



GLENDELL MINE

132 Kv Powerline Relocation
MOD 3 Environmental Assessment

for

Mt Owen Pty Limited

August 2016

Hansen Bailey
ENVIRONMENTAL CONSULTANTS

GLENDELL MINE

132 KV POWERLINE RELOCATION MODIFICATION 3

ENVIRONMENTAL ASSESSMENT

Prepared by:

HANSEN BAILEY
6/127-129 John Street
SINGLETON NSW 2330

August 2016

For:

MT OWEN PTY LIMITED
Mt Owen Complex
666 Hebden Road, Ravensworth
RAVENSWORTH NSW 2330

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1 INTRODUCTION

This section describes the background and context of the Modification sought, introduces the proponent, and explains the purpose and structure of this Environmental Assessment.

1.1 BACKGROUND

Glencore Coal Pty Limited (Glencore) owns and operates a number of mining projects located throughout NSW. The Mt Owen Complex is owned and managed by Mt Owen Pty Limited, a wholly owned subsidiary of Glencore.

The Mt Owen Complex is located within the Hunter Coalfields at Hebden in the Upper Hunter Valley of New South Wales, approximately 20 km north-west of Singleton and 26 km south-east of Muswellbrook. The Mt Owen Complex comprises three adjacent open cut coal mining operations including Mt Owen, Glendell Mine and the Ravensworth East Mines which are located within the Singleton Local Government Area (LGA).

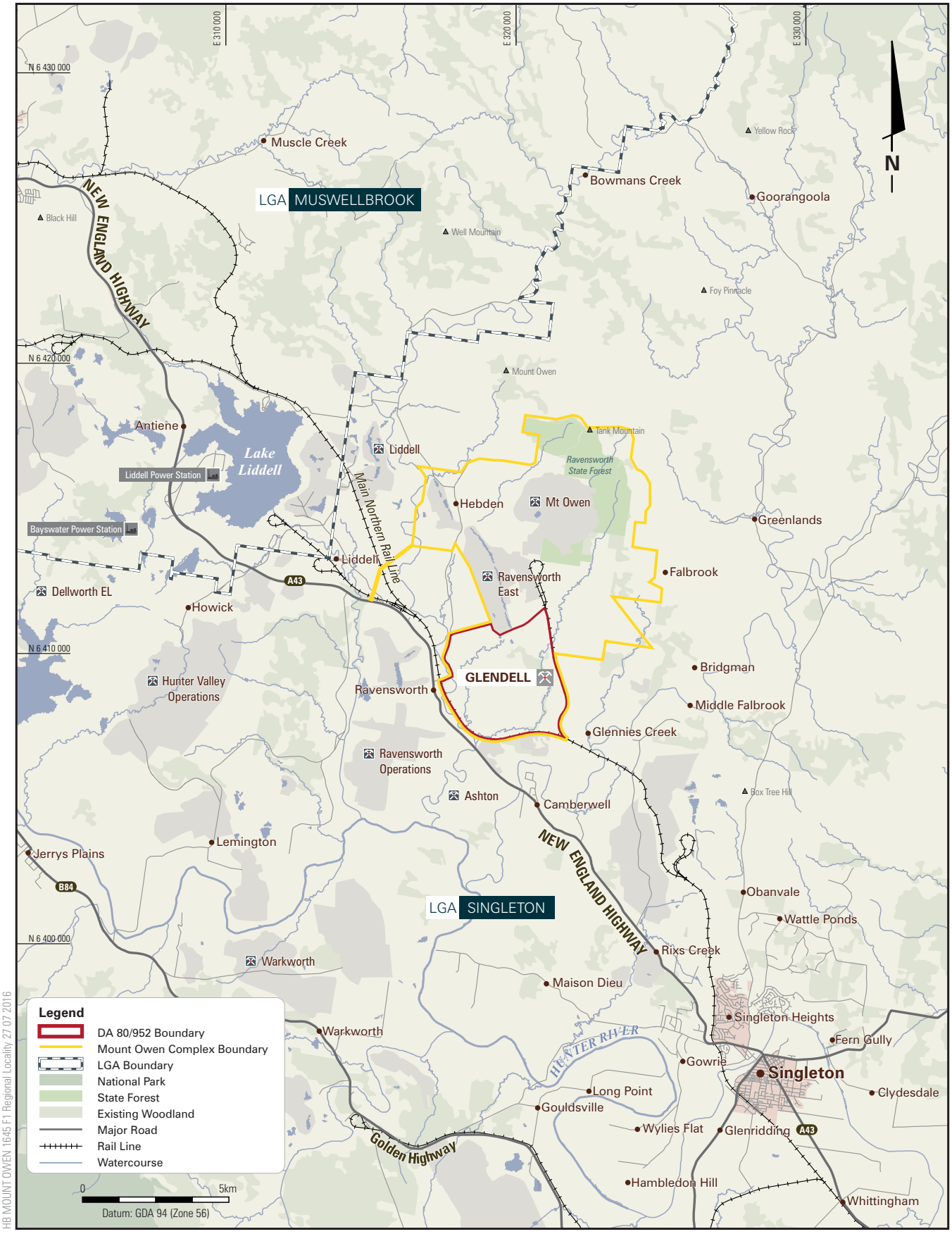
All operations within the Mt Owen Complex have had a long-established presence in the Upper Hunter Valley, with approval for Glendell mining operations being granted in the early 1980's. Since this time, there has been an ongoing commitment to meeting leading practice standards of health, safety, community and environmental management. The Mt Owen Complex has also played a significant role in contributing to the economic development of the local area, the region and more generally to the State of NSW.

Glendell Mine has approval to conduct open cut coal mining and associated activities, extracting up to 4.5 Million tonnes per annum (Mtpa) Run of Mine (ROM) coal to 2024 generally in accordance with Development Consent (DA) 80/952 (as modified). The Glendell Mine component of the Mt Owen Complex is shown on **Figure 1**. The approved operations at the Glendell Mine relevant to this Modification application are described within **Section 3**.

Mt Owen Pty Limited has identified the need to realign a 2.7 km section of an Ausgrid 132 kilovolt (kV) powerline further to the west of the Glendell Mine Approved Disturbance Boundary (Disturbance Boundary) as shown on **Figure 1** to ensure that it is not impacted from blasting or other mine related activities.

1.2 DOCUMENT PURPOSE

This Environmental Assessment (EA) supports an application for modification to DA 80/952 under Section 75W of the *Environmental Planning and Assessment Act 1979* (EP&A Act) to facilitate the relocation of a 2.7 km section of an existing 132 kV Ausgrid powerline and associated activities at the Glendell Mine (MOD 3).



HB MOUNT OWEN 1645 F1 Regional Locality 27 07 2016

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Regional Locality

FIGURE 1

1.3 PROPONENT

The proponent for MOD 3 and their relevant contact details are:

Mt Owen Pty Limited

PO Box 320

SINGLETON NSW 2330

Phone: (02) 6570 0800

Fax: (02) 6576 1643

http://mtowencomplex.com.au

1.4 DOCUMENT STRUCTURE

This EA is structured as follows:

- **Section 2** provides information relating to the existing environmental setting;
- **Section 3** provides information relating to the current operations at Glendell Mine;
- **Section 4** provides a modification description;
- **Section 5** describes the relevant regulatory framework;
- **Section 6** details the stakeholder engagement program that has been undertaken, any issues raised during that process and where each has been addressed in this EA;
- **Section 7** presents a high level risk assessment;
- **Section 8** assesses the predicted environmental impacts and outlines the management and mitigation measures to be implemented;
- **Section 9** presents a management and mitigation summary;
- **Section 10** provides a conclusion; and
- **Section 11** and **Section 12** list abbreviations and references used throughout this EA.

2 EXISTING ENVIRONMENT

This section provides a discussion on the topography and natural features, geology, land use and land ownership relevant to Glendell Mine.

2.1 TOPOGRAPHY

The Glendell Mine Disturbance Boundary is shown in **Figure 2**.

The topography of the Glendell Mine site is characterised by an undulating landscape extending to lower areas associated with Bowmans Creek, Swamp Creek and Bettys Creek all of which generally flow north to south and towards the Hunter River.

2.2 GEOLOGY

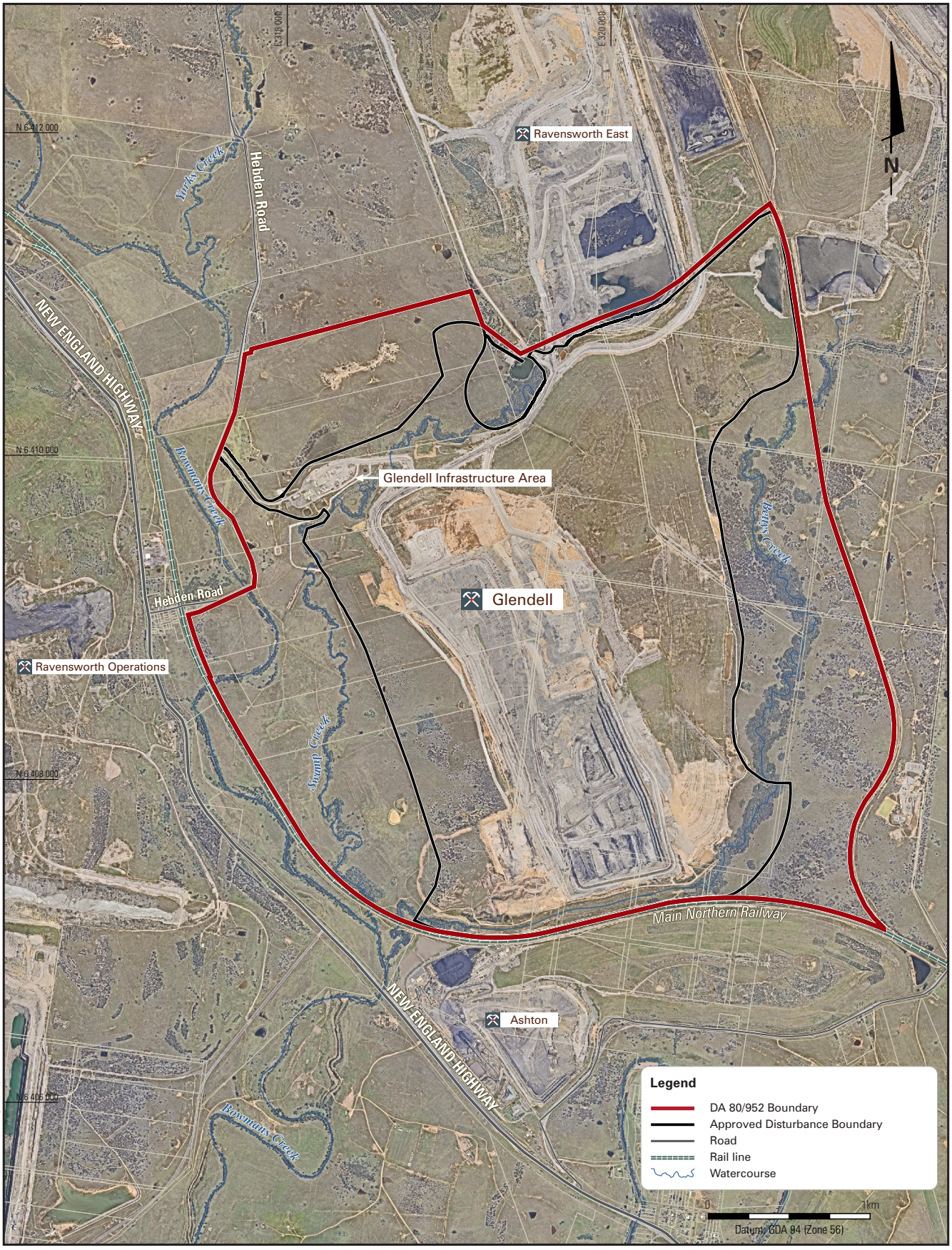
The target coal reserve within the Glendell Mine site contains a number of seams of the Foybrook Formation, which is the lowermost coal bearing formation of the Whittingham Coal Measures (Umwelt, 2007). Eight seams with open cut potential exist within the Whittingham Coal Measures from the Lemington seam to the Hebden seam and range in depth to approximately 200 m.

2.3 LAND USE

Mining operations, grazing and rural residential properties are the predominant land uses surrounding the Glendell Mine site. Prior to mining, the Glendell Mine site was used for agriculture and was dominated by grazing land with small areas of remnant and regrowth woodland, predominantly along the watercourses.

The Main Northern Railway forms the southern and south-western boundaries of the Glendell Mine and separates operations from Ashton Coal Mine. The Mt Owen Rail Spur forms the eastern boundary of Glendell Mine.

The Narama Pipeline which is utilised to transport mine water between the various Glencore mining operations traverses the powerline alignment (described in **Section 4**), along with the existing 132 kV powerline. Additional infrastructure in the vicinity of the powerline alignment includes existing access tracks and water management infrastructure.



HB MOUNT OWEN 1645 F2 Project Layout 09 08 2016 Rev A

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Approved Operations

FIGURE 2

2.4 LAND OWNERSHIP

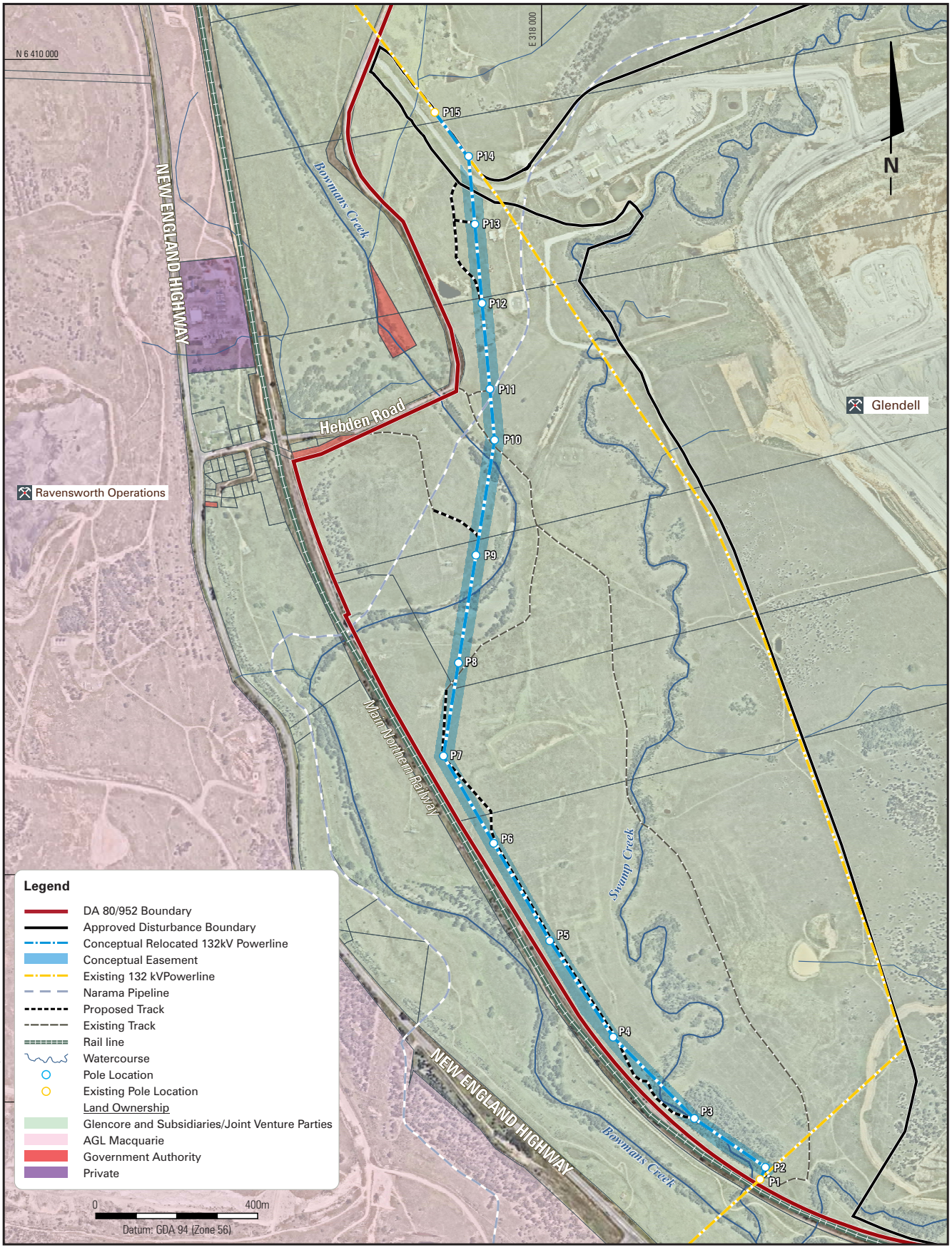
Land ownership in the vicinity of the powerline relocation is shown on **Figure 3**.

The land required for the powerline relocation is entirely owned and managed by Mt Owen Pty Limited and within the approved DA 80/952 Boundary.

Other primary landowners proximate to, but unaffected by MOD 3 includes various parcels owned by Government authorities (including ARTC) and (across the Main Northern Railway Line) AGL Macquarie (see **Figure 3**). Consultation conducted by Mt Owen Pty Limited with relevant landowners is discussed in **Section 6**.

The nearest private residences are located within the Camberwell Village, which is located approximately 1.2 km south of Glendell Mine. The proposed works are a minimum of 2.3 km away from this locality.

No change to the schedule of lands described within DA 80/952 is required for MOD 3.



HB MOUNT OWEN 1645 F3 Land Ownership 09 08 2016 Rev C

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Land Ownership

FIGURE 3

3 APPROVED OPERATIONS

This section briefly describes the approved activities at Glendell Mine including existing planning approvals, interactions with the Mt Owen Complex and the Environmental Management System.

3.1 PLANNING APPROVALS

3.1.1 Original Approval

DA 80/952 for Glendell Mine was approved by the former Minister for Planning and Environment in 1983. Mining leases have been in place since 1990. DA 80/952 is supported by the *'Glendell Environmental Impact Statement'* (Glendell EIS) (Croft & Associates, 1982).

A number of ownership changes have occurred since DA 80/952 was granted and various feasibility studies have been conducted to in relation to the operation of Glendell Mine.

3.1.2 MOD 1

MOD 1 was approved in 1997 and is supported by a Statement of Environmental Effects to enable the extraction of coal from an undeveloped coal reserve at a rate of 3.6 Mtpa ROM via open cut methods, and the construction of ancillary infrastructure including a CHPP and the Mt Owen Rail Spur. MOD 1 also allowed for the integration of the management of Glendell Mine into the Mt Owen Complex (see **Section 3.3**).

3.1.3 MOD 2

MOD 2 was approved in 2008 which enabled the further integration of Glendell Mine operations with the Mt Owen Complex operations and facilitated a revised mine plan.

MOD 2 is supported by the '*Environmental Assessment for Modification of Glendell Mine Operations*' (Umwelt, 2007) (Glendell EA) and specifically enables:

- Mining operations to be undertaken in accordance with a revised mine plan that includes:
  - Mining in a general north to south direction;
  - Increasing the rate of ROM coal extraction to 4.5 Mtpa for up to 16 years;
  - Altering the mining method to use of excavator and truck only; and
  - Alteration to the location of the approved out of pit overburden emplacement areas, but no change to the approved height of these emplacement areas.
- Integration of the Glendell Mine into the approved Mt Owen Complex operations including:
  - Transporting ROM coal via the approved Glendell Haul Road for processing at the existing Mt Owen Complex CHPP or to the existing Ravensworth East crushing plant;
  - Movement of overburden and materials between the Ravensworth East and Glendell mining areas;

  - Integrating rejects and tailings management into the approved life of mine rejects and tailings management systems of the Mt Owen Complex;
  - Integrating water management into the existing water management system of the Mt Owen Complex;
  - Transporting product coal via the use of the existing Mt Owen Rail Spur and Main Northern Railway;
  - Transporting up to approximately 1 Mtpa of product coal to domestic power stations via approved Ravensworth East infrastructure; and
  - Incorporating Glendell Mine into the existing Mt Owen Complex management systems;
- Relocation of the mine access road on Hebden Road and haul roads within the mine site;
- Alteration to the approved diversions of Swamp and Bettys Creeks;
- Construction of a 200 Megalitre (ML) mine water staging dam and associated pipeline; and
- Relocation and rationalisation of site infrastructure including offices, workshop and associated ancillary facilities.

The approval for MOD 2 included a condition that the existing conditions of consent in place at that time be replaced with the conditions of consent attached to the MOD 2 approval. The development is to be carried out generally in accordance with the Glendell EA (including the Response to Submissions), the Statement of Commitments (Appendix 3 of DA 80/952) and the conditions of DA 80/952.

Following approval of MOD 2, construction activities commenced in April 2008 with the first coal extracted in June 2008.

DA 80/952 (as modified) does not facilitate the construction, use and/or decommissioning or demolition of any powerlines to the west of the operations.

3.2 CURRENT GLENDELL MINE OPERATIONS

Figure 2 conceptually illustrates the key aspects of the approved operations at Glendell Mine relevant to MOD 3 (as described in **Section 4**). Approvals and licences held for the current Glendell Mine are listed within **Table 1**.

Table 1
Glendell Mine Approvals and Licences

Description	Expiry	Authority
DA 80/952	31/06/2024	Department of Planning & Environment (DP&E)
EPL 12840	16/10/2019 (review date)	Environment Protection Authority (EPA)
Coal Lease (CL) 358	27/03/2032	DRE

Description	Expiry	Authority
Mining Purposes Lease (MPL) 343	04/01/2026	DRE
Mining Lease (ML) 1629	09/03/2030	DRE
ML 1475	24/11/2021	DRE
ML 1476	23/11/2021	DRE
CL 382 (sublease)	11/11/2033	DRE
Exploration Licence (EL) 8184	14/10/2018	DRE

3.3 MT OWEN COMPLEX

Following the acquisition of Glendell Mine in 2003, Glencore explored synergies between its three adjacent operations Mt Owen, Ravensworth East and Glendell Mine. The Mt Owen Operations Project was granted DA 14-1-2004 in 2004 to enable the extension of the Mt Owen Mine operations.

DA 14-1-2004 and the amendment to DA 52-03-99 for Ravensworth East Mine enabled the integration of the Mt Owen, Ravensworth East and Glendell mining operations into the Mt Owen Complex (see Figure 1) through the shared use of coal transportation, coal processing and tailings management systems.

3.4 ENVIRONMENTAL MANAGEMENT SYSTEM

3.4.1 Overview

Mt Owen Pty Limited is committed to undertaking its operations and activities in an environmentally responsible manner. As such, Glendell Mine undertakes activities in accordance with an Environmental Management System (EMS). The EMS provides for the management and monitoring of a range of environmental aspects, including air quality, noise, water and waste management. The EMS aims to ensure regulatory compliance, continual improvement of performance and to satisfy the expectations of stakeholders.

Glendell Mine is operated under a series of Environmental Management Plans (EMPs) and procedures which form an integral part of the Mt Owen Complex EMS. EMPs are statutory documents (generally relating to the entire) Mt Owen Complex. EMPs relevant to Glendell Mine are listed in **Table 2**.

A key component of the EMS is the environmental monitoring network. Monitoring is routinely undertaken to monitor the environmental performance of the operations, to ensure potential environmental impacts are being appropriately managed. Regular inspections and audits of the EMS and environmental performance are also undertaken across Glendell Mine.

The environmental performance of Glendell Mine operations, including environmental monitoring data and the findings of environmental audits and inspections is reported in the Annual Review. The Annual Review is publicly available on the Mt Owen Complex website.

Table 2
Mt Owen Complex Management Plans

Title
Mt Owen Complex Environmental Management Strategy
Mt Owen Complex Environmental Monitoring Program
Mt Owen Complex Noise Monitoring Program
Mt Owen Complex Blast Management Plan
Mt Owen Complex Air Quality and Greenhouse Gas Monitoring Program
Glendell Aboriginal Cultural Heritage Management Plan (ACHMP)
Mt Owen Complex Biodiversity Management Plan (incorporating the Flora and Fauna Management Plan and Offset Management Plan)
Mt Owen Complex Landscape Management Plan
Mt Owen Complex Water Management Plan
Mt Owen Complex Surface Water Monitoring Program
Mt Owen Complex Groundwater Monitoring Program
Mt Owen Complex Erosion and Sediment Control Plan
Mt Owen Complex Surface and Groundwater Response Plan
Mt Owen Complex Bushfire Management Plan
Glendell Blast Fume Management Plan

3.4.2 Ground Disturbance Permit

A key environmental management process at Glendell Mine utilised by Mt Owen Pty Limited is the Ground Disturbance Permit (GDP) which must be approved by an Environmental representative prior to undertaking any surface disturbance work including (but not limited to) slashing, tree lopping, removal of topsoil, clearing and access to rehabilitation areas.

The internal GDP approval process assesses the disturbance task in relation to (at least) relevant approvals boundaries, sediment and erosion controls, community interactions, cultural heritage and ecology.

4 MODIFICATION DESCRIPTION

This section provides a brief summary of the existing powerline and a description of the proposed 132 kV powerline relocation.

4.1 EXISTING POWERLINE

As illustrated on **Figure 4**, a 132 kV powerline is located west of the Disturbance Boundary. The alignment of the powerline enters the northern boundary of the Glendell Mine site near the intersection of the mine's access road and Hebden Road. Traversing south, the powerline crosses Swamp Creek and runs generally along the alignment of the Disturbance Boundary until it is diverted west and heads outside of the DA 80/952 Boundary across the Main Northern Railway Line, Swamp Creek, Bowmans Creek and the New England Highway in the south.

The existing powerline is owned and maintained by Ausgrid and is part of the NSW electricity distribution network.

4.2 MINING ACTIVITIES

Mining activities at the Glendell Mine have progressed in a southerly direction since it began mining in 2008. Glendell Mine reached the southern extent of the pit in 2014 and is currently in the process of progressively mining in a northerly direction towards the Glendell Infrastructure area (as shown conceptually on **Figure 2**) in accordance with DA 80/952.

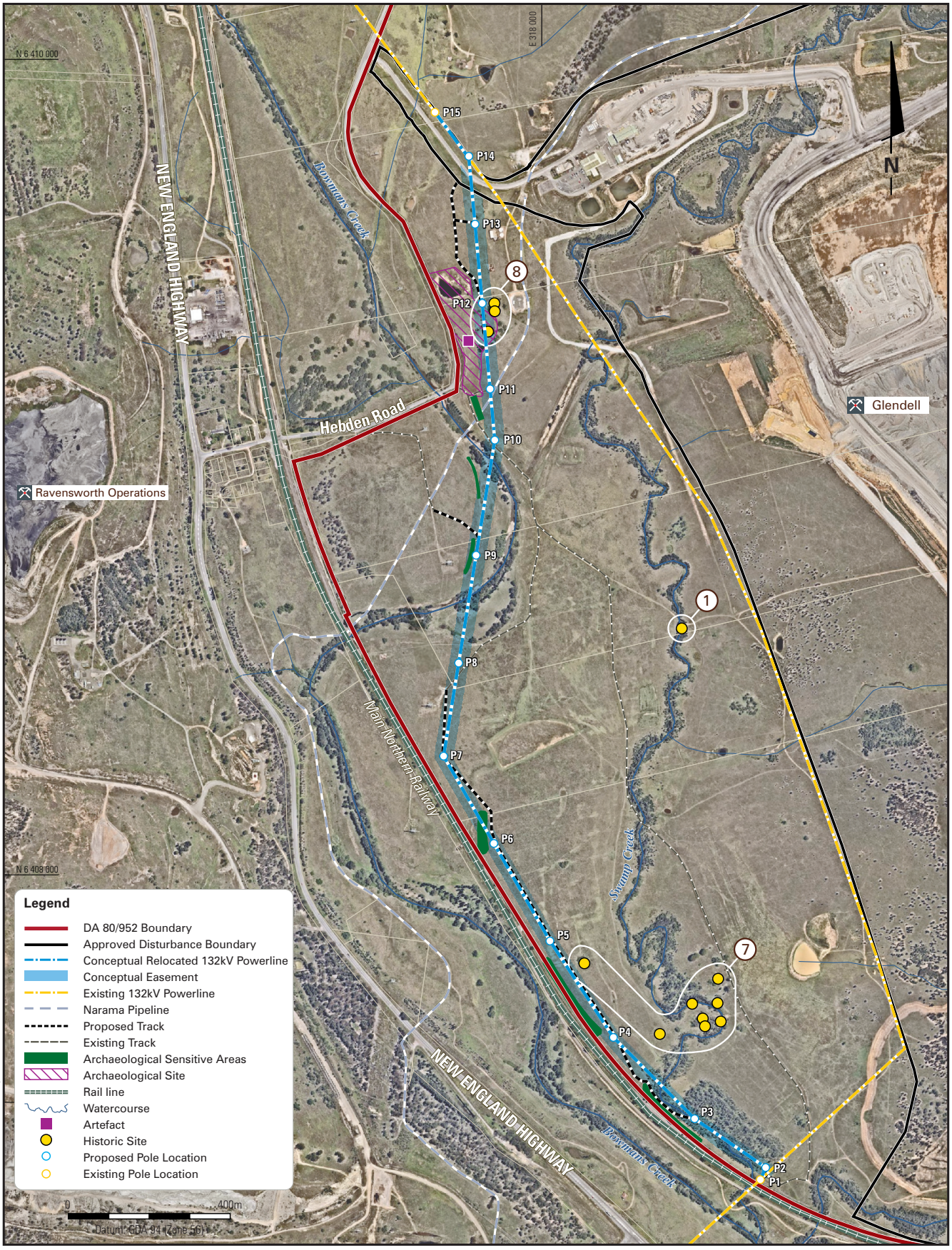
The Glendell EA stated that the proponent would further consult with Energy Australia as part of detailed mine planning to discuss blasting protocols in proximity to the power line within the Glendell Mine site. Following this consultation, Glendell Mine implemented a self-imposed
200 m safety buffer between the existing powerline and mining activities to ensure any impacts from blasting activities on the powerline are minimised.

4.3 POWERLINE REALIGNMENT

4.3.1 Overview

Mt Owen Pty Limited is seeking MOD 3 to DA 80/952 under Section 75W of the EP&A Act to facilitate the relocation of a section of the existing 132 kV powerline.

Figure 4 conceptually illustrates the powerline relocation which is located entirely within the existing DA 80/952 Project Boundary (but external to the Disturbance Boundary). It also illustrates the proposed powerline easement (further discussed in **Section 8**).



HB MOUNT OWEN 1645 F4 MOD 3 Layout 09 08 2016 Rev A

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MOD 3 Layout

FIGURE 4

MOD 3 involves the relocation of approximately 2.7 km of a 132kV powerline in the western portion of Glendell Mine. The construction will involve the installation of 13 power pole locations along the alignment which are located entirely on Glencore owned land and within the Approved DA 80/952 Boundary (see **Figure 4**). The alignment runs generally south and south-east and crosses Bowmans Creek and Swamp Creek on two occasions each; and is outside the existing self-imposed 200 m buffer from approved mining operations.

Approximately 2.9 km of existing tracks may be subject to minor upgrades and approximately 2.3 km of new tracks (as indicatively sown on **Figure 4**) will be required for both the construction and ongoing maintenance of the relocated powerline. The powerline relocation spans the Narama Pipeline running between the Glendell Mine and Ravensworth Operations, however there will be no interaction with the pipeline.

The alignment of the powerline relocation is constrained by the limit of approved mining and future identified mineable coal reserves to the east and the Main Northern Railway Line corridor to the west. The powerline relocation has also been designed in consideration of Aboriginal and historic heritage items (see **Figure 4** and **Section 8**).

The required alignment in consideration of all identified constraints has been selected via a Level 3 Accredited Service Provider (ASP3) to Ausgrid. A conceptual design for the proposed 132 kV powerline relocation has been prepared (see **Appendix A**).

4.3.2 Overhead Powerline Design

The powerline relocation will include: hole excavation, pole installation, wire stringing, development of access tracks and tree clearing.

The powerline relocation consists of a single pole overhead powerline construction with four aerial conductor wires to transfer 132 kV of electricity and provide an earth wire protection with fibre communication.

Up to 13 new poles and two existing poles will support the realigned powerline which will range in height from between 18.0 m and 27.5 m. The poles will be stock-type steel supported on base plates up to 1.5 m in diameter (i.e. they will not be direct-embedded) with galvanised steel finish. Spacing of the poles will be between 35 m and 290 m. Two stays will generally be applied to each of the existing poles at either end of the relocation route. Temporary stays may also be included along the alignment to support the poles during staged conductor stringing operations. At completion, the new steel poles with concrete footings will not require stays.

As described in detail in **Section 4.5**, the pole locations have been designed in consideration of sensitive environmental aspects. This has included consideration of ensuring poles are placed at a substantial distance from the banks of Bowmans and Swamp Creeks and avoiding sensitive archaeology and native vegetation, where practical. **Figure 4** provides a conceptual illustration of the powerline arrangement with relevant environmental features also shown.

Conceptual detailed design drawings and plans are provided in **Appendix A**. The designs are conceptual and some changes may be made to the final design prior to or during the construction process.

4.4 CONSTRUCTION

4.4.1 Summary

Construction of the powerline relocation will be undertaken over an estimated four-month period and generally be conducted in accordance with the document '*NW000-S0092 NS220 Overhead Design Manual*' (Ausgrid, 2015) (Overhead Design Manual).

Staging of the construction process is by its nature a linear process and generally follows:

- Site establishment (survey and erosion and sediment controls);
- Clearing and access;
- Fence modifications;
- Foundations and pole construction of steel poles;
- Pole installation, including dressing and erection of poles;
- Conductor installation: stringing ropes to be installed between poles, and new conductor strung under tension;
- Conductor terminations: tension conductors to design tension, terminate and clip in at each pole; and
- Commissioning.

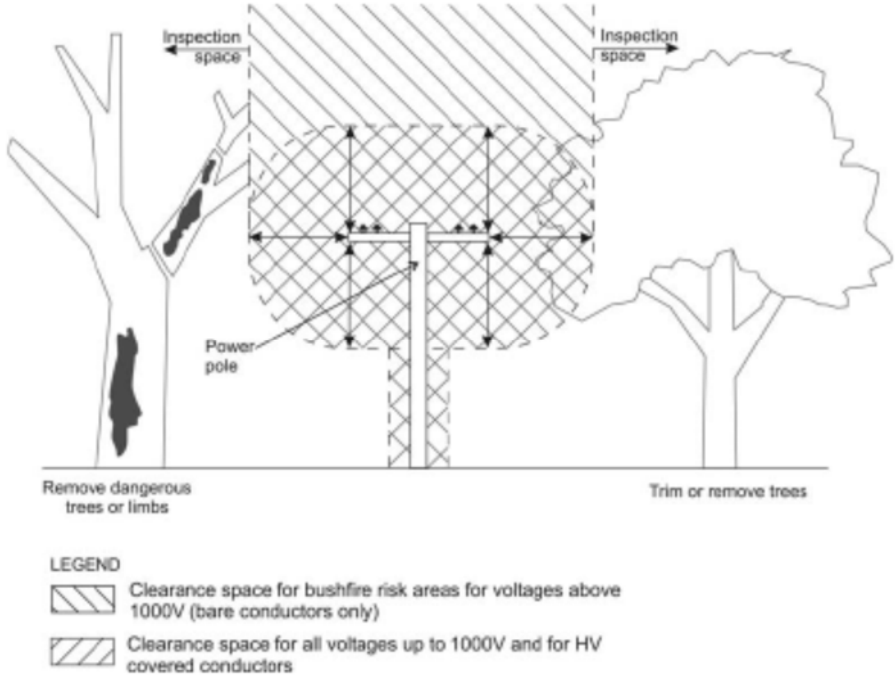
4.4.2 Vegetation Disturbance

Vegetation disturbance will be undertaken generally in accordance with '*NEG-OH21 Vegetation Safety Clearances and ISSC3, Guideline for Managing Vegetation Near Power Lines*' (DRE 2005) (Vegetation Protocol). **Figure 5** and **Figure 6** illustrate vegetation clearance requirements from Section 13.8 of the Overhead Design Manual.

Ongoing vegetation lopping to facilitate fire protection will also be undertaken in accordance with the Vegetation Protocol. No additional landscaping works are proposed.

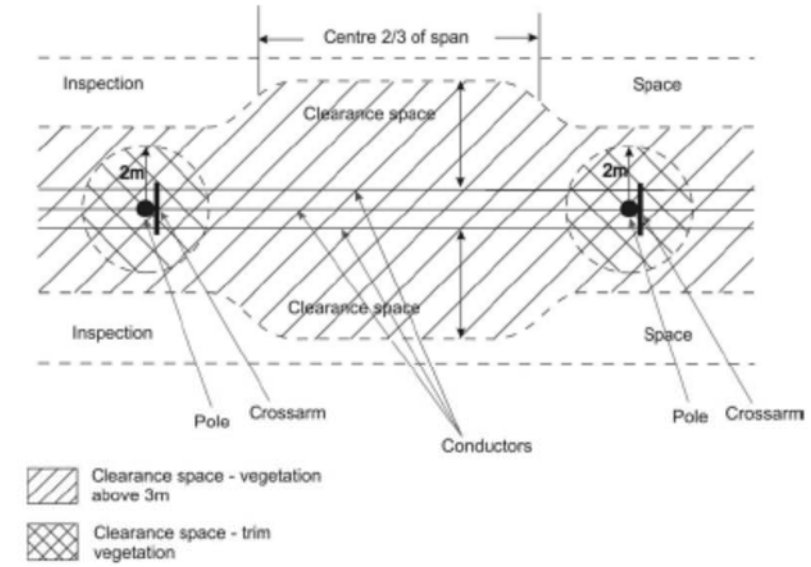
Vegetation clearing within the creek crossings will not involve ground disturbance but the lopping of trees within the specified clearance zone by chain sawing. Chain sawing within the riparian zone will be conducted on foot or by the use of cherry picker man lifts so that no heavy machinery will be required to traverse the creek beds. Clearing of vegetation outside of the creeks will be undertaken by a track mulcher with the mulched material being left in situ with the soil.

All waste material will be mulched and spread within the affected area. Maintenance of the specified vegetation clearance zone will be required whilst ever the powerline remains in use.



Source: Section 13.8 of the Overhead Design Manual

Figure 5 Vegetation Clearances Diagram



Notes:

1. Add 1.5m for spans between 200m and 400m and 2.0m for spans greater than 400m.
2. For vertical clearances, add 2m for spans between 200m and 400m, and 3m for spans greater than 400m. For horizontal clearances on spans greater than 200m, trim to 10m from the outer conductor, or to the limit of the easement where the easement width exceeds 10m from the outer conductor.

Source: Section 13.8 of the Overhead Design Manual

Figure 6 Vegetation Clearances Diagram – Plan View

The existing (and required extension of existing access tracks) will be maintained by Ausgrid or its contractors for the purpose of maintaining the powerline relocation. All track works will be undertaken generally in accordance with the *Environmental Handbook for Construction and Maintenance NS174c* (Ausgrid, 2014) and the *NS143 Easements, Leases and Rights of Way* (Ausgrid, 2016) (Ausgrid Environmental Handbook).

4.4.3 Foundations

Foundations for the power poles will be constructed by piling and or boring to a hole depth of up to 7 m. Reinforcement and concrete material will be placed in the holes created.

Excess material from the excavation will be stockpiled locally before being either spread and seeded or appropriately disposed of within the Disturbance Boundary.

Crane and temporary Elevated Work Platforms (EWPs) will be constructed around each pole location. Poles will be delivered by crane off the back of extendable pole tucks, assembled and dressed using a jacking procedure and stood with the crane. Mantra stays will be installed as required at change points utilising a hydraulic ramming tool attached to an excavator.

Conductor installation will be winched through rollers on the poles. Archaeology sites underneath conductor spans will be protected by fencing or a suitable hard protective barrier to ensure the conductors do not disturb the ground. Once the conductors are in the air, the rollers will be removed and the conductors will be clipped into the insulators.

4.4.4 Recovery

The recovery of the redundant section of the existing powerline will be the reverse order of the construction of the relocated powerline. The conductors will be dropped down to the ground and rolled up. The concrete poles will be removed by being supported at the top of the pole by crane and by excavator to dig out foundation around the bottom until the crane is able to pull the poles out. If required, a jack hammer attachment will be used on the excavator to break any concrete footing. Redundant power poles will be removed from site. The holes will be backfilled with suitable material and rehabilitated.

4.4.5 Construction Compounds and Stockpiles

Personnel required to conduct the powerline relocation will utilise the existing Glendell Mine office and facilities or its adjacent laydown area.

Some activities may require temporary facilities which, if required would be located within the Disturbance Boundary (e.g. for site shed and/or laydown areas) or within the proposed powerline relocation easement (where no surface disturbance is required).

Any surface disturbance associated with these temporary facilities will be subject to the GDP process as discussed in **Section 3.4**.

4.4.6 Access

Entry to the site for most activities will be via the existing Glendell Mine entry off Hebden Road via the Glendell Infrastructure Area as shown on **Figure 2**. The exception will be use of the two existing access tracks off Hebden Road to access the powerline easement in the vicinity of Pole P9. Further, access to southern poles (e.g. P1 and P2) which cannot use the existing creek crossing, will access via existing mine access tracks (as shown on **Figure 4**).

No parking areas will be required to be constructed within the easement or outside the Disturbance Boundary. Further, additional traffic movements will be minimal compared to that assessed in the Glendell EA. As such, a Traffic Management Plan will not be required for MOD 3.

4.5 ALTERNATIVES CONSIDERED

Ausgrid considered relocating the powerline along several different alignments. Each potential alignment required the crossing of creek lines and associated potential impacts to native vegetation and archaeological sites.

The final preferred location chosen followed detailed archaeological assessment (see **Appendix B**) and a consideration of existing infrastructure such as the New England Highway and Main Northern Railway Line.

Geotechnical investigation of the proposed positioning of each pole hole has confirmed the constructability of the powerline on the chosen alignment. Environmental assessment has confirmed that the proposed alignment is the most appropriate to minimise potential ecological and archaeological impacts (see **Section 8**).

4.6 PROJECT JUSTIFICATION

The powerline relocation is required to facilitate the continuation of safe and efficient approved mining at Glendell Mine.

Preliminary planning associated with the Glendell EA anticipated that the existing 132 kV powerline would not require relocation to facilitate mining, only the imposition of blasting criteria (i.e. vibration criteria). Operational experience since that time and extensive consultation with the infrastructure owner identified a need for a self-imposed 200 m safety buffer between the existing 132 kV powerline and mining activities. This restriction has to date, ensured that impacts from blasting activities on the powerline have been minimal.

As mining operations progress however, operations within the 200 m buffer will be required to facilitate approved mining operations. **Figure 3** illustrates recent pre-strip operations and its proximity to the existing 132 kV powerline. The proposed re-alignment of the relocated powerline has been located as far south-west as is appropriate to avoid potential future mining areas and negate the need for future relocations.

Any delays to the powerline relocation will result in further mine plan changes and potential loss of the approved extraction of coal resources in the vicinity.

