6) located within the Assessment Boundary and no further historic sites were recorded during the field survey.

Recommendations

Potential impacts to Aboriginal cultural heritage sites within the Assessment Boundary will be managed as follows:

1. All land disturbance works are to remain within the Assessment Boundary. Should ground disturbance be required outside of the Assessment Boundary, further investigation may be required.
2. All management recommendations set out in **Section 6.3** should be followed.
3. All staff and contractors associated with any ground disturbing aspects of the proposed work, should participate in an Aboriginal Cultural Heritage Awareness Induction and be

fully informed of their statutory obligations in relation to Aboriginal cultural heritage sites and objects.

4. In the event that Aboriginal objects or human remains are unearthed during the construction phase for the proposed Modification, the protocols in the *Integra Underground Aboriginal Cultural Heritage Management Plan* (HVCC 2017: Section 5.5) should be followed.

Historic heritage sites within the Assessment Boundary will be managed as follows:

1. All land disturbance works associated with the proposed Modification are to remain within the Assessment Boundary. Should ground disturbance be required outside of the Assessment Boundary, further investigation may be required.
2. There is one known historic heritage sites in the Assessment Boundary (MOH6). As the site has been assessed as having no significance and no research potential, there are no specific management recommendations pertaining to historic heritage.
3. All staff and contractors associated with any ground disturbing aspects of the proposed work, should be fully informed of their statutory obligations in relation to historic heritage sites and objects.
4. In the event that historic objects are unearthed during the construction phase for the proposed Modification, the protocols in the *Historical Heritage Management Plan* (HVCC 2017b: Section 3.1) should be followed.

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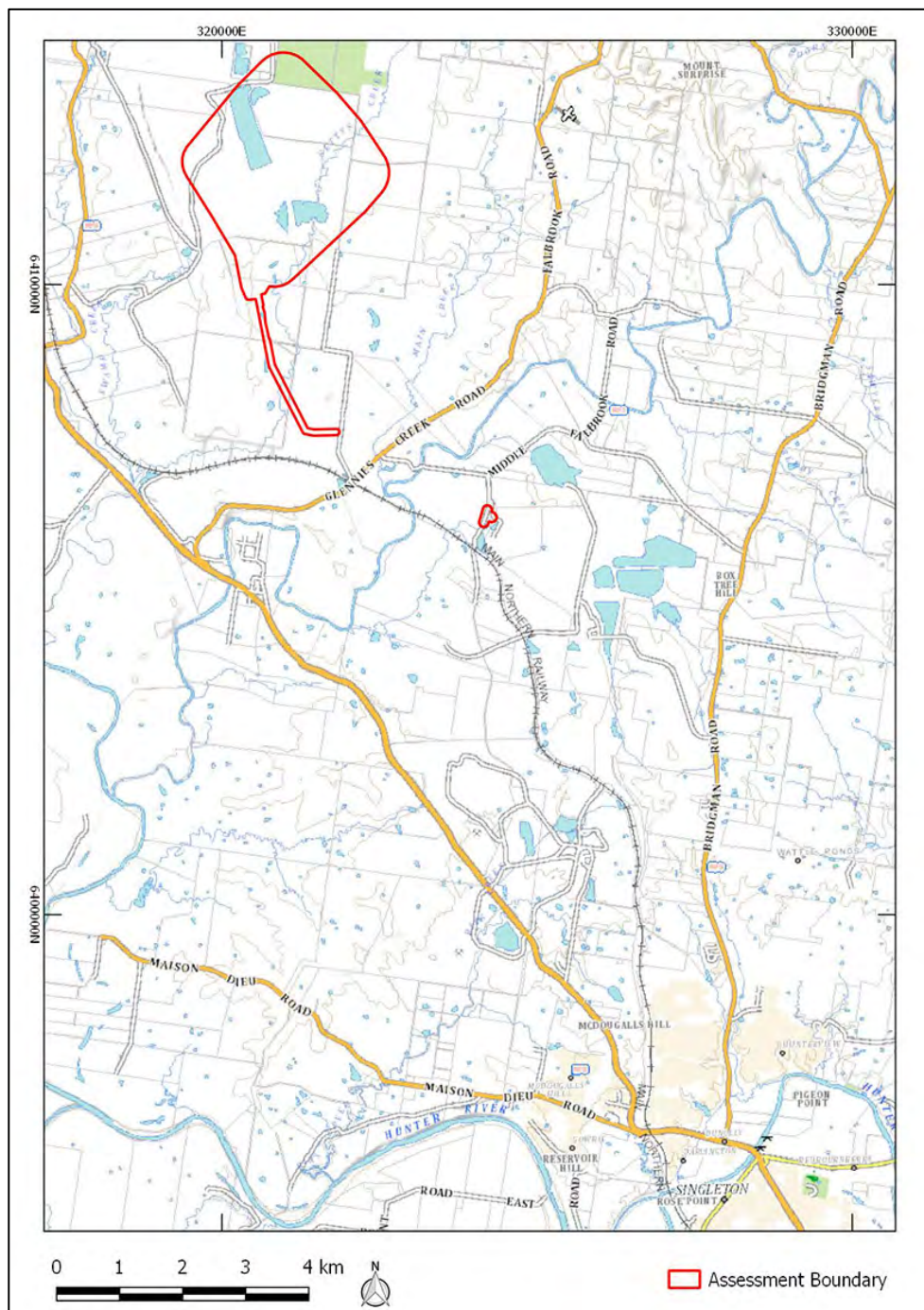
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1 INTRODUCTION

1.1 BRIEF DESCRIPTION OF THE PROPOSED MODIFICATION

OzArk Environmental & Heritage Management (OzArk) has been engaged by Hansen Bailey (the Client), on behalf of HV Coking Coal Pty Limited (HVCC; the Proponent) to complete an Aboriginal and Historic Heritage Impact Assessment for the proposed Modification to Project Approval (PA) 08_0101 for the Integra Underground Mine (Integra Underground). The proposed Modification is situated within the Singleton Local Government Area (LGA) (**Figure 1-1**).

Figure 1-1. Location map showing the Assessment Boundary in relation to Singleton.



1.2 BACKGROUND

HVCC operates Integra Underground in the Upper Hunter Valley of New South Wales (NSW). HVCC is a wholly owned subsidiary of Glencore Coal Pty Limited (Glencore).

Hansen Bailey is currently preparing an application on behalf of HVCC to modify Integra Underground's PA 08_0101. This proposed Modification application will be made under Section 75W of the *Environmental Planning and Assessment Act 1979* (EP&A Act). HVCC is seeking approval to continue longwall mining of the Middle Liddell Seam further to the north of the currently approved longwall panels. The proposed Modification also involves the construction and operation of ancillary surface infrastructure.

1.3 PROPOSED WORK

The proposed Modification includes the following components:

- Adjustments to the approved mine plan for the Middle Liddell Seam including:
 - o Realignment and extension of the main headings further to the northwest;
 - o Increases to the lengths and widths of the approved longwalls (LWs) 15–17; and
 - o Mining of additional longwall panels (LWs 18–19 or LWs 18–20).
- Construction and use of additional surface infrastructure including:
 - o Auxiliary fans in the maingate of each longwall panel to assist in the efficient ventilation of the longwall mining area;
 - o Additional electricity transmission lines and distribution lines;
 - o Additional dewatering boreholes and associated infrastructure;
 - o Additional gas drainage boreholes to ensure the safety of underground operations;
 - o Increased usage of the currently approved gas flares; and
 - o Relocation of the existing store facility and the construction and use of an additional access road off Middle Falbrook Road.
- Use of the C4 Dam to store raw water from Glennies Creek.

The proposed mining activities and ancillary surface infrastructure associated with the proposed Modification are conceptually illustrated on **Figure 1-2** to **Figure 1-4**.

Integra Underground is located adjacent to the Mount Owen Complex (MOC) which is also owned and operated by Glencore. The proposed Modification does not involve any alterations to the Development Consent (SSD-5850) for the MOC. However, the proposed mining activities and infrastructure development will be undertaken within the approved Project Area for the MOC.

1.4 ASSESSMENT BOUNDARY

For the purposes of this Environmental Assessment, an Assessment Boundary (encompassing an area of approximately 806 hectares [ha]) has been established to cover all areas that may be affected by the proposed Modification. The Assessment Boundary includes all land that may be subject to subsidence associated with the proposed longwall mining, or disturbance associated with the construction of ancillary surface infrastructure.

Figure 1-5, showing an aerial with the Assessment Boundary superimposed, illustrates that the Assessment Boundary is mostly within cleared and modified lands associated with the MOC. The Assessment Boundary also includes a small area next to the existing Integra Underground Surface Infrastructure Area (referred to herein as the Integra Underground surface facilities), which will contain the new access road off Middle Falbrook Road.

In general, from north to south, the Assessment Boundary encompasses the following features (also shown on **Figure 1-5**):

- Underground Extraction Area: Comprises approximately 773ha. Of this area approximately 42ha can be regarded as unmodified, 62.6ha can be regarded as moderately modified and the remaining 668.4ha as highly modified. The unmodified portions include a small portion of the Ravensworth State Forest (Southern Remnant and Southern Remnant Offset) and a portion of landforms along the banks of Bettys Creek in the south of the Underground Extraction Area. The areas considered as being moderately modified include landforms within the Mount Owen Rail Spur and Loop and a wooded area, mostly consisting of revegetation, in the east of the Underground Extraction Area.
- 66kV powerline corridor: Comprises approximately 27.4ha. While moderately disturbed from past land use practices including vegetation clearing and soil loss, this portion of the Assessment Boundary has not been modified by mining activities apart from a few localised incidences. The powerline corridor crosses an unmodified portion of Bettys Creek.
- Surface infrastructure amendments: Comprises approximately 6ha. This portion of the Assessment Boundary has been impacted by road construction, dams, laydown areas and buildings. Approximately 2.3ha of this portion can be regarded as unmodified.

Figure 1-6 shows a selection of landforms present within the Assessment Boundary.

Figure 1-2: Conceptual proposed Modification overview.

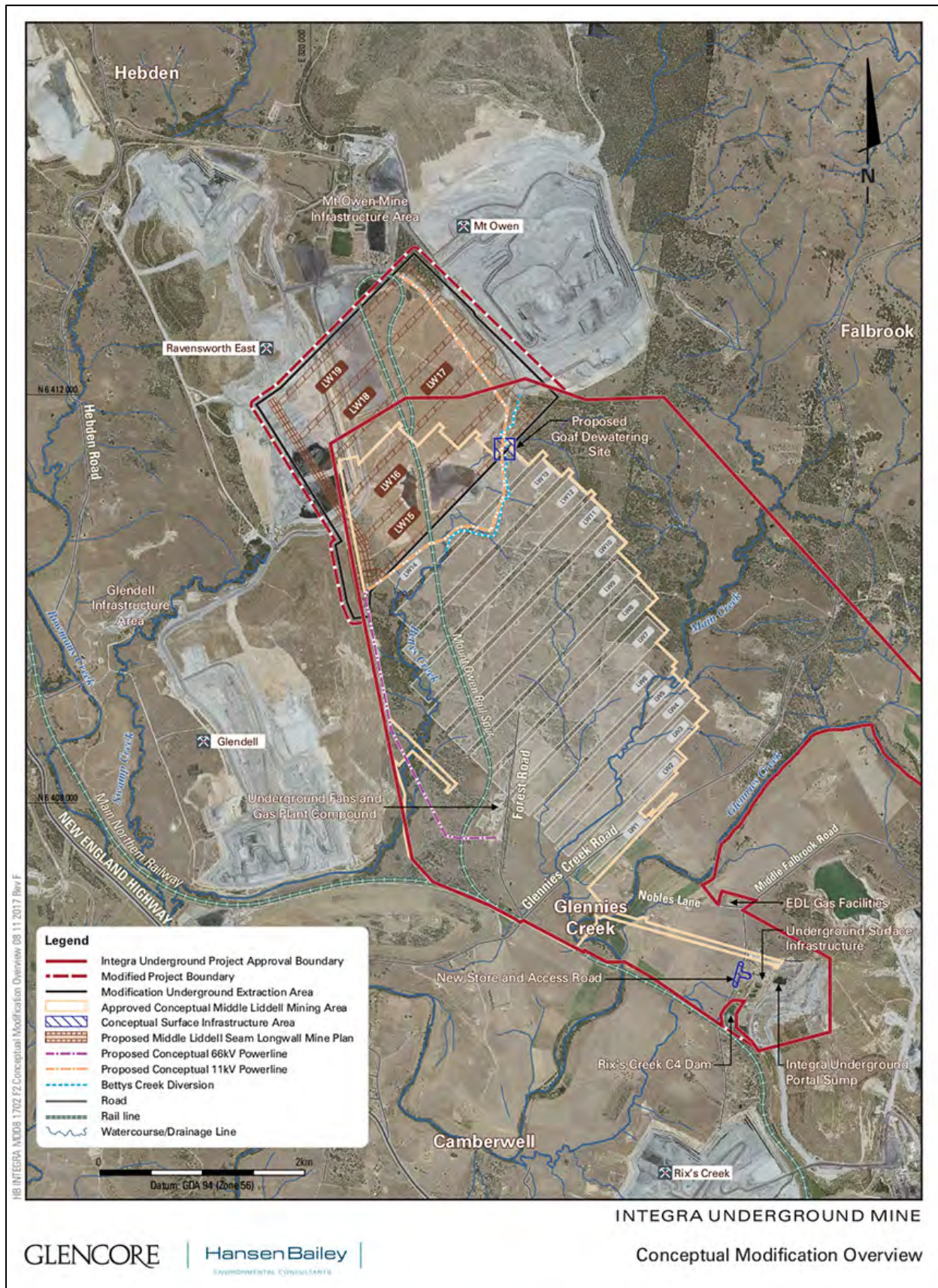


Figure 1-3: Conceptual longwall mine plan.

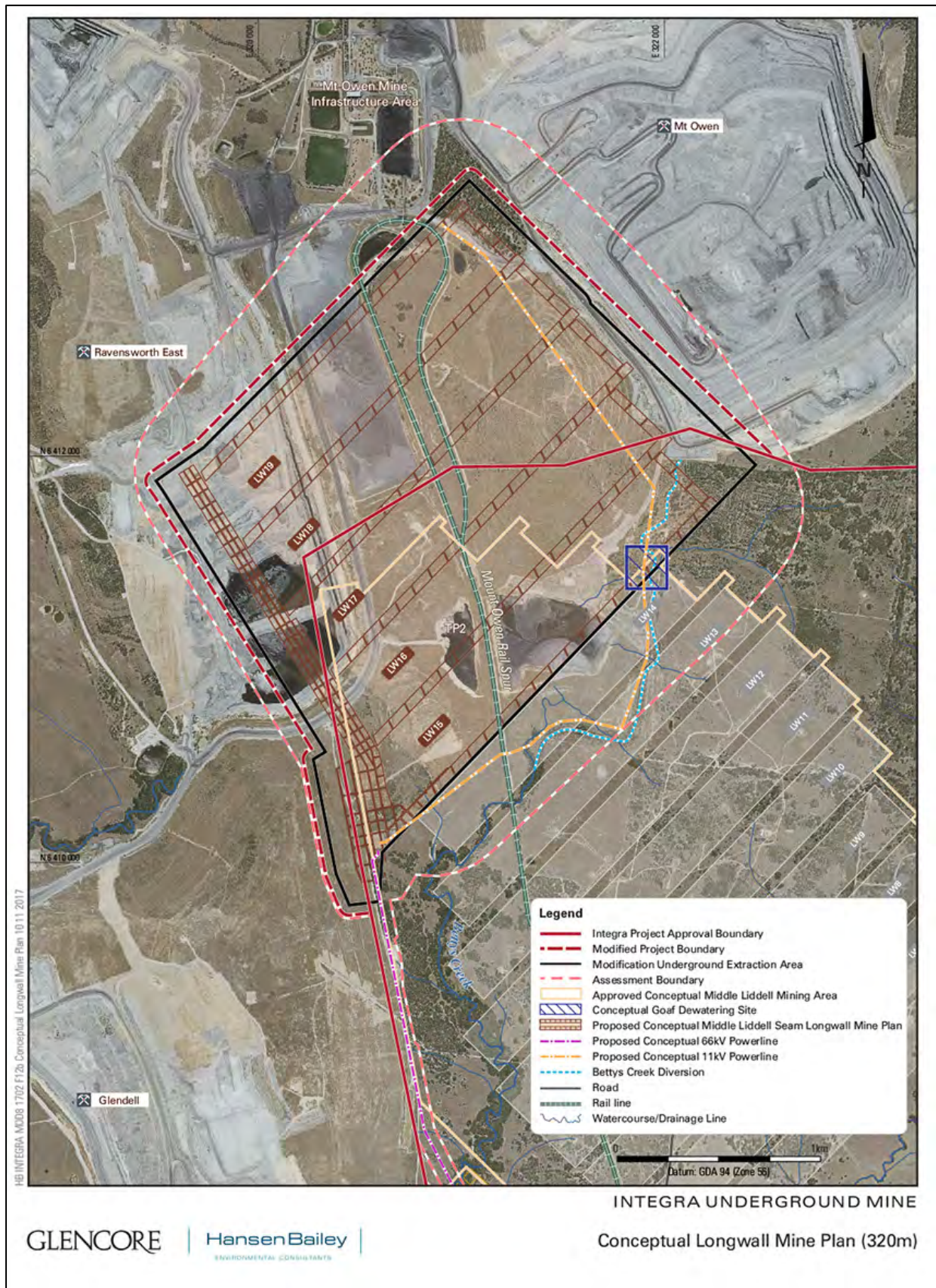


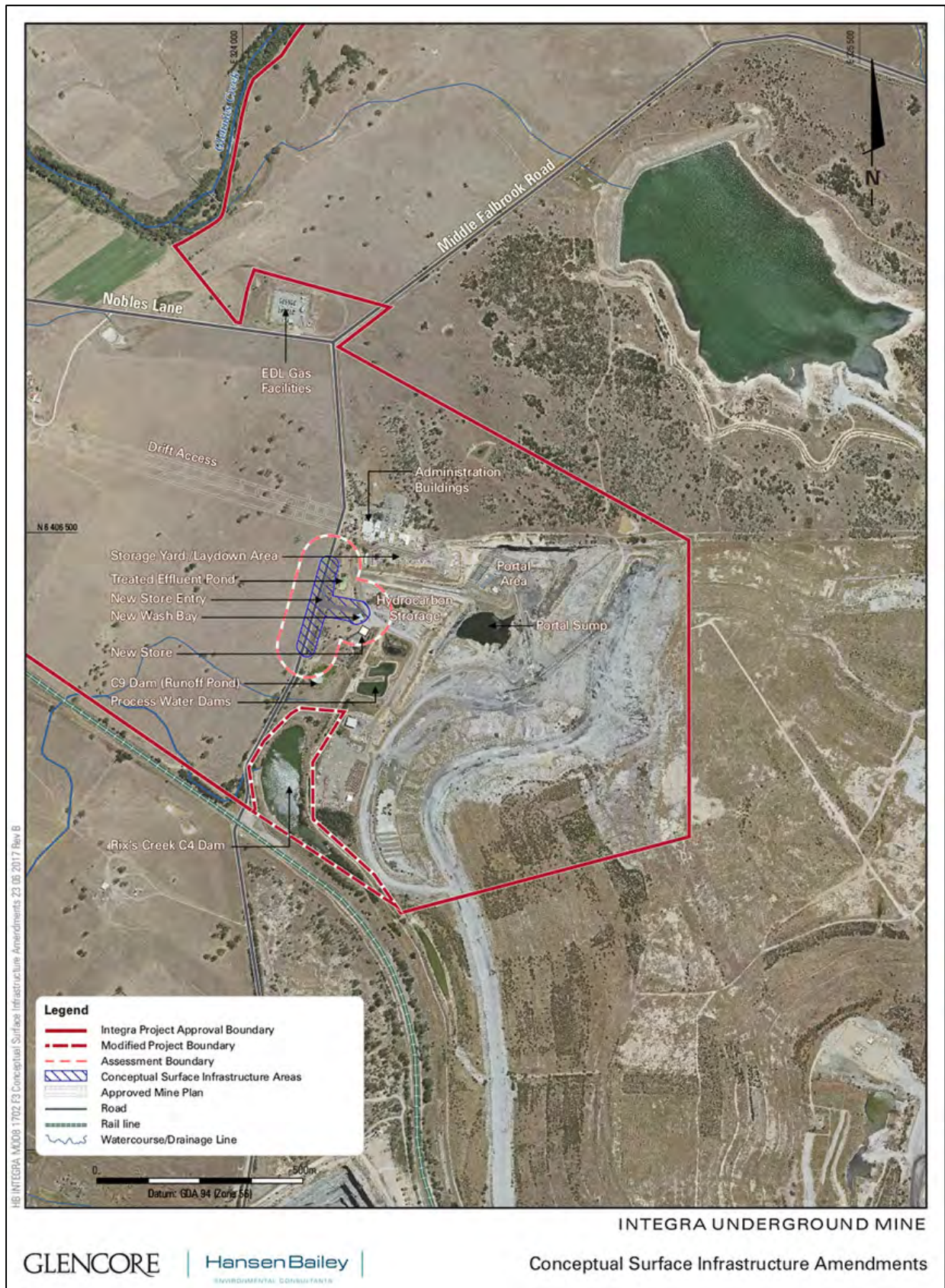
Figure 1-4: Conceptual surface infrastructure amendments.

Figure 1-5. Aerial showing the Assessment Boundary.

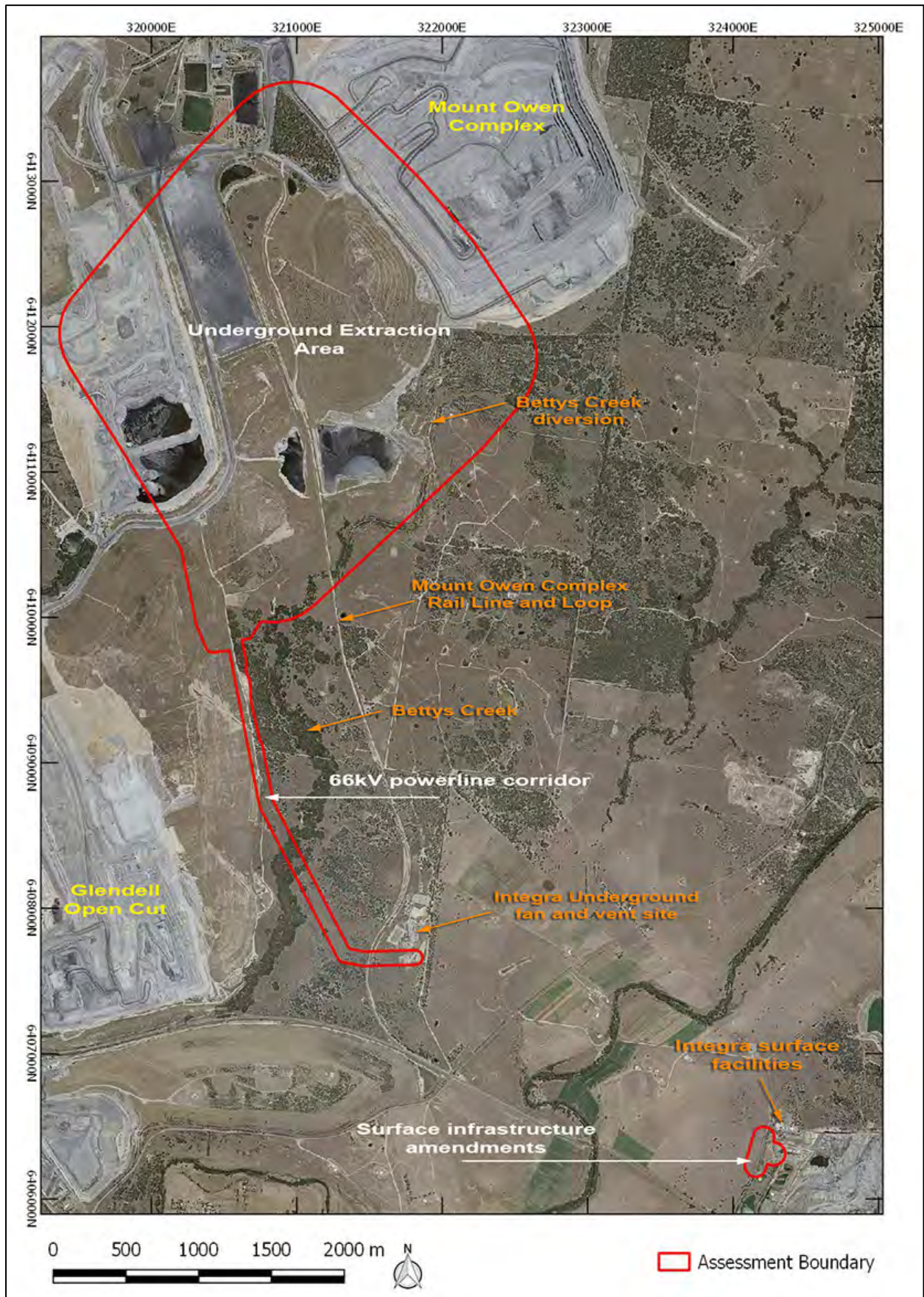


Figure 1-6: Landforms within the Assessment Boundary.

