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KURRI KURRI LATERAL PIPELINE

Amendment Report

FINAL

September 2022

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Amendment Report

FINAL

Prepared by
Umwelt (Australia) Pty Limited
on behalf of
APA Group

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Environmental & Social Consultants

This report was prepared using Umwelt's ISO 9001 certified Quality Management System.

Acknowledgement of Country

Umwelt would like to acknowledge the traditional custodians of the country on which we work and pay respect to their cultural heritage, beliefs, and continuing relationship with the land. We pay our respect to the Elders – past, present, and future.

Document Status

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	Name	Date	Name	Date
Final V1.0	Paul Douglass	29/9/2022	Paul Douglass	29/9/2022

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1.0 Introduction

1.1 Background

Snowy Hydro Limited (Snowy Hydro) is developing a gas-fired peaking power station, referred to as the Hunter Power Project (HPP), at the site of the former Hydro Australia Pty Ltd (Hydro) aluminium smelter at Kurri Kurri. The HPP aims to provide up to 750 megawatts (MW) of 'on-demand' electricity to supplement Snowy Hydro's generation portfolio with dispatchable capacity when the needs of electricity consumers are highest. The HPP was approved, subject to conditions, by the Secretary of the Department of Planning and Environment (DPE) on 17 December 2021 and by the Commonwealth Minister for the Environment on 6 February 2022.

APA Transmission Pty Limited, a wholly owned subsidiary of APA Group (APA), has been engaged by Snowy Hydro to develop a gas supply solution for the HPP. Accordingly, APA has proposed the Kurri Kurri Lateral Pipeline (KKLP) Project (the Project) to supply gas for the HPP from the existing Sydney to Newcastle Pipeline (SNP - formally referred to as the Jemena Gas Networks (JGN) Northern Trunk).

The Project would involve the construction, operation and maintenance of a medium pressure transmission pipeline, compressor station, high pressure storage pipeline, delivery station, and other ancillary surface facilities, as further discussed in **Section 1.2**. The Project and its regional context are shown on **Figure 1.1**.

The Environmental Impact Statement (EIS) for the Kurri Kurri Lateral Pipeline Project (Umwelt, 2022) was placed on public exhibition from 13 April to 10 May 2022. During public exhibition, 38 submissions were made on the Project. This included 17 government agency submissions and 21 community / public organisations submissions. The KKLP remains generally as described in Section 3 of the EIS. However, several design amendments have been made in response ongoing consultation with directly affected landholders and agency submissions received during the exhibition period. These include the relocation of the JGN offtake facility to the eastern side of Lenaghans Drive, an adjusted transmission pipeline alignment either side of Buchanan Road and a refined footprint for the storage pipeline. Several minor amendments to the transmission pipeline construction alignment are also proposed. Project amendments are further described in **Section 1.3** and **Section 3.0**.

This Amendment Report details the proposed amendments to the Project, and associated impact assessment and consultations. This Amendment Report has been prepared by Umwelt Australia Pty Ltd (Umwelt) on behalf of APA in accordance with the *State significant infrastructure guidelines – preparing an amendment report* (DPE, 2021).

1.2 The Project as described in the EIS

The Project, as presented in the EIS, comprises the following primary components:

- A buried, steel, medium diameter (outer diameter of 355.6 mm), medium pressure (up to 6.9 megapascal (MPag)) transmission pipeline of approximately 20.1 km in length to provide a gas supply from the existing Sydney to Newcastle Pipeline (SNP), via offtake and delivery facilities, to the Hunter Power Project (HPP) site.

- A compressor station at the termination of the transmission pipeline to boost gas pressure prior to transfer to a storage pipeline.
- A buried, steel, medium diameter (outer diameter of 355.6 mm), high pressure (up to 15.3 MPag) interconnect pipeline of approximately 1.3 km in total length, providing an interface between the compressor station, storage pipeline and delivery station.
- A buried, steel, large diameter (outer diameter of 1067mm), high pressure (up to 15.3 MPag) storage pipeline of approximately 24 km in total length downstream of the compressor station with approximately 70 terajoules (TJ) of useable gas storage ready to supply the HPP.
- A delivery station to receive gas from the storage pipeline and control temperature, pressure and flow rate prior to delivery of gas to the HPP.

The compressor station and delivery station are located within the HPP project site boundary.

A compressor station and storage pipeline are required as part of the Project as the SNP does not provide sufficient gas volumes or pressure to meet the supply requirements of the HPP. As such, a direct pipeline connection between the SNP and the HPP is not a viable solution for gas supply to the HPP.

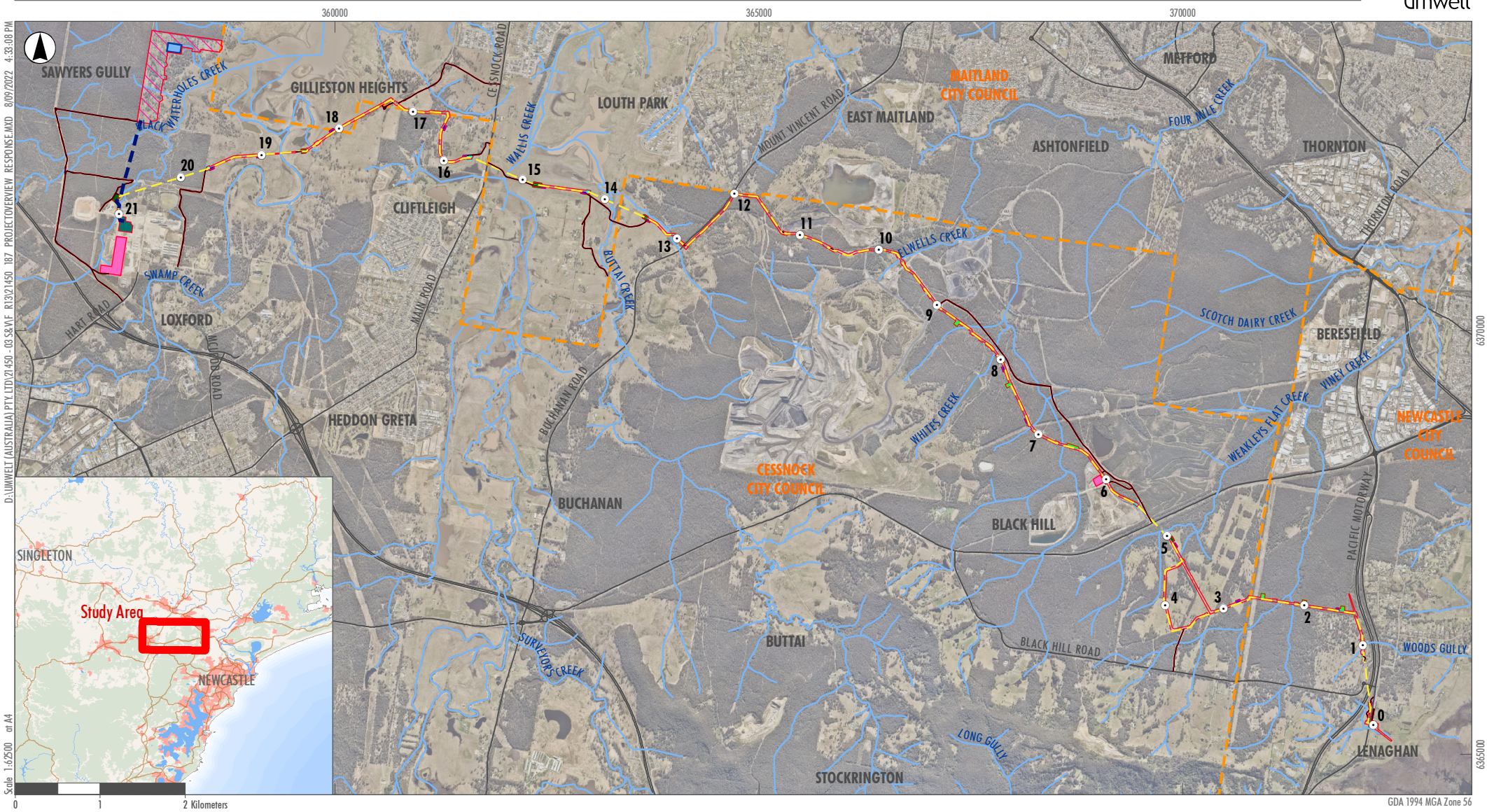
The Project has also been designed to allow gas flow from the storage pipeline back into the SNP, which may ameliorate pipeline capacity constraints in the region by providing a significant gas source near the northern termination of the SNP.

APA will not own gas transferred between the SNP and the HPP but will own the infrastructure proposed for the Project that enables this transfer.

The Project will be designed, constructed, commissioned and operated in accordance with the requirements of AS 2885 Pipelines – Gas and liquid petroleum. The transmission pipeline will also be designed, constructed, commissioned and operated in accordance with the requirements of ASME B31.12-ASME Design code for Hydrogen Piping and Pipelines, in order to maintain readiness for potential use of hydrogen in the east coast gas network.

Environmental management for the Project will be in accordance with the *Australian Pipelines and Gas Association Code of Environmental Practice* (2017), which provides pipeline industry tested environmental standards for planning, design, construction, operation and decommissioning. The Code of Practice is recognised nationally by the various State and Territory Governments as a guide to environment and heritage management of gas pipeline projects.

An overview of the Project as presented in the EIS, is summarised in **Table 1.1**.



Legend

- Project Construction Footprint
- Transmission Pipeline Alignment
- Kilometre Point
- Interconnect Pipeline
- Compressor and Delivery Station
- Storage Pipeline
- HDD Entry
- HDD Exit
- Pipe and Equipment Laydown Area
- Turkeys Nest Dam
- Turnaround
- Vegetation Stockpile
- Local Government Area Boundary
- Roads
- Watercourses

Image Source: Neamap (August 2021) Data source: NSW LPI (2020;2021)

FIGURE 1.1

Project Location

Table 1.1 Project Summary, as presented in the EIS

Project element	Summary
The Project	The Project will involve the construction, operation and maintenance of: • a buried, medium diameter (up to DN350), medium pressure (up to 6.9 MPag) transmission pipeline of approximately 20.1 km long • a buried, medium diameter (up to DN350), high pressure (up to 15.3 MPag) interconnect pipeline of approximately 1.3 km • a buried, large diameter (up to DN1050), high pressure (up to 15.3 MPag) storage pipeline of approximately 24 km • associated surface facilities such as a compressor station, delivery station and offtake station.
Location	The Project is located in the rural locality of Lenaghan, approximately 15 km northwest of Newcastle to approximately 2 km north of Kurri Kurri, NSW. The Project's transmission pipeline traverses the three Local Government Areas (LGAs) of Cessnock, Maitland and Newcastle.
The Project area	The Project area is defined as the Project's combined construction footprint located over approximately 103 ha and incorporates: • the construction right of way (ROW) for the transmission, interconnect and storage pipelines • construction workspaces required for the transmission, interconnect and storage pipelines, truck turnarounds, vegetation storage, horizontal directional drilling (HDD) entry and exit locations, horizontal bore entry and exit locations, watercourse crossing workspaces and line pipe storage areas • access tracks to provide access to the construction footprint • construction footprints for the offtake facility, compressor station and delivery station.
Operational footprint	Approximately 2 ha for the JGN offtake facility, compressor station and delivery station.
Schedule of land	The Project is located across some 76 cadastral lots, with a full list of the parcel numbers provided in the Schedule of Lands.
Construction footprint	Approximately 103 ha.
Construction water use and supply	The Project's estimated total water usage is 33 ML. Non potable water for dust control and hydrotesting will be sourced from non-potable water service providers or existing landholders with available allocations.
Off-site supporting infrastructure	• existing road network • water supply (non-potable) • waste and wastewater disposal facilities.
Construction hours	• transmission pipeline and JGN offtake facility: 7 am to 6 pm Monday to Friday and 8am to 1pm Saturdays • storage pipeline: 6 am to 6 pm seven days per week • compressor station and delivery station: 6am to 6pm weekdays and 8am to 1pm Saturdays • limited construction activities outside standard hours.

Project element	Summary
Construction workforce	Approximately 398 personnel during peak construction (around one month duration). Up to 330 personnel over the remainder of the 12-month construction period.
Construction duration	Approximately 12 months.
Commencement of operation	Anticipated in Q4 2023.
Operational workforce	Approximately 5 personnel.
Project life	Approximately 30 years.
Capital Investment Value	Approximately $264 million.

1.3 Proposed amendments

Since submission of the EIS for the Project in March 2022, APA has continued to consult with directly affected landholders, and stakeholders more broadly. Ongoing consultation has led to several design refinements, as normally occurs for gas transmission pipelines and linear infrastructure generally. Key design refinements are the movement of the JGN offtake facility to the eastern side of Lenaghans Drive, an adjusted transmission pipeline alignment either side of Buchanan Road and a refined footprint for the storage pipeline. Several minor refinements are also proposed. Further detail is provided in **Section 3.0.**

Amendments have generally been proposed for the following reasons:

- Ongoing landholder consultation and negotiations
    - Movement of JGN Offtake facility from western side to eastern side of Lenaghans Drive.
    - Avoidance of advanced mine rehabilitation vegetation on the northern side of John Renshaw Drive.
    - Minimisation of impacts to potential future residential areas on the eastern and western side of Buchanan Road.
    - Rearrangement of laydown areas on the former Kurri Kurri aluminium smelter site.
    - Minor boundary changes to the compressor station and delivery station to align with the HPP Project site.
- Refinements to crossing designs for existing infrastructure
    - Crossing of the M1 Pacific Motorway and Lower Hunter Freight Corridor by HDD.
    - Avoidance of underground water and telecommunications services near the Donaldson Mine administration building.
    - Crossing of Main Road and Testers Hollow road upgrades by HDD.

- Minimisation of environmental and social impacts based on additional information received since publication of the EIS or to reflect commitments made in the EIS
    - Avoidance of Aboriginal cultural heritage conservation zone adjacent to the M1 road reserve.
    - Increased separation distance between construction activities and a microbat roost site north of John Renshaw Drive.
    - Avoidance of partially rehabilitated coal fines stockpiles and dams on the western side of Buchanan Road.
    - Avoidance of acid sulfate soils, reduction in impacts to Sydney Freshwater Wetlands EEC and minimisation of flood exposure on the Wallis Creek floodplain by increasing HDD length.
    - Refined storage pipeline construction footprint to reduce the area of impact to a critically endangered ecological communities and include areas for sediment dams.
- Refinements to engineering design and construction planning
    - Inclusion of venting apparatus adjacent to the JGN Offtake facility.
    - Further mitigate mine subsidence risks by fine scale positioning of infrastructure near historic underground mine workings.
    - Minor increase to vent stack height at the Compressor Station.
    - Provision of additional access tracks.

1.4 Purpose and structure of this report

In accordance with the DPIE Guideline (2021), this Amendment Report is structured as follows:

- **Section 1.0**– provides a brief summary of the Project to provide context for the amendments.
- **Section 2.0** – identifies any changes to the strategic context as a result of the Project amendments.
- **Section 3.0** – describes the proposed amendments to the Project.
- **Section 4.0** – identifies any changes to the statutory requirements as a result of the proposed amendments.
- **Section 5.0** – summarises the stakeholder engagement that has been undertaken during the development of the project amendments.
- **Section 6.0** – provides a detailed summary of any changes in impacts resulting from the proposed amendments.
- **Section 7.0** – provides an updated justification of the amended project.
- **Section 8.0** – references.

2.0 Strategic Context

The strategic context and need for the Project are outlined in detail in Section 4 of the KKLP EIS and Section 4 of the HPP EIS. In summary, the KKLP is to provide infrastructure that enables gas to be supplied to the approved HPP in order that it may strengthen energy security in NSW. Some recent changes to the strategic context of the HPP and KKLP are described in **Section 2.1**.