5 REGULATORY FRAMEWORK

This section briefly describes the regulatory framework under which Glendell Mine is approved and operates, as it relates to MOD 3. It discusses the ability of the Minister for Planning and Environment to modify DA 80/952 under section 75W of the EP&A Act and describes the applicable approvals process. It also includes a reference to other NSW and Commonwealth legislation potentially relevant to MOD 3.

5.1 ENVIRONMENTAL PLANNING AND ASSESSMENT ACT 1979

5.1.1 Modification Approval Pathway

Glendell Mine operates generally in accordance with DA 80/952 (as modified) which was originally granted under Part 4 of the EP&A Act in 1983.

Clause 8J(8) of the *Environmental Planning and Assessment Regulations 2000* (EP&A Regulations) provides an avenue for major developments approved under Part 4 of the EP&A Act to be modified under Section 75W of the EP&A Act, stating that:

> *(8) For the purposes only of modification, the following development consents are taken to be approvals under Part 3A of the Act and section 75W of the Act applies to any modification of such a consent:*
>
> *(a) a development consent granted by the Minister under section 100A or 101 of the Act,*
>
> *(b) a development consent granted by the Minister under State Environmental Planning Policy No 34 - Major Employment-Generating Industrial Development,*
>
> *(c) a development consent granted by the Minister under Part 4 of the Act (relating to State significant development) before 1 August 2005 or under clause 89 of Schedule 6 to the Act,*
>
> *(d) a development consent granted by the Land and Environment Court, if the original consent authority was the Minister and the consent was of a kind referred to in paragraph (c).*
>
> *The development consent, if so modified, does not become an approval under Part 3A of the Act."*

DA 80/952 was granted by the Minister under section 101 of the EP&A Act. Therefore pursuant to clause 8J(8)(a) of the EP&A Regulation DA 80/952 is taken to be an approval under Part 3A of the EP&A Act for the purposes of modification, and section 75W applies to the modification of the consent.

Section 75W of the EP&A Act has now been repealed. However clause 12 of Schedule 6A of the EP&A Act states that '*section 75W of Part 3A continues to apply to modifications of the development consents referred to in clause 8J (8) of the Environmental Planning and Assessment Regulation 2000, and so applies whether an application for modification is made before or after the commencement of this clause*.' Since DA 80/952 is a development consent referred to in clause 8J(8) of the EP&A Regulations, section 75W continues to apply to any modification of the consent.

5.1.2 Landowner Consent and Notification

Under Clause 8F of the EP&A Regulations the consent of the landowner is not required for a modification application under section 75W of the EPA Act for a " *… mining or petroleum production project…*" which (under clause 8F(4)) includes '… *any activity that is related to mining …*'".

Section 8F(3)(b) of the EP&A Regulations applies to mining development other than a project that also comprises a linear infrastructure project. A linear infrastructure project includes development for the purposes of public utility infrastructure. Clause 8F(3)(a) provides that:

(a) "in the case of a linear infrastructure project or a project designated under subclause (1) (e)—to the public by advertisement published in a newspaper circulating in the area of the project before the start of the public consultation period for the project,..."

Mt Owen Pty Limited will give notice to the public in accordance with clause 8F(3) of the EP&A Regulations, as required.

5.1.3 Section 75W of the EP&A Act

This application for Modification is made under section 75W of the EP&A Act. The relevant aspects of that section are as follows:

"(2) The proponent may request the Minister to modify the Minister's approval for a project. The Minister's approval for a modification is not required if the project as modified will be consistent with the existing approval under this Part.

(3) The request for the Minister's approval is to be lodged with the Director-General. The Director-General may notify the proponent of environmental assessment requirements with respect to the proposed modification that the proponent must comply with before the matter will be considered by the Minister.

(4) The Minister may modify the approval (with or without conditions) or disapprove of the modification."

MOD 3 will not result in any change to the core elements of DA 80/952 including:

- Total coal production rates, mining footprint or duration of mining;
- Existing method of mining or destination of ROM and product coal;
- The character of the currently approved infrastructure components;
- Approved final landforms; and
- Existing manning levels or operational hours.

Additional discussion regarding the currently approved operations is provided in **Section 5.2** and **Section 5.3**.

A detailed description of MOD 3 is provided in **Section 4**. MOD 3 entails the realignment of an existing 132 kV powerline which has limited environmental consequences beyond those which have been the subject of previous assessment and has been approved under DA 80/952.

It is therefore available for the Minister to modify DA 80/952 under section 75W of the EP&A Act as sought.

5.1.4 Environmental Assessment Requirements

Section 75W(3) of the EP&A Act states that the Secretary (formerly the Director-General) may notify the proponent of Environmental Assessment Requirements for a proposed modification.

The DP&E advised in July 2016 that Environmental Assessment Requirements would not be issued due to the minor nature of MOD 3.

5.1.5 Objects of the EP&A Act

The objects of the EP&A Act are stated in section 5 of the Act and include:

(a) "to encourage:

(i) the proper management, development and conservation of natural and artificial resources, including agricultural land, natural areas, forests, minerals, water, cities, towns and villages for the purpose of promoting the social and economic welfare of the community and a better environment,

(ii) the promotion and co-ordination of the orderly and economic use and development of land,

(iii) the protection, provision and co-ordination of communication and utility services,

(iv) the provision of land for public purposes,

(v) the provision and co-ordination of community services and facilities, and

(vi) the protection of the environment, including the protection and conservation of native animals and plants, including threatened species, populations and ecological communities, and their habitats, and

(vii) ecologically sustainable development, and

(viii) the provision and maintenance of affordable housing, and

(b) to promote the sharing of the responsibility for environmental planning between the different levels of government in the State, and

(c) to provide increased opportunity for public involvement and participation in environmental planning and assessment.

MOD 3 is required specifically to protect utility services. MOD 3 has been designed so as not to be inconsistent with any of the Objects of the EP&A Act (see **Section 4.6**).

5.2 ENVIRONMENTAL PLANNING INSTRUMENTS

5.2.1 State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007

State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007 (SEPP Mining) determines the permissibility of mining developments and the matters that must be considered by consent authorities when evaluating development applications for mining developments. Clause 7(1) states:

"(1) Mining
Development for any of the following purposes may be carried out only with development consent:

(a) underground mining carried out on any land,

(b) mining carried out:

(i) on land where development for the purposes of agriculture or industry may be carried out (with or without development consent), or

(ii) on land that is, immediately before the commencement of this clause, the subject of a mining lease under the Mining Act 1992 or a mining licence under the Offshore Minerals Act 1999,

(c) mining in any part of a waterway, an estuary in the coastal zone or coastal waters of the State that is not in an environmental conservation zone,

(d) facilities for the processing or transportation of minerals or mineral bearing ores on land on which mining may be carried out (with or without development consent), but only if they were mined from that land or adjoining land,

(e) mining on land that is reserved as a state conservation area under the National Parks and Wildlife Act 1974,

(f) extracting a bulk sample as part of resource appraisal of more than 20,000 tonnes of coal or of any mineral ore."

Given the proposed relocated 132 kV powerline is contained wholly on land zoned RU1 (where agriculture may be carried out), under Clause 7(1) of SEPP Mining, MOD 3 is permissible with consent under the EP&A Act.

5.2.2 State Environmental Planning Policy Infrastructure (2007)

The *State Environmental Planning Policy Infrastructure (2007)* (Infrastructure SEPP) allows development of the purpose of an electricity transmission or distribution network to be carried out by or on behalf of an electricity provider without development consent.

Consultation with Ausgrid (see **Section 6**) determined that a modification to DA 80/952 under Section 75W of the EP&A Act would provide the most expeditious planning approvals path to facilitate the relocation of the existing 132 kV powerline.

5.2.3 NSW Strategic Regional Land Use Policy

The requirement for a Gateway Certificate or Site Verification Certificate in respect of certain modification applications for mining and petroleum development comes from clause 50A of the EP&A Regulations and Part 4AA of SEPP Mining.

The term "mining or petroleum development" is defined in clause 17A of SEPP Mining as:

(a) development specified in clause 5 (Mining) of Schedule 1 to State Environmental Planning Policy (State and Regional Development) 2011, but only if:

(i) A mining lease under the Mining Act 1992 is required to be issued to enable the development to be carried out because:

(a) The development is proposed to be carried out outside the mining area of an existing mining lease, or

(b) There is no current mining lease in relation to the proposed development."

None of the elements of the development proposed by MOD 3 are within the definition of "*mining or petroleum development*" because none of these activities give rise to the requirement for a Mining Lease (see **Section 5.4.4**).

Accordingly, neither a Site Verification Certificate nor a Gateway Certificate is required to accompany this application.

5.3 LOCAL ENVIRONMENTAL PLANS

Section 89E(2) of the EP&A Act provides that "*Development consent may not be granted if the development is wholly prohibited by an environmental planning instrument*".

Section 89E(3) EP&A Act provides that "*Development consent may be granted despite the development being partly prohibited by an environmental planning instrument*".

MOD 3 is located entirely within the Singleton LGA on land zoned as "RU1 Primary Production" under provisions of the *Singleton Local Environmental Plan 2013* (Singleton LEP).

The land use table in the Singleton LEP provides that open cut mining is permissible with development consent in zone RU1. Further, section 7 of SEPP Mining provides that mining is permissible on any land where agriculture or industry is permissible. Therefore, MOD 3 is permissible with consent.

Figure 7 illustrates MOD 3 in relation to the Singleton LEP zoning.

5.4 OTHER NSW LEGISLATION

5.4.1 Exemptions

As stated in **Section 5.1** DA 80/952 is proposed to be modified under Section 75W pursuant to Clause 8J(8) of the EP&A Regulation. Clause 8J(8) provides that a development consent modified under that clause using Section 75W of the EP&A Act does not become an approval under Part 3A of the Act.

As such, the exemptions afforded by Section 75U and 75V to Part 3A projects do not apply to MOD 3.

5.4.2 Threatened Species Conservation Act 1997

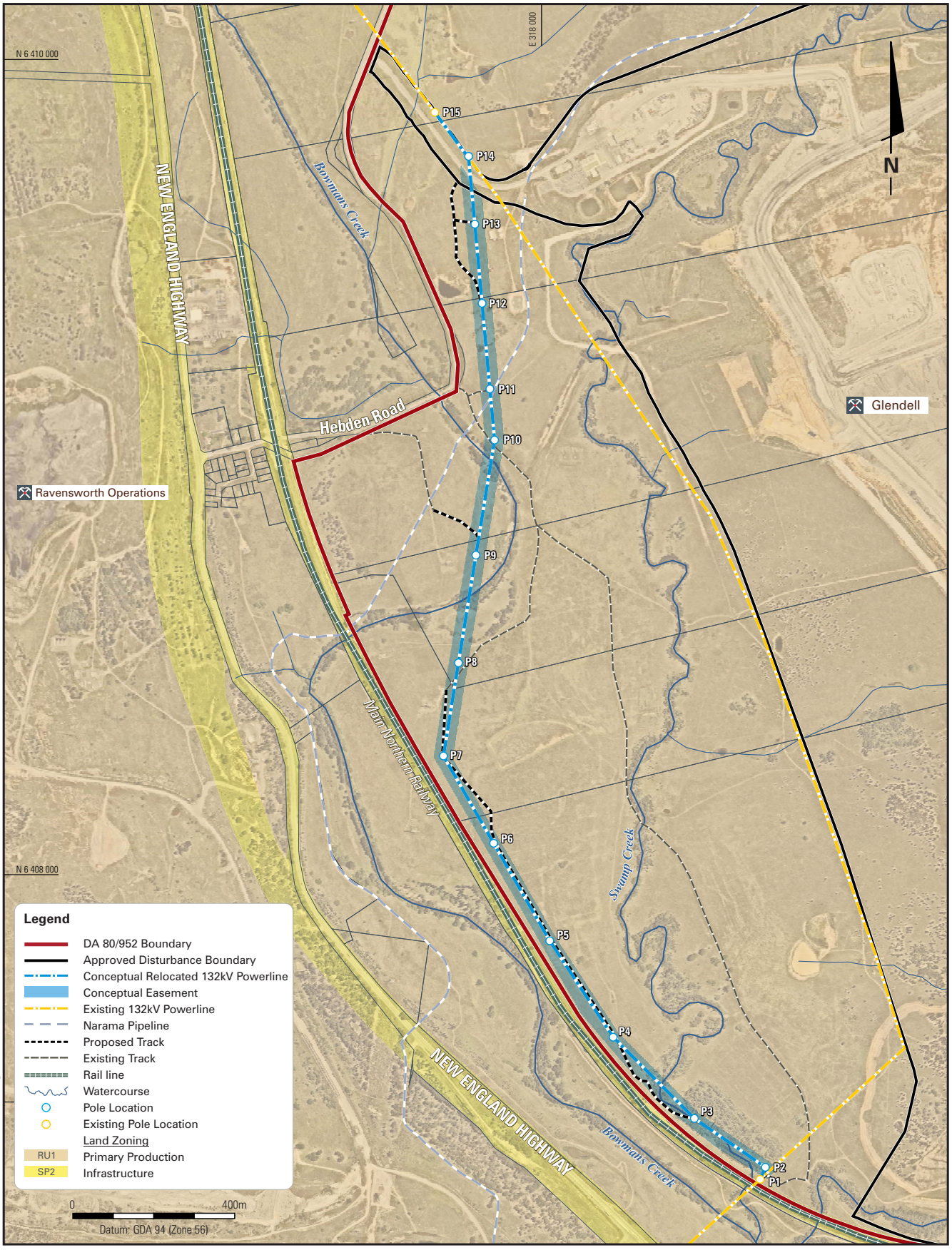
The *Threatened Species Conservation Act 1997* (TSC Act) lists and defined threatened species, populations and ecological communities and critical habitat within NSW. The TSC Act also provides a framework of the assessment of a development's impacts on threatened species.

As described in **Section 8.1.2**, the powerline relocation will not cause any impact to threatened species listed under the TSC Act.

5.4.3 Heritage Act 1977

The *Heritage Act 1977* (Heritage Act) makes provision for control over the manner in which items of European heritage significance (relics) are managed and prevents their uncontrolled destruction or change without an excavation permit under Section 139.

As described in **Section 8.3.2**, the powerline relocation will not cause any impact requiring a Section 139 approval.



HB MOUNT OWEN 1645 F7 Land Zoning 09 08 2016 Rev C

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Land Zoning

FIGURE 7

5.4.4 National Parks and Wildlife Act 1974

Under the *National Parks and Wildlife Act 1974* (NP&W Act), it is an offence to harm or desecrate an Aboriginal place or object without a permit under Section 90 or Section 87 of the NP&W Act. As described in **Section 8.2.2**, the powerline relocation will not cause any impact requiring a Section 90 or 87 permit.

5.4.5 Native Vegetation Act 2003

Under the *Native Vegetation Act 2003* (NV Act) it is an offence to clear native vegetation without development consent (subject to certain exceptions).

Section 25(l) of the NV Act provides that clearing authorised under the Mining Act is exempt from the provisions of the NV Act. Any vegetation clearing required in relation to MOD 3 will occur within existing mining authorities as discussed in **Section 4.4.2** and as illustrated on **Figure 8**. Therefore the powerline relocation will not require approval under the NV Act (see **Section 8.1**).

5.4.6 Rural Fires Act 1997

The *Rural Fires Act 1997* (Rural Fires Act) provides the statutory framework to prevent, mitigate and suppress bush fires in rural districts, and to coordinate bush fire-fighting and prevention. The powerline relocation will not cause any impact requiring additional approvals under the Rural Fires Act.

5.4.7 Water Management Act 2000

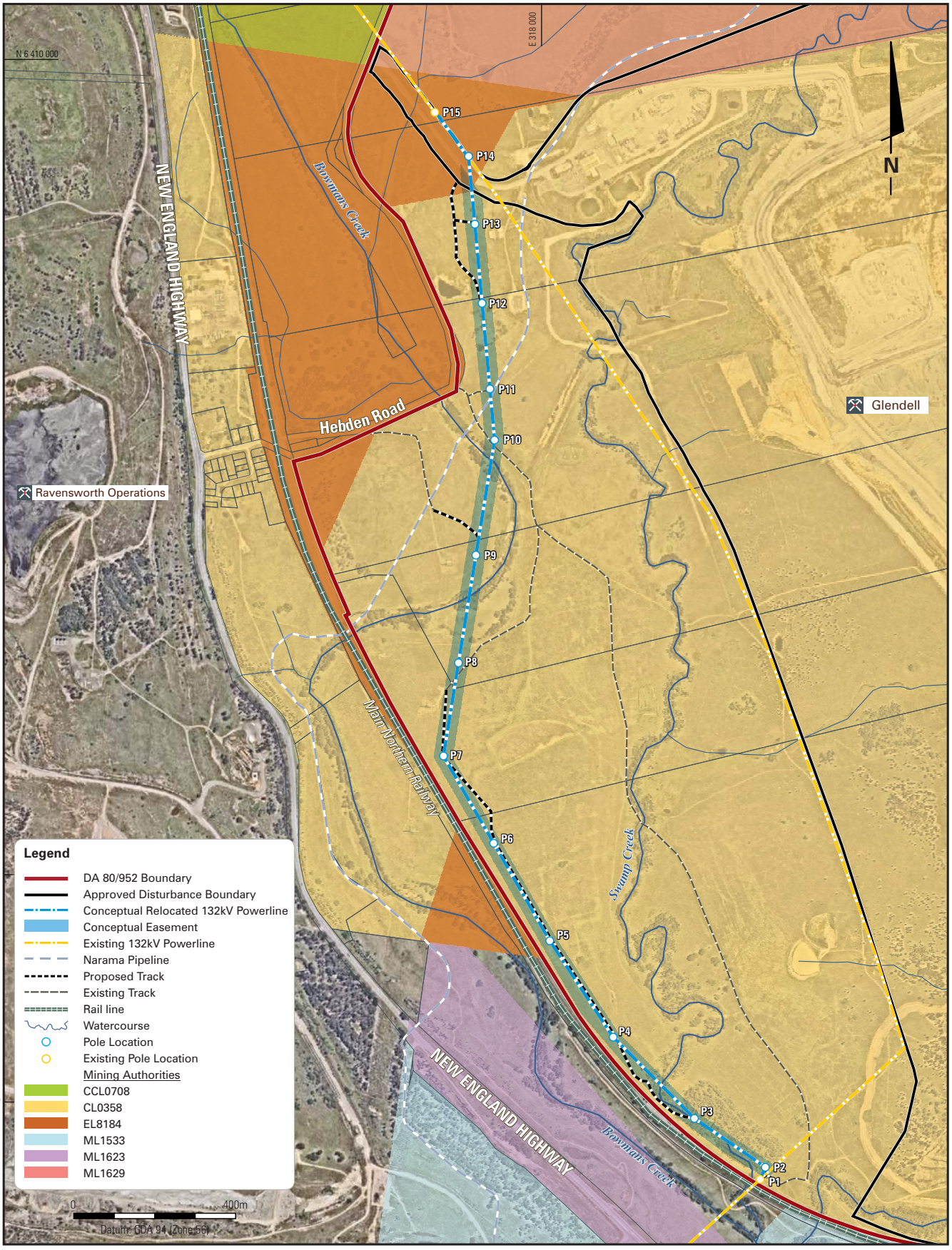
The licensing and approvals provisions of the *Water Management Act 2000* (WM Act) apply to water sources that are the subject of a Water Sharing Plan (WSP). Water sources that are not the subject of a WSP are regulated by the *Water Act 1912* (Water Act).

MOD 3 surface activities are situated entirely within the Jerrys Water Source under the '*Water Sharing Plan for the Hunter Unregulated and Alluvial Water Sources 2009'* which was proclaimed under the WM Act.

Until recently, the take of water from the fractured rock aquifer and basement rocks was regulated under Part 5 of the Water Act. The '*Water Sharing Plan for the North Coast Fractured and Porous Rock Groundwater Sources'* (North Coast WSP) commenced on 1 July 2016 and applies to the DA 80/952 Boundary.

As outlined in **Section 8.4**, no additional impacts requiring additional water licences under the WM Act are required for MOD 3.

Further, a controlled activity approval will not be required under the WM Act for the carrying out of works on waterfront land as the powerline relocation is exempt under Clause 16 of Part 2 of Schedule 5 of the *Water Management (General) Regulation 2011.* The powerline relocation will be undertaken in an area where a lease is held under the *Mining Act 1992* (Mining Act) (see **Section 5.4.8**).



HB MOUNT OWEN 1645 F8 Mining Leases 09 08 2016 Rev C

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Mining Authorities

FIGURE 8

5.4.8 Mining Act 1992

The mining of coal in NSW is regulated by the Mining Act. Section 380AA of the Mining Act notes that the applicant for a development consent for a coal mining project must be the holder of an authority in respect of coal for the land where mining is proposed by the application. An "authority" is defined in the Mining Act as an exploration licence, an assessment lease or a mining lease. The requirement that there be an authority for coal applies only in respect of the areas where "mining for coal" is proposed. As MOD 3 does not entail mining for coal, section 380AA of the Mining Act will not preclude the application for, or grant of, consent for MOD 3.

Section 6(3) of the Mining Act identifies activities requiring a mining lease for mining purposes and states:

> *"(3) The mining purposes specified for the purposes of this section are the following mining related purposes:*
>
> *(a) the construction, maintenance or use of any reservoir, dam (including a tailings dam), drain or water race, other than any reservoir, dam, drain or water race principally used for purposes not connected with mining or any other activities regulated by or under an authorisation,*
>
> *(b) opal puddling,*
>
> *(c) the removal, stockpiling or depositing of overburden, ore or tailings to the extent that it is associated with mineral extraction or mine beneficiation."*

The activities for which approval is sought in MOD 3 do not conform to any of the mining purposes specified in Section 6(3) of the Mining Act. The activity will be undertaken within existing mining authorities as shown on **Figure 8** currently held by the Mt Owen Complex, which is wholly-owned by Mt Owen Pty Limited.

In accordance with existing mining authorisation requirements, the existing Mt Owen Complex Mining Operations Plan (MOP) approved to 2019 will be updated for MOD 3 to the satisfaction of relevant authorities.

5.4.9 Protection of the Environment Operations Act 1997

Section 48 of the *Protection of the Environment Operations Act 1997* (POEO Act) provides that an Environment Protection Licence (EPL) is required for scheduled activities under the Act. Under clause 28 of Schedule 1 of the POEO Act, "*mining for coal*" is deemed to be a scheduled activity if the daily production exceeds 500 tonnes, or if the disturbance area exceeds 4 ha.

Glendell Mine holds EPL12840 administered by the EPA under Section 43(b) of the POEO Act. No variation to EPL12840 will be required to facilitate MOD 3.

5.5 COMMONWEALTH LEGISLATION

5.5.1 Environment Protection and Biodiversity Conservation Act 1999

If a proposed action is likely to have a significant impact on one or more Matters of National Environmental Significance (MNES), the action is deemed to be a "*controlled action*". The approval of the Minister for the Environment must be obtained before a controlled action can be carried out.

Ecology

The Glendell EA determined that approval from the Commonwealth Minister for the Environment was not required for the Glendell Mine. An assessment of the significance of the impacts of the activities described within the Glendell EA on threatened fauna species identified within or with potential to occur in the Glendell Mine site was undertaken as part of the flora and fauna assessment.

As further discussed in **Section 8.1.2**, the powerline relocation will not have a significant impact on any known threatened species or communities listed under the EPBC Act.

Water Resources

MOD 3 has also considered the potential impacts on water resources in relation to the Federal Guidelines: *Matters of National Environmental Significance Significant Impact Guidelines 1.1* and the *Significant Impact Guidelines 1.3; Coal seam gas and large coal mining developments – impacts on water resources* (EPBC Water Guidelines). The following extract from the EPBC Water Guidelines are relevant to MOD 3:

> *"4.2.1 If a referral for a proposed expansion or modification to a project does not involve extraction of … coal, then it will not be within the definition of … 'large coal mining development', and the water trigger will not apply …."*
>
> A *"large coal mining development"* is defined under the EPBC Act (section 528) as:
>
> *"any coal mining activity that has, or is likely to have, a significant impact on water resources (including any impacts of associated salt production and/or salinity):*
>
> *(a) in its own right; or*
>
> *(b) when considered with other developments, whether past, present or reasonably foreseeable developments."*

Further extracts from the EPBC Water Guidelines are also relevant to MOD 3:

> *"3.4. Extraction of CSG or coal*
>
> *The definitions of "large coal mining development" relate to impacts on a water resource of activities that form part of the process of extracting coal …. The development of associated infrastructure that is not part of the extraction process is not included in the definitions of … large coal mining development.*

Extraction of … coal must form part of the activity and not merely be associated with it. Where referred along with new or modified extraction of … coal, the following activities will form part of the extractive process:

- *water supply for use in the extraction of … coal*
- *management of water generated as a result of extraction of … coal, such as holding dams or water treatment facilities*
- *management of waste generated as a result of extraction of … coal, such as spoil heaps.*

However, these activities will not independently be … coal mining development where there is no new or modified extraction of … coal…."

"3.5. Associated infrastructure

The development of associated infrastructure that is not part of the extraction process is not included in the definitions of "… large coal mining development. This may include:

- *transport infrastructure, such as pipelines, road or rail infrastructure*
- *office/housing and amenity construction*
- *environment protection, monitoring and associated land management activities…"*

MOD 3 does not entail any extraction of coal. MOD 3 only relates the realignment of an existing 132 kV powerline. Therefore, MOD 3 does not constitute a "*large coal mining development*" for the purposes of section 24D of the EPBC Act.

MOD 3 will not have a significant impact on any MNES. As such, no referral of MOD 3 under Section 68 of the EPBC Act to the Minister for the Environment for an approval under Part 9 of the EPBC Act is required.

5.5.2 Native Title Act 1993

The *Native Title Act 1993* (NT Act) provides for the recognition and protection of native title.

Section 23A of the NT Act states that native title is extinguished by "*previous exclusive possession acts*" attributable to the Commonwealth. Under section 23B of the NT Act, native title over land is extinguished by the grant of a freehold estate over that land, provided that the grant occurred on or before 23 December 1996. Native title has the potential to exist on Crown Land.

MOD 3 will not require the grant of any new mining leases and will not result in the disturbance, or the placement of infrastructure on any Crown Land, which may be subject to Native Title.

6 STAKEHOLDER ENGAGEMENT

This section provides a summary of the stakeholder engagement undertaken for MOD 3.

6.1 STAKEHOLDER ENGAGEMENT

Table 3 outlines the consultation activities undertaken for MOD 3. The stakeholder engagement program included consultation with Local and State government agencies along with neighbouring land owners, industry and the Mt Owen Complex Community Consultative Committee (CCC).

6.2 ONGOING STAKEHOLDER ENGAGEMENT

Various mechanisms are implemented by Mt Owen Pty Limited to engage with its community. The 'Mt Owen Complex Social Involvement Plan' directs community engagement strategies, aims to identify and understand stakeholder concerns and ensures the community is factually informed in relation to its mining activities including those at Glendell Mine.

Key stakeholder consultation methods that are utilised by Mt Owen Pty Limited include:

- Regular consultation with neighbouring land owners and industry (including one on one meetings and the operation of a blasting hotline);
- CCC updates;
- Distribution of regular community newsletters and information sheets to up to 150 neighbours); and
- Preparation and distribution of the Annual Review for the Mt Owen Complex (incorporating Glendell Mine).

Table 3
Stakeholder Engagement and Consultation

Stakeholder	Consultation	Issues Identified	Section
DP&E	Meeting held 13 July 2016	• Robust justification required for the selected alignment as well as alternatives considered.	**4.5** & **4.6**
		• Include Ausgrid specifications for clearances in powerline easement.	**4.4.2**
		• Consult with ARTC over Application.	**Table 3**
		• Provide details of weed management program in EA.	**8.1.3**
		• Consult with OEH & DPI – Water over Application.	**Table 3**

Stakeholder	Consultation	Issues Identified	Section
DPI – Water	Meeting held 21 July 2016	• Include robust justification for the selected alignment and alternatives considered.	**4.5** and **4.6**
		• Include Ausgrid specifications for clearances in powerline easement and explain how vegetation is to be cleared under the powerline alignment.	**4.4.2**
		• Describe in the EA the riparian land management measures both in place and proposed.	**8.1.3**
		• Provide in the EA details of the geotechnical work undertaken and confirm that the pole holes will not intercept the water table.	**8.4**
OEH	Meeting held 21 July 2016.	• Include the proposed ecological mitigation measures discussed at the meeting in the EA.	**8.1.3**
		• Tree offsetting - 10 trees should be planted for every mature tree that is severely lopped within relevant creek lines.	**8.1.3**
		• Committed to management of an area generally consistent with the commitments of the HMA as described in **Section 8.1.3**.	**8.1.3**
		• A due diligence assessment of each mature tree should take place at the lopping stage and two nesting boxes should be erected for any tree hollow identified that has to be lopped.	**8.1.3**
Singleton Shire Council (SSC)	Review of powerline presentation. Email dated 18 July 2016.	• SSC raised no issues of concern.	N/A

Stakeholder	Consultation	Issues Identified	Section
ARTC	Agreement in principle provided for location and methodology 16 April 2016.	• Before approval can be given and a Licence issued, Mt Owen Pty Limited to provide by 16/10/16: o Final design plans; o Designs to consider ARTC parameters; o Services search; and o Insurances, Accreditations and work permits.	**Appendix A**
Ausgrid	• June 2013 powerline relocation project commenced. • April 2014 Initial Meeting held with Ausgrid. • September 2014 Ausgrid release Asset Relocation Brief (SR-00350). • March 2015 Downer EDI Engineering Pty Ltd engaged to undertake detailed design. • August 2015 Geotechnical Investigation undertaken. • April 2016 design drawings complete. Awaiting Ausgrid Certification.	• Design agreed with Ausgrid.	N/A
CCC	• Presentation of the Powerline Relocation modification to the CCC on Friday 22 July 2016	• Management of historical heritage items.	**8.3.3**

7 RISK ASSESSMENT

A risk assessment was completed to identify potential environmental and socio-economic issues associated with MOD 3. The primary purpose of the risk assessment process was to prioritise and focus the required environmental and socio-economic impact studies required for the MOD 3.

Each of the environmental and social-economic issues identified have been assessed and where appropriate, management and mitigation measures have been developed. Each of the potential environmental issues was ranked as being of low, moderate, high or critical risk. The risk rating allocated to an impact is dependent upon the probability of the impact occurring and the potential consequences should the impact materialise.

Table 4 summarises findings from the risk assessment.

Due to the minor nature of the Modification, no environmental aspects provided a critical or high risk. Ecology, Aboriginal archaeology, historic heritage and surface water were determined to be of moderate risk with all remaining environmental and socio-economic issues identified as being low risk.

Aspects identified as having a moderate environmental impact risk ranking formed the primary focus of this EA and were more intensively assessed. Aspects which have been identified as having a low risk were also assessed however a lesser scope of works was conducted for these secondary issues, based on their lower risk rating.

Table 4
Environmental and Socio-Economic Risk Rating

Risk Rating	Aspect
Critical	None
High	None
Moderate	Ecology, Aboriginal archaeology, historic heritage, water resources (erosion and sediment control)
Low	Amenity (air quality and noise), visual and lighting

8 IMPACTS, MANAGEMENT AND MITIGATION

This section provides a summary of the environmental impacts of MOD 3 described in ***Section 4*** *and the mitigation measures identified to manage these impacts.*

8.1 ECOLOGY

8.1.1 Background

A detailed ecological impact assessment was conducted for the Glendell EA. Following is a discussion on the key findings from the Glendell EA as they relate to the powerline relocation. The Disturbance Boundary constitutes an area of 824 ha.

Figure 9 provides an illustration of the vegetation communities, threatened species, aquatic and fauna habitat identified in the Glendell EA proximate to the powerline relocation.

Vegetation Communities

Five vegetation communities were mapped within the DA 80/952 Boundary, including:

- Derived Grassland;
- MU 27 – Central Hunter Ironbark – Spotted Bum – Grey Box Forest;
- MU 28 – Central Hunter Swamp Oak Forest;
- MU 30 – Hunter Valley River Oak Forest; and
- MU 32 – Central Hunter Bulloak Forest Regeneration.

None of the vegetation communities are listed as Endangered Ecological Communities (EEC) under the TSC Act or EPBC Act.

The Derived Grassland and the Central Hunter Bulloak Forest Regeneration vegetation communities are the dominant vegetation communities within Glendell Mine.

Threatened Flora

Database searches were undertaken for a 10 km radius of the site with those flora species either occurring or with a potential to occur at Glendell Mine assessed. The following were identified in the Glendell EA and occur in the vicinity of the powerline relocation:

- *Eucalyptus camaldulensis* in the Hunter Catchment – Endangered Population; and
- *Acacia pendula* in the Hunter Catchment – Endangered Population (which also conforms to the Weeping Myall Woodland EEC).

Neither of these two species will be impacted by the powerline relocation.

The aquatic habitat identified in proximity to the powerline easement between P4 and P5 will be avoided by the powerline relocation.

Threatened Fauna

Systematic flora surveys of Glendell Mine were undertaken for the Glendell EA and included trapping, walking transects, call playback and the use of echolocation detectors. From a total of 198 flora species recorded during surveys, 34% were introduced species.

Five habitat types were recorded based on the vegetation communities recorded and include:

- Box – Ironbark Woodland;
- Bulloak Woodland;
- Creekline;
- Grassland; and
- Aquatic Habitat.

The Glendell EA indicated that the habitat types within the Glendell Mine site provided moderate habitat for bird and bat species, including habitat for the identified and potentially occurring threatened fauna species, and large macropods. The highest quality habitat within the Glendell Mine site was the Box / Woodland habitat associated with the Central Hunter Box – Ironbark Woodland vegetation community, which is predominantly outside of the Disturbance Boundary.

A '*Test for Ecological Significance*' was used to assess the likely impacts on those threatened species, endangered populations and EECs that were recorded during surveys, as well as for those species with potential habitat at Glendell Mine. This assessment concluded that the proposed Glendell Mine would not have a significant impact on any identified, or potentially occurring fauna species at Glendell Mine.

Habitat Management Areas

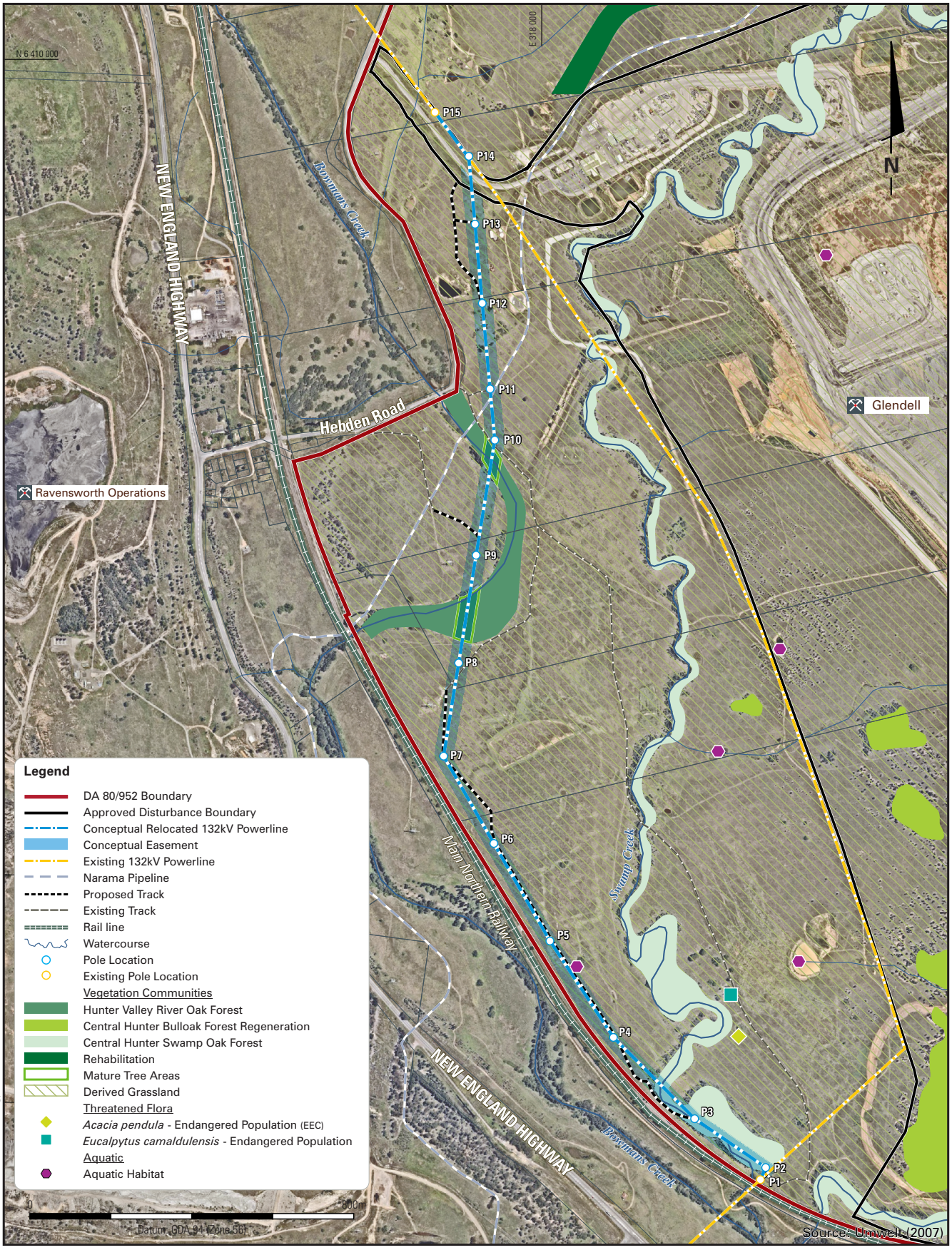
Mt Owen Pty Limited committed to the establishment and management of areas of existing vegetation located within the eastern extent of the Glendell Mine site to minimise the impacts of the proposed Glendell operations on vegetation communities and the associated loss of fauna habitat.

Mt Owen Pty Limited has in place approved Biodiversity and Landscape Management Plans which detail management commitments for ecology at Glendell Mine including that of the HMA.

8.1.2 Impact Assessment

Direct temporary disturbance of up to 0.06 ha to derived grassland will occur from the installation of the foundations for each pole proposed for the relocated powerline.

Minor temporary direct disturbance of up to 0.06 Ha of Central Hunter Swamp Oak Forest at each of poles P02 and P03 will occur from the installation of the foundations for each pole (see **Figure 9**).



HB MOUNT OWEN 1645 F9 Ecology 09 08 2016 Rev A

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Ecology

FIGURE 9

The majority of the easement under the proposed realigned powerline is grassland however indirect impacts to 1.4 ha of the Central Hunter Swamp Oak Forest and 0.65 ha of Hunter Valley River Oak Forest will be necessary due to lopping under wires at three creek crossings to ensure adequate clearance as per Ausgrid Guidelines (see **Section 4.4.2**). No direct impacts to Hunter Valley River Oak Forest will occur.

No direct or indirect impacts to the Central Hunter Ironbark – Spotted Bum – Grey Box Forest or Central Hunter Bulloak Forest Regeneration communities will occur.

No known EEC will be disturbed by the powerline relocation nor will any threatened or endangered fauna species.

8.1.3 Management and Mitigation

Ecological management will occur in accordance with the Mt Owen Complex Biodiversity Management Plan (Incorporating the Flora and Fauna Management Plan and Offset Management Plan) (BMP) and internal Mt Owen Complex Weed Management Plan currently in place at Glendell Mine and GDP process as described in **Section 3.4**.

Additional specific management measures proposed to be implemented during the construction and operations of the powerline include:

- Field identification by an appropriately qualified person of the *Acacia pendula* and *Eucalyptus camaldulensis* adjacent the southern existing track will occur prior to any works to be undertaken in the vicinity;
- A due diligence assessment of each mature tree will be undertaken at the lopping stage:
    - Ten (10) trees will be planted for each mature tree within the Hunter Valley River Oak Forest vegetation type that is severely lopped within Bowmans Creek in the two mature tree areas as shown on **Figure 9**;
    - Two (2) nesting boxes will be erected for any tree hollow identified that has to be lopped; and
- Any tree lopping along Bowmans Creek and Swamp Creek will be undertaken manually with chainsaws to allow the root structures to remain in situ; and
- Designation of a 4 ha area that was previously approved for disturbance in the Glendell EA to be managed by Mt Owen Pty Limited consistent with the commitments of the adjacent HMA. This area will be identified and incorporated into the Mt Owen Complex BMP; and
- Rehabilitation of relevant areas of removed powerline as described in **Section 4.4.4**.

8.2 ABORIGINAL HERITAGE

8.2.1 Background

OzArk Environmental and Heritage Management Pty Ltd was engaged by Mt Owen Pty Ltd to prepare the '*Glendell Mine Proposed 132 KV Power Line Relocation'* (Due Diligence Assessment) which is reproduced in **Appendix B**. The Due Diligence Assessment was undertaken in accordance with the '*Due Diligence Code of Practice for the Protection of Aboriginal Objects in NSW*' (DECCW, 2010).

A review of the AHIMS database indicated 19 registered sites within the vicinity of the powerline relocation, however only one is located within the proposed powerline easement.

Registered site 'MOCO OS-10' (AHIMS ID 37-3-1198) was a low-density artefact scatter previously identified partly within the easement. This site is identified as being salvaged on the AHIMS database.

A visual inspection of the proposed powerline route was undertaken by OzArk in June 2015 whereby six additional "*potential archaeologically sensitive areas*" were identified.

8.2.2 Impact Assessment

No registered Aboriginal archaeological sites have been identified as being directly impacted by the powerline relocation. However, the Due Diligence Assessment notes that MOCO OS-10 is at risk of being impacted.

Additionally, Sensitive Areas 1 to 6 are at risk of impact from the temporary disturbance associated with the erecting of the poles for the powerline as conceptually illustrated on **Figure 4**.

8.2.3 Mitigation and Management

Impacts from the powerline relocation will be managed in accordance with the existing ACHMP (2014) and the GDP Process. The following specific mitigation measures will be implemented to avoid inadvertent impacts to Aboriginal heritage:

- MCO OS-10 is to be avoided by the activities associated with the powerline relocation. This includes not establishing any new access tracks within MCO OS-10. The existing track to the house/sheds can be used without any grading or widening;
- MCO OS-10 is to be bordered by temporary fencing with a 5 m buffer and 'Do not Enter' signs attached;
- Induction and training is to occur of the construction workforce to ensure MC OS-10 is not accessed or disturbed;

- Sensitive Areas 1 to 6 are not anticipated to be disturbed by the powerline relocation, however, in the event the access track or power poles will impact these sites, Mt Owen will undertake appropriate investigation in the form of test excavations at the sites according to the *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (DECCW 2010b); and
- Should any unidentified Aboriginal archaeological sites be located during operations, the procedures of the approved ACHMP and the '*Unanticipated Finds Protocol*' in **Appendix B** will be followed.