	
1. View of regenerating woodland in the east of the Underground Extraction Area within the Assessment Boundary.	2. View of modified landforms within the Mount Owen Rail Loop overlying the Underground Extraction Area within the Assessment Boundary.
	
1. View of regenerating woodland within the powerline corridor portion of the Assessment Boundary.	2. View of modified landforms surrounding the surface infrastructure amendments portion of the Assessment Boundary.

1.5 ASSESSMENT APPROACH

The current assessment follows the *Code of Practice for the Investigation of Aboriginal Objects in New South Wales* (Code of Practice; DECCW 2010).

Field assessment and reporting followed the *Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW* (OEH 2011).

Background information relevant to both the Aboriginal and historic heritage impact assessments is presented in **Sections 1** and **2** of this report. The Aboriginal cultural heritage impact assessment is presented in **Sections 3** to **6** of this report while the historic heritage impact assessment is presented in **Sections 7** to **9** of this report. Recommendations regarding Aboriginal cultural heritage and historic heritage are provided in **Section 10**.

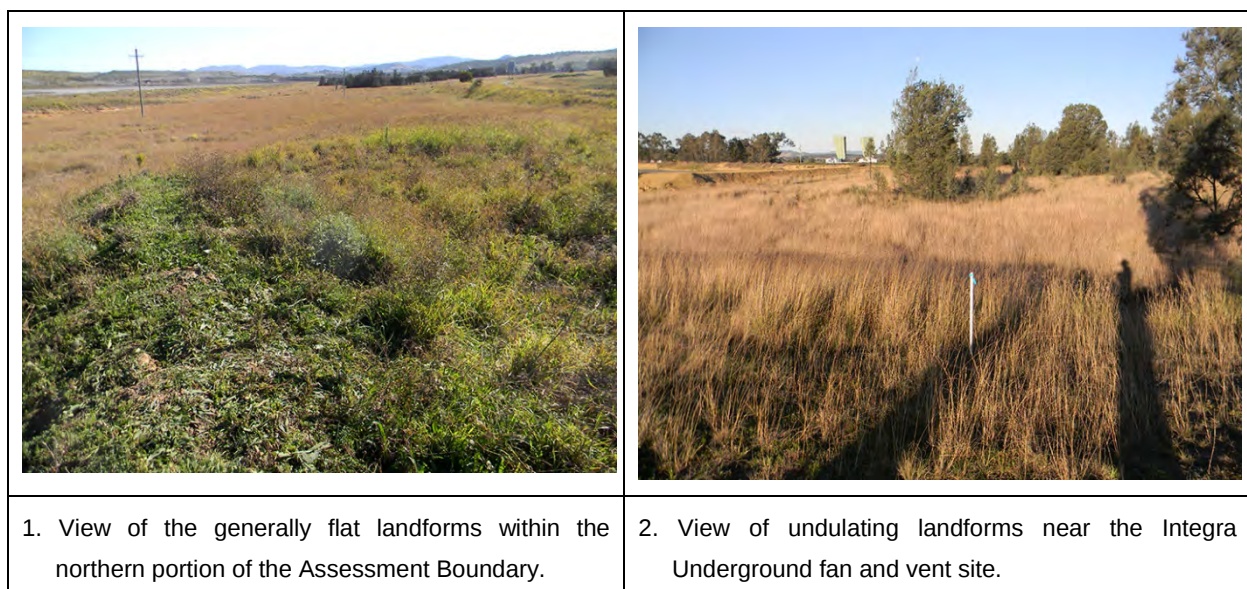
2 LANDSCAPE CONTEXT

An understanding of the environmental contexts of a study area is requisite in any Aboriginal archaeological investigation (DECCW 2010). It is a particularly important consideration in the development and implementation of survey strategies for the detection of archaeological sites. In addition, natural geomorphic processes of erosion and/or deposition, as well as humanly activated landscape processes, influence the degree to which these material culture remains are retained in the landscape as archaeological sites; and the degree to which they are preserved, revealed and/or conserved in present environmental settings.

2.1 TOPOGRAPHY

The topography within the Assessment Boundary is generally undulating with low to moderate gradients (**Figure 2-1**). The northern portion of the Assessment Boundary, now highly modified from previous mining activity, would have once been part of flat landforms between Swamp and Bettys Creeks. In the east of the Assessment Boundary the elevation increases towards a locally prominent ridge that separates Bettys Creek from Main Creek. The Assessment Boundary does not include the ridge itself but does include the flanking slopes to the west of the ridgeline. The portion of the Assessment Boundary where the powerline corridor is proposed is primarily composed of flat landforms to the west of Bettys Creek. The southern portion of the Assessment Boundary next to the Integra Underground surface facilities is within lower slopes overlooking the floodplains on the southern side of Glennies Creek.

Figure 2-1. Topography within the Assessment Boundary.



2.2 GEOLOGY AND SOILS

The Assessment Boundary is wholly located within the Central Hunter Foothills landscape unit (Mitchell 2002). The geology of this landscape unit is characterised by Permian lithic sandstone,

conglomerate, shale and coal (Mitchell 2002: 73). Coal resources come from this landscape unit. As has been commonly reported in other surveys in this region (Brayshaw 1986), there are two major soil depositional units in the Assessment Boundary. An upper unit (commonly called the A-Horizon), composed primarily of sand and silt but sometimes with gravel present. This upper unit overlies and is very distinct from the underlying clay and gravel B-Horizon which ranges from brown to yellow in colour.

2.3 HYDROLOGY

The landforms of the Assessment Boundary historically encompassed two named creek lines, Swamp Creek and Bettys Creek (**Figure 2-2**). However, both Swamp Creek and Bettys Creek have previously been altered by approved mining activities to the extent that the northern portions of Swamp Creek (within the Assessment Boundary) are no longer extant and Bettys Creek has been diverted and no longer has a natural flow regime (see **Figure 2-2**).

Bettys Creek was once a third order watercourse (Umwelt 2003). It has been noted in previous archaeological assessments that during wet periods, Bettys Creek was characterised by a chain of ponds morphology. It was noted that a complete absence of water is also possible (Umwelt 2004). It is also accepted that changes to the hydrology of the area due to mining and creek diversions are likely to have greatly altered the pre-1788 form of Bettys Creek. Bettys Creek includes numerous meander cut-offs, swampy hollows and intermittent pools that may be the remnants of the 19th century 'chain of ponds' morphology.

The portions of Bettys Creek within the Assessment Boundary were dry at the time of the field assessment, although the extant creek is significantly modified from its original form and current water levels should not be considered a reflection of past conditions. While now well-vegetated, the creek bank morphology shows signs of wide-spread erosion with evidence of channel changes and past gully erosion. Further, the current regrowth of *Casuarina* species on its banks indicates soil loss from the creek margins as *Casuarina* species are able to recolonise very nutrient poor soils (**Figure 2-3**).

Swamp Creek would have once been a second order watercourse within the Assessment Boundary. However, all portions of this system within the Assessment Boundary have been removed by approved mining activity.

The closest higher order waterway to the Assessment Boundary is Glennies Creek, a tributary of the Hunter River, which was noted by Appleton (2002) as being a permanent water source for the area. Glennies Creek only becomes dry during extended periods of drought.

Figure 2-2. Aerial of the Assessment Boundary showing surrounding hydrological features.

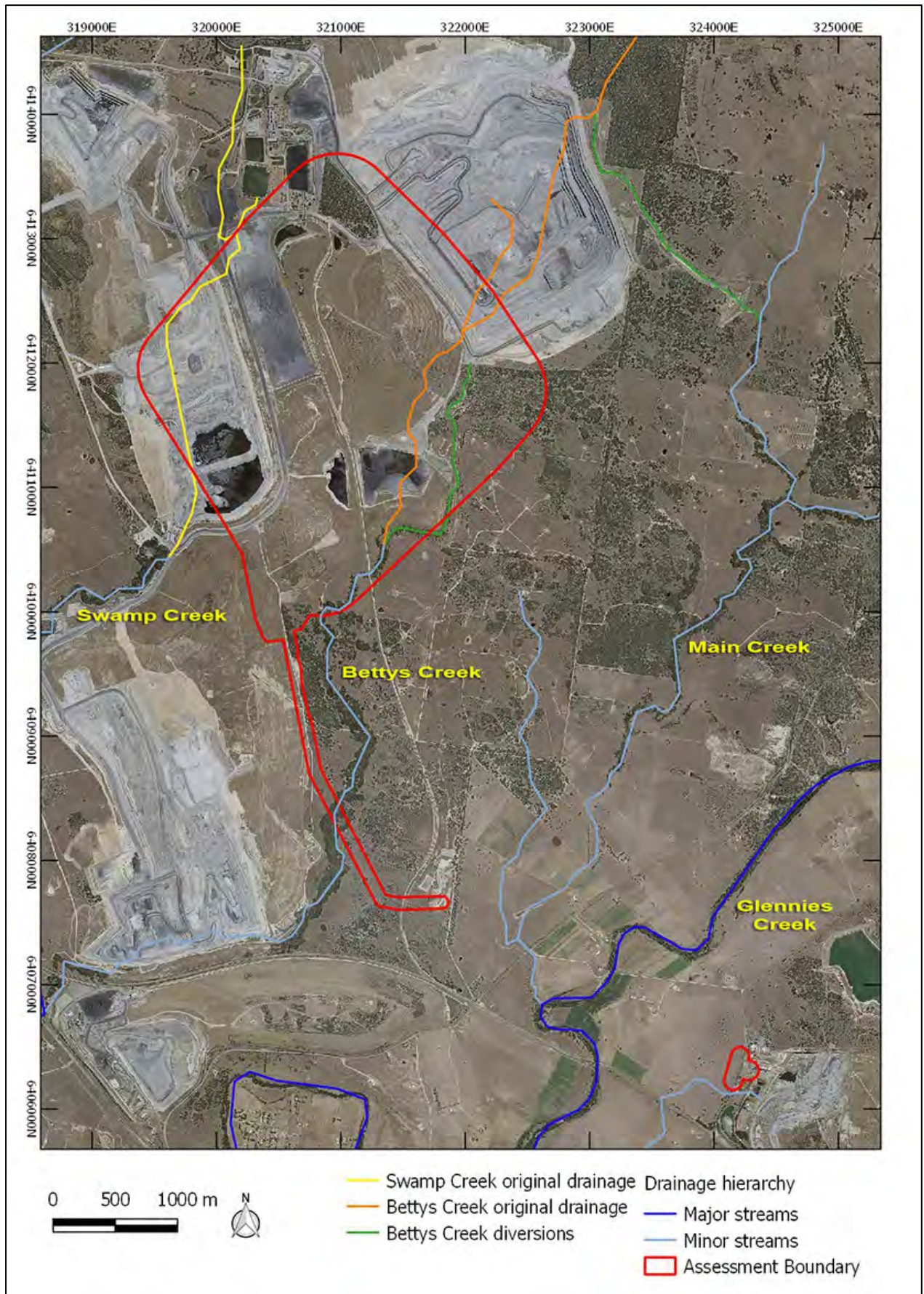
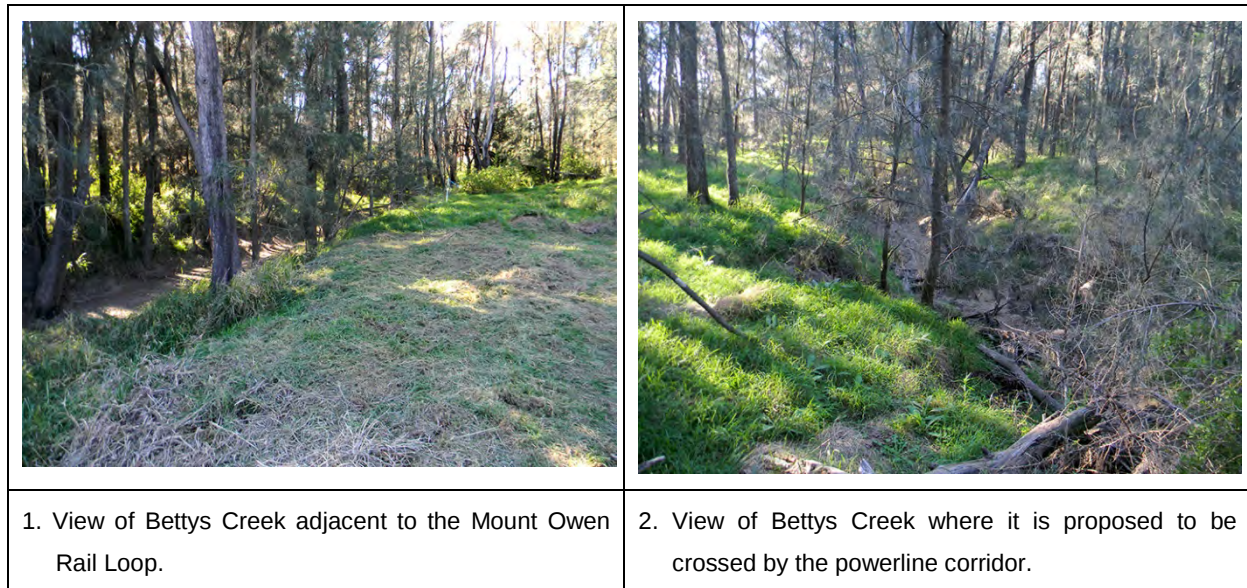


Figure 2-3. Hydrology within the Assessment Boundary.

2.4 VEGETATION

The Assessment Boundary has been heavily modified from its original environment, primarily during the agricultural land use phase, when the Assessment Boundary was almost completely cleared (**Figure 2-4**). The only exception to this is the portion of the Ravensworth State Forest (now referred to as the Southern Remnant and the Southern Remnant Offset) that exists within the Assessment Boundary. While there is evidence that this woodland has been logged in the past, this vegetation community is largely absent across the remainder of the Assessment Boundary.

In terms of food and medicinal plants for Aboriginal use, researchers have noted that the Bettys Creek catchment contains food plants such as bulrush, chocolate lily, fringed lily, kangaroo grass, kurrajong, mat-rush, onion orchid, rushes and sedges, spike rush and water ribbon. All of these resources are at their best for consumption in the late spring to end of summer period. Medicinal plants present within the Bettys Creek catchment included native geranium. Species providing fibre for the making of nets, bags and containers included narrow-leaved ironbark, rats tail grass, mat-rush, spike rush and other rushes and sedges (Umwelt 2013d: 3).

At present, almost all woodland in the Assessment Boundary is regrowth, apart from patches within the Ravensworth State Forest, and mature trees are very rare. **Figure 2-4** shows the extensive nature of the clearing across the Assessment Boundary. Regenerating woodland tends to occur in the form of thick stands of *Casuarina* along drainage lines and open *Eucalyptus* woodland on the slopes to the east. Other extensive areas within the Assessment Boundary have been previously cleared and are still open grasslands that were used until very recently for grazing.

In conclusion, the Assessment Boundary does not include large areas of undisturbed vegetation communities and the current vegetation regime consists almost entirely of exotic species or regenerating native species.

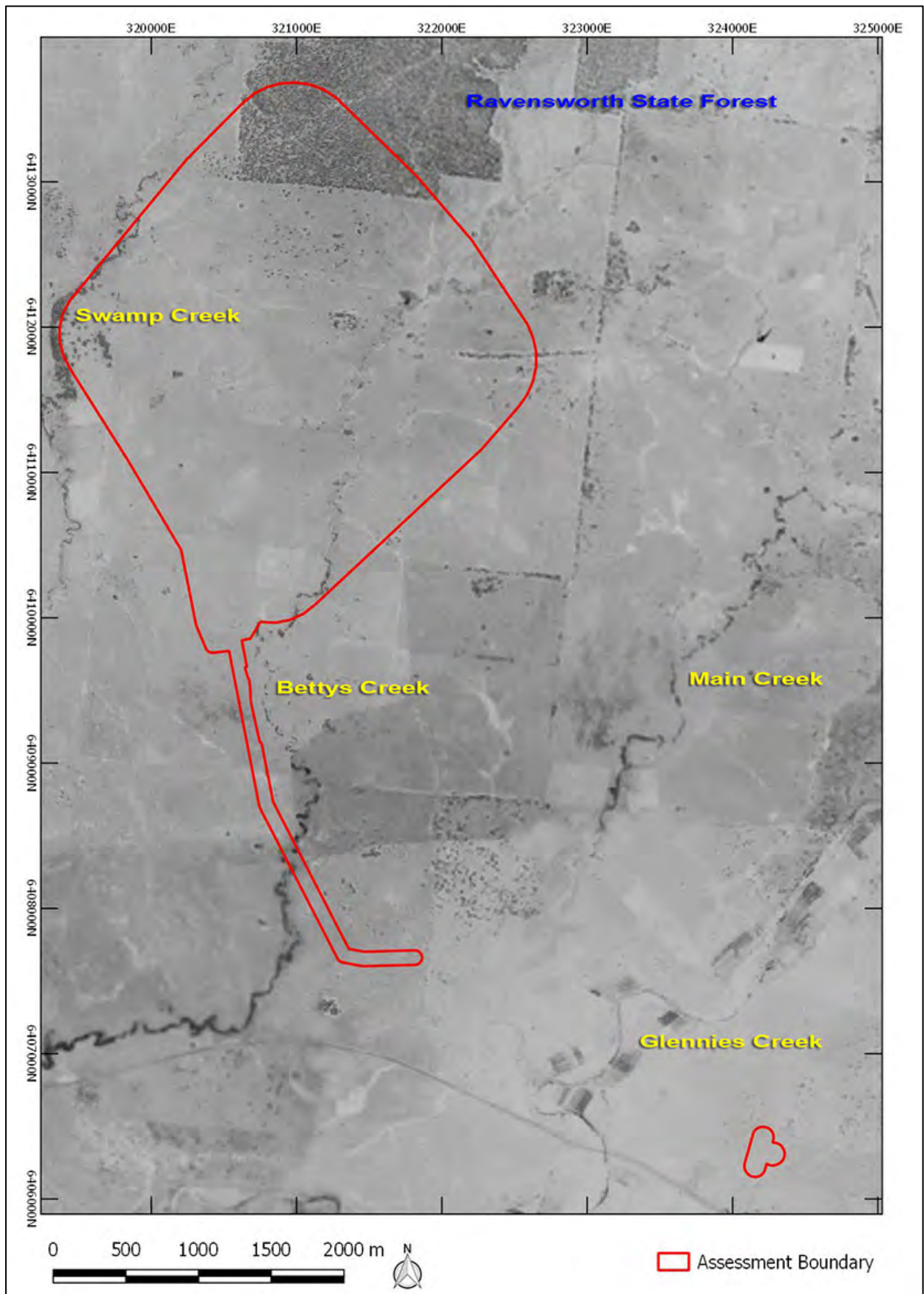
In the past, creek corridors such as Bettys Creek or Glennies Creek would have had limited and seasonal resources that could be utilised in a sporadic manner by Aboriginal groups. Larger nearby systems (such as Bowmans Creek) may have supported a more diverse resource base. However, when compared to river systems such as the nearby Hunter River, areas within the Assessment Boundary would have been more limited in their appeal as locations for more intensively used camp sites.

2.5 CLIMATE

The Sydney Basin Bioregion, within which the Assessment Boundary is located, exhibits a temperate climate. Summers are warm and there is no dry season.

The closest climate statistics are those recorded over the past 15 years at the Bureau of Meteorology's Singleton meteorological station which is located approximately 17km to the southeast of the Assessment Boundary (BOM 2017). These records show that temperatures are highest in January (mean maximum temperature: 31.7°C) and lowest in July (mean minimum temperature: 4.4°C). Rainfall records from the site indicate that average annual rainfall is 676.5 millimetres (mm) with the highest rainfall in February (mean monthly rainfall: 87.1mm) and lowest in July (mean monthly rainfall: 25.4mm).

Figure 2-4. A 1958 aerial showing the nature of the Assessment Boundary during the agricultural phase of land use.



2.6 LAND USE HISTORY AND EXISTING LEVELS OF DISTURBANCE

The majority of the Assessment Boundary has been cleared for agricultural and mining purposes. The Assessment Boundary is located within the MOC and Integra Underground mining lease boundaries. The removal of mature trees has lowered the potential for culturally modified trees (either scarred or carved) to be present. The resulting soil loss and subsequent intensive grazing are likely to have displaced surface manifestations and subsurface deposits, if present. Land clearance and soil compaction from stock trampling would have also contributed to increased rates of erosion. Water run-off and erosion associated with land clearance and farming practices has affected the natural flow of creek lines within and surrounding the Assessment Boundary.

In addition, large portions of the Assessment Boundary have been heavily modified by approved mining activities. These activities include open cut mining, overburden emplacement areas, railway lines, roads, drill pads, pipelines and dams. It is estimated that of the total area of the Assessment Boundary (806ha) that 680ha or 84.4% has been modified to the extent that the original landform is no longer discernible. A further 20ha or 2.5% of the area has been impacted by moderate modification where there is evidence of large scale earth moving activities that have heavily disturbed the original landform. As such, approximately 13% of the Assessment Boundary can be regarded as largely unmodified (apart from the impacts of vegetation clearance, soil loss and isolated impacts such as roads/tracks, drill pads and monitoring equipment). Of this unmodified area, only the land within the Ravensworth State Forest, which amounts to 16.5ha or 2% of the land within the Assessment Boundary, can be considered to have experienced low levels of modification. Only in this 2% of the Assessment Boundary have vegetation clearing, soil loss and grazing been kept to a minimum and the original landforms remain largely intact.

2.7 CONCLUSION

The Code of Practice requires that the following variables be considered when examining the environmental context of the Assessment Boundary:

1. Describe the landscape history at a scale that allows the subject area (Assessment Boundary) to be characterised into meaningful components (or units) for the archaeological investigation.
 - o The Assessment Boundary is wholly contained within gentle lower slope or flat landforms without distinguishing features which allow a meaningful differentiation of the Assessment Boundary into distinct survey units.
2. Describe the landforms present within the subject area (Assessment Boundary) using standard or generally accepted classifications.
 - o The Assessment Boundary is wholly contained within gentle lower slopes or flat landforms. The landforms adjacent to minor drainage lines are flat but are not alluvial floodplains.