2.1 Strategic context for the amended project

The strategic context of NSW energy policies remains fundamentally as described in the KKLP EIS, with the intent of maintaining energy security as the electricity system transitions to low carbon emissions sources. There has been a change in Commonwealth government since the EIS was submitted and, relevantly, an increase to national targets for greenhouse gas emissions reduction as discussed further below.

As described in Section 4.2 of the KKLP EIS, the assessment of the HPP EIS conducted by the NSW DPE (2021a) concluded that the HPP would strengthen energy security in NSW, as it would:

- Contribute to closing the previously forecast reliability gap in 2023-2024 following the retirement of Liddell Power Station.
- Mitigate electricity supply scarcity for the Hunter, Sydney and Wollongong regions associated with the retirement of Vales Point Power Station in 2029.
- Mitigate reliability risks associated with the potential early exit of coal-fired power stations ahead of planned closure timeframes.
- Provide an ongoing source of synchronous energy to contribute to system security.
- Contribute to avoiding electricity price increases following the closure of Liddell Power Station for the scenario described in the Report of the Liddell Taskforce.

Further, the Notice of Decision for the HPP, issued by the NSW Minister for Energy and Environment on 17 December 2021 (DPE 2021b), notes that:

The project would provide firming supply and synchronous generation which is increasingly important in the transition to a low carbon emissions energy sector and as coal fired power stations are retired. The Department considers the project would play an important role in this transition by facilitating additional intermittent renewable energy supply into the NEM.

The HPP has been assessed and planning approvals granted by both the NSW and Commonwealth governments. Construction of the HPP has commenced. The KKLP is necessary to facilitate operation of the HPP and is therefore necessary to provide the benefits to NSW identified by DPE described above.

Section 5 of the KKLP EIS considers the Project alternatives, including a 'Do Nothing' alternative. Under this alternative the Project would not be constructed, and any potential negative environmental and social impacts would not occur. However, the 'Do Nothing' alternative also implies that the objectives of the Project would not be met. The Project is essential to supply gas necessary for the HPP to meet its primary role of providing electricity supply when renewable generation is low.

Since submission of the KKLP EIS, several relevant assessments of energy security have been published and energy market events have occurred that have further emphasised the strategic context of the Project. Specifically, the Australian Energy Market Operator (AEMO) published several reports describing the need for flexible baseload power generation to facilitate increased generation from intermittent renewable energy sources. Additionally, a reduction in reliability of the National Energy Market (NEM) during a period of increased demand, and associated electricity price spikes, occurred during Q2 2022. These factors are discussed below.

The most recent assessments of electricity supply in the NEM were published by the AEMO during April 2022 as the Update to 2021 Electricity Statement of Opportunities ('the Update', AEMO 2022a), and during August 2022 as the 2022 Electricity Statement of Opportunities (2022 ESOO, AEMO 2022b). The Update provides a revision to the 2021 Electricity Statement of Opportunities for the National Electricity Market (2021 ESOO, AEMO 2021), due to material changes to the forecasts of the supply demand balance in New South Wales. Most notably, these changes include the announcement by Origin Energy of the potential early retirement of Eraring Power Station in August 2025. Eraring Power Station supplies around 25 % of NSW electricity.

The Update forecasts an electricity supply reliability gap for NSW from 2025–26, which is four years earlier than the 2029-30 gap identified in the 2021 ESOO. Note that the HPP is included in the 2021 ESOO as a committed project, which means supply of electricity from the HPP is assumed when assessments of electricity supply reliability are made by AEMO. AEMO also note in the 2021 ESOO that inclusion of the HPP has improved the reliability outlook compared to the 2020 ESOO forecast. As such, without the HPP and the KKLP, the forecast electricity reliability gap for NSW from 2025–26 would be larger and may commence sooner.

The 2022 ESOO released during August 2022 reiterates the findings of the Update in that reliability gaps are forecast in New South Wales from 2025-26 even when the HPP is included as a committed project. The 2022 ESOO states that:

In 2023-24, Liddell Power Station is expected to retire, however the commitment of new generation capacity noted in the 2021 ESOO, including the 750 MW Kurri Kurri Power Station, is forecast to achieve reliability within the Interim Reliability Measure following the plant's retirement. The forecast 2025-26 reliability gap occurs when Eraring Power Station is expected to retire, as previously identified in the April 2022 Update to the 2021 ESOO.

Subsequent to the federal election of May 2022, the Commonwealth government provided an updated Nationally Determined Contribution (NDC) under the Paris Agreement to the Executive Secretary of the United Nations Framework Convention on Climate Change (UNFCCC). This NDC update formalised a pledge to reduce greenhouse gas emissions by 43 per cent below 2005 levels by 2030. This pledge has since been legislated under the Climate Change Bill 2022. Given previous findings that the HPP would facilitate additional intermittent renewable energy supply into the NEM, any increase to emissions reductions targets further strengthens the strategic context for the HPP and therefore the KKLP.

During June 2022, the National Electricity Market experienced a sustained period of very high prices, resulting in the market prices being administered and capped at $300/MWh. The pricing volatility was driven by high demand associated with cold weather, low levels of coal fired generation availability and variable levels of renewable energy generation. AEMOs Quarterly Energy Dynamics Q2 2022 (AEMO 2022c) reports that gas-fired generation for the NEM during Q2 2022 rose by an average of 472 MW, or 27 %, compared to Q2 2021 to its highest Q2 average level since 2017. Most notably, average gas-fired generation in New South Wales increased by 340MW to its highest Q2 average since 2014. Simultaneously, NEM greenhouse gas emissions declined to their lowest Q2 on record.

The gas fired generators in NSW, such as Snowy Hydro's Colongra power station, Energy Australia's Tallawarra power station and Origin Energy's Uranquity power station were essential for maintaining a stable electricity supply for NSW during this period. Tallawarra was running at very high levels in May and June averaging 78 % of capacity, and Colongra generated at record quarterly levels (AEMO 2022c). The heavy reliance upon gas fired generation during this period demonstrated the critical role gas plays in the generation fleet of an electricity system that is transitioning away from base load coal fired generation.

The ability of natural gas generation to contribute to a secure energy system as uptake of renewables continues has also been reiterated by the 2022 Integrated System Plan (ISP), released by AEMO during June 2022 (AEMO 2022d). The ISP states that peaking gas-fired generators will play a crucial role as significant coal-fired generation retires, as an on-demand fuel source during extended periods of low VRE output, and to provide power system services for grid security and stability (AEMO 2022d, p57).

In summary, the strategic context for the KKLP fundamentally remains as described in the KKLP EIS. Since submission of the EIS, increases in electricity prices, reductions in energy system reliability and commitments from the Commonwealth Government to increase generation from intermittent renewable energy sources have further emphasised the strategic context for the Project.

3.0 Description of the Amendments

This section describes the proposed amendments to the project as described in the EIS. The proposed amendments have been developed in response to consultation with landowners, through ongoing development of the Project design and to further mitigate environmental impacts. A consolidated, revised Project description, taking into account the proposed amendments, is provided in **Appendix A**.

3.1 Comparison of Project in EIS and Amended Project

For each of the key Project elements, **Table 3.1** provides a comparison between the Project as exhibited in the EIS and the proposed amendments. A full description of each of the amendments is provided in **Section 3.2**.

Table 3.1 Comparison of Project in EIS and Amended Project

Project Element	Summary of Project as Exhibited	Summary of the amendments	Reference
The Project	The Project will involve the construction, operation and maintenance of: • a buried, medium diameter (up to DN350), medium pressure (up to 6.9 MPag) transmission pipeline of approximately 20.1 km long • a buried, medium diameter (up to DN350), high pressure (up to 15.3 MPag) interconnect pipeline of approximately 1.3 km • a buried, large diameter (up to DN1050), high pressure (up to 15.3 MPag) storage pipeline of approximately 24 km • associated surface facilities such as a compressor station, delivery station and offtake station.	• Transmission pipeline length will be approximately 21.1 km. • Storage pipeline length will be approximately 24.4 km. The storage pipeline will be internally lined. All other design parameters are unchanged.	**Figure 3.1** **Section 3.2.3** **Section 3.2.4**
Location	The Project is located in the rural locality of Lenaghan, approximately 15 km northwest of Newcastle to approximately 2 km north of Kurri Kurri, NSW. The Project's transmission pipeline traverses the three Local Government Areas (LGAs) of Cessnock, Maitland, and Newcastle.	No change	

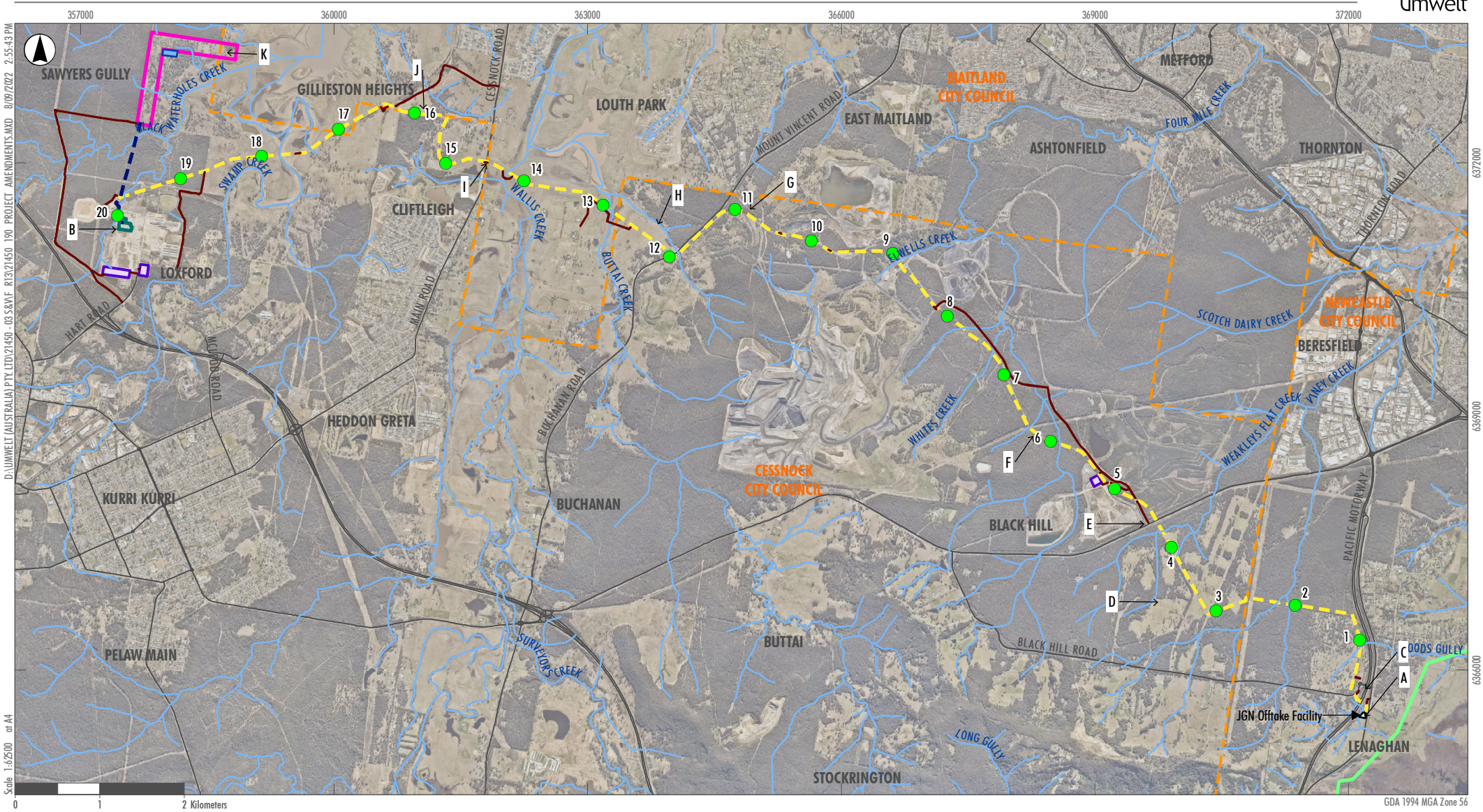
Project Element	Summary of Project as Exhibited	Summary of the amendments	Reference
The Project area	The Project area is defined as the Project's combined construction footprint located over approximately 103 ha and incorporates: • the construction right of way (ROW) for the transmission, interconnect and storage pipelines • construction workspaces required for the transmission, interconnect and storage pipelines, truck turnarounds, vegetation storage, HDD entry and exit locations, horizontal bore entry and exit locations, watercourse crossing workspaces and line pipe storage areas • access tracks to provide access to the construction footprint • construction footprints for the Offtake facility, compressor station and delivery station.	The construction footprint has increased from 103 ha to approximately 106 ha.	**Figure 3.2 A-N**
Operational footprint	Approximately 2 ha for the JGN Offtake facility, compressor station and delivery station.	The operational footprint has changed from 2 ha to approximately 4.8 ha for the JGN Offtake facility, compressor station and delivery station.	**Figure 3.2A**
Schedule of Lands	The Project is located across some 76 cadastral lots, with a full list of the parcel numbers provided in the Schedule of Lands.	The number of cadastral parcels has been reduced from 76 parcels to 73 cadastral parcels.	**Section 3.2.1**
Construction water use and supply	The Project's estimated total water usage is 33 ML. Non potable water for dust control and hydrotesting will be sourced from non-potable water service providers or existing landholders with available allocations.	The overall estimated water consumption has been reduced from an estimated 33ML to an estimated 27 ML. The storage pipeline will be internally lined, therefore water for hydrotesting can be reused between the two test sections, reducing water consumption. Total HDD length has increased, with a corresponding increase to water requirements for this activity.	**Section 6.2.2**
Off-site supporting infrastructure	• Existing road network • Water supply (non-potable) • Waste and wastewater disposal facilities.	No change.	-

Project Element	Summary of Project as Exhibited	Summary of the amendments	Reference
Construction hours	• Transmission pipeline and JGN Offtake facility: 7 am to 6 pm Monday to Friday and 8 am to 1 pm Saturdays • Storage pipeline: 6 am to 6 pm, seven days per week • Compressor station and delivery station: 6 am to 6 pm weekdays and 8 am to 1 pm Saturdays • Limited construction activities outside standard hours.	No change	-
Construction workforce	Approximately 398 personnel during peak construction (around one month duration). Up to 330 personnel over the remainder of the 12-month construction period.	No change.	-
Construction duration	Approximately 12 months.	No change.	-
Commencement of operation	Anticipated in Q4 2023.	No change.	-
Operational workforce	Approximately 5 personnel.	No change.	-
Project life	Approximately 30 years.	No change.	-
Capital Investment Value	Approximately $264 million.	No change.	-

3.2 Project amendments

The Project amendments are described below and shown in **Figure 3.1** and **Figure 3.2A-N**. The Project amendments have been grouped into three categories according to the appropriate Project element as follows:

- Associated surface facilities – changes to the JGN Offtake facility location and layout of the compressor station, delivery station and associated laydown area.
- Pipelines – changes to transmission pipeline alignment and storage pipeline construction footprint.
- Access tracks – addition of four access tracks.



Legend

- Transmission Pipeline Alignment
- Interconnect Pipeline
- Sydney to Newcastle Pipeline (JGN Northern Trunk)
- Local Government Area Boundary
- Kilometre Point
- Compressor and Delivery Station
- Pipe Laydown Areas
- Storage Pipeline
- Turkey Nest Dam
- JGN Offtake Facility
- Access Tracks
- Roads
- Watercourses

A - JGN Offtake facility - location change
B - Compressor station and laydown areas - layout change
C - M1 and Lower Hunter Freight Corridor crossing - alignment shift
D - Broaden management estate - alignment shift
E - Crossing of John Renshaw Drive - alignment shift
F - North of mines administration building - alignment shift
G - Buchanan Road East - alignment shift
H - Buchanan Road West - alignment shift
I - Wallis Creek Floodplain - alignment shift
J - Crossing of the South Maitland Coalfields - alignment shift
K - Storage pipeline - layout change

FIGURE 3.1

Overview of Project Amendments

Image Source: Neamap (August 2021) Data source: NSW LPI (2020;2021)

3.2.1 Associated surface facilities

3.2.1.1 JGN offtake facility

The JGN offtake facility has been relocated from the western side of Lenaghans Drive to the eastern side of Lenaghans Drive. The EIS presented the JGN offtake facility on the western side of Lenaghans Drive (Lot 51 DP1158920) based on favourable consultation with the landholder. However, ongoing negotiations have failed to reach an agreement to locate the facility on this property. As such, discussions with adjacent landholders were undertaken with a view to locating the offtake facility on a nearby landholding.