8.3 HISTORICAL HERITAGE

8.3.1 Background

As part of the Glendell EA, Umwelt prepared the '*Historical Heritage Assessment for Modification of Glendell Mine Operations*' which provided a detailed assessment of historic heritage (Umwelt, 2007) (EA Heritage Assessment). The EA Heritage Assessment included management and mitigation measures which considered the impact of Glendell Mine on historical heritage within and surrounding the Disturbance Boundary.

The management strategy developed as part of the Glendell EA Heritage Assessment included the archival recording of all heritage items identified within the Approved Disturbance Area to the standards of local heritage significance as specified by the guidelines of the NSW Heritage Office.

Extant items outside the Disturbance Boundary which are not to be indirectly impacted by proposed blasting were fenced off, protected and conserved in situ. Extant historical heritage items identified in the EA Heritage Assessment as 1, 7 and 8 are located in the vicinity of the powerline relocation are identified on **Figure 4** and described in **Table 5**.

Table 5
Historic Heritage Sites

Item	Complex	Resource	Significance and Management
1	None	a) Wooden Bridge across Swamp Creek	• Local significance. • This site is outside the Disturbance Boundary but within the DA 80/952 Boundary. The site has been fenced off, protected and conserved. This site may be impacted by blasting. • As this item is potentially affected by vibration from blasting, a detailed recording of the structure and associated features to the NSW Heritage Office's standard for archival recordings of local heritage significance has been completed by a qualified heritage consultant. • As this item is a work and not a relic, it is not protected by Section 139 of the Heritage Act and a Section 140 permit is not a requirement.

Item	Complex	Resource	Significance and Management
7	Ruins of the Former Marali Homestead	a) Marali homestead ruins include the ruins of a house b) Telegraph pole c) The wooden bridge across Swamp Creek d) Remains of a footbridge e) A shed across the creek from the ruins of Marali Homestead (on the opposite side of Swamp Creek) f) Yards associated with shed g) Yards in paddock further afar form ruins and shed h) Water tank, well and trough i) Yards nearby the well	• Local significance. • Site is outside the Disturbance Boundary but within the DA 80/952 Boundary. • Items 7b to 7i have been fenced off, protected and conserved. • Items 7b to 7i are structural features that may be impacted by proposed blasting. As Items 7b to 7i are potentially affected by vibration from blasting, a detailed recording of these features to the NSW Heritage Office's standard for archival recordings of local heritage significance has been completed by a qualified heritage consultant. • As Item 7b and 7i are structural features and in some case works and are not relics, they are not protected by Section 139 of the Heritage Act and a Section 140 permit is not a requirement. • Item 7a has been fenced off, protected and conserved. As Item 7a is the ruined structural remains and archaeological evidence of the former Marali homestead, it will not be impacted by proposed blasting. Item 7a is evidence of European occupation that is over fifty years old. Therefore, it is protected by the relic's provisions of Section 139 of the Heritage Act. • As Item 7a has no archaeological research potential and its land use history is well documented in the historical record, any future change in impacts would need endorsement by the NSW Heritage Office under an exception application.
8	Site of the former Hillview Homestead	a) Two former Hillview homestead sites were once on this site. The more recent home was burnt to the ground prior to 2001 and the older home appears to have been removed (building materials appear to have been scavenged) since 2001. Both houses were present in aerial photography dating to 1958 b) Sheds (shearing, milking and maintenance) near the former Hillview homesteads	• Local significance. • This site is outside the Approved Disturbance Area but within the DA 80/952 boundary. The site will continue to have access controlled and Items b and c will continue to be protected and conserved. • Items 8b and 8c are structural features that may be impacted by proposed blasting. As Items 8b to 8c are potentially affected by vibration from blasting, a detailed recording of these features to the NSW Heritage Office's standard for archival recordings of local heritage significance has been completed by a qualified heritage consultant. • As Items 8b and 8c are standing structures and not relics, they are not protected by the relic's provisions of Section 139 of the Heritage Act. • Item 8a is the site of the ruined Hillview homesteads, which has been salvaged and contains no evidence of the former homesteads or its occupation apart from some of the original gardens. Therefore, neither a

Item	Complex	Resource	Significance and Management
		c) Yards and fences near the former Hillview homesteads	Section 140 permit nor an exception application is a requirement for any proposed impact.

8.3.2 Impact Assessment

As illustrated on **Figure 4**, sites 7 and 1 will not be impacted by the powerline relocation. The eastern most sub-site of site 7 (site 7g) is located within 50 m of the proposed easement.

A shed associated with Site 8 (Site 8b), will need to be removed to facilitate the powerline relocation (as shown in **Plate 1** and **Plate 2**). A second shed associated with Site 8b will not need to be removed to facilitate the powerline relocation.

Items associated with Site 8b are standing structures and not relics, as such they are not protected by the relic's provisions of Section 139 of the Heritage Act.

8.3.3 Mitigation Measures

Impacts from MOD 3 will be managed in accordance with the existing historic heritage management procures and the GDP process.

The following specific mitigation measures for the powerline relocation will be implemented to avoid inadvertent impacts to historic heritage:

- Site 7g will be identified in the field to ensure it is not disturbed by MOD 3 activities; and
- The shed associated with Site 8b (shown in **Plate 1**) will be manually dismantled and removed from the site.

Plate 1
Shed to be Removed (Site 8b)

Plate 2
Shed to be Retained (Site 8b)

8.4 WATER RESOURCES

8.4.1 Background

Glendell Mine is located primarily in the catchment of Bettys Creek and Swamp Creek. Both flow through the site and into Bowmans Creek to the south-west of Glendell Mine.

Bowmans Creek intersects the eastern extent of the Glendell Mine site and continues south and joins the Hunter River approximately 3.5 km downstream of the Glendell Mine.

Glendell Mine is located within a surface and groundwater catchment that has been modified by surrounding land uses and mining operations.

The catchments of Swamp and Bettys Creeks have been substantially modified by upstream mining operations including the Mt Owen Complex. Swamp Creek has a highly modified catchment with an area of approximately 740 ha (Umwelt, 2007).

8.4.2 Impact Assessment

The construction of the powerline's foundations will involve the removal of vegetation which has a potential to result in areas of exposed soil material which may lead to erosion in a rainfall event.

Poles within 100 m of Bowmans Creek or Swamp Creek with a potential to lead to erosion include P2, P3, P8, P9 and P10.

Pole foundations will be installed at a shallow depth of up to approximately 7 m under the surface. Geotechnical investigations by Ausgrid at pole locations have confirmed no groundwater interception will occur.

No poles are proposed and thus no direct impacts will occur to creek banks or within creek lines.

Spills from hydrocarbons from equipment or vehicles has a potential to affect water quality in the area.

8.4.3 Mitigation Measures

Impacts from the powerline relocation will be managed in accordance with the existing Water Management Plan (WMP), Erosion and Sediment Control Plan, Surface and Groundwater Response Plan, the GDP Process and Sections 2.1 and 2.3 of the Ausgrid Environmental Handbook.

The following specific mitigation measures for the powerline relocation will be implemented to avoid inadvertent impacts to water resources:

- Prior to commencement of works, access routes will be clearly delineated and conveyed to all workers on the Modification;
- All works will be designed in accordance with the '*Managing Urban Stormwater, Soils and Construction'* (Landcom, 2004);

- Equipment required for tree clearing will not be fuelled within the MOD 3 easement. It will be done offsite or within designated areas the Mt Owen Complex;
- EWP's will be utilised to lop trees within the riparian zone;
- Only trees within the easement will be lopped; and
- Ecological commitments as described in Section 8.1 will assist in reducing potential sediment and erosion control issues (e.g. tree planting and inspections);

8.5 AMENITY

This section assesses amenity impacts including noise and air quality predominant associated with the construction of the powerline.

8.5.1 Background

The Glendell EA included comprehensive assessments for noise, air and other amenity impacts. Mitigation and management measures were identified and are reflected in the EMS and management plans as indicated in **Section 3.4**.

Passing traffic on the New England Highway is approximately 500 m away (see **Figure 4**) from the powerline relocation and the closest private receiver to the easement is over 2.3 km away with no visual line of sight. As described in **Section 2.4**, all land adjacent to the powerline relocation are mine owned.

8.5.2 Impact Assessment

Construction activities associated with the powerline relocation have a potential to generate noise, dust and visual impacts. The existing environment is approximate to the Main Northern Railway, New England Highway and various mining operations. It is unlikely that the minor activities associated with the powerline relocation will impact on any private neighbours or commuters.

Lighting is unlikely to impact any private neighbours or commuters as the work will be undertaken in daylights hours and in consideration of the significant distance to any property.

8.5.3 Mitigation Measures

Impacts will be managed in accordance with the existing EMS, GDP process and management plans as described in **Section 3.4**. Management of lighting impacts will continue to be undertaken in accordance with Condition 50 of DA80/952 and relevant Australian Standards.

9 SUMMARY OF KEY MANAGEMENT AND MITIGATION MEASURES

Table 6 summarises the key management and mitigation measures proposed in this EA which are additional to the existing Statement of Commitments for Glendell Mine.

The objective of this summary is to ensure that MOD 3's environmental and social impacts are minimised by implementing the appropriate management, monitoring and mitigation strategies.

Table 6
Modification Management & Mitigation Measures

Ref.	Commitment	Section
1	Field identification of the *Acacia pendula* and *Eucalyptus camaldulensis* adjacent to the southern existing track will be undertaken by an appropriately qualified person prior to any powerline relocation works if any works are to be undertaken in the immediate vicinity of this area.	**8.1.3**
2	Due diligence assessment of each mature tree to be lopped will be undertaken prior to disturbance. For any mature native tree that is lopped in the area shown as 'Mature Tree Areas' in **Figure 9:** o Ten (10) trees will be planted; and o Two (2) nesting boxes will be erected for any tree hollow identified.	**8.1.3**
3	Any tree lopping required along Bowmans Creek and Swamp Creek in the riparian zone will be undertaken manually with chainsaws to allow the root structures to remain in situ.	**8.1.3**
5	Implement identified management measures to avoid potential impacts to Aboriginal heritage sites MCO OS-10 and Sensitive Areas 1 to 6 during MOD 3 activities	**8.2.3**
6	Should any unidentified Aboriginal archaeological sites be located during operations, the procedures of the approved ACHMP and the '*Unanticipated Finds Protocol*' in **Appendix B** will be followed.	**8.2.3**
7	Site 7g will be identified in the field to ensure it is not disturbed by MOD 3 activities.	**8.3.3**
8	The shed associated with Site 8b (shown in **Plate 1**) will be manually dismantled, with salvaged materials removed from site.	**8.3.3**
9	Erosion and sediment controls will be implemented prior to the commencement of works, to minimise the potential for inadvertent impacts to local water resources.	**8.4.3**
10	Redundant power poles will be removed from site. The holes will be backfilled with suitable material and rehabilitated.	**4.4.4**

10 CONCLUSION

Mt Owen Pty Limited has identified the need to realign a 2.7 km section of an Ausgrid 132 kV powerline further to the west of its approved mining limit to ensure that it is not impacted from blasting or other mine related activities. This EA supports an application under Section 75W of the EP&A Act to modify DA 80/952 in this regard.

MOD 3 activities are located entirely on land owned by Glencore, with the nearest neighbours located approximately 2.3 km from the MOD 3 activities.

The proposed pole locations have been designed in consideration of sensitive environmental aspects including ensuring each is placed at a substantial distance from the banks of Bowmans and Swamp Creeks, avoiding potentially sensitive archaeology and native vegetation.

This EA has demonstrated that amenity impacts can be managed in accordance with the existing EMS, GDP process and EMPs.

This EA further shows that through its existing EMS and adherence to the Ausgrid Vegetation Protocol, impacts to identified ecology and heritage will be managed to ensure minimal environmental impacts.

Additional commitments including the completion of ecological inspections, field demarcation of significant archaeological sites and additional management of an ecologically significant area adjacent to the existing HMA will further reduce potential environmental impacts from MOD 3 activities.

The powerline relocation is required to facilitate the continuation of safe and efficient approved mining at Glendell Mine.

Preliminary planning associated with the Glendell EA anticipated that the existing 132 kV powerline would not require relocation to facilitate mining, only the imposition of blasting criteria (i.e. vibration criteria). Operational experience since that time and extensive consultation with the infrastructure owner identified a need for a self-imposed 200 m safety buffer between the existing 132 kV powerline and mining activities. This restriction has to date, ensured that impacts from blasting activities on the powerline have been minimal.

As mining operations progress however, operations within the 200 m buffer will be required to facilitate approved mining operations.

The proposed re-alignment of the relocated powerline has been located as far south-west as is appropriate to avoid potential future mining areas and negate the need for future relocations.

Any delays to the powerline relocation will result in further mine plan changes and potential loss of the approved extraction of coal resources in the vicinity. Any modifications to the mine plan in the absence of the proposed powerline relocation would impact on the mining operation and potentially sterilise part of a NSW owned state significant coal resource.

* * *

For
HANSEN BAILEY

Dianne Munro
Principal Environmental Scientist

James Bailey
Director

11 ABBREVIATIONS

Abbreviation	Description
AHIMS	Aboriginal Heritage Information Management System
ACHMP	Aboriginal Cultural Heritage Management Plan
ARTC	Australian Rail Track Corporation
CCC	Community Consultative Committee
CHPP	Coal Handling and Preparation Plant
CL	Coal Lease
DA	Development Assessment
BMP	Biodiversity Management Plan
DP&E	NSW Department of Planning and Environment
DRE	Division of Resources and Energy
EA	Environmental Assessment
EMP	Environmental Management Plans
EMS	Environmental Management System
EEC	Endangered Ecological Community
EPA	Environment Protection Authority
EP&A Act	*Environmental Planning and Assessment Act 1979*
EPA& Regulations	*Environmental Planning and Assessment Regulations 2000*
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
EPL	Environment Protection Licence
EWP	Elevated work platform
Glencore	Glencore Coal Pty Limited
Glendell EIS	*Glendell Environmental Impact Statement* (Croft & Associates 1982).
Glendell EA	*Environmental Assessment for Modification of Glendell Mine Operations'* (Umwelt, 2007)
Glendell SEE	*Statement of Environmental Effects for Modification of Glendell Mine Operations* (Glendell, 1997)
GDP	Ground Disturbance Protocol
HMA	Heritage Management Area
Heritage Act	*Heritage Act 1977*
km	Kilometre
kV	Kilovolts
LGA	Local Government Area
M	Million
Mining Act	*Mining Act 1992*
ML	Mining Lease
MOP	Mining Operations Plan
Mt Owen Complex	Consisting of the operations at Mt Owen, Glendell and the Ravensworth East mining areas
MOD 3	*132 kV Powerline Relocation Modification EA* (this EA)
MNES	Matters of National Environmental Significance

Abbreviation	Description
Singleton LEP	*Singleton Local Environment Plan 2013*
NT Act	*Native Title Act 1993*
Mt	Million tonnes
Mtpa	Million tonnes per annum
NPW Act	*National Parks and Wildlife Act 1974*
NSW	New South Wales
North Coast WSP	*Water Sharing Plan for the North Coast Fractured and Porous Rock Groundwater Sources 2016*
NV Act	*Native Vegetation Act 2003*
POEO Act	*Protection of the Environment Operations Act 1997*
ROM	Run of Mine
Singleton LEP	*Singleton Local Environmental Plan 2013*
SSC	Singleton Shire Council
Rural Fires Act	*Rural Fires Act 19997*
Infrastructure SEPP	*State Environmental Planning Policy(Infrastructure) 2007*
SEPP Major Projects	*State Environmental Planning Policy(Major Projects) 2005*
SEPP Mining	*State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007*
TSC Act	*Threatened Species Conservation Act 1997*
TEC	NSW Threatened Ecological Communities
Water Act	*Water Act 1912*
WM Act	*Water Management Act 2000*
WSP	Water Sharing Plan

12 REFERENCES

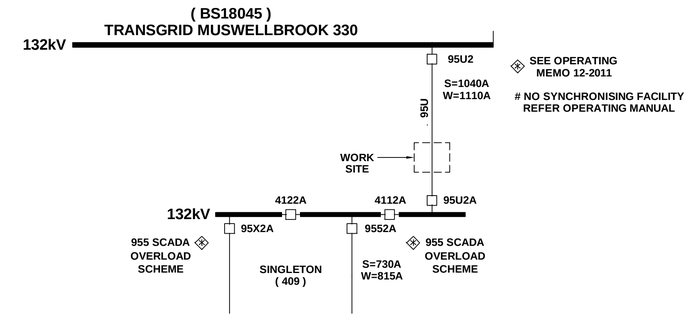
- Ausgrid (2014) *Environmental Handbook for Construction and Maintenance NS174c.*
- Ausgrid (2015) *NW000-S0092 NS220 Overhead Design Manual.*
- Ausgrid (2016) *Environmental Handbook for Construction and Maintenance NS174c NS143 Easements, Leases and Rights of Way.*
- Croft & Associates (1982) *Glendell Mine Environmental Impact Statement*.
- Glencore (2014) Glendell Mine Aboriginal Cultural Heritage Management Plan.
- Landcom (2004) *Managing Urban Stormwater, Soils and Construction*.
- NSW Department of Resources & Energy (2005) *NEG-OH21 Vegetation Safety Clearances and ISSC3, Guideline for Managing Vegetation Near Power Lines*.
- Umwelt (2007) *Environmental Assessment for Modification of Glendell Mine Operations*.

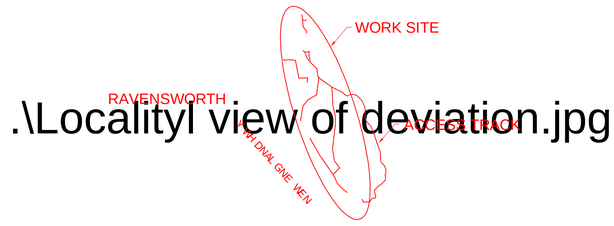
APPENDIX A

Detailed Design Drawings

SCHEDULE TO THE CERTIFIED DESIGN	PROJECT NUMBER: SC		
1. CONNECTION CUSTOMER	XXXXX		
2. PREMISES ADDRESS			
2. THE CONNECTION			
Maximum capacity of the connection: (i.e. maximum permitted current draw)	XXXX Amps		
Point of common coupling:	((substation XY12345 LV busbar), (Premises pole/pillar number XY12345)		
Connection point (i.e. point of supply):	(substation XY12345 LV busbar), (Premises pole/pillar 'A'/MSB/POA)		
4. LEASES AND EASEMENTS REQUIRED BY AUSGRID			
The leases and easements as shown in the certified design:			
5. PREMISES CONNECTION ASSETS			
(a) Funded by the connection customer undertaken by ASP1:	All work depicted in the certified design that are not included in 5(b) or 5(d) below		
(b) Funded by Ausgrid undertaken by ASP1:	(Supply and installation of .....)/(Supply only....)/(Installation only....)/(Trenching from...to....)/(Spare conduit)/(Low voltage interconnector)/(Streetlighting bracket/luminaire) etc		
(c) Ausgrid's payment to your ASP/1 if it undertakes works in 5(b):(incl GST)	$XXX,XXX.XX		
(d) Funded by Ausgrid undertaken by Ausgrid :	(Insert AG undertaken work if any. Do not include monopoly works) (Terminate LV cable in kiosk substation)/(Install HV cable in zone substation yard)/(Jointing of pilot cable)/(Joints in city pits?) (funding of recoverable portion of kiosk substation) (supply ZZZkVA transformer/RMCB/protection panel to site/store)etc		
6. AUSGRID'S CONNECTION REALATED ANCILLARY SERVICES (incl GST)	*if this service is required more than once, you will incur this fee on each occasion ** if this service is required, the ASP/1 will incur this fee on each occasion		
Standard Offer -ASP1 Connection:	$XX,XXX.XX	Access Permit:	$XX,XXX.XX
Contestable Process Facilitation:	$XX,XXX.XX	Clearance to Work:	$XX,XXX.XX
Property Services:	$XX,XXX.XX	Inspection* (ASP/1 Grade A/B/C):	$XX,XXX.XX
Customer Interface Coordination:	$XX,XXX.XX	Substation Commissioning:	$XX,XXX.,XX
Notification of Arrangement:	$XX,XXX.XX	Supply temporary connections:	$XX,XXX.XX
Administration:	$XX,XXX.XX	Reinspection:	$XX,XXX.XX
Substation Contribution:	$XXX.XX per hour	* If this service is required, the ASP/1 will incur this fee on each occasion	$XX,XXX.XX
7. TIMEFRAMES FOR CONNECTION SERVICES AND WORKS			
Timeframes for connection will be developed by your ASP/1 and accepted by Ausgrid in accordance with clause 9.3 of the connection contract. A Table of Critical Dates will be annexed to the connection contract.			
8. PIONEER SCHEME			
Does a Pioneer Scheme apply ?		Commencement date of scheme:	
Is connection customer the original customer ?		If no, connecting customer is scheme member number:	
New scheme applies to:	(HV\LV\Substation)	Connection Customer req'd contribution:	$XXX,XXX.XX
9. DEED OF GUARANTEE OF REVENUE			$XX,XXX
Is a deed of guarantee of minimum revenue required for connection assets constructed by or on behalf of Ausgrid in accordance with clauses 6?			
Amount of security required:	$XXX,XXX.XX	Security must be provided in the form of a bank guarantee by an Australian bank.	

REFER TO SHEET 2 FOR SITE PLAN (POLES 1 TO 8)
REFER TO SHEET 3 FOR SITE PLAN (POLES 8 TO 16)
REFER TO SHEET 4 FOR PROFILES (POLES 1 TO 8)
REFER TO SHEET 5 FOR PROFILES (POLES 8 TO 16)
REFER TO SHEET 19 FOR AUSGRID PROPERTY RIGHTS





LOCALITY SKETCH
N.T.S.

CAD DRAWING
AMENDMENTS

ASSOCIATED DRAWINGS

Replace this text in Block MY_LOGO with Company Logo and Company Address, Phone and Project Details.

ASP REF.	ASP Quality File Reference
CERTIFICATION NUMBER	##/##

DESIGNED BY	FR
DRAWN BY	TK
CHECKED BY	FR
SUBMIT DATE	12/10/2015
LGA	RAVENSWORTH
MAP REF.	
AUSGRID REF.	CN31
PRJTRAK No.	XCS010127

RAVENSWORTH
GLENDELL MINE
132 kV RELOCATIONS

SIZE A1 | AUSGRID PROJECT No. SR00350 | SHEETS 1 of 19 | AMD. 0

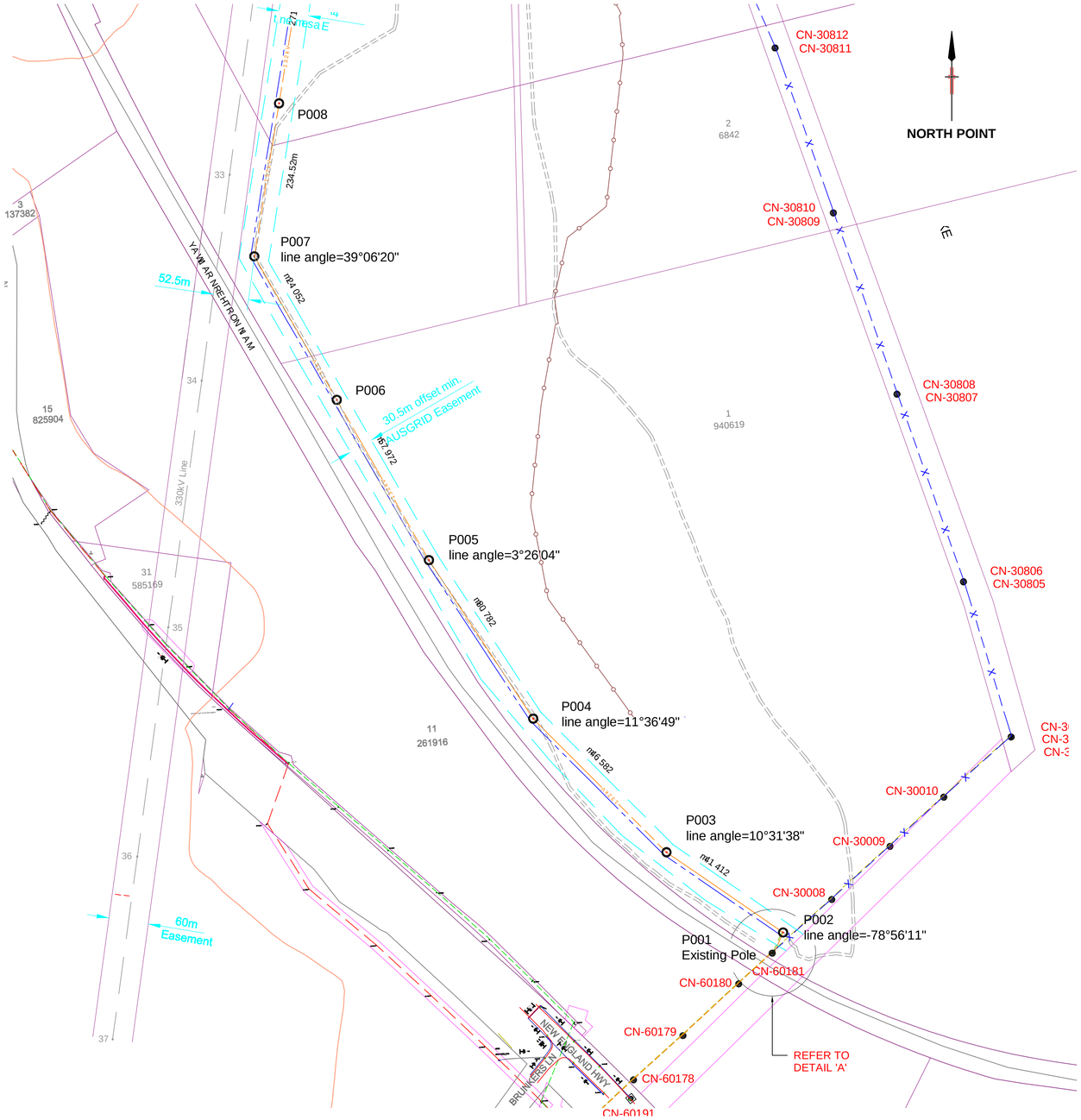
20150629

CHECK FOR OTHER SERVICES BEFORE BORING OR EXCAVATING

WARNING

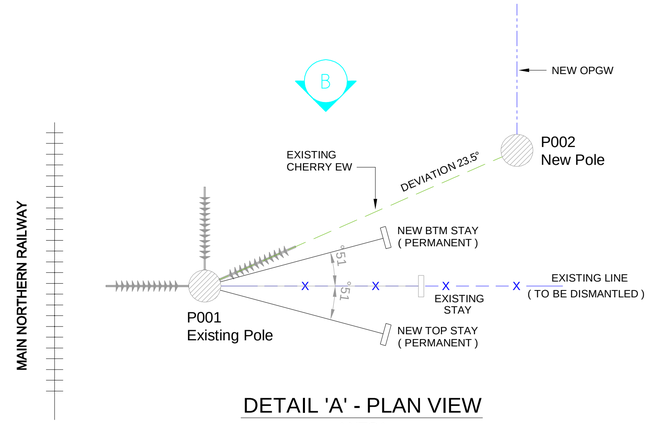
- THIS DESIGN CANNOT BE USED FOR CONSTRUCTION PURPOSES UNTIL THE LOCATION OF ALL EXISTING SERVICES IS VERIFIED.
- THE INFORMATION PROVIDED IN THIS DESIGN MUST BE CHECKED ON SITE AND THE MOST CURRENT INFORMATION ON THE CONFIGERATION OF ALL SERVICES, INCLUDING AUSGRID'S NETWORK, MUST BE VERIFIED IMMEDIATLEY BEFORE CONSTRUCTION COMMENCES BY CONTACTING DIAL-BEFORE-YOU-DIG BY TELEPHONE ON 1100 OR AT www.1100.com.au.
- DIAL-BEFORE-YOU-DIG INFORMATION MUST NOT BE OLDER THAN 20 BUSINESS DAYS AT THE TIME OF CONSTRUCTION.

ALL WORKS TO BE UNDERTAKEN IN ACCORDANCE WITH AUSGRID'S NETWORK STANDARD.

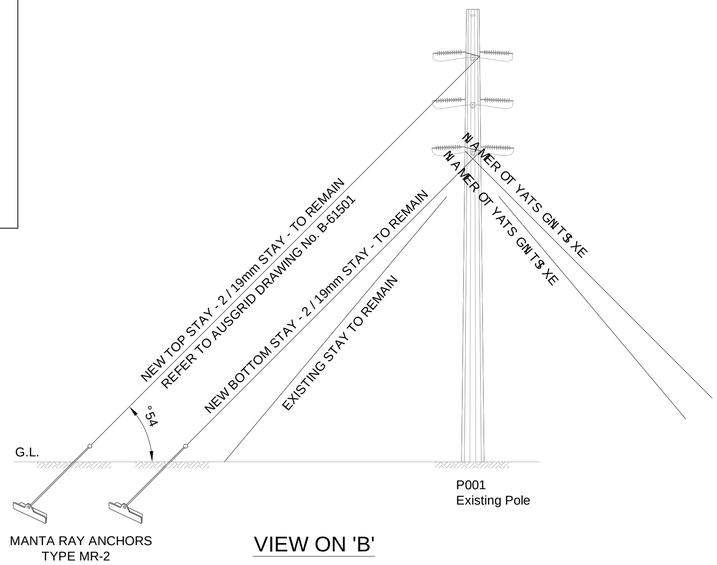


LEGEND

- Existing 11 kV Line
- Existing 66 kV Line
- Existing 132 kV Line
- Existing 330 kV Line
- Proposed 132 kV Line
- Existing Line to be Demolished
- OPGW Installed
- OHEW Retained
- Construction Access
- Existing Pole
- Proposed Pole
- Narama Water Pipeline
- Existing Fence



DETAIL 'A' - PLAN VIEW
(NTS)



VIEW ON 'B'

NOTE : ALL STAYS ARE PERMANENT

SCALE 1 : 4000
0 100 200 300 400 METRES

SITE PLAN (POLES 1 TO 8)

REFER TO SHEET 3 FOR SITE PLAN (POLES 8 TO 16)
REFER TO SHEET 4 FOR PROFILES (POLES 1 TO 8)
REFER TO SHEET 5 FOR PROFILES (POLES 8 TO 16)
REFER TO SHEET 19 FOR AUSGRID PROPERTY RIGHTS

AMENDMENTS	
A	REVISED FOR AUSGRID REVIEW COMMENTS TK / FR - 21.1.2016
B	REVISED FOR AUSGRID REVIEW COMMENTS TK / FR - 30.3.2016

CAD DRAWING

ASSOCIATED DRAWINGS

Replace this text in Block MY_LOGO with Company Logo and Company Address, Phone and Project Details.

ASP REF. ASP Quality File Reference

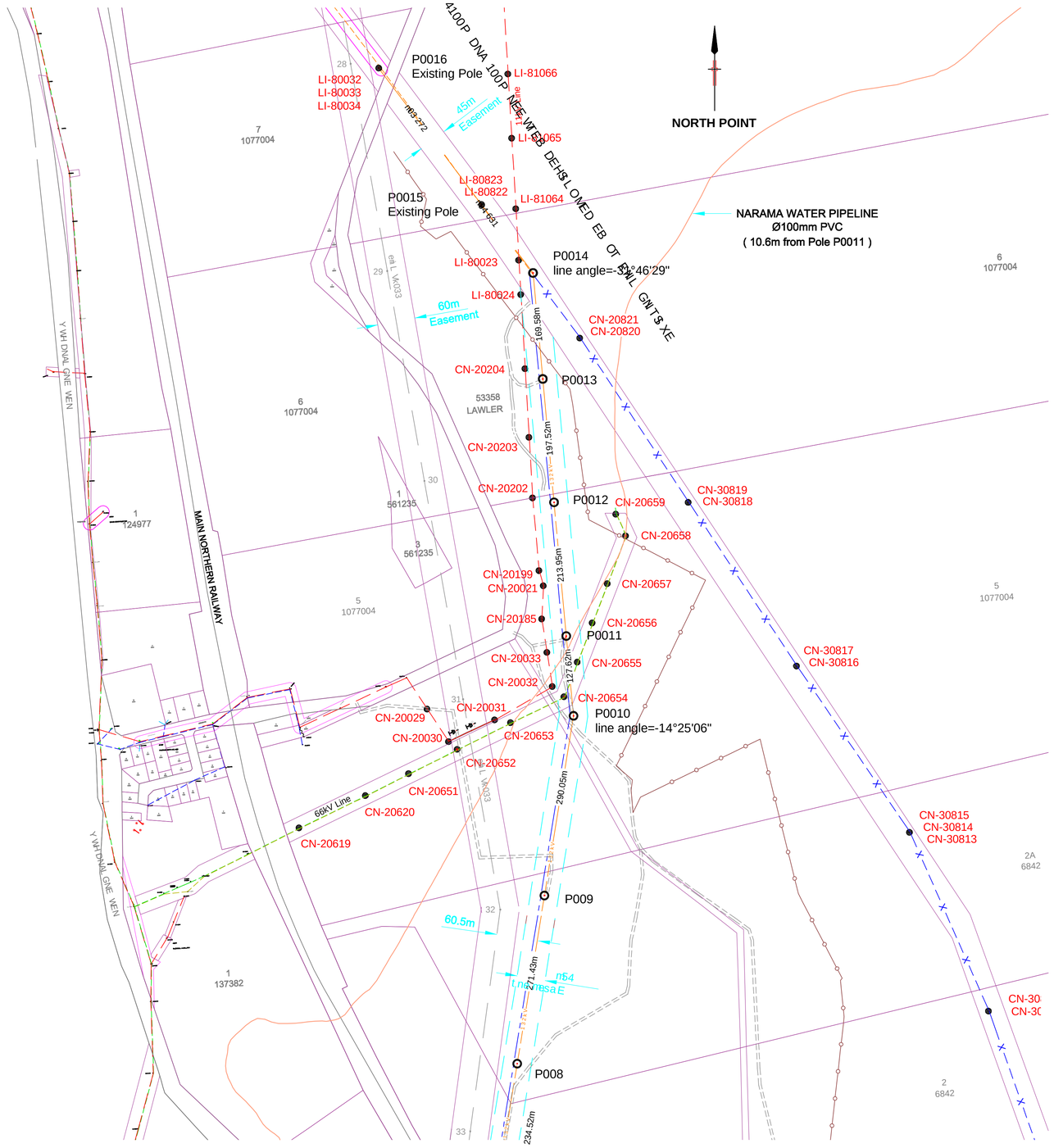
CERTIFICATION NUMBER ##/##

DESIGNED BY	FR
DRAWN BY	TK
CHECKED BY	FR
SUBMIT DATE	12/10/2015
LGA	RAVENSWORTH
MAP REF.	-
AUSGRID REF.	CN31
PRJTRAK No.	XCS010127

RAVENSWORTH
GLENDELL MINE
132 kV RELOCATIONS

SIZE A1 | AUSGRID PROJECT No. SR00350 | SHEETS 2 of 19 | AMD. B

20150629



SCALE 1 : 4000

0 100 300 METRES

200 400

SITE PLAN (POLES 8 TO 16)

CHECK FOR OTHER SERVICES BEFORE BORING OR EXCAVATING

WARNING

- THIS DESIGN CANNOT BE USED FOR CONSTRUCTION PURPOSES UNTIL THE LOCATION OF ALL EXISTING SERVICES IS VERIFIED.
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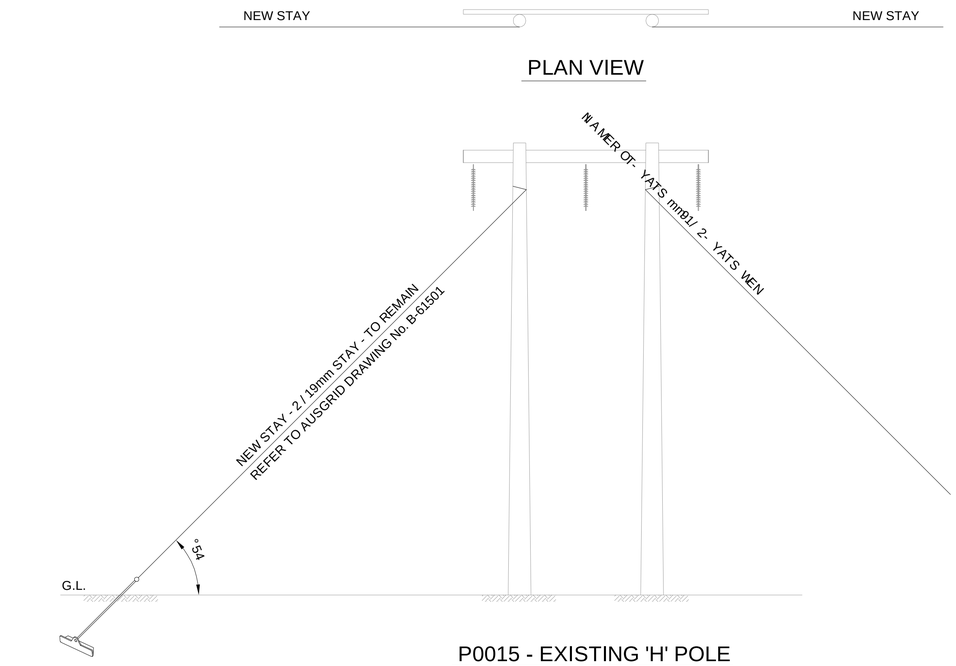


P0015 - EXISTING 'H' POLE

NOTE : ALL STAYS ARE PERMANENT

REFER TO SHEET 2 FOR SITE PLAN (POLES 1 TO 8)
REFER TO SHEET 4 FOR PROFILES (POLES 1 TO 8)
REFER TO SHEET 5 FOR PROFILES (POLES 8 TO 16)
REFER TO SHEET 19 FOR AUSGRID PROPERTY RIGHTS

CABLE CREDIT FOR DEMOLISH OF EXISTING LINE

- **CHERRY - 5462m LENGTH**
- **OLIVE - 8927m LENGTH**

POLES TO BE REMOVED

- **CN-30008**
- **CN-30009**
- **CN-30010**
- **CN-30011, CN-30012, CN-30013**
- **CN-30805, CN-30806**
- **CN-30807, CN-30808**
- **CN-30809, CN-30810**
- **CN-30811, CN-30812**
- **CN-30813, CN-30814, CN-30815**
- **CN-30816, CN-30817**
- **CN-30818, CN-30819**
- **CN-20820, CN-20821**

CAD DRAWING

AMENDMENTS

A — REVISED FOR AUSGRID REVIEW COMMENTS TK / FR - 21.1.2016

B — REVISED FOR AUSGRID REVIEW COMMENTS TK / FR - 30.3.2016

ASSOCIATED DRAWINGS

Replace this text in Block MY_LOGO with Company Logo and Company Address, Phone and Project Details.

ASP REF. ASP Quality File Reference

CERTIFICATION NUMBER ##/##

DESIGNED BY	FR
DRAWN BY	TK
CHECKED BY	FR
SUBMIT DATE	12/10/2015
LGA	RAVENSWORTH
MAP REF.	
AUSGRID REF.	CN31
PRJTRAK No.	XCS010127

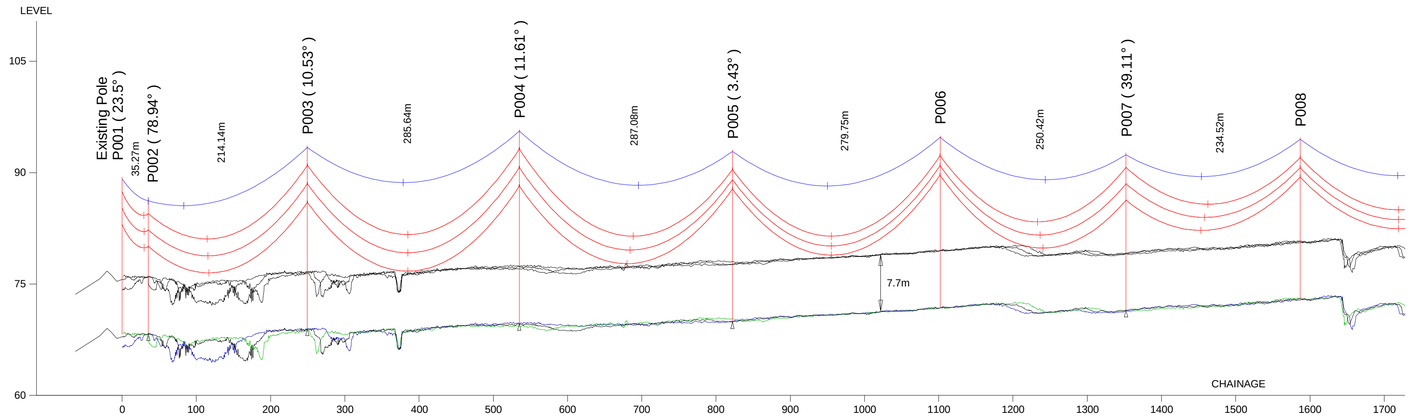
RAVENSWORTH
GLENDELL MINE
132 kV RELOCATIONS

SIZE A1 | AUSGRID PROJECT No. SR00350 | SHEETS 3 of 19 | AMD. B

20150629

POLE SETOUT DETAILS

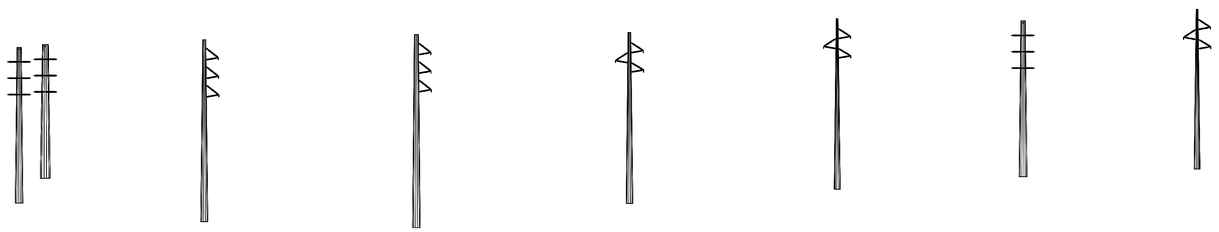
REF IDENTIFIER	Pole number	EASTING	NORTHING	POLE TYPE	AUSGRID DRAWING No.	FOUNDATION DRAWING	UTILISATION (%)	POLE PRESET (mm)	VIBRATION DAMPERS				ADDITIONAL CONSTRUCTION DETAIL
									CONDUCTOR - VSD4032		EW - VSD2025 + VDSR-150		
									BACK	AHEAD	BACK	AHEAD	
P001	CN60181	318,550.63	6,407,218.34	Existing pole	514121		69.4	-					Two additional stays to be added before cut-in
P002	CN30034	318,564.63	6,407,250.61	18M220KN	514121	SHEET 06	73.7	80					OPGW Splice Box
P003	CN30035	318,388.19	6,407,371.95	245M80KN	202351	SHEET 07	72.0	290	1	1	1	1	
P004	CN30036	318,186.37	6,407,574.08	26M80KN	202351	SHEET 08	80.8	300	1	1	1	1	
P005	CN30037	318,028.58	6,407,813.91	23M60KN	212803	SHEET 09	71.1	130	1	1	1	1	
P006	CN30038	317,889.09	6,408,056.40	23M40KN	212803	SHEET 10	85.1	-	0	1	1	1	
P007	CN30039	317,764.23	6,408,273.47	215M140KN	514121	SHEET 11	87.8	330	0	0	2	2	
P008	CN30040	317,801.71	6,408,504.97	215M40KN	212803	SHEET 12	81.5	-	1	1	1	1	
P009	CN30041	317,845.10	6,408,772.91	215M40KN	212803	SHEET 13	87.4	-	0	1	1	1	
P0010	CN30042	317,891.46	6,409,059.23	275M140KN	514121	SHEET 14	74.6	190	2	0	2	0	OPGW Splice Box
P0011	CN30043	317,879.85	6,409,186.32	275M40KN	212803	SHEET 15	59.9	-	1	1	1	1	
P0012	CN30044	317,860.38	6,409,399.38	20M40KN	212803	SHEET 16	59.0	-	0	1	0	1	
P0013	CN30045	317,842.41	6,409,596.08	20M40KN	212803	SHEET 17	55.4	-	0	1	0	1	
P0014	CN30046	317,826.97	6,409,764.95	215M140KN	514121	SHEET 18	78.4	270					Twin earthwires in span ahead, connect to one attachment / OPGW Splice Box
P0015	L1-80822, L1-80823	317,744.84	6,409,873.97	Existing pole	513051		74.3	-					Ensure insulators are plumb during and after cut-in. Two additional stays to be added before cut-in, as per drawing 513049



132 kV RELOCATION PROFILE

Horiz. Scale : 100.0m
Vert. Scale : 10.0m

Clearance Line at 7.7m Above Ground



CHECK FOR OTHER SERVICES BEFORE BORING OR EXCAVATING

WARNING

- THIS DESIGN CANNOT BE USED FOR CONSTRUCTION PURPOSES UNTIL THE LOCATION OF ALL EXISTING SERVICES IS VERIFIED.
- THE INFORMATION PROVIDED IN THIS DESIGN MUST BE CHECKED ON SITE AND THE MOST CURRENT INFORMATION ON THE CONFIGERATION OF ALL SERVICES, INCLUDING AUSGRID'S NETWORK, MUST BE VERIFIED IMMEDIATLEY BEFORE CONSTRUCTION COMMENCES BY CONTACTING DIAL-BEFORE-YOU-DIG BY TELEPHONE ON 1100 OR AT www.1100.com.au.
- DIAL-BEFORE-YOU-DIG INFORMATION MUST NOT BE OLDER THAN 20 BUSINESS DAYS AT THE TIME OF CONSTRUCTION.