3. Identify the primary modes of geomorphic activity in the subject area: aggraded, degraded, eroded (stable), or eroded (active), and determine if objects are likely to be concealed below the ground surface or revealed by erosional processes.
 - o Most landforms in the Assessment Boundary are degraded following the loss of vegetation cover during the agricultural phase of land use in the Assessment Boundary. Active, widespread, erosion is absent from the Assessment Boundary although historical aerial photographs of the area (**Figure 2-4**) suggest that erosion has historically been a feature of the area. The implication of these observations is that Aboriginal sites that may have been present in the Assessment Boundary have probably been removed or disturbed by the historic erosion and soil loss that has occurred.
4. Identify the forms of erosion within the archaeologically surveyed area, and where appropriate, the subject area (Assessment Boundary) as a whole.
 - o Erosion has been historically present across the Assessment Boundary but is now stable with no large active exposures being evident. The only exception is active gully erosion that was noted in the east of the Underground Extraction Area.
5. Describe the soils present and, where available, outline their formation history.
 - o Soils display thin A-Horizon soils above deep B-Horizon clays. At several locations, creek banks indicated a leached A-Horizon of no more than 10 centimetres (cm) depth. Within the A-Horizon, humic topsoil is limited to the upper-most few centimetres. The soils appear to have low nutritional values probably as a result of previous soil loss.
6. Describe the land use history of the subject area (Assessment Boundary).
 - o The Assessment Boundary has a long history of agricultural use before being replaced by intensive mining land use. This has resulted in an observable modification of the land's surface brought about by the initial vegetation clearing and the following intensive grazing. The closely settled nature of this area is attested by the relatively densely distributed current and disused dwellings and a wide range of farm infrastructure including tracks, fences and dams. The current period of mining land use has impacted the ground surface primarily through open cut mining and overburden emplacements, infrastructure installation (pipelines, gas wells), as well as associated tracks, soil dumps and environmental monitoring equipment.
7. Describe, and if relevant, map the natural resources and natural features that will have influenced the use of the landscape in the past.
 - o The relatively flat land and well-watered nature of the Assessment Boundary would have attracted early European settlement in the area. There are no particular resources that would have necessarily attracted Aboriginal occupation of the area apart from the presence of generally permanent waterways (such as nearby Glennies Creek) that must have provided pathways and resources for past populations.

3 THE ABORIGINAL CULTURAL HERITAGE IMPACT ASSESSMENT

3.1 RELEVANT LEGISLATION

Cultural heritage is managed by a number of state and national Acts. Baseline principles for the conservation of heritage places and relics can be found in the *Burra Charter* (Australia ICOMOS 2013). The *Burra Charter* has become the standard of best practice in the conservation of heritage places in Australia, and heritage organisations and local government authorities have incorporated the inherent principles and logic into guidelines and other conservation planning documents. The *Burra Charter* generally advocates a cautious approach to changing places of heritage significance. This conservative notion embodies the basic premise behind legislation designed to protect our heritage, which operates primarily at a state level.

A number of Acts of parliament provide for the protection of heritage at various levels of government.

3.1.1 State legislation

Environmental Planning and Assessment Act 1979 (EP&A Act)

This Act established requirements relating to land use and planning. The framework governing environmental and heritage assessment in NSW is contained within the following parts of the EP&A Act:

- **Part 3A (now repealed):** Approvals process for Major Projects. Although Part 3A was repealed on 1 October 2011, the provisions continue to apply to projects that were formerly approved under Part 3A;
- **Part 4:** Local government development assessments, including heritage. May include schedules of heritage items;
 - o **Division 4.1:** Approvals process for State Significant Development;
- **Part 5:** Environmental impact assessment on any heritage items which may be impacted by activities undertaken by a state government authority or a local government acting as a self-determining authority; and
- **Part 5.1:** Approvals process for state significant infrastructure.

Under Section 75U of the former Part 3A of the EP&A Act, approved projects do not require approval under the *National Parks and Wildlife Act 1974* to impact Aboriginal sites and such impacts, should they occur, are managed under an approved *Aboriginal Cultural Heritage Management Plan* (ACHMP).

National Parks and Wildlife Act 1974 (NPW Act)

Amended during 2010, the NPW Act provides for the protection of Aboriginal objects (sites, objects and cultural material) and Aboriginal places. Under the Act (Part 6), an Aboriginal object

is defined as: any deposit, object or material evidence (not being a handicraft for sale) relating to indigenous and non-European habitation of the area that comprises NSW, being habitation both prior to and concurrent with the occupation of that area by persons of European extraction, and includes Aboriginal remains.

An Aboriginal place is defined under the NPW Act as an area which has been declared by the Minister administering the Act as a place of special significance for Aboriginal culture. It may or may not contain physical Aboriginal objects.

As of 1 October 2010, it is an offence under Section 86 of the NPW Act to 'harm or desecrate an object the person knows is an Aboriginal object'. It is also a strict liability offence to 'harm an Aboriginal object' or to 'harm or desecrate an Aboriginal place', whether knowingly or unknowingly. Section 87 of the Act provides a series of defences against the offences listed in Section 86, such as:

- The harm was authorised by and conducted in accordance with the requirements of an Aboriginal Heritage Impact Permit (AHIP) granted under Section 90 of the Act;
- The defendant exercised 'due diligence' to determine whether the action would harm an Aboriginal object; or
- The harm to the Aboriginal object occurred during the undertaking of a 'low impact activity' (as defined in the regulations).

Under Section 89A of the Act, it is a requirement to notify the Director-General of the Office of Environment and Heritage (OEH) of the location of an Aboriginal object. Identified Aboriginal items and sites are registered on the Aboriginal Heritage Information Management System (AHIMS).

3.1.2 Commonwealth legislation

***Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)**

Matters of National Environmental Significance (MNES) under the EPBC Act include heritage items listed under the National Heritage List and the Commonwealth Heritage List, both administered by the Commonwealth Department of the Environment and Energy. Ministerial approval is required under the EPBC Act for proposals involving significant impacts to National/Commonwealth heritage places.

3.1.3 Applicability to the proposed Modification

The current application to modify PA 08_0101 is being made under section 75W of the EP&A Act.

Aboriginal sites within the Assessment Boundary are afforded legislative protection under the NPW Act. Since the project was approved under Part 3A of the EP&A Act, an AHIP is not required for the proposed Modification (pursuant to Section 75U of the EP&A Act).

It is noted there are no Commonwealth or National heritage listed places within the Assessment Boundary, and as such, the heritage provisions of the EPBC Act do not apply.

3.2 PURPOSE AND OBJECTIVES

The purpose of the Aboriginal and historic heritage impact assessment is to identify and assess heritage constraints relevant to the proposed works and to provide recommendations to avoid and/or manage potential impacts.

3.2.1 Aboriginal archaeological assessment objectives

The current assessment will apply the Code of Practice (to the completion of an Aboriginal heritage assessment) in order to meet the following objectives:

Objective One: Undertake background research on the area within the Assessment Boundary to formulate a predicative model for site location within the Assessment Boundary;

Objective Two: Identify and record objects or sites of Aboriginal heritage significance within the Assessment Boundary, as well as any landforms likely to contain further archaeological deposits; and

Objective Three: Assess the likely impacts of the proposed work to Aboriginal cultural heritage and provide management recommendations.

3.3 DATE OF THE ABORIGINAL CULTURAL HERITAGE ASSESSMENT

The fieldwork component of this assessment was undertaken on 6 July 2017.

3.4 OZARK INVOLVEMENT

3.4.1 Field assessment

The fieldwork component of this heritage assessment (Aboriginal and historic) was undertaken on Thursday, 6 July 2017 by:

- Fieldwork Director: Ben Churcher (Principal Archaeologist, OzArk, BA[Hons], Dip Ed).

3.4.2 Reporting

The reporting component of the heritage (Aboriginal and historic) assessment was undertaken by:

- Report Author: Ben Churcher.

- Contributor: Stephanie Rusden (Project Archaeologist, OzArk).
- Reviewer: Dr Jodie Benton (Director, OzArk).

3.5 ABORIGINAL COMMUNITY INVOLVEMENT

There was no representation from the Aboriginal community present during the field survey for the assessment. Consultation with the Aboriginal community would have been undertaken if the assessment recorded Aboriginal cultural heritage sites that could not be avoided by the proposed Modification. As no additional Aboriginal sites were recorded and no previously recorded Aboriginal sites are expected to be impacted by the proposed Modification, extensive consultation with the Aboriginal community has not occurred.

While no Aboriginal community accompanied the survey, consultation with the Aboriginal community has occurred by various means; namely:

- Consultation during the Mount Owen Continued Operations project; and
- Specific consultation regarding this proposed Modification.

3.5.1 Consultation during the Mount Owen Continued Operations project

The majority of the Assessment Boundary (all of the Underground Extraction Area and the 66kV powerline corridor) is within, or in close proximity to, the MOC. Large and representative portions of the Assessment Boundary were subject to survey by archaeologists and Aboriginal community members for the Mount Owen Continued Operations project that was undertaken from 2012 to 2013. OzArk completed the Aboriginal archaeological values assessment (2013; also Umwelt 2015 Appendix 13b) and the Aboriginal cultural values assessment was undertaken by Australian Cultural Heritage Management Pty Limited in the *Environmental Impact Statement* (EIS) for the project (Umwelt 2015, Appendix 13a). The project involved extensive Aboriginal community engagement; both in the participation with the survey and test excavation program, as well as in the investigation of the area's Aboriginal cultural values.

ACHM 2013: 114 summarises the cultural values of the area in which the Assessment Boundary is located. What follows is an edited excerpt of the Mount Owen Continued Operations project Statement of Significance (ACHM 2013: Section 5:10):

It is noted that the numerous Aboriginal stakeholders who participated in this cultural values assessment process hold values which relate to the wider Hunter Valley region generally, and less directly to the Project Area specifically. However, one of the Knowledge Holder groups holds very strong values over the Project Area. Other than the one group expressing strong connection to the Project Area, there was very little other information presented in the disclosed material or values workshops which relates specifically to the Project Area.

A common theme in many Aboriginal cultural heritage assessments is the proprietary interest members of the relevant Aboriginal communities hold in regard to the wider cultural landscape including archaeological sites or places within any given area. This proposed Modification is no exception in this regard. Within the context of the current assessment, there are strong on-going connections to places created and used by ancestors alongside demonstrably strong interests in the manner in which those places are managed or harmed as a result of this proposed Modification. These sentiments are not unique, and must certainly be considered in the overall assessment of the significance of the places in question. The connection to these places is noted as often being relatively unspecific and generally do not appear to relate to any surviving traditional knowledge or customary cultural practices, apart from one of the Knowledge Holder groups who express a strong connection to on-going cultural knowledge and customary lore in this location.

The cultural values expressed by the participants in the Mount Owen Continued Operations project assessment have been consistent in voicing an over-arching concern for the wider landscape and criticism of the negative impact of mining on that landscape. Consistent in the material disclosed is a sense of 'outrage' and grief at the treatment of Aboriginal people since First Settlement (dispossession and genocide are mentioned repeatedly) through to more contemporary experiences (i.e. the Stolen Generation).

ACHM 2013: Section 5:10 concludes:

There is little doubt that the wider cultural landscape surrounding (and encompassing) the Project Area is of high cultural and historical significance to Wonnarua people. The historical associations with early settlement, conflict, dispossession and survival are important, and the nature of the area as a surviving cultural landscape of significance to numerous members of the Wonnarua people makes this an area of regional and national significance. The regional archaeological record is also of high regional significance. Overall, the cultural significance of the wider region is considered to be high, and requires considerable additional research to fully understand.

As the Assessment Boundary is generally included within the area assessed for the Mount Owen Continued Operations project, the cultural values outlined above can be held to also apply to the landforms within the Assessment Boundary.

3.5.2 Specific consultation regarding this proposed Modification

Section 2.1.3 of the Integra Underground ACHMP (HVCC 2017) establishes that Integra Underground will utilise the Mount Owen Aboriginal Cultural Heritage Working Group (ACHWG) in order to provide, in part, 'ongoing communication of information on mining operations and cultural heritage management and the Aboriginal community'. As the ACHWG includes

Wonnarua Knowledge Holders, this meeting provided the opportunity for the proposed Modification to be discussed between the Proponent and the Aboriginal community.

The proposed Modification (MOD 8) was presented and discussed at an ACHWG meeting held on 24 August 2017.

Item 6 of the meeting's minutes state:

SG (Scott Grunsell: Integra Underground) provided an overview of the proposed extension of the Integra Underground Mine to the north below MOC. Key issues discussed included:

- Discussion between ACHWG members regarding the impacts associated with the proposal, with the main impact being minor subsidence;*
- SG described the environmental assessment for the proposed modification in particular the Aboriginal and Historic Heritage Impact Assessment. A discussion was had between members regarding what weighting consultants use in regards to how sites are graded, being either low, medium or high significance. The inaccuracy of AHIMS site cards was also discussed.*
- SG detailed works associated with MOD 8, explaining that the main impacts would be related to subsidence with minor areas of surface disturbance associated with ventilation and gas drainage infrastructure. SG also detailed that known sites may be avoided where practicable, however, options to salvage sites under the AHIP process were included in MOD 8.*

The feedback received at the ACHWG meeting has been considered by Integra Underground; particularly the observation regarding the inaccuracy of AHIMS site data. Integra Underground responded that the Integra Underground spatial database is reviewed on an annual basis, including a review of AHIMS register as per Section 5.2 of the Integra Underground ACHMP (HVCC 2017).

4 ABORIGINAL ARCHAEOLOGY BACKGROUND

4.1 ETHNO-HISTORIC SOURCES OF REGIONAL ABORIGINAL CULTURE

The Assessment Boundary is located in the Wonnarua tribal area of the Upper Hunter Valley.

The Wonnarua people lived in an environment rich in food resources. Freshwater fish, shellfish, reptiles, mammals, birds and plant food provided a diverse diet (see Brayshaw 1981). Brayshaw (1986b: 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. Reed spears and shells were traded inland for possum skin rugs and fur cord (Brayshaw 1986b: 41). Social gatherings were a feature of Aboriginal life in this area.

Visiting by coastal and inland groups for initiations and ceremonies seemed to occur. These were conducted within earthen circles and carved trees were often associated with these sites (Brayshaw 1981: 12).

Material culture items for this area included many items made of bark obtained from various trees. For example, tea tree bark (*Melaleuca quinquenervia*) was used for the construction of huts, and the bark of the cabbage-tree (*Livistona australis*) and Kurrajong (*Brachychiton eopulneus*) were used to make cord for the manufacture of fishing lines and nets and also for sewing up canoes (Brayshaw 1981). Baskets, shields and canoes were also made from bark. Some shields, however, were also made from the wood of the nettle tree (*Urticaceae*) or fig (*Ficus* spp.). Boomerangs, clubs, spear throwers and hatchets were also manufactured. Spears were of composite manufacture, usually being lengths of grass tree (*Xanthorrhoea australis*) to which points of hard wood were attached. Maintenance tools included stone adzes and chisels, abrasive stones, small fishhook files, bone awls and sharpened shell knives and scrapers (Brayshaw 1981b: 10). After 1788, glass and iron hatchets became sought after items.

There is virtually no reference to flaked stone tools in the nineteenth century descriptions of Aboriginal material culture in the Hunter Valley. This paucity of information is at odds with the types of occupation evidence which are preserved in the valley. By far the most common type of Aboriginal site in the inland part of the valley is the "open campsite" or stone artefact scatter.

There are few records of the Aboriginal population of the central valley. Howe reported five people at Jerry's Plains in 1819, Dangar reported 15 people at Dartbrook in 1824, and Mathew reported 60 people at Wollombi in 1830 and 300 men at Patricks Plains in 1834. At least 200 men were involved in the 1826 attack on Merton. Scott and McLeod in 1826 estimated a total of about 500 people at that time (Resource Planning 1991: 17) although this estimate, and the others above, are likely to be highly inaccurate as they are based on assumptions rather than detailed censuses.

From 1825, there is documented conflict between the Aboriginal population and settlers within the Hunter Valley, including the Ravensworth/Foy Brook area (for example, *The Australian*, 9 September 1826 [<http://trove.nla.gov.au/ndp/del/page/4248909>]). Although the exact location of these conflicts is unknown, the history of raids and counter-raids demonstrate that the Wonnarua people were fierce defenders of their tribal lands.

4.2 REGIONAL ARCHAEOLOGICAL CONTEXT

A large amount of heritage work has been undertaken in the Upper Hunter Valley and a detailed examination of this work is beyond the scope of this assessment. Consequently, only a brief regional archaeological context that focuses on work in landforms similar to those within the Assessment Boundary is provided here.

4.2.1.1 *Umwelt (Australia) Pty Limited 2004 (Umwelt 2004)*

Umwelt conducted an Aboriginal Archaeological Assessment for the Glendell Open Cut Mine during September, October and December 2001. The Glendell study area includes part of the central portion of the current Assessment Boundary. The Glendell survey area incorporated sections of Bowmans Creek, Swamp Creek and Bettys Creek. A total of 37 previously unrecorded sites were located during the 2001 fieldwork survey of the Glendell project area. The sites consisted of 30 artefact scatters, including one small quarry site with an associated artefact scatter, one scatter in an area with a buried soil profile and seven isolated finds. The Bowmans Creek 5 quarry site was recorded as having an associated artefact scatter as the majority of the artefacts in the site were manufactured from mudstone and silcrete rather than the quartz and quartzite materials available at the site.

Artefact analysis of the salvage assemblage recorded:

- flakes and broken flakes dominated the assemblage (78%), followed by flaked pieces (15%) and cores (3%). Within the flake category, 4% were retouched and half of the retouched flakes were backed. Heat shatter accounted for 3% of the artefacts;
- the mudstone and silcrete flakes were of similar size. Volcanic flakes were generally larger and heavier than flakes composed of other raw materials;
- volcanic flakes had a significantly higher percentage of cortex than silcrete or mudstone, and mudstone artefacts had a higher percentage of cortex than silcrete;
- silcrete artefacts had a higher overall rate of retouch than mudstone artefacts (8.2% and 6.3% respectively), and silcrete retouched artefacts were more likely to be backed than retouched mudstone artefacts; and
- a number of artefacts relating to post-European occupation of the area were also recovered, including fragments of glass and pottery. The location of this material closely correlated with concentrations of Aboriginal stone artefacts. Additionally, at least one

Aboriginal artefact manufactured from glass was salvaged, suggesting that the area was used by Aboriginal people in the post-contact period.

4.2.1.2 *Integra Underground Coal Project: Heritage Assessment (ERM 2009)*

In 2009, ERM completed the *Integra Underground Coal Project: Heritage Assessment* for the proposed extension of mining activities at the Underground Operations (ERM 2009). The survey was completed over two days in 2007. Three new sites were recorded as part of the assessment at Main Creek (MCIS01, MCIS02 and MCIS03) and two previously recorded sites around Possum Skin Dam (PSDASA and PSDASB) were located. The three sites along Main Creek were all recorded as isolated finds with no potential archaeological deposits (PADs), and were assessed as having low archaeological significance (ERM 2009). The two sites recorded at Possum Skin Dam were identified as being artefact scatters. PSDASA was recorded as an 'extensive low density artefact scatter' around the southern end of the dam. The site was determined to have moderate potential for PAD. PSDASA was originally recorded as five different isolated artefact scatters and isolated finds; however, they were re-recorded as a larger, more complex site. PSDASB was recorded as a low density artefact scatter with no PAD. Recorded artefacts, largely complete and broken flakes, were comprised of silcrete, mudstone and chert.

4.2.1.3 *Nundah Bank Third Track: Aboriginal Cultural Heritage Assessment (Biosis 2011)*

Biosis (2011) completed a survey for the new third track and ancillary infrastructure adjacent to the existing Main Northern Rail Line at Nundah Bank, located within the Integra Open Cut Coal mining lease area but outside of the Assessment Boundary. The survey identified 17 new Aboriginal sites, including nine artefact scatters and eight isolated finds. The identification of the sites was consistent with the Biosis predictive model which highlighted that artefact scatters and isolated finds were the most likely site type to be identified.

4.2.1.4 *Mount Owen Extension Area (Umwelt 2012a)*

The Mount Owen Extension Area salvage was undertaken under National Parks and Wildlife Service (NPWS) s.90 Consent¹ #1762 and formed Part 1 of the salvage program for the Bettys Creek valley (Umwelt 2012a). The salvage included the surface collection of 21 sites within broader surface collection areas, manual excavation in five locations and grader scrapes of all landform units following surface and subsurface salvage. The salvage included sub-surface investigations of landforms surrounding Bettys Creek which are present in the Assessment Boundary. The fieldwork was conducted from December 2003 through to February 2004. A total of 8,304 artefacts were recovered during the Mount Owen Extension Area salvage including

¹ A s.90 consent is now known as an AHIP.

1,151 (13.9%) from the surface collection, 5,999 (72.2%) from the manual excavations and 1,154 (13.9%) from the grader scrapes.

4.2.1.5 West Dump Area (Umwelt 2012b)

The West Dump Area salvage was undertaken in 2003 in accordance with NPWS section 90 Consent #2131 and formed Part 2 of the salvage program for the Bettys Creek valley, to the east of the Assessment Boundary. The salvage included the surface collection of nine sites within the West Dump Area and grader scrapes of the banks of a section of Bettys Creek associated with site BC44 following the surface salvage of this area (Umwelt 2012b). A total of 398 stone artefacts were recovered during the West Dump Area salvage including 385 (96.7%) from site BC44 (surface collection 273 and grader scrapes 112), while the remaining 13 artefacts (3.4%) came from the other Bettys Creek sites (BC46 = 1 artefact, BC47 = 3 artefacts, BC48 = 1 artefact, BC50 = 1 artefact, BC55 = 2 artefacts and BC58 = 5 artefacts).

4.2.1.6 Mount Owen Operations Area (Umwelt 2013a)

The Mount Owen Operations Area salvage was undertaken in accordance with NPWS section 90 Consent #2267 and formed Part 3 of the salvage program for the Bettys Creek valley (Umwelt 2013a). This salvage also included sites associated with Main Creek in the adjacent valley to the east of Bettys Creek. The salvage included the surface collection of 17 sites in the Bettys Creek valley and six sites in the Main Creek valley and the mechanical excavation of three sites and manual excavation of two of the sites associated with Main Creek. In total, 1,205 artefacts were recovered during the section 90 #2267 surface collection and subsurface salvage program for the Mount Owen Operations Area. Of the 1,205 stone artefacts salvaged from the Bettys Creek and Main Creek catchments, 292 were recovered through surface collection with the remaining 913 artefacts recovered during subsurface investigation and salvage at MC-2, MC-3 and MC-6 (Main Creek).

4.2.1.7 Glendell Project Area (Umwelt 2013b)

Salvage of the Glendell Project Area was undertaken in accordance with NPWS section 90 Consent #2267 and formed Part 4 of the salvage program for the Bettys Creek valley (Umwelt 2013b). A total of 2,713 artefacts were recovered from the Glendell Project Area salvage including 829 (30.6%) via surface collection, 274 (10.1%) from Excavation 1 (Bettys Creek 10), 19 (0.7%) from Excavation 2 (Bettys Creek 9), 1,414 (52.1%) from Excavation 3 (Bettys Creek 2) and 177 (6.5%) from the grader scrapes. A total of 2,604 artefacts (96% of the assemblage) were recovered from the Bettys Creek catchment, 52 (1.9%) from the Bowmans Creek catchment and 57 (2.1%) from the Swamp Creek catchment.

4.2.1.8 Aboriginal Archaeological Values Assessment: Mount Owen Continued Operations (OzArk 2013)

From 2012 to 2013, OzArk completed the *Aboriginal Archaeological Values Assessment: Mount Owen Continued Operations* (2013). The assessment covered 464ha within the MOC boundary and included surface survey and test excavation. The current Assessment Boundary traverses the 2012 survey units 2 and 4. In total, 11 artefact scatters, 20 isolated finds and three extensions to previously recorded sites were recorded.

