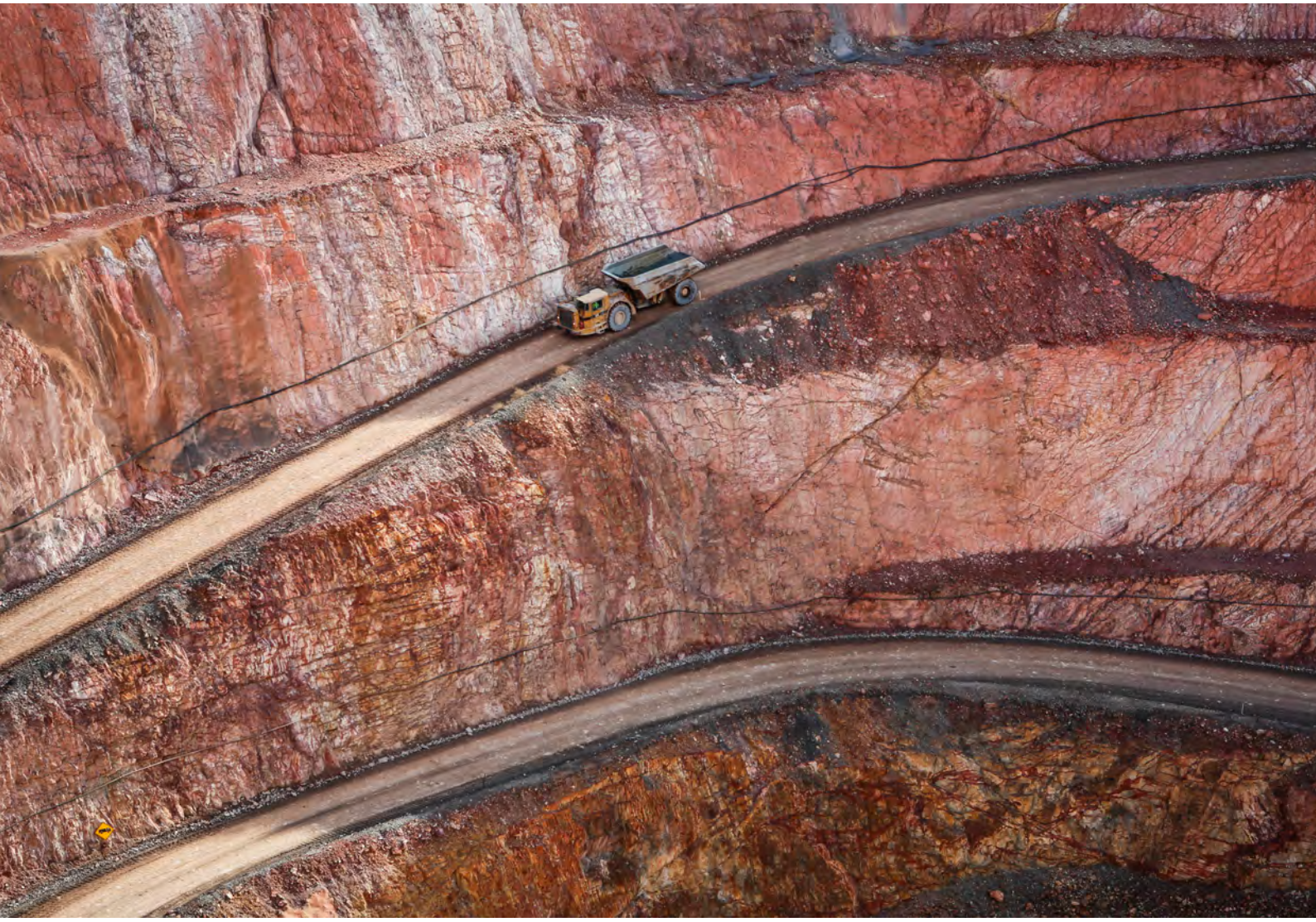
New Cobar Complex Project, State Significant Development (SSD10419)

Environmental Impact Assessment

Prepared for Peak Gold Mines
February 2021



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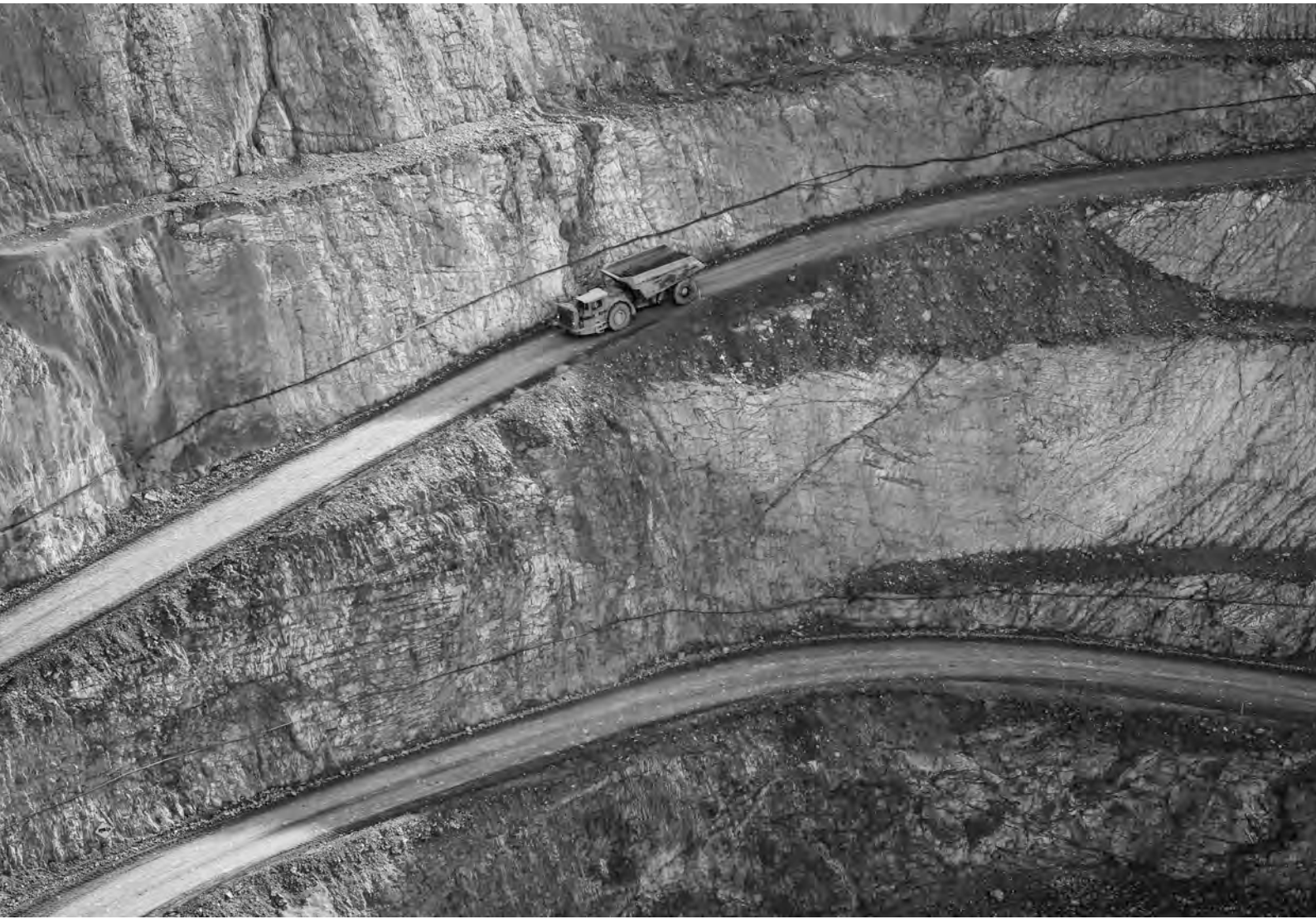
Part C-2 Impact assessment



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11 Surface water

11.1 Introduction

A surface water impact assessment (SWA) was completed by EMM to assess the predicted impacts of the project on surface water. The SWA was prepared in accordance with the policies and guidelines set out in the SEARs. The SWA is provided in full in Appendix J.

11.2 Assessment requirements

The SEARS require an assessment of likely surface water impacts of the project. Specific requirements relating to surface water and EMM responses are provided in Table 11.1.

Table 11.1 Surface water assessment requirements

Assessment requirements	EMM responses
An assessment of the likely impacts of the development on the quantity and quality of surface and groundwater resources having regard to the NSW Aquifer Interference Policy.	Impacts to surface water resources are described in Section 11.5 and Appendix J, Section 7. Impacts to groundwater resources are described in Chapter 10 and Appendix I.
An assessment of the likely impacts of the development on aquifers, watercourses, riparian land, water-related infrastructure, and other water users.	Impacts to surface water resources are described in Section 11.5 and Appendix J, Section 7.
A detailed site water balance, including a description of site water demands, water disposal methods (including the location, volume and frequency of any water discharges and management of discharge water quality), water supply arrangements, water supply and transfer infrastructure and water storage structures, including: an assessment of the reliability of water supply, including consideration of climate change; and demonstration that water can be obtained from an appropriately authorised supply in accordance with the operating rules of any relevant Water Sharing Plans (WSP).	A site water balance is provided in Appendix I, Section 5.6 and summarised in Section 11.4.1 and 11.5.4. An assessment of the reliability of supply including consideration of climate change is provided in Appendix J, Section 9.4.
Identification of any licensing requirements or other approvals under the *Water Act 1912* and/or *Water Management Act 2000*, including a description of the measures proposed to ensure the development can operate in accordance with the requirements of any relevant WSP or water source embargo.	Water licencing is addressed in Section 11.7 and Appendix J, Section 9. A description of all licencing requirements is presented in Chapter 0
A detailed description of the proposed water management system (including sewerage), water monitoring program and other measures to mitigate surface water and groundwater impacts.	The water management system is described in Section 11.4.1 and Appendix J, Section 8.3. A monitoring program is described in Section 11.6.2 and Appendix J, Section 9.
A description of construction erosion and sediment controls, how the impacts of the development on areas of erosion, salinity or acid-sulphate risk, steep gradient land or erodible soils types would be managed and any contingency requirements to address residual impacts.	Construction erosion and sediment controls are described in Section 11.6.3 and Appendix J, Section 5.7.

Table 11.1 Surface water assessment requirements

Assessment requirements	EMM responses
An assessment of the potential flooding impacts of the project.	Flood impacts are described in Section 11.5.3 and Appendix J, Section 6.3

11.2.1 Methodology

The SWA was prepared in accordance with the policies and guidelines set out in the SEARs, relevant government assessment requirements, policies and guidelines, including:

- Australian Rainfall and Runoff (ARR2019) (Ball et al. 2019);
- Floodplain Development Manual (DIPNR 2005);
- Managing Urban Stormwater: Soils and Construction – Volume 1 (Landcom 2004);
- Managing Urban Stormwater: Soils and Construction – Volume 2E – mines and quarries (DECC 2008);
- Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZG 2018); and
- NSW Water Quality and River Flow Objectives (DECCW 2006).

The method and a detailed summary of assessment for the projects against key policy requirements, is contained in the SWA (Appendix J).

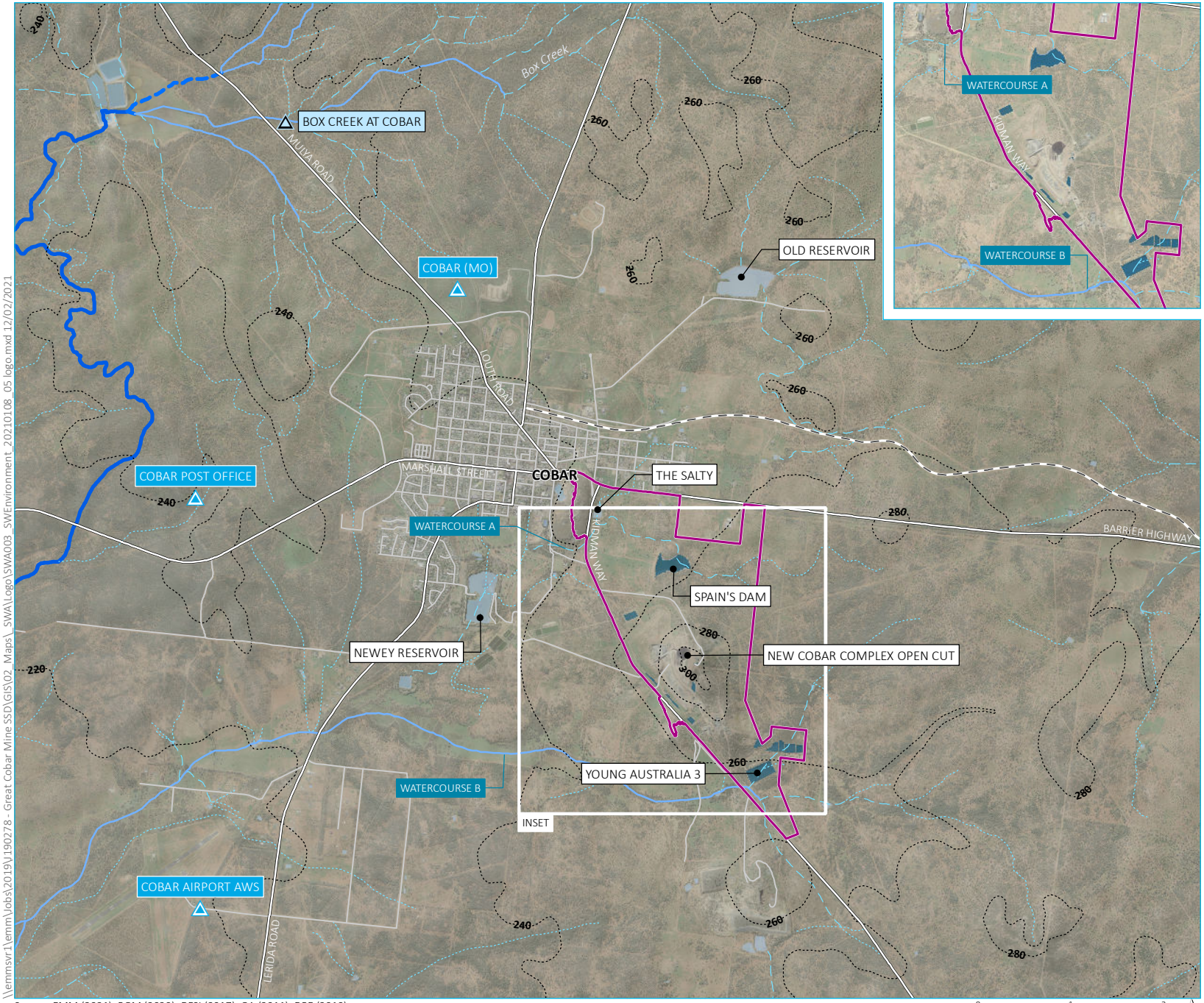
11.3 Existing environment

11.3.1 Climate and local watercourses

The project is in a semi-arid region of the Darling River catchment and experiences hot summers, mild-winters and generally low annual rainfall totals.

The majority of surface infrastructure associated with the New Cobar Complex is located on top of a ridgeline and is not impacted by local watercourse flows. The main drainage features in the project area are two second order ephemeral watercourses that flow to the north and south of the existing New Cobar Complex surface infrastructure (see Figure 11.1).

The watercourse to the north (Watercourse A) receives runoff from a natural catchment along with any discharge from the mine water management system. The watercourse is impounded by Spain's Dam prior to discharging via the Spain's Dam emergency spillway to a waterbody known as 'the Salty' (non-mine dam capturing rainfall runoff from Cobar industrial area and surrounds). It is noted that the complex is a zero-discharge site, utilising the spillway in emergencies only. Downstream of the New Cobar Complex, the watercourse traverses (via overtopping) Kidman Way prior to flowing south-west around the existing Great Cobar slag dump and into Newey Reservoir.



KEY

- Rainfall gauge
- Stream gauge
- Project area
- Contour (20 m)
- Rail line
- Major road
- Minor road
- Waterbody
- Mine water management storage

Strahler stream order

- 1st order
- 2nd order
- 3rd order
- 4th order
- 5th order

Source: EMM (2021); PGM (2020); DFSI (2017); GA (2011); DPE (2019)

0 1 2 km

GDA 1994 MGA Zone 55

N

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Existing surface water environment

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Figure 11.1

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The watercourse to the south (Watercourse B) receives runoff from a natural catchment that is diverted around the mine via a series of diversion banks and drainage channels. The watercourse re-joins its original flow path downstream of the Young Australia 3 mine water management dam prior to traversing Kidman Way, where it becomes a third order watercourse. The two watercourses join approximately 3 km downstream of the New Cobar Complex.

No permanent watercourses exist within the New Cobar Complex and surrounding landscape. All watercourses upstream and downstream of the complex have ephemeral flow regimes.

11.3.2 Surface and groundwater interactions

Connectivity between the groundwater and surface water environment is expressed via the following two mechanisms:

- recharge to groundwater systems is expected to occur primarily via rainfall infiltration with an estimated average rainfall recharge of 0.5 mm/year (or 0.15% of annual average rainfall); and
- discharge of groundwater primarily occurs via underground mine dewatering. Groundwater inflow into the underground workings is pumped to the surface where it is managed within the existing New Cobar Complex water management system (see Section 11.4).