ALL WORKS TO BE UNDERTAKEN IN ACCORDANCE WITH AUSGRID'S NETWORK STANDARD.

REFER TO SHEET 2 FOR SITE PLAN (POLES 1 TO 8)
REFER TO SHEET 3 FOR SITE PLAN (POLES 8 TO 16)
REFER TO SHEET 5 FOR PROFILES (POLES 8 TO 16)
REFER TO SHEET 19 FOR AUSGRID PROPERTY RIGHTS

NOTES

1. OLIVE CONDUCTOR DRAWN @ 120°C
2. OPGW CONDUCTOR DRAWN @ 15°C
3. UNDERCROSSING DRAWN @ -5°C
4. POLES DESIGNED USING PLSPOLE VERSION 14.00 x 64
5. LINE DESIGNED USING PLSCADD VERSION 14.00 x 64
6. PRESET DIRECTION IS OPPOSITE TO ANGLE BISECTOR
7. EXISTING CHERRY OHEW POLES 1 TO 2
8. NEW OPGW OHEW POLES 2 TO 14
9. EXISTING CHERRY OHEW POLES 14 TO 16
10. OPGW TERMINATIONS ARRANGEMENT 3 ON DRAWINGS 565747 (P007) AND 230085 (P002, P010 AND P014)
11. OPGW SUSPENSION ARRANGEMENT 3 ON DRAWING 185405 FOR ALL OTHER POLES
12. CONDUCTOR : ONE DAMPER AT 1220mm FROM SUPPORT
    TWO DAMPERS AT 1040mm AND 1880mm FROM SUPPORT
13. EARTHWIRE : ONE DAMPER AT 790mm FROM SUPPORT
    TWO DAMPERS AT 1020mm AND 1430mm FROM SUPPORT

CAD DRAWING

AMENDMENTS

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B	REVISED FOR AUSGRID REVIEW COMMENTS TK / FR - 30.3.2016

ASSOCIATED DRAWINGS

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LGA	RAVENSWORTH
MAP REF.	
AUSGRID REF.	CN31
PRJTRAK No.	XCS010127

ASP REF. ASP Quality File Reference

CERTIFICATION NUMBER ## / ##

RAVENSWORTH
GLENDELL MINE
132 kV RELOCATIONS

SIZE A1 | AUSGRID PROJECT No. SR00350 | SHEETS 4 of 19 | AMD. B

20150629

NOTES

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2. OPGW CONDUCTOR DRAWN @ 15°C
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4. POLES DESIGNED USING PLSPOLE VERSION 14.00 x 64
5. LINE DESIGNED USING PLSCADD VERSION 14.00 x 64
6. PRESET DIRECTION IS OPPOSITE TO ANGLE BISECTOR
7. EXISTING CHERRY OHEW POLES 1 TO 2
8. NEW OPGW OHEW POLES 2 TO 14
9. EXISTING CHERRY OHEW POLES 14 TO 16
10. CONDUCTOR - SAGS AND TENSIONS INCLUDE CREEP COMPENSATION OF 15°C.
    - PRE-SAG CONDUCTOR BY HOLDING AT 40.0kN FOR 24 HOURS BEFORE SAGGING TO TABLE VALUES.
11. OPGW - SAGS AND TENSIONS INCLUDE CREEP COMPENSATION OF 10°C.
    - PRE-SAG OPGW BY HOLDING AT 15.0kN FOR 24 HOURS BEFORE SAGGING TO TABLE VALUES.
12. CHERRY HAS NO CREEP COMPENSATION OR PRE-SAG REQUIRED.
13. INSULATOR STOCK CODES ARE H117721 FOR TENSION STRINGS, 178291 FOR POST INSULATORS.
14. POLES 7 AND 10 CAN SUPPORT SINGLE PHASE OR OPGW TERMINATED.
15. POLE 2 CAN SUPPORT ALL PHASES AND OPGW TERMINATED.

REFER TO SHEET 2 FOR SITE PLAN (POLES 1 TO 8)
REFER TO SHEET 3 FOR SITE PLAN (POLES 8 TO 16)
REFER TO SHEET 4 FOR PROFILES (POLES 1 TO 8)
REFER TO SHEET 19 FOR AUSGRID PROPERTY RIGHTS

CHECK FOR OTHER SERVICES BEFORE BORING OR EXCAVATING

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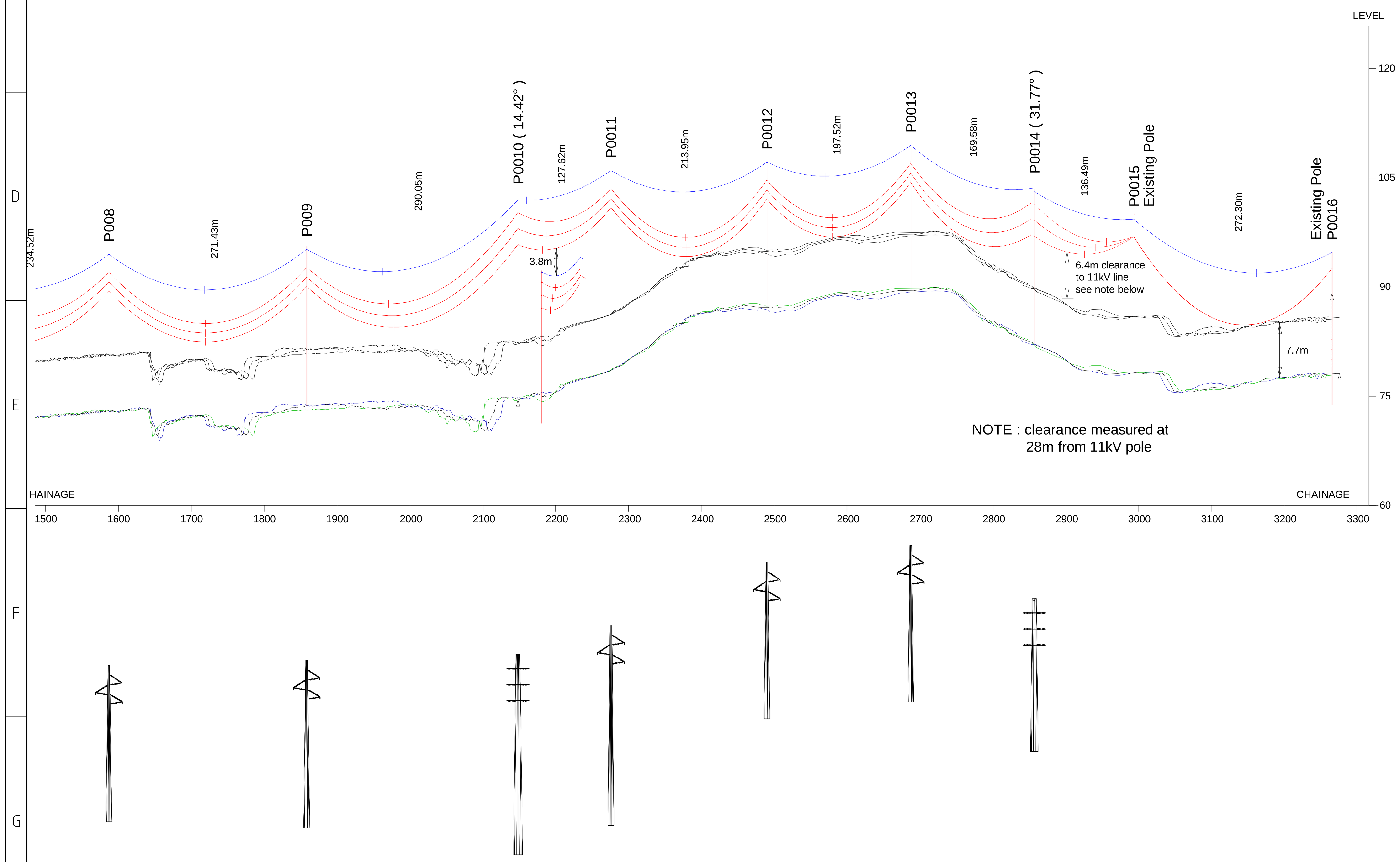

132 kV RELOCATION PROFILE
Horiz. Scale : 100.0m
Vert. Scale : 10.0m
Clearance Line at 7.7m Above Ground

	OVERHEAD MAINS STRINGING TABLE					**DESIGN TEMPERATURE 120 DEG.**						
WIRE	**LEFT**	**SPAN**				**TEMPERATURE (DEG.)**						
TYPE	**STRUCTURE**	**(m)**		**0**	**5**	**10**	**15**	**20**	**25**	**30**	**35**	**40**
TENSION @ 15 DEG. C												
STRAIN POINTS	**P001 to P002**	**RULING SPAN**	**35.3**									
Olive	P001	35.3	Sag (m)	0.46	0.5	0.54	0.58	0.61	0.65	0.68	0.72	0.75
2.8% CBL			Tension (N)	6556	5999	5559	5189	4881	4620	4394	4196	4020
Cherry	P001	35.3	Sag (m)	0.26	0.31	0.36	0.41	0.45	0.49	0.54	0.57	0.61
3.5% CBL			Tension (N)	2380	2002	1724	1521	1368	1249	1153	1076	1010
STRAIN POINTS	**P002 to P007**	**RULING SPAN**	**267.5**									
Olive	P002	214.1	Sag (m)	2.97	3.09	3.2	3.32	3.44	3.55	3.67	3.78	3.9
22.5% CBL	P003	285.5		5.28	5.49	5.7	5.91	6.11	6.32	6.53	6.73	6.93
	P004	287		5.34	5.55	5.76	5.97	6.18	6.38	6.59	6.8	7
	P005	279.7		5.07	5.27	5.47	5.67	5.87	6.07	6.26	6.46	6.65
	P006	250.4		4.06	4.22	4.38	4.54	4.7	4.86	5.02	5.17	5.33
			Tension (N)	37091	35677	34387	33175	32057	31016	30038	29137	28283
OPGW	P002	214.1	Sag (m)	2.67	2.79	2.9	3.02	3.14	3.26	3.38	3.49	3.61
13.7% CBL	P003	285.6		4.74	4.96	5.16	5.37	5.59	5.8	6	6.22	6.42
	P004	287.1		4.79	5.01	5.22	5.43	5.64	5.86	6.07	6.28	6.49
	P005	279.7		4.55	4.75	4.95	5.15	5.36	5.56	5.76	5.96	6.16
	P006	250.4		3.65	3.81	3.97	4.13	4.29	4.45	4.61	4.78	4.93
			Tension (N)	10019	9592	9205	8846	8510	8202	7918	7650	7405
STRAIN POINTS	**P007 to P010**	**RULING SPAN**	**268.3**									
Olive	P007	234.5	Sag (m)	3.56	3.71	3.84	3.98	4.12	4.26	4.4	4.53	4.67
22.5% CBL	P008	271.4		4.77	4.96	5.15	5.34	5.52	5.71	5.89	6.08	6.26
	P009	290		5.45	5.67	5.88	6.09	6.31	6.52	6.73	6.94	7.15
			Tension (N)	37091	35676	34387	33190	32056	31016	30053	29153	28314
OPGW	P007	234.5	Sag (m)	3.2	3.34	3.48	3.62	3.76	3.9	4.05	4.18	4.32
13.7% CBL	P008	271.4		4.28	4.47	4.66	4.85	5.04	5.23	5.42	5.61	5.79
	P009	290		4.89	5.11	5.33	5.54	5.76	5.98	6.19	6.4	6.62
			Tension (N)	10019	9600	9205	8850	8518	8206	7918	7658	7409
STRAIN POINTS	**P010 to P014**	**RULING SPAN**	**185.7**									
Olive	P0010	127.6	Sag (m)	1.03	1.1	1.16	1.23	1.29	1.36	1.43	1.5	1.56
22.5% CBL	P0011	213.9		2.91	3.08	3.26	3.44	3.63	3.82	4.01	4.2	4.39
	P0012	197.5		2.48	2.63	2.78	2.94	3.1	3.26	3.42	3.58	3.74
	P0013	169.6		1.83	1.94	2.05	2.17	2.28	2.4	2.52	2.64	2.76
			Tension (N)	37861	35701	33758	31939	30277	28800	27418	26191	25057
OPGW	P0010	127.6	Sag (m)	0.93	0.99	1.05	1.11	1.18	1.25	1.32	1.38	1.45
13.7% CBL	P0011	213.9		2.61	2.78	2.95	3.13	3.32	3.51	3.69	3.89	4.08
	P0012	197.5		2.23	2.37	2.52	2.67	2.83	2.99	3.15	3.31	3.48
	P0013	169.6		1.64	1.74	1.85	1.97	2.08	2.2	2.32	2.44	2.57
			Tension (N)	10207	9605	9036	8514	8040	7605	7218	6858	6535

CAD DRAWING
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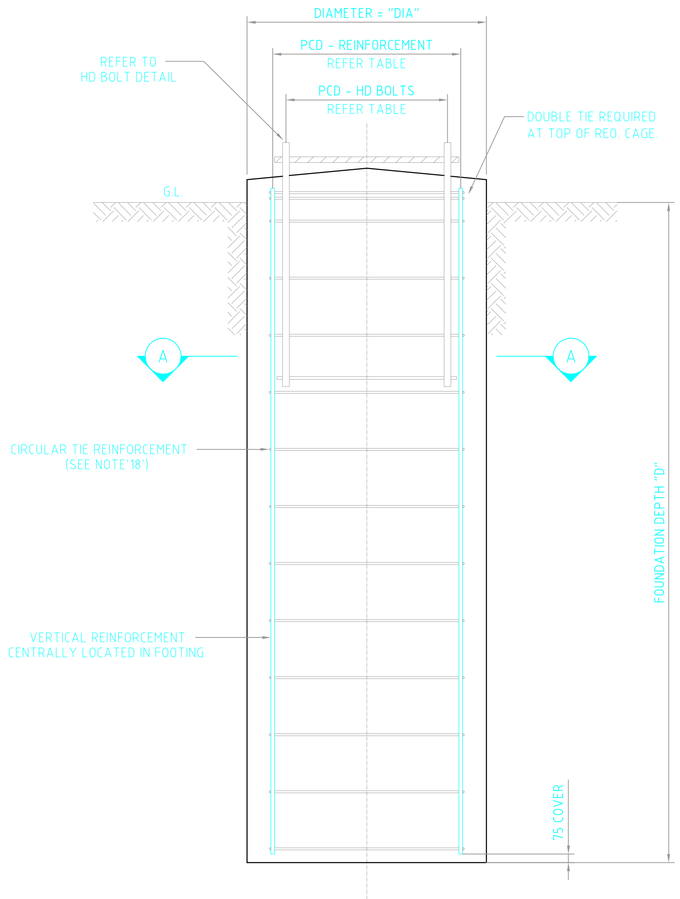
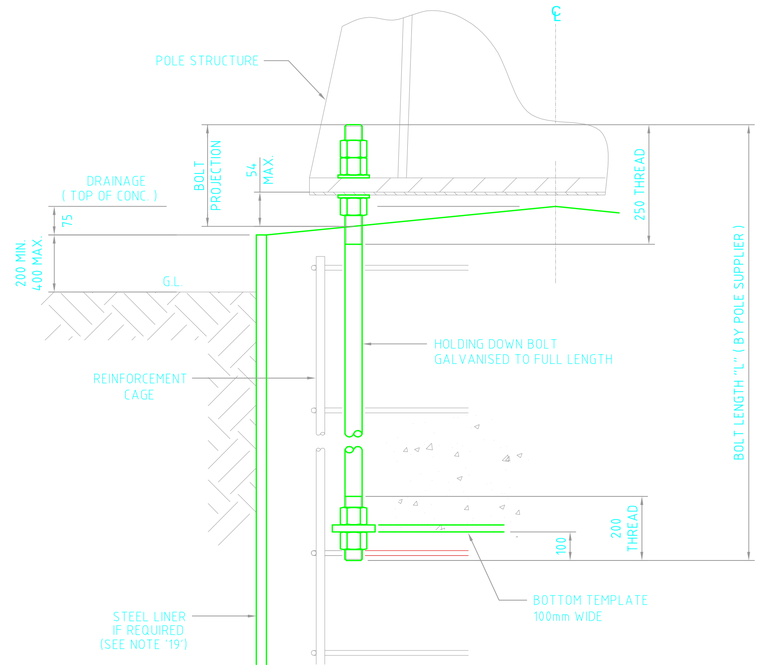
RAVENSWORTH
GLENDELL MINE
132 kV RELOCATIONS

SIZE A1 — AUSGRID PROJECT No. SR00350 — SHEETS 5 of 19 — AMD. B



SECTIONAL ELEVATION



HOLDING DOWN BOLT DETAIL

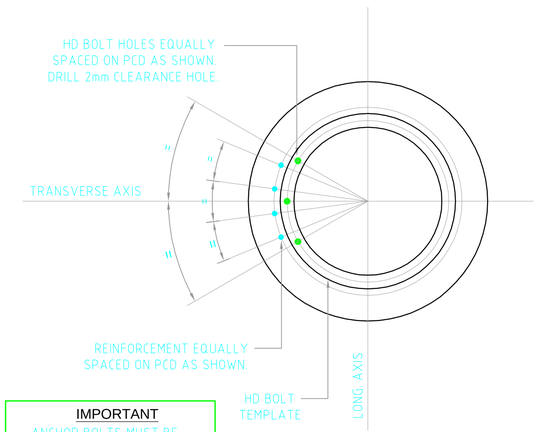
REFER TABLE

CONSTRUCTION NOTES:

1. ALL WORK SHALL CONFORM WITH AS3600-2009 "CONCRETE STRUCTURES", AS 2159 " PILING DESIGN AND INSTALLATION", AND AUSGRID SPECIFICATION
2. ANCHOR BOLTS 40CR MATERIAL GRADE 450MPa ALL NUTS, BOLTS, WASHERS GALVANISED.
3. BOTTOM TEMPLATE GRADE Q345B, UNCOATED.
4. WELDING OF REINFORCING TO AS1554. NO WELDING OF OR TO HD BOLTS.
5. TOP OF HD BOLT CAGE TO BE HELD FIRMLY USING A STEEL TEMPLATE.
6. CONCRETE FOOTING GRADE N32, 80 SLUMP, 20mm MAX. AGGREGATE.
7. REINFORCING GRADE 500N.
8. CONCRETE FOOTING TO BE CAST WITHOUT JOINTS.
9. HD BOLTS TO BE CLEANED, RUN FREE AND GREASED IMMEDIATELY AFTER FOOTING POUR.
10. CURE CONCRETE FOR A MINIMUM OF 14 DAYS PRIOR TO ERECTION OF POLE.
11. NUTS AND WASHERS TO BE SNUG TIGHT AGAINST BASE PLATE.
12. FORMED EXPOSED SURFACE FINISHES TO AS3610 CLASS 3.
13. UNFORMED EXPOSED SURFACES TO BE SMOOTH STEEL TROWELLED FINISH.
14. MINIMUM CONCRETE COVER TO REINFORCEMENT AND HOLDING DOWN BOLTS = 75mm
15. LINERS, IF REQUIRED, TO BE STEEL WITH DIAMETER AND WALL THICKNESS TO SUIT METHOD OF INSTALLATION. MINIMUM WALL THICKNESS 12mm.
16. LINERS IF REQUIRED TO BE INSTALLED WITHOUT DISTURBANCE TO IN-SITU SOIL STRUCTURE.
17. FOR GEOTECHNICAL INFORMATION AND DESIGN PARAMETERS, REFER TO PARSONS BRINCKERHOFF GEOTECHNICAL REPORT NUMBER 2161126A-GEO-REP-001 REVISION B DATED 29 SEPTEMBER 2015.
18. PILE FITMENTS TO BE EITHER CONTINUOUS SPIRAL OR HOOPS WITH 160mm LONG SINGLE SPLICE WELD IN ACCORDANCE WITH AS1554.3.
19. STEEL LINER RECOMMENDED FOR THIS SITE - FULL DEPTH.

DESIGN NOTES:

1. FOUNDATION DESIGN IS IN ACCORDANCE WITH THE BRINCH HANSEN METHOD AS DETAILED IN AS/NZS 7000.
2. GEOTECHNICAL COMPONENT STRENGTH FACTOR = 0.6
3. THE TABULATED DESIGN ACTIONS ARE EXCLUSIVE OF THE GEOTECHNICAL COMPONENT STRENGTH FACTOR.
4. TABULATED DESIGN ACTIONS ARE ULTIMATE DESIGN LOADS TO AS1170 STANDARD.



IMPORTANT
ANCHOR BOLTS MUST BE LOCATED ON TRANSVERSE AXIS

SECTION A—A

POLE				
TYPE	HEIGHT m	DESIGN MOMENT kNm	VERTICAL FORCE kN	DESIGN SHEAR kN
18M220KN	18	4030	43	220

FOUNDATION	
DIAMETER "DIA"	DEPTH "D"
2000	6200

HOLDING DOWN BOLTS				
PCD	No. OFF	BAR SIZE	BOLT LENGTH "L"	BOLT PROJECTION
1276	36	36	2000	220

REINFORCEMENT			
PCD	No. OFF BARS	BAR SIZE	CIRCULAR TIES
1760	34	N28	N16@250

CAD DRAWING

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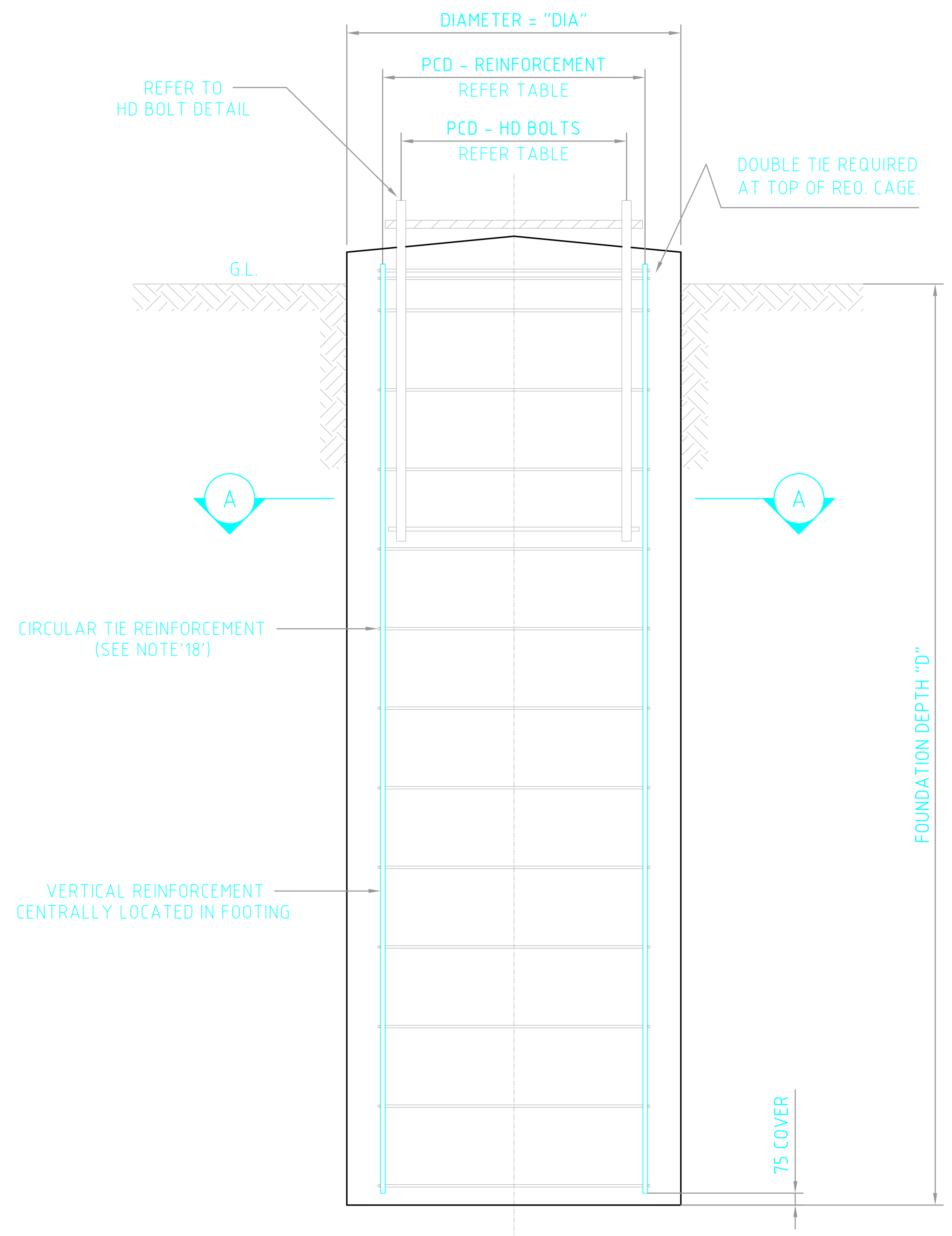
AUSGRID REF.	CN31
PRJTRAK No.	XCS010127

##/##

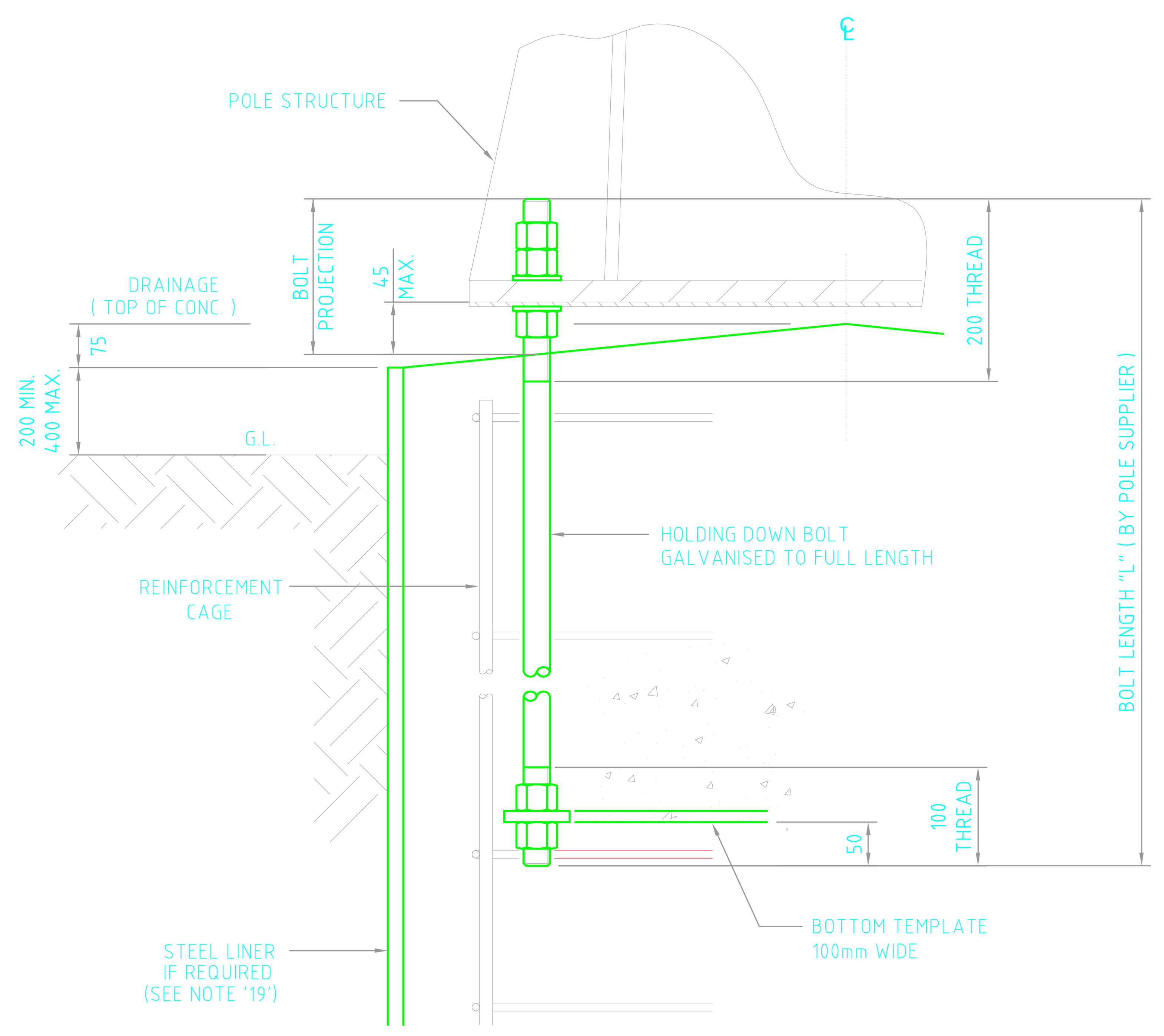
RAVENSWORTH
GLENDELL MINE
132kV RELOCATION
POLE TYPE-18M220KN-SITE P002
FOUNDATION DETAILS

SIZE A1 | AUSGRID PROJECT No. SR00350 | SHEETS 6 of 19 | AMD. 0

20150629



SECTIONAL ELEVATION



HOLDING DOWN BOLT DETAIL

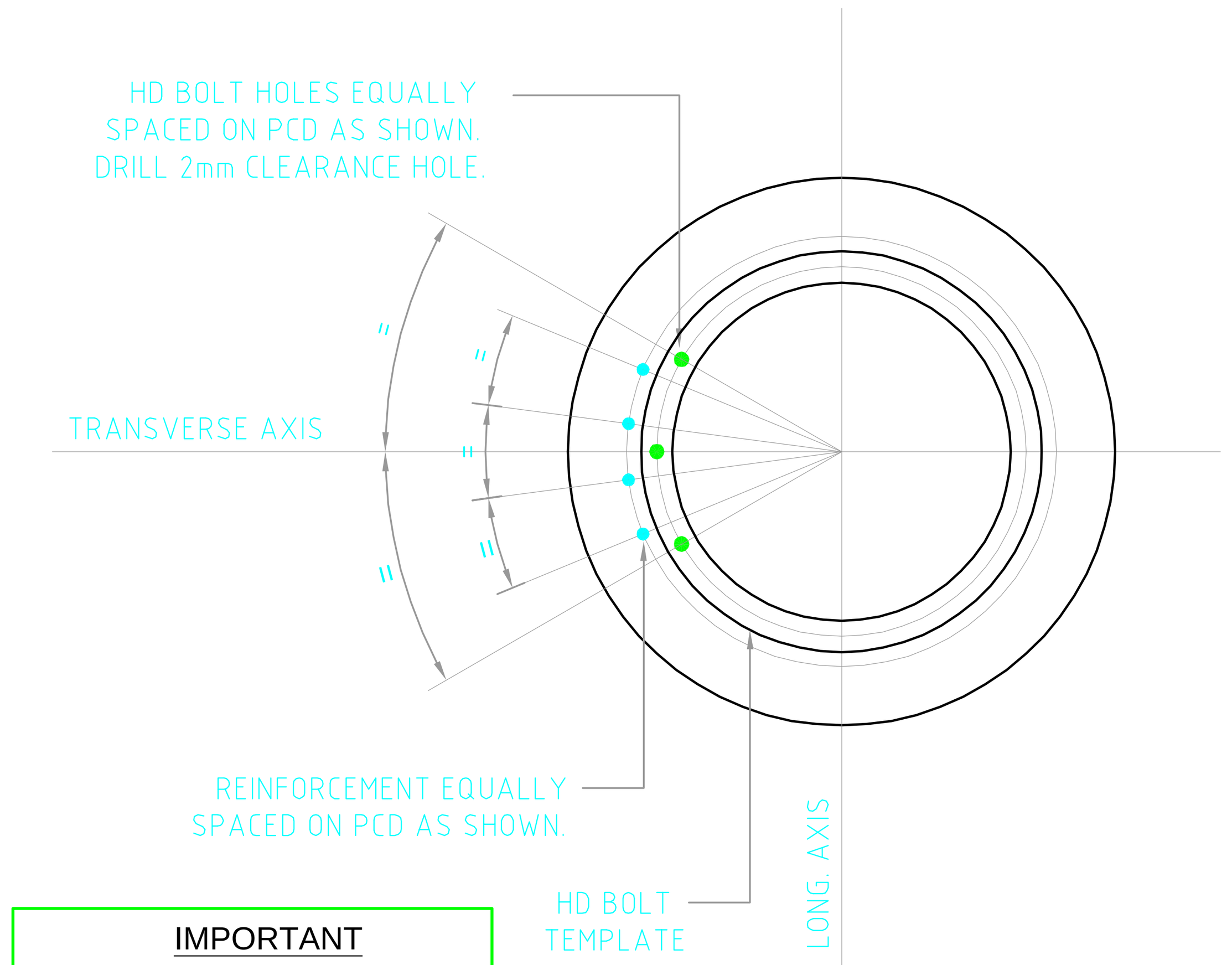
REFER TABLE

CONSTRUCTION NOTES:

1. ALL WORK SHALL CONFORM WITH AS3600-2009 "CONCRETE STRUCTURES", AS 2159 " PILING DESIGN AND INSTALLATION", AND AUSGRID SPECIFICATION
2. ANCHOR BOLTS 40CR MATERIAL GRADE 450MPa ALL NUTS, BOLTS, WASHERS GALVANISED.
3. BOTTOM TEMPLATE GRADE Q345B, UNCOATED.
4. WELDING OF REINFORCING TO AS1554. NO WELDING OF OR TO HD BOLTS.
5. TOP OF HD BOLT CAGE TO BE HELD FIRMLY USING A STEEL TEMPLATE.
6. CONCRETE FOOTING GRADE N32, 80 SLUMP, 20mm MAX. AGGREGATE.
7. REINFORCING GRADE 500N.
8. CONCRETE FOOTING TO BE CAST WITHOUT JOINTS.
9. HD BOLTS TO BE CLEANED, RUN FREE AND GREASED IMMEDIATELY AFTER FOOTING POUR.
10. CURE CONCRETE FOR A MINIMUM OF 14 DAYS PRIOR TO ERECTION OF POLE.
11. NUTS AND WASHERS TO BE SNUG TIGHT AGAINST BASE PLATE.
12. FORMED EXPOSED SURFACE FINISHES TO AS3610 CLASS 3.
13. UNFORMED EXPOSED SURFACES TO BE SMOOTH STEEL TROWELLED FINISH.
14. MINIMUM CONCRETE COVER TO REINFORCEMENT AND HOLDING DOWN BOLTS = 75mm
15. LINERS, IF REQUIRED, TO BE STEEL WITH DIAMETER AND WALL THICKNESS TO SUIT METHOD OF INSTALLATION. MINIMUM WALL THICKNESS 12mm.
16. LINERS IF REQUIRED TO BE INSTALLED WITHOUT DISTURBANCE TO IN-SITU SOIL STRUCTURE.
17. FOR GEOTECHNICAL INFORMATION AND DESIGN PARAMETERS, REFER TO PARSONS BRINCKERHOFF GEOTECHNICAL REPORT NUMBER 2161126A-GEO-REP-001 REVISION B DATED 29 SEPTEMBER 2015.
18. PILE FITMENTS TO BE EITHER CONTINUOUS SPIRAL OR HOOPS WITH 160mm LONG SINGLE SPLICE WELD IN ACCORDANCE WITH AS1554.3.
19. STEEL LINER RECOMMENDED FOR THIS SITE - FULL DEPTH.

DESIGN NOTES:

1. FOUNDATION DESIGN IS IN ACCORDANCE WITH THE BRINCH HANSEN METHOD AS DETAILED IN AS/NZS 7000.
2. GEOTECHNICAL COMPONENT STRENGTH FACTOR = 0.6
3. THE TABULATED DESIGN ACTIONS ARE EXCLUSIVE OF THE GEOTECHNICAL COMPONENT STRENGTH FACTOR.
4. TABULATED DESIGN ACTIONS ARE ULTIMATE DESIGN LOADS TO AS1170 STANDARD.



IMPORTANT
ANCHOR BOLTS MUST BE LOCATED ON TRANSVERSE AXIS

SECTION A-A

POLE				
TYPE	HEIGHT m	DESIGN MOMENT kNm	VERTICAL FORCE kN	DESIGN SHEAR kN
245M80KN	24.5	1999	41.3	80

FOUNDATION	
DIAMETER "DIA"	DEPTH "D"
1650	4200

HOLDING DOWN BOLTS				
PCD	No. OFF	BAR SIZE	BOLT LENGTH "L"	BOLT PROJECTION
1102	28	30	1500	180

REINFORCEMENT			
PCD	No. OFF BARS	BAR SIZE	CIRCULAR TIES
1430	30	N24	N16@250

CAD DRAWING
AMENDMENTS

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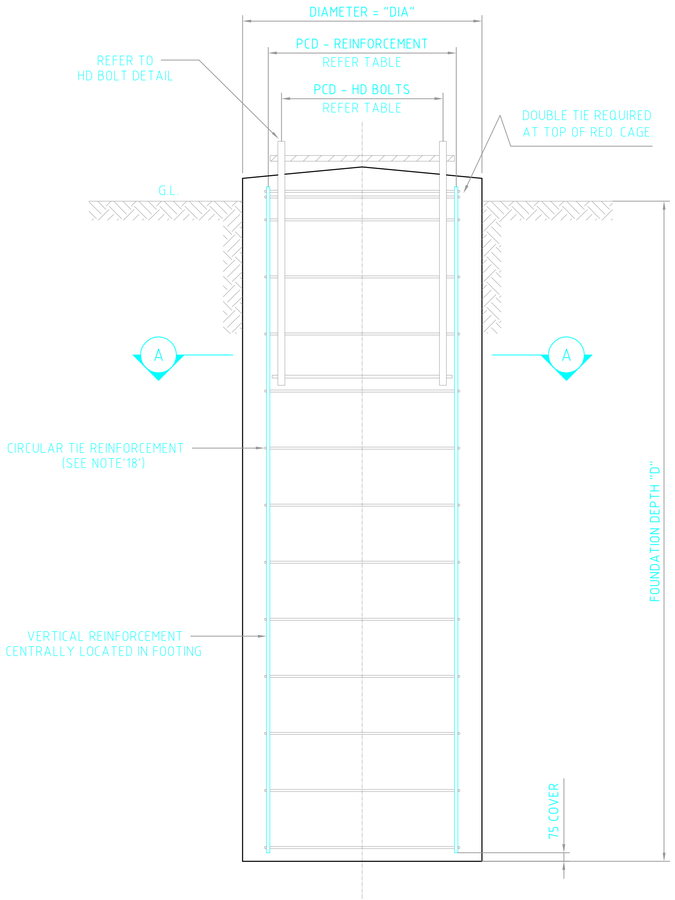
LGA	RAVENSWORTH
MAP REF.	
AUSGRID REF.	CN31
PRJTRAK No.	XCS010127

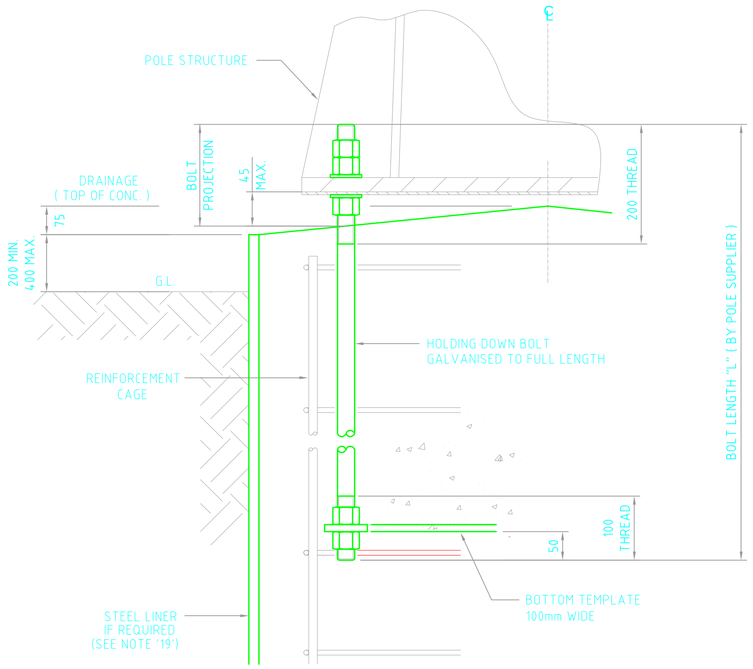
RAVENSWORTH
GLENDELL MINE
132kV RELOCATION
POLE TYPE-245M80KN-SITE P003
FOUNDATION DETAILS

SIZE A1 | AUSGRID PROJECT No. SR00350 | SHEETS 7 of 19 | AMD. 0

20150629



SECTIONAL ELEVATION



HOLDING DOWN BOLT DETAIL

REFER TABLE

CONSTRUCTION NOTES:

1. ALL WORK SHALL CONFORM WITH AS3600-2009 "CONCRETE STRUCTURES", AS 2159 " PILING DESIGN AND INSTALLATION", AND AUSGRID SPECIFICATION
2. ANCHOR BOLTS 40CR MATERIAL GRADE 450MPa ALL NUTS, BOLTS, WASHERS GALVANISED.
3. BOTTOM TEMPLATE GRADE Q345B, UNCOATED.
4. WELDING OF REINFORCING TO AS1554. NO WELDING OF OR TO HD BOLTS.
5. TOP OF HD BOLT CAGE TO BE HELD FIRMLY USING A STEEL TEMPLATE.
6. CONCRETE FOOTING GRADE N32, 80 SLUMP, 20mm MAX. AGGREGATE.
7. REINFORCING GRADE 500N.
8. CONCRETE FOOTING TO BE CAST WITHOUT JOINTS.
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12. FORMED EXPOSED SURFACE FINISHES TO AS3610 CLASS 3.
13. UNFORMED EXPOSED SURFACES TO BE SMOOTH STEEL TROWELLED FINISH.
14. MINIMUM CONCRETE COVER TO REINFORCEMENT AND HOLDING DOWN BOLTS = 75mm
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17. FOR GEOTECHNICAL INFORMATION AND DESIGN PARAMETERS, REFER TO PARSONS BRINCKERHOFF GEOTECHNICAL REPORT NUMBER 2161126A-GEO-REP-001 REVISION B DATED 29 SEPTEMBER 2015.
18. PILE FITMENTS TO BE EITHER CONTINUOUS SPIRAL OR HOOPS WITH 160mm LONG SINGLE SPLICE WELD IN ACCORDANCE WITH AS1554.3.
19. STEEL LINER RECOMMENDED FOR THIS SITE - FULL DEPTH.