The results of the 2012/2013 OzArk assessment were:

- 91% of the newly recorded sites were either isolated finds or low density artefact scatters without associated archaeological deposits.
- Test excavation was carried out at two locations. No sub-surface artefacts were retrieved from one site and 114 artefacts were excavated from the other site. At the site that recorded artefacts (MOCO OS-4), most of the artefacts were concentrated in a small area, representing two or three discrete knapping events of mudstone and silcrete.
- Widespread disturbances and thin A Horizon soils were noted across the assessment area. Thin, or non-existent, A Horizon soils were also noted during the test excavation at both locations.
- The most common raw materials were indurated mudstone and silcrete with smaller quantities of chert, siltstone, quartzite and quartz also identified.
- Flakes and flaked pieces accounted for the bulk of assemblages. Proportions of cores and backed blades were low.
- Most sites were situated close to drainage lines.

4.3 LOCAL ARCHAEOLOGICAL CONTEXT

4.3.1 Desktop database searches conducted

A desktop search was conducted on the following databases to identify any previously recorded heritage sites within the Assessment Boundary. The results of this search are summarised in **Table 4-1** and presented in detail in **Appendix 1**.

Table 4-1. Aboriginal heritage: desktop-database search results.

Name of Database Searched	Date of Search	Type of Search	Comment
Commonwealth Heritage Listings	25/7/17	Singleton LGA	No places listed on either the National or Commonwealth heritage lists are located within the Assessment Boundary
National Native Title Claims Search	25/7/17	Native Title Tribunal spatial data (downloaded 20/4/17)	Native title claim NC2013/006 (Scott Franks and Anor on behalf of the Plains Clans of the Wonnarua People) includes the

Name of Database Searched	Date of Search	Type of Search	Comment
			land within the Assessment Boundary
OEH AHIMS	25/7/17	2 x searches (GDA Zone 56): Eastings: 319204 to 323084 Northings: 6409900 to 6414046 Eastings: 320380 to 324515 Northings: 6406056 to 6410033	161 sites are within the search area (encompassing an area broader than the Assessment Boundary). There are six valid sites within the Assessment Boundary, however, one of these plots to a highly modified area and has probably been salvaged under approval
Local Environment Plan (LEP)	25/7/17	Singleton Local Environmental Plan 2013	None of the Aboriginal places noted occur near the Assessment Boundary

As per **Table 4-1**, it is noted that the Assessment Boundary includes land currently subject to a Native Title Claim (NC2013/006 Scott Franks and Anor on behalf of the Plains Clans of the Wonnarua People).

A search of the OEH administered AHIMS database returned 161 records for Aboriginal heritage sites within the designated search area. Of these 161 sites, 34 sites remain *in situ* within the landscape and are listed on AHIMS as either 'valid' or 'partially destroyed'. **Table 4-2** presents the site types identified in the AHIMS search.

Table 4-2. AHIMS site types and frequencies.

Site Type	Number	% Frequency
Artefact scatters (varying artefact numbers)	126	78
Isolated find (one with PAD)	34	21
Modified Tree	1	1
Total	161	100

Figure 4-1 shows the location of the AHIMS sites in relation to the Assessment Boundary.

It can be seen on **Figure 4-1** that the centroids of six sites are within or in close proximity to the Assessment Boundary. These are discussed separately below:

- 37-3-1173 (MOCO IF-4). This isolated mudstone flake was recorded by OzArk in 2012 on generally flat land at the north of the existing Mount Owen Rail Spur in the bank area of a large storage dam. The assessment inspected the site location but the artefact was not visible at the time.
- 37-3-1175 (MOCO IF-6). This isolated mudstone flake was recorded by OzArk in 2012 in an area of disturbance from earthmoving to the east of the Mount Owen Rail Spur. The assessment inspected the site location but the artefact was not visible at the time.
- 37-3-0294 (MORL 2) was recorded in 1995 by ERM Mitchell McCotter in a survey of the then proposed Mount Owen Rail Spur. The site is located on the western side of the Mount

Owen rail spur and on the northern bank of Bettys Creek. The site location was revisited during the assessment, and while protected by old fencing, no artefacts were visible due to thick groundcover.

- 37-3-0612 (Bettys Creek 22). This isolated mudstone broken flake was recorded in a scour on the western bank of Bettys Creek. The site was recorded by Umwelt in 2003. The site location was revisited during the assessment, however, the artefact was not visible due to thick groundcover.
- 37-3-1194 (MOCO OS-6). Recorded by OzArk in 2012 and described as a diffuse artefact scatter, although it would be more accurately described as a number of isolated finds located within the one landform unit. OzArk noted that no concentrations of artefacts were noted and the artefact assemblage from MOCO OS-6 is best characterised as a low density background of artefacts in areas adjacent to Bettys Creek. The landform containing MOCO OS-6 is flat and is largely covered with Casuarina regrowth. Soils are poor in nutrition and sandy. In 2017 a central portion of the site was salvaged by OzArk as part of the Mount Owen Continued Operations Project (Development Consent SSD-5850). Four artefacts were collected as part of the salvage program. As a result, 37-3-1194 is listed as 'partially destroyed' and now has a non-contiguous site extent (**Figure 4-2**), portions of which are within the Assessment Boundary.
- 37-3-0668 (Swamp Creek PAD). This PAD was recorded by Umwelt in 2001. Very little information exists for this site recording. The author cannot locate a site card in the AHIMS nor can a record of the site being investigated/salvaged be found. However, the AHIMS location places the site in a highly modified landform and it will be assumed henceforth that the site has been salvaged in the past.

Figure 4-1. AHIMS sites in relation to the Assessment Boundary.

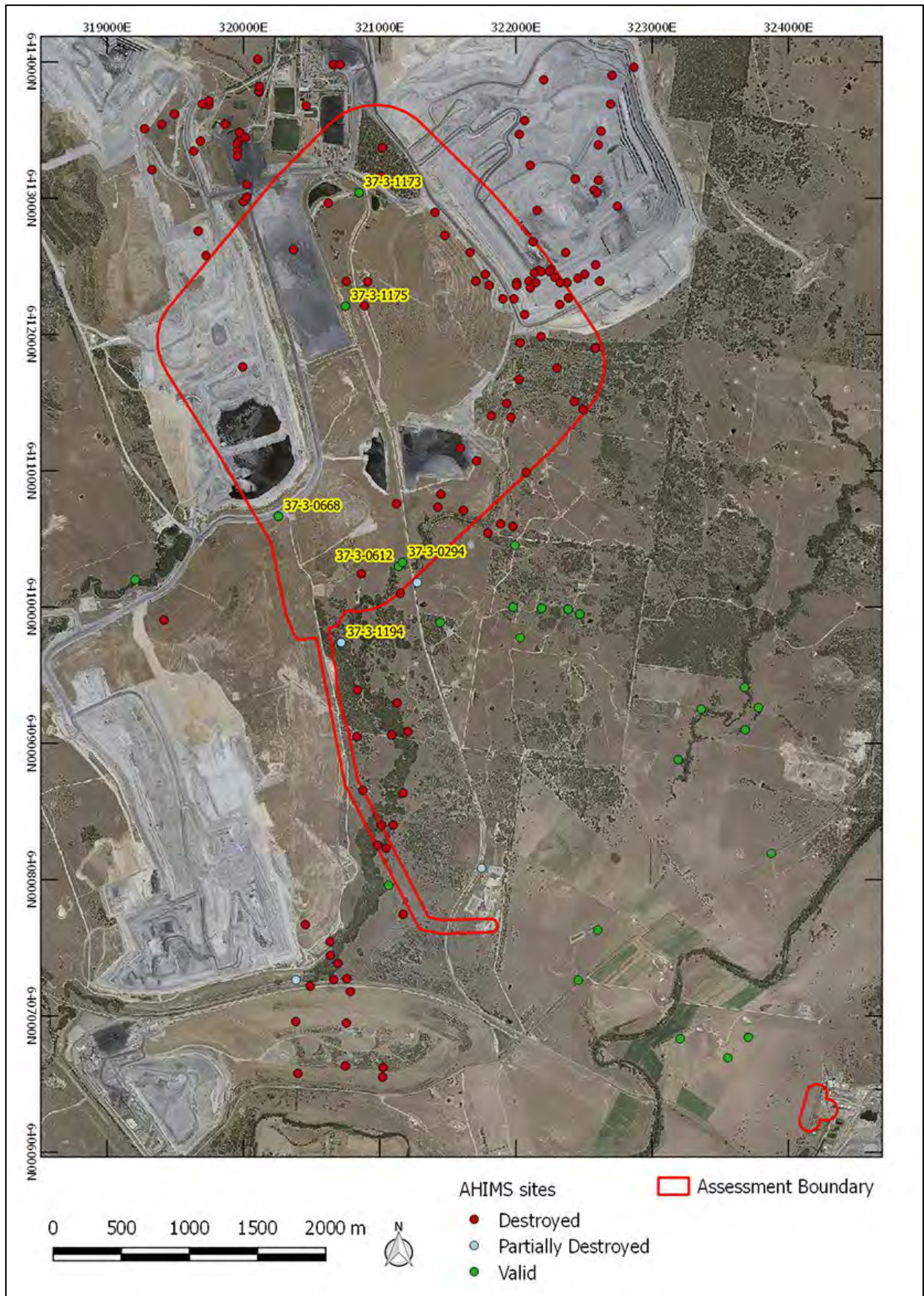
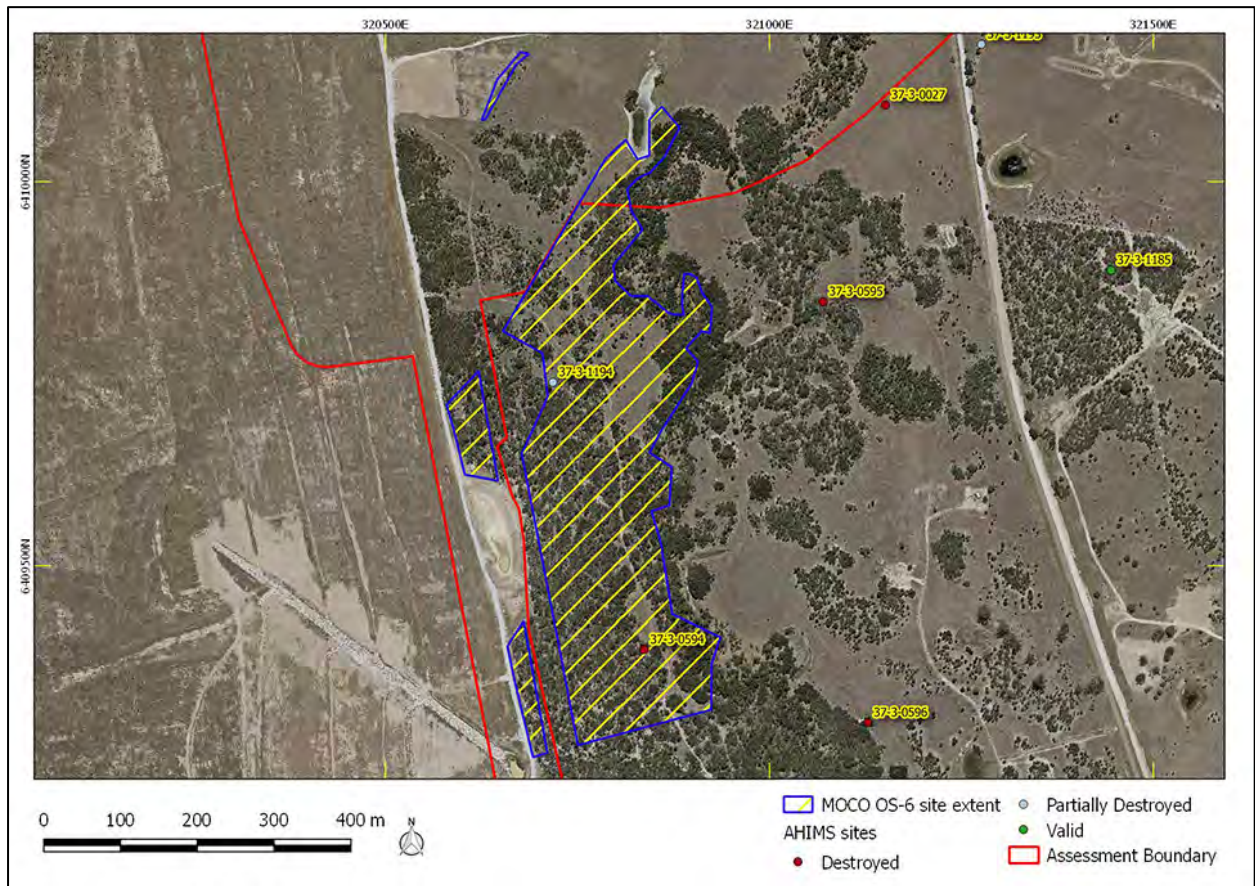


Figure 4-2: Location of 37-3-1194 (MOCO OS-6) in relation to the Assessment Boundary.

4.4 PREDICTIVE MODEL FOR SITE LOCATION

Across Australia, numerous archaeological studies in widely varying environmental zones and contexts have demonstrated a high correlation between the permanence of a water source and the permanence and/or complexity of Aboriginal occupation. Site location is also affected by the availability of and/or accessibility to a range of other natural resources including: plant and animal foods; stone and ochre resources and rock shelters; as well as by their general proximity to other sites/places of cultural/mythological significance. Consequently, sites tend to be found along permanent and ephemeral water sources, along access or trade routes or in areas that have good flora/fauna resources and appropriate shelter.

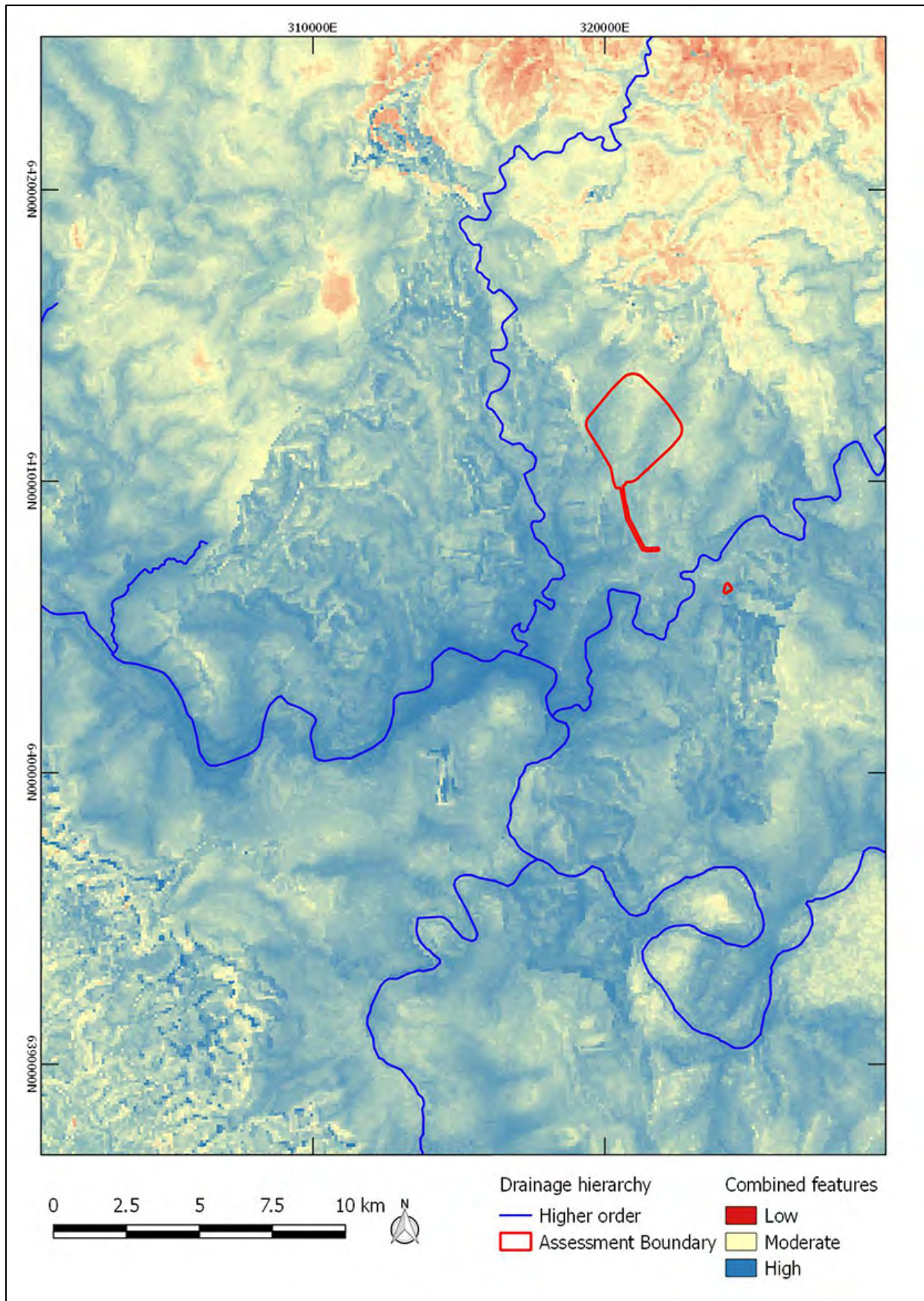
In formulating a predictive model for Aboriginal archaeological site location within any landscape it is also necessary to consider post-depositional influences on Aboriginal material culture. In all but the best preservation conditions, very little of the organic material culture remains of ancestral Aboriginal communities survives to the present. Generally it is the more durable materials such as stone artefacts, stone hearths, shell, and some bones that remain preserved in the current landscape. Even these however may not be found in their original depositional context since these may be subject to either (a) the effects of wind and water erosion/transport - both over short and long time scales or (b) the historical impacts associated with the introduction of European farming practices including: grazing and cropping; land degradation associated with exotic pests

such as goats and rabbits and the installation of farm related infrastructure including water-storage, utilities, roads, fences, stockyards and residential quarters. Scarred trees may survive for up to several hundred years but rarely beyond.

OEH (2014) have produced a series of 'pre-1750' predictive models termed the Aboriginal Sites Decision Support Tool (ASDST) that combine data derived from AHIMS with a series of spatial variables that describe the landscape. The ASDST outputs GIS raster layers composed of one hectare cells that predict the likelihood of Aboriginal sites (e.g. mounds, artefacts, modified trees, grinding grooves, burials and hearths) occurring in the landscape prior to European settlement. These models do not account for land use disturbance in the intervening period, or natural conditions leading to differential preservation of features. However, the ASDST includes an 'accumulated impacts' model that indicates the extent to which post-settlement land-use history has impacted upon Aboriginal site features in the landscape. However, the 'accumulated impacts' layer is very out of date for a rapidly changing landscape such as in the Upper Hunter Valley. In combination, these models are used to predict the likelihood of encountering different Aboriginal site types prior to European settlement, and how the distribution of Aboriginal sites are likely to have been affected in the interim.

The image shown on **Figure 4-3** is a combination of all site types and shows a gradation of the likelihood that an Aboriginal cultural heritage site could have been present in any one hectare. In the figure legend, a low reading represents a low likelihood of a site being present while a higher reading represents a higher likelihood. This ranking is for site likelihood, as distinct to 'potential', and can be used on a broad scale only. While the model shown on **Figure 4-3** shows that portions of the Assessment Boundary may once have had potential to contain Aboriginal sites, the Assessment Boundary does not contain landforms with a high probability of containing Aboriginal sites such as areas closer to the Hunter River. On **Figure 4-3**, major streams (i.e. rivers and named creeks) have been overlain on the ASDST predictive model and this demonstrates the high correlation between site location and larger, permanent waterways. As the Assessment Boundary lacks such waterways, the likelihood of locating sites in these landforms is diminished.

Given the ASDST predictive results, the high degree of landform modification within the Assessment Boundary (**Section 2.6**), and the considerable amount of previous archaeological investigations that have been carried out, including archaeological salvage (**Section 4.2**), it is predicted that there is a low probability of locating further large, complex sites within the Assessment Boundary.

Figure 4-3. ASDST predictive data of the Assessment Boundary.

Knowledge of the environmental contexts of the Assessment Boundary and a desktop review of the known local and regional archaeological record and the ASDST, the following predictions are made concerning the probability of those site types being recorded within the Assessment Boundary:

- Isolated finds may be indicative of: random loss or deliberate discard of a single artefact, the remnant of a now dispersed and disturbed artefact scatter, or an otherwise obscured or sub-surface artefact scatter. They may occur anywhere within the landscape but are more likely to occur in topographies where open artefact scatters typically occur.
 - o As isolated finds can occur anywhere, particularly within disturbed contexts, it is predicted that this site type could be recorded within the Assessment Boundary.
- Open artefact scatters are defined as two or more artefacts, not located within a rock shelter, and located no more than 50 metres (m) away from any other constituent artefact. This site type may occur almost anywhere that Aboriginal people have travelled and may be associated with hunting and gathering activities, short or long term camps, and the manufacture and maintenance of stone tools. Artefact scatters typically consist of surface scatters or sub-surface distributions of flaked stone discarded during the manufacture of tools, but may also include other artefactual rock types such as hearth and anvil stones. Less commonly, artefact scatters may include archaeological stratigraphic features such as hearths and artefact concentrations which relate to activity areas. Artefact density can vary considerably between and across individual sites. Small ground exposures revealing low density scatters may be indicative of background scatter rather than a spatially or temporally distinct artefact assemblage. These sites are classed as 'open', that is, occurring on the land surface unprotected by rock overhangs. Open artefact scatters are sometimes referred to as 'open camp sites'.

Artefact scatters are most likely to occur on level or low gradient contexts, along the crests of ridgelines and spurs, and elevated areas fringing watercourses or wetlands. Larger sites may be expected in association with permanent water sources.

Topographies which afford effective through-access across, and relative to, the surrounding landscape, such as the open basal valley slopes and the valleys of creeks, will tend to contain more and larger sites, mostly camp sites evidenced by open artefact scatters.

- o Artefact scatters, as well as isolated stone artefacts, are the predominant site types occurring in the region (**Section 4.3**). The expected location of artefact scatters is on eroded exposures most commonly adjacent to creek lines, such as Bettys Creek. This site type is likely to be in a secondary context from disturbances such as erosion, and farming and mining practices (**Section 2.6**). It is likely that any sites associated with such landforms are likely to have a low artefact density and a low complexity of tool types as the sites are either one-off events or only infrequently used. Should these site types be present, the artefact assemblage is likely to be dominated by flakes from mudstone and silcrete. Other recorded materials could include quartz, chert, tuff, volcanics and petrified wood. It is noted that the Assessment Boundary has already been subjected to a number of previous archaeological assessments that have recorded a number of sites in the vicinity. This indicates that further artefact scatters could be possible

but that previous assessments have probably recorded the larger examples of this site type (**Section 4.2**).

- Aboriginal scarred trees contain evidence of the removal of bark (and sometimes wood) in the past by Aboriginal people, in the form of a scar. Bark was removed from trees for a wide range of reasons. It was a raw material used in the manufacture of various tools, vessels and commodities such as string, water containers, roofing for shelters, shields and canoes. Bark was also removed as a consequence of gathering food, such as collecting wood boring grubs or creating footholds to climb a tree for possum hunting or bark removal. Due to the multiplicity of uses and the continuous process of occlusion (or healing) following removal, it is difficult to accurately determine the intended purpose for any particular example of bark removal. Scarred trees may occur anywhere old growth trees survive. The identification of scars as Aboriginal cultural heritage items can be problematical because some forms of natural trauma and European bark extraction create similar scars. Many remaining scarred trees probably date to the historic period when bark was removed by Aboriginal people for both their own purposes and for roofing on early European houses. Consequently the distinction between European and Aboriginal scarred trees may not be clear.
 - o Due to the near-total historic clearance of trees from within the Assessment Boundary (see **Figure 2-4**), this site type is predicted to be very rare. It is also noted that this site type is very rare at a regional level.
- Quarry sites and stone procurement sites typically consist of exposures of stone material where evidence for human collection, extraction and/or preliminary processing has survived. Typically these involve the extraction of siliceous or fine grained igneous and meta-sedimentary rock types for the manufacture of artefacts. The presence of quarry/extraction sites is dependent on the availability of suitable rock formations.
 - o Quarries could be present where outcrops of bedrock [e.g. silcrete] have been used by Aborigines as raw materials for the manufacture of stone artefacts. Quarry sites have been identified in the vicinity and this site type has the potential to occur within the Assessment Boundary if outcrops of suitable rock are present. However, outcrops of suitable rocks are considered as having a low probability of occurring.
- Burials are generally found in soft sediments such as aeolian sand, alluvial silts and rock shelter deposits. In valley floor and plains contexts, burials may occur in locally elevated topographies rather than poorly drained sedimentary contexts. Burials are also known to have occurred on rocky hilltops in some limited areas. Burials are generally only visible where there has been some disturbance of sub-surface sediments or where some erosional process has exposed them.
 - o Although it is possible that this site type could be found within the Assessment Boundary, it is considered a rare site type especially given the disturbance that has occurred within the Assessment Boundary.