There is limited natural groundwater discharge to surface water bodies (eg discharge to creeks) and/or loses via evapotranspiration given the depth to groundwater generally greater than 20 mbgl.

The existing groundwater environment including presence of GDEs is described further in Chapter 10.

11.3.3 Water quality

Water quality data is available from PGM's ongoing monitoring program. Water quality data for total suspended solids (TSS), oil and grease are obtained as part of the New Cobar Complex EPL requirements. EPL3596 includes two reference points that relate to surface water discharge and monitoring conditions at the New Cobar Complex. An extended water quality suite (including nutrients, major ions, and metals) is also sampled at some locations to provide further information on mine water quality to support operations.

WQOs are sourced from either the NSW Water Quality and River Flow Objectives (DECCW 2006), and Australian and New Zealand Environment and Conservation Council (ANZECC) and Agriculture and Resource Management Council of Australia and New Zealand (ARMCANZ) 2000 guidelines. Appendix I discusses the relevant environmental water values (ie the beneficial use of water) in the project area. The most appropriate beneficial use adjacent to, and downstream of the New Cobar Complex is livestock water supply. Environmental values relating to drinking water, aquatic ecosystems and recreation are not relevant due to the existing environment and distance to watercourses and waterbodies.

Water quality across the site is influenced by whether a waterbody receives mine contact water or not. Water management dams that receive mine contact water are shown to have higher EC and concentrations of total dissolved solids (TDS), sulphate, and metals. Spain's Dam generally has the highest concentrations of these substances which may be attributed to it being the primary discharge point for excess mine dewatering water.

Two samples, one each taken from NC1 and NC2 showed it to generally be of better water quality than the other water management dams that received mine contact water. The observed water quality (based on the one sample) at NC1 and NC2 was more typical of dirty water stormwater runoff than mine contact water.

Young Australia 2D generally experiences poorer water quality than Young Australia 3, indicating that water quality improves moving downstream in the Young Australia complex. Water quality improvements may be attributed to runoff from a broader catchment area diluting mine contact discharge, and/or the settlement of sediment as water passes through the series of water management dams.

The water quality of waterbodies that receive runoff from dirty water or rehabilitated catchments is generally within WQO ranges. This is also the case for the Salty Dam which receives runoff from both a natural catchment and the Cobar town stormwater network. TSS concentrations were relatively high in one of the two samples taken at the Salty Dam. TSS concentrations are often attributed with stormwater runoff from urban/developed areas. Water quality at the Salty Dam is expected to be primarily influenced by runoff from the upstream stormwater network which captures residential and industrial runoff.

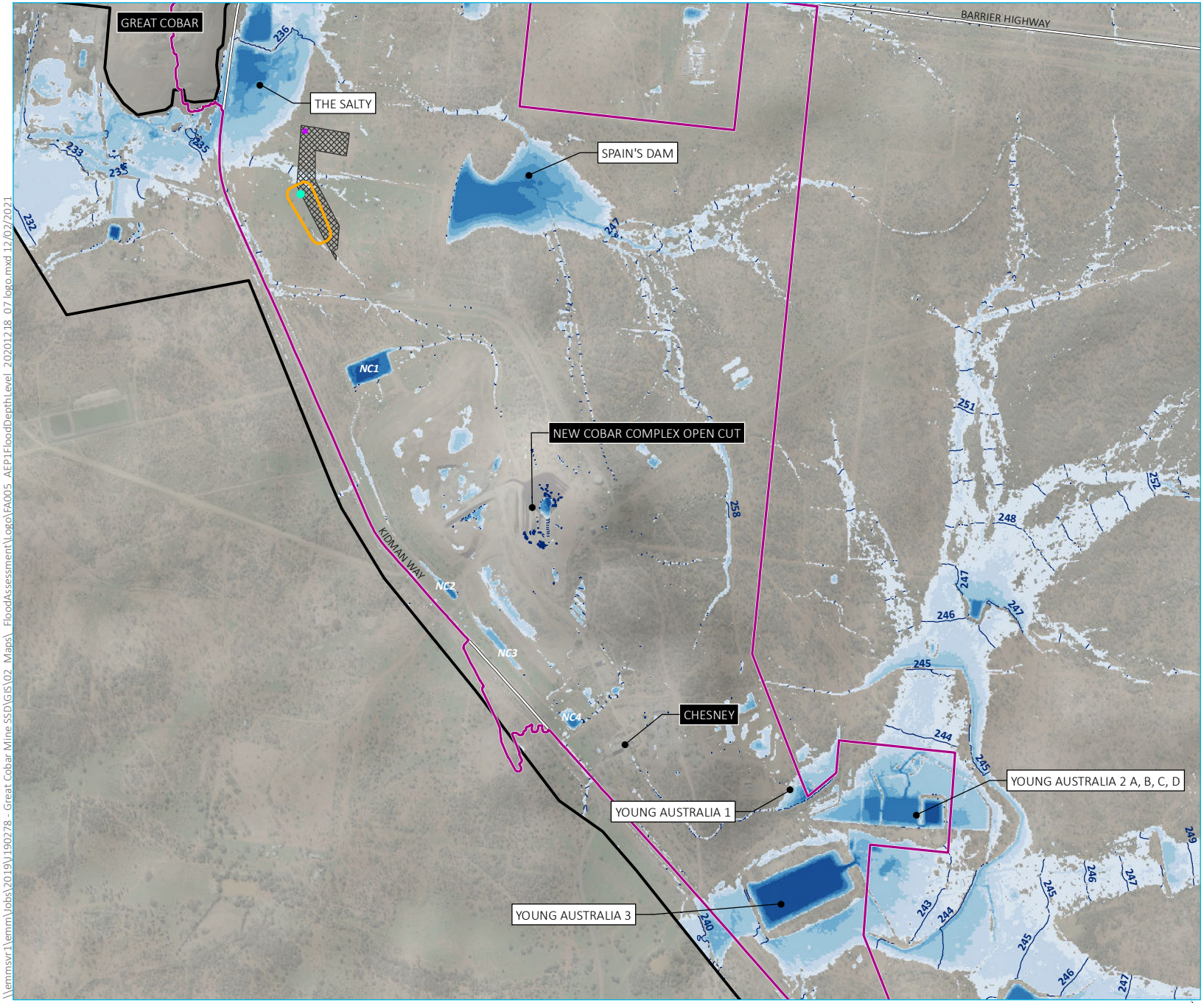
11.3.4 Flood characteristics

Flooding in vicinity of the New Cobar Complex generally comprises shallow overland sheet flow. Due to the flat terrain and low rainfall totals, drainage lines do not typically have a well-defined channel. Consequently, flows are typically wide and shallow with low velocities (less than 1 m/s). Flooding is generally associated with shorter duration storm events, where flood levels rise and fall rapidly (in the order of minutes to hours, rather than days).

The majority of the existing surface infrastructure associated with the New Cobar Complex is located on top of a ridgeline and is unaffected by flooding from local watercourses. Flooding from the catchment upstream of the Young Australia dams/blocks the diversion bunds that form the northern and eastern boundary of the New Cobar Complex water management system. This results in the inundation of the Young Australia 2 and Young Australia 3 water management dams. Floodwaters that enter the site area are attenuated by the water management dams, decreasing the peak flow downstream (ie across Kidman Way). The remainder of the New Cobar Complex is, with the exception of some isolated low points in the terrain that receive local runoff, relatively unaffected by flooding.

Runoff from the catchment to the north of the New Cobar Complex drains through the Salty Dam before traversing Kidman Way and discharging to Newey Reservoir. Flooding is primarily contained to the watercourse (the Salty Dam) and overbank area and does not inundate the general area of the proposed power line or other New Cobar Complex infrastructure.

Runoff from within the New Cobar Complex is managed via the existing stormwater drainage network with no discharge occurring offsite for events up to and including the 1% annual exceedance probability (AEP) design flood event. Existing 1% AEP flood conditions at the New Cobar Complex are shown in Figure 11.2.



KEY

- Project area
- Exhaust air rise
- Exhaust air rise buffer
- Fresh air intake
- Proposed power line corridor
- Major road
- TUFLOW model boundary
- 1% AEP flood level contour

1% AEP flood depth (m)

- 0 - 0.1
- 0.1 - 0.25
- 0.25 - 0.5
- 0.5 - 1
- 1 - 1.5
- 1.5 - 2
- 2 - 3
- > 3

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Source: EMM (2021); DFSI (2017); GA (2011); DPE (2019)

0 250 500 m

GDA 1994 MGA Zone 55

N

1% AEP flood depth and level

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Figure 11.2

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11.4 Water management

11.4.1 Water management system

An existing water management system is in place at the New Cobar Complex and is operated and managed in accordance with PGM's WMP. The existing water management system will be used to manage water resources for the project. The existing site is a zero-discharge site.

The water management system schematic (Figure 11.3**Error! Reference source not found.**) shows the movement of water across the site. The schematic shows:

- The system involves several defined catchments and key infrastructure, which are shown in Figure 11.4.
- Water management storages, their catchment areas and relationship with other water storages.
- Movement of different water types into water storages:
    - *Stormwater runoff*, which is surface water runoff that is generated from rainfall and any substance transported with it, including suspended solids, sediments, and contaminants.
    - *Mine contact water*, which is stormwater runoff that comes into contact with mine processing areas or water that is dewatered from the underground workings. It may have elevated concentrations of salts, metals, hydrocarbons and/or other chemicals.
    - *Dirty water*, which is stormwater runoff from catchments disturbed by mining activities such as soil stockpiles, rehabilitation areas that are yet to be stabilised and roads. It may have elevated concentrations of suspended solids and sediments.
    - *Clean water*, which is stormwater runoff from catchments that are undisturbed by mining or other mining related activities.
    - *Process water*, which is water that is used by or produced by mining activities including water used in the underground workings, at the surface for dust suppression, and water transferred to Peak Complex ore processing. Process water can also be recycled, meaning it is reused within the water management system, generally following the settlement of suspended solids and sediment.
- Evaporation and rainfall processes.
- Overflow processes.
- Process water use – process water is used in the New Cobar Complex underground workings, for dust suppression of roads and stockpiles within the New Cobar Complex, and transferred to the Peak Complex for use in the Peak process water system.

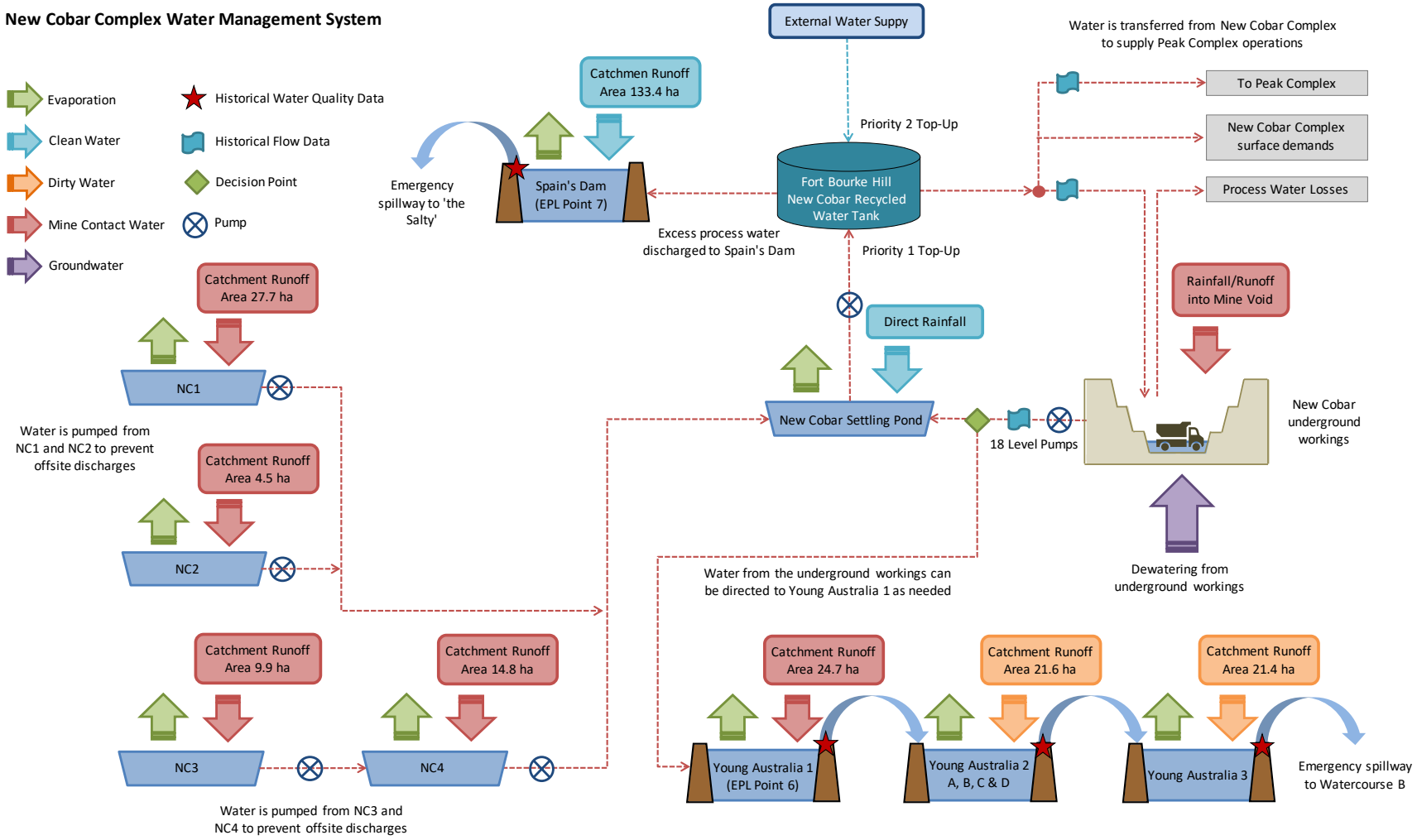
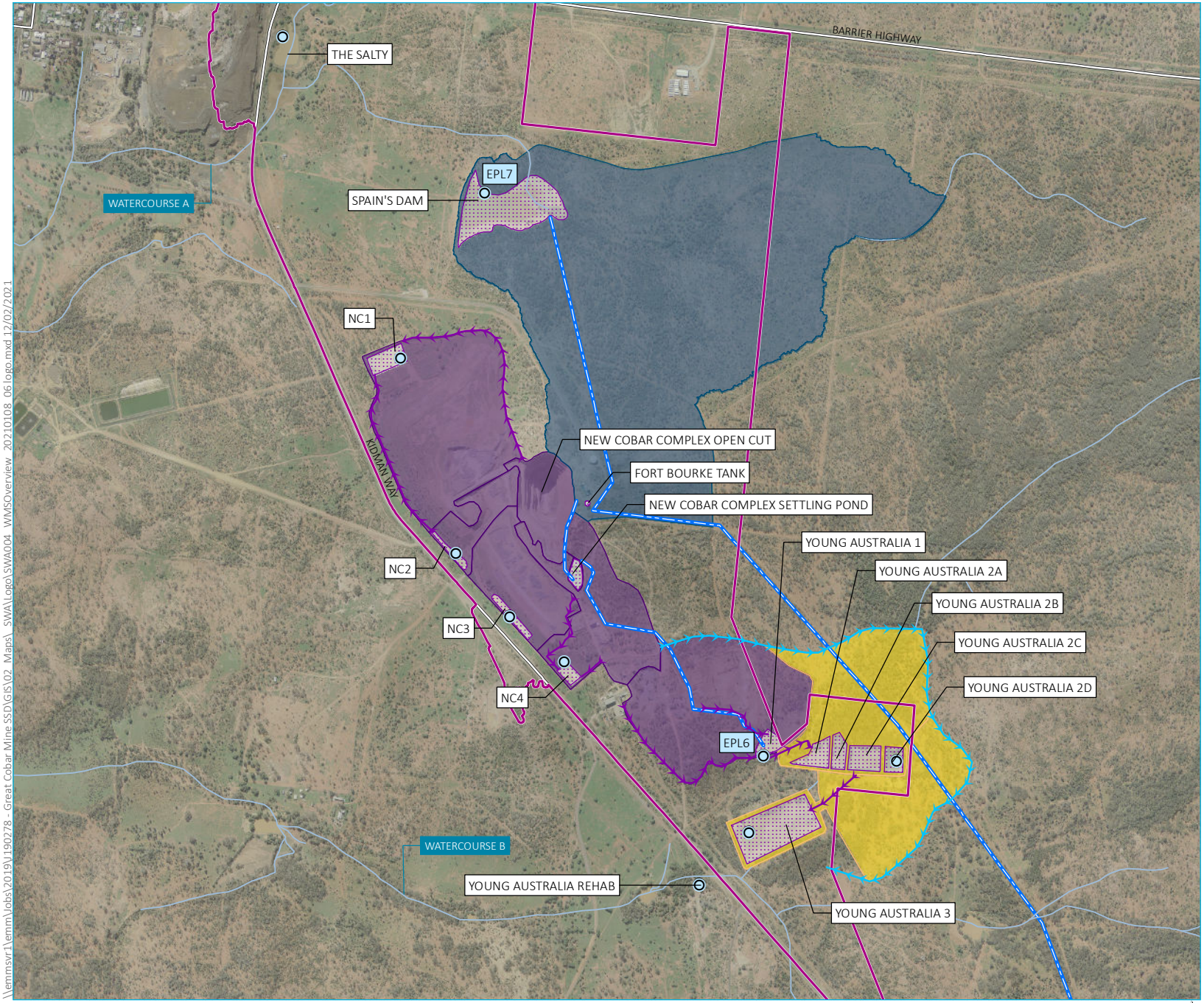


Figure 11.3 New Cobar Complex water management system schematic



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Source: EMM (2021); PGM (2020); DFSI (2017)

Mine water management system overview

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New Cobar Complex Project
Environmental impact assessment
Figure 11.4

PGM's overarching water management strategy is to reduce the ingress of clean water on site and reuse water in operations before the water is pumped to Spain's Dam and Young Australia dams for evaporation. This approach includes:

- a number of clean water diversion bunds and drains upstream of the water management system;
- water management dams are in place to capture and treat (via sedimentation) stormwater runoff;
- water management dams that receive mine contact water (via stormwater runoff or underground dewatering) include additional storage capacity and/or infrastructure (ie pumps) to minimise the risk of discharging mine contact water offsite; and
- water that is dewatered from the underground workings is either recycled back to the New Cobar Complex underground operations, used to supply water demand at the New Cobar Complex surface or transferred to the Peak Complex for use as process water.