DESIGN NOTES:

1. FOUNDATION DESIGN IS IN ACCORDANCE WITH THE BRINCH HANSEN METHOD AS DETAILED IN AS/NZS 7000.
2. GEOTECHNICAL COMPONENT STRENGTH FACTOR = 0.6
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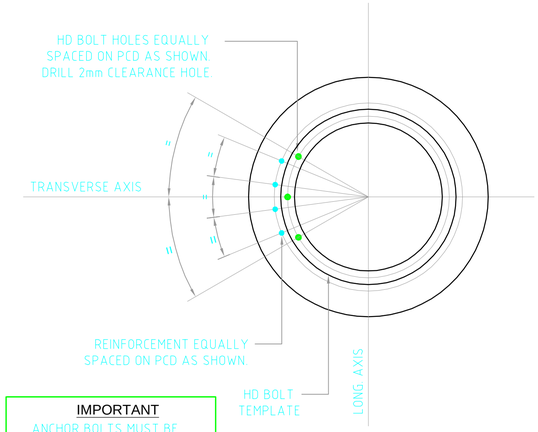


IMPORTANT
ANCHOR BOLTS MUST BE LOCATED ON TRANSVERSE AXIS

SECTION A—A

POLE				
TYPE	HEIGHT m	DESIGN MOMENT kNm	VERTICAL FORCE kN	DESIGN SHEAR kN
26M80KN	26	2120	44.7	80

FOUNDATION	
DIAMETER "DIA"	DEPTH "D"
1800	5100

HOLDING DOWN BOLTS				
PCD	No. OFF	BAR SIZE	BOLT LENGTH "L"	BOLT PROJECTION
1164	28	30	1500	180

REINFORCEMENT			
PCD	No. OFF BARS	BAR SIZE	CIRCULAR TIES
1575	28	N28	N16@250

CAD DRAWING

AMENDMENTS

ASSOCIATED DRAWINGS

Replace this text in Block
MY_LOGO with Company
Logo and Company Address,
Phone and Project Details.

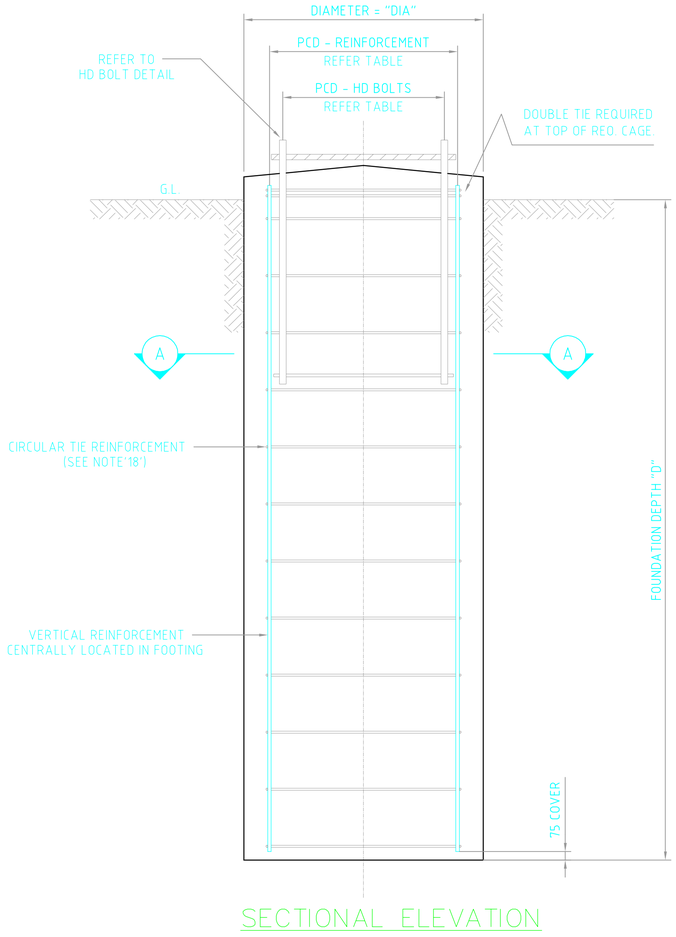
CERTIFICATION NUMBER

DESIGNED BY	GSP
DRAWN BY	DJM
CHECKED BY	KB
SUBMIT DATE	12/10/2015
LGA	RAVENSWORTH
MAP REF.	
AUSGRID REF.	CN31
PRJTRAK No.	XCS010127
ASP REF.	ASP Quality File Reference

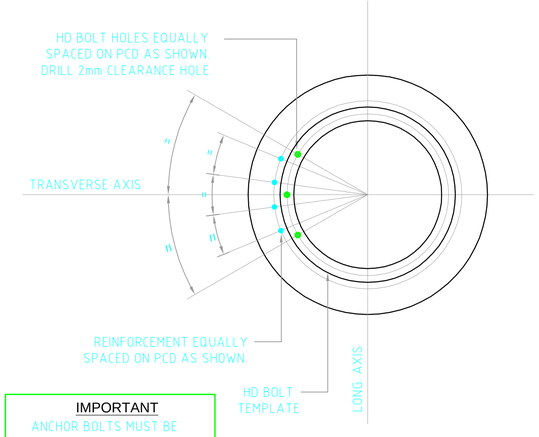
RAVENSWORTH
GLENDELL MINE
132kV RELOCATION
POLE TYPE-26M80KN-SITE P004
FOUNDATION DETAILS

SIZE	AUSGRID PROJECT No.	SHEETS	AMD.
A1	SR00350	8 of 19	0

20150629

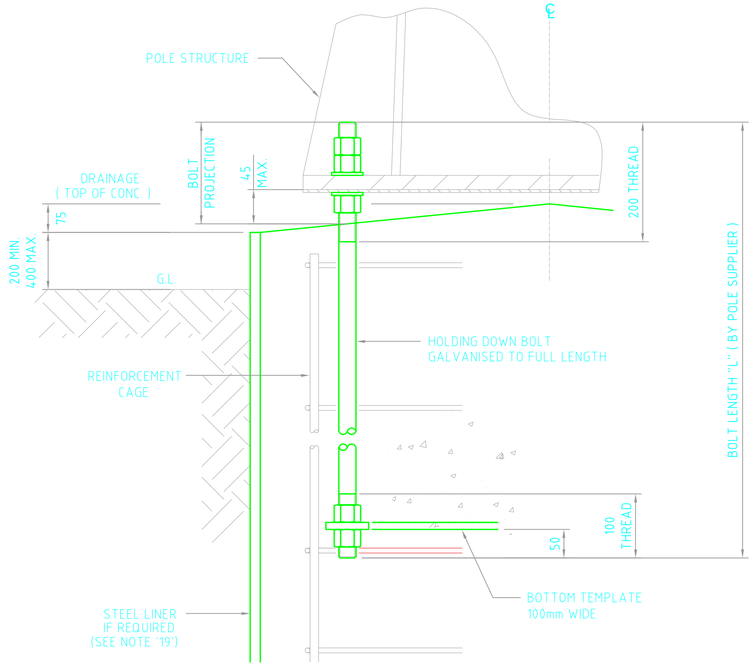


SECTIONAL ELEVATION



IMPORTANT
ANCHOR BOLTS MUST BE
LOCATED ON TRANSVERSE AXIS

SECTION A–A



HOLDING DOWN BOLT DETAIL
REFER TABLE

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POLE

TYPE	HEIGHT m	DESIGN MOMENT kNm	VERTICAL FORCE kN	DESIGN SHEAR kN
23M60KN	23	1408	30.6	60

FOUNDATION

DIAMETER "DIA"	DEPTH "D"
1650	4200

HOLDING DOWN BOLTS

PCD	No. OFF	BAR SIZE	BOLT LENGTH "L"	BOLT PROJECTION
1032	20	30	1500	180

REINFORCEMENT

PCD	No. OFF BARS	BAR SIZE	CIRCULAR TIES
1430	30	N24	N16@250

CAD DRAWING
AMENDMENTS

ASSOCIATED DRAWINGS

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Phone and Project Details.

ASP REF. ASP Quality File Reference

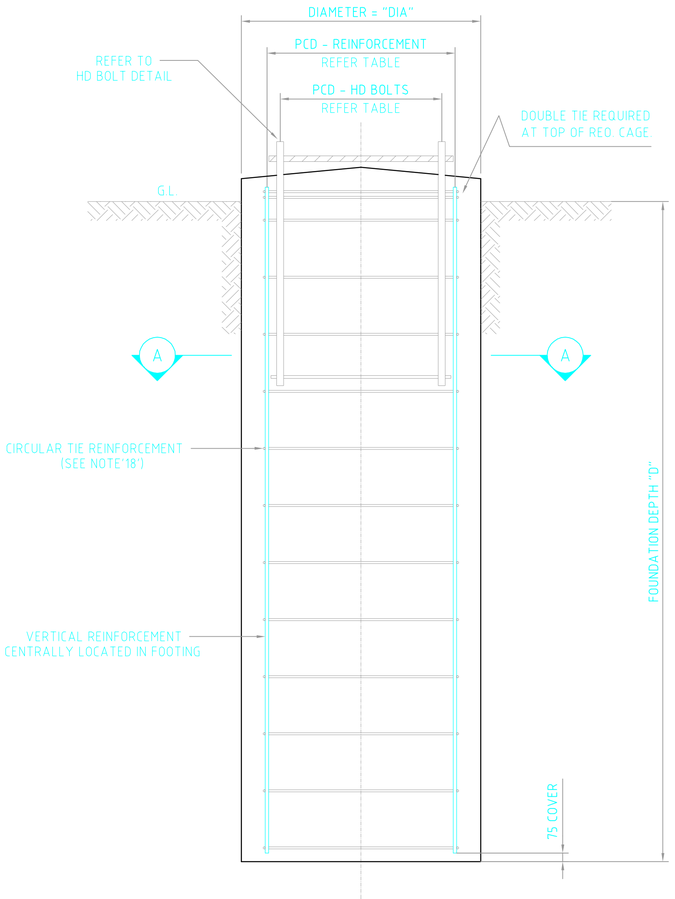
CERTIFICATION NUMBER ##/##

DESIGNED BY	GSP
DRAWN BY	DJM
CHECKED BY	KB
SUBMIT DATE	12/10/2015
LGA	RAVENSWORTH
MAP REF.	
AUSGRID REF.	CN31
PRJTRAK No.	XCS010127

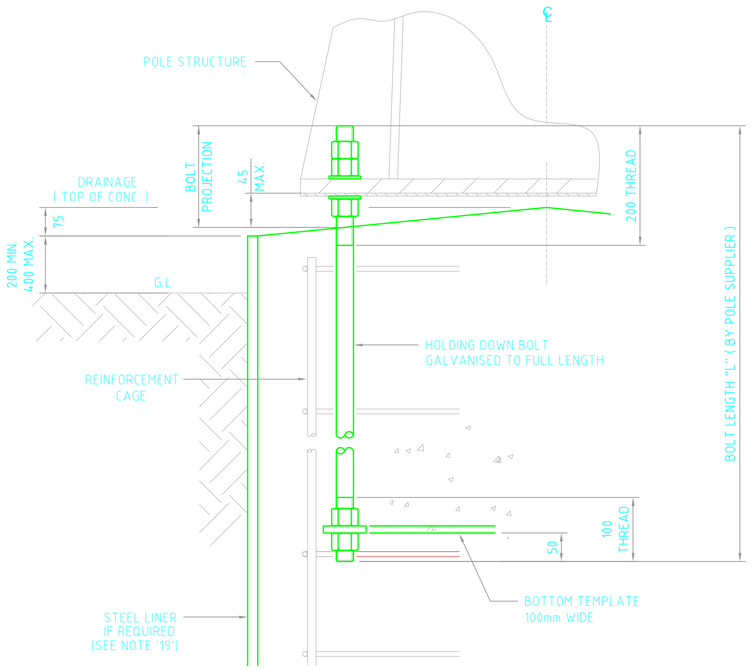
RAVENSWORTH
GLENDELL MINE
132kV RELOCATION
POLE TYPE-23M60KN-SITE P005
FOUNDATION DETAILS

SIZE A1 | AUSGRID PROJECT No. SR00350 | SHEETS 9 of 19 | AMD. 0

20150629



SECTIONAL ELEVATION



HOLDING DOWN BOLT DETAIL

REFER TABLE

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19. STEEL LINER RECOMMENDED FOR THIS SITE - FULL DEPTH.

DESIGN NOTES:

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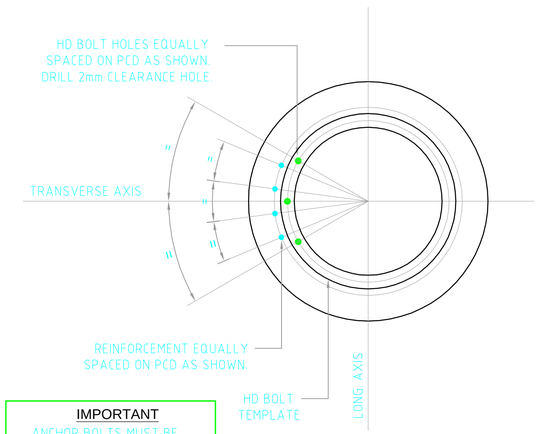


IMPORTANT
ANCHOR BOLTS MUST BE LOCATED ON TRANSVERSE AXIS

SECTION A–A

POLE				
TYPE	HEIGHT m	DESIGN MOMENT kNm	VERTICAL FORCE kN	DESIGN SHEAR kN
23M40KN	23	939	22.1	40

FOUNDATION	
DIAMETER "DIA"	DEPTH "D"
1650	4200

HOLDING DOWN BOLTS				
PCD	No. OFF	BAR SIZE	BOLT LENGTH "L"	BOLT PROJECTION
972	16	30	1500	180

REINFORCEMENT			
PCD	No. OFF BARS	BAR SIZE	CIRCULAR TIES
1430	30	N24	N16@250

CAD DRAWING
AMENDMENTS

ASSOCIATED DRAWINGS

Replace this text in Block
MY_LOGO with Company
Logo and Company Address,
Phone and Project Details.

ASP REF. ASP Quality File Reference

CERTIFICATION NUMBER

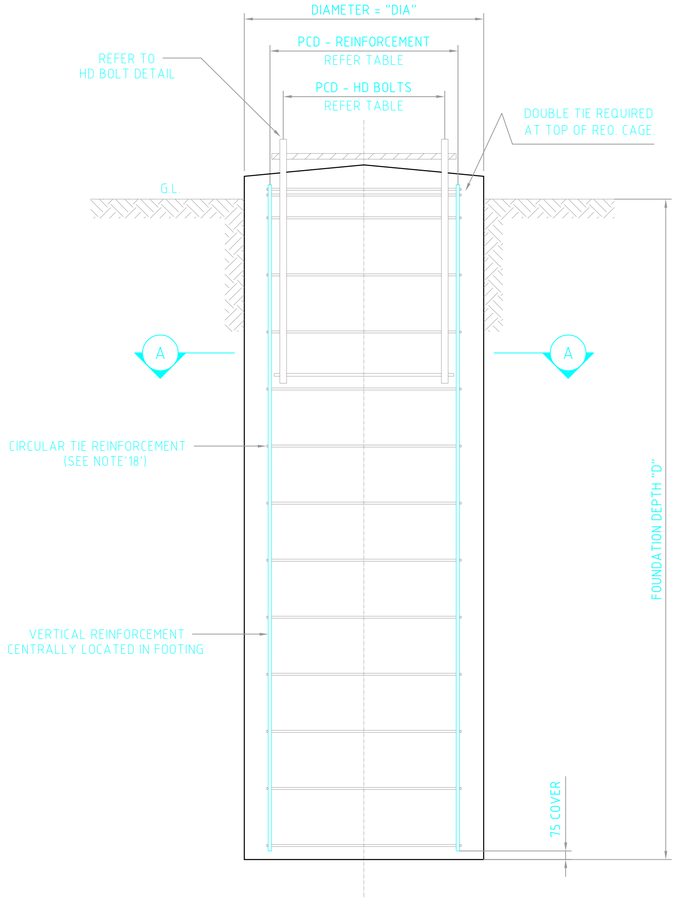
DESIGNED BY	GSP
DRAWN BY	DJM
CHECKED BY	KB
SUBMIT DATE	12/10/2015
LGA	RAVENSWORTH
MAP REF.	
AUSGRID REF.	CN31
PRJTRAK No.	XCS010127

/ ## /

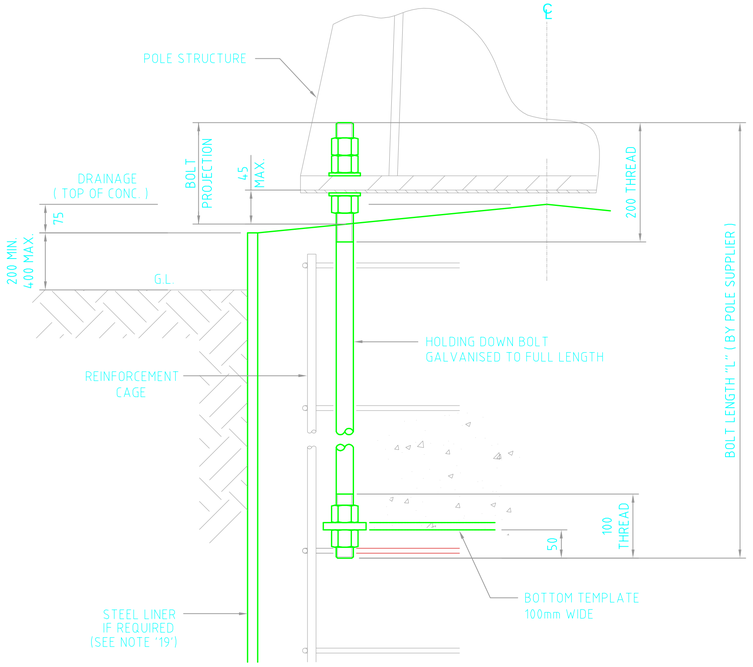
RAVENSWORTH
GLENDELL MINE
132kV RELOCATION
POLE TYPE-23M40KN-SITE P006
FOUNDATION DETAILS

SIZE	AUSGRID PROJECT No.	SHEETS	AMD.
A1	SR00350	10 of 19	0

20150629



SECTIONAL ELEVATION



HOLDING DOWN BOLT DETAIL

REFER TABLE

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DESIGN NOTES:

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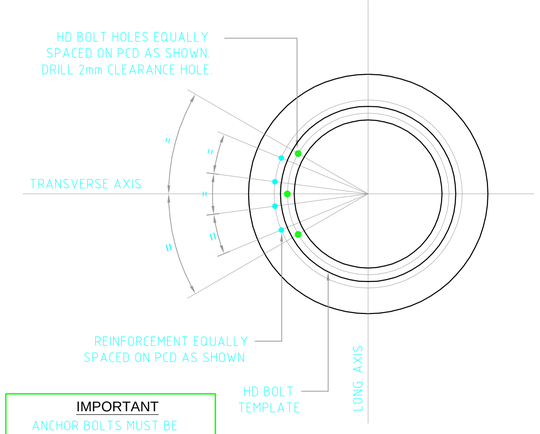


IMPORTANT
ANCHOR BOLTS MUST BE LOCATED ON TRANSVERSE AXIS

SECTION A–A

POLE				
TYPE	HEIGHT m	DESIGN MOMENT kNm	VERTICAL FORCE kN	DESIGN SHEAR kN
215M140KN	21.5	3057	41.5	140

FOUNDATION	
DIAMETER "DIA"	DEPTH "D"
1800	6200

HOLDING DOWN BOLTS				
PCD	No. OFF	BAR SIZE	BOLT LENGTH "L"	BOLT PROJECTION
1250	40	30	1500	180

REINFORCEMENT			
PCD	No. OFF BARS	BAR SIZE	CIRCULAR TIES
1575	28	N28	N16@250

CAD DRAWING

AMENDMENTS

ASSOCIATED DRAWINGS

Replace this text in Block MX, LOGO with Company Logo and Company Address, Phone and Project Details.

ASP REF. ASP Quality File Reference

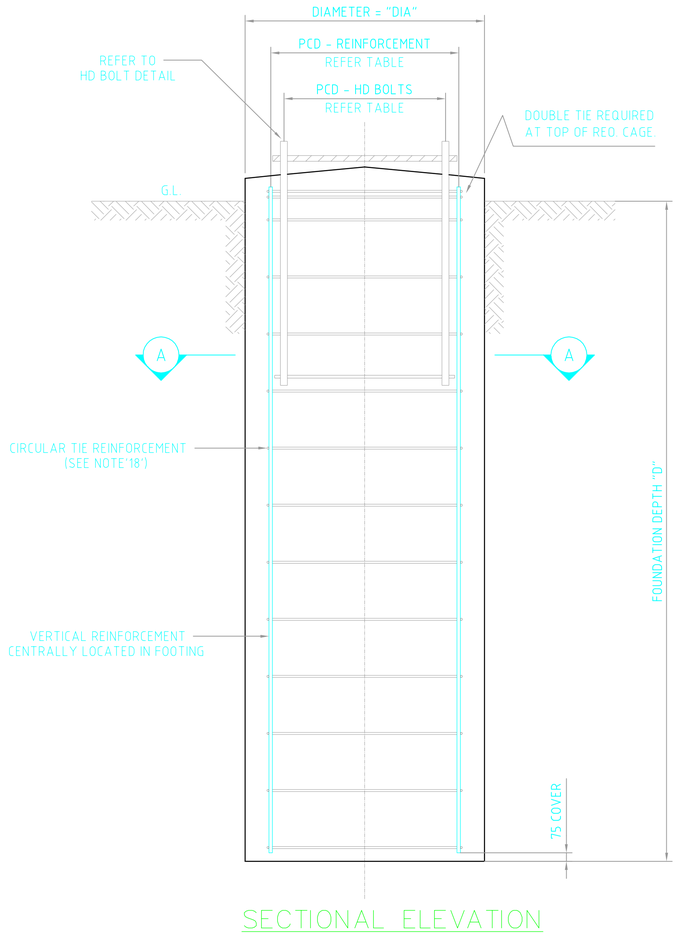
CERTIFICATION NUMBER ##/##

DESIGNED BY	GSP
DRAWN BY	DJM
CHECKED BY	KB
SUBMIT DATE	12/10/2015
LGA	RAVENSWORTH
MAP REF.	
AUSGRID REF.	CN31
PRJTRAK No.	XCS010127

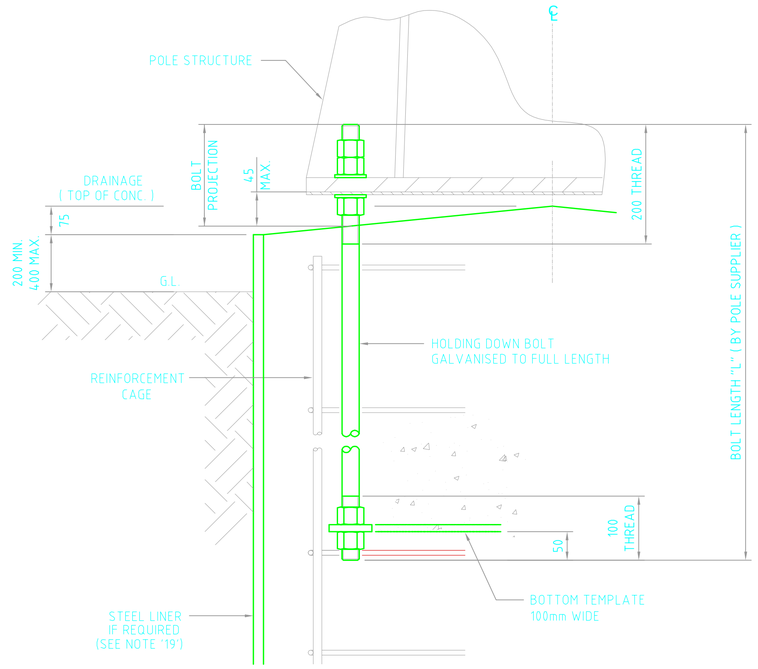
RAVENSWORTH
GLENDELL MINE
132kV RELOCATION
POLE TYPE-215M140KN-SITE P007
FOUNDATION DETAILS

SIZE A1 | AUSGRID PROJECT No. SR00350 | SHEETS 11 of 19 | AMD. 0

20150629



SECTIONAL ELEVATION



HOLDING DOWN BOLT DETAIL

REFER TABLE

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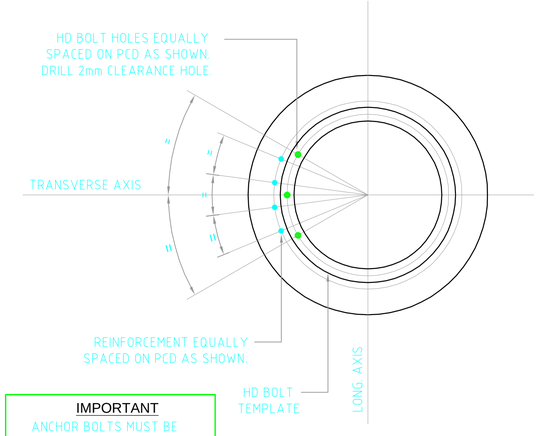

IMPORTANT
ANCHOR BOLTS MUST BE LOCATED ON TRANSVERSE AXIS

SECTION A—A

POLE				
TYPE	HEIGHT m	DESIGN MOMENT kNm	VERTICAL FORCE kN	DESIGN SHEAR kN
215M40KN	21.5	879	19.2	40

FOUNDATION	
DIAMETER "DIA"	DEPTH "D"
1500	4300

HOLDING DOWN BOLTS				
PCD	No. OFF	BAR SIZE	BOLT LENGTH "L"	BOLT PROJECTION
932	16	30	1500	180

REINFORCEMENT			
PCD	No. OFF BARS	BAR SIZE	CIRCULAR TIES
1275	20	N24	N16@250

CAD DRAWING

AMENDMENTS

ASSOCIATED DRAWINGS

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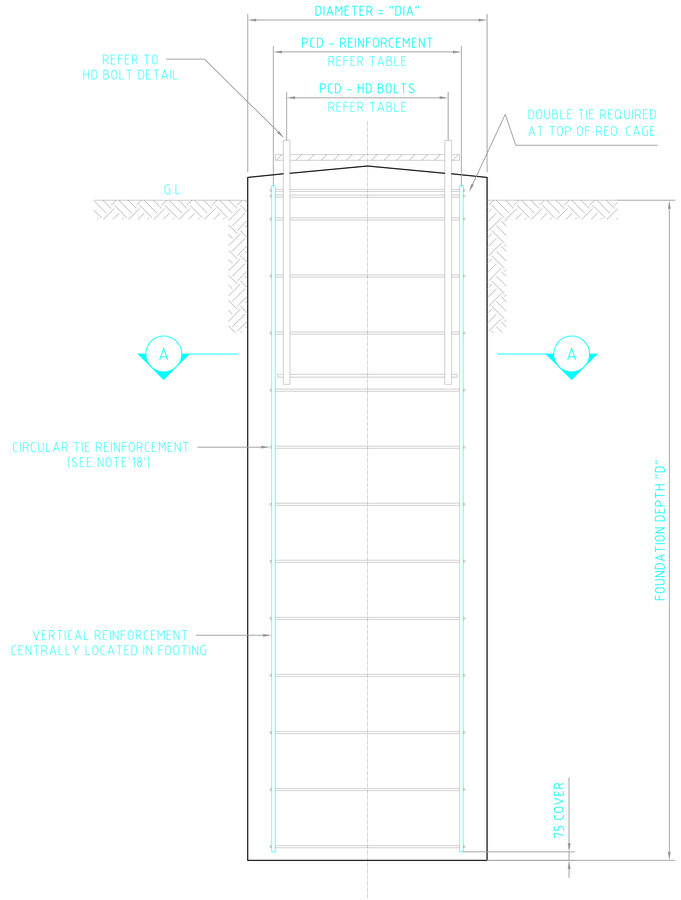
MAP REF.	
AUSGRID REF.	CN31
PRJTRAK No.	XCS010127

/ #

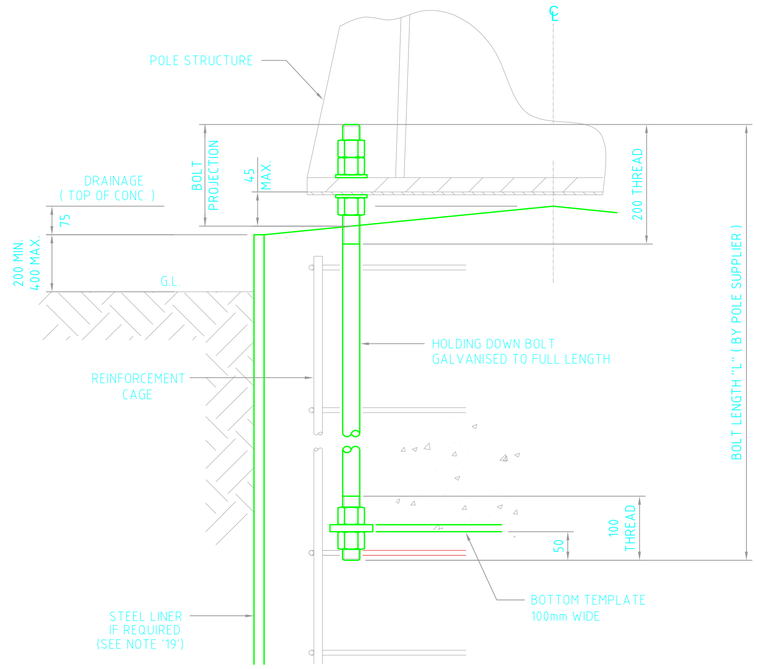
RAVENSWORTH
GLENDELL MINE
132kV RELOCATION
POLE TYPE-215M40KN-SITE P008
FOUNDATION DETAILS

SIZE A1 | AUSGRID PROJECT No. SR00350 | SHEETS 12 of 19 | AMD. 0

20150629



SECTIONAL ELEVATION



HOLDING DOWN BOLT DETAIL

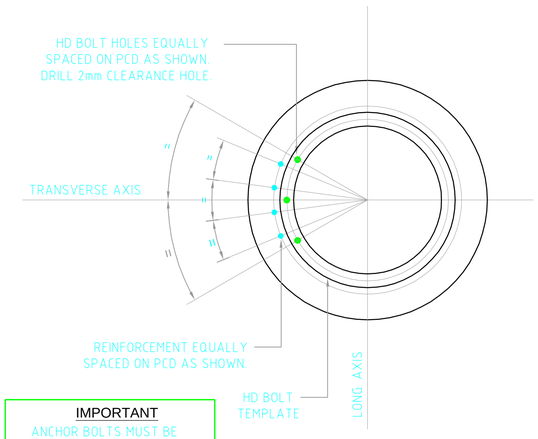
REFER TABLE

CONSTRUCTION NOTES:

1. ALL WORK SHALL CONFORM WITH AS3600-2009 "CONCRETE STRUCTURES", AS 2159 " PILING DESIGN AND INSTALLATION", AND AUSGRID SPECIFICATION
2. ANCHOR BOLTS 40CR MATERIAL GRADE 450MPa ALL NUTS, BOLTS, WASHERS GALVANISED.
3. BOTTOM TEMPLATE GRADE Q345B, UNCOATED.
4. WELDING OF REINFORCING TO AS1554. NO WELDING OF OR TO HD BOLTS.
5. TOP OF HD BOLT CAGE TO BE HELD FIRMLY USING A STEEL TEMPLATE.
6. CONCRETE FOOTING GRADE N32, 80 SLUMP, 20mm MAX. AGGREGATE.
7. REINFORCING GRADE 500N.
8. CONCRETE FOOTING TO BE CAST WITHOUT JOINTS.
9. HD BOLTS TO BE CLEANED, RUN FREE AND GREASED IMMEDIATELY AFTER FOOTING POUR.
10. CURE CONCRETE FOR A MINIMUM OF 14 DAYS PRIOR TO ERECTION OF POLE.
11. NUTS AND WASHERS TO BE SNUG TIGHT AGAINST BASE PLATE.
12. FORMED EXPOSED SURFACE FINISHES TO AS3610 CLASS 3.
13. UNFORMED EXPOSED SURFACES TO BE SMOOTH STEEL TROWELLED FINISH.
14. MINIMUM CONCRETE COVER TO REINFORCEMENT AND HOLDING DOWN BOLTS = 75mm
15. LINERS, IF REQUIRED, TO BE STEEL WITH DIAMETER AND WALL THICKNESS TO SUIT METHOD OF INSTALLATION. MINIMUM WALL THICKNESS 12mm.
16. LINERS IF REQUIRED TO BE INSTALLED WITHOUT DISTURBANCE TO IN-SITU SOIL STRUCTURE.
17. FOR GEOTECHNICAL INFORMATION AND DESIGN PARAMETERS, REFER TO PARSONS BRINCKERHOFF GEOTECHNICAL REPORT NUMBER 2161126A-GEO-REP-001 REVISION B DATED 29 SEPTEMBER 2015.
18. PILE FITMENTS TO BE EITHER CONTINUOUS SPIRAL OR HOOPS WITH 160mm LONG SINGLE SPLICE WELD IN ACCORDANCE WITH AS1554.3.
19. STEEL LINER RECOMMENDED FOR THIS SITE - FULL DEPTH.

DESIGN NOTES:

1. FOUNDATION DESIGN IS IN ACCORDANCE WITH THE BRINCH HANSEN METHOD AS DETAILED IN AS/NZS 7000.
2. GEOTECHNICAL COMPONENT STRENGTH FACTOR = 0.6
3. THE TABULATED DESIGN ACTIONS ARE EXCLUSIVE OF THE GEOTECHNICAL COMPONENT STRENGTH FACTOR.
4. TABULATED DESIGN ACTIONS ARE ULTIMATE DESIGN LOADS TO AS1170 STANDARD.



IMPORTANT
ANCHOR BOLTS MUST BE LOCATED ON TRANSVERSE AXIS

SECTION A–A

POLE				
TYPE	HEIGHT m	DESIGN MOMENT kNm	VERTICAL FORCE kN	DESIGN SHEAR kN
215M40KN	21.5	879	19.2	40

FOUNDATION	
DIAMETER "DIA"	DEPTH "D"
1500	4100

HOLDING DOWN BOLTS				
PCD	No. OFF	BAR SIZE	BOLT LENGTH "L"	BOLT PROJECTION
932	16	30	1500	180

REINFORCEMENT			
PCD	No. OFF BARS	BAR SIZE	CIRCULAR TIES
1275	20	N24	N16@250

CAD DRAWING
AMENDMENTS

ASSOCIATED DRAWINGS

Replace this text in Block
MY_LOGO with Company
Logo and Company Address,
Phone and Project Details.

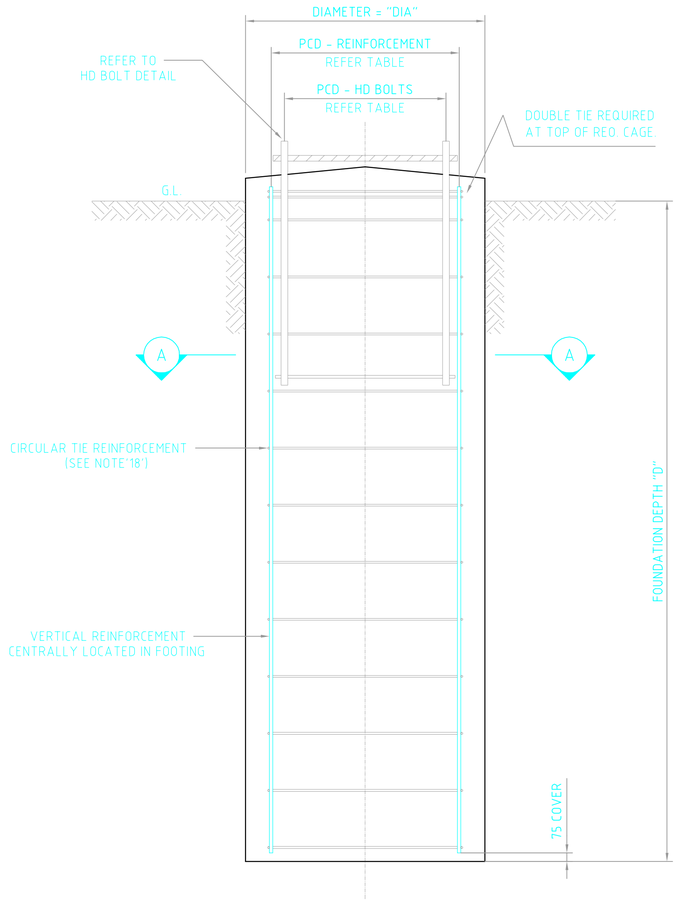
ASP REF.	ASP Quality File Reference
CERTIFICATION NUMBER	##/##

DESIGNED BY	GSP
DRAWN BY	DJM
CHECKED BY	KB
SUBMIT DATE	12/10/2015
LGA	RAVENSWORTH
MAP REF.	
AUSGRID REF.	CN31
PRJTRAK No.	XCS010127

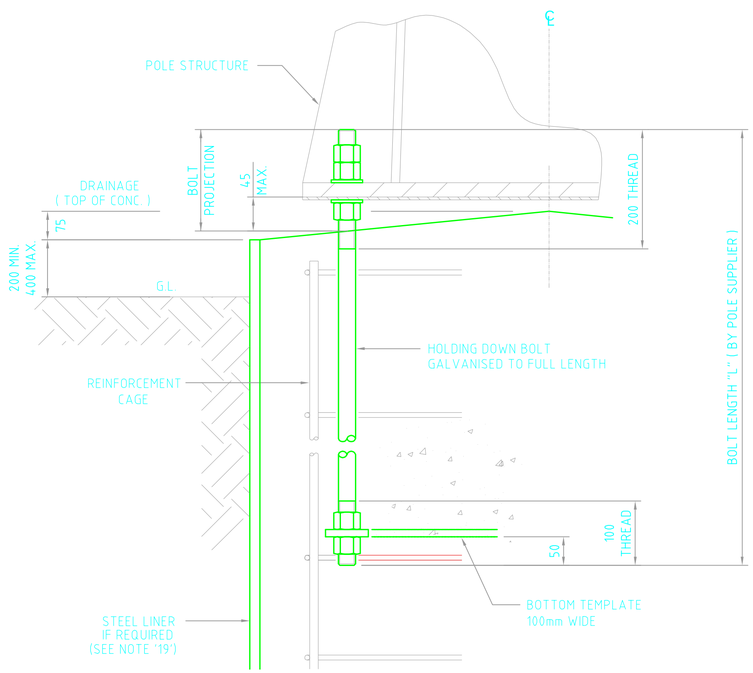
RAVENSWORTH
GLENDELL MINE
132kV RELOCATION
POLE TYPE-215M40KN-SITE P009
FOUNDATION DETAILS

SIZE	AUSGRID PROJECT No.	SHEETS	AMD.
A1	SR00350	13 of 19	0

20150629



SECTIONAL ELEVATION



HOLDING DOWN BOLT DETAIL

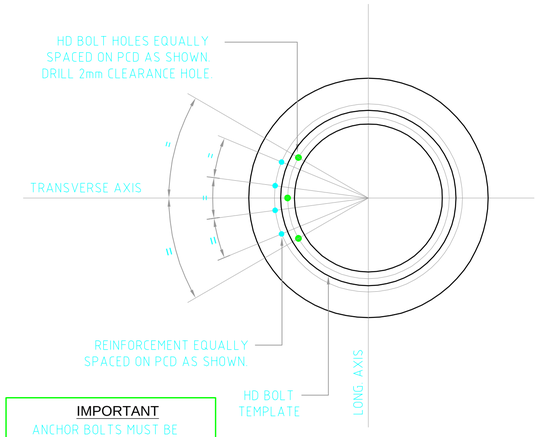
REFER TABLE

CONSTRUCTION NOTES:

1. ALL WORK SHALL CONFORM WITH AS3600-2009 "CONCRETE STRUCTURES", AS 2159 " PILING DESIGN AND INSTALLATION", AND AUSGRID SPECIFICATION
2. ANCHOR BOLTS 40CR MATERIAL GRADE 450MPa ALL NUTS, BOLTS, WASHERS GALVANISED.
3. BOTTOM TEMPLATE GRADE Q345B, UNCOATED.
4. WELDING OF REINFORCING TO AS1554. NO WELDING OF OR TO HD BOLTS.
5. TOP OF HD BOLT CAGE TO BE HELD FIRMLY USING A STEEL TEMPLATE.
6. CONCRETE FOOTING GRADE N32, 80 SLUMP, 20mm MAX. AGGREGATE.
7. REINFORCING GRADE 500N.
8. CONCRETE FOOTING TO BE CAST WITHOUT JOINTS.
9. HD BOLTS TO BE CLEANED, RUN FREE AND GREASED IMMEDIATELY AFTER FOOTING POUR.
10. CURE CONCRETE FOR A MINIMUM OF 14 DAYS PRIOR TO ERECTION OF POLE.
11. NUTS AND WASHERS TO BE SNUG TIGHT AGAINST BASE PLATE.
12. FORMED EXPOSED SURFACE FINISHES TO AS3610 CLASS 3.
13. UNFORMED EXPOSED SURFACES TO BE SMOOTH STEEL TROWELLED FINISH.
14. MINIMUM CONCRETE COVER TO REINFORCEMENT AND HOLDING DOWN BOLTS = 75mm
15. LINERS, IF REQUIRED, TO BE STEEL WITH DIAMETER AND WALL THICKNESS TO SUIT METHOD OF INSTALLATION. MINIMUM WALL THICKNESS 12mm.
16. LINERS IF REQUIRED TO BE INSTALLED WITHOUT DISTURBANCE TO IN-SITU SOIL STRUCTURE.
17. FOR GEOTECHNICAL INFORMATION AND DESIGN PARAMETERS, REFER TO PARSONS BRINCKERHOFF GEOTECHNICAL REPORT NUMBER 2161126A-GEO-REP-001 REVISION B DATED 29 SEPTEMBER 2015.
18. PILE FITMENTS TO BE EITHER CONTINUOUS SPIRAL OR HOOPS WITH 160mm LONG SINGLE SPLICE WELD IN ACCORDANCE WITH AS1554.3.
19. STEEL LINER RECOMMENDED FOR THIS SITE - FULL DEPTH.