5 RESULTS OF ABORIGINAL ARCHAEOLOGICAL ASSESSMENT

5.1 SAMPLING STRATEGY AND FIELD METHODS

Standard archaeological field survey and recording methods were employed in this study (Burke & Smith 2004).

The survey was undertaken by one archaeologist from OzArk without representation from the Aboriginal community. The survey was also attended by a Glencore representative.

The survey targeted archaeologically sensitive areas such as areas adjacent to Bettys Creek, the remaining portion of the Ravensworth State Forest and landforms in which sites have been previously recorded (such as adjacent to MOCO OS-8 near the Integra Underground fan and vent site). The assessment also investigated a representative sample of all other landforms within the Assessment Boundary. The survey tracks traversed during the assessment are shown on **Figure 5-1**.

The Assessment Boundary has been subject to numerous past studies. As such, the archaeological characteristics of the Assessment Boundary are well understood. For example, a number of surveys have been completed in the past five years within or adjacent to the Assessment Boundary. The survey tracks for these assessments are also shown on **Figure 5-1** and include:

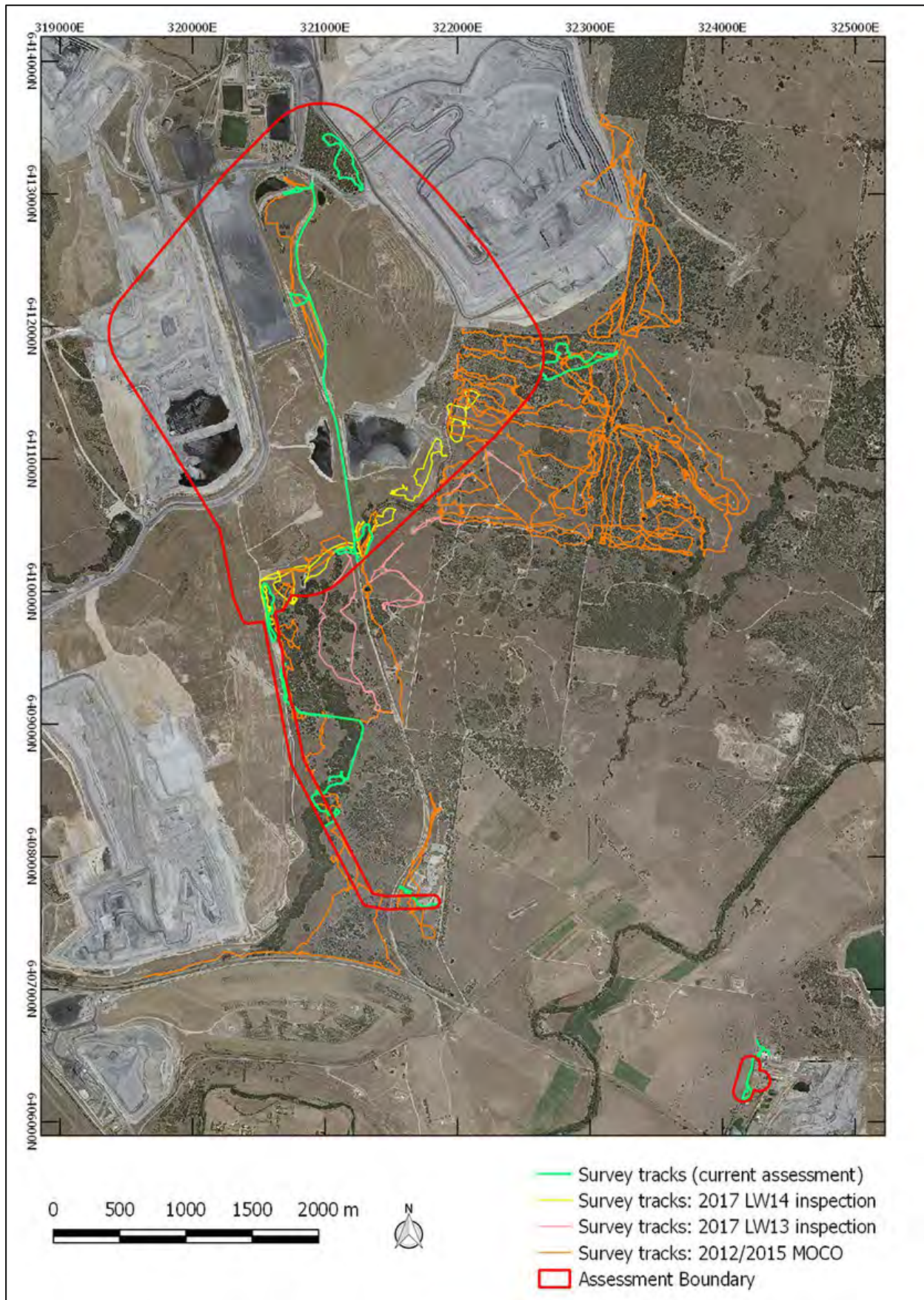
- 2012–2015 assessment for the Mount Owen Continued Operations Project (MOCO) undertaken by two archaeologists and members of the Aboriginal community;
- 2017 assessment for surface infrastructure associated with LW13 at Integra Underground undertaken as a Due Diligence assessment by one archaeologist; and
- 2017 assessment for surface infrastructure associated with LW14 at Integra Underground undertaken as a Due Diligence assessment by one archaeologist.

Combined with the assessment undertaken for the current study, the plotted survey tracks of these recent assessments indicate that all archaeologically sensitive landforms within the Assessment Boundary, particularly those along Bettys Creek, have been assessed thoroughly.

5.2 PROJECT CONSTRAINTS

There were no constraints to the successful assessment of the Assessment Boundary. The weather was mild and there was reasonable ground surface visibility (GSV) across representative portions of the Assessment Boundary. While not every portion of the Assessment Boundary was directly inspected (as the survey focussed on areas not heavily modified by approved mining activities), all representative landforms within the Assessment Boundary were assessed and this allowed some extrapolation of the archaeological potential of areas not directly assessed.

Figure 5-1. Aerial showing survey coverage during the current and previous assessments.



5.3 EFFECTIVE SURVEY COVERAGE

Two of the key factors influencing the effectiveness of archaeological survey are GSV and ground surface exposure (GSE). These factors are quantified in order to ensure that the survey data provides adequate evidence for the evaluation of the archaeological materials across the landscape. For the purposes of the current assessment, these terms are used in accordance with the definitions provided in the Code of Practice (DECCW 2010).

GSV is defined as:

...the amount of bare ground (or visibility) on the exposures which might reveal artefacts or other archaeological materials. It is important to note that visibility, on its own, is not a reliable indicator of the detectability of buried archaeological material. Things like vegetation, plant or leaf litter, loose sand, stone ground or introduced materials will affect the visibility. Put another way, visibility refers to 'what conceals' (DECCW 2010: 39).

GSE is defined as:

...different to visibility because it estimates the area with a likelihood of revealing buried artefacts or deposits rather than just being an observation of the amount of bare ground. It is the percentage of land for which erosion and exposure was sufficient to reveal archaeological evidence on the surface of the ground. Put another way, exposure refers to 'what reveals' (DECCW 2010: 37).

Table 5-1 tabulates the effective survey coverage of the Assessment Boundary of all landforms that are not highly modified by approved mining activities. The calculations show that effective survey coverage ranged from 6% to 24% depending on the portion of the Assessment Boundary and some notes on this conclusion are necessary:

- This calculation is focussed on the amount of the ground surface that could be seen at any one location. Obviously this varies within the Assessment Boundary with some areas having no GSV due to grass cover and other areas having much higher GSV;
- Large portions of the Underground Extraction Area were not physically assessed as it contains highly modified landforms. The calculation of GSV and GSE in **Table 5-1** relates to the areas actually assessed. Smaller portions of the powerline corridor and the surface infrastructure amendments were also highly modified and do not appear in the calculations in **Table 5-1**.
- Where there was low GSV, the assessment evaluated the landform's potential to contain Aboriginal sites and, as such, a calculation of survey coverage from GSV alone is misleading; and
- All landforms with higher archaeological potential such as along drainage lines were inspected more closely and generally had greater GSV. As such, the calculation of

survey efficacy is not taking into account the fact that GSV was often greater in areas of higher archaeological potential.

Table 5-1. Survey coverage data outside of highly modified landforms.

Survey Unit	Landform	Survey Unit Area (sq m)	GSV %	GSE %	Effective Coverage Area (sq m) (= Survey Unit Area x Visibility % x Exposure %)	Effective Coverage % (= Effective Coverage Area / Survey Unit Area x 100)
Underground Extraction Area	flat for the majority/gently sloping in the east	7,330,000	60	10	439,800	6
Powerline corridor	flat for the majority/gently sloping in the south	274,000	80	30	65,760	24
Surface infrastructure amendments	lower slopes	60,000	65	10	3,900	6.5

5.4 ABORIGINAL SITES RECORDED

No additional Aboriginal sites were recorded as a result of the field assessment. Further, no landform within the Assessment Boundary was seen as having potential to contain further, subsurface archaeological deposits due to the moderate level of disturbance across the Assessment Boundary and the generally thin soils.

5.5 PREVIOUSLY RECORDED ABORIGINAL SITES LOCATED

As noted in **Section 4.3.1**, according to AHIMS, there are six sites that are within the Assessment Boundary. However, one of these sites, 37-3-0668 (Swamp Creek PAD), is likely to have been salvaged in the past and will not be discussed further.

There are, therefore, five valid sites located within the Assessment Boundary. The locations of all five sites were visited during the assessment and while surface artefacts were not visible at any of the site locations, all sites are regarded as remaining extant within the landscape.

5.6 DISCUSSION

The predictive model set out in **Section 4.4** indicated that only isolated finds and low density artefact scatters would be recorded within the Assessment Boundary.

The fact that no new sites were recorded is possibly indicative of the following:

- Only small portions of the Assessment Boundary intersect with archaeologically sensitive landforms, such as the banks of Bettys Creek. This diminishes the opportunity to record Aboriginal sites;
- There has been a moderate to high degree of landform modification across the Assessment Boundary due to past agricultural land uses (**Section 2.6**). Past land uses have had the effect of stripping top soils and potentially removing low density sites from the Assessment Boundary had they once existed; and

- Large portions of the Assessment Boundary, particularly north of Bettys Creek have been heavily modified by approved mining activities. These activities have altered the ground surface in clear and observable ways and any sites in these areas have either been appropriately salvaged or have been irrevocably lost.

5.7 LIKELY IMPACTS TO ABORIGINAL HERITAGE FROM THE MODIFICATION

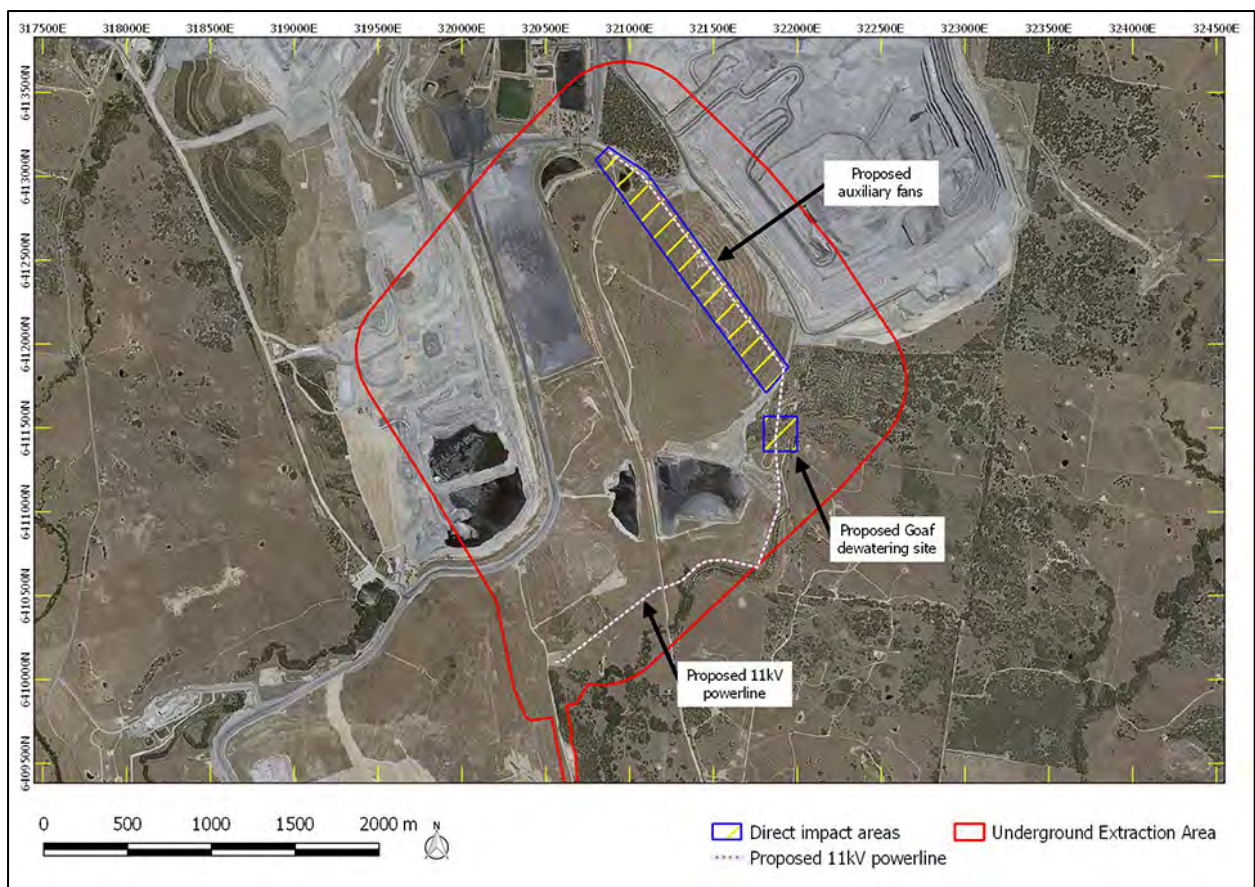
As set out in **Section 1.3**, the proposed Modification potentially involves both direct and indirect impacts to Aboriginal cultural heritage sites. Specifically these are:

- Underground Extraction Area: potential indirect impacts associated with land subsidence resulting from the proposed longwall mining. There are potential direct impacts from an auxiliary fan installation, installation of an 11kV powerline and a Goaf dewatering site within the Underground Extraction Area (**Figure 5-2**). Specifically, these direct impacts occur in the following landforms:
 - o Auxiliary fans: located entirely within highly modified landforms including dams and waste emplacements;
 - o 11kV powerline: located entirely within highly modified landforms principally waste emplacements
 - o Goaf dewatering site: the majority of this area has been previously impacted by activities associated with the construction of the Bettys Creek diversion and subsequent revegetation works. A small portion of this area in the east is within relatively unmodified landforms.
- Powerline corridor: potential direct impacts from the construction of the powerline and use of the existing access track; and
- Surface infrastructure amendments: potential direct impacts from the construction of the new store entry, new wash bay and new store.

The potential impacts to the five known sites within the Assessment Boundary are shown in **Table 5-2**.

Table 5-2: Potential impact to known sites within the Assessment Boundary.

Site	Location	Type of impact	Degree of impact
37-3-1173 (MOCO IF-4)	Underground Extraction Area	Indirect (subsidence related)	Minimal
37-3-1175 (MOCO IF-6)	Underground Extraction Area	Indirect (subsidence related)	Minimal
37-3-0294 (MORL 2)	Underground Extraction Area	Indirect (subsidence related)	Minimal
37-3-0612 (Bettys Creek 22)	Underground Extraction Area	Indirect (subsidence related)	Minimal
37-3-1194 (MOCO OS-6)	Underground Extraction Area Powerline corridor	- Indirect (subsidence related) in northern portion of site (marked by a yellow circle on Figure 5-3). - Direct in a small remnant portion in the north of the site that is adjacent to a proposed 11kV powerline (marked by a pink circle on Figure 5-3). - Direct if powerline built to the east of the access road, no impact from the powerline if built to the west of the access road.	- Minimal (subsidence related) in northern portion of site (marked by a yellow circle on Figure 5-3). - Partial if northern remnant is impacted by the proposed 11kV powerline (marked by a pink circle on Figure 5-3). - Partial if powerline built to the east of the access road, no further impact from the powerline if built to the west of the access road.

Figure 5-2: Aerial showing the areas of direct impact within the Underground Extraction Area.

Those sites located within the Underground Extraction Area are either a low density artefact scatters (37-3-0294; MORL 2), or isolated finds. These types of sites are generally not sensitive to subsidence effects. Potential impacts could be related to surface cracking and/or water pooling

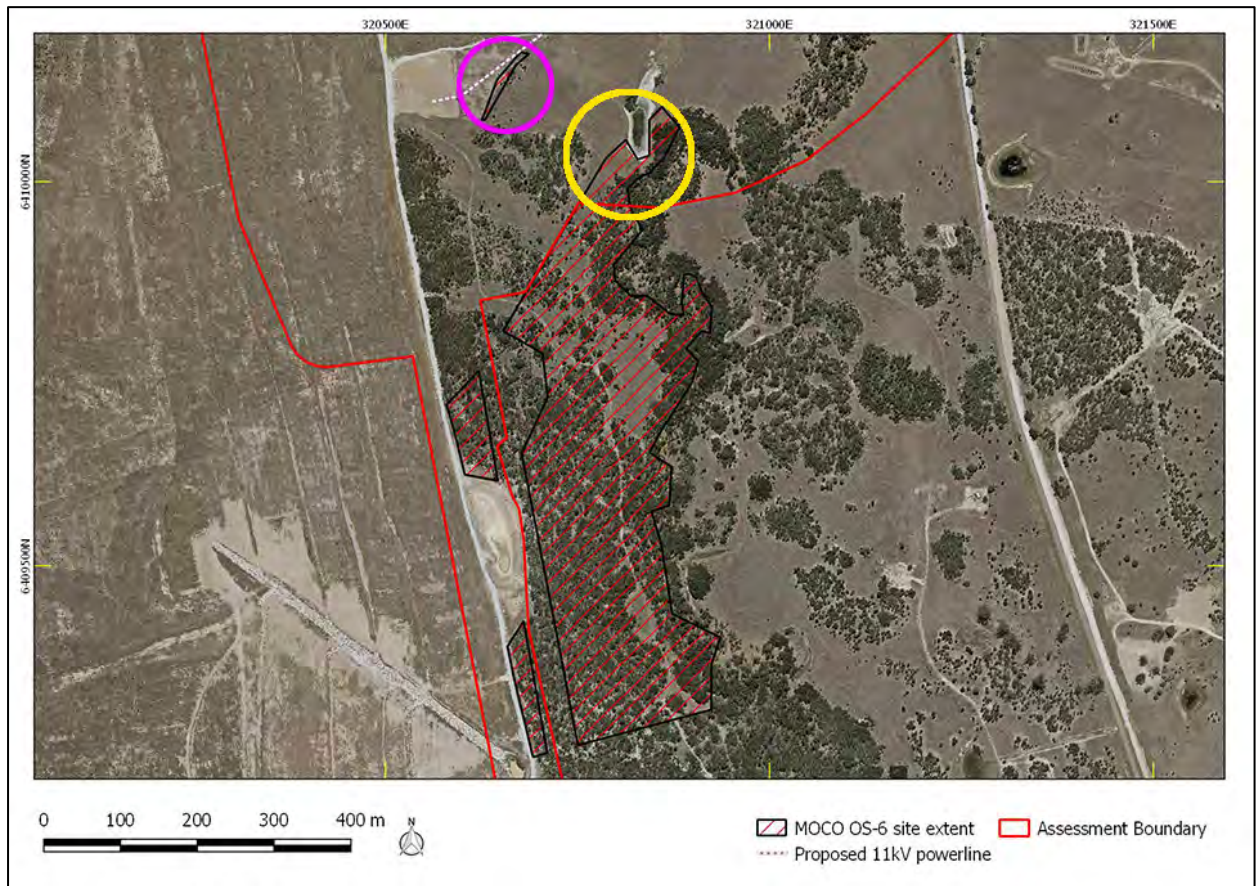
although such impacts are difficult to accurately predict. As such, management measures set out in **Section 6** include monitoring of the sites to ensure that such impacts are noted and alleviated should they occur.

The western portion of 37-3-1194 (MOCO OS-6) is located within the powerline corridor (**Figure 4-2**). If construction of the powerline is required to be placed to the east of the existing access track, portions of 37-3-1194 (MOCO OS-6) will be impacted. However, if it is feasible to place the powerline to the west of the existing access road in areas that are highly modified, then impacts to 37-3-1194 (MOCO OS-6) will be avoided. There is no constraint to the continued use of the existing access track adjacent to 37-3-1194 (MOCO OS-6) as this lies outside of the site extent for 37-3-1194 (MOCO OS-6).

As shown on **Figure 5-3**, the current site extent of 37-3-1194 (MOCO OS-6) is non-contiguous as the central portion of the site was salvaged as part of the Mount Owen Continued Operations salvage program in 2017. This has resulted in a small portion of the site remaining in the north of the former site extent (marked with a pink circle on **Figure 5-3**) and a small portion of the site being within the Underground Extraction Area (marked with a yellow circle on **Figure 5-3**). Impacts to these portions of the site are potentially:

- The northernmost portion is located very close to the proposed 11kV powerline and could be directly impacted by the powerline construction; and
- The portion of the site within the Underground Extraction Area could be indirectly impacted by mine related subsidence.

Figure 5-3: View of 37-3-1194 (MOCO OS-6) in relation to potential impacts.



6 MANAGEMENT AND MITIGATION: ABORIGINAL HERITAGE

6.1 GENERAL PRINCIPLES FOR THE MANAGEMENT OF ABORIGINAL SITES

Appropriate management of cultural heritage items is primarily determined on the basis of their assessed significance as well as the likely impacts of the proposed development. The following management options are general principles, in terms of best practice and desired outcomes, rather than mitigation measures against individual site disturbance.

- Avoid impact by altering the development proposal to avoid impact to a recorded Aboriginal site. If this can be done, then a suitable demarcation around the site must be provided to ensure its protection both during the short-term construction phase of development and in the long-term use of the area. If plans are altered, care must be taken to ensure that impacts do not occur to areas not previously assessed.
- If impact is unavoidable then the protocols to manage impacted sites will be made under the authority of an approved ACHMP.

6.2 EXISTING MANAGEMENT MEASURES

Integra Underground operates under an approved ACHMP (HVCC 2017). Protocols for the management of known sites, as well as protocols for the management of newly recorded sites, are set out in Sections 4 and 5 of the Integra Underground ACHMP.

If any previously unidentified sites are encountered during the construction phase of the proposed Modification, they will be managed in accordance with the chance finds protocol set out in the Integra Underground ACHMP.