11.4.2 Mine dewatering

Groundwater from the New Cobar Complex underground workings is managed by pumping from development headings to various underground pump stations. The water is then re-pumped to the New Cobar Complex settling pond for treatment (via sedimentation) prior to re-use underground or pumping to Peak Complex for reuse as process water.

Average groundwater inflow rates to the New Cobar Complex underground workings have historically ranged between 4−8 L/s. However, groundwater inflow rates have been observed between 1−15 L/s (see Appendix J). Groundwater inflows to the New Cobar underground workings over the 12-year mine schedule have been estimated in the groundwater assessment. The groundwater inflows are assumed to be equivalent to the volume of water that requires dewatering to the water management system. The average groundwater inflow over the 12-year mine schedule is estimated to be 860 kL/day (10 L/s).

11.4.3 Water supply

The New Cobar Complex (and the wider PGM operation) has historically used town water for potable water supply and to supplement process water demand. This is accessed via a high security allocation from the Macquarie and Cudgegong Regulated Rivers Water Source. Water is transported from Burrendong Dam, 335 km south-east of Cobar, via the Macquarie River to Warren, and then via the Albert Priest Channel to Nyngan. From Nyngan, water is pumped via a pipeline to the CSC raw water tank on Fort Bourke Hill and then via the CSC distribution network to various customers (including PGM).

Historically, approximately 550 ML/year of high security water from Burrendong Dam has been used as make up water for the New Cobar Complex and Peak Complex operations. PGM's allocation is about 1,200 ML/year, however due to transmission losses of roughly 50% (primarily as a result of evaporative and seepage losses along the Albert Priest Channel) this allocation converts to a usable supply at the mine of about 600 ML/year.

Groundwater that is dewatered from the New Cobar Complex underground workings is also used as a source of water. Dewatering water is preferentially used to supply process water demands. The high security supply from Burrendong Dam is required when the dewatering rate is less than mine process water requirements, or the water quality of the dewatering water is unsuitable for use.

Following approval of the SoEE for the dewatering of the Great Cobar historic workings in December 2019, up to 400 ML/year can be extracted to replace the town water currently used. This is as part of a move for PGM's strategy to be more self-reliant and sustainable in times of drought. The water from the Great Cobar shaft will be used to make up any shortfall in site demand that cannot be made up by dewatering of underground workings or from Burrendong Dam.

11.5 Impact assessment

11.5.1 Surface water quality

i Construction phase

Ground disturbance associated with the construction of the proposed surface infrastructure may increase concentrations and loads of suspended solids, nutrients and metals in runoff. Impacts to receiving watercourses may occur if runoff from disturbed areas is left unmitigated. Construction activities will be undertaken in accordance with Managing Urban Stormwater: Soils and Construction: Volume 1 – Soils and construction (Landcom 2004) and PGM's Erosion and Sediment Control Plan (PGM 2016) to limit the potential for downstream impacts.

Impacts to water quality due to runoff from disturbed areas are considered minor and manageable with the proposed management measures in place. Any residual impacts to downstream water quality during construction will only occur short-term, during construction period.

ii Operational phase

The quality of water stored within the water management system exceeds livestock water supply default guideline values for electrical conductivity, total dissolved solids, sulphate and some metals. Overflows from the water management system may also contain similar concentrations of these water quality parameters.

Overflows from Spain's Dam are predicted to occur during a 90th percentile rainfall year, or approximately once every 10 years on average. Overflows from Spain's Dam are expected to mix rapidly with runoff from the town industrial area and broader catchment that drains to the Salty. Residual water quality impacts associated with overflows from Spain's Dam are considered to be minor and short-term as overflows are:

- expected to occur infrequently (on average once every 10 years) and for a short period of time (one to two days);
- predicted to coincide with substantial runoff from the town industrial area and broader catchment resulting in rapid mixing immediately downstream of the dam (ie in the Salty); and
- expected to have a similar discharge regime to existing conditions resulting in no additional risk or impact to downstream water quality.

Water quality impacts to other downstream watercourses are not expected as overflows are not predicted to occur from the rest of the New Cobar Complex water management infrastructure.

11.5.2 Surface water quantity

Table 11.2 summarises the circumstances that may result in overflows from the New Cobar Complex.

Table 11.2 Summary of overflow characteristics

Circumstance for overflow	Overflow description	Source of water	Applicable water management dams
Overflows during a significant rainfall event	Overflows will occur during and shortly after rainfall events when total runoff exceeds the volume of Spain's Dam. Once Spain's Dam is full, overflows will occur at the same rate as inflows.	Excess mine dewatering water and runoff from upstream catchment.	Spain's Dam
Overflows during extended wet periods	Overflows will occur during extended wet periods when there is not sufficient time to restore the capacity (via evaporation or pump out) of Spain's Dam between small rainfall events.	Excess mine dewatering water and runoff from upstream catchment.	Spain's Dam

11.5.3 Flooding

i Increased flooding from proposed surface infrastructure

The only surface infrastructure proposed for the project is a power line, pad mounted compact substation and emergency egress headframe and winder. No flood impacts are anticipated as:

- no material flooding is shown to currently occur within the general area of proposed power line (see Figure 11.2); and
- permanent infrastructure associated with the proposed power line and emergency egress are expected to have negligible footprint within the flood extent.

ii Floodwater mixing with mine contact water

The risk of floodwater mixing with mine contact water and then discharging offsite is low for most of the New Cobar Complex. This is due to limited inflows from upstream catchments and adequately sized water management dams (to capture runoff from mine operational areas).

Inundation of the Young Australia 2 and Young Australia 3 water management dams may occur as a result of floodwaters overtopping the upstream diversion bunds. This additional volume of floodwater that enters the dams increases the risk of discharging mine contact water downstream during a flood event.

iii Flood risk to life and equipment

Kidman Way is expected to be inundated to the north and south of the New Cobar Complex during a significant flood event but not as a result of PGM operations. The inundation of Kidman Way is anticipated to be short-term, with the duration of any disruption likely measured in hours, rather than days. Due to its location on a ridgeline, the New Cobar Complex has sufficient flood refuge and shelter for staff to gather should the mine become cut-off during flooding.

Flooding within the New Cobar complex is primarily contained within defined drainage lines and some isolated low points of the terrain that receive local runoff. There is minimal risk to equipment within most of the New Cobar Complex. No active operations occur in vicinity of the Young Australia 2 and Young Australia 3 water management dams. Hence, there is a low risk of equipment becoming damaged should flooding inundate this area.

The flood immunity of the fresh air intake and exhaust air rise approved as part of the Great Cobar Exploration Decline should be considered given the proximity to the watercourse that drains through the Salty Dam.

Runoff to the New Cobar Complex open cut is primarily associated with excess rainfall occurring within the open cut footprint. Runoff that ponds within the New Cobar Complex open cut is dewatered to the surface to maintain underground access. Flooding of the New Cobar open cut is mitigated via this dewatering process.

11.5.4 Water balance modelling

A site water balance was developed for the New Cobar Complex water management system. The purpose of the model is to estimate site water transfers, assess the frequency and volume of discharges, and assess the reliability of water supply for the project. The water balance model is informed by:

- rainfall and evaporation data;
- groundwater inflow estimates that were established in the groundwater assessment (see Appendix I); and
- the existing water management system described in Section 11.4.1.

The water balance model applies a continuous simulation methodology that simulates the response of the water management system under a range of climatic conditions (ie rainfall and evaporation). A 57-year simulation period was adopted for the water balance model using daily rainfall and evaporation data from the Cobar Meteorological Office (48027) rainfall gauge between 1963 and 2020. Two separate modelling approaches have been used to simulate the site water balance:

- Deterministic modelling approach – used to provide typical water balance results based on the average estimated groundwater inflow rate over the 12-year mine schedule. Results are presented in schematic format for typical dry (10th percentile), median (50th percentile) and wet (90th percentile) rainfall years.
- Probabilistic modelling approach – used to investigate the security of water supply in more depth. Probabilistic modelling simulates the water management system response for each individual year of the 12-year mine schedule using predicted groundwater inflow volumes. Results are presented as a time series.

11.5.5 Water balance results

Water balance model results for typical dry (10th percentile), median (50th percentile) and wet (90th percentile) periods were calculated.

i Site discharges

The water balance results show that no overflows occur for dry (10th percentile) and typical (median) annual rainfall conditions. During a typical wet year (90th percentile), overflows of 9 ML/year are expected to occur from Spain's Dam. Overflows from Spain's Dam are a function of runoff from the adjacent catchment and the volume of excess water that is dewatered from the underground workings and discharged to the dams. Overflows from Spain's Dam are predicted to occur once every 10 years on average and are associated with extended periods of wet weather or significant rainfall events. Discharges due to mine dewatering volumes alone (ie in the absence of significant catchment runoff) are not expected to occur.

ii Reliability of water supply

The water balance model was used to undertake a probabilistic assessment of water demands over the 12-year mine schedule to better understand the reliability of water supply. The probabilistic assessment involved simulating the New Cobar Complex water management system over the 12-year mine schedule with the inclusion of the groundwater inflow time series. A total of 57 model runs were undertaken where each run commenced at a different year within the 57-year climate record from the Cobar MO (48027).

Reliance on external water demand will be greater in the second half of the proposed mine schedule. This is due to the predicted decrease in groundwater inflow (which is dewatered to the surface for use as process water) as mining progresses. The maximum volume of water that would need to be sourced externally is estimated as 577 ML/year and occurs in year 12 of the mine schedule.

The results also show the modelled external water supply experiences low variability as the percentile bands cover a narrow range for each year of the mine schedule.

External water supply can be sourced by dewatering the Great Cobar shaft and from Burrendong Dam (refer to Section 11.4.3). As the volume of water in the Great Cobar shaft is groundwater dependent, an assessment of the Great Cobar shaft water supply reliability is provided in the groundwater assessment (Appendix I). The assessment determined that water stored in the Great Cobar shaft is sufficient to supply external water requirements for the project in the absence of the Burrendong Dam water source. The assessment concluded that risks associated with water supply security for the project are low.

iii Reliability of water supply from Burrendong Dam

As PGM holds high security access to water from Burrendong Dam, their water allocation is expected to be available in all but severe drought periods. The effective storage of Burrendong Dam dropped below 5% of capacity during the 2019 drought and allocation of high security water to all entitlement holders was reduced to 80% as a result. Hence, an effective storage volume of 5% has been used to identify periods of low water availability in Burrendong Dam. This storage volume threshold is unlikely to prevent access to water altogether but rather, based on previous water determinations, may result in curtailment of allocations.

Historical storage levels in Burrendong Dam were obtained from the BoM Water Data Online website (BoM 2020) for the period 1967 to 2020. Review of the data shows Burrendong Dam experienced less than 5% effective storage on three separate occasions over the 53-year period between 1967 and 2020. The probability of Burrendong Dam having less than 5% effective storage is approximately 5% in any given year of the mine schedule, assuming historic data is representative of future conditions.

11.6 Commitments and management measures

11.6.1 Water management plan

A WMP is in place for PGM's existing operations, including the New Cobar Complex. The WMP documents the proposed mitigation and management measures for approved activities, and includes the surface and groundwater monitoring program, reporting requirements, spill management and response, water quality trigger levels, corrective actions, contingencies, and responsibilities for management measures. The WMP will be updated in consultation with the relevant government agencies and consider submissions raised during the exhibition and approvals process of the project.

11.6.2 Monitoring program

Monitoring will continue to be undertaken in accordance with the Approved Methods for the Sampling and Analysis of Water Pollutants in New South Wales (EPA 2004). Surface water quality monitoring locations are shown in Figure 11.1.

Sites will be monitored annually (with the exception of Spain's Dam and Young Australia 1 which is bi-annual and annually through EPL monitoring). Physico-chemical properties (pH, EC and temperature) will be measured either in-situ using a water quality meter or undertaken by a National Association of Testing Authorities (NATA) certified laboratory. Total suspended solids, oil, grease, major ions, nutrients and metals will be analysed by a NATA certified laboratory. PGM will also continue metering water transfers; flow meters are read on a weekly basis.

11.6.3 Surface disturbance

Prior to surface disturbance or excavation, a "Permit to Disturb/Dig" is required to be submitted. The permit system ensures adequate erosion and sedimentation controls are identified and implemented prior to disturbance. Construction of the proposed power line and ancillary infrastructure is anticipated to be completed within a short period of time and involve minimal ground disturbance. Water management during construction of the power line, including erosion and sediment control, will be undertaken in accordance with Managing Urban Stormwater: Soils and Construction: Volume 1 – Soils and construction (Landcom 2004), Managing Urban Stormwater: Soils and Construction – Volume 2E – mines and quarries (DECC 2008) and PGM's Erosion and Sediment Control Plan ((ESCP) which is incorporated into the WMP) (PGM 2016). The implementation of these water management measures is expected to mitigate any impacts to the receiving surface water environment during construction.

All major erosion and sediment control structures at the New Cobar Complex are described in PGM's ESCP (PGM 2016). PGM manages these structures through regular inspections and preventative maintenance, as required.

11.6.4 Flooding

The following controls are proposed to reduce potential flood risks:

- where practical, upstream diversion drains will be sized to divert flows resulting from the 5% AEP flood event as per Managing Urban Stormwater: Soils and Construction – Volume 2E – mines and quarries (DECC 2008);
- equipment will be stored outside of areas affected by substantial flooding, such as adjacent to Young Australia 2 and Young Australia 3; and
- sufficient flood refuge will be maintained for the length of the mine schedule.

11.7 Water licencing and security

PGM holds several existing water access licences (WALs) and approvals to extract surface water and groundwater. PGM's surface water allocation for Burrendong Dam is jointly held with several other mining operations in and around Cobar. PGM currently holds licences to extract:

- 620 ML/year of groundwater from the Lachlan Fold Belt Murray Darling Basin Groundwater Source under WAL31045; and
- approximately 1.2 GL/year of surface water from a shared allocation of 4.15 GL/year from the Macquarie and Cudgegong Regulated Rivers Water Source. Licence holders include all members of the Cobar Water Board (includes CSC, CSA Mine and Endeavour Mine). As described in Section 11.4.3, due to transmission losses PGMs allocation converts to a usable supply of approximately 600 ML/year.

Surface water licencing requirements have been estimated using the water balance model described in Appendix J. The maximum external water supply volume will be required in years where the groundwater dewatering rate is not meeting mine water demands. In this case, the existing 1.2 GL (600 ML after accounting for transmission losses) surface water allocation from Burrendong Dam is sufficient to cover the required volume of water.

All of the surface water runoff from the New Cobar Complex is captured in the water management dams. Captured surface water runoff is either used as process water within the mine operation, lost to evaporation, or discharged to receiving waters.

The capture of surface water runoff in the water management dams is considered to be excluded works under Water Management (General) Regulation 2011, Schedule 1, item 3 (dams solely for the capture, containment or recirculation of drainage). Accordingly, no WALs are required for the capture of surface water runoff within the New Cobar Complex.

11.8 Residual impacts

Residual risks are outlined in Table 11.3. The table identifies the surface water affecting activity and potential risk/effect, lists the existing and proposed mitigation controls and actions and provides an assessment of the residual risk.