DESIGN NOTES:

1. FOUNDATION DESIGN IS IN ACCORDANCE WITH THE BRINCH HANSEN METHOD AS DETAILED IN AS/NZS 7000.
2. GEOTECHNICAL COMPONENT STRENGTH FACTOR = 0.6
3. THE TABULATED DESIGN ACTIONS ARE EXCLUSIVE OF THE GEOTECHNICAL COMPONENT STRENGTH FACTOR.
4. TABULATED DESIGN ACTIONS ARE ULTIMATE DESIGN LOADS TO AS1170 STANDARD.



IMPORTANT
ANCHOR BOLTS MUST BE LOCATED ON TRANSVERSE AXIS.

SECTION A—A

POLE				
TYPE	HEIGHT m	DESIGN MOMENT kNm	VERTICAL FORCE kN	DESIGN SHEAR kN
275M140KN	27.5	3904	65	140

FOUNDATION	
DIAMETER "DIA"	DEPTH "D"
2000	6600

HOLDING DOWN BOLTS				
PCD	No. OFF	BAR SIZE	BOLT LENGTH "L"	BOLT PROJECTION
1380	44	30	1500	180

REINFORCEMENT			
PCD	No. OFF BARS	BAR SIZE	CIRCULAR TIES
1760	34	N28	N16@250

CAD DRAWING
AMENDMENTS

ASSOCIATED DRAWINGS

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MY_LOGO with Company
Logo and Company Address,
Phone and Project Details.

ASP REF. ASP Quality File Reference

CERTIFICATION NUMBER

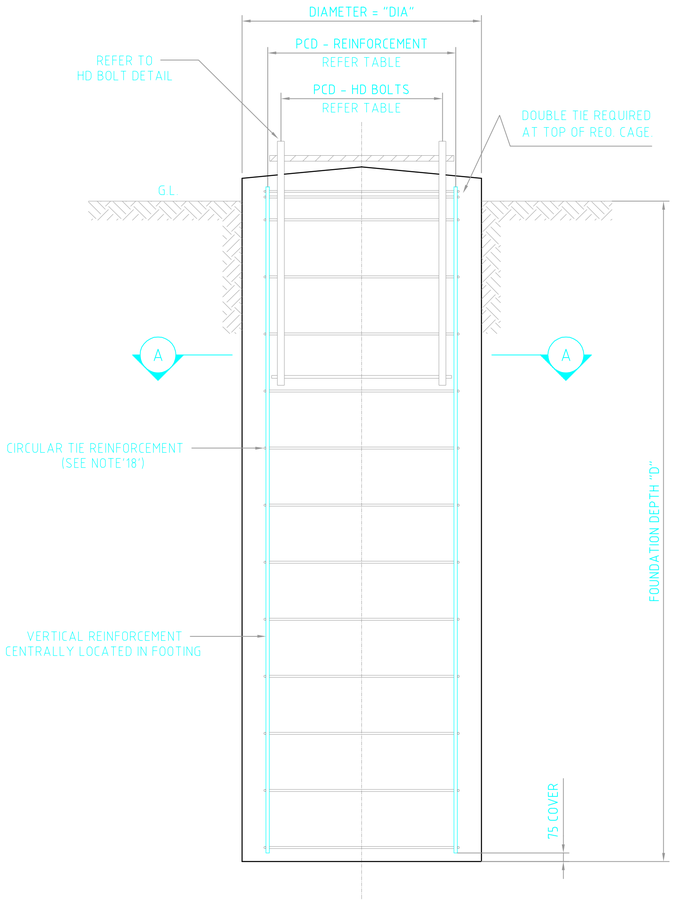
/ #

DESIGNED BY	GSP
DRAWN BY	DJM
CHECKED BY	KB
SUBMIT DATE	12/10/2015
LGA	RAVENSWORTH
MAP REF.	
AUSGRID REF.	CN31
PRJTRAK No.	XCS010127

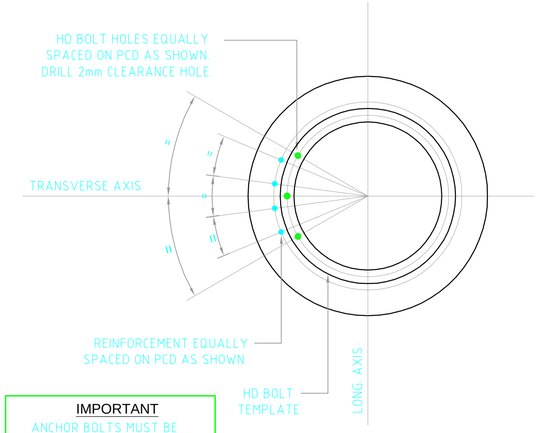
RAVENSWORTH
GLENDELL MINE
132kV RELOCATION
POLE TYPE-275M140KN-SITE P010
FOUNDATION DETAILS

SIZE A1 | AUSGRID PROJECT No. SR00350 | SHEETS 14of19 | AMD. 0

20150629

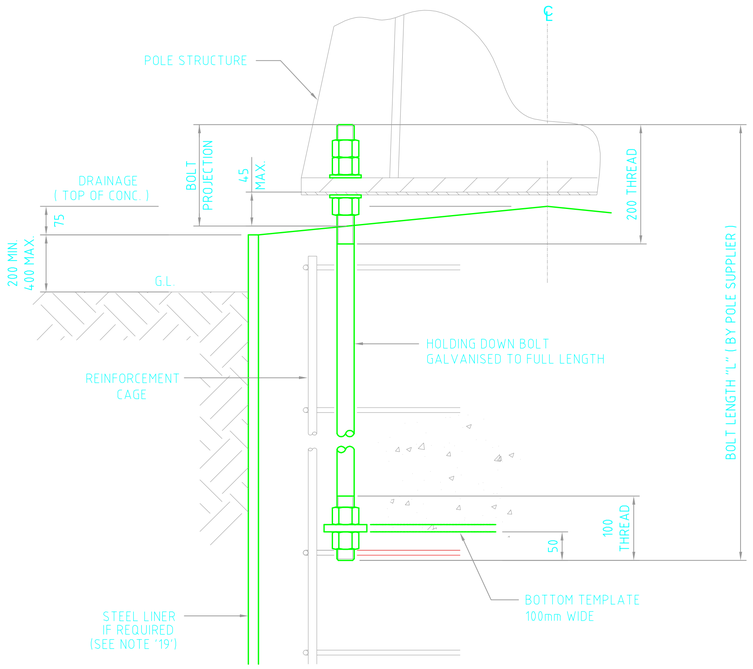


SECTIONAL ELEVATION



IMPORTANT
ANCHOR BOLTS MUST BE
LOCATED ON TRANSVERSE AXIS

SECTION A—A



HOLDING DOWN BOLT DETAIL
REFER TABLE

CONSTRUCTION NOTES:

1. ALL WORK SHALL CONFORM WITH AS3600-2009 "CONCRETE STRUCTURES", AS 2159 " PILING DESIGN AND INSTALLATION", AND AUSGRID SPECIFICATION
2. ANCHOR BOLTS 40CR MATERIAL GRADE 450MPa ALL NUTS, BOLTS, WASHERS GALVANISED.
3. BOTTOM TEMPLATE GRADE Q345B, UNCOATED.
4. WELDING OF REINFORCING TO AS1554. NO WELDING OF OR TO HD BOLTS.
5. TOP OF HD BOLT CAGE TO BE HELD FIRMLY USING A STEEL TEMPLATE.
6. CONCRETE FOOTING GRADE N32, 80 SLUMP, 20mm MAX. AGGREGATE.
7. REINFORCING GRADE 500N.
8. CONCRETE FOOTING TO BE CAST WITHOUT JOINTS.
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11. NUTS AND WASHERS TO BE SNUG TIGHT AGAINST BASE PLATE.
12. FORMED EXPOSED SURFACE FINISHES TO AS3610 CLASS 3.
13. UNFORMED EXPOSED SURFACES TO BE SMOOTH STEEL TROWELLED FINISH.
14. MINIMUM CONCRETE COVER TO REINFORCEMENT AND HOLDING DOWN BOLTS = 75mm
15. LINERS, IF REQUIRED, TO BE STEEL WITH DIAMETER AND WALL THICKNESS TO SUIT METHOD OF INSTALLATION. MINIMUM WALL THICKNESS 12mm.
16. LINERS IF REQUIRED TO BE INSTALLED WITHOUT DISTURBANCE TO IN-SITU SOIL STRUCTURE.
17. FOR GEOTECHNICAL INFORMATION AND DESIGN PARAMETERS, REFER TO PARSONS BRINCKERHOFF GEOTECHNICAL REPORT NUMBER 2161126A-GEO-REP-001 REVISION B DATED 29 SEPTEMBER 2015.
18. PILE FITMENTS TO BE EITHER CONTINUOUS SPIRAL OR HOOPS WITH 160mm LONG SINGLE SPLICE WELD IN ACCORDANCE WITH AS1554.3.
19. STEEL LINER RECOMMENDED FOR THIS SITE - TOP 1m ONLY.

DESIGN NOTES:

1. FOUNDATION DESIGN IS IN ACCORDANCE WITH THE BRINCH HANSEN METHOD AS DETAILED IN AS/NZS 7000.
2. GEOTECHNICAL COMPONENT STRENGTH FACTOR = 0.6
3. THE TABULATED DESIGN ACTIONS ARE EXCLUSIVE OF THE GEOTECHNICAL COMPONENT STRENGTH FACTOR.
4. TABULATED DESIGN ACTIONS ARE ULTIMATE DESIGN LOADS TO AS1170 STANDARD.

POLE				
TYPE	HEIGHT m	DESIGN MOMENT kNm	VERTICAL FORCE kN	DESIGN SHEAR kN
275M40KN	27.5	1126	29.3	40

FOUNDATION	
DIAMETER "DIA"	DEPTH "D"
1500	3800

HOLDING DOWN BOLTS				
PCD	No. OFF	BAR SIZE	BOLT LENGTH "L"	BOLT PROJECTION
947	20	30	1500	180

REINFORCEMENT			
PCD	No. OFF BARS	BAR SIZE	CIRCULAR TIES
1275	20	N24	N16@250

CAD DRAWING
AMENDMENTS

ASSOCIATED DRAWINGS

Replace this text in Block MY_LOGO with Company Logo and Company Address, Phone and Project Details.

ASP REF. ASP Quality File Reference

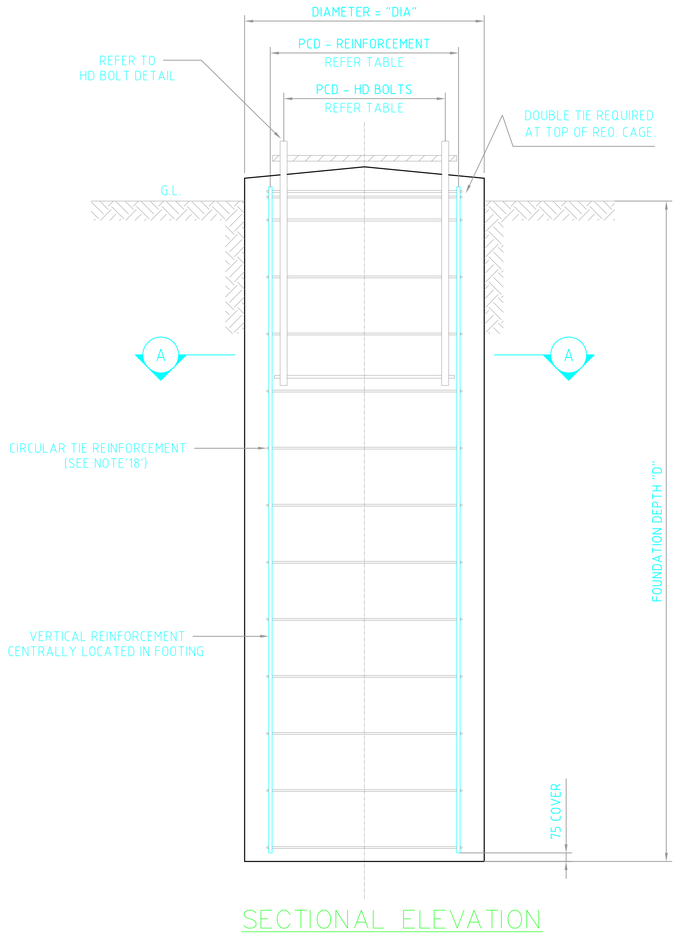
CERTIFICATION NUMBER ##/##

DESIGNED BY	GSP
DRAWN BY	DJM
CHECKED BY	KB
SUBMIT DATE	12/10/2015
LGA	RAVENSWORTH
MAP REF.	
AUSGRID REF.	CN31
PRJTRAK No.	XCS010127

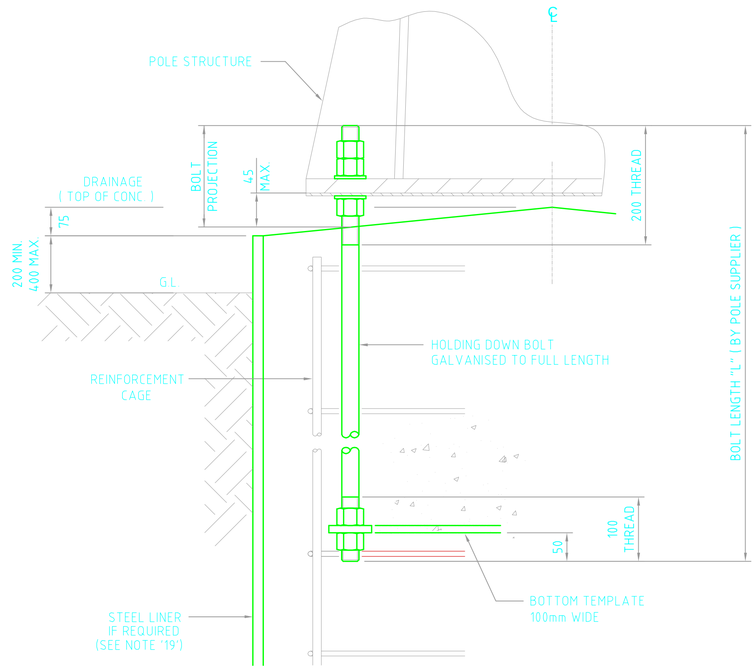
RAVENSWORTH
GLENDELL MINE
132kV RELOCATION
POLE TYPE-275M40KN-SITE P011
FOUNDATION DETAILS

SIZE A1 | AUSGRID PROJECT No. SR00350 | SHEETS 15 of 19 | AMD. 0

20150629



SECTIONAL ELEVATION



HOLDING DOWN BOLT DETAIL

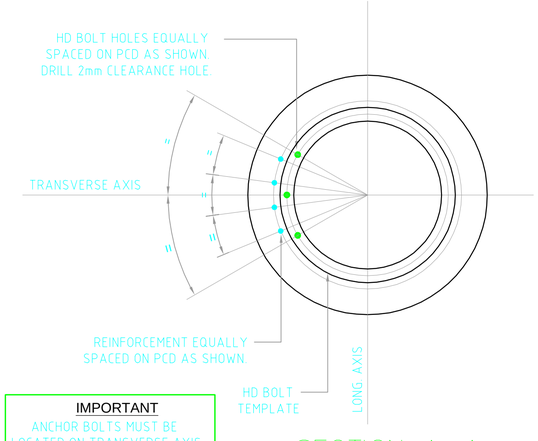
REFER TABLE

CONSTRUCTION NOTES:

1. ALL WORK SHALL CONFORM WITH AS3600-2009 "CONCRETE STRUCTURES", AS 2159 " PILING DESIGN AND INSTALLATION", AND AUSGRID SPECIFICATION
2. ANCHOR BOLTS 40CR MATERIAL GRADE 450MPa ALL NUTS, BOLTS, WASHERS GALVANISED.
3. BOTTOM TEMPLATE GRADE Q345B, UNCOATED.
4. WELDING OF REINFORCING TO AS1554. NO WELDING OF OR TO HD BOLTS.
5. TOP OF HD BOLT CAGE TO BE HELD FIRMLY USING A STEEL TEMPLATE.
6. CONCRETE FOOTING GRADE N32, 80 SLUMP, 20mm MAX. AGGREGATE.
7. REINFORCING GRADE 500N.
8. CONCRETE FOOTING TO BE CAST WITHOUT JOINTS.
9. HD BOLTS TO BE CLEANED, RUN FREE AND GREASED IMMEDIATELY AFTER FOOTING POUR.
10. CURE CONCRETE FOR A MINIMUM OF 14 DAYS PRIOR TO ERECTION OF POLE.
11. NUTS AND WASHERS TO BE SNUG TIGHT AGAINST BASE PLATE.
12. FORMED EXPOSED SURFACE FINISHES TO AS3610 CLASS 3.
13. UNFORMED EXPOSED SURFACES TO BE SMOOTH STEEL TROWELLED FINISH.
14. MINIMUM CONCRETE COVER TO REINFORCEMENT AND HOLDING DOWN BOLTS = 75mm
15. LINERS, IF REQUIRED, TO BE STEEL WITH DIAMETER AND WALL THICKNESS TO SUIT METHOD OF INSTALLATION. MINIMUM WALL THICKNESS 12mm.
16. LINERS IF REQUIRED TO BE INSTALLED WITHOUT DISTURBANCE TO IN-SITU SOIL STRUCTURE.
17. FOR GEOTECHNICAL INFORMATION AND DESIGN PARAMETERS, REFER TO PARSONS BRINCKERHOFF GEOTECHNICAL REPORT NUMBER 2161126A-GEO-REP-001 REVISION B DATED 29 SEPTEMBER 2015.
18. PILE FITMENTS TO BE EITHER CONTINUOUS SPIRAL OR HOOPS WITH 160mm LONG SINGLE SPLICE WELD IN ACCORDANCE WITH AS1554.3.
19. STEEL LINER NOT REQUIRED FOR THIS SITE.

DESIGN NOTES:

1. FOUNDATION DESIGN IS IN ACCORDANCE WITH THE BRINCH HANSEN METHOD AS DETAILED IN AS/NZS 7000.
2. GEOTECHNICAL COMPONENT STRENGTH FACTOR = 0.6
3. THE TABULATED DESIGN ACTIONS ARE EXCLUSIVE OF THE GEOTECHNICAL COMPONENT STRENGTH FACTOR.
4. TABULATED DESIGN ACTIONS ARE ULTIMATE DESIGN LOADS TO AS1170 STANDARD.



IMPORTANT
ANCHOR BOLTS MUST BE LOCATED ON TRANSVERSE AXIS

SECTION A–A

POLE				
TYPE	HEIGHT m	DESIGN MOMENT kNm	VERTICAL FORCE kN	DESIGN SHEAR kN
20M40KN	20	818	17.6	40

FOUNDATION	
DIAMETER "DIA"	DEPTH "D"
1500	3800

HOLDING DOWN BOLTS				
PCD	No. OFF	BAR SIZE	BOLT LENGTH "L"	BOLT PROJECTION
893	16	30	1500	180

REINFORCEMENT			
PCD	No. OFF BARS	BAR SIZE	CIRCULAR TIES
1275	20	N24	N16@250

CAD DRAWING

AMENDMENTS

ASSOCIATED DRAWINGS

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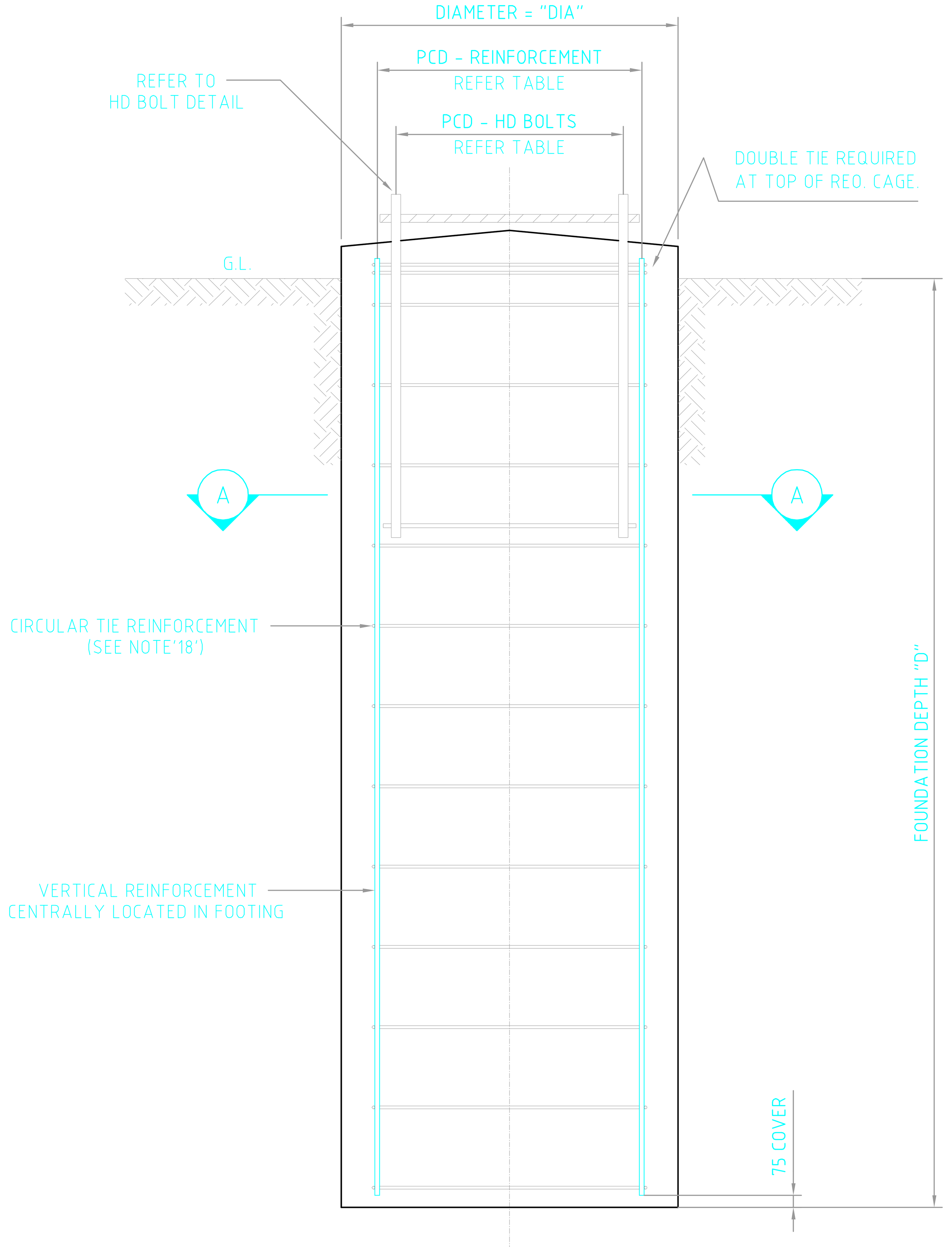
ASP REF.	ASP Quality File Reference
CERTIFICATION NUMBER	##/##

DESIGNED BY	GSP
DRAWN BY	DJM
CHECKED BY	KB
SUBMIT DATE	12/10/2015
LGA	RAVENSWORTH
MAP REF.	
AUSGRID REF.	CN31
PRJTRAK No.	XCS010127

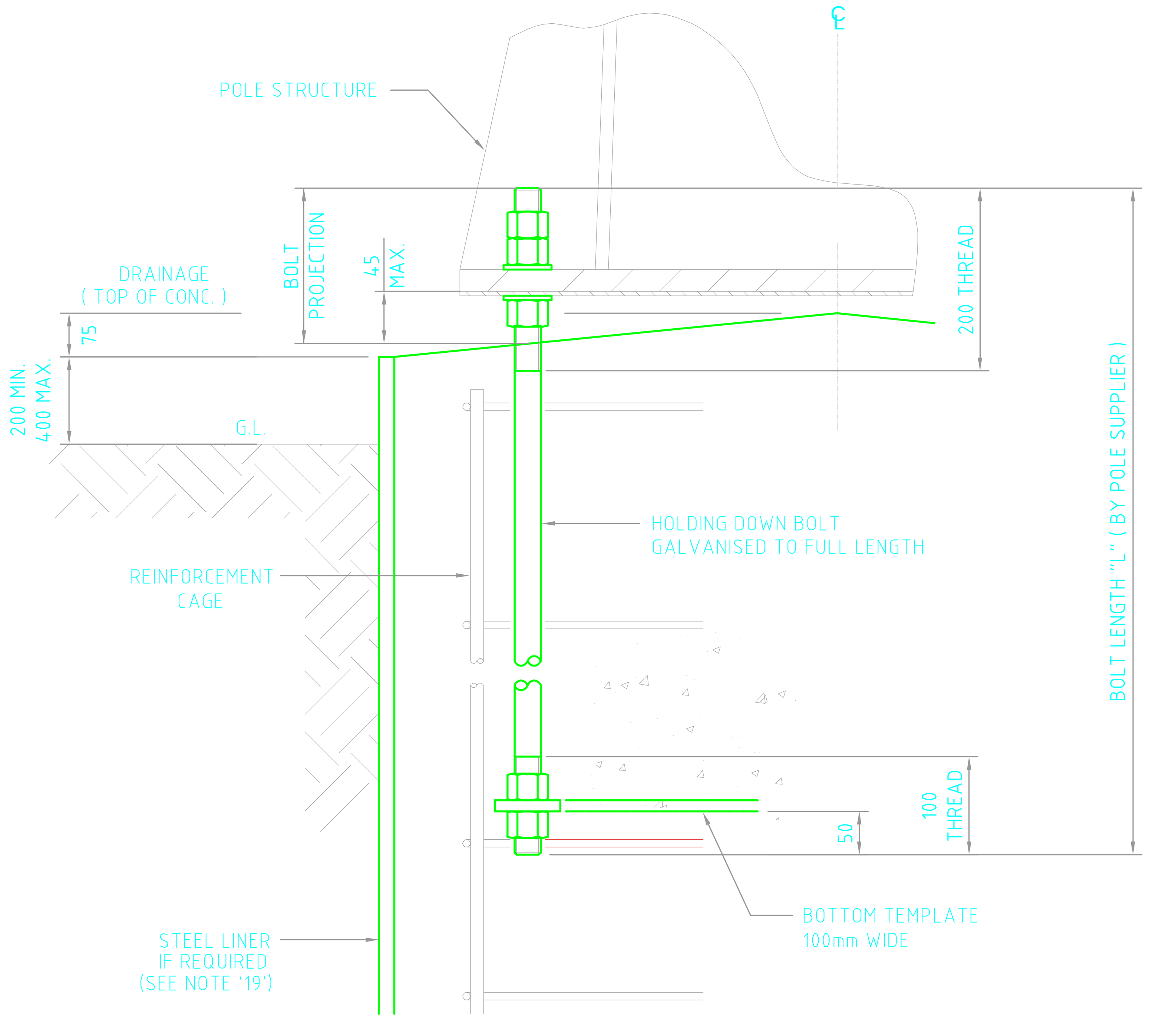
RAVENSWORTH
GLENDELL MINE
132kV RELOCATION
POLE TYPE-20M40KN-SITE P012
FOUNDATION DETAILS

SIZE	AUSGRID PROJECT No.	SHEETS	AMD.
A1	SR00350	16 of 19	0

20150629

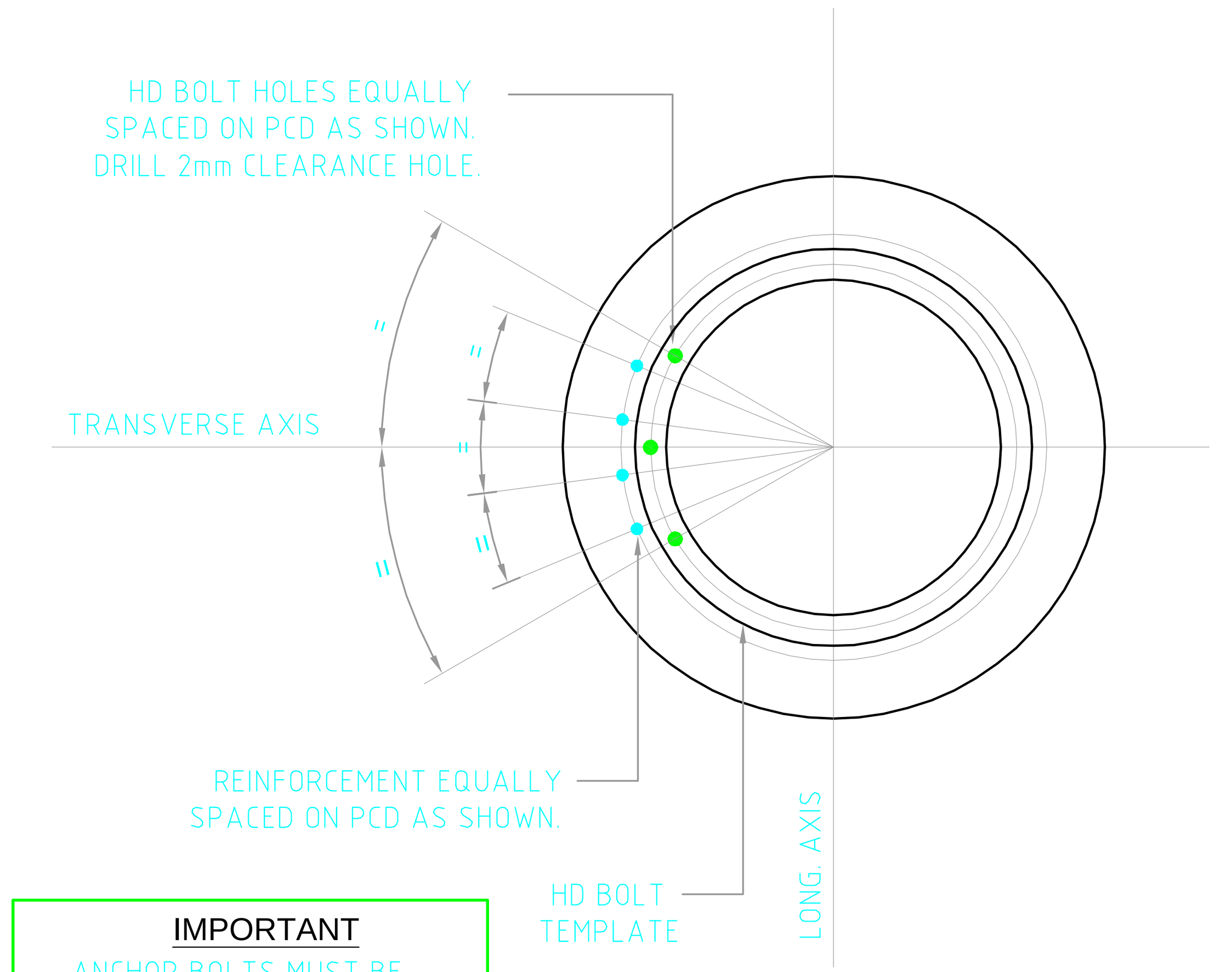


SECTIONAL ELEVATION



HOLDING DOWN BOLT DETAIL

REFER TABLE



IMPORTANT

ANCHOR BOLTS MUST BE LOCATED ON TRANSVERSE AXIS.

SECTION A – A

CONSTRUCTION NOTES:

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2. ANCHOR BOLTS 40CR MATERIAL GRADE 450MPa ALL NUTS, BOLTS, WASHERS GALVANISED.
3. BOTTOM TEMPLATE GRADE Q345B, UNCOATED.
4. WELDING OF REINFORCING TO AS1554. NO WELDING OF OR TO HD BOLTS.
5. TOP OF HD BOLT CAGE TO BE HELD FIRMLY USING A STEEL TEMPLATE.
6. CONCRETE FOOTING GRADE N32, 80 SLUMP, 20mm MAX. AGGREGATE.
7. REINFORCING GRADE 500N.
8. CONCRETE FOOTING TO BE CAST WITHOUT JOINTS.
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12. FORMED EXPOSED SURFACE FINISHES TO AS3610 CLASS 3.
13. UNFORMED EXPOSED SURFACES TO BE SMOOTH STEEL TROWELLED FINISH.
14. MINIMUM CONCRETE COVER TO REINFORCEMENT AND HOLDING DOWN BOLTS = 75mm
15. LINERS, IF REQUIRED, TO BE STEEL WITH DIAMETER AND WALL THICKNESS TO SUIT METHOD OF INSTALLATION. MINIMUM WALL THICKNESS 12mm.
16. LINERS IF REQUIRED TO BE INSTALLED WITHOUT DISTURBANCE TO IN-SITU SOIL STRUCTURE.
17. FOR GEOTECHNICAL INFORMATION AND DESIGN PARAMETERS, REFER TO PARSONS BRINCKERHOFF GEOTECHNICAL REPORT NUMBER 2161126A-GEO-REP-001 REVISION B DATED 29 SEPTEMBER 2015.
18. PILE FITMENTS TO BE EITHER CONTINUOUS SPIRAL OR HOOPS WITH 160mm LONG SINGLE SPLICE WELD IN ACCORDANCE WITH AS1554.3.
19. STEEL LINER NOT REQUIRED FOR THIS SITE.

DESIGN NOTES:

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2. GEOTECHNICAL COMPONENT STRENGTH FACTOR = 0.6
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4. TABULATED DESIGN ACTIONS ARE ULTIMATE DESIGN LOADS TO AS1170 STANDARD.

POLE				
TYPE	HEIGHT m	DESIGN MOMENT kNm	VERTICAL FORCE kN	DESIGN SHEAR kN
20M40KN	20	818	17.6	40

FOUNDATION	
DIAMETER "DIA"	DEPTH "D"
1500	3800

HOLDING DOWN BOLTS				
PCD	No. OFF	BAR SIZE	BOLT LENGTH "L"	BOLT PROJECTION
893	16	30	1500	180

REINFORCEMENT			
PCD	No. OFF BARS	BAR SIZE	CIRCULAR TIES
1275	20	N24	N16@250

CAD DRAWING

AMENDMENTS

ASSOCIATED DRAWINGS

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DESIGNED BY	GSP
DRAWN BY	DJM
CHECKED BY	KB
SUBMIT DATE	12/10/2015
LGA	RAVENSWORTH
MAP REF.	
AUSGRID REF.	CN31
PRJTRAK No.	XCS010127
ASP REF.	ASP Quality File Reference

CERTIFICATION NUMBER ## / ##

RAVENSWORTH
GLENDELL MINE
132kV RELOCATION
POLE TYPE-20M40KN-SITE P013
FOUNDATION DETAILS

SIZE A1 | AUSGRID PROJECT No. SR00350 | SHEETS 17 of 19 | AMD. 0

20150629

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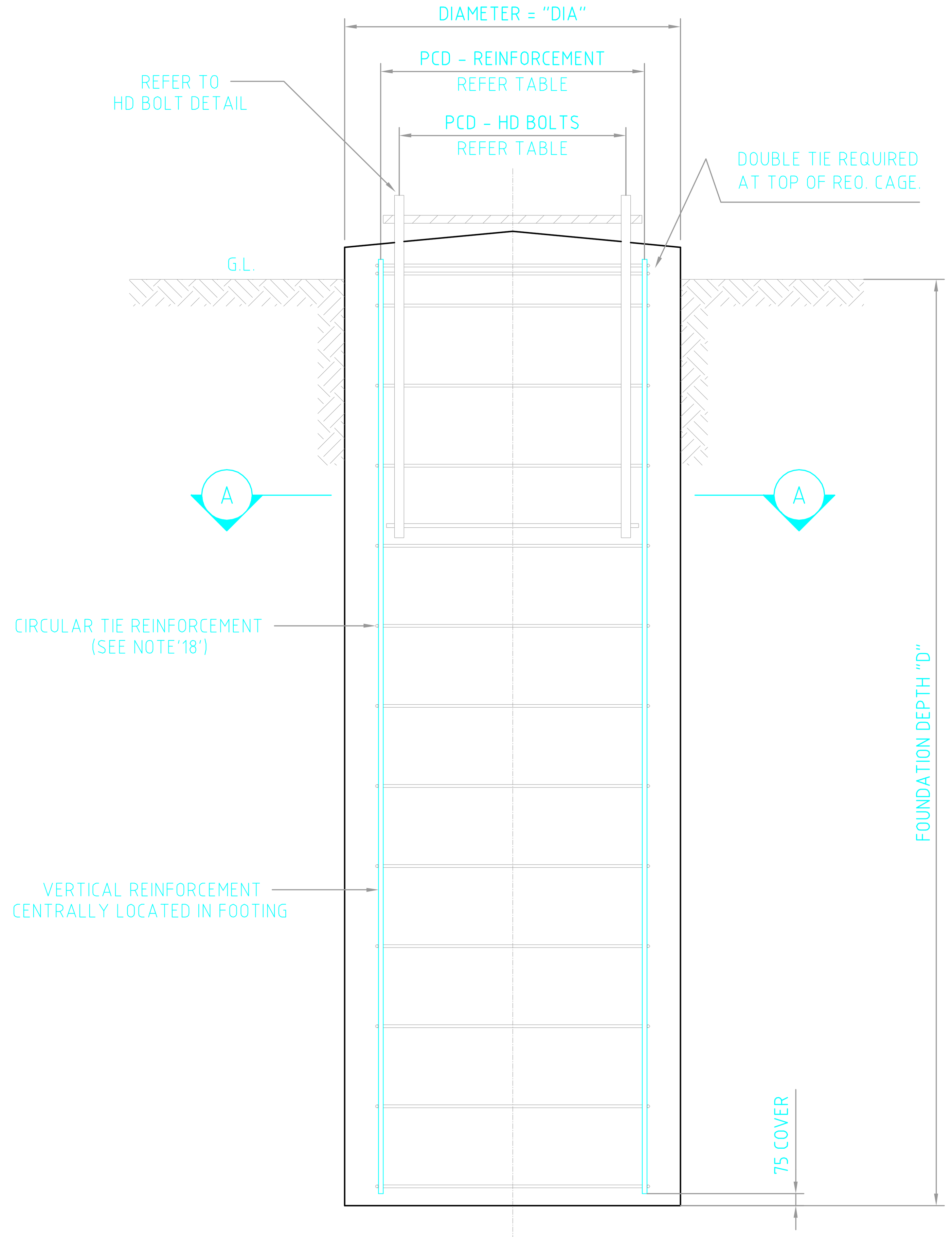
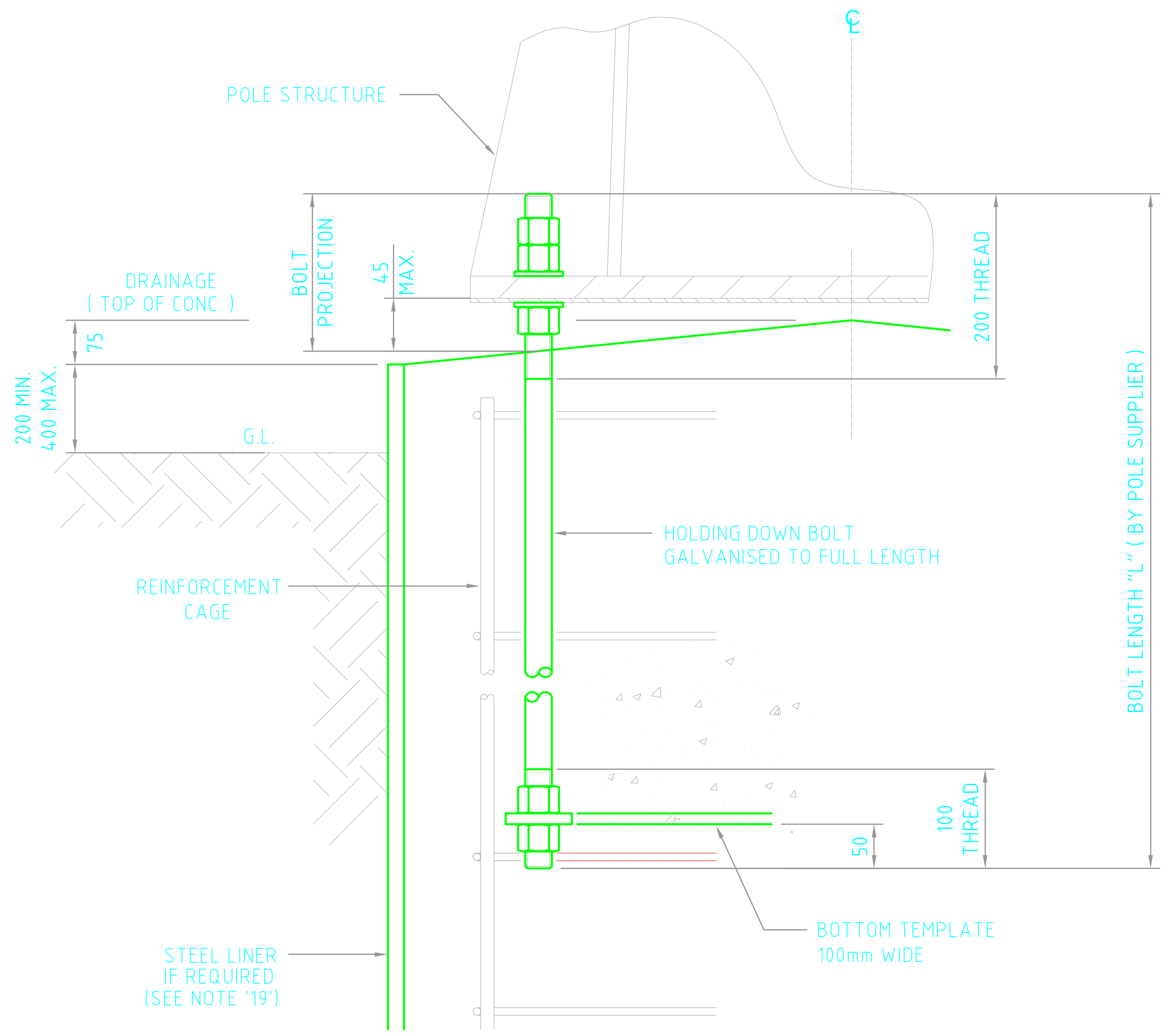


SECTIONAL ELEVATION



HOLDING DOWN BOLT DETAIL

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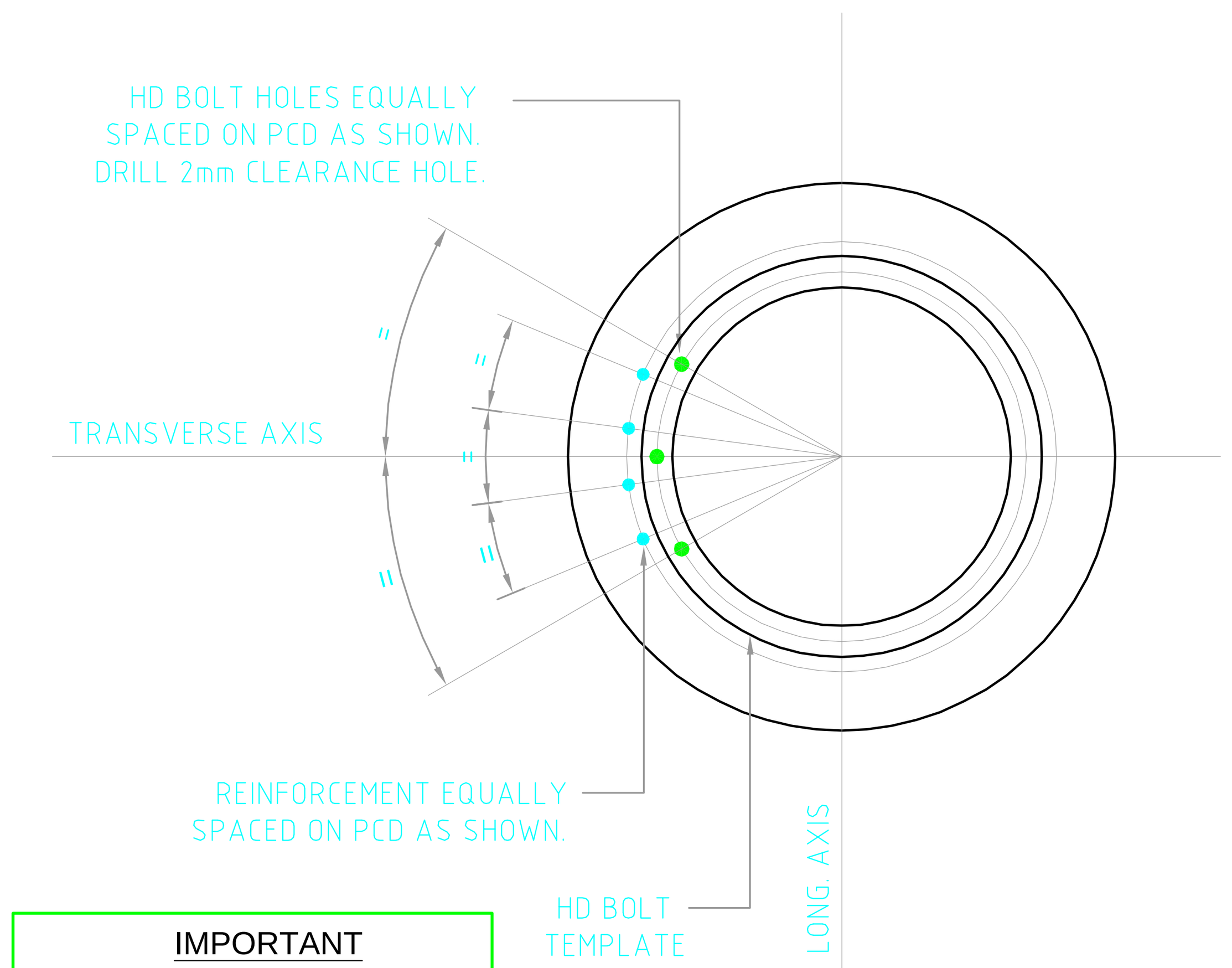
2. ANCHOR BOLTS 40CR MATERIAL GRADE 450MPa ALL NUTS, BOLTS, WASHERS GALVANISED.
3. BOTTOM TEMPLATE GRADE Q345B, UNCOATED.
4. WELDING OF REINFORCING TO AS1554. NO WELDING OF OR TO HD BOLTS.
5. TOP OF HD BOLT CAGE TO BE HELD FIRMLY USING A STEEL TEMPLATE.
6. CONCRETE FOOTING GRADE N32, 80 SLUMP, 20mm MAX. AGGREGATE.
7. REINFORCING GRADE 500N.
8. CONCRETE FOOTING TO BE CAST WITHOUT JOINTS.
9. HD BOLTS TO BE CLEANED, RUN FREE AND GREASED IMMEDIATELY AFTER FOOTING POUR.
10. CURE CONCRETE FOR A MINIMUM OF 14 DAYS PRIOR TO ERECTION OF POLE.
11. NUTS AND WASHERS TO BE SNUG TIGHT AGAINST BASE PLATE.
12. FORMED EXPOSED SURFACE FINISHES TO AS3610 CLASS 3.
13. UNFORMED EXPOSED SURFACES TO BE SMOOTH STEEL TROWELLED FINISH.
14. MINIMUM CONCRETE COVER TO REINFORCEMENT AND HOLDING DOWN BOLTS = 75mm
15. LINERS, IF REQUIRED, TO BE STEEL WITH DIAMETER AND WALL THICKNESS TO SUIT METHOD OF INSTALLATION. MINIMUM WALL THICKNESS 12mm.
16. LINERS IF REQUIRED TO BE INSTALLED WITHOUT DISTURBANCE TO IN-SITU SOIL STRUCTURE.
17. FOR GEOTECHNICAL INFORMATION AND DESIGN PARAMETERS, REFER TO PARSONS BRINCKERHOFF GEOTECHNICAL REPORT NUMBER 2161126A-GEO-REP-001 REVISION B DATED 29 SEPTEMBER 2015.
18. PILE FITMENTS TO BE EITHER CONTINUOUS SPIRAL OR HOOPS WITH 160mm LONG SINGLE SPLICE WELD IN ACCORDANCE WITH AS1554.3.
19. STEEL LINER NOT REQUIRED FOR THIS SITE.