APA have subsequently reached in-principle agreement with the landholder on the eastern side of Lenaghans Drive (Lot 453 DP 807778) to locate the JGN offtake facility at the location shown in **Figure 3.2A**. This landholding hosts the Sydney to Newcastle Pipeline and the proposed short section of interconnecting pipeline between the SNP and JGN delivery facility.

The amended location is approximately 70 m east of the location shown in the EIS at its' closest point. Access to the amended location would be either through the affected landholding or the landholding to the north, to be informed by ongoing landholder discussions.

The location change has required changes to the internal layout of equipment for the JGN offtake facility however its overall form and function remain unchanged from that proposed in the EIS.

An emergency venting apparatus for the JGN offtake facility, as described in Section 2.3.4.1 of the EIS, is proposed to be located between the JGN offtake facility and the Sydney to Newcastle pipeline. The venting apparatus will be co-located with the short section of transmission pipe connecting to the Sydney to Newcastle pipeline, which will be constructed and operated by Jemena.

3.2.1.2 Compressor station, delivery station and associated laydown areas

The southern boundary of the compressor station and delivery station footprint has been extended approximately 50 m to the south, compared to that identified in the EIS, to align with the southern extent of the HPP 'proposal site' (refer to **Figure 3.2L**). This also aligns with the boundaries of the proposed Lot 2 DP 1276814 of the Regrowth Kurri Kurri project. This amendment increases the area of the footprint by around 0.75 ha. The entire compressor station and delivery station area consists of hardstand that has been used for industrial activities for many decades. The additional area remains subject to remediation required to be undertaken as part of the Hydro Aluminium project (SSD-6666).

The fine scale arrangement of equipment within the compressor station and delivery station boundary has also been adjusted.

Section 2.3.6.3 of the EIS describes a construction laydown area of up to 5 ha to be located on existing hardstand of the former Kurri Kurri aluminium smelter adjacent to the compressor station and delivery station. The construction laydown area would be used during the construction of the compressor station and delivery station facilities for storage of equipment and materials. During preparation of the EIS, the exact location of the laydown area was not known given it was subject to ongoing discussions between APA and Snowy Hydro, Hydro Aluminium, and the Regrowth Kurri Kurri project. All of these stakeholders have an interest in the use of this land during the construction period.

Discussions have further progressed with these parties and the laydown areas have been rearranged. The laydown area east of Harts Road within the former carpark of the smelter has been removed and the laydown area west of Harts Road has been extended. The total area for laydown adjacent to the compressor station has been reduced from 8.0 ha to 6.5 ha and remains on hardstand of the former aluminium smelter.

The area of mapped important habitat for the swift parrot west of Harts Road is now avoided, whilst noting that this mapped area does not provide any habitat for the swift parrot given it is a cleared carpark.

3.2.2 Transmission pipeline

3.2.2.1 M1 Pacific Motorway and Lower Hunter Freight Corridor crossing

Alignment options for crossing the M1 Pacific Motorway (M1) and Lower Hunter Freight Corridor (LHFC) are described in Section 5.3.1.2 of the EIS. Consultation with TfNSW has been ongoing since EIS submission and in principle agreement has been reached to progress the Option 2 design crossing using a horizontal direction drill (HDD). The environmental impacts of Option 2 are generally reduced relative to the base case alignment presented in the EIS through the use of HDD rather than horizontal boring and open trenching. An assessment of environmental impacts of crossing options are outlined in Section 5.3.1.2 of the EIS.

To the north of the HDD exit point, the construction footprint for the transmission pipeline has been shifted to the west by 5m to avoid all direct impacts to Lot 50 DP881157 (refer to **Figure 3.2B**). This lot is a conservation zone for Aboriginal cultural heritage created during construction of the M1.

To facilitate the HDD, a stringing area to construct the welded pipeline to be pulled back through the borehole is required. The stringing area is required to be aligned with the HDD angle, and so will extend north for around 215 m from the construction right of way near KP1.2 (refer to **Figure 3.2C**).

3.2.2.2 Broaden Management Industrial Estate

The alignment alterative proposed in Section 5.3.1.2 of the EIS for the Broaden Management Industrial Estate remains under discussion with the landholder and has been adopted as the base case for this Amendment Report (refer to **Figure 3.2D**). This adds around 800 m of additional length of the transmission pipeline and as such provides a conservative worst-case scenario. Discussions with the landholder regarding use of the original alignment presented as the base case in the EIS are ongoing. Both options are assessed in this Amendment Report, where the base case is referred to as the 'amended design' and the alternative as the 'amended design - Broaden alternative'.

3.2.2.3 Crossing of John Renshaw Drive and entry to Donaldson open cut mine

Ongoing consultation with the landholder and mine operator (Donaldson Coal Pty Ltd) has refined the alignment for the transmission pipeline where it enters Lot 1392 DP 1126633, directly north of John Renshaw Drive (refer to **Figure 3.2E**). This amendment involves changing the angle of the HDD under John Renshaw Drive so that it exits further west onto the bench of an existing mining pit.

This amendment enables direct impacts to vegetation established for at least 13 years as part of mining rehabilitation activities to be avoided. The proposed alignment also eliminates a bored crossing of the Hunter Water Corporation Chichester Trunk Gravity Main (CTGM). The CTGM passes through two culverts beneath mine access roads adjacent to the bored crossing. Further biodiversity surveys have located a population of the Southern Myotis (NSW *Biodiversity Conservation Act* 2016 – vulnerable) using these culverts for roosting. By eliminating the bored crossing of the CTGM, disturbance to bats roosting in the culverts from construction noise and dust emissions will be reduced.

In principle agreement has been reached with the landholder for this amendment.

3.2.2.4 Area north of existing mines administration building

Detailed survey investigations have located numerous buried services (water and telecommunications) within the EIS construction footprint for around 700m north of the existing administration building for the Donaldson and Abel mines. It is proposed to move the construction footprint 25m to the west so that most services are avoided (refer to **Figure 3.2F**).

The crossing of Four Mile Creek shifts slightly upstream and will remain as a special crossing.

3.2.2.5 Mine haul road

Minor amendment to follow the existing mine haul road for around 300 m near KP 10.4, rather than remaining adjacent to the Hunter Water trunk main. Amendment made at the request of the mine operator (Bloomfield).

3.2.2.6 Buchanan Road – east

APA has engaged in ongoing discussions with the landholder (Ashtonfields) regarding the positioning of the alignment between approximately KP11.0 and Buchanan Road. The key constraints for the transmission pipeline alignment in this area are existing residential areas immediately north of Lot 1 DP 1045723, old underground mine workings, remnant vegetation, and potential residential development following completion of mining operations.

The landholder's preference is for the alignment to follow Hunter Water Corporation trunk mains to the north-west, then the northern and western boundaries of Lot 1 DP 1045723, and this alignment has been adopted for the Project. No new landholders are directly affected by this option, as shown in the **Figure 3.2 G**.

3.2.2.7 Buchanan Road – west

Further discussions with the landholder (Ashtonfields) and mining lease holder (Bloomfield) have sought to refine the EIS alignment between Buchanan Road and Buttai Creek. Key constraints in this area are old underground mine workings, partially rehabilitated coal fines stockpiles and dams from previous coal mining operations, proposed residential development following completion of mining operations, remnant vegetation and flooding extents.

A refined alignment has been developed which avoids partially rehabilitated coal fines stockpiles and dams, minimises impacts to potential future residential areas and is positioned above key flood extents (refer to **Figure 3.2H**). Overall, this alignment represents a minor change from the alignment presented in the EIS, with no new landholders impacted, and no material change to impacts.

In principle agreement has been reached with the landholder (Ashtonfields) and mining lease holder (Bloomfield) for this alignment.

3.2.2.8 Wallis Creek floodplain

As described in Section 7.3.4.2 of the EIS, APA has committed to extending the length of the Wallis Creek HDD to the east to avoid trenching through an area of acid sulfate soils immediately east of Wallis Creek. This amendment also reduces flooding risk during construction. This concept has now been developed further by also extending the Wallis Creek HDD to the west such that the crossings of Main Road, the Testers Hollow road upgrade and Wallis Creek are achieved with a single HDD (refer to **Figure 3.2I**). As such the horizontal bore of Main Road is no longer required.

Overall environmental impacts are reduced with this amendment by avoiding an area of acid sulfate soils and avoiding disturbance to around 1.4 ha of the Sydney Freshwater Wetlands endangered ecological community. The HDD pad west of Main Road has been positioned such that impacts to the potential archaeological deposit (PAD) adjacent to Main Road (TH-PAD-01 Extension) are avoided.

To further mitigate potential flooding impacts during construction, it is also proposed to move the construction footprint between Buttai Creek and Wallis Creek 25 m to the south to an area of higher elevation.

3.2.2.9 Crossing of the South Maitland Coalfields

As described in Section 5.3.1.1 of the EIS, the historic South Maitland Coalfields extend from Maitland to south-west of Cessnock. As such, any transmission line route between Leneghan and Kurri Kurri is required to cross the underground workings of this coalfield. The alignment presented in the EIS crosses an area of underground workings between KP16.2 and KP16.4 (KP16.6 to KP 16.8 of the amended alignment).

Further technical investigations of the proposed crossing location have been undertaken and a minor refinement to move the alignment 10m to the north is proposed (refer to **Figure 3.2J**). This refinement will further mitigate mine subsidence risks by locating the pipeline above sections of the underground workings that have previously subsided.

3.2.3 Storage pipeline

The construction footprint for the storage pipeline has been modified to avoid a stand of river-flat eucalypt forest (EPBC Act critically endangered ecological community, BC Act endangered ecological community) and reduce the extent of construction within an east-west aligned gully. This has been achieved by reducing the length and width of the east-west section of the storage pipeline, and a commensurate increase to the width of the north-south section (refer to **Figure 3.2K**). In addition, areas to incorporate sediment dams have been included in the construction footprint based on runoff calculations.

This amendment has been developed as part of a commitment to investigate options to minimise impacts to the river-flat eucalypt forest community at the north-eastern extent of the storage pipeline footprint, as included in the EIS mitigation measure (B09).

Overall, the construction footprint has increased from 33 ha to 35 ha.

3.2.4 Additional access tracks

The Project amendments include four additional access tracks as described below.

3.2.4.1 Black Hill Road to construction footprint

An existing sealed track of around 500 m on Lot 2 DP 1260203 (refer to **Figure 3.2D**). This track connects Black Hill Road with the construction footprint on the Broaden Management industrial estate. No additional disturbance is required for this track, which is proposed to be used only for truck deliveries of pipe lengths (around 9 deliveries) and of HDD equipment (around 5 deliveries each for mobilisation and de-mobilisation) to the construction footprint. This will provide a second access point to the construction footprint between KP 0.7 and the crossing of John Renshaw Drive at KP 5.2. This section of Black Hill Road between John Renshaw Drive and the access track entry point to the Broaden Management industrial estate will only be used for deliveries of pipe segments and mobilisation and demobilisation of HDD equipment. Deliveries will occur outside of peak road use periods.

3.2.4.2 Valley View Lane to construction footprint

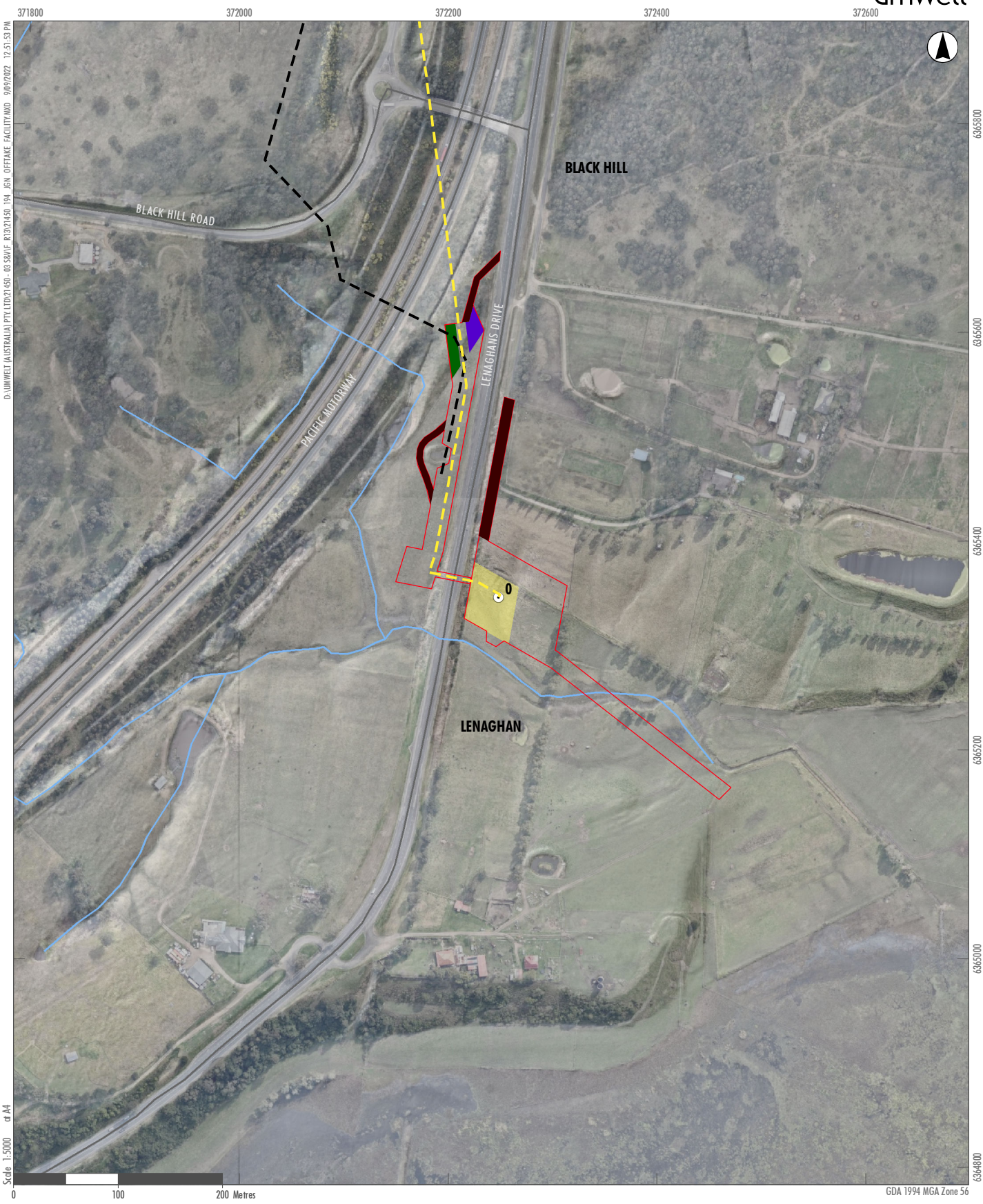
A track of 800 m length following an existing farm track though a cleared paddock on Lot 2 DP779342 (refer to **Figure 3.2H**). This track will connect Valley View Lane with the construction footprint between Wallis Creek and Buttai Creek and enable trucks transporting pipe lengths and HDD equipment to access the construction footprint in the event that wet weather prevents the use of the access track across Buttai Creek. These trucks cannot navigate further along Valley View Lane due to the narrow road width and two right angle turns.