Table 11.3 Mitigation measures and residual risk

Impact	Water affecting activity	Potential risk/effect	Mitigation actions/controls (existing and proposed)	Residual risk
Surface water quantity	• Construction activities	• Increase to hardpacked or impervious areas resulting in increased runoff from construction areas.	• Construction of proposed surface infrastructure will be undertaken in accordance with Managing Urban Stormwater: Soils and Construction: Volume 1 – Soils and construction (Landcom 2004) and PGM's Erosion and Sediment Control Plan (PGM 2016).	**Low** – management measures expected to mitigate impacts to the receiving surface water environment during construction.
	• Water management storages	• Overtopping of water management dams altering downstream flow regimes.	• PGM to implement a program of sequential desilting of all dams in the New Cobar Complex as part of an operation works program to reinstate and maintain full storage capacities. • Maximise the reuse of water from onsite storages – site water is preferentially and regularly reused onsite. • Pumps are implemented to dewater storages before overtopping can occur. • Diversion drains to be maintained to minimise the volume of stormwater runoff from upstream catchments entering the water management system. • Spain's Dam water level will be monitored to inform operational decisions and validate water balance predictions. • Redirection of excess mine dewatering water to Young Australia dams as needed to reduce risk of overflows from Spain's Dam.	**Low** – ongoing maintenance and management measures are used to maintain the volume of stored water in water management storages. Overflows from Spain's Dam predicted to occur once every 10 years on average.
	• Mine dewatering	• Mine dewatering rate exceeds capacity of the water management system. • Discharges from mine water management system alter downstream flow regimes.	• Mine dewatering water is preferentially used as process water. • Mine dewatering rates will continue to be monitored and used to validate the groundwater and water balance model. • Water Management Plan to address management measures to be implemented if mine dewatering rates exceed predicted rates.	**Low** – ongoing monitoring will be used to identify periods of higher mine groundwater inflow and appropriate management measures will be implemented.

Table 11.3 Mitigation measures and residual risk

Impact	Water affecting activity	Potential risk/effect	Mitigation actions/controls (existing and proposed)	Residual risk
Surface water quality	• Construction activities	• Surface disturbance during construction increasing concentrations and loads of suspended solids, nutrients, and metals in runoff.	• Construction of proposed surface infrastructure will be undertaken in accordance with Managing Urban Stormwater: Soils and Construction: Volume 1 – Soils and construction (Landcom 2004) and PGM's Erosion and Sediment Control Plan (PGM 2016).	**Low** – management measures expected to mitigate impacts to the receiving surface water environment during construction.
	• Mine contact water storages	• Overtopping of water management dams resulting in water quality impacts to downstream receiving environment.	• PGM to implement a program of sequential desilting of all dams in the New Cobar Complex as part of an operational works program to reinstate and maintain full storage capacities. • Maximise the reuse of water from onsite storages – site water is preferentially and regularly reused onsite. • Pumps are implemented to dewater storages before overtopping can occur. • Diversion drains to be maintained to minimise the volume of stormwater runoff from upstream catchments entering the water management system. • Spain's Dam water level will be monitored to inform operational decisions and validate water balance predictions. • Redirection of excess mine dewatering water to Young Australia dams as needed to reduce risk of overflows from Spain's Dam.	**Low** – ongoing maintenance and management measures are used to maintain the volume of stored water in water management storages. Overflows from Spain's Dam predicted to occur once every 10 years on average.
	• Mine dewatering	• Mine dewatering rate exceeds capacity of the water management system. • Discharges from mine water management system may exceed receiving environment WQOs, impacting downstream water quality.	• Mine dewatering water is preferentially used as process water. • Mine dewatering rates will continue to be monitored and used to validate the groundwater and water balance model. • Water Management Plan to address management measures to be implemented if mine dewatering rates exceed predicted rates.	**Low** – ongoing monitoring will be used to identify periods of higher mine groundwater inflow and appropriate management measures will be implemented.

Table 11.3 Mitigation measures and residual risk

Impact	Water affecting activity	Potential risk/effect	Mitigation actions/controls (existing and proposed)	Residual risk
	• Built infrastructure (roads, buildings, plant)	• Runoff may contain elevated concentrations and loads of suspended solids and nutrients.	• The stormwater management system directs surface water runoff from the existing mine disturbance area to water management storages for evaporation or reuse as process water. • Stormwater infrastructure will be maintained under PGM's Water Management Plan.	**Low** – stormwater infrastructure to be maintained to provide adequate drainage.
	• Hazardous goods storage (containment failure)	• Runoff may contain hydrocarbons and other chemical pollutants.	• Existing bunded storage areas for fuel, reagents, and other hazardous materials.	**Low** – hazardous goods storage isolated from surrounding area.
Flooding	• Mine contact water storages	• Mixing of flood waters and mine contact water resulting in water quality impacts to downstream receiving environment.	• PGM to implement a program of sequential desilting of all dams in the New Cobar Complex as part of an operational works program to reinstate and maintain full storage capacities. • Where practical, upstream diversion drains will be sized to convey flows resulting from the 5% AEP flood event as per Managing Urban Stormwater: Soils and Construction – Volume 2E – mines and quarries (DECC 2008).	**Low** – water management infrastructure to be maintained to provide adequate flood protection.
	• Infrastructure located in flood extent	• Risk to life and equipment.	• Where practical, upstream diversion drains will be sized to convey flows resulting from the 5% AEP flood event as per Managing Urban Stormwater: Soils and Construction – Volume 2E – mines and quarries (DECC 2008). • fresh air intake and exhaust air rise to be constructed above the probable maximum flood level. • Equipment stored outside of areas affected by substantial flooding, such as adjacent to Young Australia 2 and Young Australia 3. • Sufficient flood refuge will be maintained for the length of the proposed mine schedule.	**Low** – infrastructure and equipment to be located outside of flood extent where practical. Flood refuge provided.

11.9 Conclusion

A surface water assessment has been undertaken to assess the potential impacts of the project on surface water resources. The surface water assessment has considered the impacts the project may have to the receiving water environment with consideration of the relevant SEARs and the NSW Water Quality and River Flow Objectives (DECCW 2006). Potential flood impacts and risk have also been addressed. Residual impacts associated with the project include:

- All except one of the water management structures are not anticipated to discharge or overflow to the downstream receiving environment over the life of the project.
- Overflows from Spain's Dam are predicted to occur on average once every 10 years. Overflows from Spain's Dam are expected to occur due to intense rainfall or prolonged wet periods when substantial rainfall and runoff would be experienced across the Cobar region. Hence, no significant impacts to streamflow regimes are expected.
- The water quality of Spain's Dam overflows may exceed WQOs for electrical conductivity, total dissolved solids, sulphate and some metals. Residual impacts to downstream water quality are considered minor and short-term. This is due to the low predicted frequency of overflows and rapid mixing that would occur with runoff from surrounding areas, including industrial areas of Cobar, prior to discharging downstream of the project area.
- Most of the New Cobar Complex is unaffected by flooding. No impacts to local flood characteristics are expected as a result of proposed surface infrastructure.
- Flood management controls are proposed to reduce or eliminate potential flood risk to life and equipment for areas of the New Cobar Complex that are subject to flooding.
- Some mixing of floodwaters and mine contact water is expected to occur. However, the risk of water quality impacts to downstream watercourses is considered low as floodwaters that enter the site are detained within water management dams for more frequent flood events (up to 5% AEP) and rapid mixing of waters is expected in larger flood events (1% AEP and greater magnitude floods).
- Water requirements for PGM will be met by dewatering of underground workings and reuse of water onsite (60% of requirement), and external sources (40% of requirement) comprising dewatering from the Great Cobar historic workings and drawing from an existing high security allocation from Burrendong Dam.
- Water supply security is of low risk to the project as water supply from the Great Cobar historic workings is predicted to meet external water supply requirements should high security water supply from Burrendong Dam be unavailable due to severe drought.

The assessed residual impacts are expected to be similar to those of the existing New Cobar Complex operations. Hence, any additional risk or potential impacts to the receiving environment as a result of the project are anticipated to be minor.

PGM will continue to monitor water usage, mine dewatering volumes, water transfers and surface water quality. Additionally, water level monitoring within Spain's Dam will be undertaken to further inform operational water management. Monitoring each component of the water management system will inform

when management responses are required. Monitoring of groundwater inflows will be used to validate mine dewatering estimates. Triggers and thresholds will be reviewed and updated to provide context on if, how, and when management measures are required as part of the revised WMP.

12 Biodiversity

12.1 Introduction

A desktop biodiversity assessment was undertaken by EMM to assess the predicted impacts of the project on biodiversity, to facilitate the application for a BDAR waiver and seek determination from the Commonwealth that the project was not a controlled action.

12.2 Assessment requirements

12.2.1 State

The SEARS require an assessment of likely biodiversity impacts of the project. Specific requirements relating to biodiversity and EMM responses are provided in Table 12.1.

On 13 October 2020, EMM on behalf of PGM submitted a BDAR waiver request to DPIE due to minimal impact on biodiversity values (Appendix B). On 29 October 2020, DPIE determined the project is unlikely to have a significant impact on biodiversity values, and a BDAR report is not required as part of the EIS.

Table 12.1 Biodiversity assessment requirements

Requirement	Relevant section of the EIS
Key issues	
An assessment of the likely biodiversity impacts of the development, in accordance with the Biodiversity Assessment Method and documented in a Biodiversity Development Assessment Report, and a strategy to offset any residual impacts of the development in accordance with the rules under the Biodiversity Offsets Scheme, unless the Planning Secretary and the Environment Agency Head determine that the proposed development is not likely to have any significant impacts on biodiversity values; and residual impacts of the development in accordance with the rules under the Biodiversity Offsets Scheme, unless the Planning Secretary and the Environment Agency Head determine that the proposed development is not likely to have any significant impacts on biodiversity values; and an assessment of the likely impacts of the development on aquatic ecology, including aquatic biodiversity and key fish habitats;	A BDAR Waiver was granted by the Secretary of DPIE on 29 October 2020 (Appendix B)
Standard environmental assessment requirements – biodiversity	
1. Biodiversity impacts related to the proposed New Cobar Complex are to be assessed in accordance with Section 7.9 of the Biodiversity Conservation Act 2017 the Biodiversity Assessment Method and documented in a Biodiversity Development Assessment Report (BDAR). The BDAR must include information in the form detailed in the Biodiversity Conservation Act 2016 (s6.12), Biodiversity Conservation Regulation 2017 (s6.8) and Biodiversity Assessment Method, unless DPIE and DPE determine that the proposed development is not likely to have any significant impacts on biodiversity values.	A BDAR Waiver was granted by the Secretary of DPIE on 29 October 2020 (Appendix B)
2. The BDAR must document the application of the avoid, minimise and offset framework including assessing all direct, indirect and prescribed impacts in accordance with the Biodiversity Assessment Method.	A BDAR Waiver was granted by the Secretary of DPIE on 29 October 2020 (Appendix B)

Table 12.1 Biodiversity assessment requirements

Requirement	Relevant section of the EIS
3. The BDAR must include details of the measures proposed to address the offset obligation as follows: • the total number and classes of biodiversity credits required to be retired for the development/project; • the number and classes of like-for-like biodiversity credits proposed to be retired; • the number and classes of biodiversity credits proposed to be retired in accordance with the variation rules; • any proposal to fund a biodiversity conservation action; • any proposal to conduct ecological rehabilitation (if a mining project); and • any proposal to make a payment to the Biodiversity Conservation Fund. If seeking approval to use the variation rules, the BDAR must contain details of the reasonable steps that have been taken to obtain requisite like-for-like biodiversity credits.	A BDAR Waiver was granted by the Secretary of DPIE on 29 October 2020 (Appendix B)
4. The BDAR must be submitted with all spatial data associated with the survey and assessment as per Appendix 11 of the BAM.	A BDAR Waiver was granted by the Secretary of DPIE on 29 October 2020 (Appendix B)
5. The BDAR must be prepared by a person accredited in accordance with the Accreditation Scheme for the Application of the Biodiversity Assessment Method Order 2017 under s6.10 of the *Biodiversity Conservation Act 2016*.	A BDAR Waiver was granted by the Secretary of DPIE on 29 October 2020 (Appendix B). The BDAR Waiver request was prepared by a suitably qualified and accredited person

12.2.2 Commonwealth

On 22 July 2020, a Referral (EPBC 2020/8712) under the EPBC Act was submitted to DAWE for ministerial determination as to whether the project was likely to have a significant impact on MNES. On 20 August 2020, DAWE determined that the project was “not a controlled action”, meaning a significant impact on MNES was not considered likely, and further environmental assessment under the EPBC Act was not required (Appendix C).

12.3 Commitments and management measures

The surface infrastructure associated with the project will require the construction of a 400 m long power line spur. The proposed power line spur will traverse up to 400 m of cleared land in a corridor between Kidman Way and Spain’s Dam, with an easement footprint of no more than 0.8 ha.

The exact alignment of the power line will be subject to detailed design after the EIS stage and refined to use already cleared areas and avoid the removal of native vegetation. It is proposed that the location of power poles (the only works involving ground disturbance which would normally involve vegetation removal) and locating the subsequent power line corridor, will be micro-sited so as to avoid removal (power pole) or safety pruning (corridor) of any Mulga (*Acacia aneura)* and White Cypress Pine (*Callitris glaucophylla*) which are the canopy species within proximity to the proposed powerline.

Present and future mining will be subjected to ongoing monitoring and stability assessments to ensure no subsidence occurs.

12.4 Conclusion

The project will have negligible impacts on biodiversity values as surface activities will be limited to areas of significant existing disturbance. Native vegetation will be avoided by micro-siting infrastructure within the power line corridor. No subsidence is predicted, and groundwater drawdown will not impact GDEs, terrestrial plant communities or other native vegetation.

As negligible impacts on biodiversity is anticipated, offsets are not required.

13 Aboriginal heritage

13.1 Introduction

An Aboriginal cultural heritage assessment (ACHA) was completed by EMM to assess the predicted cultural heritage impacts associated with the project. The ACHA was prepared in accordance with the DECCW's Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010 (DECCW 2010a). The ACHA is provided in full in Appendix K.

13.2 Assessment requirements

The SEARs require an assessment of the likely heritage impacts of the project. The specific requirements relating to heritage are provided in Table 13.1.

Table 13.1 Heritage assessment requirements

Relevant authority and assessment requirement	Relevant section of the EIS
DPIE – Secretary's Environmental Assessment Requirements	
An assessment of the likely Aboriginal and historic heritage (cultural and archaeological) impacts of the development	Appendix K Chapter 13 Refer to the Historical Heritage Assessment included in Chapter 14 and Appendix L of the EIS for assessment of historical heritage impacts.
Including consultation with Aboriginal stakeholders in accordance with Aboriginal Cultural Heritage Consultation Requirements for Proponents (OEH 2010).	Appendix K Section 13.2.2
Standard Environmental Assessment Requirements	
Identify and describe the Aboriginal cultural heritage values that exist across the whole area that will be affected by the development and document these in an Aboriginal Cultural Heritage Assessment Report (ACHAR). This may include the need for surface survey and test excavation. The identification of cultural heritage values must be conducted in accordance with the Code of Practice for Archaeological Investigations of Aboriginal Objects in NSW (OEH 2010), and guided by the Guide to investigating, assessing and reporting on Aboriginal Cultural Heritage in NSW (DECCW 2011) and consultation with DPIE regional branch officers.	Appendix K Chapter 13
Consultation with Aboriginal people must be undertaken and documented in accordance with the Aboriginal cultural heritage consultation requirements for proponents 2010 (DECCW). The significance of cultural heritage values for Aboriginal people who have a cultural association with the land must be documented in the ACHAR.	Appendix K Sections 13.2.2, 13.3 and 13.6
Impacts on Aboriginal cultural heritage values are to be assessed and documented in the ACHAR. The ACHAR must demonstrate attempts to avoid impact upon cultural heritage values and identify any conservation outcomes. Where impacts are unavoidable, the ACHAR must outline measures proposed to mitigate impacts. Any objects recorded as part of the assessment must be documented and notified to DPIE.	Appendix K Sections 13.6 and 13.7 Chapter 24

13.2.1 Methodology

The ACHA was prepared in accordance with the relevant government assessment requirements, guidelines and policies, including:

- Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW (OEH 2011);
- Aboriginal Cultural Heritage Consultation Requirements for Proponents (DECCW 2010a); and
- Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales (DECCW 2010b).

The method is described in full in the ACHA (Appendix K).

13.2.2 Aboriginal consultation

The assessment adopted the processes and methods outlined in DECCW's Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010 (DECCW 2010a) to identify relevant registered aboriginal parties (RAPs) with whom to consult. The consultation process initially identified eight Aboriginal stakeholder organisations who may have had an interest in the project. Following notification, six responded as wishing to be registered for subsequent consultation through the project.

The field program included the participation of two of these organisations being the Cobar Local Aboriginal Land Council, and the Ngemba, Ngiyampaa, Wangaaypuwan and Wayilwan People native title applicant. A meeting with the Ngemba, Ngiyampaa, Wangaaypuwan and Wayilwan People was also undertaken after the site inspection to ensure involvement of key knowledge holders, and to discuss the project.

A summary of Aboriginal consultation undertaken for the project is presented in Table 13.2.

Table 13.2 Summary of Aboriginal consultation undertaken for the project

Consultation Stage	Description	Date Initiated	Date Completed	Notes
1	Government Agency Pre-Notification	28 April 2020	-	Additional details provided in Appendix B.2 of Appendix K.
	Advertisement in the *Cobar Weekly*	17 April 2020		A tear sheet is provided in Appendix B.2 of Appendix K.
	Notification and registration of potential Aboriginal stakeholders	13 May 2020	27 May 2020	Additional details are provided in Appendix B.2 of Appendix K.
2/3	Presentation of information about the proposed project; and gathering information about cultural significance	3 June 2020	1 July 2020	Additional details are provided in Appendix B.3 of Appendix K.
	Field Investigation	2 July 2020		Additional details are provided in Section 2.4 and 6 of Appendix K.
	Meeting	3 July 2020		Additional details are provided in Section 2.4 of Appendix K.
4	Review of draft report	16 October 2020	13 November 2020	Additional details are provided in Section B.4 of Appendix K.