DESIGN NOTES:

1. FOUNDATION DESIGN IS IN ACCORDANCE WITH THE BRINCH HANSEN METHOD AS DETAILED IN AS/NZS 7000.
2. GEOTECHNICAL COMPONENT STRENGTH FACTOR = 0.6
3. THE TABULATED DESIGN ACTIONS ARE EXCLUSIVE OF THE GEOTECHNICAL COMPONENT STRENGTH FACTOR.
4. TABULATED DESIGN ACTIONS ARE ULTIMATE DESIGN LOADS TO AS1170 STANDARD.



IMPORTANT
ANCHOR BOLTS MUST BE LOCATED ON TRANSVERSE AXIS

SECTION A–A

POLE				
TYPE	HEIGHT m	DESIGN MOMENT kNm	VERTICAL FORCE kN	DESIGN SHEAR kN
215M140KN	21.5	3057	41.5	140

FOUNDATION	
DIAMETER "DIA"	DEPTH "D"
1800	5800

HOLDING DOWN BOLTS				
PCD	No. OFF	BAR SIZE	BOLT LENGTH "L"	BOLT PROJECTION
1250	40	30	1500	180

REINFORCEMENT			
PCD	No. OFF BARS	BAR SIZE	CIRCULAR TIES
1575	28	N28	N16@250

CAD DRAWING
AMENDMENTS

ASSOCIATED DRAWINGS

Replace this text in Block MY_LOGO with Company Logo and Company Address, Phone and Project Details.
R:\TL_cad\LOGOS\DWG_LOGO_ASP.jpg

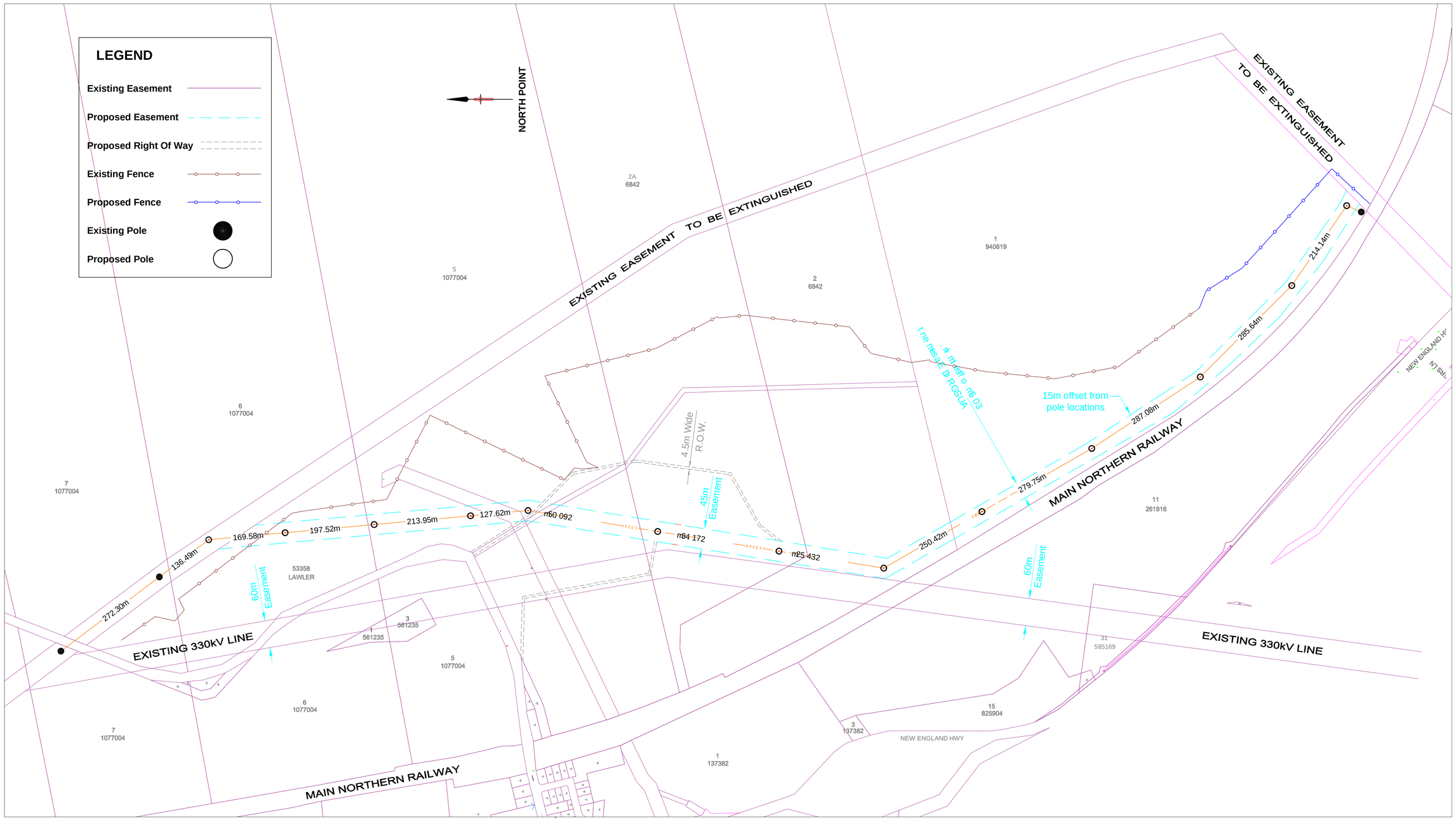
ASP REF.	ASP Quality File Reference
DESIGNED BY	GSP
DRAWN BY	DJM
CHECKED BY	KB
SUBMIT DATE	12/10/2015
LGA	RAVENSWORTH
MAP REF.	
AUSGRID REF.	CN31
PRJTRAK No.	XCS010127

CERTIFICATION NUMBER ##/##

RAVENSWORTH
GLENDELL MINE
132kV RELOCATION
POLE TYPE-215M140KN-SITE P014
FOUNDATION DETAILS

SIZE A1 | AUSGRID PROJECT No. SR00350 | SHEETS 18 of 19 | AMD. 0

20150629



REFER TO SHEET 2 FOR SITE PLAN (POLES 1 TO 8)
REFER TO SHEET 3 FOR SITE PLAN (POLES 8 TO 16)
REFER TO SHEET 4 FOR PROFILES (POLES 1 TO 8)
REFER TO SHEET 5 FOR PROFILES (POLES 8 TO 16)

AUSGRID PROPERTY RIGHTS

SCALE 1 : 4000
0 100 300 METRES
200 400

AMENDMENTS	
A	REVISED FOR AUSGRID REVIEW COMMENTS TK / FR - 30.3.2016

CAD DRAWING

ASSOCIATED DRAWINGS

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ASP REF. ASP Quality File Reference

CERTIFICATION NUMBER ##/##

DESIGNED BY	FR
DRAWN BY	TK
CHECKED BY	FR
SUBMIT DATE	12/10/2015
LGA	RAVENSWORTH
MAP REF.	
AUSGRID REF.	CN31
PRJTRAK No.	XCS010127

RAVENSWORTH GLENDELL MINE 132 kV RELOCATIONS

SIZE A1 | AUSGRID PROJECT No. SR00350 | SHEETS 19 of 19 | AMD. A

20150629

APPENDIX B

Archaeological Due Diligence Assessment

VIEW ALONG A SECTION OF THE PROPOSED ETL RELOCATION.

ARCHAEOLOGICAL DUE DILIGENCE ASSESSMENT

GLENDELL MINE PROPOSED 132KV POWER LINE RELOCATION

SINGLETON LOCAL GOVERNMENT AREA

JULY 2015

REPORT PREPARED BY

OZARK ENVIRONMENTAL & HERITAGE MANAGEMENT PTY LTD

FOR MT OWEN COMPLEX, GLENCORE

Environmental and Heritage Management P/L

OzArk EHM
145 Wingewarra St
(PO Box 2069)
Dubbo NSW 2830

Phone: (02) 6882 0118
Fax: (02) 6882 0630
jodie@ozarkehm.com.au
phil@ozarkehm.com.au
www.ozarkehm.com.au

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DOCUMENT CONTROLS

Proponent	Mt Owen Complex, Glencore		
Client	Mt Owen Complex, Glencore		
Project No / Purchase Order No			
Document Description	Archaeological Due Diligence Assessment: Glendell Mine Proposed 132kV Power Line Relocation, NSW.		
	Name	Signed	Date
Clients Reviewing Officer			
Clients Representative Managing this Document		OzArk Person(s) Managing this Document	
		Jodie Benton	
Location		OzArk Job No.	
		1244	
Document Status **V3.0 Final**		Date 06.07.15	
Draft V1.1 Author to Editor OzArk 1st Internal (Series V1._ = OzArk internal edits)		V1.0 NH to BC 08.07.15 V1.1 BC edit 15/7/15	
Draft V2.0 Report Draft for release to client (Series V2._ = OzArk and Client edits)		V2.0 OzArk to Mt Owen 20.07.15	
FINAL V3._once latest version of draft approved by client		V3.0 Final – 16.11.15	
Prepared For		Prepared By	
Glenn Cook Environment and Community Manager Mt Owen Complex PO Box 320 Singleton NSW 2330 P: 02 6570 0802 F: 02 6576 1643 E: Glenn.Cook@glencore.com.au		Nick Harrop Senior Archaeologist OzArk Environmental & Heritage Management Pty. Limited 145 Wingewarra Street (PO Box 2069) Dubbo NSW 2830 P: 02 6882 0118 F: 02 6882 6030 E: nick@ozarkehm.com.au	

Acknowledgement

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

EXECUTIVE SUMMARY

OzArk Environmental & Heritage Management (OzArk) have been engaged by Mt Owen Complex, Glencore (the Proponent) to complete an archaeological *Due Diligence* assessment of a proposed power line relocation (the Proposal). The Proposal involves the relocation of approximately 2.7km of 132kV power line in the western portion of Glendell Mine in the Singleton Local Government Area (LGA; **Figure 1−1**).

One previously-recorded site (MOCO OS-10, AHIMS ID 37-3-1198) overlaps with the current design of the Proposal.

This assessment included a visual inspection of the proposed power line diversion by OzArk on 30 June 2015. No new recordings were made of Aboriginal sites within the study area. However, ground surface visibility was very low during the inspection and six potential archaeologically sensitive areas (Sensitive Areas 1 to 6) were identified.

Based on the findings of this assessment, the following recommendations are made:

1. Site MOCO OS-10 should be avoided by the Proposal. In order to ensure this, the following actions should be taken:
    a. The Proponent should consider a design that spans MOCO OS-10 and ensures that no electricity towers/poles are constructed within the confines of MOCO OS-10. Additionally, no new access tracks should be constructed within MOCO OS-10 although the existing track to the house/sheds can be used without the existing track being graded or widened.
    b. The site should be bordered by temporary fencing surrounding the site with a minimum 5m buffer and 'Do Not Enter' signs attached.
    c. The workforce should be made aware of the location of the site and that it is to be avoided.
2. If MOCO OS-10 is unavoidable by the Proposal, then the proponent will need to consult with the Aboriginal community under the ACHCRs process and apply for an AHIP.
3. Sensitive Areas 1 to 6 should be further investigated if they are to be impacted in order to determine if they contain sites of Aboriginal heritage. Appropriate investigation would be test excavation according to the *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (DECCW 2010b).
4. If unexpected remains are encountered during the proposed works that are suspected to be of Aboriginal cultural heritage, even where MOCO OS-10 AND Sensitive Areas 1 to 6 are avoided, then the *Unanticipated Finds Protocol* (**Appendix 2**) should be followed.
5. The workforce should be made aware of the legislative protection of Aboriginal sites and that there are other sites present in the general area.

6. Should the parameters of the Proposal extend beyond the area assessed, then further assessment may be required.

CONTENTS

FIGURES

TABLES

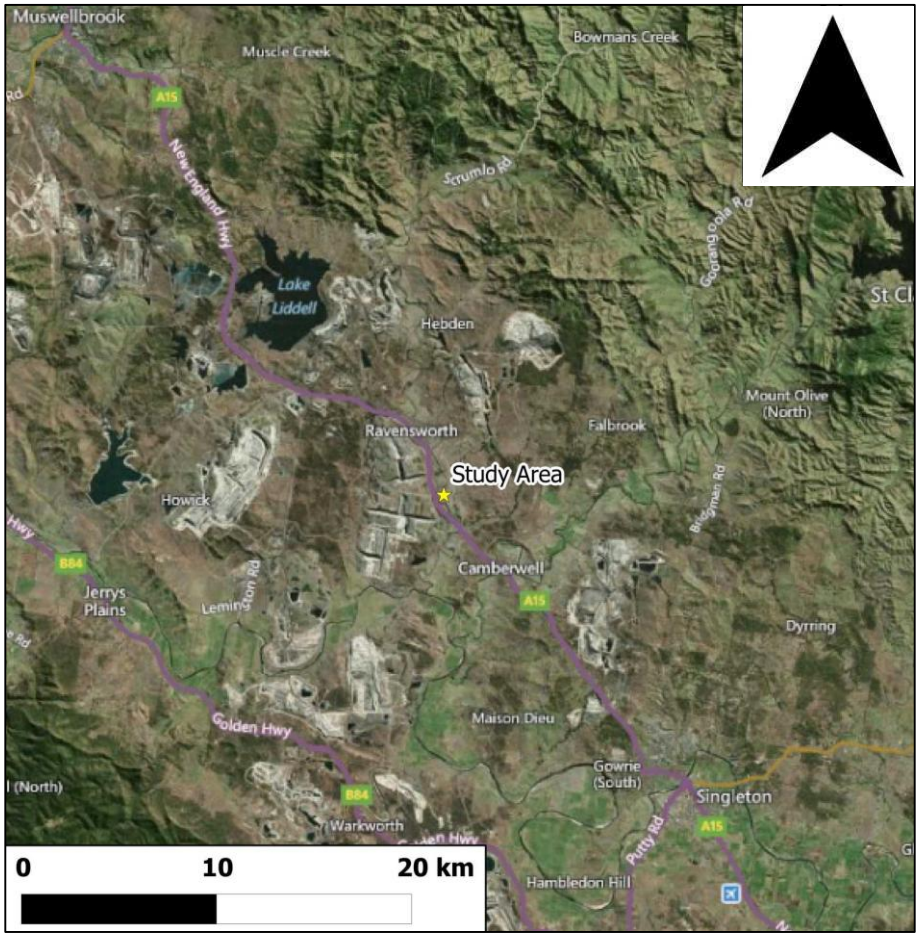
PLATES

1 INTRODUCTION

1.1 BRIEF DESCRIPTION OF THE PROPOSAL

OzArk Environmental & Heritage Management (OzArk) have been engaged by Mt Owen Complex, Glencore (the Proponent) to complete an archaeological *Due Diligence* assessment of a proposed power line relocation (the Proposal). The Proposal involves the relocation of approximately 2.7km of 132kV power line in the western portion of Glendell Mine in the Singleton Local Government Area (LGA; **Figure 1−1**).

Figure 1-1: Location of the Proposal (base map source: Bing).



1.2 PROPOSED WORKS

The proposed works involve the realignment of approximately 2.7km of 132kV power line (**Figures 1−2** to **1−4**). The Proposal will include the placement of towers at regular intervals. Tree clearance will be required in two areas where the proposed power line crosses creek lines.

Figure 1-2: Overview of the proposed power line.

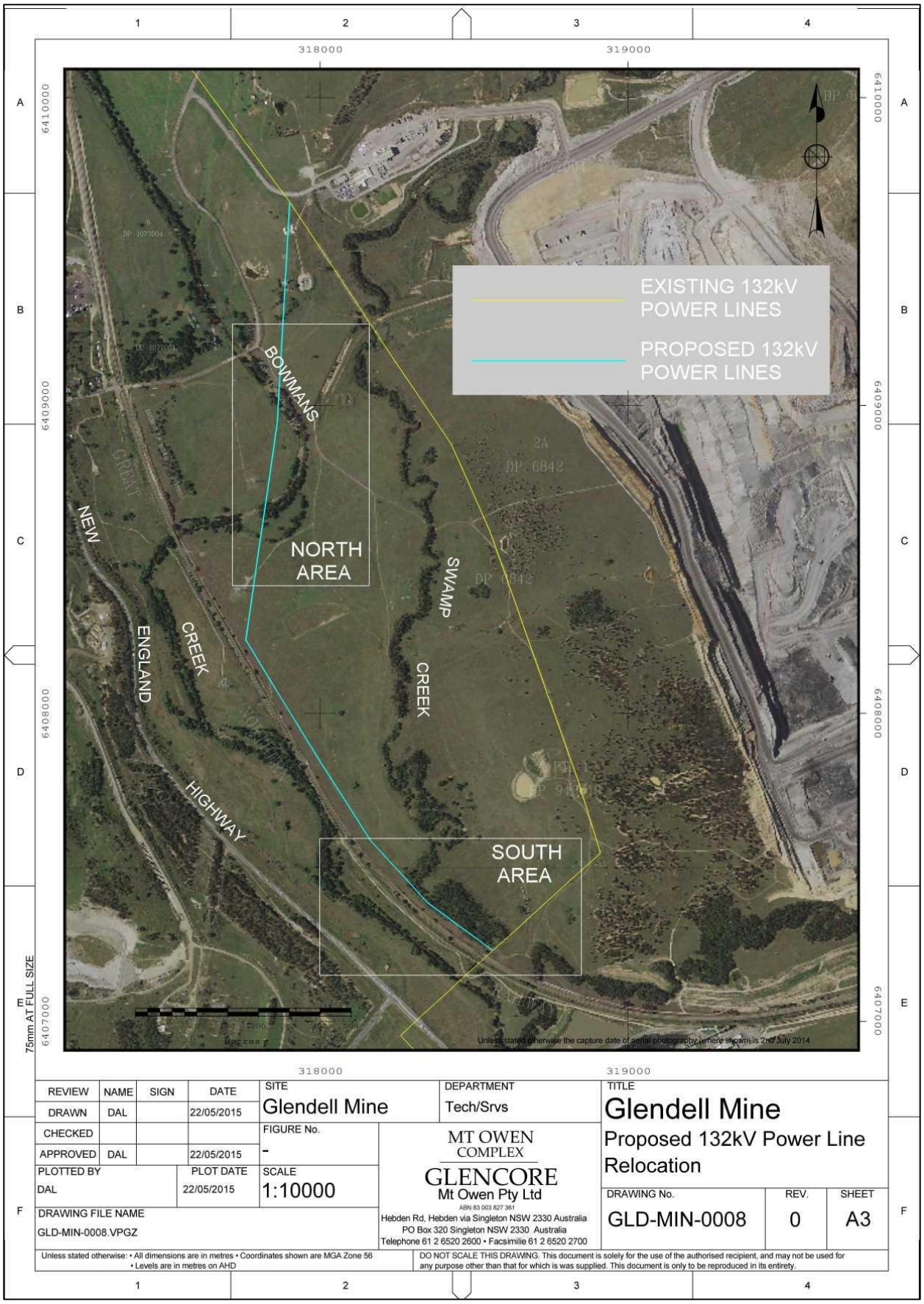


Figure 1-3: Detailed view of the northern area of the Proposal.

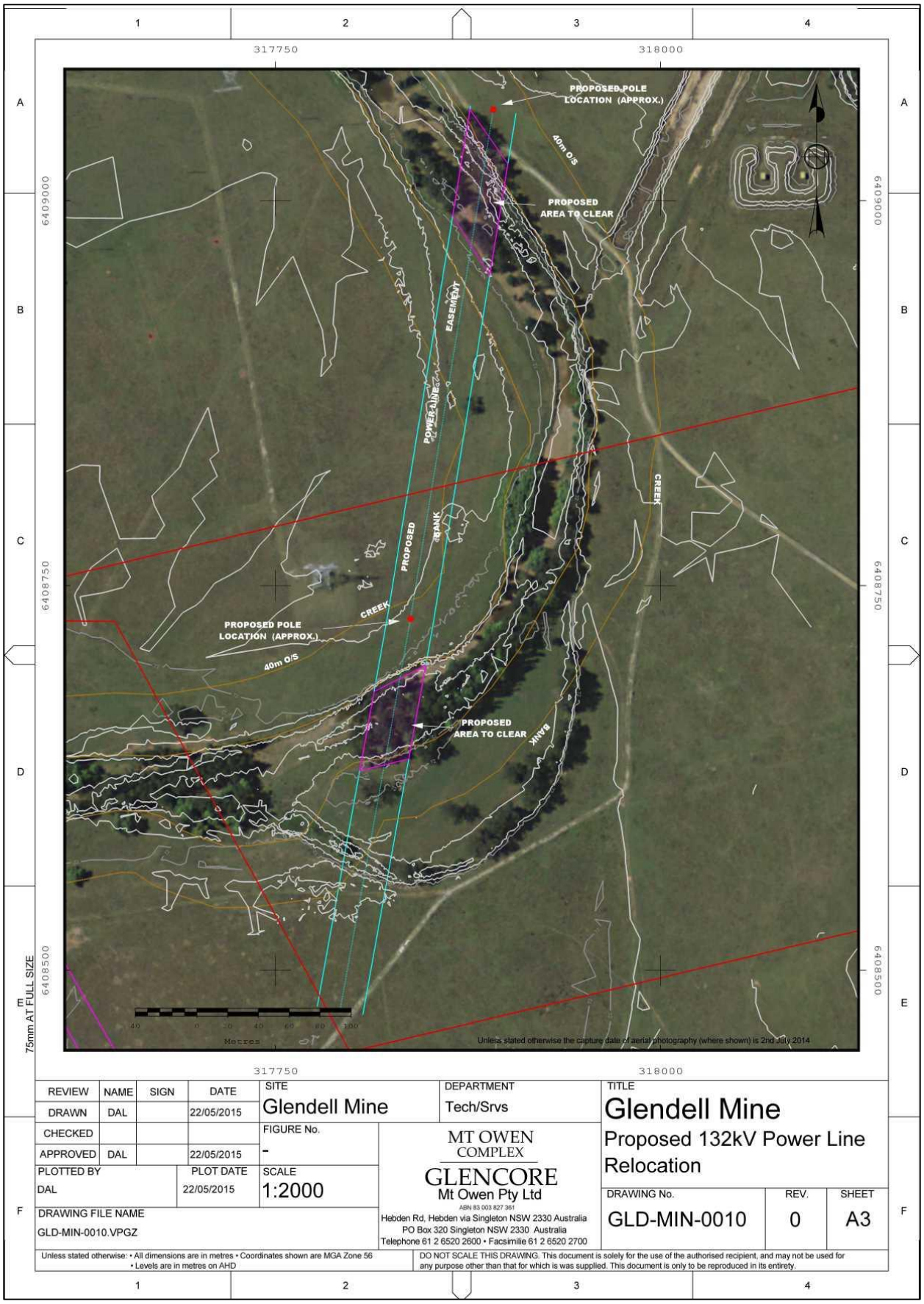
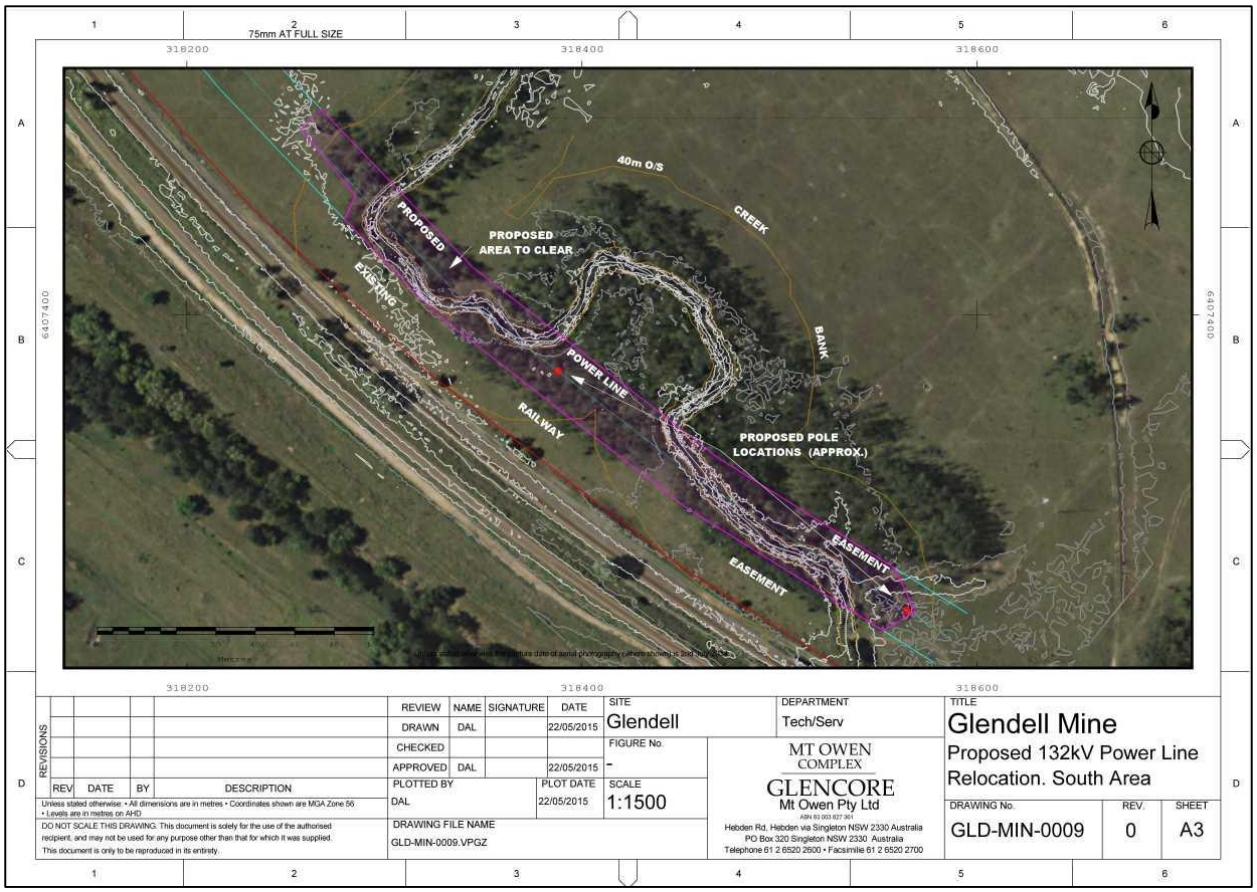


Figure 1-4: Detailed view of the southern area of the Proposal.



1.3 STUDY AREA

The Proposal is in the western portion of the Glendell Mine mining lease. The Study Area is a 60m-wide corridor centred on the proposed centre-line of the power line (**Figure 1−2**). The Study Area is within paddocks that are currently being used for stock grazing. The Proposal crosses Bowmans Creek and Swamp Creek in the 'northern area' (**Figure 1−3**) and 'southern area' (**Figure 1−4**) respectively.

1.4 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.

1.4.1 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 4:** Local government development assessments, including heritage. May include schedules of heritage items;
- **Part 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.

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 (S.5), 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, viz.:

- The harm was authorised by and conducted in accordance with the requirements of an Aboriginal Heritage Impact Permit (AHIP) 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 Office of Environment and Heritage (OEH) Director-General of the location of an Aboriginal object. Identified Aboriginal items and sites are registered on the Aboriginal Heritage Information Management System (AHIMS).

1.4.2 Commonwealth Legislation

Environmental Protection and Biodiversity Conservation Act 1999 (EPBC Act)

Amendments in 2003 established the National Heritage List and the Commonwealth Heritage List, both administered by the Commonwealth Department of the Environment. Ministerial approval is required under the EPBC Act for proposals involving significant impacts to National/Commonwealth heritage places.

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 assess/approve/decline proposals involving modification to heritage items or places listed on the Register. Most proposals involving modification are assessed under Section 60 of the Heritage Act.

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 Act protected any 'relic' that was more than 50 years old. Now the age determination has been dropped from the Act and relics are protected according to their heritage significance assessment rather than purely 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 ordered under an excavation permit.

1.4.3 Applicability to the Project

The current project will be assessed under Part 4 of the EP&A Act.

Any Aboriginal sites within the Study Area are afforded legislative protection under the NPW Act.

Any items of local or state historical heritage significance within the Study Area are afforded legislative protection under the Heritage Act.

It is noted there are no Commonwealth or National heritage listed places within the Study Area, and as such, the EPBC Act does not apply.

2 THE ARCHAEOLOGICAL ASSESSMENT

2.1 PURPOSE AND OBJECTIVES

The purpose of the current study is to identify and assess heritage constraints relevant to the proposed works.

The current assessment will apply the *Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales* (DECCW 2010a) in the completion of an Aboriginal archaeological assessment, in order to meet the following objectives:

Objective One: Undertake a background study of Aboriginal heritage nearby to the Study Area;

Objective Two: Identify and record Aboriginal objects, sites and sensitive landforms within the Study Area; and

Objective Three: Provide management recommendations for the Study Area based on the results of Objectives Two and Three and possible impacts.

2.2 DATE OF ARCHAEOLOGICAL ASSESSMENT

The fieldwork component of this assessment was undertaken by OzArk on 30 June 2015.

2.3 OZARK INVOLVEMENT

2.3.1 Field Assessment

The fieldwork component of the current project was undertaken by Nick Harrop, Senior Archaeologist at OzArk (BA [Hons], University of Sydney).

2.3.2 Reporting

The reporting component of the current project was undertaken by:

- Report Author: Nick Harrop (quals and experience); and
- Reviewer: Ben Churcher (OzArk Principal Archaeologist, BA[Hons] – University of Queensland, Dip Ed – University of Sydney).

3 LANDSCAPE CONTEXT

An understanding of the environmental contexts of a Study Area is requisite in any Aboriginal archaeological investigation (DECCW 2010b). 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.

3.1 TOPOGRAPHY AND HYDROLOGY

The majority of the Study Area is within a flat flood plain with minor changes in elevation due to terracing (**Plate 1**). The northern end of the Study Area traverses the southern slope and crest of a hill that overlooks the flood plain (**Plate 2**).

The Proposal crosses Bowmans Creek and Swamp Creek, both reliable water sources (**Plates 3** and **4**). The course of Bowmans Creek has, in the past, shifted to the east of its current location within the Study Area, as evidenced by a lower terrace immediately to the west of the current creek course. The Study Area is within 350m of one of these creeks at all points.

An ephemeral drainage line is nearby to the Study Area, just north of its divergence from Swamp Creek. A large eroded gully in the central section of the Study Area is also an ephemeral water source.

3.2 GEOLOGY AND SOILS

Silcrete was recorded to be outcropping at site MOCO OS-10 within the Study Area (OzArk 2013: 113). The outcrop was observed to extend into areas of very low visibility so the extent of the outcrop is uncertain. No large rock formations outcrop elsewhere in the Study Area. Ground surface visibility (GSV) was very low during the inspection and as such little could be seen of the geology. Some sedimentary river cobbles were observed in the bed of Bowmans creek. One piece of mudstone was noted in an area of erosion.

A topsoil layer of sandy loam, likely alluvial, covers the Study Area. It was observed to be at least 20cm thick (**Plate 5**). It is likely to be generally thicker, as it was only observed to be 20cm thick at the edge of an erosion gully.

3.3 VEGETATION

The Study Area has been cleared of trees and shrubs with the exception of the creek lines (**Plates 1** to **4**). Casuarinas and a few mature trees of other variety densely populate the banks of the creek lines. Elsewhere, the Study Area is covered by thick grasses.

3.4 CLIMATE

The closest climate data is from Singleton, approximately 19km to the south of the Study Area. Records since 2002 show that average annual rainfall is approximately 685mm. It peaks between November and February, but is relatively consistent throughout the year. January is the warmest month, with mean temperatures peaking at 31.7 degrees Celsius. July and August are the coldest months with mean minimum temperatures of 4.3 and 4.2 degrees Celsius respectively.

3.5 LAND–USE HISTORY AND EXISTING LEVELS OF DISTURBANCE

The Study Area has been historically used for agricultural purposes and is currently used as grazing land. It is uncertain exactly what past land uses took place within the Study Area, but it is likely that the two most significant causes of disturbance are grazing from cloven-hooved animals (sheep and cattle) and tree clearance. Other artificial disturbances include auxiliary agricultural infrastructure such as vehicle tracks and fences.

Natural disturbance from events such as flooding is also likely to have impacts on the soil profile. Erosion is also a significant factor in isolated sections of the Study Area, and is likely to be exacerbated by tree clearance.

3.6 CONCLUSION

The availability of reliable water sources within and close to the Study Area indicate that the area would have been a favourable location for Aboriginal occupation in the past. While current disturbances such as agricultural land use makes it difficult to accurately ascertain what other resources may have been available in the past, the relatively temperate climate and availability to reliable water sources would have enabled occupation of the area during all seasons.

While there are no topographic features within the Study Area that would have acted as a focus for past Aboriginal occupation, it can be assumed that the Study Area would have a favourable occupation location. However, natural disturbances (such as changes to the in-stream location of creeks and associated erosion) and artificial disturbances (such as the noted agricultural land uses) have the ability to disturb and/or obscure archaeological deposits had they been present within the Study Area.

4 ABORIGINAL ARCHAEOLOGY BACKGROUND

4.1 ETHNO-HISTORIC SOURCES OF REGIONAL ABORIGINAL CULTURE

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

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

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.

4.2 REGIONAL ARCHAEOLOGICAL CONTEXT[1]

A very large amount of heritage work has been undertaken in the Hunter Valley and is beyond the scope of this assessment. Consequently, only a brief regional archaeological context that focuses on work in similar landforms to the Study Area is provided here.

Evidence from the Central Lowlands sub-region of the Hunter Valley (broadly between Murrurundi in the north and Cessnock in the south-east), suggests that archaeological material is scattered almost continuously, but in varying density, along most creek banks and flats. It has been suggested that archaeological material is primarily contained in a corridor approximately 100m wide on either side of a creek channel (Koettig 1990: 13).

In broad terms, these open artefact scatters appear to be confined to the A-Horizon of the soil (topsoil) profile which is generally less than 50cm in depth (Hughes 1981; Stern 1981). These sites are often disturbed and stratification is unclear (Hughes 1984: 8). Artefacts are generally manufactured from indurated mudstone, with silcrete, fossilised wood and chert occurring less frequently (Hiscock and Koettig 1985). Features found at open surface scatters include hearths, pits, ovens and heat treatment areas (Burton *et al.* 1990). These sites are generally detected where some form of ground disturbance has occurred, for example erosion due to both cultural

[1] Extracted and abridged from OzArk 2013.

and non-cultural processes, and thus the extent of the site is often difficult to determine. Often the density of artefacts on the surface do not relate to the amount of subsurface archaeological material (see Koettig 1990: 15).

A review of GHD (2005), HLA-Envirosciences (2005) and Umwelt (2007) provides the following regional synthesis:

- Archaeological sites, even where surface evidence is not present, occur on most landforms. This was confirmed by a HLA-Envirosciences (2005) excavation program, in which Aboriginal sites were encountered on alluvial terraces, flats, slopes, bench areas, spurs and ridgelines. HLA-Envirosciences acknowledges that the sample areas were biased somewhat as they were all near creek lines;
- Site frequency and density are dependent on their location in the landscape. This theme is consistent throughout NSW and is influenced by a range of factors, the most relevant of which the existing level of disturbance. More specifically, the potential for undisturbed *in situ* deposits remaining in the upper Hunter on a mining property is generally low;
- The highest concentration of Aboriginal sites on the valley floor surrounds creeks and waterways;
- Few scarred trees are recorded reflecting the high degree of tree clearing in the region;
- The most frequently recorded raw material is indurated mudstone (a fine gained siliceous material) associated with Hunter River gravels. Other frequently recorded materials include locally sourced silcrete, quartz and volcanic stones; and
- Assemblages recorded in the region consist largely of unmodified flakes with few formed tools. Backed blades comprise the characteristic diagnostic artefact in the region. The mid- to late-Holocene appears to have witnessed this move to smaller tools, perhaps as an impetus to conserve raw material during tool manufacture or due to new functionality requirements. This impetus seems to have driven the development of what Hiscock (1993) calls the Redbank A Strategy (RAS, after three sites along Redbank Creek (within the United Colliery south of Singleton) of backed blade production. It is noted that RAS reduction has been infrequently recorded at other sites in the district and no mention of it is made for sites within the Study Area.

Mention will be made here of two Koettig's excavations, at Glennies Creek and Camberwell, due to their proximity to the Study Area (Koettig 1986, 1992).

The initial survey of the Glennies Creek to Singleton pipeline recommended that excavations be undertaken at six locations along the northern section of pipeline route where visibility was poor. This resulted in the further identification of five sites. Further archaeological work concentrated

on two sites in the valley of Foy Brook near Mount Olive. The sites are on small alluvial flats adjacent to Foy Brook and surrounded on either side by steeply rising slopes to ridge crests.

The survey work at Camberwell Coal Mine recommended salvage archaeological work on a number of sites considered to have archaeological potential. This work was undertaken by Koettig in 1990 (reported in Koettig 1992).