3.2.4.3 Main Road to construction footprint

A track of 350 m length following an existing farm track though a cleared paddock on Lot 2 DP1249763 on the western side of Main Road (refer to **Figure 3.2M**). Previously a crossing of Main Road was proposed adjacent to the horizontal bore of the road. The horizontal bore has been replaced by a HDD from the western side of Main Road to the eastern side of Wallis Creek, as described in **Section 3.2.2.1**. A track is required to access the HDD workspace.

3.2.4.4 Bishops Bridge Road (unmade) to HDD construction footprint

A track of approximately 1 km length following an existing track to the north-west of the smelter site (refer to **Figure 3.2 N**). This track will provide access to the workspace for the HDD pad of the interconnect pipeline and transmission pipeline. Use of this track is proposed so that interactions between APA traffic accessing the HDD area and Hydro Aluminium traffic accessing the containment cell being used as part of remediation activities are minimised.



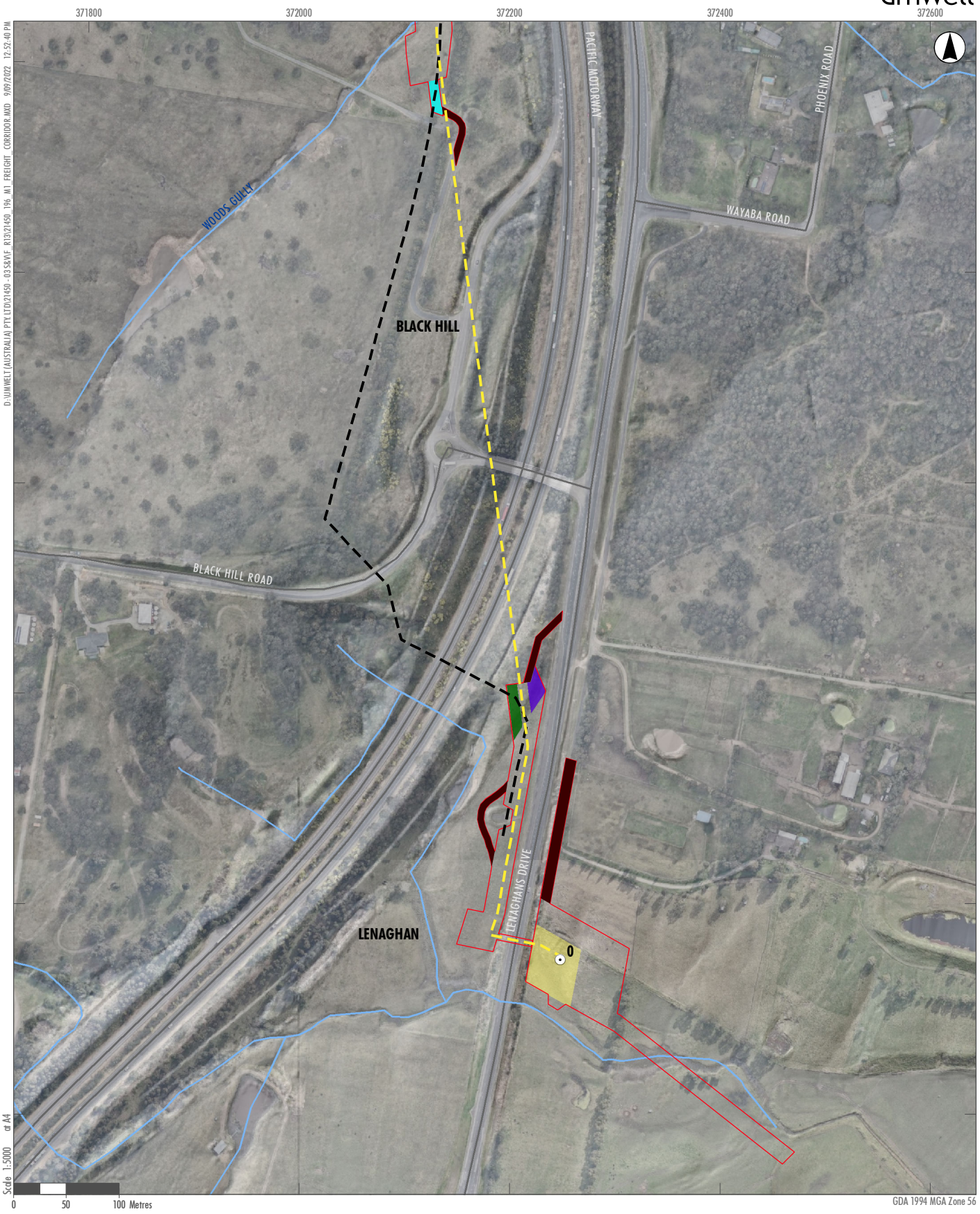
Legend

- Project Construction Footprint
- Transmission Pipeline Alignment
- Previous Transmission Pipeline Alignment
- Kilometre Point
- JGN Offtake Facility
- HDD Entry
- Turnaround
- Access Tracks
- Roads
- Watercourses

FIGURE 3.2A

JGN Offtake Facility

Image Source: Nearmap (August 2022) Data source: NSW DFSI (2022)



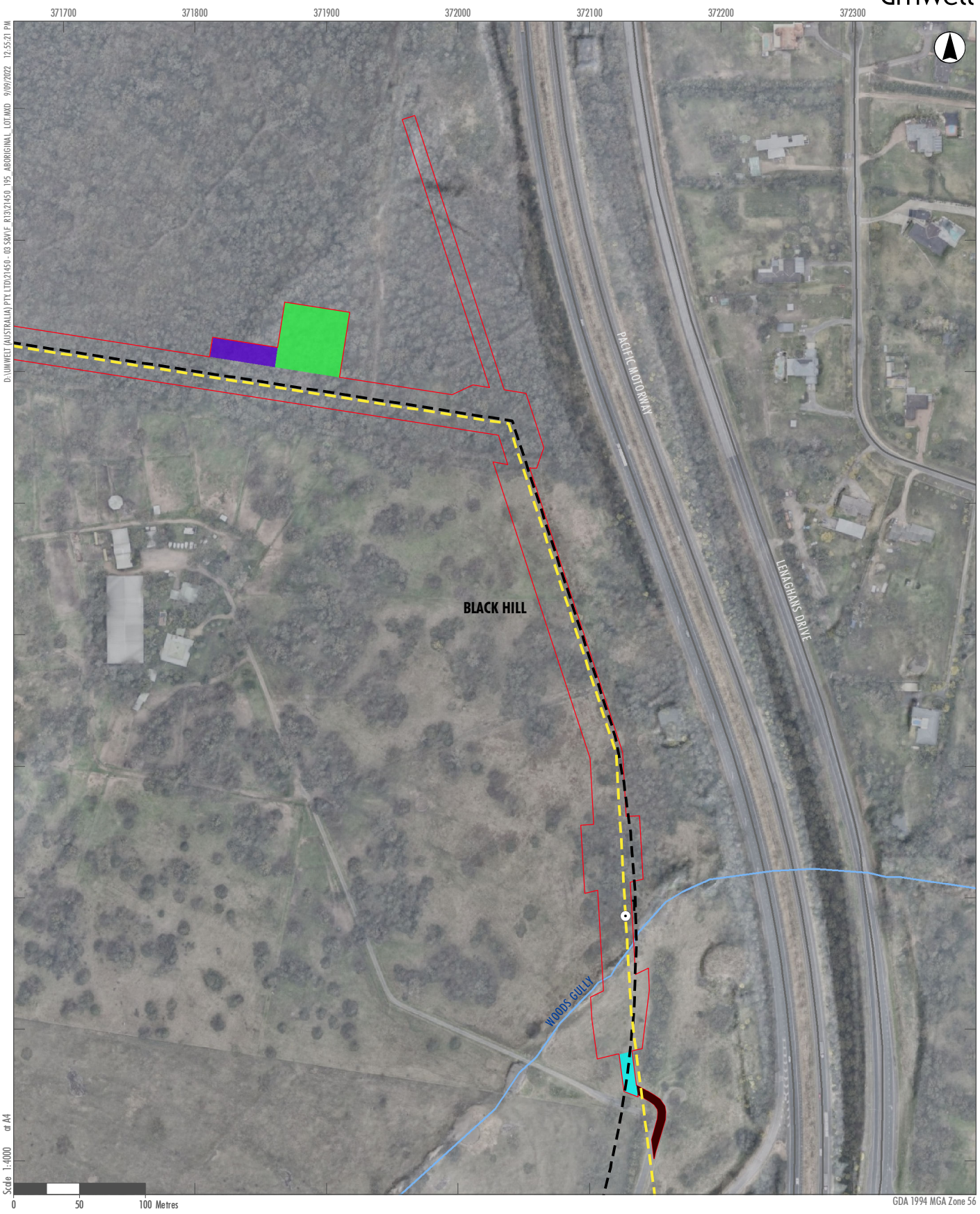
Legend

- Project Construction Footprint
- Transmission Pipeline Alignment
- Previous Transmission Pipeline Alignment
- Kilometre Point
- JGN Offtake Facility
- HDD Entry
- HDD Exit
- Turnaround
- Access Tracks
- Roads
- Watercourses

FIGURE 3.2B

M1 and Lower Hunter Freight Corridor Crossing

Image Source: Nearmap (August 2022) Data source: NSW DFSI (2022)



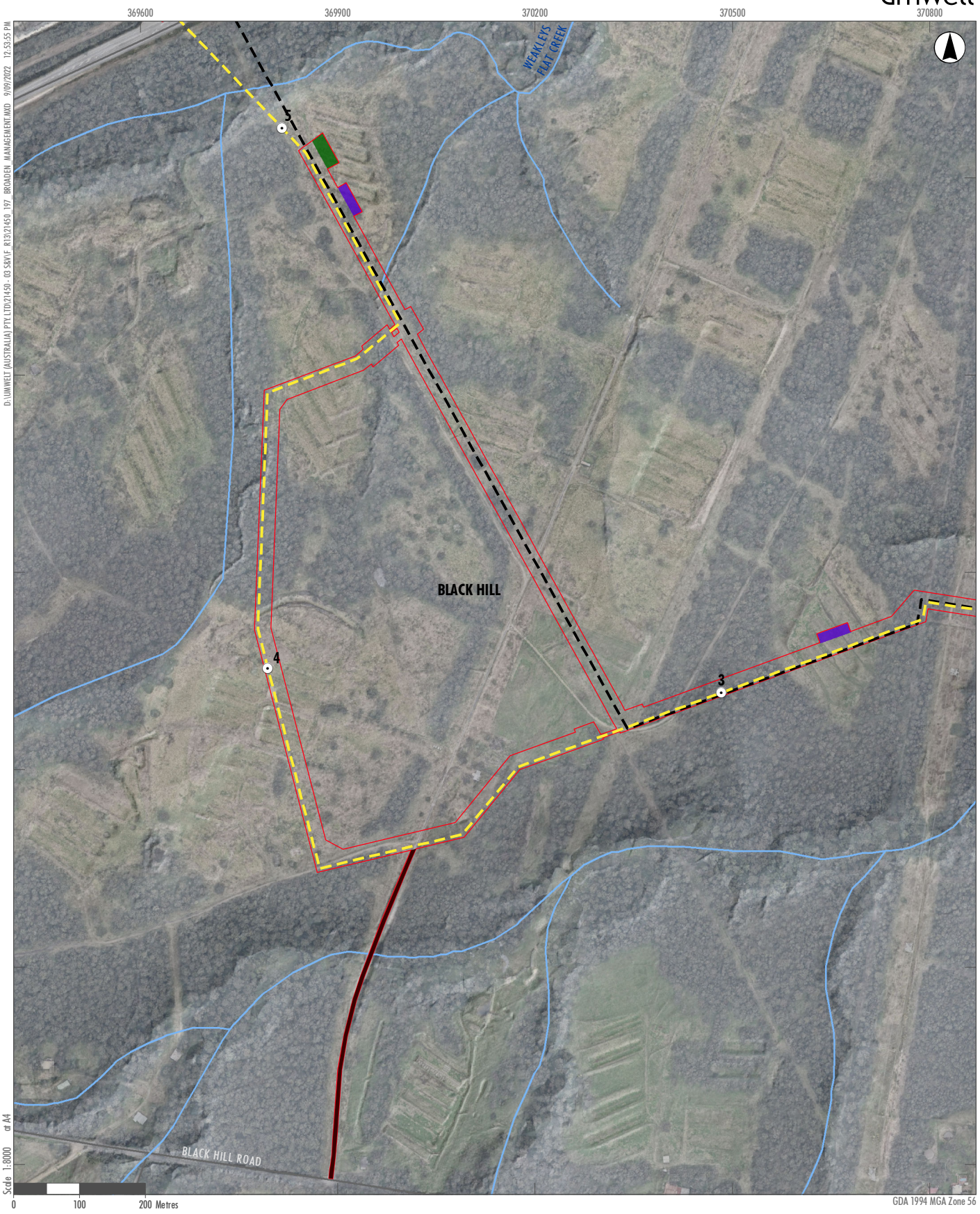
Legend

- Project Construction Footprint
- Transmission Pipeline Alignment
- Previous Transmission Pipeline Alignment
- Kilometre Point
- HDD Exit
- Turnaround
- Vegetation Stockpile
- Access Tracks
- Roads
- Watercourses

FIGURE 3.2C

Lot 50 DP 881157

Image Source: Nearmap (August 2022) Data source: NSW DFSI (2022)



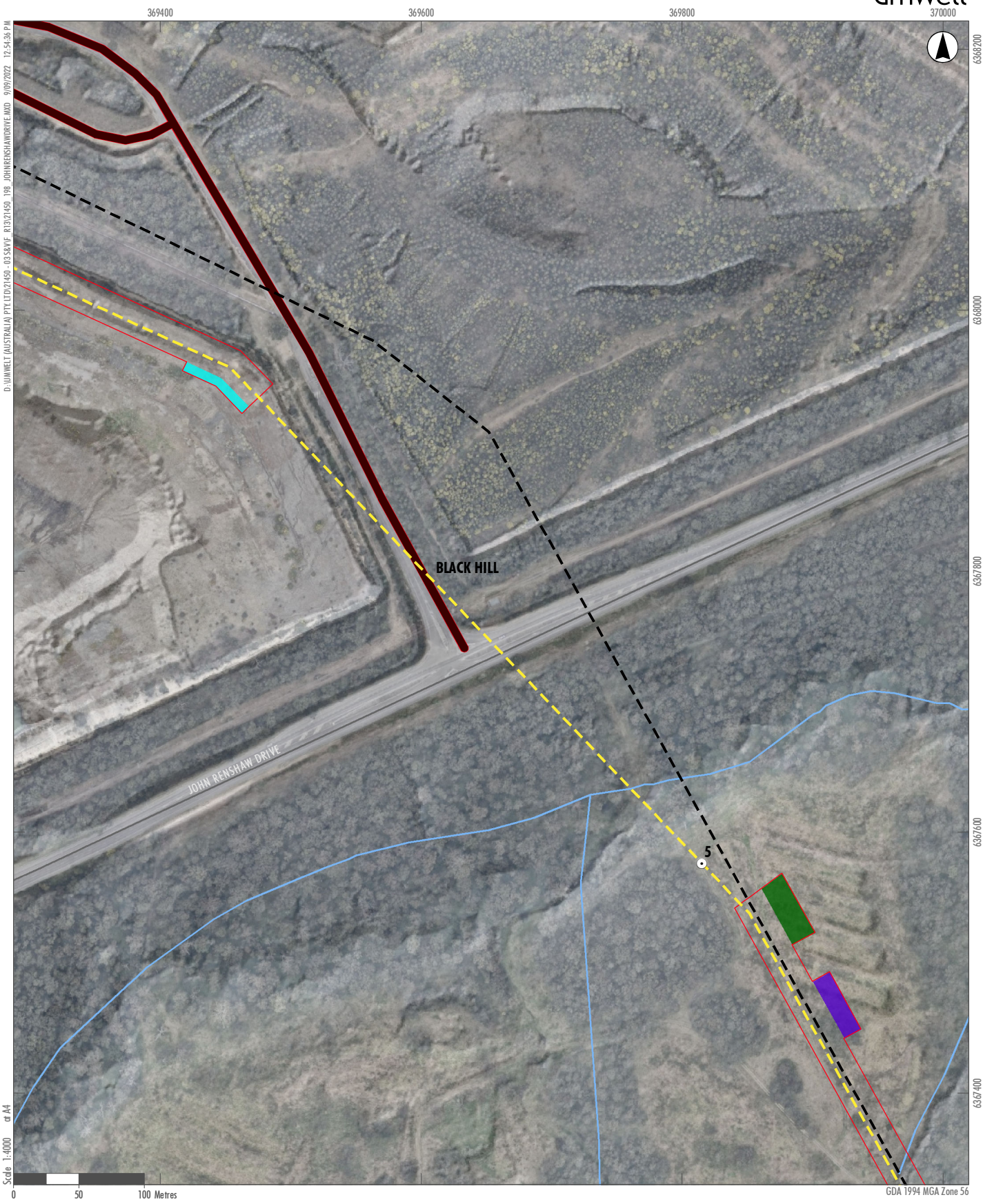
Legend

- Project Construction Footprint
- Transmission Pipeline Alignment
- Previous Transmission Pipeline Alignment
- Kilometre Point
- HDD Entry
- Turnaround
- Access Tracks
- Roads
- Watercourses