A draft version of the ACHA, which included all background information, results, draft significance assessment and draft management recommendations, was issued to all RAPs on 16 October 2020, accompanied by an email specifying a 28-day timeframe for review. The draft ACHA included highlighted text indicating sections where RAP input was sought in regard to Aboriginal heritage values, significance assessment and management measures. No comment was made by the RAPs.

A full description of Aboriginal consultation, including the process, findings, and feedback, is provided in Section 2 of Appendix K.

13.3 Existing environment

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

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

The project area has a diverse geological and geomorphological landscape, which results in a range of environments and ecotones that would have been attractive resources to past Aboriginal populations. However, it is some distance from any major water sources, which would likely have limited activity to ephemeral or temporary use in the past. The project area is dominated by flat relief and residual soil profiles, limiting site types to surface and/or shallowly buried cultural materials (stone or shell artefacts). The potential for rockshelters, grinding grooves, etc, is considered unlikely based on the geomorphology.

The project area was subjected to extensive disturbance in the past from previous historical mining, European mining settlements and agriculture. As such, the survivability of cultural materials across the project area is considered likely to be poor and localised.

13.3.1 Ethno-historical context

Cobar is the traditional home to the Ngiyampaa or Ngempa people who, to distinguish themselves from other language groups in the area, refer to themselves as the people who speak Ngiyampaa the Wangaaypuwan (or Wongaibon) way (Donaldson 1980; Tindale 1974). Ngiyampaa people may refer to themselves by one of the following three names to more specifically indicate their traditional country within the peneplain (Smart et al 2000, p. 19):

- Pilaarrkiyalu meaning Belah Tree People whose country is traditionally associated with the lands south and west of Cobar and to the east of Ivanhoe;
- Nhiilyikiyalu meaning Nelia Tree People whose country is to the west of Ivanhoe; and

- Karuliyalu meaning Stone Country People whose country is the areas of Cobar, the Gundabooka Ranges and Walgett. They have also referred to themselves as the Mulga People, Red Soil People, Dry Country People or 'the people who stay out back and don't camp on rivers' (NPWS 2003, p. 109, Smart et al 2000, p. 19).

It is this last group that are likely to have occupied the landscape of the current project area.

There are limited ethno-historical accounts directly relevant to the Cobar area. The nearest example comes from Oxley in 1817 who documented sighting an Aboriginal family of six persons, and later an elaborate six-foot-high burial mound in the area between Condobolin and Lake Cargelligo (Oxley 1820). Sturt (1849) made a series of observations on the Aboriginal people of the Darling River west of the Cobar region. Later, Bennett (1883) documented some observations of Aboriginal people in the Cobar region, including the use of eucalyptus, hakea and currajong roots for the extraction of water. He noted that people would retreat to the Darling and Lachlan Rivers during droughts, and mentioned feuding that would occur between the river people and those of the back country.

The lack of watercourses constrained the use and occupation of the Cobar region. Cunningham (1973) indicates that Aboriginal people utilised a range of intermittent water courses, including natural rockpools and waterholes. He suggests that there were numerous examples of these features having been modified and/or constructed by Aboriginal people in the past, such as the use of fire on existing cracks within rock outcropping to create depressions and holes for water to be retained (see Section 4.2 in Appendix K). Such rockpools and waterholes were commonly found on or near major rock outcrops, and these environments are more likely to contain denser cultural materials than other parts of the region.

By 1873, Cobar began to establish itself as a permanent township, growing from its former status as a mining outpost (Clelland 1984). The establishment of large pastoral holdings in the 1880s led directly to the displacement of the local Aboriginal people. Whilst some Aboriginal people remained on stations, many were forced to move to various camps and to Gundabooka Station, and subsequently onto Brewarrina Mission.

Discussions with the Aboriginal stakeholders indicate that Cornish Town, a former informal settlement in the project area, had both Aboriginal and non-Aboriginal residents; and still holds value to the stakeholders.

13.3.2 Archaeological context

Previous archaeological investigations of the region are extremely sparse. Academically, these have primarily focused upon rock art assemblages within stone ridge country located to the north and west of the project area – Mount Grenfell being an example. Cultural resource management investigations have been associated with proposed and/or modifications to mining activities. These studies all suggest generally sporadic and/or ephemeral past use of the region, with a focus of occupation and visitation on springs, waterholes and other natural soaks.

A search of the AHIMS database identified 71 Aboriginal sites within 80 km of the project area. However, no AHIMS sites are located within the project area (the nearest recorded sites are some 10 km to the northwest). A previously identified artefact scatter – consisting of four stone artefacts – is located within the project area (near the proposed fresh air intake) but is not currently listed on the AHIMS database. This artefact scatter was identified through a field investigation conduct by PGM for the Great Cobar exploration decline REF and the Great Cobar dewatering project SoEE. (see Plate 13.1).

Source: Eco Logical 2019, pp. 10-11)

Plate 13.1 "Artefact Scatter 1": (left) scald containing the artefact scatter, (right) two silcrete flakes

Open camp sites (artefact scatters and isolated finds) represent 45.1% of the previously documented sites in the region, followed by culturally modified (carved or scarred) trees which account for 39.4%. Lesser representation of rockshelters, ceremonial sites, quarries and burials are also documented.

Since 2010, two Aboriginal Heritage Impact Permits (AHIPs) have been issued in the Cobar LGA, neither of which relate to the project area.

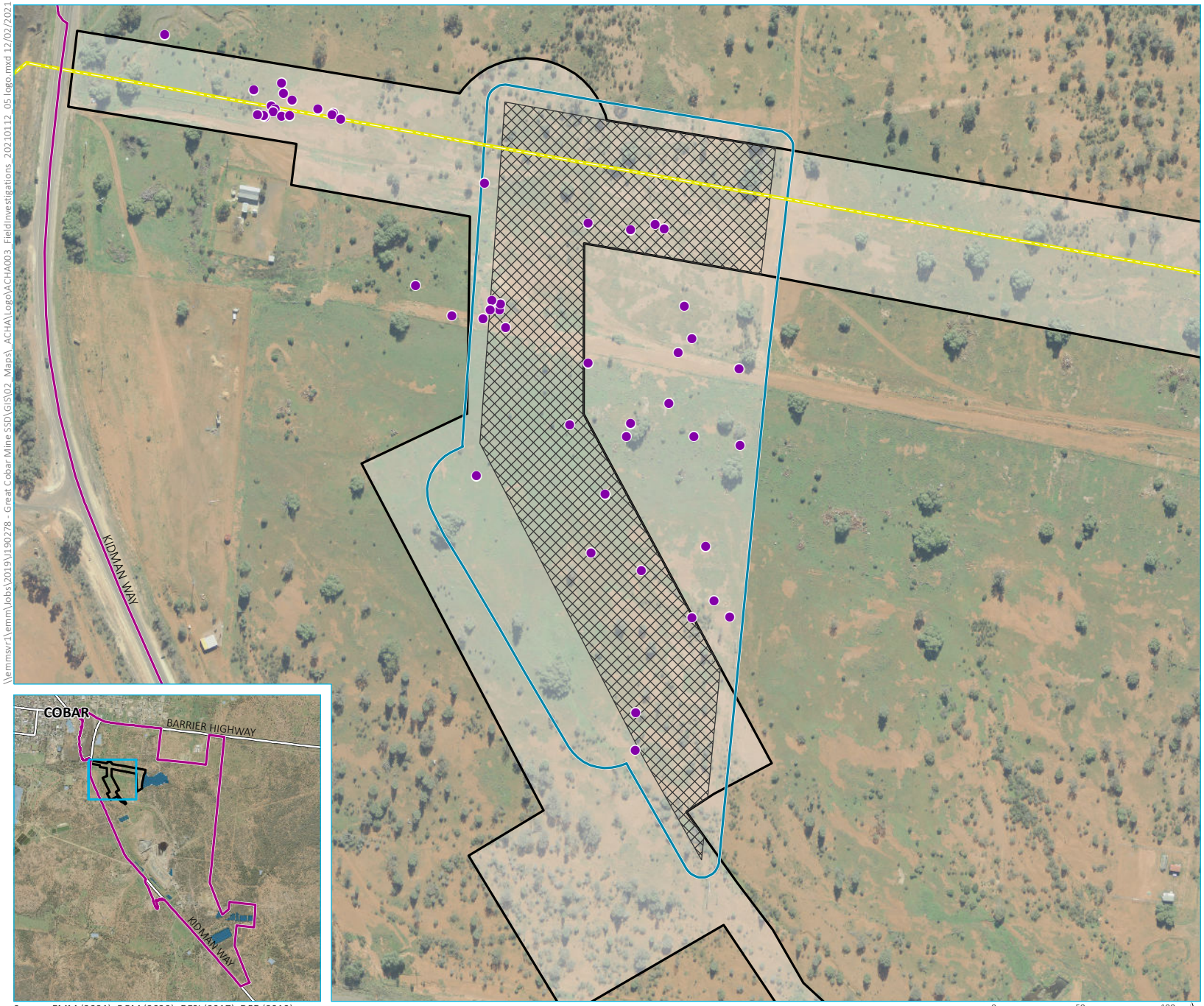
13.4 Field investigation

An archaeological field survey of the project area was undertaken by EMM archaeologists, with the assistance of the Cobar LALC and Ngemba, Ngiyampaa, Wangaaypuwan and Wayilwan People as RAPs, on 2 July 2020. The field survey undertook a general overview of the project area, and a targeted investigation of the location of the proposed surface activities for the project, including the power line corridor, exhaust air rise and fresh air intake (Figure 13.1). A full description of the ACHA field investigation is provided in Section 6 of Appendix K.

Overall, the field survey investigated transects across ~7 ha of the area containing the proposed surface infrastructure, and primarily encompassed flat open plains that have been subject to heavy disturbance in the past, including Cornish Town.

The field investigation documented ~36 stone artefacts (1 artefact per 1,930 m^2) across the area investigated (Figure 13.1**Error! Reference source not found.**). Some five of these artefacts were within the ~400 m x 20 m power line corridor footprint. All consisted of surface finds primarily in areas of former historical activity, such as roads, fire breaks and de-vegetation (Plate 13.2).

No clearly discernible pattern of the distribution of the stone artefacts is evident, although greater numbers (~50%) were encountered in close (<100 m) proximity to the Salty waterhole to the northwest of the project area. Artefacts in proximity to the water-holes are likely an extension of 'Artefact Scatter 1'; an Aboriginal site previously identified through the Aboriginal heritage due diligence assessment for the Great Cobar historical underground workings Dewatering Pipeline (ELA 2019) which was approved by CSC in 2019 (see Section 5.3.1vi of Appendix K).



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Source: EMM (2021); PGM (2020); DFSI (2017); DPE (2019)

Field investigation areas

Peak Gold Mines
New Cobar Complex Project
Environmental impact assessment
Figure 13.1

KEY

- Project area
- Investigated area
- Area previously surveyed by EcoLogical Australia in 2018 (indicative)
- Area of contemporary value
- Identified Aboriginal object
- Great Cobar dewatering pipeline
- Proposed power line corridor

Source: EMM (2021); PGM (2020); DFSI (2017); DPE (2019)

0 50 100 m

GDA 1994 MGA Zone 55

N

Identified Aboriginal sites

Peak Gold Mines
New Cobar Complex Project
Environmental impact assessment
Figure 13.2

aurelia METALS Ltd.

EMM creating opportunities

These findings suggest the validity of the waterholes as being present prior to contact with non-Aboriginal peoples and being used by Aboriginal people in the past. The remaining artefacts are distributed intermittently across the investigated area and demonstrate no clear patterning.

Plate 13.2 An artefact found in the vicinity of a previous recorded artefact scatter in 2019, looking northwest. Note the Salty evident in the background

Given the low numbers of artefacts (~1/1,930 m^2), it is considered to reflect primarily a background scatter indicative of ephemeral use of the broader region in the past. It is further acknowledged that significant historical disturbance has occurred in this area, including Cornish Town, that may have had an influence on the distribution and/or survivability of the cultural materials identified.

In addition to the Aboriginal objects, the remains of Cornish Town (removed in the 1960s by CSC) were also considered to have some contemporary (post-contact social) and historical value to the Aboriginal stakeholders. The town was inhabited by Aboriginal and non-Aboriginal people over the late 19th and early-mid 20th and there was a direct connection with the inspection including an Aboriginal RAP who had lived in Cornish Town before it was removed. Structural building material was identified in the location of one of the Aboriginal participants former childhood dwelling (see Plate 13.3).

Plate 13.3 Structural remains of a house within Cornish Town, View east

13.5 Assessment criteria

13.5.1 Significance assessment

All Aboriginal objects in NSW are protected under the NPW Act. It is recognised that the destruction of sites may be necessary to allow other activities or developments to occur. In order for the consent authority to make informed decisions on such matters, an important element of cultural resource management is determining the significance of cultural heritage places and objects to understand what may be lost; and how best it can be mitigated. However, it is highlighted that something can be of little or no significance and still be protected under the NPW Act.

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

The criteria adopted for this report are defined in Table 13.3. The management implications of these sites' significance are described below.

Table 13.3 A summary of criteria used to assess the cultural significance (OEH 2011, pp. 8–10)

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

The assessment identified two Aboriginal sites within the project area, a low density background scatter of stone artefacts across the proposed surface activity area – incorporating a previously documented site nearby (Artefact Scatter 1) – and the remains of a former post-contact township within which Aboriginal people formed some of the inhabitants. These findings are consistent with the broader regional models that suggest more intense occupation and land use was dictated by the availability of waterholes, rockpools, springs, etc, and frequently in association with uplands and/or geological outcropping, with the presence of water often pooling in and around such uplands. The project area has few of these attributes, with only an ephemeral waterhole, the Salty, being present on the north-western edge of the curtilage, and in the vicinity of which some evidence of past visitation was observed, namely the New Cobar Complex Background Scatter (see Section 7 of the ACHA in Appendix K).

The New Cobar Complex Background Scatter consists of a moderately to heavily disturbed low-density artefact scatter on the surface of the soil profile, and therefore has limited ability to inform our understanding of past Aboriginal activity. Such sites can only provide limited information on the habits and behaviours of past activity, and no chronology on when the site was utilised or occupied. As such the site is considered to have low scientific significance, is not rare to the region, nor is it a particularly good example of these types of site (ie representativeness). The site has no evidence of historical significance, nor aesthetic significance being within an active mine site.

The remains of the Cornish Town is considered to meet a number of the significance criteria at a local level. The removal of the township in the 1960s has resulted in little of the site remaining today. As such, the significance criteria are based primarily on the intangible values associated with the township. These include its potential ability (through oral information and histories), to provide information about the past use and activities of the locale by Aboriginal people through the post-contact period – a time interval that often has limited information, and is now forming a focus for historians (eg Dunn 2020; Irish 2017; Karskens 2020). Knowledge of post-contact Aboriginal societies in the Cobar region is currently very limited, and so research of this site may fill a critical gap in this knowledge. The site also has cultural/social values specific to the local Aboriginal community, both through its direct connection of key informants having lived there, and a broader connection to these post-contact societies. Currently, there are no specific historical values known for the site.

A summary of the significance values for each Aboriginal object and/or site identified is provided in Table 13.4.

Table 13.4 Significance of Aboriginal objects and/or sites identified

Site	AHIMS #	Site Type	Significance				
			Scientific	Aesthetic	Historical	Cultural	Overall
New Cobar Complex Background Scatter (encompasses previously documented 'Artefact Scatter 1')	-	Low density artefact scatter	L	-	-	L	Low
Cornish Town	-	Habitation structure (ruins)	M	-	-	M	Moderate

Note: 1. High = H; Moderate = M; Low = L; I = Indeterminate.
2. The overall significance is comparable with the highest ranking achieved in any of the four main criteria.

13.6 Impact assessment

13.6.1 Project impacts

There are two types of potential impact, direct and indirect. Direct impacts relate to construction activities and their removal, truncation and/or disturbance of the ground surface, vegetation, geological outcropping and of the upper soil profile. Indirect impacts are the result of both construction and post-construction activities that may result in environmental changes that would affect cultural material within, or near project activities.

The majority of the project activities will be located underground and/or in existing operational mining complexes. The underground activities will have negligible surface impacts, and as such will be unlikely to have any direct/indirect harm to cultural materials if present. A review of the existing mining complex suggests that the survivability of Aboriginal cultural materials in already disturbed areas would be unlikely; and therefore impacts from the proposed activities are similarly considered to be unlikely.

The power line corridor will result in ground surface disturbance and has the potential to impact surface cultural material. These may likely result in the direct impact to ~0.8 ha (of the 3.9 ha area investigated) through excavation and installation of power poles, although currently this activity has substantial buffers for planning purposes, and the actual disturbance area will likely be much less. Given the majority of cultural material is located at, or near the current land surface, unmitigated, these proposed activities would cause 100% impact within their footprints, since all require excavation to >1 m below surface. Indirect impacts would also likely be largely constrained to these buffered areas, and/or existing infrastructure that runs across these areas (ie a number of established roads, etc, are already present).