6.3 MANAGEMENT RELATED TO THIS PROPOSED MODIFICATION

Management to ensure that there are no impacts to recorded Aboriginal sites falls into two categories: construction design; and site monitoring measures.

6.3.1 Construction design

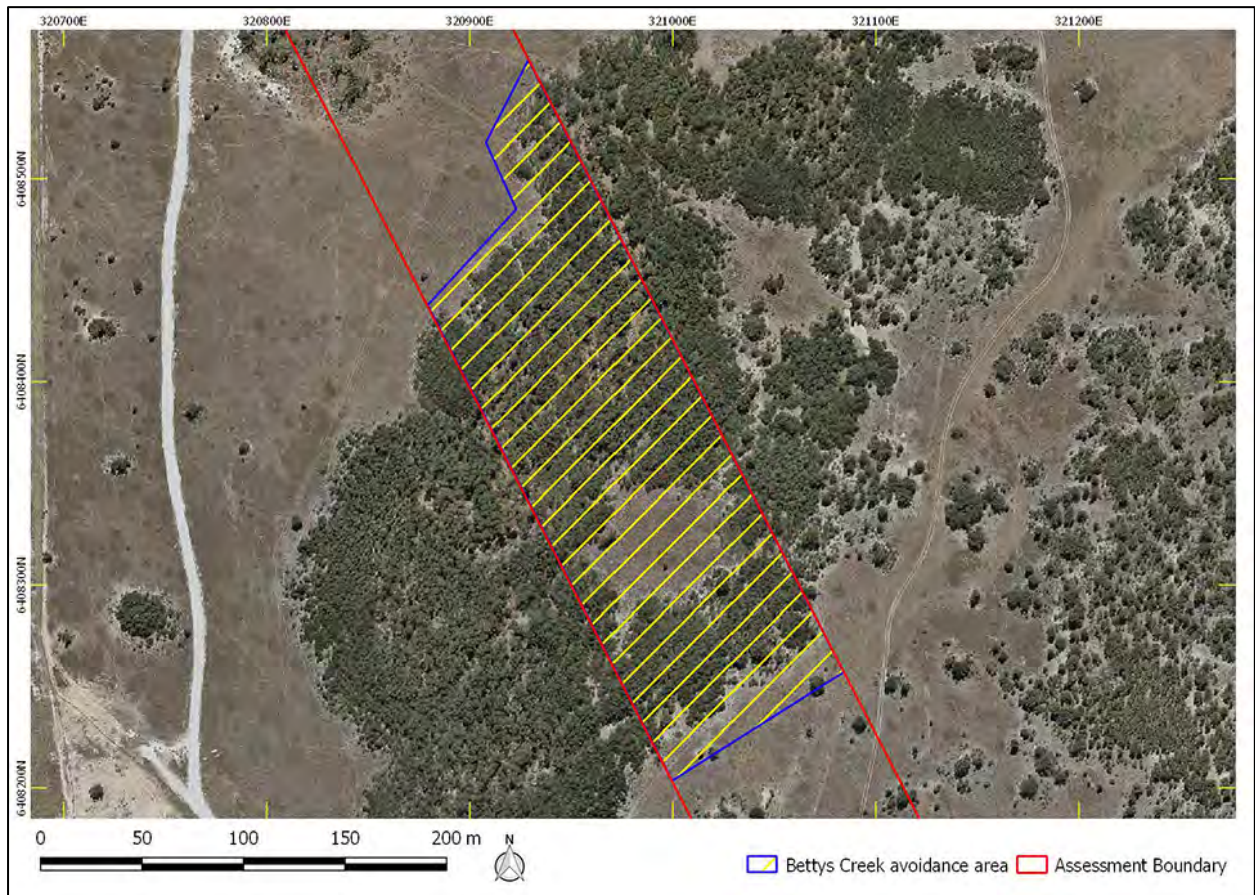
1. Ground Disturbance Permits will be undertaken prior to any ground disturbing activities associated with the proposed Modification to ensure that impacts to identified heritage items are minimised and that the recommended controls are implemented.
2. As noted in **Section 5.7**, 37-3-1194 (MOCO OS-6) is potentially at risk of impact should the powerline be constructed to the east of the existing access track in the vicinity of the site (**Figure 4-2**). Impacts to 37-3-1194 (MOCO OS-6) will be avoided if the powerline is placed to the west of the access track in highly modified landforms.

This presents two alternatives to the management of 37-3-1194 (MOCO OS-6):

- Avoid impact to the site by placing the powerline to the west of the existing access track; or
 - If the powerline must be located to the east of the existing track, undertake a surface collection of artefacts from within the powerline corridor in accordance with the approved ACHMP.
3. As further noted in **Section 5.7**, 37-3-1194 (MOCO OS-6) is potentially at risk of direct impact from construction associated with the proposed 11kV powerline (pink circle on **Figure 5-3**).

This presents two alternatives to the management of 37-3-1194 (MOCO OS-6) regarding this impact:

- Prior to construction activities associated with the proposed 11kV powerline, the northern remnant portion of 37-3-1194 (MOCO OS-6) should be inspected by a qualified archaeologist to determine if this area is a valid part of the site extent for 37-3-1194 (MOCO OS-6). If there is no visible evidence that site 37-3-1194 extends to this area, then this portion of the site extent could be removed via a site card amendment, thereby removing any heritage constraints in this small area; or
 - Should evidence be noted to suggest that this small portion does contain valid manifestations of MOCO OS-6, then those portions of the site within the Assessment Boundary would be managed according to an approved ACHMP. It is assessed here that a possible, albeit unlikely, scenario would be that surface artefacts are noted and that these would be recorded and collected according to the policy set out in an approved ACHMP.
4. When designing the powerline where it crosses Bettys Creek, it would be an archaeologically advantageous outcome if the Bettys Creek avoidance area shown on **Figure 6-1** could be avoided by ground disturbing activities such as power pole installation or access track construction. This would constitute a span of approximately 275m. If this is not possible and impacts within this avoidance area are likely, the following recommendations are made:
- Ground disturbing impacts within this area should be minimised as much as is possible; and
 - A suitably qualified archaeologist should be present to sight the actual location of any ground disturbance. If, at the time of the inspection it is determined that the proposed impact location risks harming Aboriginal cultural heritage, these impacts would be managed under the terms of an approved ACHMP. It is assessed here that a possible, albeit unlikely, scenario would be that surface artefacts are noted and that these would be recorded and collected according to the policy set out in an approved ACHMP.

Figure 6-1: Aerial showing the archaeologically sensitive landforms surrounding Bettys Creek.

6.3.2 Subsidence monitoring

As noted in the ACHMP (HVCC 2017): Section 3.4.2 referring to sites above Integra Underground LWs 13–14:

As noted by SCT (2017), the magnitude and frequency of previous surface cracking at IUG (Integra Underground) is minimal. Although subsidence may result in the lowering of ground surface level and alterations in the morphology of landforms, as noted within the EA (Environmental Assessment), vertical or horizontal displacement will not directly cause significant disturbance to any of the sites... Consequently, the potential for disturbance at the identified sites is considered insignificant and no perceptible impacts are expected at these sites.

Indirect impacts such as earthworks required to remediate subsidence-induced erosion, surface cracking and/or ponding across the IUG project area may disturb surface and subsurface artefacts. However, it is unlikely that these activities will affect the archaeological significance of the low density artefact scatters...

1. Although the risk of harm to known Aboriginal sites as result of subsidence is likely to be minimal, Section 5.3 of the Integra Underground ACHMP (HVCC 2017) provides a protocol for the management of impacts associated with subsidence remediation. This

protocol should also be adopted for any remediation impacts arising from the extraction of coal for the proposed Modification:

- Prior to any remediation that may be required within or close to known Aboriginal sites, OEH and local Aboriginal community representatives will be consulted;
 - Should there be remediation works required in potentially sensitive archaeological areas (such as within 20m of Bettys Creek) a qualified archaeologist will assess the potential impact of the planned works;
 - Prior to any subsidence remediation works within or close to known Aboriginal sites, a qualified archaeologist will assess the potential impact of the planned works; and
 - As required, should subsidence levels be greater than predicted, archaeological subsurface testing may be undertaken in affected areas in consultation with Aboriginal stakeholders and OEH.
2. In addition, Section 4.3.3 of the Integra Underground ACHMP (HVCC 2017) outlines a protocol for a site condition monitoring program. The five sites potentially liable to impact from mine related subsidence (37-3-1173 [MOCO IF-4]; 37-3-1175 [MOCO IF-6]; 37-3-1194 (MOCO OS-6); 37-3-0294 [MORL 2] and 37-3-0612 [Bettys Creek 22]) should be included in this monitoring program specifically to monitor any impacts arising from mine subsidence.

HISTORIC HERITAGE IMPACT ASSESSMENT REPORT

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7 HISTORIC HERITAGE IMPACT ASSESSMENT: INTRODUCTION

7.1 BRIEF DESCRIPTION OF THE PROPOSED MODIFICATION

Please refer to **Section 1** for a description of the proposed Modification and the Assessment Boundary.

7.2 RELEVANT LEGISLATION

7.2.1 State legislation

Environmental Planning and Assessment Act 1979 (EP&A Act)

The relevant provisions of the EP&A Act are described in **Section 3.1.1**.

Under Section 75U of the EP&A Act, approved projects under the former Part 3A do not require approval under the Heritage Act (see below) to impact historic sites. Impacts to heritage sites, should they occur, are managed under an approved *Historic Heritage Management Plan* (HHMP).

Heritage Act 1977 (Heritage Act)

The *Heritage Act 1977* (Heritage Act) is applicable to the current assessment. This Act established the Heritage Council of NSW. The Heritage Council's role is to advise the government on the protection of heritage assets, make listing recommendations to the Minister in relation to the State Heritage Register, and determination of proposals that involve modification to heritage items or places listed on the Register. Ordinarily, proposals involving the modification of a listed heritage item will require approval under Part 4 of the Heritage Act. However, due to the application of Section 75U of the EP&A Act, such an approval is not required for projects approved under Part 3A.

Automatic protection is afforded to 'relics', defined as 'any deposit or material evidence relating to the settlement of the area that comprised New South Wales, not being Aboriginal settlement, and which holds state or local significance' (note: formerly the Heritage Act protected any 'relic' that was more than 50 years old. The age criterion has since been dropped from the Act and relics are protected according to their heritage significance assessment by a qualified archaeologist rather than purely based on their age). Excavation of land on which it is known or where there is reasonable cause to suspect that 'relics' will be exposed, moved, destroyed, discovered or damaged is prohibited unless authorised by an excavation permit issued under Section 139 of the Heritage Act. However, Section 75U of the EP&A Act provides that excavation permits are not required for projects approved under Part 3A.

7.2.2 Commonwealth legislation

Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)

The relevant provisions of the EPBC Act are described in **Section 3.1.2**.

7.2.3 Applicability to the proposed Modification

The proposed Modification to PA 08_0101 is sought under section 75W of the EP&A Act.

Any items of local or state historical heritage significance within the Assessment Boundary are afforded legislative protection under the Heritage Act. Since the project was approved under Part 3A of the EP&A Act, excavation permits to impact heritage sites issued under Section 139 of the Heritage Act are not required for the proposed Modification (pursuant to Section 75U of the EP&A Act).

It is noted there are no Commonwealth or National heritage listed places within the Assessment Boundary, and as such, the heritage provisions of the EPBC Act do not apply.

7.3 HISTORIC HERITAGE ASSESSMENT OBJECTIVES

The current assessment applied the Heritage Council's *Historical Archaeology Code of Practice* (Heritage Council 2006) to the completion of a historical heritage assessment, including field investigations, in order to meet the following objectives:

- Objective One:** To identify whether or not historical heritage items or places are, or are likely to be, present within the Assessment Boundary;
- Objective Two:** To assess the significance of any recorded historical heritage items or places;
- Objective Three:** Determine whether the activities of the proposed Modification are likely to cause harm to recorded historical heritage items or places; and
- Objective Four:** Provide management recommendations and options for mitigating impacts.

7.4 DATE OF THE HISTORIC HERITAGE ASSESSMENT

The fieldwork component of this assessment was undertaken by Ben Churcher of OzArk on 6 July 2017 concurrently with the Aboriginal cultural heritage assessment.

7.5 LANDSCAPE CONTEXT

Please refer to **Section 2** for a description of the landscape context of the Assessment Boundary.

8 HISTORIC HERITAGE ASSESSMENT: BACKGROUND

8.1 BRIEF HISTORY OF THE REGION

The brief history provided here has been largely sourced from Umwelt (2014).

8.1.1 Pastoralism

The pastoral industry was the earliest established industry within the area. Benjamin Singleton placed a notice in the Sydney Gazette as early as December 1821 advertising agistment at St Patrick's Plains at 10 shillings a head per annum for not less than three years. In 1823, John Howe was granted permission to graze his stock at Patrick's Plains, agisting 1,000 sheep and 1,200 cattle. Horse breeding also became a thriving industry. The Scotts of Glendon were importing stud horses in 1822 and Alexander Bowman bred a number of race horses at Oaklands, to the south-east of the Assessment Boundary. In the 1820s, Dr James Bowman ran 2,000 merino sheep and 200 head of cattle on his Ravensworth Estate. Bowman's sheep were said to rank among the first crossbreeds in the colony. During the 19th century, the area of Ravensworth Estate was central to local and regional wool production. In the late 1850s Captain William Russell had travelled to Europe specifically to purchase merino rams to improve his NSW flocks. However, there was a shift from wool production in the nineteenth century to mixed farming, dairying and to a lesser degree grazing became more important in the 20th century. Parasitic infections in sheep in the late 19th century further encouraged the shift to dairy farming. The 1828 census indicates that, of the 191 large (over 1,000 acre) estates occupying the Upper Hunter Valley, 'only one third were sheep grazing enterprises with cattle raising being much more common' (Turner 1995: 18).

8.1.2 Dairying

Dairying was one of the initial impetuses for the division of large estates in the Upper Hunter Valley. The subdivision of the area's large estates commenced in the mid-19th century and by the early 20th century the Upper Hunter Valley was mostly occupied by dairy farms of up to 500 acres in size (Heritage Office & DUAP 1996: 49). Dairy farming became an important land use after sheep/wool production began to wane in the 19th century due to parasitic infections in sheep. The importance of the dairying industry in the Upper Hunter Valley coincided with the 'development of the mechanical separation of milk and refrigeration causing a re-shaping of the pattern of farming' in the Singleton and Muswellbrook Local Government Areas, due to the increased demand for dairy products in Australia and overseas (Turner 1995: 19). Dairying increased after World War I as soldiers were given small holdings and government assistance to establish small agricultural businesses, such as dairy farms (Heritage Office & DUAP 1996: 49). The effect of soldier settlement increased after World War II in Singleton when the 'country was

cut up into wheat-sheep farms' (Heritage Office & DUAP 1996: 49). In 1955 the NSW milk board established quotas for the supply of milk to overcome shortages.

In the second half of the 20th century the dairying industry went into a gradual decline. Since 1901 the dairy industry in NSW had been controlled by various government bodies. In the mid to late 1960s, policies aimed towards specialisation and amalgamation affected the smaller scale dairy farms. Then in the 1970s, Britain joined the European Economic Community and as a result, Australia lost its main dairy export market. In the early 1970s the Milk Board was replaced with the Dairy Industry Authority, resulting in the reallocation of milk quotas and the eventual deregulation of the industry. Farm improvements to meet new regulations and standards, including the installation of refrigerated holding tanks, resulted in many of the typical small dairy farms of the area becoming unviable. The number of dairy farms in NSW dropped from 9,061 in 1970 to 4,626 in 1976 (Dunne 2012: 75–81). The importance of dairying as a land use is reflected in the history of the Assessment Boundary and the number of former dairy sites identified within and in the vicinity of the Assessment Boundary as part of previous assessments (see **Section 8.2.1**).

8.1.3 Agriculture

The Singleton locality contained several thousand acres clear of timber and covered with rich alluvial soil which produced heavy crops of wheat, maize, barley, oats, rye, potatoes and natural grasses.

Wheat crops grown in the Hunter Valley were prone to the disease 'rust', which struck severely in 1857 (Turner 1995). Disease, together with the relatively dry conditions in the Upper Hunter Valley, made wheat a precarious crop and as a result its production declined. The decline in wheat cultivation saw an increase in barley production mainly for stock feed but as the dairy industry began to grow, lucerne crops became a more viable option. Examination of **Figure 2-4** indicates that there were no areas of cultivation within the Assessment Boundary.

8.2 LOCAL CONTEXT

8.2.1 Desktop database searches conducted

A desktop search was conducted on the following databases to identify any previously-recorded heritage sites within the Assessment Boundary. The results of this search are summarised in **Table 8-1**.

Although there is one known historic site existing within the Assessment Boundary, there are a number of non-listed historic sites within the Assessment Boundary that have been previously destroyed by approved mining activities (**Figure 8-1**), namely:

- Sites RE31 to RE33: *Archaeological investigation and reporting contained in The Historical Archaeology of Ravensworth East Mine, near Singleton, NSW: Excavation and Recording of Sites RE31, RE32 and RE33*. Prepared by Umwelt for Xstrata Mt Owen (2006).
- Sites MOH1 to MOH3: *Archaeological investigation and reporting contained in Historical Archaeology: Archival Recording and Excavation, Mt Owen Operations, Singleton, NSW*. Prepared by Umwelt for Xstrata Mount Owen (2006).

Following their excavation and/or recording in accordance with the relevant approval conditions, RE31 to RE33 and MOH1 to MOH3 have been removed as part of approved works.

In general, these previously identified and managed sites were representative of early dairy farming in the Upper Hunter in the twentieth century, after F.J.L. Measures subdivided the Ravensworth Estate and sold the subdivided lots to prospective mixed farming and dairy enterprises.

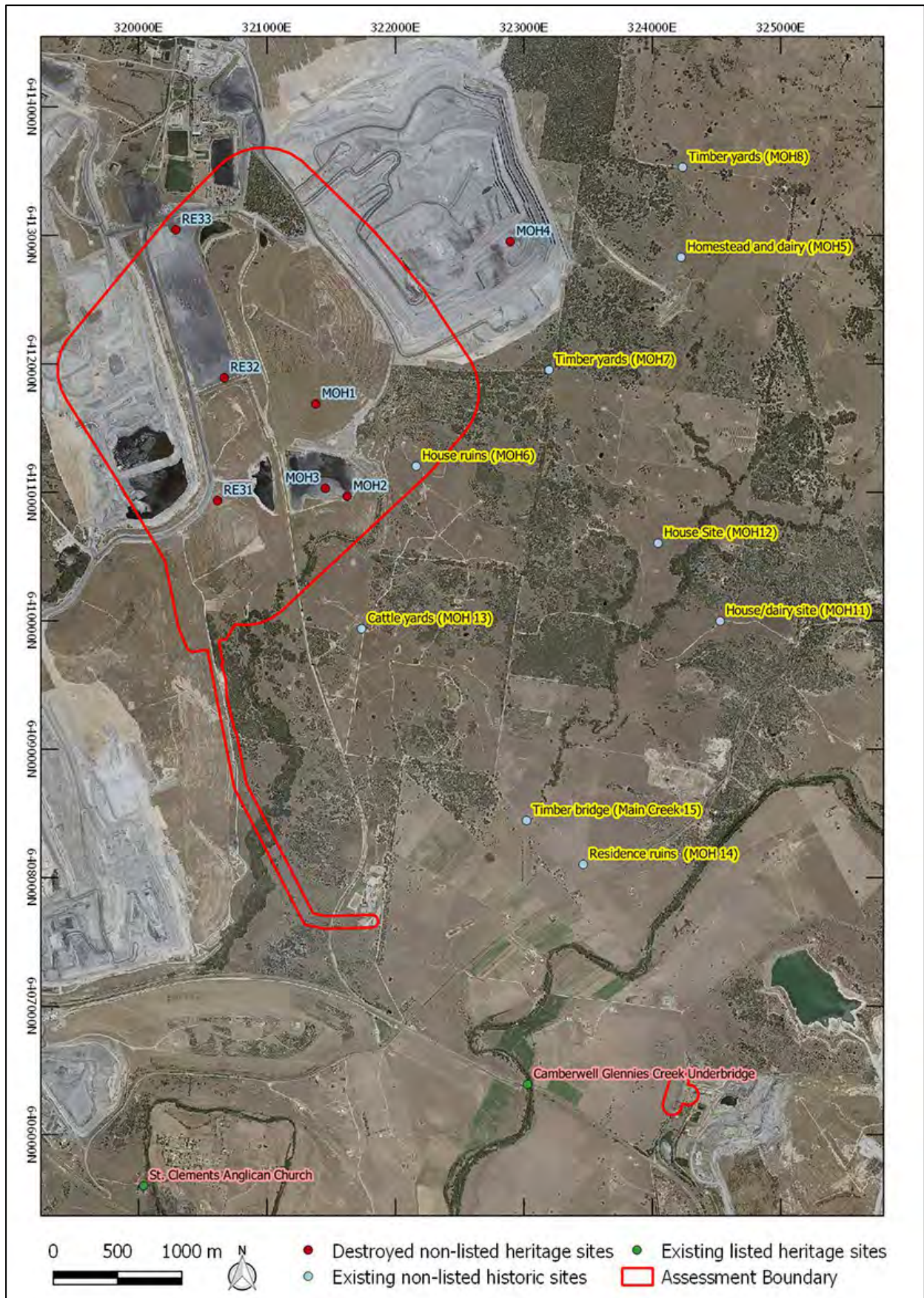
A number of non-listed heritage items located to the east of the Assessment Boundary remain extant including: former house ruins, former dairy ruins, timber cattle yards and a wooden bridge over Main Creek (**Figure 8-1**).

One heritage item with a statutory listing is located outside, but within the vicinity of, the Assessment Boundary: the Camberwell Glennies Creek Underbridge (**Figure 8-1**). The railway bridge is a good example of an American-type steel Pratt truss bridge and has local heritage significance and is listed under the Heritage and Conservation Register (section 170 of the Heritage Act) for the Australian Rail Track Corporation.

Table 8-1. Historic heritage: desktop-database search results.

Name of Database Searched	Date of Search	Type of Search	Comment
National and Commonwealth Heritage Listings	25/7/17	Singleton LGA	No listed items are within or immediately adjacent to the Assessment Boundary
State Heritage Register	25/7/17	Singleton LGA	No listed items are within or immediately adjacent to the Assessment Boundary
Singleton Local Environment Plan (LEP)	25/7/17	Singleton LGA	No listed items are within or immediately adjacent to the Assessment Boundary

Figure 8-1: The relationship of recorded historic sites to the Assessment Boundary.