FIGURE 3.2D

Broaden Management Industrial Estate

Image Source: Nearmap (August 2022) Data source: NSW DFSI (2022)



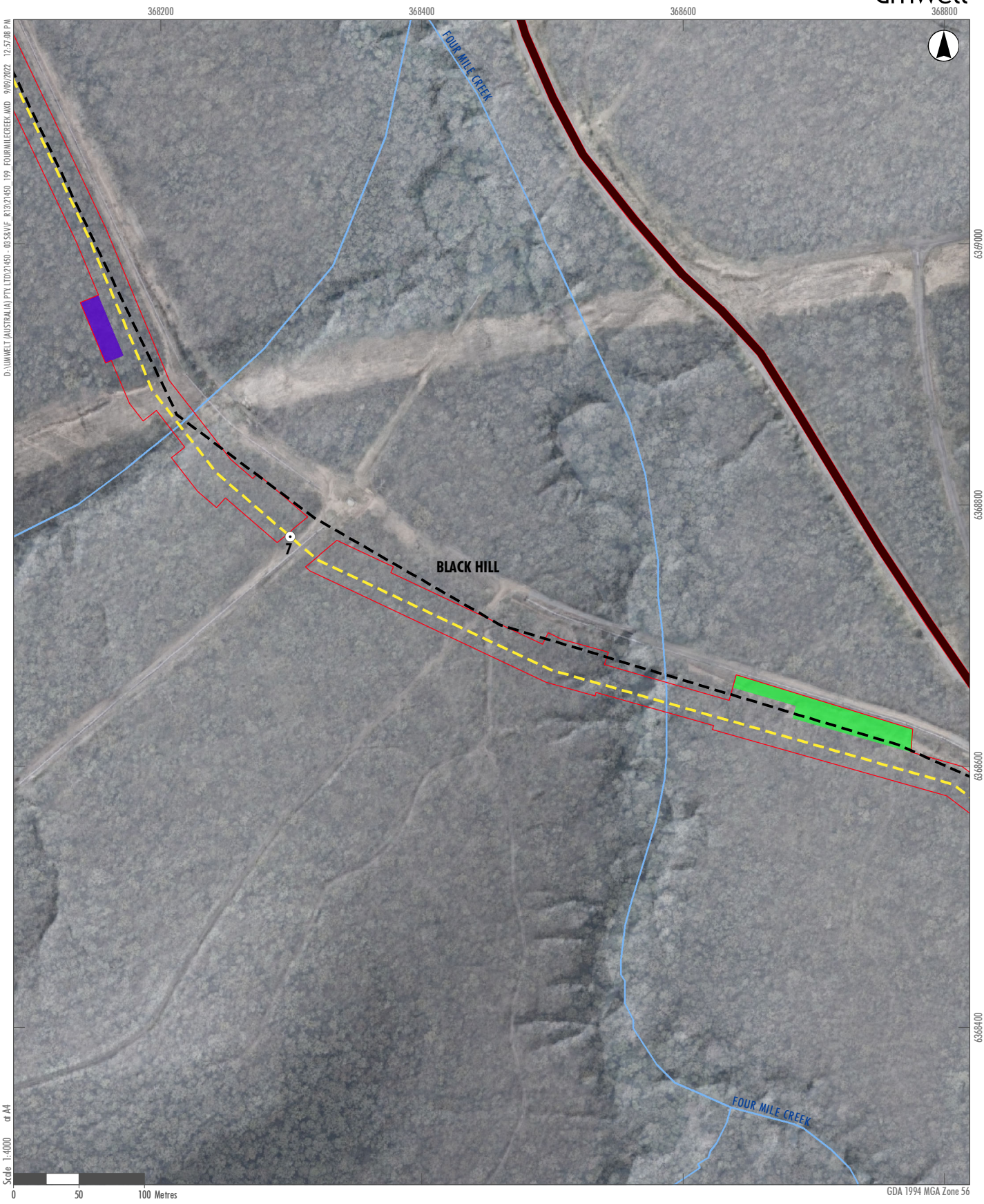
Legend

- Project Construction Footprint
- Transmission Pipeline Alignment
- Previous Transmission Pipeline Alignment
- Kilometre Point
- HDD Entry
- HDD Exit
- Turnaround
- Access Tracks
- Roads
- Watercourses

FIGURE 3.2E

Crossing of John Renshaw Drive and entry to Donaldson open cut mine

Image Source: Nearmap (August 2022) Data source: NSW DFSI (2022)



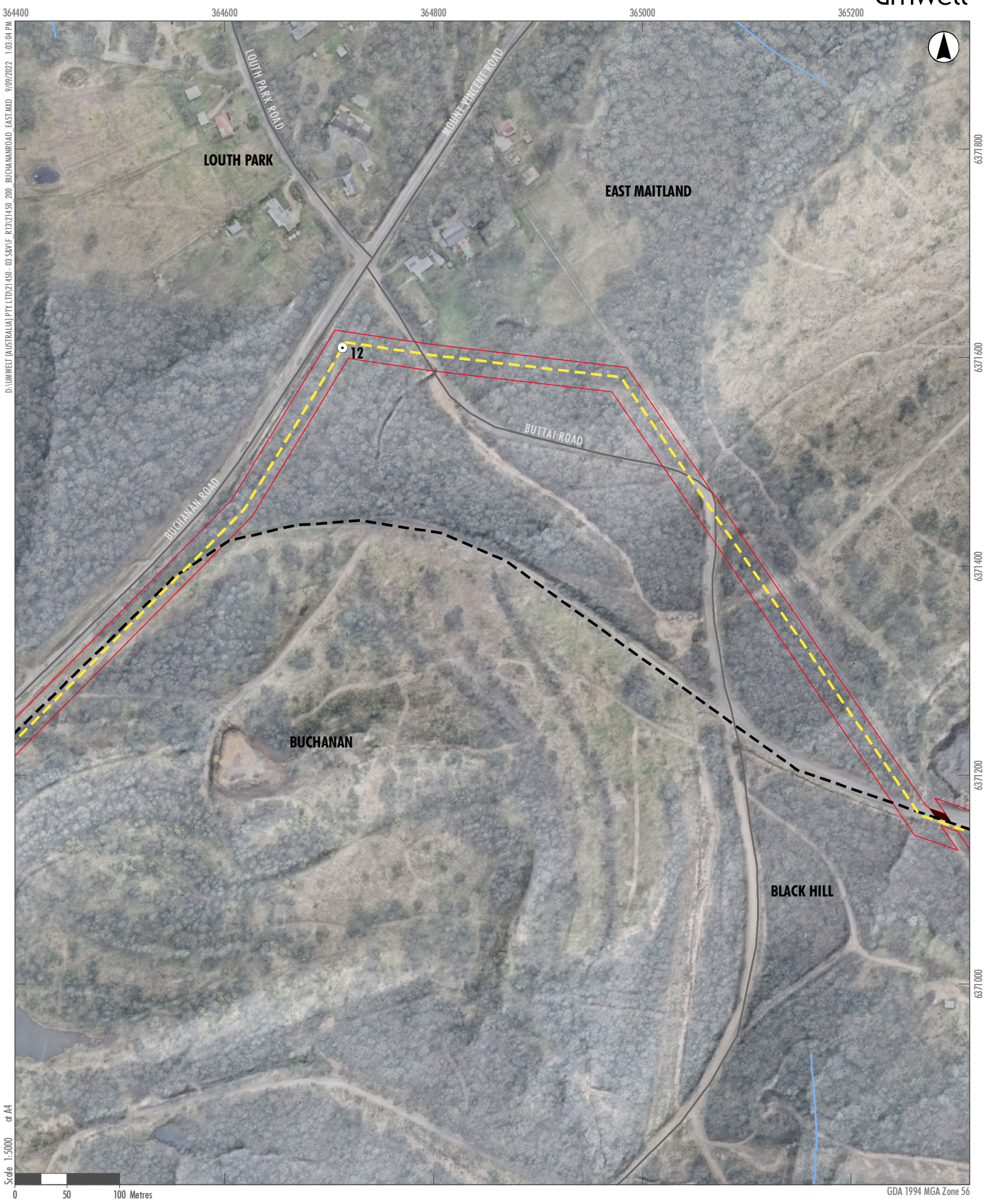
Legend

- Project Construction Footprint
- Transmission Pipeline Alignment
- Previous Transmission Pipeline Alignment
- Kilometre Point
- Turnaround
- Vegetation Stockpile
- Access Tracks
- Roads
- Watercourses

FIGURE 3.2F

Area north of existing mines administration building

Image Source: Nearmap (August 2022) Data source: NSW DFSI (2022)



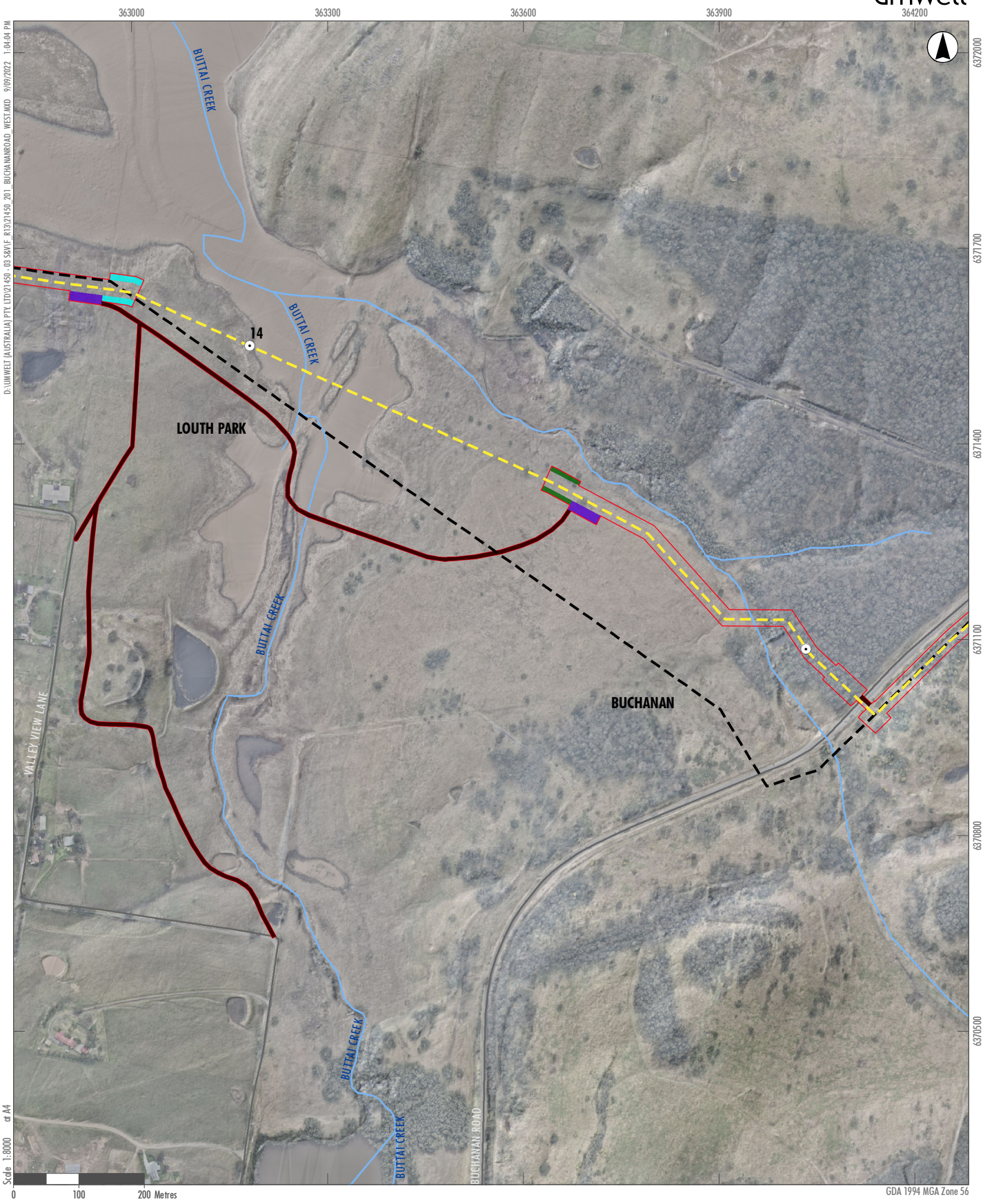
Legend

- Project Construction Footprint
- Transmission Pipeline Alignment
- Previous Transmission Pipeline Alignment
- Kilometre Point
- Access Tracks
- Roads
- Watercourses

FIGURE 3.2G

Buchanan Road - East

Image Source: Nearmap (August 2022) Data source: NSW DFSI (2022)