From previous investigations, the following generalisations can be made about archaeological patterns in the Hunter Valley region:

- Sites are commonly open artefact scatters or isolated finds;
- Sites are generally of low density;
- Most sites are situated close to drainage lines;
- Archaeological material is densest within 30m of the creek edge but continues at a lower density away from the creek;
- Some artefact concentrations are virtually continuous along larger creek lines and associated foot slopes;
- 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 are low;
- There is evidence of heat-treated artefacts; and
- Many recorded artefacts are characteristic of the Small Tool Tradition (Bondaian) of the late Holocene.

4.3 LOCAL ARCHAEOLOGICAL CONTEXT

4.3.1 Desktop Database Searches Conducted

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

As per **Table 4−1**, it is noted that the Study Area includes land currently subject to a Native Title Claim by Scott Franks and Anor on behalf of the Plains Clans of the Wonnarua People (Tribunal File No. NC2013/006, Federal Court No. NSD1680/2013).

Table 4-1: Desktop-database search results.

Name of Database Searched	Date of Search	Type of Search	Comment
Commonwealth Heritage Listings http://www.environment.gov.au/cgi-bin/ahdb/search.pl	29.06.15	Singleton LGA	No places listed on either the National or Commonwealth heritage lists are located within the Study Area.
National Native Title Claims Search http://www.ntv.nntt.gov.au/index.asp	29.06.15	NSW	An active Native Title claim includes the Study Area.
OEH AHIMS http://www.environment.nsw.gov.au/awssapp/login.aspx	29.06.15	Centred on the Study Area with a minimum buffer of 50m.	19 sites within the search area.
Local Environment Plan (LEP) http://www.austlii.edu.au/au/legis/nsw/consol_reg/	29.06.15	Singleton LEP of 2013	None of the Aboriginal places noted occur near the Study Area.

A search of the OEH administered AHIMS database returned 19 records for Aboriginal heritage sites within the designated search area (**Figure 4−1**). One of the sites, MOCO OS-10 (AHIMS ID 37−3−1198) partially overlaps with the Study Area (**Figure 6−4**). It is a low-density, open artefact scatter. The location of another site (37−3−0614) is recorded to be within the Study Area and within MOCO OS-10. However, it is listed as 'destroyed' on AHIMS having been previously salvaged. A further three of the 19 sites within the search area are listed as 'destroyed' on AHIMS and none are within 50m of the Study Area.

All previously-recorded sites are/were stone artefact sites, at least two of which are isolated stone artefact sites. Two sites (37−3−0619 and 37−3−0620) have associated Potential Archaeological Deposits (PADs). These are associated with Swamp Creek to the east.

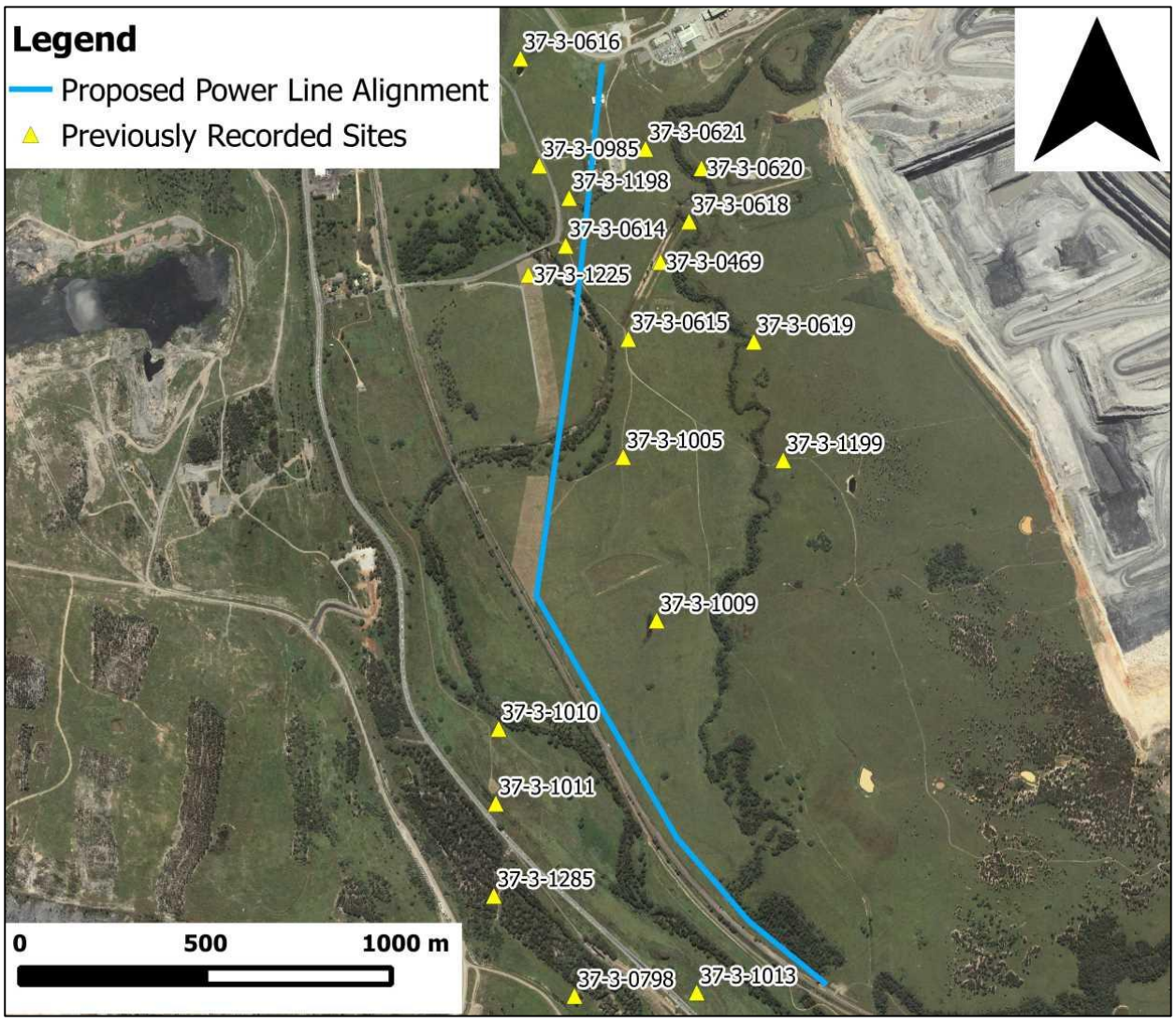
The most relevant local archaeological study is OzArk's *Aboriginal Archaeological Values Assessment: Mount Owen Continued Operations* (2013). The assessment covered 464ha within the Mount Owen mine complex and included surface survey and test excavation. In total, 11 artefact scatters, 20 isolated finds and three extensions to previously recorded sites were recorded. Other than the new recordings / extensions, three previously recorded sites are also within the OzArk 2013 survey area.

The results of the 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, most of the artefacts were concentrated in a small area, representing two or three discreet 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 results of the 2013 OzArk assessment were consistent with the regional characteristics described in **Section 4−2**.

Figure 4-1: Distribution of previously-recorded sites near the Study Area.



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.

The following predictive model is formulated based on knowledge of the environmental contexts of the Study Area and a desktop review of the known local and regional archaeological record:

- Any possible sites are most likely to be open artefact scatters or isolated finds with the following characteristics:
  - Within 200m of a waterway and on a terrace;
  - Most likely low-moderate density, possibly higher within 30m of Swamp Creek or Bowman's Creek;
  - Will have an artefact assemblage dominated by flakes with few cores made from mudstone and silcrete and will have few chronological markers in the typology apart from the presence of backed blades.
- Scarred trees are possible on the few remaining mature trees of suitable type (i.e. not casuarinas);
- Hearths are possible but are likely to have been damaged by existing disturbances and, if present, may only remain as a disarticulated scatter of baked clay nodules. Similarly, ceremonial sites are possible but any evidence such as stone arrangements are likely to be disturbed;
- A quarry is possible in the vicinity of MOCO OS-10 due to outcropping silcrete, but no evidence of quarrying was observed during the recording of the site (OzArk 2013: 113)
- Burials are also possible but are unlikely to have survived; and
- Grinding grooves and rock shelters will not occur due to an absence of necessary geological formations.

5 APPLICATION OF THE DUE DILIGENCE CODE OF PRACTICE

5.1 INTRODUCTION

In late 2010, changes were made to the National Parks and Wildlife Act 1974 (NPW Act 1974) via the Omnibus Bill. As of October 2010, the *Due Diligence Code of Practice for the Protection of Aboriginal Objects in NSW* (DECCW 2010a) was instituted to assist developers to exercise the appropriate level of caution when carrying out activities that could cause harm to Aboriginal heritage.

5.2 DEFENCES UNDER THE NPW REGULATIONS 2009

The first step before application of the Due Diligence process itself is to determine whether the proposed activity is a "low impact activity" for which there is a defence in the NPW regulations 2009. The exemptions are listed in Section 7.5 of the Regulations (DECCW 2010a: 6).

The activities of the Proponent do not fall into any of these exemption categories. Therefore the Due Diligence process must be applied.

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

The regulations (DECCW 2010a: 18) define disturbed land as follows:

> *Land is disturbed if it has been the subject of a human activity that has changed the land's surface, being changes that remain clear and observable.*
>
> *Examples include ploughing, construction of rural infrastructure (such as dams and fences), construction of roads, trails and tracks (including fire trails and tracks and walking tracks), clearing vegetation, construction of buildings and the erection of other structures, construction or installation of utilities and other similar services (such as above or below ground electrical infrastructure, water or sewerage pipelines, stormwater drainage and other similar infrastructure) and construction of earthworks.*

5.3 APPLICATION OF THE DUE DILIGENCE CODE OF PRACTICE TO THE PROPOSED DEVELOPMENT

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

The following paragraphs address this due diligence for the Glendell Mine Proposed 132kV Power Line Relocation.

Step 1: Will the activity disturb the ground surface or any culturally modified trees?

Yes the activity will disturb the ground. Go to Step 2.

Step 2: Are there any:

a) Relevant confirmed site records or other associated landscape feature information on AHIMS? and/or

b) Any other sources of information of which a person is already aware? and/or

c) Landscape features that are likely to indicate presence of Aboriginal objects?

a) Yes, one valid site (MOCO OS-10; 37−3−1198) overlaps with the current design of the Proposal (see **Appendix 1**).

b) No

c) Landscape features noted here include (DECCW 2010):

- within 200 metres of waters, or
- located within a sand dune system, or
- located on a ridge top, ridge line or headland, or
- located within 200 metres below or above a cliff face, or
- within 20 metres of or in a cave, rock shelter, or a cave mouth

and' is on land that is not disturbed land (see **Section 5.2**) then you must go to Step 3.

Yes, the majority of the Study Area is within 200m of Bowmans Creek or Swamp Creek, and most of this area appears to only include limited surface disturbance despite likely tree clearance. A small portion of the Study Area is on the crest of a hill, but the soil profile appears to be more disturbed in this location.

Step 3: Can harm to Aboriginal objects listed on AHIMS or identified by other sources of information and/or can the carrying out of the activity at the relevant landscape features be avoided?

No. There are is one known Aboriginal site within the Study Area and the activity will impact landforms within 200 metres of water.

An answer of 'no' to Step 3 advances the process to Step 4.

The Proponent has elected to proceed with a visual inspection as per Step 4 of the *Due Diligence* Process to better clarify any heritage constraints for the Proposal. The visual inspection is intended to better inform the levels of existing disturbance within the Study Area and to identify any possible sites not previously recorded. The results of the visual inspection are provided in **Section 6**.

6 RESULTS OF ABORIGINAL ARCHAEOLOGICAL ASSESSMENT

6.1 SAMPLING STRATEGY AND FIELD METHODS

The Study Area was inspected by vehicular and pedestrian means. The majority of the Study Area was driven over in a vehicle, with frequent stops made where GSV was available and also to generally record sensitive landscape features.

6.2 PROJECT CONSTRAINTS

GSV was generally very low, and in parts, non-existent. This almost entirely excluded the possible recording of all site types with the exception of scarred trees. Therefore the assessment is based on landscape sensitivity and previously-recorded sites, and as such, is not supported by possible surface manifestations of sites.

6.3 SURVEY RESULTS

No new recordings were made of Aboriginal sites during the visual inspection of the Study Area. As outlined above, the extent to which this result is affected by the low GSV is uncertain.

Six sections of the Study Area overlap with potential archaeologically sensitive landforms. Without surface artefacts, it is difficult to assess the potential for subsurface artefacts. However, the absence of surface artefacts could easily be a reflection of low GSV and so assessment is made based on landscape features and existing disturbance. Due to the increased uncertainty of the potential archaeologically sensitive landforms, these sections are referred to as 'Sensitive Areas' rather than the usual 'PADs'. These Sensitive Areas have the following characteristics that support them as being archaeologically sensitive:

- Sensitive Areas 1, 2, 3, 6 and most of 5 are within 100m of reliable water. Sensitive Area 4 and the southern end of 5 are within 100m of ephemeral waterways;
- All are on elevations, although very slight in cases, above the surrounding floodplain;
- Existing disturbances appear to be limited to tree clearance and stock grazing, with natural hydrological disturbance such as scouring possible. While these have impacted the soil profile to varying degrees, there is a possibility of relatively intact soils to be remnant across the Sensitive Areas;
- A-horizon soils appear deep enough to contain archaeological deposits across most of the Study Area; and
- There are a number of recorded sites near the Study Area and the regional archaeological patterns indicate the likelihood of sites within the Sensitive Areas.

The Sensitive Areas are briefly described in **Table 6−1** and are shown in **Figures 6−1** to **6−3**. It is important to note that many of the boundaries of the Sensitive Areas are approximations as only the vicinity of the Study Area was investigated. Additionally, there are small areas within

them that are disturbed or marshy: these areas are not as archaeologically sensitive as adjacent areas.

Table 6-1: Description of Sensitive Areas.

Sensitive Area	Central Coordinates (GDA94, Zone 56)		Description	Plate Reference
	Easting	Northing		
1	317850	6409135	This is a small, roughly level area, approximately 50m by 20m in area, nearby to Bowmans Creek. It is bordered to the north and east by hill slopes, to the south by a drop in elevation, and to the west by a track. Occupies a contiguous landform to that in which artefacts have been previously recorded at MOCO OS-10.	6
2	317845	6408965	This Sensitive Area covers a slight elevation to the west of Bowmans Creek. The landscape drops away to the east onto a lower terrace, and drops slightly in all other directions. This area is 110m by 10m.	7
3	317830	6408770	This Sensitive Area covers a slight elevation to the west of Bowmans Creek. The landscape drops away to the east onto a lower terrace, and drops slightly in all other directions. This area is 90m by 10m.	8
4	317860	6408085	This Sensitive Area is a roughly-defined area to the southeast of an erosion gully. Only the gully and a fence to the southwest are certain boundaries.	9
5	318075	6407670	This is a very broad area that covers a terrace above the landscape to the east. It is bordered by a rail line to the west, beyond which is Bowmans Creek. The eastern boundary is an ephemeral drainage line. The northern and southern boundaries are defined by slight elevation drops.	10
6	318320	6407385	This area is an approximately 200m-long and 15m-wide strip of slightly elevated land along the west bank of Swamp Creek.	11

Figure 6-1: Indicative locations of Sensitive Areas 1 to 3.

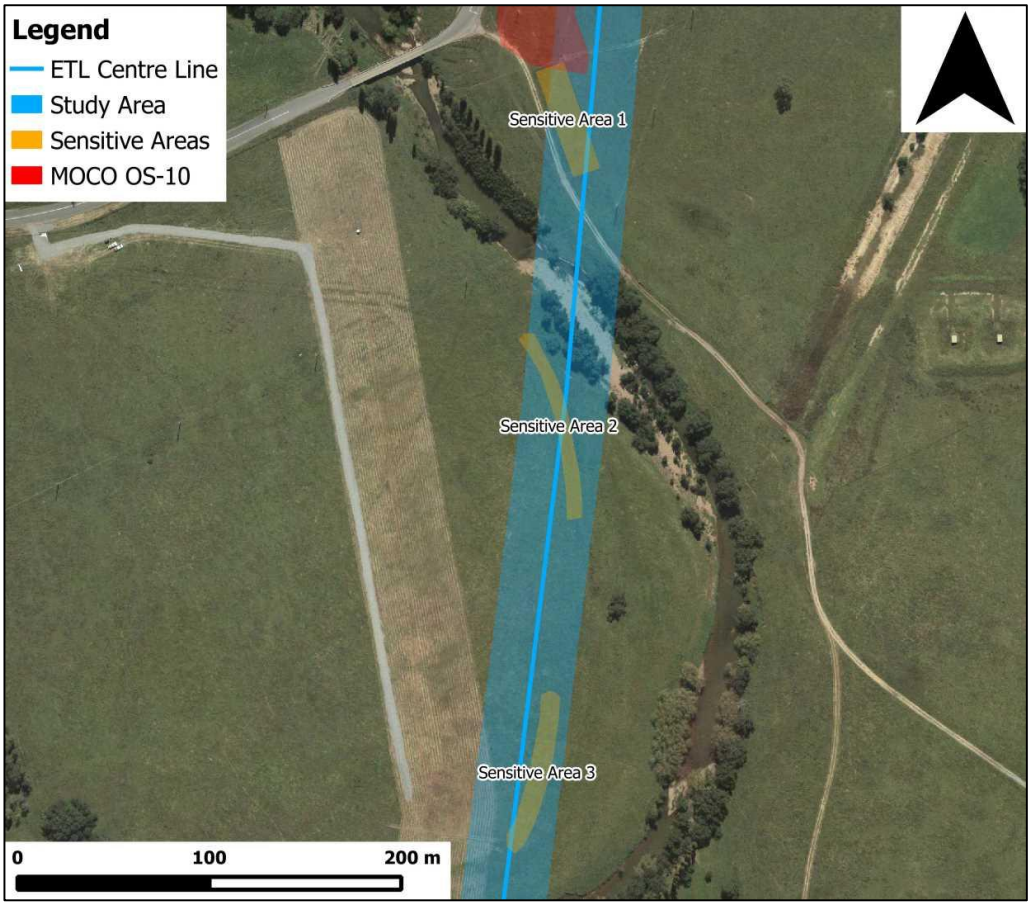


Figure 6-2: Indicative locations of Sensitive Area 4.

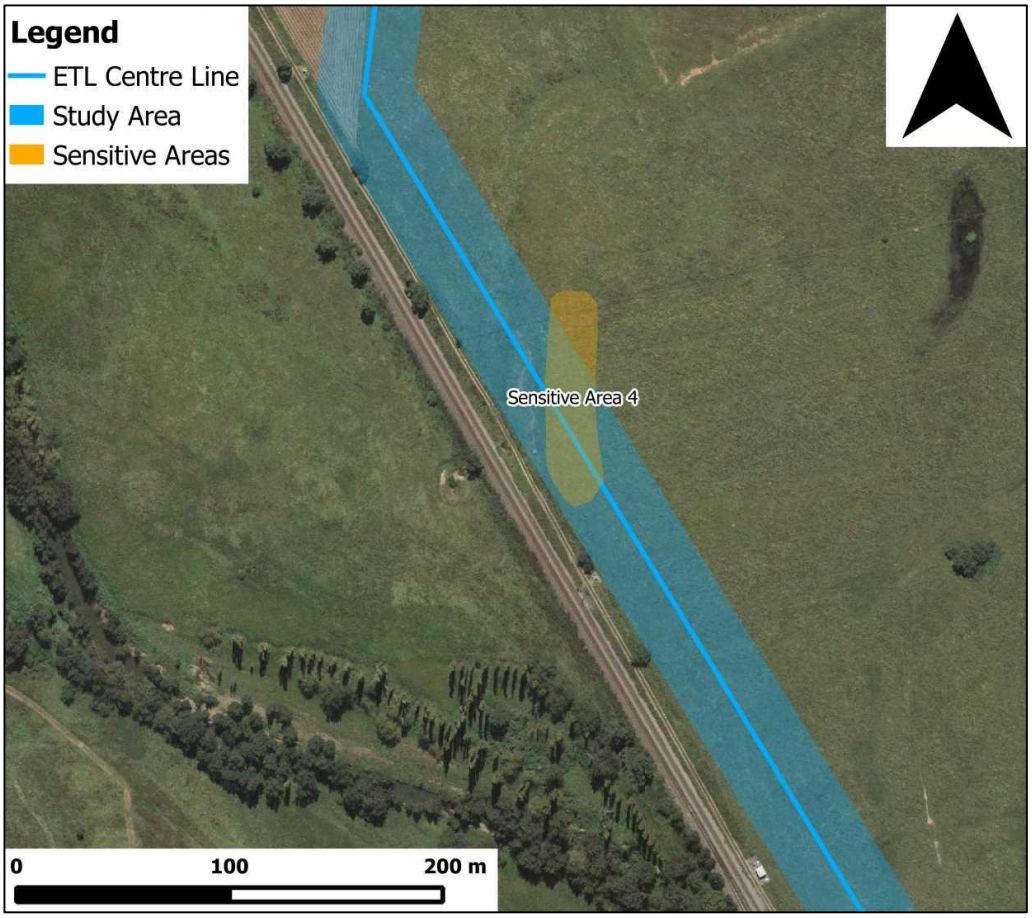
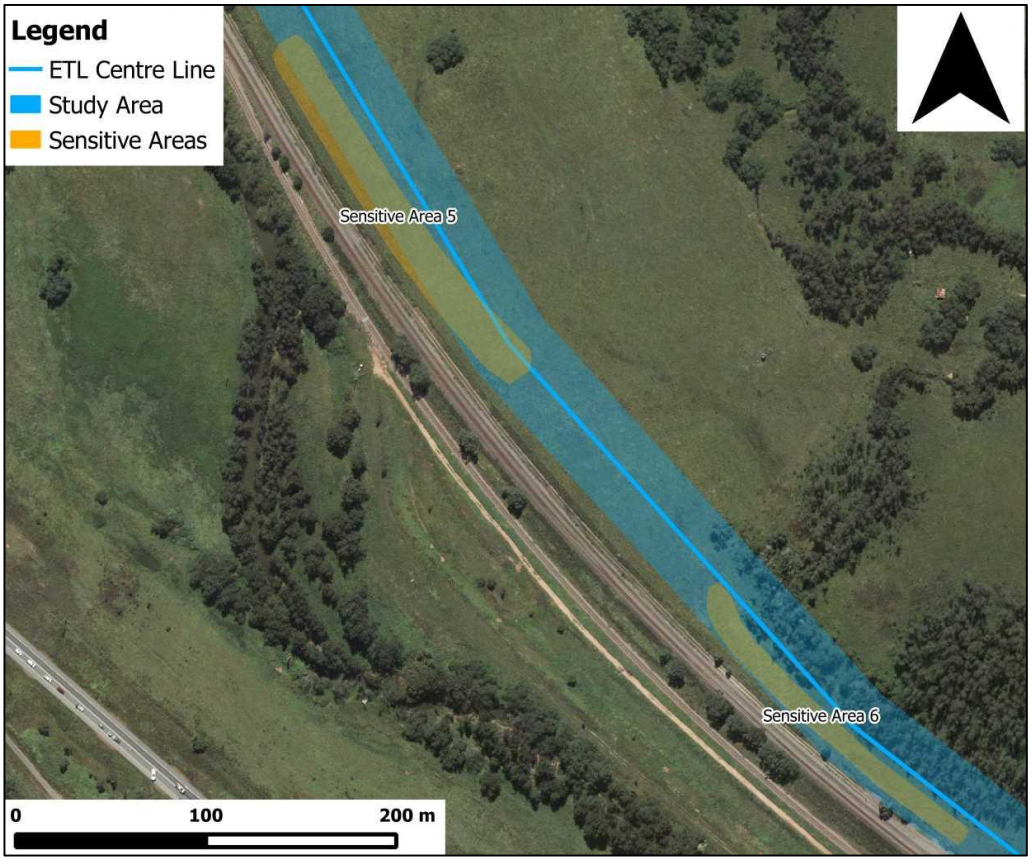


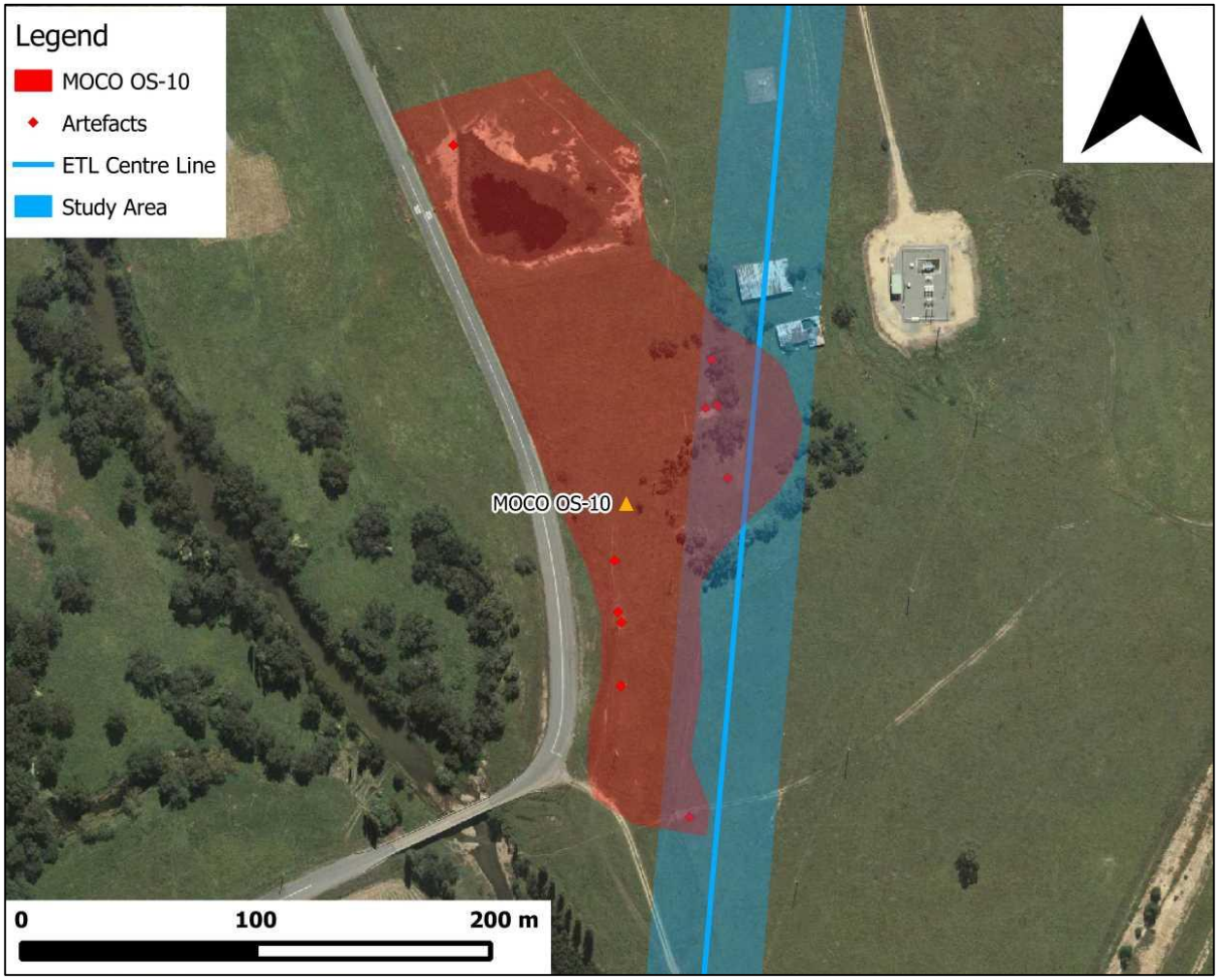
Figure 6-3: Indicative locations of Sensitive Areas 5 and 6.



6.4 ABORIGINAL SITES LOCATED

MOCO OS-10 (37−3−1198) is the only valid previously-recorded site within the Study Area (**Figure 6−4**). It was not revisited during the site inspection. The 2013 recording, including site boundaries, is considered valid.

Figure 6-4: Proximity of the Study Area to MOCO OS-10 and recorded artefacts.



MOCO OS-10 is located on a rise to the north of Bowmans Creek and is largely to the west of the Study Area. The site contains silcrete outcrops but none appeared to have been utilised for quarrying. The site extends for 325m in a northwest-southeast direction and is up to 115m wide.

20 artefacts were recorded at MOCO OS-10 including two indurated mudstone / tuff cortical cores. The remaining artefacts were flakes or broken flakes sourced from mudstone, silcrete, banded chert and quartzite. The incidence of cores is reflective of the results from nearby a site (Bowmans Creek 2), suggesting the area was used for artefact production. No formal tool types were recorded in contrast to results from nearby sites such as Bowmans Creek 5 where this activity seems to have been concentrated.

The site has been impacted by the construction of a farm house and sheds at the top of the rise as well as the farm track leading to this house. Hebden Road forms an artificial westerly boundary

to the site. In addition, soil loss is evident across the site and rock outcropping is frequent indicating that the remaining soils are thin. It is therefore assessed that there is a low likelihood that MOCO OS-10 contains further, undetected, subsurface archaeological deposits.

6.5 DISCUSSION

It is difficult to compare the results of the field inspection with the predictive model due to the low GSV. However, aspects of the archaeological and landscape context, which informs the predictive model, are relevant to the formulation of Sensitive Areas. These relevant aspects are set out in **Section 6.3**.

In assigning the label 'Sensitive Area' to sections of the Study Area, there are a few important things to recognise. Firstly, had there been adequate GSV and no surface artefacts were recorded, it is unlikely that these sections would be deemed archaeologically sensitive. The label is precautionary.

As mentioned in **Section 6.3**, the extent of the Sensitive Areas was not fully established. The boundaries were set only where they were nearby to the Study Area. Additionally, the general uncertainty of the archaeological sensitivity of these areas makes defining their boundaries more difficult.

Finally, there are minor disturbances and natural depressions within the Sensitive Areas that are not as archaeologically sensitive as adjacent areas. For practical purposes they are included in the area, but any further investigation should take this into consideration.

6.6 ASSESSMENT OF SIGNIFICANCE

The appropriate management of cultural heritage items is usually determined on the basis of their assessed significance as well as the likely impacts of any proposed developments. Scientific, cultural and public significance are identified as baseline elements of significance assessment, and it is through the combination of these elements that the overall cultural heritage values of a site, place or area are resolved.

The scientific significance of MOCO OS-10 has been assessed in OzArk 2013. It has been described as having low scientific / archaeological significance based on the following factors:

- Low density of artefacts;
- No formal tool types;
- Soil loss from erosion in the A-Horizon;
- Existing disturbance from the construction of Hebden Road and agricultural activities; and
- The fragmentation of the surrounding archaeological landscape from mining activities;

The cultural, aesthetic and historical value of MOCO OS-10 was assessed in the Mount Owen Continued Operations (MOCO) cultural values report. The site, like others in the MOCO study area, has high cultural values as it is an indicator of past Aboriginal occupation in the area. MOCO OS-10 has low aesthetic values due to past disturbances and its scant representation within the landscape. There are no known historical associations with the site and MOCO OS-10 was assessed as having no historical values.

6.7 LIKELY IMPACTS TO ABORIGINAL HERITAGE FROM THE PROPOSAL

Under the current design of the Proposal, MOCO OS-10 is at risk of being impacted. Additionally, Sensitive Areas 1 to 6 are at risk of impact. The precise nature and extent of the impact is not assessed in this report. However, it is presumed that there will be significant disturbance in the location of the towers for the power line and likely surface disturbance from heavy-vehicle movement. Management measures for possible impacts to MOCO OS-10 and Sensitive Areas 1 to 6 are suggested in **Section 7**.

7 MANAGEMENT AND MITIGATION: ABORIGINAL HERITAGE

7.1 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. **Sections 6.6** and **6.7** describe, respectively, the significance / potential of the recorded sites and the likely impacts of the 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 or in this case by avoiding impact to a recorded Aboriginal site. If this can be done, then a suitable curtilage 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 approval to disturb sites must be sought from OEH and will depend on many factors including the site's assessed significance. Aboriginal community consultation will also need to occur following the OEH *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (ACHCRs; DECCW 2010c). If granted, the local Aboriginal communities may wish to collect or relocate any evidence of past Aboriginal occupation (Aboriginal object), whether temporarily or permanently, if necessary. The fate of all artefacts remains within the statutory control of the OEH. A care and control permit may be issued to local Aboriginal groups or, with Aboriginal community consent, to other parties, for educational or display purposes.

7.2 MANAGEMENT AND MITIGATION OF RECORDED ABORIGINAL SITES

The precise nature of the impacts associated with the Proposal are not known. Additionally, this *Due Diligence* assessment provides only a basic level of assessment. The low GSV in the Study Area also hampered accurate assessment. As a consequence of these factors, the following is a basic set of management measures that are conditional on a better understanding of impacts and further investigation:

- Site MOCO OS-10 should be avoided by the Proposal. In order to ensure this, the following actions should be taken:

    - The Proponent should consider a design that spans MOCO OS-10 and ensures that no electricity towers/poles are constructed within the confines of MOCO OS-10. Additionally, no new access tracks should be constructed within MOCO OS-10 although the existing track to the house/sheds can be used without the existing track being graded or widened.

  - The site should be bordered by temporary fencing surrounding the site with a minimum 5m buffer and 'Do Not Enter' signs attached.
  - The workforce should be made aware of the location of the site and that it is to be avoided.

- If MOCO OS-10 is unavoidable by the Proposal, then the proponent will need to consult with the Aboriginal community under the ACHCRs process and apply for an AHIP.
- Sensitive Areas 1 to 6 should be further investigated if they are to be impacted in order to determine if they contain sites of Aboriginal heritage. Appropriate investigation would be test excavation according to the *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (DECCW 2010b).

8 RECOMMENDATIONS

Under Section 91 of the NPW Act (as amended in 1974) it is mandatory that all Aboriginal sites recorded under any auspices be registered with OEH AHIMS. As a professional in the field of cultural heritage management it is the responsibility of OzArk to ensure this process is undertaken.

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

- Legal requirements under the terms of the NPW Act (as amended in 1974) whereby it is illegal to damage, deface or destroy an Aboriginal place or object without the prior written consent of OEH;
- The findings of the current investigations undertaken within the Study Area; and
- The interests of the Aboriginal community.

Recommendations concerning the Study Area are as follows:

1 Site MOCO OS-10 should be avoided by the Proposal. In order to ensure this, the following actions should be taken:

   a. The Proponent should consider a design that spans MOCO OS-10 and ensures that no electricity towers/poles are constructed within the confines of MOCO OS-10. Additionally, no new access tracks should be constructed within MOCO OS-10 although the existing track to the house/sheds can be used without the existing track being graded or widened.

   b. The site should be bordered by temporary fencing surrounding the site with a minimum 5m buffer and 'Do Not Enter' signs attached.

   c. The workforce should be made aware of the location of the site and that it is to be avoided.

2 If MOCO OS-10 is unavoidable by the Proposal, then the proponent will need to consult with the Aboriginal community under the ACHCRs process and apply for an AHIP.

3 Sensitive Areas 1 to 6 should be further investigated if they are to be impacted in order to determine if they contain sites of Aboriginal heritage. Appropriate investigation would be test excavation according to the *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (DECCW 2010b).

4 If unexpected remains are encountered during the proposed works that are suspected to be of Aboriginal cultural heritage, even where MOCO OS-10 AND Sensitive Areas 1 to 6 are avoided, then the *Unanticipated Finds Protocol* (**Appendix 2**) should be followed.

5 The workforce should be made aware of the legislative protection of Aboriginal sites and that there are other sites present in the general area.

6 Should the parameters of the Proposal extend beyond the area assessed, then further assessment may be required.

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PLATES

Plate 1: Representative view to the north of the Study Area from Sensitive Area 3.

Plate 2: View to the south from the northern end of the Study Area.

Plate 3: View of the proposed power line route along the tree-line of Swamp Creek.

Plate 4: View of an intersection of the Study Area with Bowmans Creek.

Plate 5: Soil profile at Sensitive Area 3.

Plate 6: View to the north along Sensitive Area 1.

Plate 7: View to the northeast along Sensitive Area 2.

Plate 8: View to the southwest along Sensitive Area 3.

Plate 9: View to the north of Sensitive Area 4.

Plate 10: View to the north of Sensitive Area 5.

Plate 11: View to the southwest of Sensitive Area 6 from the north.

APPENDIX 1: AHIMS EXTENSIVE SEARCH RESULTS

Office of Environment & Heritage

AHIMS Web Services (AWS)

Extensive search - Site list report

Purchase Order/Reference : 1244 Ext
Client Service ID : 179472

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
37-3-0985	REA89	GDA	56	317742	6409391	Open site	Valid	Artefact : -		103364
	Contact	Recorders	Umwelt (Australia) Pty Limited					Permits		
37-3-1005	REA124	GDA	56	317982	6408615	Open site	Valid	Artefact : -		
	Contact	Recorders	Umwelt (Australia) Pty Limited					Permits		
37-3-1009	REA131	GDA	56	318080	6408179	Open site	Valid	Artefact : -		
	Contact	Recorders	Umwelt (Australia) Pty Limited					Permits		
37-3-1010	REA132	GDA	56	317660	6407881	Open site	Destroyed	Artefact : -		
	Contact	Recorders	Umwelt (Australia) Pty Limited,Ms.Alison Lamond					Permits		
37-3-1011	REA133	GDA	56	317656	6407681	Open site	Valid	Artefact : -		103364
	Contact	Recorders	Umwelt (Australia) Pty Limited					Permits		
37-3-1013	REA141	GDA	56	318206	6407185	Open site	Valid	Artefact : -		103364
	Contact	Recorders	Umwelt (Australia) Pty Limited					Permits		
37-3-0614	Bowmans Creek 2	AGD	56	317711	6408987	Open site	Valid	Artefact : -		99019,100895, 102380
	Contact	Recorders	Janice Wilson					Permits	2267	
37-3-0615	Bowmans Creek 3	AGD	56	317884	6408740	Open site	Valid	Artefact : -		99019,100895
	Contact	Recorders						Permits	2267	
37-3-0616	Bowmans Creek 4	AGD	56	317580	6409486	Open site	Valid	Artefact : -		99019,100895, 102380
	Contact	Recorders	Umwelt (Australia) Pty Limited					Permits	2267	
37-3-0618	Swamp Creek 1	AGD	56	318042	6409058	Open site	Valid	Artefact : -		99019,100895, 102380
	Contact	Recorders						Permits	2267	
37-3-0619	Swamp Creek 2	AGD	56	318222	6408739	Open site	Valid	Artefact : -, Potential Archaeological Deposit (PAD) : -		99019,100895, 102380
	Contact	Recorders						Permits	2267	
37-3-0620	Swamp Creek 3	AGD	56	318073	6409201	Open site	Valid	Artefact : -, Potential Archaeological Deposit (PAD) : -		99019,100895, 102380
	Contact	Recorders						Permits	2267	
37-3-0621	Swamp Creek 4	AGD	56	317921	6409250	Open site	Valid	Artefact : -		99019,100895, 102380
	Contact	Recorders						Permits	2267	
37-3-1198	MOCO OS-10	GDA	56	317824	6409306	Open site	Valid	Artefact : 1		
	Contact	Recorders	Ben Churcher,OzArk Environmental and Heritage Management					Permits		
37-3-1199	MOCO OS-11	GDA	56	318413	6408614	Open site	Valid	Artefact : 1		

Report generated by AHIMS Web Service on 29/06/2015 for Nicholas Harrop for the following area at Datum :GDA, Zone : 56, Eastings : 317700 - 318600, Northings : 6407200 - 6409700 with a Buffer of 50 meters. Additional Info : To ground-truth possible sites within the search area.. Number of Aboriginal sites and Aboriginal objects found is 19

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Office of Environment & Heritage

AHIMS Web Services (AWS)

Extensive search - Site list report

Purchase Order/Reference : 1244 Ext

Client Service ID : 179472

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
	Contact	Recorders	Ben Churcher,OzArk Environmental and Heritage Management					Permits		
37-3-1285	REA395	GDA	56	317655	6407434	Open site	Destroyed	Artefact : -		
	Contact	Recorders	Ms.Alison Lamond,Ms.Nadia Zakrzewski					Permits		
37-3-1225	REA 444 (Tower 31)	GDA	56	317718	6409098	Open site	Destroyed	Artefact : -		
	Contact	Recorders	Ms.Alison Lamond,Ms.Alison Lamond					Permits		
37-3-0469	Bowmans/Swamp Creek Trench 1	AGD	56	317967	6408948	Open site	Valid	Artefact : -		102380
	Contact	Recorders	Janice Wilson					Permits	1325	
37-3-0798	Liddell EW 15	GDA	56	317877	6407170	Open site	Destroyed	Artefact : 21		101420,102617
	Contact	Recorders	Mrs.Angela Besant,Insite Heritage Pty Ltd,Insite Heritage Pty Ltd					Permits	3428	

Report generated by AHIMS Web Service on 29/06/2015 for Nicholas Harrop for the following area at Datum :GDA, Zone : 56, Eastings : 317700 - 318600, Northings : 6407200 - 6409700 with a Buffer of 50 meters. Additional Info : To ground-truth possible sites within the search area.. Number of Aboriginal sites and Aboriginal objects found is 19

APPENDIX 2: UNANTICIPATED FINDS PROTOCOL

An Aboriginal artefact is anything which is the result of past Aboriginal activity. This includes stone (artefacts, rock engravings etc.), plant (culturally scarred trees) and animal (if showing signs of modification; i.e. smoothing, use). Human bone (skeletal) remains may also be uncovered while onsite.

Cultural heritage significance is assessed by the Aboriginal community and is typically based on traditional and contemporary lore, spiritual values, and oral history, and may also take into account scientific and educational value.

Protocol to be followed in the event that previously unrecorded or unanticipated Aboriginal object(s) are encountered:

1. All ground surface disturbance in the area of the finds should cease immediately the finds are uncovered.
    a) The discoverer of the find(s) will notify machinery operators in the immediate vicinity of the find(s) so that work can be halted; and
    b) The site supervisor will be informed of the find(s).
2. If there is substantial doubt regarding an Aboriginal origin for the finds, then gain a qualified opinion from an archaeologist as soon as possible. This can circumvent proceeding further along the protocol for items which turn out not to be archaeological. If a quick opinion cannot be gained, or the identification is positive, then proceed to the next step.
3. Immediately notify the following authorities or personnel of the discovery:
    a) OEH; and
    b) Relevant Aboriginal Community Representatives.
4. Facilitate, in co-operation with the appropriate authorities and relevant Aboriginal community representatives:
    a) The recording and assessment of the finds;
    b) Fulfilling any legal constraints arising from the find(s). This will include complying with OEH directions; and
    c) The development and conduct of appropriate management strategies. Strategies will depend on consultation with stakeholders and the assessment of the significance of the find(s).
5. Where the find(s) are determined to be Aboriginal Objects, any re-commencement of construction related ground surface disturbance may only resume in the area of the find(s) following compliance with any consequential legal requirements and gaining written approval from OEH (as required).