One non-listed site (MOH6) remains within the Assessment Boundary. Recorded by Umwelt the site is described as:

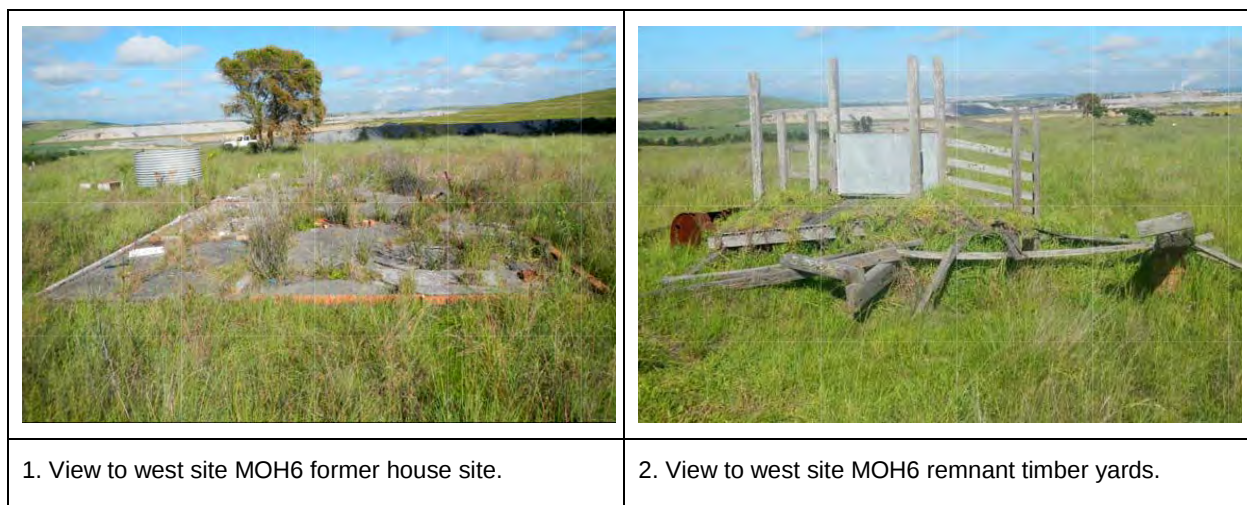
The former house is evident by an approximately 10.5 by 7 metre area of concrete slab footing with remnant single width brick walls (refer to Plate 4.15). Associated with the slab is assorted domestic debris including a television, oven and washing machine. The house site is part of an approximately 175 metre long area containing derelict timber yards and sheep ramp, concrete slab with concrete machine bases, concrete water tank with PVC piping, demolition rubble and a timber frame enclosure/chicken coop.

Umwelt 2014: 4.13

Umwelt 2014: 6.8 concludes that MOH6 “has been assessed as having no significance and no research potential.” Recommendations in relation to the Mount Owen Continued Operations Project were that “no further management of site MOH6 is required” (Umwelt 2014: 6.8).

Figure 8-2 shows views of MOH6 sourced from Umwelt 2014.

Figure 8-2. Views of MOH6 (source Umwelt 2014, Plates 4.15, 4.16).



8.3 SURVEY METHODOLOGY

Standard archaeological field survey and recording methods were employed in this study (Burke & Smith 2004). The survey occurred concurrently with the Aboriginal cultural heritage assessment (Section 5.1).

8.4 PROJECT CONSTRAINTS

There were no constraints to the successful completion of the assessment.

9 RESULTS OF HISTORIC HERITAGE IMPACT ASSESSMENT

9.1 HISTORIC HERITAGE SITES RECORDED

No additional historic sites were recorded as a result of the field assessment. Further, no landform within the Assessment Boundary was seen as having potential to contain further, subsurface archaeological deposits due to the moderate to high level of disturbance across the Assessment Boundary and the generally thin soils.

9.2 DISCUSSION

Due to the numerous previous assessments within the Assessment Boundary, it was predicted that any historic sites, often being more noticeable than Aboriginal sites, would already have been recorded. Due to the relatively small portions of the Assessment Boundary that remain unmodified it was unlikely that further historic sites would be recorded.

9.3 LIKELY IMPACTS TO HISTORIC HERITAGE FROM THE PROPOSED MODIFICATION

There is one extant historic heritage site located within the Underground Extraction Area portion of the Assessment Boundary. This site, MOH6, has been previously assessed as having no heritage values, a conclusion the current assessment agrees with. As such, no historic heritage values will be impacted by the proposed Modification.

9.4 MANAGEMENT AND MITIGATION: HISTORIC HERITAGE

9.4.1 General principles for the management of historic sites

Appropriate management of heritage items is primarily determined on the basis of their assessed significance as well as the likely impacts of the proposed development.

In terms of best practice and desired outcomes, avoiding impact to any historical item is the preferred outcome. However, where a historical site has been assessed as having no heritage value, there is no legislative requirement to mitigate impacts to such an item.

9.4.2 Management of historic sites within the Assessment Boundary

There is one known historic heritage site within the Assessment Boundary that has been assessed as having no significance and no research potential. There are therefore no specific management recommendations pertaining to historic heritage.

10 RECOMMENDATIONS

10.1 ABORIGINAL HERITAGE

Under Section 89A of the NPW Act, it is mandatory that all newly-recorded Aboriginal sites be registered with OEH on the AHIMS register. To this end, it is noted that no new Aboriginal sites were recorded during the assessment.

The following recommendations are made on the basis of the predicted impacts and with regard to:

- Legal requirements under the NPW Act whereby it is illegal to damage, deface or destroy an Aboriginal place or object without the prior written consent of OEH or under the protocols of an approved ACHMP;
- The findings of the current investigations undertaken within the Assessment Boundary; and
- The interests of the Aboriginal community.

Recommendations concerning the proposed Modification are as follows:

1. All land disturbance works are to remain within the Assessment Boundary. Should ground disturbance be required outside of the Assessment Boundary, further investigation may be required.
2. All management recommendations set out in **Section 6.3** should be followed.
3. All staff and contractors associated with any ground disturbing aspects of the proposed work, should participate in an Aboriginal Cultural Heritage Awareness Induction and be fully informed of their statutory obligations in relation to Aboriginal cultural heritage sites and objects.
4. In the event that Aboriginal objects or human remains are unearthed during the construction of the proposed Modification, the protocols in the Integra Underground ACHMP (HVCC 2017: Section 5.5) should be followed.

10.2 HISTORIC HERITAGE

The following recommendations are made on the basis of the predicted impacts and with regard to:

- Legal requirements under the Heritage Act;
- Guidelines presented in the Burra Charter (Australia ICOMOS 2013);
- The findings of the current assessment; and
- The interests of the local community.

Recommendations concerning the proposed Modification are as follows.

1. All land disturbance works are to remain within the Assessment Boundary. Should ground disturbance be required outside of the Assessment Boundary, further investigation may be required.
2. There is one known historic heritage sites in the Assessment Boundary (MOH6). As the site has been assessed as having no significance and no research potential, there are no specific management recommendations pertaining to historic heritage.
3. All staff and contractors associated with any ground disturbing aspects of the proposed work, should be fully informed of their statutory obligations in relation to historic heritage sites and objects.
4. In the event that historic objects are unearthed during the construction of the proposed Modification, the protocols in the *Historical Heritage Management Plan* (HVCC 2017b: Section 3.1) should be followed.

REFERENCES

- ACHM 2013 Australian Cultural Heritage Management (Victoria) Pty Limited. 2013. *Mount Owen Continued Operations Project. Aboriginal Cultural Heritage Assessment Report and Consultation Records. Volume 1.* Report for Mount Owen Pty Ltd.
- Australia ICOMOS 2013 International Council on Monuments and Sites 2013. *The Burra Charter: The Australia ICOMOS Charter for Places of Cultural Significance*, 2013.
- Appleton 2002 Appleton, J. 2002. *Archaeological Assessment Ventilation Shaft Site and Powerline Glennies Creek*. Report to Consol Energy Australia.
- Biosis 2011 Biosis Research. 2011. *Nundah Bank Third Track: Aboriginal Cultural Heritage Assessment*. Report to KMH Environmental.
- BOM 2017 Bureau of Meteorology 2017. Australian Government, Bureau of Meteorology [website]. Available from: <http://www.bom.gov.au/> [accessed 19 April 2017].
- Brayshaw 1981 Helen Brayshaw. 1981. *Archaeological survey of Authorisation 89, proposed site of Bloomfield Collieries' Coal Mine at Rix's Creek, Singleton*. Report to NSW NPWS.
- Brayshaw 1986 Helen Brayshaw. 1986. *Archaeological Survey of Glennies Creek Coal Authorisation Areas 81 and 308, Hunter Valley, NSW*. Report to Southland Coal Limited.
- Brayshaw 1986b Helen Brayshaw. 1986. *Aborigines of the Hunter Valley: a study of colonial records*. Scone and Hunter Historical Society: Scone.
- Burke & Smith 2004 Burke, H. and Smith, C. 2004. *The Archaeologist's Field Handbook*, Blackwell, Oxford.
- DECCW 2010 Department of Environment, Climate Change and Water, Sydney (now OEH). *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales*.
- DP&E 2016 Department of Planning and Environment. *Guidelines for the Economic Assessment of Mining and Coal Seam Gas Proposals*.
- Dunne 2012 Dunne, A. 2012. *From Brook to Broke: A History of Broke Fordwich*.
- ERM 2009 ERM Pty Limited. 2009. *Integra Underground Coal Project. Heritage Assessment*. Report to Integra Coal Operations Pty Limited.

Heritage Office & DUAP 1996	Heritage Office and Department of Urban Affairs and Planning 1996. <i>Regional Histories</i> . Department of Urban Affairs and Planning and Heritage Council of New South Wales.
Heritage Council 2006	The Heritage Division, Department of Planning and Environment, <i>Historical Archaeology Code of Practice</i>
HVCC 2017	HV Coking Coal Pty Limited (Integra Underground). <i>Aboriginal Cultural Heritage Management Plan</i> (INTUG-263795162-23).
HVCC 2017b	HV Coking Coal Pty Limited (Integra Underground). <i>Historical Heritage Management Plan</i> (INTUG-263795162-24).
Mitchell 2002	Mitchell, Dr. Peter. 2002. <i>Description for NSW (Mitchell) Landscapes</i> Version 2. Department of Environment and Climate Change NSW.
OEH 2011	Office of Environment and Heritage. 2011. <i>Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in New South Wales</i> . Department of Environment, Climate Change and Water, Sydney.
OEH 2014	Office of Environment and Heritage. 2014. <i>Aboriginal Sites Decision Support Tool (ASDST)</i> . In <i>NSW Office of Environment & Heritage</i> [online GIS resource]. Available from: http://www.environment.nsw.gov.au/licences/AboriginalSitesDecisionSupportTool.htm [accessed 22 July 2015].
OzArk 2013	OzArk. 2013. <i>Aboriginal Archaeological Values Assessment: Mount Owen Continued Operations</i> . Report to Mount Owen.
Resource Planning 1991	Resource Planning Pty Limited. 1991. <i>Environmental Impact Statement Mount Owen Coal Project Hebden - New South Wales</i> . Report for Hunter Valley Coal Corporation Pty Limited.
Turner 1995	Turner, J. 1995. <i>Historical Themes of the Shire of Muswellbrook</i> , unpublished.
Umwelt 2003	Umwelt (Australia) Pty Limited. <i>Survey and Assessment of Impact on Aboriginal Cultural Heritage and Archaeological Values, Main Creek, Hunter Valley, NSW</i> . Prepared for Glennies Creek Coal Management.
Umwelt 2004	Umwelt (Australia) Pty Limited. 2004. <i>Aboriginal Archaeological Assessment - Glendell Open Cut Mine</i> . Report to Glendell Joint Venture.
Umwelt 2012a	Umwelt (Australia) Pty Limited. 2012. <i>Part 1 – Bettys Creek Salvage Program, Mount Owen Extension Area Surface and Subsurface Salvage under Section 90 Aboriginal Heritage Impact Permit #1762</i> . Report for Xstrata Mount Owen.

Umwelt 2012b	Umwelt (Australia) Pty Limited. 2012. <i>Part 2 – Bettys Creek Salvage Program, Mount Owen West Dump Area Surface and Subsurface Salvage under Section 90 Aboriginal Heritage Impact Permit #2131</i> . Report for Xstrata Mount Owen.
Umwelt 2013c	Umwelt (Australia) Pty Limited. 2013. <i>Part 3 – Bettys Creek Salvage Program, Mount Owen Operations Area Area Surface and Subsurface Salvage under Section 90 Aboriginal Heritage Impact Permit #2267</i> . Report for Xstrata Mount Owen.
Umwelt 2013d	Umwelt (Australia) Pty Limited. 2013. <i>Part 4 – Bettys Creek Salvage Program, Glendell Mine Surface and Subsurface Salvage under Section 90 Aboriginal Heritage Impact Permit #2267</i> . Report for Xstrata Mount Owen.
Umwelt 2014	Umwelt (Australia) Pty Limited. 2014. <i>Historic Heritage Assessment. Mount Owen Continued Operations Project</i> . Report for Mount Owen Pty Limited.
Umwelt 2015	Umwelt (Australia) Pty Limited. 2015. <i>Environmental Impact Statement. Mount Owen Continued Operations Project</i> . Report on behalf of Mount Owen Pty Limited.

APPENDIX 1. AHIMS SITE SEARCH

 Office of Environment & Heritage AHIMS Web Services (AWS) Extensive search - Site list report Your Ref/PO Number : 1616 Client Service ID : 292652										
SiteID	SiteName	Datum	Zone	Eastings	Northings	Context	Site Status	SiteFeatures	SiteTypes	Reports
37-3-0027	Glennies Creek Site C / Bettys Creek - C	AGD	56	321045	6409909	Open site	Destroyed	Artefact :-	Open Camp Site	164
	Contact	Recorders				Helen Brayshaw, Barry French, John Mathews		Permits		
37-3-0584	BC40	AGD	56	321600	6412200	Open site	Destroyed	Artefact :-	Permits	1762
	Contact	Recorders						Permits		
37-3-0585	BC41	AGD	56	322510	6412200	Open site	Destroyed	Artefact :-	Permits	1762
	Contact	Recorders						Permits		
37-3-0586	BC42	AGD	56	321900	6412190	Open site	Destroyed	Artefact :-	Permits	1762
	Contact	Recorders						Permits		
37-3-0587	BC43	AGD	56	321600	6412200	Open site	Destroyed	Artefact :-	Permits	1762
	Contact	Recorders						Permits		
37-3-0399	Ravensworth 10	GDA	56	319865	6413543	Open site	Destroyed	Artefact :-	Isolated Find	98221
	Contact	Recorders				ERM Australia Pty Ltd- Sydney CBD		Permits		
37-3-0320	BC 24:	AGD	56	322000	6413050	Open site	Destroyed	Artefact :-	Open Camp Site	1576, 1762
	Contact	Recorders				Mr. Matthew Barber		Permits		
37-3-0398	Ravensworth 09	GDA	56	319743	6413684	Open site	Destroyed	Artefact :-	Isolated Find	98221
	Contact	Recorders				ERM Australia Pty Ltd- Sydney CBD		Permits		
37-3-0400	Ravensworth 11	GDA	56	319972	6413482	Open site	Destroyed	Artefact :-	Isolated Find	98221
	Contact	Recorders				ERM Australia Pty Ltd- Sydney CBD		Permits		
37-3-0401	Ravensworth 12	GDA	56	319685	6413419	Open site	Destroyed	Artefact :-	Open Camp Site	98221
	Contact	Recorders				ERM Australia Pty Ltd- Sydney CBD		Permits		
37-3-0402	Ravensworth 13	GDA	56	320014	6413444	Open site	Destroyed	Artefact :-	Open Camp Site	
	Contact	Recorders				ERM Australia Pty Ltd- Sydney CBD		Permits		
37-3-0403	Ravensworth 14	GDA	56	319636	6413346	Open site	Destroyed	Artefact :-	Open Camp Site	
	Contact	Recorders				ERM Australia Pty Ltd- Sydney CBD		Permits		
37-3-0406	Rav east 6	GDA	56	319494	6413617	Open site	Destroyed	Artefact :-	Isolated Find	
	Contact	Recorders				Adam Ford, Adam Ford		Permits		
37-3-0407	Rav east 7	GDA	56	319697	6413691	Open site	Destroyed	Artefact :-	Isolated Find	
	Contact	Recorders				Adam Ford		Permits		
37-3-0408	Rav east 8	GDA	56	319747	6413714	Open site	Destroyed	Artefact :-	Isolated Find	
	Contact	Recorders				Adam Ford, Ms. Alison Nightingale		Permits		
37-3-0409	Rav east 15	GDA	56	319669	6412759	Open site	Destroyed	Artefact :-	Open Camp Site	
	Contact	Recorders				Adam Ford		Permits		
37-3-0410	ravensworth east 17	GDA	56	320000	6412975	Open site	Destroyed	Artefact :-	Isolated Find	
	Contact	Recorders				Ms. Alison Nightingale		Permits		
Report generated by AHIMS Web Service on 25/07/2017 for Stephanie Rusden for the following area at Datum :GDA, Zone : 56, Eastings : 319204 - 323084, Northings : 6409900 - 6414046 with a Buffer of 0 meters. Additional Info : survey. Number of Aboriginal sites and Aboriginal objects found is 118 This information is not guaranteed to be free from error omission. Office of Environment and Heritage (NSW) and its employees disclaim liability for any act done or omission made in the information and consequences of such acts or omission.										

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 Office of Environment & Heritage AHIMS Web Services (AWS) Extensive search - Site list report Your Ref/PO Number : 1616 Client Service ID : 292652										
SiteID	SiteName	Datum	Zone	Eastings	Northings	Context	Site Status	SiteFeatures	SiteTypes	Reports
37-3-0411	rav east 18	AGD	56	320783	6412019	Open site	Destroyed	Artefact :-	Isolated Find	
	Contact	Recorders				Adam Ford		Permits		
37-3-0412	rav east 19	GDA	56	319996	6411762	Open site	Destroyed	Artefact :-	Open Camp Site	
	Contact	Recorders				Adam Ford		Permits		
37-3-0421	rav east 22	GDA	56	321124	6410757	Open site	Destroyed	Artefact :-	Isolated Find	
	Contact	Recorders				Adam Ford		Permits		
37-3-0422	rav east 20	GDA	56	320368	6412622	Open site	Destroyed	Artefact :-	Isolated Find	
	Contact	Recorders				Adam Ford		Permits		
37-3-0423	rav east 21	GDA	56	319725	6412579	Open site	Destroyed	Artefact :-	Open Camp Site	
	Contact	Recorders				Adam Ford		Permits		
37-3-0395	Ravensworth East 5	GDA	56	319275	6413510	Open site	Destroyed	Artefact :-	Isolated Find	
	Contact	Recorders				Ms. Alison Nightingale		Permits		
37-3-0645	BC44a	GDA	56	321449	6410827	Open site	Destroyed	Artefact : 1	Permits	
	Contact	Recorders				Umwelt (Australia) Pty Limited		Permits		
37-3-0646	BC44b	GDA	56	321427	6410732	Open site	Destroyed	Artefact : 1	Permits	
	Contact	Recorders				Umwelt (Australia) Pty Limited		Permits		
37-3-0647	BC51	GDA	56	321820	6411403	Open site	Destroyed	Artefact : 3	Permits	
	Contact	Recorders				Umwelt (Australia) Pty Limited		Permits		
37-3-0648	BC52	GDA	56	321932	6411494	Open site	Destroyed	Artefact : 11	Permits	
	Contact	Recorders				Umwelt (Australia) Pty Limited		Permits		
37-3-0649	BC53	GDA	56	322429	6411508	Open site	Destroyed	Artefact : 1	Permits	
	Contact	Recorders				OzArk Environmental and Heritage Management, OzArk Environmental and Heritage		Permits		
37-3-0650	BC54	GDA	56	322302	6411754	Open site	Destroyed	Artefact : 1	Permits	
	Contact	Recorders				Umwelt (Australia) Pty Limited		Permits		
37-3-0651	BC56	GDA	56	322386	6412267	Open site	Destroyed	Artefact : 2	Permits	
	Contact	Recorders				Umwelt (Australia) Pty Limited		Permits		
37-3-0652	BC57	GDA	56	322322	6412220	Open site	Destroyed	Artefact : 1	Permits	
	Contact	Recorders				Umwelt (Australia) Pty Limited		Permits		
37-3-0657	BC63	GDA	56	321592	6411166	Open site	Destroyed	Artefact : 10	Permits	
	Contact	Recorders				Umwelt (Australia) Pty Limited		Permits		
37-3-0658	BC64	GDA	56	321712	6411072	Open site	Destroyed	Artefact : 1	Permits	
	Contact	Recorders				Umwelt (Australia) Pty Limited		Permits		
37-3-0659	BC65	GDA	56	321796	6410542	Open site	Destroyed	Artefact : 2	Permits	
	Contact	Recorders				Umwelt (Australia) Pty Limited		Permits		
Report generated by AHIMS Web Service on 25/07/2017 for Stephanie Rusden for the following area at Datum :GDA, Zone : 56, Eastings : 319204 - 323084, Northings : 6409900 - 6414046 with a Buffer of 0 meters. Additional Info : survey. Number of Aboriginal sites and Aboriginal objects found is 118 This information is not guaranteed to be free from error omission. Office of Environment and Heritage (NSW) and its employees disclaim liability for any act done or omission made in the information and consequences of such acts or omission.										

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

Your Ref/PO Number : 1616
 Client Service ID : 292652

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
37-3-0660	BC66	GDA	56	321615	6410709	Open site	Destroyed	Artefact: 2		
	Contact: T Russell	Recorders	Umwelt (Australia) Pty Limited							
37-3-0661	BC67	GDA	56	321964	6411392	Open site	Destroyed	Artefact: 2		
	Contact: T Russell	Recorders	Umwelt (Australia) Pty Limited							
37-3-0611	Bettys Creek 21	GDA	56	320865	6410243	Open site	Destroyed	Artefact: 1		99019
	Contact:	Recorders	OzArk Environmental and Heritage Management,OzArk Environmental and Heritage							
37-3-0612	Bettys Creek 22	AGD	56	321033	6410107	Open site	Valid	Artefact: -		99019
	Contact:	Recorders								
37-3-0627	Swamp Creek 13	GDA	56	319417	6409904	Open site	Destroyed	Artefact: -		99019,100895
	Contact:	Recorders	Umwelt (Australia) Pty Limited							
37-3-0668	Swamp Creek PAD	AGD	56	320150	6410475	Open site	Valid	Artefact: -		2267
	Contact: T Russell	Recorders	Umwelt (Australia) Pty Limited							
37-3-0628	BC58	GDA	56	322064	6412146	Open site	Destroyed	Artefact: -		
	Contact:	Recorders	Umwelt (Australia) Pty Limited							
37-3-0629	BC55	GDA	56	322185	6411985	Open site	Destroyed	Artefact: -		2131
	Contact:	Recorders	Umwelt (Australia) Pty Limited							
37-3-0630	BC50	GDA	56	321407	6412896	Open site	Destroyed	Artefact: -		
	Contact:	Recorders	Umwelt (Australia) Pty Limited							
37-3-0631	BC49	GDA	56	321479	6412727	Open site	Destroyed	Artefact: -		2131
	Contact:	Recorders	Umwelt (Australia) Pty Limited							
37-3-0632	BC48	GDA	56	321664	6412602	Open site	Destroyed	Artefact: -		
	Contact:	Recorders	Umwelt (Australia) Pty Limited							
37-3-0633	BC47	GDA	56	320913	6412387	Open site	Destroyed	Artefact: -		2131
	Contact:	Recorders	Umwelt (Australia) Pty Limited							
37-3-0634	BC46	GDA	56	321018	6413159	Open site	Destroyed	Artefact: -		2131
	Contact:	Recorders	Umwelt (Australia) Pty Limited							
37-3-0635	BC45	GDA	56	321020	6413369	Open site	Destroyed	Artefact: -		2131
	Contact:	Recorders	Umwelt (Australia) Pty Limited							
37-3-0636	Bettys Creek 44 (BC44)	GDA	56	322493	6411450	Open site	Destroyed	Artefact: -		2131
	Contact:	Recorders	Umwelt (Australia) Pty Limited							
37-3-1183	MOCO IF-14	GDA	56	321888	6410609	Open site	Destroyed	Artefact: 1		
	Contact:	Recorders	OzArk Environmental and Heritage Management,OzArk Environmental and Heritage							
37-3-1184	MOCO IF-15	GDA	56	321979	6410591	Open site	Destroyed	Artefact: 1		
	Contact:	Recorders	OzArk Environmental and Heritage Management,OzArk Environmental and Heritage							

Report generated by AHIMS Web Service on 25/07/2017 for Stephanie Rusden for the following area at Datum :GDA, Zone : 56, Eastings : 319204 - 323084, Northings : 6409900 - 6414046 with a Buffer of 0 meters. Additional Info : survey. Number of Aboriginal sites and Aboriginal objects found is 118

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**Office of
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AHIMS Web Services (AWS)