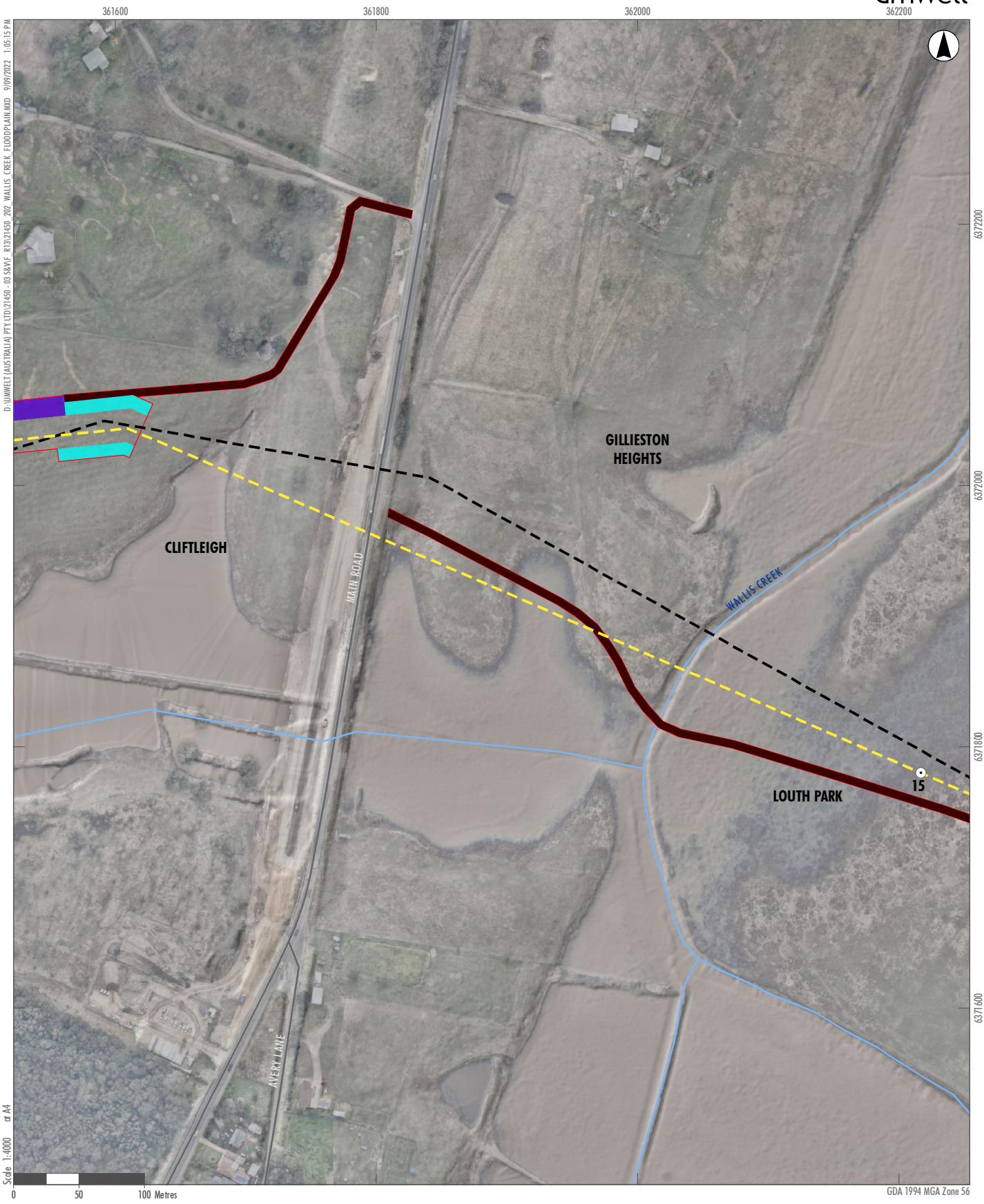
Legend

- Project Construction Footprint
- Transmission Pipeline Alignment
- Previous Transmission Pipeline Alignment
- Kilometre Point
- HDD Entry
- HDD Exit
- Turnaround
- Access Tracks
- Roads
- Watercourses

FIGURE 3.2H

Buchanan Road - West

Image Source: Nearmap (August 2022) Data source: NSW DFSI (2022)



Legend

- Project Construction Footprint
- Transmission Pipeline Alignment
- Previous Transmission Pipeline Alignment
- Kilometre Point
- HDD Exit
- Turnaround
- Access Tracks
- Roads
- Watercourses

FIGURE 3.2I

Wallis Creek Floodplain

Image Source: Nearmap (August 2022) Data source: NSW DFSI (2022)

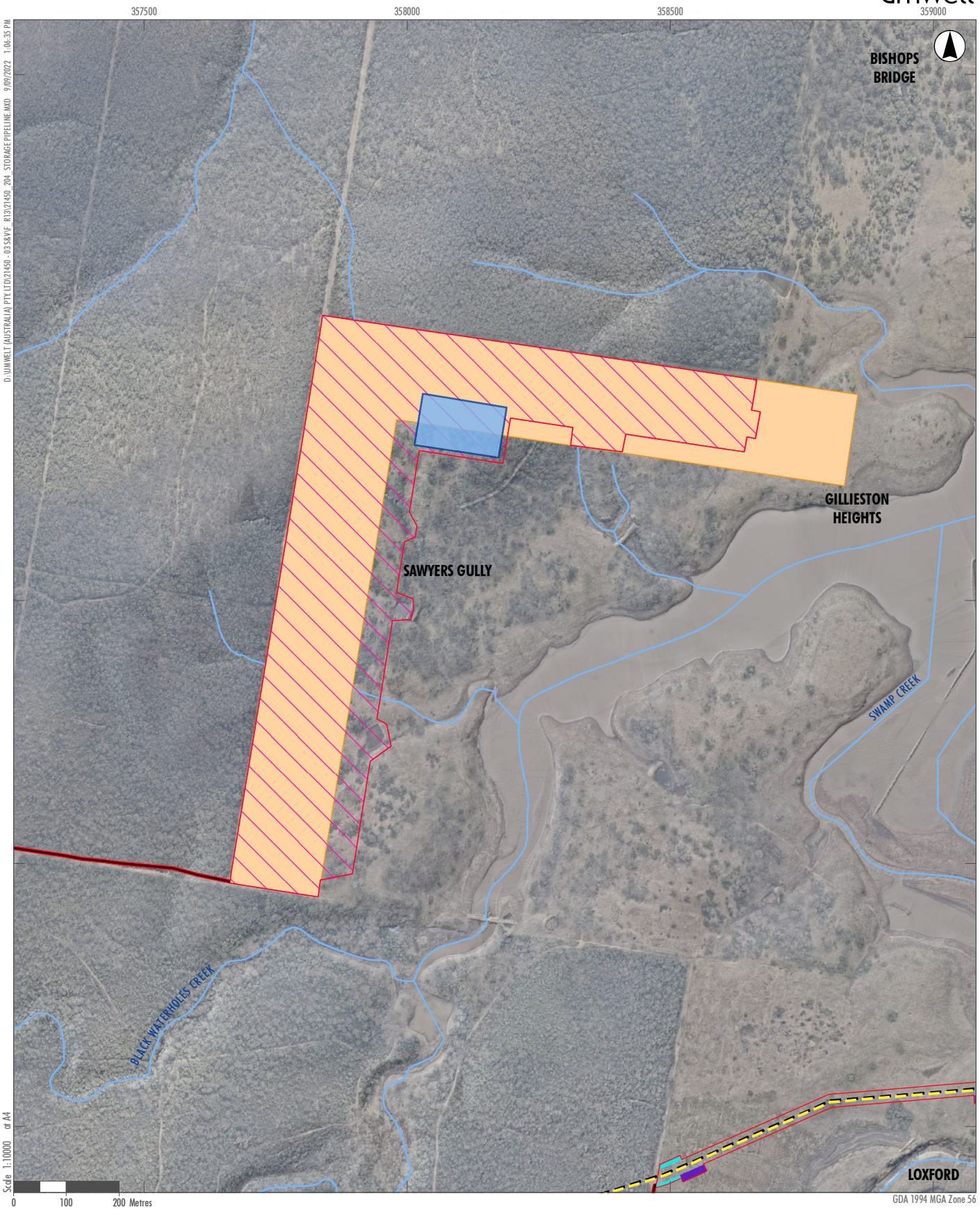
Legend

- Project Construction Footprint
- Transmission Pipeline Alignment
- Previous Transmission Pipeline Alignment
- Kilometre Point
- Turnaround
- Access Tracks
- Roads
- Watercourses

FIGURE 3.2J

Crossing of the South Maitland Coalfields

Image Source: Nearmap (August 2022) Data source: NSW DFSI (2022)



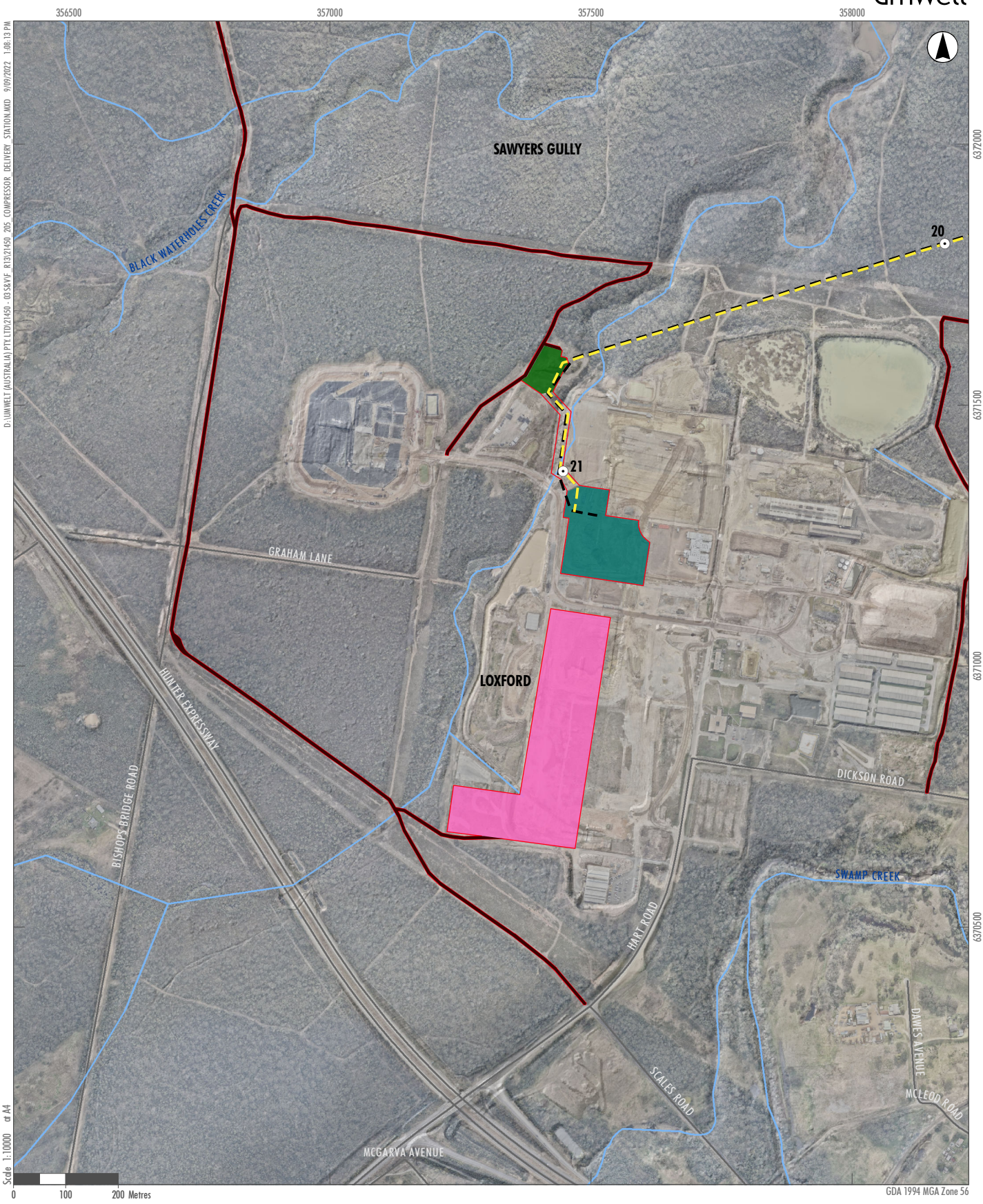
Legend

- Project Construction Footprint
- Transmission Pipeline Alignment
- Previous Transmission Pipeline Alignment
- Kilometre Point
- HDD Exit
- Turkeys Nest Dam
- Turnaround
- Storage Pipeline
- Previous Storage Pipeline
- Access Tracks
- Roads
- Watercourses

FIGURE 3.2K

Storage Pipeline

Image Source: Nearmap (August 2022) Data source: NSW DFSI (2022)



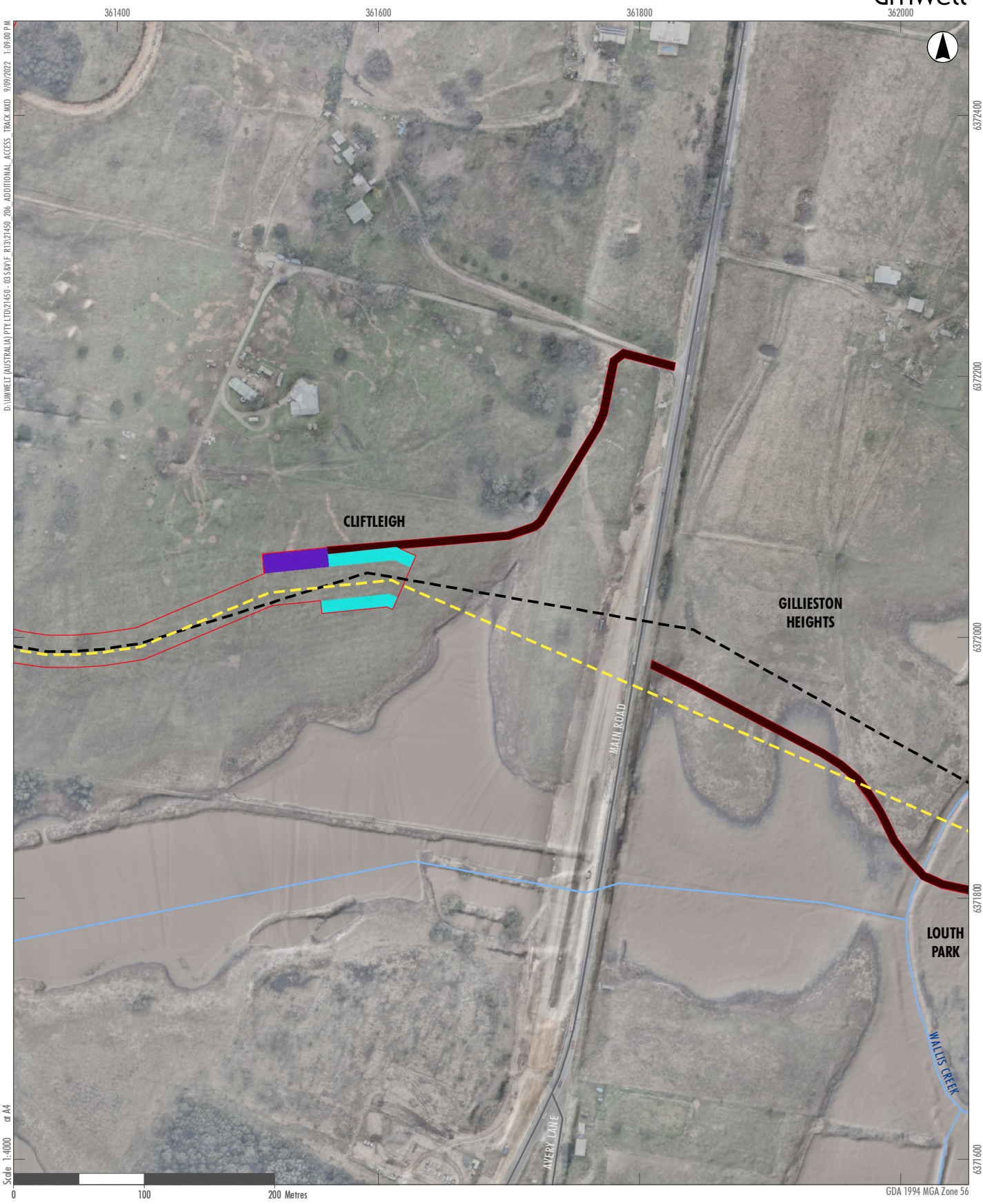
Legend

- Project Construction Footprint
- Transmission Pipeline Alignment
- Previous Transmission Pipeline Alignment
- Kilometre Point
- HDD Entry
- Pipe and Equipment Laydown Area
- Compressor Delivery Station
- Access Tracks
- Roads
- Watercourses

FIGURE 3.2L

Compressor Station, Delivery and Associated Laydown Areas

Image Source: Nearmap (August 2022) Data source: NSW DFSI (2022)