13.6.2 Aboriginal heritage impact

When overlaying the power line corridor – the only surface impacts proposed – with the outlined in two identified Aboriginal objects and/or sites may be subject to direct impact (Table 13.5). Specifically, the proposed activity would result in harm to both the New Cobar Complex Background Scatter and be within the curtilage of the Cornish Town remains (Table 13.5). In the case of the background scatter, low numbers of stone artefacts were found across the power line corridor footprint that would be affected by the works. Based on field observations, this would likely total some five observed artefacts, and potentially double this number given ground visibility allowed only 50% of the area to be inspected. The actual works would be less than the currently proposed footprint but the inspection was conservative in its approach. Given this is part of a background scatter that extends beyond the impact footprint – including the original observation of a part of the site in 2019 and recorded as ‘Artefact Scatter 1’ with higher densities of cultural material adjacent to the Big and Little Salty waterholes, it is considered that the works would have only partial loss of value through the works.

In relation to the Cornish Town footprint, there are few tangible remains that would be affected by the proposed activity. The area of identified contemporary value, an Aboriginal stakeholder’s former home, is outside the edge of the power line corridor, and will not be harmed by the proposed activity. The majority of the Cornish Town footprint would be unaffected by the proposed activity; much of it situated further east. As such, it is considered that the works would result in no loss of value to this site, the Aboriginal values of which are primarily in the history and stories of the locale rather than its tangible remains.

Overall, despite the extent of the proposed activities across the project area, the potential for direct impacts to cultural heritage are considered relatively minor. However, the works could result in some harm to cultural

materials and/or values. Strategies and recommendations to manage this are outlined in Section 13.7 and Appendix K.

Table 13.5 Summary of potential impacts to Aboriginal objects and/or sites

Site	AHIMS #	Significance	Type of harm	Location and/or activity causing harm	Degree of harm	Consequence of harm
New Cobar Complex Background Scatter (encompasses previously documented 'Artefact Scatter 1')	Not registered	Low	Direct	Proposed power line easement	Partial	Partial loss of value
Cornish Town	Not registered	Moderate	Direct	Power line corridor	Partial	No loss of value

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

13.6.3 Intergenerational equity

Intergenerational equity is the principle whereby the current generation should ensure the health, diversity and longevity of the environment for the benefit of future society. For Aboriginal heritage management, intergenerational equity can be considered primarily in terms of the cumulative impacts to Aboriginal objects, sites and/or places in a region. If few Aboriginal objects and places remain in a region (eg due to development impacts), there are fewer opportunities for future generations of Aboriginal people and the broader community to enjoy the cultural benefits. Information about the integrity, rarity and representativeness of the Aboriginal objects, sites and places that may be impacted, and how they inform the past visitation and occupation of land by Aboriginal people, are relevant to the consideration of intergenerational equity and the understanding of the cumulative impacts of a project.

A significant component of the project would be undertaken underground with negligible surface disturbance. With few exceptions, the proposed works are at least partially or entirely within areas of existing disturbance and/or past impacts. The newly proposed surface activity consists of ~0.8 ha power line corridor is similarly in areas already historically disturbed by mining activities.

The proposed activity would affect two Aboriginal sites, one of which was identified primarily for its intangible values, and which would be unaffected by the works. It is considered the direct impacts to the former Cornish Town would be minimal given the lack of physical remains. Further, through implementing the management strategy outlined in Section 13.7 and Appendix K, the proposed activity would potentially improve contemporary knowledge of the Aboriginal history of Cornish Town, and thereby result in a positive intergenerational outcome for the project.

In relation to the New Cobar Complex Background Scatter, the proposed activity would result in impacts to a portion of the site, but cultural material extends well beyond the boundary of the works curtilage. Further, it is considered that the artefacts observed where not in their primary context, having been already affected by historical activities across the site. When implementing the proposed management strategy that involves minor relocation of this already disturbed cultural material to areas immediately outside the work's areas, it is considered that the proposed activity would have negligible intergenerational or cumulative impact to cultural heritage.

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Source: EMM (2021); PGM (2020); DFSI (2017); DPE (2019)

Potential impacts to identified sites and areas of sensitivity

Peak Gold Mines
New Cobar Complex Project
Environmental impact assessment
Figure 13.3

aurelia METALS Ltd.
EMM creating opportunities

13.7 Commitments and management measures

For the purposes of the project, recommendations below include the development of an Aboriginal Cultural Heritage Management Plan (ACHMP) to provide the post-approval management framework for all future Aboriginal heritage requirements for the project. They further outline the specific mitigation measures that should be implemented prior to, during and after the project. The recommendations include measures to monitor and recover cultural materials within the final impact footprint, undertaking oral history and interpretive opportunities in relation to Cornish Town, further investigate areas of sub-surface potential, registering the cultural materials on AHIMS, implementing suitable monitoring and management of indirect impacts, completing any post-excavation analyses and reporting, and lodging the various documentation with appropriate public repositories.

In discussions with the Aboriginal stakeholders, key mitigation measures will include the following:

- Once determined, the power line corridor and ancillary construction area needs to be identified on the ground (eg through flagging or pegging), and an opportunity provided for the Aboriginal stakeholders to inspect and recover any Aboriginal objects within this impact footprint. The Aboriginal stakeholders requested that the objects remain on country, and as such they would likely be relocated to an area immediately outside of the impact footprint.

- Given the harm to the curtilage of the Cornish Town, attempts to avoid impact to this curtilage and notably areas of contemporary value (see Figure 13.3) should be adopted by the project. Further, development of an oral history to further understand the cultural values of the site to Aboriginal people will be undertaken. Consideration to implementing interpretation in suitable locations around the project area based on these results will be considered.

Management strategies and recommendations are discussed further in Section 10 of Appendix K.

13.8 Conclusion

The findings of the ACHA are summarised as follows:

- The assessment adopted the processes and methods outlined in DECCW's Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010 (DECCW 2010a) and responds to the requirements of the SEARs to asses likely heritage impacts of the project.

- Previous archaeological investigations of the region are extremely sparse. Where undertaken, these studies all suggest generally sporadic and/or ephemeral past use of the region, with a focus of occupation and visitation on springs, waterholes and other natural soaks. The project area generally does not conform to this archaeological model as it is generally lacking any formal drainage or permanent water sources that would allow long residence times or substantive vegetation to become established. Both desktop analysis and ground-truthing validated these findings, and further identified that significant level of disturbance had occurred within the project area.

- An archaeological field survey was undertaken by EMM archaeologists and representatives of the RAPs and native title applicant representatives. The field survey undertook a general overview of the project area, and a targeted investigation of the proposed surface activities for the project, including the power line corridor.

- The proposed underground activities would have negligible direct or indirect impacts to Aboriginal heritage. Similarly, the majority of surface impacts are proposed in areas of existing heavy disturbance associated with historical mining operations, agricultural and post-contact settlement. The focus of surface impacts for the ACHA has been a ~3.4 ha area within which the proposed power-line easement will be located. This easement will be no greater than 0.8 ha, and actual surface disturbance will be significantly less.

- The power line easement has the potential to harm the identified Aboriginal artefacts within the New Cobar Complex Background Scatter a low density scatter of artefacts, extending beyond the boundaries of the easement and encompassing formerly identified 'Artefact Scatter 1' and the remains of Cornish Town. These impacts may cause partial loss of value to these sites, with management strategies proposed to further minimise these effects.

- Overall, the proposed activity would result in negligible cumulative impact with the Aboriginal sites already being heavily affected by past activities. When including suggested management strategies, it is considered that the proposed activity would potentially have positive cumulative (intergenerational) impacts, allowing improved engagement of the Aboriginal community with the locale, as well as providing further information on poorly understood post-contact history.

14 Historical heritage

14.1 Introduction

A statement of heritage impact (SoHI) was completed by EMM to assess the predicted historical heritage impacts associated with the project. The SoHI was prepared in general accordance with the relevant government assessment requirements, guidelines and policies.

The SoHI is provided in full in Appendix L.

14.2 Assessment requirements

The SEARs require an assessment of the likely heritage impacts of the project. The specific requirements relating to heritage are provided in Table 14.1.

Table 14.1 Heritage assessment requirements

Relevant authority and assessment requirement	Relevant section of the EIS
DPIE	
An assessment of the likely Aboriginal and historic heritage (cultural and archaeological) impacts of the development,	Appendix L and Chapter 14 Refer to the ACHA included in Chapter 13 and Appendix K of the EIS for assessment of Aboriginal heritage impacts.
Including consultation with Aboriginal stakeholders in accordance with Aboriginal Cultural Heritage Consultation Requirements for Proponents (OEH 2010).	Refer to ACHA in Chapter 13 and Appendix K of this EIS.
Standard Environmental Assessment Requirements	
Provide a heritage assessment including but not limited to an assessment of impacts to State and local heritage including conservation areas, natural heritage areas, places of Aboriginal heritage value, buildings, works, relics, gardens, landscapes, views, trees should be assessed. Where impacts to State or locally significant heritage items are identified, the assessment shall:	Chapters 13 and 14 Appendices K and L of this EIS
a. outline the proposed mitigation and management measures (including measures to avoid significant impacts and an evaluation of the effectiveness of the mitigation measures) generally consistent with the NSW Heritage Manual (1996),	Sections 14.6 and 14.7 Appendix L of this EIS
b. be undertaken by a suitably qualified heritage consultant(s) (note: where archaeological excavations are proposed the relevant consultant must meet the NSW Heritage Council's Excavation Director criteria),	Section 1.7 in Appendix L
c. include a statement of heritage impact for all heritage items (including significance assessment),	Sections 14.5 and 0 Appendix L of this EIS
d. consider impacts including, but not limited to, vibration, demolition, archaeological disturbance, altered historical arrangements and access, landscape and vistas, and architectural noise treatment (as relevant), and	Section 14.6 Appendix L of this EIS
e. where potential archaeological impacts have been identified develop an appropriate archaeological assessment methodology, including research design, to guide physical	Section 14.7 Appendix L of this EIS

Table 14.1 Heritage assessment requirements

Relevant authority and assessment requirement	Relevant section of the EIS
archaeological test excavations (terrestrial and maritime as relevant) and include the results of these test excavations.	

14.2.1 Methodology

The report and field survey were undertaken using the principles of The Australian International Council on Monuments and Sites, Charter for Places of Cultural Significance (also known as the Burra Charter) (Australia ICOMOS 2013) and the NSW Heritage Manual (Heritage Office 1996).

The Burra Charter defines the concept of cultural significance as 'aesthetic, historic, scientific, social or spiritual value for past, present or future generations' (Australia ICOMOS 2013, Article 1.2). It identifies that conservation of an item of cultural significance should be guided by the item's level of significance.

The Heritage Manual comprises the following guidance documents:

- Statements of Heritage Impact Guidelines (Heritage Office 2006);
- Investigating Heritage Significance (Heritage Office 2004);
- Assessing Heritage Significance (Heritage Office 2001); and
- Assessing Significance for Historical Archaeological Sites and 'Relics' (Heritage Branch Department of Planning 2009).

The method is described in full in the SoHI in Appendix L.

14.3 Existing environment

14.3.1 Heritage listings

An extensive search of national, State and local heritage registers was conducted on 13 July 2020. There are two locally listed heritage sites within the project area, and a further 19 items listed on the Cobar LEP within 1 km. There are no other heritage listed sites in the project area, but there is one item listed on the Commonwealth Heritage List (CHL) (The Cobar Post Office) and one on the State Heritage Register (SHR) (Cobar Railway Station and Yard) within 1 km of the project area. There are six items listed under s170 of the EP&A Act in Cobar; however, all are over 1 km from the nearest new surface disturbance.

A summary of heritage items within the project area and within 1 km of the project area is provided in Table 14.2. Registered heritage items in the vicinity of the project area are shown in Figure 14.1. Note that the Barrier Highway is referred to as Marshall Street as it passes through Cobar.

Table 14.2 Register search for heritage items in and near the project area

Register	Name	Item ID on the Cobar LEP	Address		Distance to nearest new surface disturbance
Within the project area					
Cobar LEP (2012)	Cobar Pastoral and Mining Technology Museum 1910	I8	Nyngan Road (Barrier Highway), Cobar		950 m
	Towser's Huts	I24	Fort Bourke Hill, off Kidman Way, Chesney Gold Mine		810 m
Within 1km of project area					
Cobar LEP (2012)	Hotel Corner, corner of Linsley and Marshall Street, Great Western Hotel 1895	I14	Marshall Street (Barrier Highway), Cobar	350 m west	1.15 km
	Municipal Council Chambers (former)	I16	43 Linsley St, Cobar	450 m west	1.15 km
	Professional offices (former Tattersalls then Course House Hotel)	I19	Barton Street	570 m west	1.25 km
	CSIRO, Soil Research Division (former School of Arts)	I11	13 Becker Street	540 m west	1.35 km
	Dwelling house (former St. Margaret's Presbyterian Manse)	I12	28 Becker Street	670 m west	1.35 km
	Masonic Hall	I15	16 Bourke Street	780 m west	1.45 km
	St. Lawrence O'Toole Roman Catholic Church	I22	Prince Street	750 m west	1.35 km
	Sisters of Mercy Convent and classrooms 1884	I21	Prince Street	740 m west	1.35 km
	Police Station and barracks	I18	Barton Street	650 m west	1.35 km
	Police Station, lock up and cells (former)	I17	Barton Street	650 m west	1.35 km
	Church of England	I5	Barton Street	650 m west	1.35 km
	Cobar Courthouse	I6	Barton Street	650 m west	1.35 km
	Cobar Fire Station	I7	Barton Street	650 m west	1.35 km
	St. Margaret's Uniting Church	I23	Barton Street	650 m west	1.35 km
	School Masters Residence	I20	10 Blakey Street	650 m west	1.35 km
	Bulk Store (Former Wright Heaton and Co Ltd)	I4	Linsley Street (North)	610 m north west	1.60 km
	Brick cottage	I2	11 Murray Street	980 m north west	1.85 km
	"Woodleigh"	I25	13 Murray Street	960 m north west	1.85 km
	Dwelling house	I13	Brough Street	720 m west	2 km

Table 14.2 Register search for heritage items in and near the project area

Register	Name	Item ID on the Cobar LEP	Address		Distance to nearest new surface disturbance
Within the project area					
State Heritage Register	Cobar Railway Station and Yard*	01114 (LEP I10)	Nyngan-Cobar Railway, Cobar	710 m northwest	1.7 km
Commonwealth Heritage List	Cobar Post Office*	106178 [LEP I 9}	47 Linsley St, Cobar	480 m west	1.15 km

* Cobar Railway Station and Yard (I10), and Cobar Post Office (I9) are also listed on the Cobar LEP (2012).

14.3.2 Historical summary

Cobar is well known for its mining history, a history which extends from Aboriginal people mining pigments of ochre, kaolin and blue and green copper minerals at 'Kubbur', an Aboriginal water hole and quarry; through to early exploration and prospecting, to the establishment of mines throughout the district.

i Early Aboriginal history

An overview of the Aboriginal history of the local area can be found in Chapter 13 and Appendix K.

ii European occupation

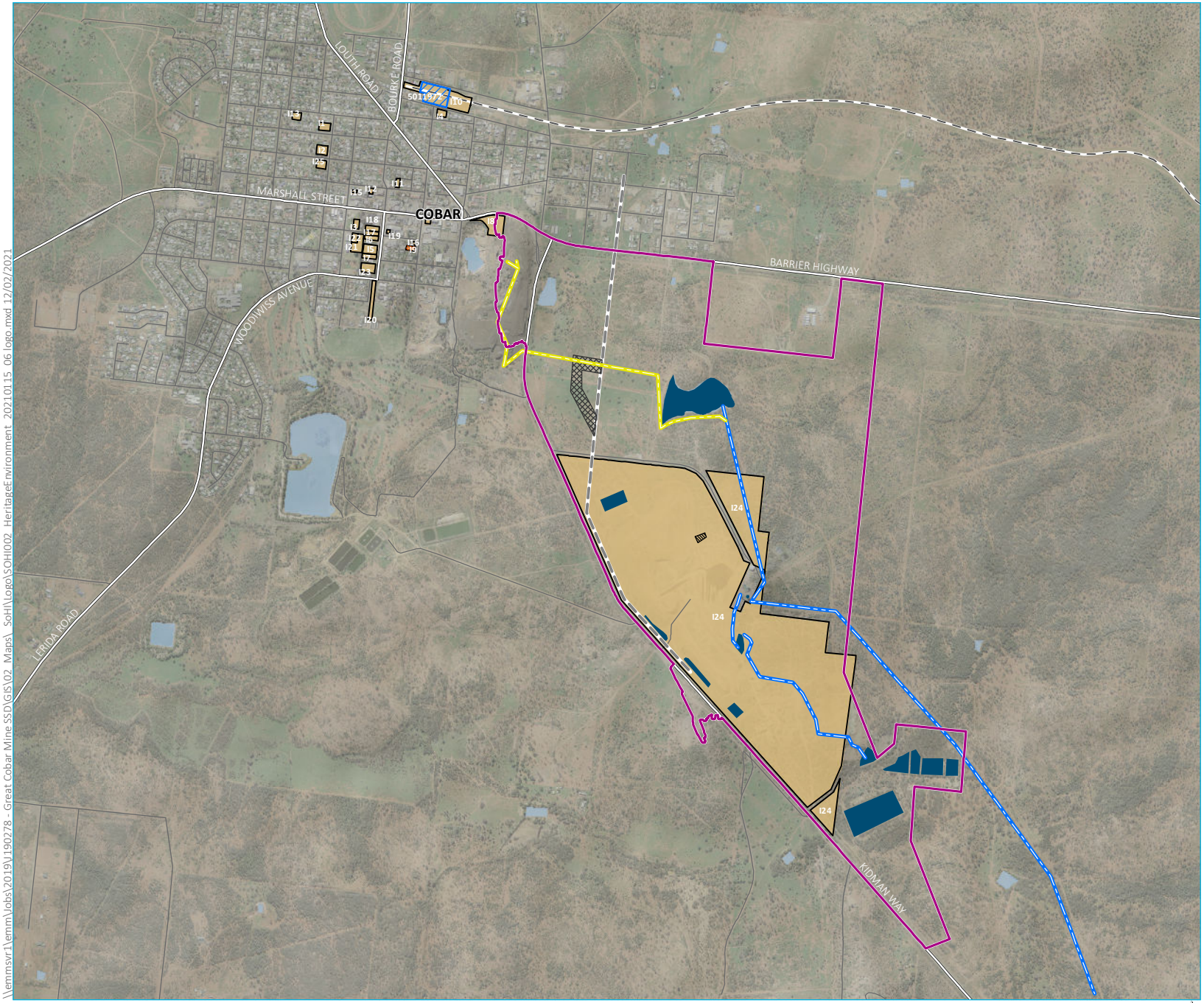
Exploration of the area west of the Blue Mountains began after 1817, with major expeditions by Oxley, Sturt and Mitchell. By 1830, squatters had begun to occupy large areas of the west as the Cobar Peneplain was promoted as productive sheep and cattle grazing country (DPIE 2016). "Squatting" was a method of pastoral landholding that occurred from the 1820s, whereby sheep and cattle farming was established on Crown Land outside the limits of location; in effect, pastoralists occupied land before it was released by the colonial government (SLM 2017).