Extensive search - Site list report

Your Ref/PO Number : 1616
 Client Service ID : 292652

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
37-3-1191	MOCO OS-3	GDA	56	322033	6411939	Open site	Destroyed	Artefact: 1		
	Contact:	Recorders	OzArk Environmental and Heritage Management,OzArk Environmental and Heritage							
37-3-1193	MOCO OS-5	GDA	56	321276	6410179	Open site	Valid	Artefact: 1		
	Contact:	Recorders	OzArk Environmental and Heritage Management,OzArk Environmental and Heritage							
37-3-1173	MOCO IF-4	GDA	56	320849	6413041	Open site	Valid	Artefact: 1		
	Contact:	Recorders	OzArk Environmental and Heritage Management,Mr.Ben Churcher							
37-3-1174	MOCO IF-5	GDA	56	320623	6412964	Open site	Destroyed	Artefact: 1		
	Contact:	Recorders	OzArk Environmental and Heritage Management,OzArk Environmental and Heritage							
37-3-1175	MOCO IF-6	GDA	56	320749	6412208	Open site	Valid	Artefact: 1		
	Contact:	Recorders	OzArk Environmental and Heritage Management,Mr.Ben Churcher							
37-3-1176	MOCO IF-7	GDA	56	322584	6411899	Open site	Destroyed	Artefact: 1		
	Contact:	Recorders	OzArk Environmental and Heritage Management,OzArk Environmental and Heritage							
37-3-1177	MOCO IF-8	GDA	56	322024	6411670	Open site	Destroyed	Artefact: 1		
	Contact:	Recorders	OzArk Environmental and Heritage Management,OzArk Environmental and Heritage							
37-3-1182	MOCO IF-13	GDA	56	322076	6410987	Open site	Destroyed	Artefact: 1		
	Contact:	Recorders	OzArk Environmental and Heritage Management,OzArk Environmental and Heritage							
37-3-1161	MT OWEN IF3	GDA	56	322583	6411899	Open site	Valid	Artefact: 1		
	Contact:	Recorders	Virtus Heritage							
37-3-0294	Site 2:	GDA	56	321168	6410327	Open site	Valid	Artefact: -	Open Camp Site	
	Contact:	Recorders	Noeleen Curran,OzArk Environmental and Heritage Management,Ms.Alison Nightingale							
37-3-0295	Site 1:	GDA	56	320755	6412389	Open site	Destroyed	Artefact: -	Open Camp Site	
	Contact:	Recorders	Noeleen Curran,Ms.Alison Nightingale							
37-3-0297	BC 1:	AGD	56	322470	6412870	Open site	Destroyed	Artefact: -	Open Camp Site	
	Contact:	Recorders	Mr.Matthew Barber							
37-3-0298	BC 2:	AGD	56	322490	6412850	Open site	Destroyed	Artefact: -	Open Camp Site	1087,1576,1762
	Contact:	Recorders	Mr.Matthew Barber							
37-3-0299	BC 3:	AGD	56	322270	6412190	Open site	Destroyed	Artefact: -	Open Camp Site	1576,1762
	Contact:	Recorders	Mr.Matthew Barber							
37-3-0300	BC 4:	AGD	56	322400	6412250	Open site	Destroyed	Artefact: -	Open Camp Site	1576,1762
	Contact:	Recorders	Mr.Matthew Barber							
37-3-0303	BC 7:	AGD	56	322590	6413500	Open site	Destroyed	Artefact: -	Open Camp Site	1576,1762
	Contact:	Recorders	Mr.Matthew Barber							
37-3-0306	BC 10:	AGD	56	322760	6413770	Open site	Destroyed	Artefact: -	Open Camp Site	1576,1762
	Contact:	Recorders	Mr.Matthew Barber							

Report generated by AHIMS Web Service on 25/07/2017 for Stephanie Rusden for the following area at Datum :GDA, Zone : 56, Eastings : 319204 - 323084, Northings : 6409900 - 6414046 with a Buffer of 0 meters. Additional Info : survey. Number of Aboriginal sites and Aboriginal objects found is 118

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 Office of Environment & Heritage		AHIMS Web Services (AWS)				Your Ref/PO Number : 1616 Client Service ID : 292652				
		Extensive search - Site list report								
SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
37-3-0307	BC 11: Contact	AGD	56	322600	6413710	Open site	Destroyed	Artefact :-	Open Camp Site	
		Recorders		Mr.Matthew Barber				Permits	1576,1762	
37-3-0308	BC 12: Contact	AGD	56	322520	6413300	Open site	Destroyed	Artefact :-	Open Camp Site	
		Recorders		Mr.Matthew Barber				Permits	1576,1762	
37-3-0309	BC 13: Contact	AGD	56	322500	6413200	Open site	Destroyed	Artefact :-	Open Camp Site	
		Recorders		Mr.Matthew Barber				Permits	1576,1762	
37-3-0312	BC 16: Contact	AGD	56	322050	6412720	Open site	Destroyed	Artefact :-	Open Camp Site	
		Recorders		Mr.Matthew Barber				Permits	1576,1762	
37-3-0313	BC 17: Contact	AGD	56	322020	6412490	Open site	Destroyed	Artefact :-	Open Camp Site	
		Recorders		Mr.Matthew Barber				Permits	1576,1762	
37-3-0314	BC 18: Contact	AGD	56	322060	6412280	Open site	Destroyed	Artefact :-	Open Camp Site	
		Recorders		Mr.Matthew Barber				Permits	1576,1762	
37-3-0315	BC 19: Contact	AGD	56	322030	6412260	Open site	Destroyed	Artefact :-	Open Camp Site	
		Recorders		Mr.Matthew Barber				Permits	1576,1762	
37-3-0316	BC 20: Contact	AGD	56	322080	6412270	Open site	Destroyed	Artefact :-	Open Camp Site	
		Recorders		Mr.Matthew Barber				Permits	1576,1762	
37-3-0317	BC 21: Contact	AGD	56	322150	6412290	Open site	Destroyed	Artefact :-	Open Camp Site	
		Recorders		Mr.Matthew Barber				Permits	1576,1762	
37-3-0318	BC 22: Contact	AGD	56	322140	6412270	Open site	Destroyed	Artefact :-	Open Camp Site	
		Recorders		Mr.Matthew Barber				Permits	1576,1762	
37-3-0319	BC 23: Contact	AGD	56	321990	6412200	Open site	Destroyed	Artefact :-	Open Camp Site	
		Recorders		Mr.Matthew Barber				Permits	1576,1762	
37-3-0321	BC 25: Contact	AGD	56	322330	6412950	Open site	Destroyed	Artefact :-	Open Camp Site	
		Recorders		Mr.Matthew Barber				Permits	1576,1762	
37-3-0322	BC 26: Contact	AGD	56	322500	6412940	Open site	Destroyed	Artefact :-	Open Camp Site	
		Recorders		Mr.Matthew Barber				Permits	1576,1762	
37-3-0323	BC 27: Contact	AGD	56	322640	6412750	Open site	Destroyed	Artefact :-	Open Camp Site	
		Recorders		Mr.Matthew Barber				Permits	1576,1762	
37-3-0324	BC 28: Contact	AGD	56	322480	6412320	Open site	Destroyed	Artefact :-	Open Camp Site	
		Recorders		Mr.Matthew Barber				Permits	1576,1762	
37-3-0325	BC 29: Contact	AGD	56	322350	6412220	Open site	Destroyed	Artefact :-	Open Camp Site	
		Recorders		Mr.Matthew Barber				Permits	1576,1762	
37-3-0333	BC 37: Contact	AGD	56	321800	6412070	Open site	Destroyed	Artefact :-	Open Camp Site	
		Recorders		Mr.Matthew Barber				Permits	1762	
Report generated by AHIMS Web Service on 25/07/2017 for Stephanie Rusden for the following area at Datum :GDA, Zone : 56, Eastings : 319204 - 323084, Northings : 6409900 - 6414046 with a Buffer of 0 meters. Additional Info : survey, Number of Aboriginal sites and Aboriginal objects found is 118 This information is not guaranteed to be free from error omission. Office of Environment and Heritage (NSW) and its employees disclaim liability for any act done or omission made on the information and consequences of such acts or omission.										
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AHIMS Web Services (AWS)

Extensive search - Site list report

Your Ref/PO Number : 1616
 Client Service ID : 292652

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
37-3-0334	BC 38: Contact	AGD	56	321700	6412170	Open site	Destroyed	Artefact :-	Open Camp Site	
		Recorders		Mr.Matthew Barber				Permits	1576,1762	
37-3-0335	BC 39: Contact	AGD	56	321670	6412250	Open site	Destroyed	Artefact :-	Open Camp Site	
		Recorders		Mr.Matthew Barber				Permits	1576,1762	
37-3-0194	HVCC 1: Contact	AGD	56	320355	6413489	Open site	Destroyed	Artefact :-	Open Camp Site	2043,2206
		Recorders		Pam Dean-Jones				Permits	363	
37-3-0195	HVCC 2: Contact	AGD	56	320555	6413789	Open site	Destroyed	Artefact :-	Isolated Find	2043,2206
		Recorders		Pam Dean-Jones				Permits	363	
37-3-0196	HVCC 3: Contact	AGD	56	320605	6413789	Open site	Destroyed	Artefact :-	Open Camp Site	2043,2206
		Recorders		Pam Dean-Jones				Permits	363	
37-3-0326	BC 30: Contact	AGD	56	322220	6412190	Open site	Destroyed	Artefact :-	Open Camp Site	
		Recorders		Mr.Matthew Barber				Permits	1576,1762	
37-3-0327	BC 31: Contact	AGD	56	322180	6412230	Open site	Destroyed	Artefact :-	Open Camp Site	
		Recorders		Mr.Matthew Barber				Permits	1576,1762	
37-3-0328	BC 32: Contact	AGD	56	322040	6412190	Open site	Destroyed	Artefact :-	Open Camp Site	
		Recorders		Mr.Matthew Barber				Permits	1576,1762	
37-3-0330	BC 34: Contact	AGD	56	322260	6412410	Open site	Destroyed	Artefact :-	Open Camp Site	
		Recorders		Mr.Matthew Barber				Permits	1576,1762	
37-3-0331	BC 35: Contact	AGD	56	321900	6412170	Open site	Destroyed	Artefact :-	Open Camp Site	
		Recorders		Mr.Matthew Barber				Permits	1576,1762	
37-3-0332	BC 36: Contact	AGD	56	321880	6412070	Open site	Destroyed	Artefact :-	Open Camp Site	
		Recorders		Mr.Matthew Barber				Permits	1576,1762	
37-3-0228	HVCC 37: Contact	GDA	56	319965	6413419	Open site	Destroyed	Artefact :-	Open Camp Site	2043,2206
		Recorders		Pam Dean-Jones				Permits	363	
37-3-0229	HVCC 38: Contact	GDA	56	319955	6413399	Open site	Destroyed	Artefact :-	Open Camp Site	2043,2206
		Recorders		Pam Dean-Jones				Permits	363	
37-3-0230	HVCC 39: Contact	GDA	56	319955	6413349	Open site	Destroyed	Artefact :-	Isolated Find	2043,2206
		Recorders		Pam Dean-Jones				Permits	363	
37-3-0231	HVCC 40: Contact	GDA	56	319955	6413309	Open site	Destroyed	Artefact :-	Open Camp Site	2043,2206
		Recorders		Pam Dean-Jones				Permits	363	
37-3-0232	HVCC 41: Contact	GDA	56	320025	6413099	Open site	Destroyed	Artefact :-	Open Camp Site	2043,2206
		Recorders		Pam Dean-Jones				Permits	363	
37-3-0233	HVCC 42: Contact	GDA	56	320025	6413009	Open site	Destroyed	Artefact :-	Isolated Find	2043,2206
		Recorders		Pam Dean-Jones				Permits	363	

Report generated by AHIMS Web Service on 25/07/2017 for Stephanie Rusden for the following area at Datum :GDA, Zone : 56, Eastings : 319204 - 323084, Northings : 6409900 - 6414046 with a Buffer of 0 meters. Additional Info : survey, Number of Aboriginal sites and Aboriginal objects found is 118

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 Office of Environment & Heritage		AHIMS Web Services (AWS) Extensive search - Site list report							Your Ref/PO Number : 1616 Client Service ID : 292652	
SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
37-3-0234	HVCC 43; Contact	GDA	56	320115	6413779	Open site	Destroyed	Artefact:-	Open Camp Site	2043.2206
37-3-0235	HVCC 44; Contact	GDA	56	320115	6413789	Open site	Destroyed	Artefact:-	Isolated Find	2043.2206,102139
37-3-0236	HVCC 45; Contact	GDA	56	320115	6413819	Open site	Destroyed	Artefact:-	Open Camp Site	2043.2206,102139
37-3-0238	HVCC 47; Contact	GDA	56	320105	6414019	Open site	Destroyed	Artefact:-	Isolated Find	2043.2206
37-3-0267	HVCC 76; Contact	GDA	56	322205	6413869	Open site	Destroyed	Artefact:-	Open Camp Site	2043.2206
37-3-0268	HVCC 77; Contact	GDA	56	322065	6413569	Open site	Destroyed	Artefact:-	Isolated Find	2043.2206
37-3-0269	HVCC 78; Contact	GDA	56	322025	6413469	Open site	Destroyed	Artefact:-	Isolated Find	2043.2206
37-3-0424	RE34 Contact	AGD	56	319294	6413351	Open site	Destroyed	Artefact:-		
37-3-0425	RE35 Contact	GDA	56	319328	6413209	Open site	Destroyed	Artefact:-		
37-3-0429	BC 33; Contact	AGD	56	322000	6412150	Open site	Destroyed	Artefact:-	Open Camp Site	1576,1762
37-3-0696	GCS10 Contact	GDA	56	322190	6409990	Open site	Valid	Artefact:-		
37-3-0697	GCS9 Contact	AGD	56	321887	6410261	Open site	Valid	Artefact:1		100162
37-3-0698	GCS8 Contact	AGD	56	322278	6409792	Open site	Valid	Artefact:1		
37-3-0689	G11, Glendell Contact	AGD	56	319100	6410010	Open site	Valid	Artefact:3		
37-3-0700	GCS-9 Contact	AGD	56	322364	6409756	Open site	Valid	Artefact:1		100162
37-3-0701	GCS-10 Contact	AGD	56	321874	6409806	Open site	Valid	Artefact:11		100162
Report generated by AHIMS Web Service on 25/07/2017 for Stephanie Rusden for the following area at Datum :GDA, Zone : 56, Eastings : 319204 - 323084, Northings : 6409900 - 6414046 with a Buffer of 0 meters. Additional Info : Survey. Number of Aboriginal sites and Aboriginal objects found is 118 This information is not guaranteed to be free from error omission. Office of Environment and Heritage (NSW) and its employees disclaim liability for any act done or omission made on the information and consequences of such acts or omission.										

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 Office of Environment & Heritage		AHIMS Web Services (AWS) Extensive search - Site list report							Your Ref/PO Number : 1616 Client Service ID : 292659	
SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
37-3-0520	ASH24 Contact	AGD	56	320680	6406986	Open site	Destroyed	Artefact:-		
37-3-0528	Ashton Ridge Top site Contact	AGD	56	320920	6406428	Open site	Destroyed	Artefact:-		98163
37-3-0531	Ashton EWA 9 Contact	AGD	56	320294	6406386	Open site	Destroyed	Artefact:-		98163
37-3-0532	Ashton Slope site Contact	AGD	56	320278	6406766	Open site	Destroyed	Artefact:-		98163
37-3-0004	(refer to 37-3-0498) ASH2 Contact	AGD	56	320916	6406359	Open site	Deleted	Artefact:-		
37-3-0498	ASH 2 Contact	AGD	56	320916	6406359	Open site	Destroyed	Artefact:-		
37-3-0505	ASH9 also known as (Ashton Tributary Site) Contact	AGD	56	320650	6406755	Open site	Destroyed	Artefact:-		
37-3-0026	Glennies Creek Site B / Bettys Creek - B Contact	AGD	56	320530	6407352	Open site	Destroyed	Artefact:-	Open Camp Site	164
37-3-0593	Bettys Creek 3 Contact	GDA	56	321088	6409060	Open site	Destroyed	Artefact:-		99019,100895
37-3-0594	Bettys Creek 4 Contact	GDA	56	320837	6409391	Open site	Destroyed	Artefact:-		99019,100895
37-3-0595	Bettys Creek 5 Contact	GDA	56	321070	6409844	Open site	Destroyed	Artefact:-		99019,100895
37-3-0596	Bettys Creek 6 Contact	GDA	56	321129	6409296	Open site	Destroyed	Artefact:-		99019,100895
37-3-0597	Bettys Creek 7 Contact	AGD	56	321102	6408895	Open site	Destroyed	Artefact:-		99019,100895
37-3-0598	Bettys Creek 8 Contact	GDA	56	321172	6408634	Open site	Destroyed	Artefact:-		99019,100895
37-3-0599	Bettys Creek 9 Contact	GDA	56	321100	6408400	Open site	Destroyed	Artefact:-		99019,100895
37-3-0600	Bettys Creek 10 Contact	GDA	56	321048	6408229	Open site	Destroyed	Artefact:1		99019,100895
37-3-0601	Bettys Creek 11 Contact	GDA	56	320695	6407384	Open site	Destroyed	Artefact:-		99019,100895
Report generated by AHIMS Web Service on 25/07/2017 for Stephanie Rusden for the following area at Datum :GDA, Zone : 56, Eastings : 320380 - 324515, Northings : 6406056 - 6410033 with a Buffer of 0 meters. Additional Info : Survey. Number of Aboriginal sites and Aboriginal objects found is 49 This information is not guaranteed to be free from error omission. Office of Environment and Heritage (NSW) and its employees disclaim liability for any act done or omission made on the information and consequences of such acts or omission.										

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SiteID	SiteName	Datum	Zone	Eastng	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
37-3-0603	Bettys Creek 13	GDA	56	320662	6407265	Open site	Destroyed	Artefact:-		99019,100895
	Contact	Recorders						Permits	2267	
37-3-0604	Bettys Creek 14	GDA	56	320759	6407271	Open site	Destroyed	Artefact:-		99019,100895
	Contact	Recorders						Permits	2267	
37-3-0605	Bettys Creek 15	GDA	56	320638	6407443	Open site	Destroyed	Artefact:1		99019,100895
	Contact	Recorders						Permits	2267	
37-3-0606	Bettys Creek 16	GDA	56	320877	6408654	Open site	Destroyed	Artefact:-		99019,100895
	Contact	Recorders						Permits	2267	
37-3-0607	Bettys Creek 17	GDA	56	320833	6409048	Open site	Destroyed	Artefact:-		99019,100895
	Contact	Recorders						Permits	2267	
37-3-0608	Bettys Creek 18	GDA	56	320455	6407608	Open site	Destroyed	Artefact:-		99019,100895
	Contact	Recorders						Permits	2267	
37-3-1105	MOCO IF-16	GDA	56	321435	6409805	Open site	Valid	Artefact:1		
	Contact	Recorders						Permits		
37-3-1186	MOCO IF-17	GDA	56	321066	6407957	Open site	Valid	Artefact:1		
	Contact	Recorders						Permits		
37-3-1194	MOCO OS-6	GDA	56	320718	6409739	Open site	Valid	Artefact:1		
	Contact	Recorders						Permits		
37-3-1195	MOCO OS-7	GDA	56	321013	6408399	Open site	Destroyed	Artefact:1		
	Contact	Recorders						Permits		
37-3-1196	MOCO OS-8	GDA	56	321748	6408083	Open site	Valid	Artefact:1		
	Contact	Recorders						Permits		
37-3-1197	MOCO OS-9	GDA	56	320386	6407263	Open site	Partially Destroyed	Artefact:1		
	Contact	Recorders						Permits		
37-3-0188	Glennies creek site 2	AGD	56	323450	6406500	Open site	Valid	Artefact:-	Open Camp Site	2155
	Contact	Recorders						Permits	320	
37-3-0189	Glennies creek site 3	AGD	56	323600	6406650	Open site	Valid	Artefact:-	Open Camp Site	2155
	Contact	Recorders						Permits	320	
37-3-0187	Glennies creek site 1	AGD	56	323100	6406540	Open site	Valid	Artefact:-	Open Camp Site	2155
	Contact	Recorders						Permits		
37-3-0019	Glennies Creek Sydenham	AGD	56	323770	6408000	Open site	Valid	Modified Tree (Carved or Scarred):	Scarred Tree	164
	Contact	Recorders						Permits		
						Len Dwyll				

Report generated by AHIMS Web Service on 25/07/2017 for Stephanie Rusden for the following area at Datum :GDA, Zone : 56, Eastings : 320380 - 324515, Northings : 6406056 - 6410033 with a buffer of 0 meters. Additional Info : Survey. Number of Aboriginal sites and Aboriginal objects found is 49

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AHIMS Web Services (AWS)

Extensive search - Site list report

Your Ref/PO Number : 1616
 Client Service ID : 292659

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
37-3-0025	Glenies Creek Site A / Brayshaw Site A / Bettys Creek - A	AGD	56	320877	6408960	Open site	Destroyed	Artefact :-	Open Camp Site	164,99019,100 895
	Contact	Recorders	Helen Brayshaw,Barry French,John Mathews							
37-3-0506	ASH10 also known as Ashton Rail site	AGD	56	320384	6407026	Open site	Destroyed	Artefact :-	Permits	1325,1324,1325,2267
	Contact	Recorders	Ms.Vanessa Hardy							
37-3-0510	ASH14 Also known as Ashton Firebreak Site	AGD	56	320642	6406440	Open site	Destroyed	Artefact :-	Permits	1691
	Contact	Recorders	Ms.Vanessa Hardy							
37-3-0679	Main Creek 10	AGD	56	323577	6408908	Open site	Valid	Artefact : 14, Potential Archaeological Deposit (PAD) : 1	Permits	1691
	Contact T Russell	Recorders	Leila McAdam							
37-3-0680	Main Creek 11	AGD	56	323255	6409959	Open site	Valid	Artefact : 1	Permits	
	Contact T Russell	Recorders	Leila McAdam							
37-3-0681	Main Creek 12	AGD	56	323085	6408687	Open site	Valid	Artefact : 17, Potential Archaeological Deposit (PAD) :-	Permits	
	Contact T Russell	Recorders	Leila McAdam							
37-3-0682	Main Creek 13	AGD	56	322495	6407438	Open site	Valid	Artefact : 9,Potential Archaeological Deposit (PAD) :-	Permits	
	Contact T Russell	Recorders	Leila McAdam							
37-3-0683	Main Creek 14	AGD	56	322352	6407070	Open site	Valid	Artefact : 29, Potential Archaeological Deposit (PAD) :-	Permits	
	Contact T Russell	Recorders	Leila McAdam							
37-3-0684	Main Creek 9	AGD	56	323675	6409970	Open site	Valid	Artefact : 1,Potential Archaeological Deposit (PAD) :-	Permits	
	Contact T Russell	Recorders	Leila McAdam							
37-3-0685	Main Creek 8	AGD	56	323573	6409219	Open site	Valid	Artefact : 13	Permits	
	Contact T Russell	Recorders	Leila McAdam							
37-3-0696	GCS10	GDA	56	322190	6409990	Open site	Valid	Artefact :-	Permits	
	Contact Searle	Recorders	OzArk Environmental and Heritage Management,Mr.Ben Churchill,Mrs.Nicola Roche							
37-3-0698	GCS8	AGD	56	322278	6409792	Open site	Valid	Artefact : 1	Permits	
	Contact Searle	Recorders	Miss.Nicola Roche							

Report generated by AHIMS Web Service on 25/07/2017 for Stephanie Rusden for the following area at Datum :GDA, Zone : 56, Eastings : 320380 - 324515, Northings : 6406056 - 6410033 with a Buffer of 0 meters. Additional Info : Survey. Number of Aboriginal sites and Aboriginal objects found is 49

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