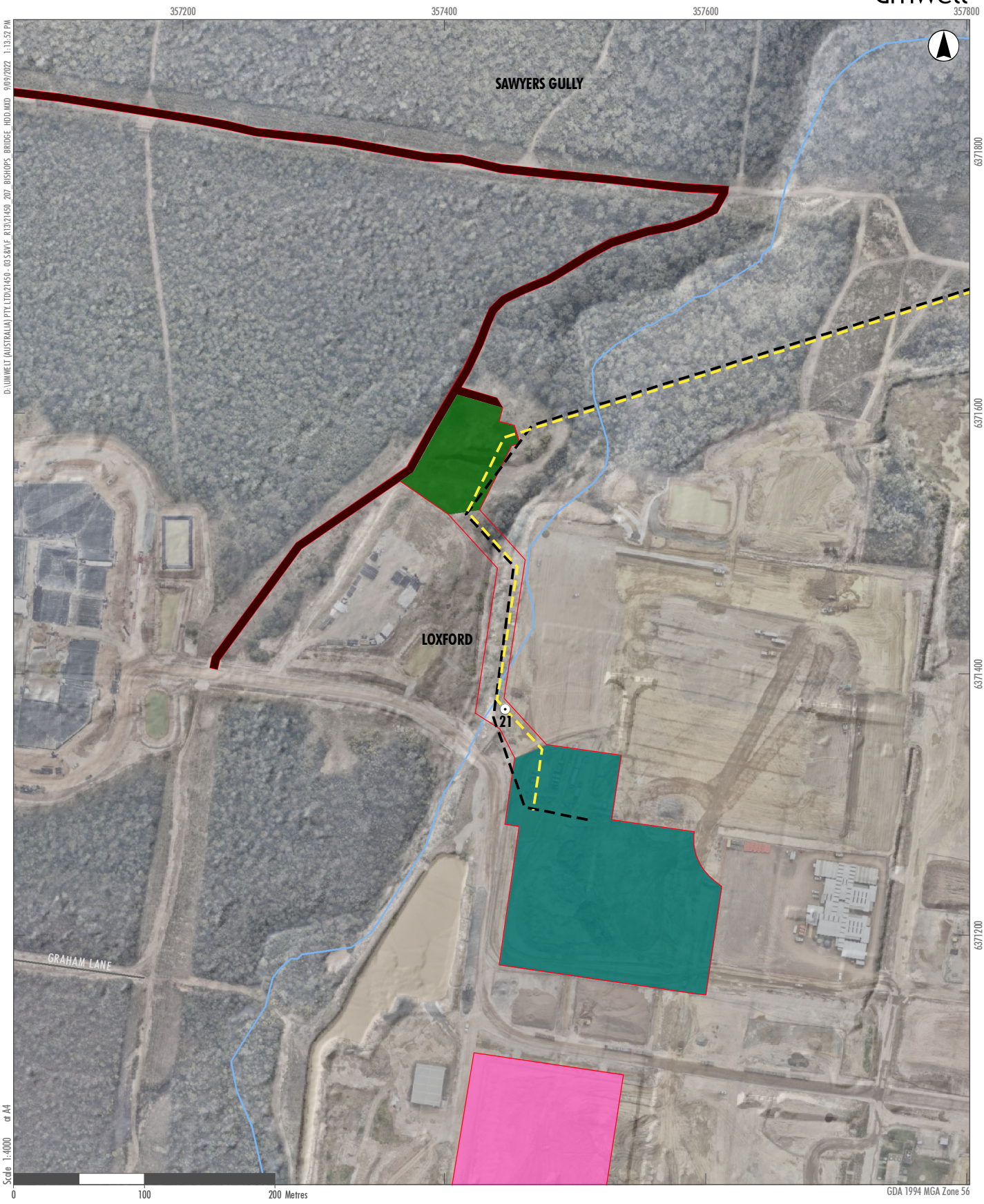
Legend

- Project Construction Footprint
- Transmission Pipeline Alignment
- Previous Transmission Pipeline Alignment
- Kilometre Point
- HDD Exit
- Turnaround
- Compressor Delivery Station
- Access Tracks
- Roads
- Watercourses

FIGURE 3.2M

Main Road to Construction Footprint

Image Source: Nearmap (August 2022) Data source: NSW DFSI (2022)



Legend

- Project Construction Footprint
- Transmission Pipeline Alignment
- Previous Transmission Pipeline Alignment
- Kilometre Point
- HDD Entry
- Pipe and Equipment Laydown Area
- Compressor Delivery Station
- Access Tracks
- Roads
- Watercourses

FIGURE 3.2N

Bishops Bridge Road (unmade) to HDD Construction Footprint

Image Source: Nearmap (August 2022) Data source: NSW DFSI (2022)

3.2.1 Operational footprint

The operational footprint for the Project has been revised to incorporate the following amendments, all of which require hardstand areas to be maintained for the life of the Project:

- an access track to the JGN Offtake facility
- the turkeys nest dam at the storage pipeline
- minor increase to the JGN Offtake facility operational footprint and associated emergency vent
- increased operational area for the compressor station and delivery station
- inclusion of a scraper station at the storage pipeline above ground connection header assembly.

Existing access tracks that will be used periodically for access to Project infrastructure and easements or purchased land for the transmission pipeline and storage pipeline have not been included as part of the operational footprint. Existing access tracks are owned and subject to ongoing use by landholders and the construction footprint of the transmission pipeline and storage pipeline will be rehabilitated to stable, vegetated landforms. Any disturbance of rehabilitated landforms required for Project maintenance during operations will be subject to assessment as project modifications, as described in Section 5.3.4.2 of the EIS.

Table 3.2 Operational footprint of the EIS and amended Project

Infrastructure	Operations disturbance area (ha)	
	EIS	Amended design
Transmission pipeline ROW	0	0
Mainline valve (MLV)	0.02	0.02
Extra work spaces (truck turnarounds, vegetation storage, HDD and bore entry and exit workspaces, watercourse crossing workspaces)	0	0
Access Tracks Permanent access track to JGN Offtake facility. Access tracks used for operational access to the MLV, compressor station and delivery station are existing.	0[2]	0.2
Pipeline Laydown Areas	0	0
Storage pipeline construction footprint	0	0
Turkeys Nest Dam Assume remains in place for life of project	0	1.2
JGN Offtake facility	0.1	0.2
JGN Offtake facility - Emergency vent	0	0.01
Compressor station and delivery station	1.2	2.2
Scraper station at storage pipeline	0	1.0
Total	**2**	**4.8**

4.0 Statutory Context

This section provides an overview of the statutory context for the Project and provides a discussion on any changes to statutory requirements as a result of the amended project. A review of the statutory context in relation to the Project amendments did not identify any additional requirements or items that have not previously been addressed in the EIS.

4.1 NSW assessment and approval process

The NSW Minister for Planning declared the Project to be Critical State Significant Infrastructure (CSSI) under Section 5.13 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). CSSI projects are listed in Schedule 5 of SEPP (Planning Systems) 2021 (formerly CSSI projects listed under SEPP State and Regional Development 2011), with clause 12(2)(c) providing for "*a gas transmission and storage pipeline, receiving station and compressor units,"* as part of the Newcastle Gas-Fired Power Station project. As the project is CSSI, it requires approval from the NSW Minister for Planning under Division 5.2, Part 5 of the EP&A Act.

An EIS was prepared for the Project in accordance with the requirements of Division 5.2 of the EP&A Act and was placed on public exhibition from 13 April to 10 May 2022. During the exhibition period, members of the community and interested stakeholders and were able to review the EIS and make a written submission to the DPE for consideration in its assessment of the Project.

This Amendment Report has been prepared in line with clause 179(2) of the Environmental Planning and Assessment Regulation 2021 (EP&A Regulation) which states that an application may, with the approval of the Planning Secretary, be amended at any time before the application is determined. The Planning Secretary has been advised of APA's intention to amend the Project with this Amendment Report describing the proposed Project amendments and assessing the associated environmental impacts.

4.1.1 Revised State Environmental Planning Policies

Since exhibition of the EIS in April 2022, a program to simplify and consolidate state environmental planning policies (SEPPs) has been implemented by DPE. The 45 former SEPPs have been consolidated into a new framework based on focus areas resulting in 11 new policies.

The intent and requirements of the SEPPs remains largely the same and no changes relevant to the Project amendments have been noted. To assist in interpretation of the statutory context section of the EIS, **Table 4.1** lists the SEPPs identified in the EIS as relevant to the Project and provides the new SEPP reference for that particular subject matter.

Table 4.1 Revised State Environmental Planning Policies

SEPPs identified in the EIS	New SEPP reference
State Environmental Planning Policy (State and Regional Development) 2011	State Environmental Planning Policy (Planning Systems) 2021
State Environmental Planning Policy (Infrastructure) 2007	State Environmental Planning Policy (Transport and Infrastructure) 2021
State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007	State Environmental Planning Policy (Resources and Energy) 2021
State Environmental Planning Policy (Koala Habitat Protection) 2020/2021	State Environmental Planning Policy (Biodiversity and Conservation) 2021
State Environmental Planning Policy (Coastal Management) 2018 (Coastal Management SEPP)	State Environmental Planning Policy (Resilience and Hazards) 2021
State Environmental Planning Policy No. 33 – Hazardous and Offensive Development	State Environmental Planning Policy (Resilience and Hazards) 2021
State Environmental Planning Policy No. 55 – Remediation of land	State Environmental Planning Policy (Resilience and Hazards) 2021

4.2 Commonwealth assessment and approval process

A Project referral under the *Commonwealth Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) was submitted to the Australian Department of Climate Change, Energy, the Environment and Water (DCCEEW) (formerly Department of Agriculture, Water and the Environment (DAWE)) on 6 December 2021. The Project was determined to be a controlled action on 9 February 2020 and as such requires approval from the Commonwealth Minister for the Environment.

The Minister for the Environment has accredited the NSW planning process for the assessment of the Project, and it will be assessed under the Bilateral Agreement process between the Commonwealth and NSW Governments. Therefore, a single EIS was prepared to address the requirements set out by DPE and DCCEEW. This Amendment Report will be provided to DCCEEW to facilitate their determination regarding the Project.

Further detail regarding the overall legislative approval processes that apply to the proposal is provided in Section 3.0 of the EIS.

5.0 Stakeholder Engagement

This section outlines community and stakeholder engagement carried out during and following exhibition of the EIS for the Project.

5.1 Consultation to support EIS exhibition

The Project EIS was placed on public exhibition by the DPE from 13 April to 10 May 2022. The exhibition period provided stakeholders with an opportunity to review the EIS and, if they chose, prepare and make a submission to the DPE.

The EIS was made publicly available on the DPE's Major Projects website (Kurri Kurri Lateral Pipeline Project | Planning Portal - Department of Planning and Environment (nsw.gov.au), with a link to the Major Projects website also provided on APA's KKLP Project webpage (kurri kurri lateral pipeline project | APA Group). A hard copy of the EIS was publicly displayed at the offices of Newcastle City Council.

Newspaper advertisements advising of exhibition of the EIS were placed in the Cessnock Advertiser, Newcastle Herald and Maitland Mercury.

The following communication materials continued to be available during the EIS exhibition period:

- Project website – https://www.apa.com.au/about-apa/our-projects/kurri-kurri-lateral-pipeline-project/
- Project email address – kklp@apa.com.au
- Social Pinpoint page - https://apa.mysocialpinpoint.com/kurri-kurri-lateralpipeline#/sidebar/tab/the_project
- Free call contact number – 1800 804 893
- Introductory Project information sheet - https://www.apa.com.au/globalassets/about-apa/ourprojects/kurri-kurri-lateral-pipeline-project/kurri-kurri-lateral-pipeline-project-information-sheet.pdf

5.2 Consultation during development of the amendments

Following exhibition of the EIS, consultation and engagement activities were undertaken with a range of stakeholders including directly impacted land holders and residents, relevant government authorities, local councils, utilities owners, and Aboriginal stakeholders. Details of the consultation and key items of discussion are presented in **Section 5.2.1** to **Section 5.2.4**.

5.2.1 Directly impacted landholders

APA has continued to engage with all directly impacted landholders following EIS exhibition. Engagement has involved written communication and face-to-face meetings with impacted landholders to discuss design refinements, easement agreements and the potential impacts of the refined proposal in comparison to the impacts identified in the EIS.

All proposed amendments to the design of associated surface facilities, the transmission pipeline alignment and the storage pipeline construction footprint have been developed in consultation with the directly affected land holder. This has included both amendments within a previously affected property as well as amendments that have resulted in a new landholder being affected.

In principal agreement has been reached for the majority of the amendments to the transmission pipeline alignment, storage pipeline footprint and associated surface facility layouts. Where agreement has not yet been confirmed, consultation is ongoing.

5.2.2 Government agencies

APA has undertaken ongoing engagement with local, State and Federal government representatives throughout the development of the Submissions Report and Amendment Report. A summary of this consultation is provided in **Table 5.1** below.

Table 5.1 Summary of government agency consultation during preparation of the Submissions Report and Amendment Report

Agency name	Date	Description and Purpose of Contact
State Government		
DPE – Planning team	April to September 2022	Ongoing liaison with DPE Planning officers to provide progress updates on the Submissions Report and Amendment Report.
	28 July 2022	Site visit with DPE planning officers to view and discuss proposed design changes.
Office of Energy and Climate Change	April to September 2022	Ongoing liaison with the OECC pipeline licensing officers by means of telephone and meetings to discuss the Project, pipeline licensing and land access as well as providing project updates.
	6 September 2022	Site visit with OECC – Pipeline Licensing Team to view the Project area and discuss pipeline licensing process.
DPE – Biodiversity and Conservation Division	30 June 2022	Meeting to discuss proposed responses to the issues raised by BCD in their EIS submission. Communicated that a revised Biodiversity Development Assessment Report would be submitted and incorporate responses to BCD queries.
DPE – Crown Lands	August to September 2022	Phone calls and emails to discuss the process for obtaining a pipeline easement where the transmission pipeline crosses the Wallis Creek Crown Waterway.
Transport for NSW	April to September 2022	Ongoing liaison with TfNSW officers by means of telephone, email and meetings to discuss transmission pipeline design for crossings of TfNSW infrastructure, interaction with the LHFC as well as providing project updates.
Subsidence Advisory NSW	April to September 2022	Phone calls and emails to discuss results of subsidence and geotechnical assessments of mine subsidence areas.

Agency name	Date	Description and Purpose of Contact
Local Government		
Cessnock City Council	April to September 2022	Ongoing liaison with planning and engineering officers by means of telephone and emails to discuss transmission pipeline design for crossings of CCC roads, clarification of potential biodiversity impacts as well as providing project updates.
	9 June 2022	Meeting to discuss potential future residential developments, pipeline design for road crossings, and impacts of horizontal directional drilling beneath remnant vegetation.
Newcastle City Council	April to September 2022	Ongoing liaison with planning and engineering officers by means of telephone and emails to discuss transmission pipeline design for crossings of NCC roads, as well as providing project updates.
Maitland City Council	April to September 2022	Ongoing liaison with planning and engineering officers by means of telephone and emails to discuss transmission pipeline design for crossings of proposed MCC roads and residential developments, as well as providing project updates.

5.2.3 Utilities and South Maitland Railway operator

APA has continued consultation with utility providers in relation to potential impacts on their assets as a result of the project and project amendments.

Consultation has continued with Ausgrid and Hunter Water Corporation regarding the design of transmission pipeline crossings of existing services and utilities owned by these organisations, and progression of agreements to enable construction and operation of the relevant transmission pipeline crossings to occur. Discussions with Hunter Water regarding supply of water for the construction phase of the Project have also been ongoing.

Consultation has also been undertaken with Aurizon Pty Ltd, who purchased South Maitland Railways Pty Limited on the 2 March 2022. The transmission pipeline alignment crosses the South Maitland Railway at KP 17.3.

A summary of the consultation undertaken during preparation of the submissions and amendment reports is provided in **Table 5.2** below.

Table 5.2 Summary of consultation with utilities during preparation of the submissions and amendment reports

Agency name	Date	Description and Purpose of Contact
Utilities		
Hunter Water Corporation	April 2022 to September 2022	Ongoing liaison with HWC officers by means of telephone, email and meetings to discuss Project crossing designs for HWC infrastructure, water availability for construction uses, as well as providing project updates.
	23 March 2022	APA submission of a 'development application' to Hunter Water in accordance with Section 49 of the *Hunter Water Act* 1991.
Ausgrid	April 2022 to September 2022	Ongoing liaison with Ausgrid staff by means of telephone, email and meetings to discuss Project crossing designs for Ausgrid easements and infrastructure as well as providing project updates.
Aurizon	April 2022 to September 2022	Ongoing liaison with Aurizon staff by means of telephone, email and meetings to discuss Project crossing designs for the South Maitland Railway as well as providing project updates.