Governor Thomas Brisbane instituted the "ticket of occupancy" process between 1821 and 1825 to give graziers already occupying land some security (Starr and Nicholas 1978, pp.9-10). This new system of pastoral 'licences' allowed squatters to occupy lands outside the settled districts provided they did so for pastoral purposes. The squatters paid an annual fee to the Crown.

iii History of mining in Cobar

The Cobar area has seen four major stages of mining activity:

- 1870–1921: copper and later gold mining dominated by the Great Cobar mine;
- 1930–1952: gold mining focussed on the New Occidental and Chesney mines;
- 1961–1985: major base-metal mining following discoveries at CSA and Elura (now Endeavor) mines; and
- 1985 to present: resurgence in gold and continued base-metal mining, with new discoveries following systematic exploration at Peak and New Cobar (McQueen 2016).



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Source: EMM (2021); PGM (2020); CHL (2015); DFSI (2017); DPE (2017); GA (2011); DPE (2019)

Existing heritage environment

Peak Gold Mines
New Cobar Complex Project
Environmental impact assessment
Figure 14.1

In 1869, Charles Campbell, Thomas Hartman and George Gibb – three contract well sinkers, were led to the Kubbur waterhole by their Aboriginal guides, known as Frank and Boney (Burgess 2006). Campbell, Hartman and Gibb noticed the green and blue staining at the waterhole and took rock samples to be studied. The rocks were identified as containing copper (Burgess 2006).

In partnership with the local postmaster and part time financier Joseph Becker, Campbell, Hartman and Gibb took up a mineral conditional purchase of 40 acres (16 ha) in 1870 (McQueen 2016). Becker secured an additional 10 acres (c. 4 ha) to the north and south of the initial selection, but it was the central lease that produced the richest lode and became known as the Cobar Copper Mine. In 1870, the Cobar Copper Mining Company was formed, and the lease of the Cobar Copper Mine was transferred to the company. In 1876, the South Cobar Mining Company and the Cobar Copper Mining Company merged to form the Great Cobar Copper Mine.

However, after World War I (WWI), demand for copper fell and the Great Cobar Mine closed in 1919 on cessation of War Office contracts. Associated mines including the Chesney mine were also closed (McQueen 2016). The relics of the Great Cobar Mine and associated buildings and infrastructure lie at the eastern end of Cobar, partially within the project area, and the former mine administration office building which now houses the Great Cobar Heritage Centre.

iv Cobar's mining heritage

a Great Cobar Heritage Centre

Built in 1910 as administration offices for the Great Cobar Copper Mine, the Great Cobar Heritage Centre reflects late Victorian and Federation architectural style (State Heritage Inventory (SHI) #1350020 (Heritage NSW 2020)). The building is situated on Nyngan Road (commonly known as the Barrier Highway) the main street of Cobar, overlooking the town. The building is listed on the Cobar LEP (2012) as the *Cobar Pastoral and Mining Technology Museum 1910* (I8). After the Great Cobar Mine closed down its operations in 1920, the building has had a number of uses: in the 1950s as 'Bannister's Flats', rented out by Elizabeth 'Bessie' Bannister; as accommodation for workers during construction of the CSA Mine and, since 1968, as a museum.

b Towser's huts

Towser's Huts (Cobar LEP I24) (SHI 1350078, Heritage NSW 2020) are a group of dry-stone walled buildings on the northern slope of Fort Bourke Hill off Kidman Way, to the north of the New Cobar open cut and within the project area. The site was originally a mining tenement (Portion 265) that was leased by an Italian immigrant, Antonio Tozzi c.1890s-1916. The area adjacent to his lease was occupied by the Fort Bourke Mine of Cobar Gold Mines Ltd.

The huts consist of between one and six rooms, some of which have half-round chimneys. The smallest structure with rounded walls housed two pit-type toilets. Building material comprises stone sourced from the site. The huts are now roofless and the walls stand between 0.50 m and 1.5 m high. Other features of the site are a well, drain and silt-tank.

c Wrightville, Dapville and Cornish Town

The description of Cobar that appeared in the newspapers in the 1880s describes the population of Cobar at that time as around 2,500, divided into three areas: the government township as surveyed and proclaimed in 1876, the private township on land owned by the mine around the Great Cobar Mine to the north-west of the government township, and Cornish Town, to the south. The County Robinson parish map shows the

location of two additional townships further to the south along what is now the Kidman Way, Dapville and south of that, Wrightville.

The proposed power line and corridor to supply power from an existing 22 kV line to the emergency egress winder at the fresh air intake, and a vent fan at the exhaust air rise will be located adjacent to an area previously known as Cornish Town. This was one of several residential areas to the south of Cobar that have been demolished. However, unlike Dapville and Wrightville, which were gazetted towns and can be seen on the parish maps, Cornish Town is not shown on maps. Cornish Town is visible in aerial photograph from 1963 (Plate 14.1), although the original town may have been much larger. The red line in the historical imagery is indicative of the relevant lot boundaries for where surface disturbance for this project is proposed.

An in-depth historical summary of Cornish Town and other heritage items is provided in Section 4 of the SoHI in Appendix L.

14.4 Site inspection

EMM archaeologists conducted an archaeological survey of the project area on 1 July 2020. This combined Aboriginal and historical heritage survey included the participation of Aboriginal stakeholders. Transects were walked across the area of proposed surface works for the power line (the survey area) to identify concentrations of Aboriginal and non-Aboriginal artefacts and identify any archaeological relics. Key sites within the project area were also visited to gain a greater overall understanding of the heritage context.

A detailed description of the site inspection, including additional photographs of the survey area and artefacts found in the project area, is available in Section 5 of Appendix L.

14.4.1 Cornish Town

Prior to demolition of Cornish Town in the 1960s both Aboriginal and non-Aboriginal families lived there. The main street of Cornish Town is clearly discernible today (Plate 14.2). A modern fence line now runs along its length. During the survey, a toy marble was identified embedded in the dirt of the main street. Other artefacts of childhood included bike handlebars.

Scatters of historical material were identified across the project area. Material identified included fragments of ceramic, glass, metal scrap and objects. The dates of these objects ranged from wrought iron nails and black glass, dating to the nineteenth century through to late twentieth century asbestos. The dispersed and fragmented nature of the distribution of the artefacts meant that it was difficult to identify specific historical sites.

Some of the remnant features that could be identified include: a semi-circle of bricks, laid without mortar, possibly as a base for a water tank (Plate 14.3); a fence post (Plate 14.4) and three concrete slabs (Plate 14.5). The locations of these features and others are shown in Figure 14.2.

In addition to the remnants of Cornish Town, it is possible that there is evidence of early mining, including what seems to be a mine shaft, reused as a rubbish dump.

In conclusion, the site survey did not provide a definitive catalogue of all possible remnant structures but rather, established a representative sample of the features and artefacts that remain. While the archaeological evidence within the project area is fragmented and dispersed, in conjunction with historical photographs and oral history, a more complete record of the history of Cornish Town and the lives of its inhabitants can be created.

Source: Land Insight & Resources

Plate 14.1 Historical aerial photograph, 1963

Plate 14.2 Cornish Town main street. View west

Plate 14.3 Semi-circle of bricks with no mortar. Possibly part of a stand for a water tank. View north towards the main street (beside the present-day fence line)

Plate 14.4 Fence post. View east

Plate 14.5 Three concrete slabs (the third is obscured by vegetation. Remains of a possible water tank to the left in the background (Plate 14.5). View east

14.4.2 Fort Bourke Hill Lookout

Fort Bourke Hill lookout on Fort Bourke Hill to the south of the project area, overlooks the New Cobar Complex open cut, and entrance to the underground mine. The mineral deposits at New Cobar Complex have been mined intermittently over many years. Modern mining by open cut methods began in 2000 and continued until 2004, when underground mining commenced (Cobar Shire Council 2020).

Signage at the viewing platform provides information about the surrounding landscape and the mining history of Cobar. Historical mine workings in the upper levels of the modern open cut are visible on the north face of the pit. Fort Bourke Hill and the views from the lookout are part of the cultural landscape of Cobar, as an example of an evolved and continuing cultural landscape (Australia ICOMOS 2013).

14.4.3 Towser's Huts

All that remains of Towser's Huts, five or six in total, are the stone walls up to 1.5 m high, a well, drain and silt tank. The huts are an unusual design, in particular their semi-circular fireplaces. The huts comprise of between one to six rooms. One structure with a rounded wall contained two pit-type toilets (Boughen 1986).

The huts are situated within the Peak Gold Mines lease (CML6). They are not accessible to the public and are protected by fencing.

14.4.4 Chesney Mine

Chesney Mine (commenced c.1887) was the first successful gold mine at Cobar (DPI 2007). It has been mined intermittently ever since. In 1943 the Chesney Mine began production of copper/gold ore in response to the Commonwealth Government's request to increase copper production for the World War II (WWII) war effort and remained in operation until 1952 when poor metal prices and increased operational costs caused it to close.

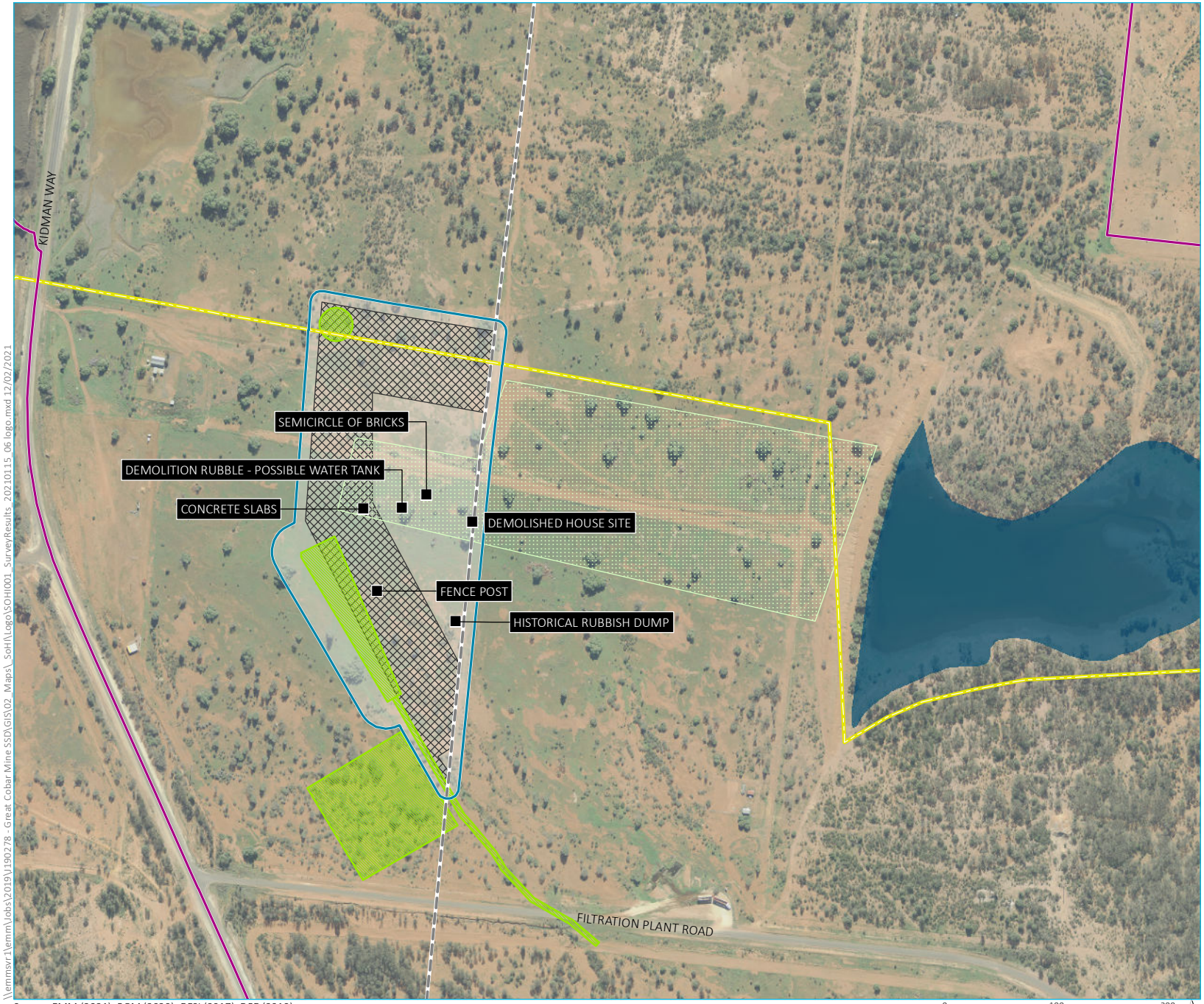
Surface remains include concrete footings and the ruins of concrete and brick structures associated with the different phases of use at the mine site and the results of the archaeological survey are demonstrated in Figure 14.2.

14.5 Assessment criteria

14.5.1 Historical themes

The Australian and NSW heritage systems employ a series of historical themes to guide the understanding of history and historical investigation in the nation and state (Heritage Office 2001). As part of any historical heritage assessment, it is important to review the historical themes when undertaking research on an area, or place, to provide proper context. The state and national themes are complementary to enable the historian to present a unified understanding of how an area fits into Australian history. The historical themes are also an important guide when assessing an item's heritage significance. They provide information on how an item may be historically significant at the local, state or national level.

Finally, historical themes help to develop interpretation and management strategies for items of heritage significance. A full list of these themes can be found on the Heritage Division website (Heritage Office 2001). Historical themes in the project area were identified based on the historical background and the results of the site inspection (see Section 4 and 5 of Appendix L). The Australian and NSW historical themes used in this report that are relevant to the project area are listed in Table 14.3.



KEY

- Project area
- Investigated area
- Approved area of disturbance*
- Survey location
- Indicative location of Cornish Town
- Great Cobar dewatering pipeline
- Existing 22kV powerline
- Proposed powerline corridor
- Waterbody
- Mine water management storage

*Approved under existing REF approvals, but not yet constructed.

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Source: EMM (2021); PGM (2020); DFSI (2017); DPE (2019)

0 100 200 m

GDA 1994 MGA Zone 55

N

Results of historical heritage survey

Peak Gold Mines
New Cobar Complex Project
Environmental impact assessment
Figure 14.2

aurelia METALS Ltd.

EMM creating opportunities

Table 14.3 Historical themes

Australian theme	NSW theme
3. Building settlements, towns and cities	Towns, suburbs and villages: activities associated with creating, planning and managing urban functions, landscapes and lifestyles in towns, suburbs and villages.
8. Developing Australian's cultural life	Domestic life: activities associated with creating, maintaining, living in and working around houses and institutions.

14.5.2 Defining heritage significance

In NSW the assessment of heritage significance is based on the Burra Charter (Australia ICOMOS 2013) and further expanded upon in the Heritage Manual's Assessing Heritage Significance (Heritage Office 2001). It lists seven criteria to identify and assess heritage values that apply when considering if an item is of state or local heritage significance as set out in Table 14.4.

Table 14.4 NSW heritage assessment criteria

Criterion	Explanation
a)	An item is important in the course or pattern of NSW's (or the local area's) cultural or natural history (Historical Significance).
b)	An item has strong or special association with the life or works of a person, or group of persons of importance in NSW's (or the local area's) cultural or natural history (Associative Significance).
c)	An item is important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement in NSW (or the local area) (Aesthetic Significance).
d)	An item has a strong or special association with a particular community or cultural group in NSW (or the local area) for social, cultural or spiritual reasons (Social Significance).
e)	An item has the potential to yield information that will contribute to an understanding of NSW's (or the local area's) cultural or natural history (Research Significance).
f)	An item possesses uncommon, rare or endangered aspects of NSW's (or the local area's) cultural or natural history (Rarity).
g)	An item is important in demonstrating the principle characteristics of a class of NSW's (or the local area's) cultural or natural places or environments (Representativeness).

14.5.3 Statement of significance

The heritage significance of Cornish Town against the NSW heritage assessment criteria is assessed in Table 14.5.

The statements of heritage significance for Towser's Huts (Table 14.6) and Cobar Pastoral and Mining Technology Museum (Table 14.7) are presented as per their heritage listings on the State Heritage Inventory (SHI). As impacts to heritage items Towser's Huts and the Cobar Pastoral and Mining Technology Museum are not anticipated, they have not been re-assessed.

i Cornish Town

Cornish Town is associated with early mining in the Cobar region and the development of Cobar. It is representative of the many small towns that grew up around mining centres and other unofficial towns such as Lobs Hole in the Snowy Mountains or Happy Valley at La Perouse, that are now abandoned and are disappearing. The site has local heritage significance for its archaeological, historical and oral history research potential. It has social significance for its intangible heritage value in the stories, memories and connections of people who lived there.

The archaeological resources relating to Cornish Town are considered to be relics in line with this assessment of significance.

Table 14.5 Cornish Town – assessment against the criteria

Criterion	Assessment	Level of significance
a) Historical	Cornish Town has historical significance as the site of a mining township still remembered by people today. Significance as an unofficial town that grew without input from an official council and planning laws. The population of the town included Aboriginal and non-Aboriginal families of different ethnic origins.	Local
b) Associative	Cornish Town has associative significance for its connection with the Cornish miners who worked in the Cobar mines from the mid nineteenth century. It is also closely associated with H.J. Cornish who owned the Criterion Hotel at the turn of the century. Cornish Town is still remembered today by people who lived or visited it prior to its demolition in the late 1960s. As such it has intangible heritage value for its memories and associations.	Local
c) Aesthetic	Not applicable	
d) Social	Cornish Town has social significance for people who lived at or still remember the town prior to its demolition in the late 1960s. As such it has intangible heritage value for its memories and associations.	Local
e) Research	The site has research significance for historical archaeology combining information gathered from archival maps and photographs, archaeological evidence and oral history. As an unofficial settlement it has research potential in how a community organised space and made decisions about land allocation and how they created a sense of community.	Local
f) Rarity	Probably quite rare.	Local
g) Representativeness	Cornish Town is representative of the satellite towns that grew up around mining centres in the nineteenth and early twentieth centuries.	Local

ii Towser's Huts

The site is evidence of the construction of huts on a mining tenement (Portion 265) leased by an Italian immigrant, Antonio Tozzi, for residential use c.1890s-1916. The site is evidence of Italian vernacular building techniques and is a rare example of its type. The site is valued by the Cobar community as evidence of its social history, in particular of that related to Italian immigration (SHI).

Table 14.6 Towser's Huts – assessment against the criteria

Criterion	Assessment	Level of significance
a) Historical	The site is evidence of the construction of huts on a mining tenement (Portion 265) leased for residential use c.1890s-1916.	Local
b) Associative	The huts are associated with an Italian immigrant, Antonio Tozzi, who built the stone structures at this site.	Local
c) Aesthetic	The site is evidence of vernacular building techniques, thought to be of Italian origin, applied to Australian conditions and using local materials.	Local
d) Social	The site is valued by the Cobar community as evidence of its diverse social history.	Local
e) Research	Preliminary investigations have not identified any attributes that might confirm whether the site meets this criterion.	Local
f) Rarity	The huts built by Antonio Tozzi are rare examples of dry-stone wall building techniques and Italian settlement in Cobar.	Local
g) Representativeness	Preliminary investigations have not identified any attributes that might confirm whether the site meets this criterion.	Local

iii Cobar Pastoral and Mining Technology Museum, 1910

The Great Cobar Heritage Centre and Cobar Miners Heritage Park demonstrates the history of mining in the area from the late-nineteenth century. It is associated with the former miners of the area. The former mine office retains many original architectural details and most importantly its scale and form remain intact. On its prominent site, the building is a landmark at the eastern end of the town of Cobar and is a good example of architecture of the Federation era. The group represents a settlement pattern and lifestyle associated with mining that was once common in rural NSW. The Cobar Mining Field in its continuity of use as a mine from the 1870s reflects the span of technologies used and developed within the industry. There is the potential to yield more information from the group.

Table 14.7 Cobar Pastoral and Mining Technology Museum– assessment against the criteria

Criterion	Assessment	Level of significance
a) Historical	This group demonstrates the history of the establishment and development of Cobar, a rural town that originated from a copper mining settlement	Local
b) Associative	The group is associated with the Great Cobar Ltd as well as the miners and the first settlers in the area.	Local
c) Aesthetic	The group indicates a level of technical achievement in the prospecting, discovery and later mining of various mineral deposits. The group also reflects of span of technologies used to in the mining industry from its earliest origins in the late 19th century. The former mine office retains many original architectural details typical of the Federation era. Most importantly, its scale and form remain intact. On its prominent site, the building is a landmark at the eastern end of the town of Cobar.	Local
d) Social	The site is valued by the Cobar community as evidence of its rich history related to mining.	Local

Table 14.7 Cobar Pastoral and Mining Technology Museum– assessment against the criteria

Criterion	Assessment	Level of significance
e) Research	The group has the potential to yield considerable information from further archaeological and documentary research.	Local
f) Rarity	The group reflects the history of mining and a mining community since the late 19th century. The architectural, archaeological, and cultural landscape that survives are rare examples of one the largest 19th century mines in the State.	Local
g) Representativeness	The former mine office building is important in demonstrating the principal characteristics of Federation architecture with some modest Classical detailing.	Local

14.6 Impact assessment

The assessment of a project's impacts to the heritage significance of a place or an item is to understand change; if it is beneficial to the place or item; and how changes can be managed to best retain significance. The historical landscape in Australia, be it rural or urban, is by social agreement, a significant aspect of our identity. That agreement is codified in legislation, the intent of which is to encourage the conservation of cultural heritage by incorporating it into development where feasible. In many situations avoiding impacts is impossible, but the aim is to reduce those impacts by either project re-design or managing the loss of information through methods that reduce and/or record significance before it is removed.

The framework around assessing significance and therefore suitable levels of impact is to understand how the place or item came to be, how important it was (and may be still) in the development of the local area or the state (the colony at the time) and providing guidance on its management.

The assessment of historical heritage impact was prepared with the principle of intergenerational equity as a guiding principle (see Section 7.1.1 of Appendix L).

This assessment considered the impacts of surface disturbance from the installation of a power line as well as other potential impacts from project activities such as subsidence and blasting.

14.6.1 Surface disturbance

Surface works include use of existing mine areas and construction of a new power line within the project area.

There are two listed heritage items within the project area. The closest listed heritage item is Towser's Huts (Cobar LEP I24) located 800 m from the power line corridor, to the south of Nyngan Road South, within ML 1483. The huts are fenced off and protected and will not be impacted by the proposed surface disturbance. Cobar Pastoral and Mining Technology Museum 1910 (Cobar LEP I8) is situated on the main street of Cobar, overlooking the town. It is approximately 950 m to the north-west of the proposed power line and will not be impacted by the proposed surface disturbance. A dilapidation assessment was conducted on the Cobar Pastoral and Mining Technology Museum in October 2019.

As no known historical heritage items are present within the proposed area of surface disturbance, the area in which excavation for the power poles is required is limited and minimal and an unexpected finds protocol

will be implemented. The proposed works are unlikely to result in a significant impact to historical heritage values.

14.6.2 Blasting and vibration

Potential blasting impacts from the proposed future underground mining operations on the surrounding community have been assessed, and are discussed in Chapter 8: Noise and vibration and Appendix G).

All current and proposed operational blast activities at the New Cobar Complex are conducted underground. Hence, there is a potential impact related to ground vibration as a result of blasting. Blast ground vibration monitoring data relevant to the New Cobar Complex underground mining operations was supplied to EMM by PGM. This data included blast ID information, MIC (the maximum amount of explosive that will fire at any one time) and measured ground vibration levels at a number of monitoring locations. Blast monitoring results between April 2019 and March 2020 were used to develop predictive site parameters for ground vibration for this assessment.

Within the project area, it is anticipated that the risk to Cornish Town archaeological site from blasting is negligible as the site contains no above ground structures of heritage significance. However, blasting has the potential to impact built structures including the Cobar Pastoral and Mining Technology Museum 1910 (Cobar LEP I8) and the standing walls (relics) of Towser's Huts (Cobar LEP I24).

The MIC used for some blasting activities will be reduced in order to comply with ground vibration criteria. As the blast ground vibration criterion for residential receivers (ie 5 mm/s PPV) is lower than the criterion for structural damage to buildings (10 mm/s PPV), the EMM NVIA concluded that, no impacts from blasting on non-residential receivers (ie structural damage to heritage buildings) is anticipated from the project if the limiting MICs provided for the nearest residential receivers are followed.

In accordance with the commitments made in the REF for the Great Cobar Exploration Decline (R.W. Corkery & Co 2020), PGM has commenced vibration monitoring of Cobar Pastoral and Mining Technology Museum 1910 (Cobar LEP I8) and have conducted a dilapidation assessment of the building. Further, PGM will continue to implement mitigation measures currently in place at the New Cobar Complex to reduce the potential impact of ground vibration as a result of blasting. Towser's Huts are located close to proposed underground stopes at the Jubilee workings, however, are unlikely to be further affected by vibration as any settlement is likely to have already occurred during the construction of the New Cobar Complex open cut located 200 m south.

14.6.3 Subsidence

Proposed underground mining as part of the project will use stope mining methods. Unlike longwall mining where a void is created and the overlying rock cracks and tilt into the void (goaf), during stope mining the open space created by the extraction of ore and minerals, known as a stope, is backfilled with waste rock and therefore the potential for subsidence to occur is considerably lower.

Beck Engineering undertook a geotechnical and subsidence assessment on behalf of EMM for the project (see Chapter 9: Subsidence and Appendix G). It was predicted that surface subsidence during the life of the mine will be negligible due to the small footprint of underground mining, the depth below the surface and the relatively strong rockmass. Forecasts for vertical and total displacement (ie subsidence) are less than 15 mm and are considered negligible. Therefore, there are no anticipated impacts from subsidence on historical heritage in the project area.

14.7 Commitments and management measures

The preparation and implementation of a Historical Heritage Management Plan (HHMP) will address the historical heritage and archaeological management considerations associated with the project. The following management measures are proposed:

- consideration of the preparation of an oral history of Cornish Town in conjunction with cultural mapping of the landscape of and around Cornish Town;
- updated signage at the Fort Bourke Hill lookout interpreting the history of Cobar and its landmarks, in consultation with Aboriginal and local stakeholders;
- continued vibration monitoring of the Great Cobar Heritage Centre (Cobar Pastoral and Mining Technology Museum 1910) for impacts from blasting, as well as remediation measures if damage is detected;
- development of and adherence to an unanticipated finds protocol; and
- development of and adherence to an encountered human remains protocol.

A summary of management measures related to heritage sites within the project area is presented in Table 14.8.

Table 14.8 Management measures for heritage sites within the project area

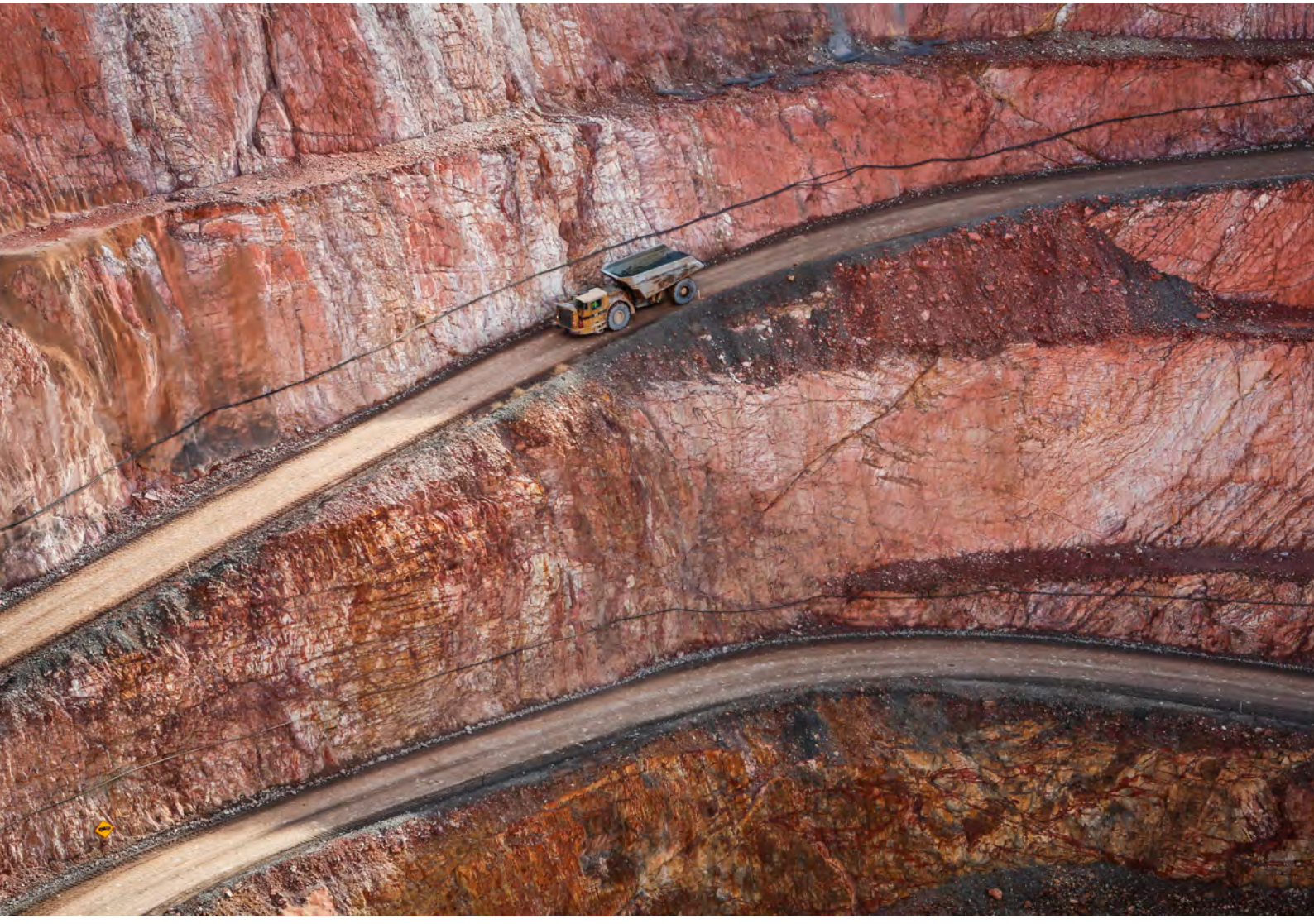
Site ID	Site name	Site type	Significance	Impact type	Project modifications	Management or mitigation options
I8	Cobar Pastoral and Mining Technology Museum 1910	Built heritage, items of moveable heritage and environs	Local	None – avoidance	Limits to blasting MICs in accordance with the NVIA.	Vibration monitoring by PGM to continue in conjunction with visual monitoring (dilapidation report already completed).
I24	Towser's Huts	Archaeological site	Local	None – avoidance	None required.	None required.
GC01	Cornish Town	Archaeological site	Local	Undetermined	Avoidance as per agreed HHMP.	Management plan in place prior to installation of power line.

14.8 Conclusion

There are two listed heritage items within the project area including Towser's Huts (Cobar LEP I24) located 200 m north of the New Cobar open cut. The huts are fenced off and protected and will not be impacted by existing or proposed surface infrastructure or mine related activities. Cobar Pastoral and Mining Technology Museum 1910 (Cobar LEP I8) is situated on the main street of Cobar, overlooking the Great Cobar open cut. It is approximately 950 m to the north-west of the nearest existing or proposed surface infrastructure, and is unlikely to be impacted by mine related activities.

The power line corridor is located in and adjacent to an area previously known as Cornish Town. This was one of several residential areas to the south of Cobar that was removed in the 1960s. Historical research identified the potential for archaeological sensitivity within the survey area as it is possible that there may be evidence relating to Cornish Town. If archaeological resources related to this phase of the region's historical development exist, they are likely to reach the threshold of local significance at a minimum.

As no known historical heritage items are present within areas of existing or proposed surface infrastructure, the area in which excavation for the power poles is required is limited and minimal. However, an unexpected finds protocol will be developed and implemented. On this basis, it is expected that the proposed works are unlikely to result in a significant impact to historical heritage values. Any potential impacts will be managed through the preparation of a HHMP.



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