5.2.4 Aboriginal stakeholders

As part of the ongoing development of the amended Project, consultation has continued with representatives of the Aboriginal community in accordance with the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2020* (Office of Environment and Heritage, 2020). As part of this process, the Registered Aboriginal Parties (RAPs) who were involved with the development of the EIS were provided the opportunity to take part in the additional cultural surveys of areas impacted by the amended Project.

The RAPs were also provided with a draft copy of the Aboriginal Cultural Heritage Assessment Report Addendum (Umwelt, 2022) with an invitation to provide comment between 24 August 2022 and 21 September 2022.

Additional consultation did not raise any substantial concerns from the RAPs. Further detail regarding the additional consultation and feedback received from RAPs as part of the amended Project is provided in Section 5.7 of the ACHAR Addendum (**Appendix C4**).

APA will continue to consult with the Aboriginal community throughout the Project, in line with commitments including if there are any unexpected finds of Aboriginal objects during construction.

5.3 Ongoing consultation

Consultation with the community and key stakeholders is ongoing and would continue prior to and during construction of the Project if planning approvals are granted. Ongoing consultation activities would aim to provide the community and stakeholders with awareness of construction processes and activities, updates on the proposed timing of construction and opportunities for feedback and input.

The Project website, email address and free call number will continue to be available prior to and during construction. Targeted consultation methods, such as letters, notifications, signage and face-to-face communications, will also continue to occur.

5.4 Community grants program

In accordance with commitments made in the KKLP EIS, APA has established a KKLP Community Grants Program to benefit local communities. Community groups and organisations located in the region of the Project and within the Cessnock, Maitland and Newcastle Local Government Areas have been encouraged to apply for funding or in-kind support through the fund.

As of 19 September 2022, 32 grant applications had been received and grants to the value of around $98,000 had been allocated. Grants have been provided to support a range of community-initiated projects, events and activities that respond to the local communities' needs and aspirations, and contribute to long-term and sustainable outcomes for the region surrounding the Project.

Examples of community initiatives supported by the KKLP Community Grants Program include:

- Early Link's disability support services for children including indoor playground equipment and craft club resources
- Hunter Valley Animal Facility and Rehoming Centre shelter
- Kurri Kurri High School's kitchenette upgrade
- St John's Ambulance trailer
- The Lions Club of Maitland's support for families with children in hospital
- Towns with Heart's new website
- Hunter Legacy's support for war widows
- Kurri Kurri District Rugby League Club's sporting facility upgrades
- Refurbishment of Kurri Kurri Community Services centre to make it accessible for elderly and people with a disability.

6.0 Assessment of Impacts

This section provides a summary of the additional assessments undertaken to assess the potential construction, operational and cumulative impacts associated with the amended Project. Where required, additional or revised mitigation measures have been proposed. A consolidated summary of all proposed management and mitigation measures, including the commitments identified in the EIS and any changes made in this Amendment Report, is presented in **Appendix B**.

Section 7 of the EIS provided an assessment of the key environmental impacts for the Project as identified in the SEARs. This Amendment Report and its appendices describe proposed changes to Project design and address the key environmental aspects associated with the amended Project, and have been prepared in consideration of the SEARs issued for the Project and the *State Significant Infrastructure Guidelines – Preparing an Amendment Report* (DPE, 2021).

Consideration of the potential environmental impacts was undertaken as part of the development of the amended Project, and potential changes were compared to the environmental impacts described in the EIS. A summary of environmental aspects and their potential to be affected by the amended Project is provided in **Table 6.1**. Technical reports from additional studies undertaken are provided in **Appendix C**.

Table 6.1 Assessment approach

Environmental aspect	Assessment approach	Reference
Land use	There no additional existing or proposed land uses impacted by the proposed amendments to the Project, and amendments have generally been developed to reduce impacts to existing or proposed land uses. This includes refinements to mitigate impacts to the M1 Pacific Motorway, Lower Hunter Freight Corridor, Emerging Black Hill Precinct, Donaldson and Bloomfield coal mining operations and potential post mining land uses, Hunter Water Corporation trunk mains, Cliftleigh and Gillieston Heights housing release areas, the Kurri Kurri Regrowth Project, the Kurri Kurri smelter remediation project and the Hunter Power Project. The amended Project is not expected to cause material adverse impacts to current and proposed land uses during construction or operation.	Additional assessment of land use impacts is not considered to be justified.
Soils and contamination	Sampling for Potential Acid Sulfate Soils (PASS) has been undertaken at the amended location of the JGN Offtake facility. An addendum to the Site Contamination Assessment (RCA 2022) has been prepared to assess the Project amendments outside of the study area assessed for the EIS contamination assessment.	**Section 6.1** and **Appendix C1**
Water	Flood modelling has been extended to include the amended location of the JGN Offtake facility. Revised estimates of water consumption during construction and operation have been developed. An addendum to the Surface Water and Hydrology Assessment (SWHA) has been prepared (Umwelt 2022a).	**Section 6.2** and **Appendix C2**

Environmental aspect	Assessment approach	Reference
Biodiversity	Additional biodiversity surveys have been undertaken for the amended Project. Impacts have been assessed via a revised Biodiversity Development Assessment Report (BDAR) (Umwelt 2022b).	**Section 6.3** and **Appendix C3**
Aboriginal cultural heritage	Additional Aboriginal cultural heritage surveys have been undertaken for the amended Project. Impacts have been assessed via an addendum to the Aboriginal Cultural Heritage Assessment (ACHA) (Umwelt 2022c).	**Section 6.4** and **Appendix C4**
Historic heritage	No changes to historic heritage impacts as assessed in the EIS will occur as a result of the Project amendments. The amended Project will not impact on any heritage items listed on national or State heritage registers. One site of local heritage significance listed under the Cessnock LEP 2011, the 'South Maitland Railway System", is still required to be traversed by the transmission pipeline. A horizontal bore is proposed for the transmission pipeline crossing of the South Maitland Railway, which will avoid direct surface impacts to the railway.	Additional assessment of historic heritage impacts is not considered to be justified.
Air quality and odour	No material changes to air quality impacts are anticipated as a result of the Project amendments. Mitigation measures for construction activities have been refined at for specific locations where separation distances to residences have been reduced. Impacts have been assessed via an addendum to the Air Quality Impact Assessment (AQIA) (GHD 2022a).	**Section 6.5** and **Appendix C5**
Greenhouse gas	The amended Project would result in a small reduction in the total amount of vegetation clearing required during construction and a minor increase in fuel usage during construction associated with the small increase in the length of transmission pipeline. Potential changes to GHG emissions as a result of the Project amendments are provided in **Section 6.6**.	**Section 6.6**
Noise and vibration	Additional noise and vibration modelling for the JGN Offtake facility and qualitative assessments for transmission pipeline alignment changes and compressor/delivery station layout changes have been undertaken. Impacts have been assessed via an addendum to the Noise and Vibration Impact Assessment (NVIA) (Umwelt 2022d).	**Section 6.7** and **Appendix C6**
Transport	Additional traffic modelling has been undertaken to assess the proposed use of Black Hill Road for limited construction deliveries and a qualitative assessment undertaken for all other Project amendments. Impact assessment has been undertaken via an addendum to the Traffic Impact Assessment (TIA) (GHD 2022b).	**Section 6.8** and **Appendix C7**
Hazards and risks	Minor changes to the hazard and risk profile are anticipated due to the amended JGN Offtake facility location and compressor station layout. Impacts have been assessed via an addendum to the Preliminary Hazard Analysis (PHA) (Umwelt 2022e).	**Section 6.9** and **Appendix C8**

Environmental aspect	Assessment approach	Reference
Visual	Minor changes to visual amenity are anticipated at the amended JGN Offtake facility location. Additional photomontages have been prepared and a qualitative assessment of impacts is provided in **Section 6.10** below.	**Section 6.10**
Social and economic	No material changes to social or economic impacts as assessed in the EIS are anticipated as a result of the Project amendments. The amended Project remains within the social locality assessed in the EIS, comprising the 11 state suburbs (SSC) intersected by or proximal to the Project construction footprint. Key perceived negative impacts (to the natural environment, access to recreational areas and public safety) and positive impacts (the potential contribution of the Project to the local and regional economy and facilitation of the energy transition away from coal) identified during the SIA are unlikely to change as a result of Project amendments. These perceived impacts broadly align with submissions made on the EIS, as discussed in detail in the Submissions Report.	Additional assessment of social and economic impacts is not considered to be justified.
Waste management	Minor changes to the Project waste inventory are anticipated as a result of the Project amendments. A revised waste inventory is provided in **Section 6.11** below.	**Section 6.11**
Cumulative impacts	No changes to cumulative impacts are anticipated as a result of the Project amendments.	Additional assessment of cumulative impacts is not considered to be justified.

6.1 Soils and contamination

An Addendum to the preliminary site (contamination) assessment has been prepared by RCA to assess the potential presence of contamination where there has been a change to the construction footprint as a result of the Project amendments. The Preliminary Site (Contamination) Assessment Addendum is attached in **Appendix C1** with a summary of the results provided below. The Preliminary Site (Contamination) Assessment Addendum should be read in conjunction with the previous investigations documented in the EIS.

6.1.1 Impact assessment

An assessment of areas where the Project footprint has been amended such that there may be a change to the previously assessed contamination risk is presented in **Table 6.2**.

Table 6.2 Assessment of amended project footprint

Project Amendment	Assessment Outcome
JGN offtake Facility	The revised location for the JGN offtake facility was not included in the previous assessment, however was sighted during the inspection of the alignment. Historical aerial photographs indicate that the area was cleared in 1954, presumed for rural residential use with the area appearing unchanged in 1975. A number of structures, presumed residences and sheds, were constructed by 1987 along with dams and the area remains generally the same until current. It is considered that there is no activity that is likely to give rise to contamination, which is consistent with the findings of the previous assessment. It is noted that, while the area is outside of the mapped risk area, an acid sulfate soil assessment is being undertaken and will include consideration of contamination in soil samples.
M1 Pacific Motorway and Lower Hunter Freight Corridor crossing	This area was considered in the previous assessment. There was no known contamination in the area with the exception of some minor refuse at the surface. As such, it is considered that no further assessment or management is required.
Broaden Management Industrial Estate	This area was not specifically considered in the previous assessment however portions were sighted. Remediation is proposed for the Broaden Management Industrial Estate and comprises the excavation of contaminated material to be reburied in a designated location, remediated such that it was suitable for use on site or removed from site. The revised alignment will potentially encounter other areas of concern such as a workshop and filled sediment ponds. While it is considered that no further assessment is required for this section of amended alignment, management measures may be specified as part of the implemented remedial strategy at the site. If construction is undertaken prior to the completion of remediation at the site, a management plan for the pipeline construction works must be prepared, taking into account the potential contamination. The amended alignment is considered more likely to encounter additional geotechnical and contamination issues compared to the original alignment.
Crossing of John Renshaw Drive to Donaldson mine	This area was not specifically considered in the previous assessment however portions were sighted. The amended alignment will potentially encounter land which has been subject to mining from sometime between 2001 and 2010 until recently. The current aerial photograph indicates that the land may have been rehabilitated and as such is likely to be fill and require consideration of the suitability of the geotechnical conditions. Depending on the source of the fill, there may be contamination present.
Mine haul road	This area was considered in the previous assessment. The land may have been rehabilitated and as such is likely to be fill with potential geotechnical constraints for the construction. Depending on the source of the fill, there may be contamination present. This assessment is unchanged from the previous assessment, noting that likelihood of encountering fill is likely to be lessened.

Project Amendment	Assessment Outcome
Buchanan Road - east	This area was not specifically considered in the previous assessment. Historical aerial photographs, indicate that the area was partially cleared, presumably for rural residential use, with the remainder of the area vegetated with trees. There is a vehicle track generally consistent with the current access roads. Structures are present in 1966 with additional structures present in 1975 at which time mining to the south and north are visible. The 1987 aerial photograph indicates that mining activities are present within close proximity to the north of the site. The land appears to have been rehabilitated by 1993. As such, the area is likely to be fill with potential geotechnical constraints for construction. Depending on the source of the fill, there may be contamination present.
Buchanan Road - west	This area was considered in the previous assessment to have been subject to mining and filling. Historical aerial photographs indicate that the area to the west of Buchanan Road was partially cleared in 1954 with indications of the waterway generally consistent with its current location; there is mining infrastructure across the road to the east. By 1966 there appears to be a dam as well as a mining waste stockpile and significant infrastructure across Buchanan Road. The extent of mining west of Buchanan Road is generally the same in 1975. The capping and re-vegetation of the stockpile is generally complete and there appears to have been some filling within the dam in 1987; almost all infrastructure to the east of Buchanan Road has been removed. There does not appear to be any changes in 1993 except for filling of the dam which may be incidental rather than targeted. The site appears the same as 1993 in both 1998 and 2001 except for the water level in the dam. The eastern portion of the revised alignment may encounter fill with potential geotechnical constraints for construction. Depending on the source of the fill, there may be contamination present. The potential to encounter fill is lower than the original alignment which traversed the stockpile.
Storage pipeline	This area was considered in the previous assessment. There was no known contamination in the area with the exception of potential acid sulfate soils at the north eastern extremity of the former storage pipeline area. The revised alignment reduces the potential for encountering these soils. As such, it is not considered that further assessment or management is required for the amended storage pipeline.

6.1.2 Management and mitigation strategies

Soil sampling will be undertaken at the amended JGN Offtake facility location with analysis to include acid sulfate soil and contamination potential. The findings of the sampling and analysis will determine the need for any additional management and mitigation strategies to those identified in the EIS.

6.2 Water

An Addendum to the Surface Water and Hydrology Impact Assessment (SWHA) has been prepared to assess the Project amendments, specifically the new location for the JGN offtake facility as it is the only Project amendment that is located outside of the extent of the flood model prepared for the EIS. The other Project amendments are not considered likely to result in any changes to the conclusions of the assessment undertaken for the EIS.

The 2-dimensional TUFLOW hydraulic model developed for the exhibited EIS was used as the basis for the additional assessment and extended to include the amended JGN offtake facility location and to incorporate appropriate flood levels for Hexham Swamp as this location may be influenced by tailwater conditions.

The SWHA Addendum is attached in **Appendix C2** with a summary of the results provided below. The SWHA Assessment Addendum should be read in conjunction with the previous investigations documented in the EIS. Further detail on use of the proposed turkey nest dam at the storage pipeline is also provided below.

6.2.1 Flood modelling results

The revised model was run for the 10 %, 1 %, 0.5 % and 0.2 % Annual Exceedance Probability (AEP) events and the Probable maximum Flood (PMF) for the local catchment critical storm duration determined (i.e. 30 minutes). The results show the following:

- The proposed finished pad level for the JGN offtake facility (approximately 5m AHD) is free from flooding for all design events except the PMF.
- 10 % AEP event – existing contours at the amended location of the JGN offtake facility are predicted to be free from flooding.
- 1 % AEP event – the flood extents have increased for existing contours and a small area at the southern boundary of the amended location of the JGN offtake facility is inundated up to a depth of approximately 250 mm. This corresponds to the low point in the topography along the southern boundary. Note that the flood mapping also shows some minor overland flooding associated with the local catchment/table drain runoff from the north being conveyed through the site. Typically, the flood velocities are up to 1 m/s at the southern boundary. Flooding at the new location is dominated by runoff from the local catchment in the 1% AEP event, with limited influence from tailwater conditions in Hexham Swamp.
- 0.5 % AEP event – the flood inundation extents for existing contours within the amended JGN offtake facility have marginally increased, with inundation depths of 0.7 m at the low point along the southern boundary. Typically, the flood velocities are up to 1 m/s at the southern boundary.
- 0.2 % AEP event – the south-west corner of the existing contours of the amended JGN offtake facility is predicted to experience flood depths up to approximately 1.3 m depth. Typically, the flood velocities are up to 1.8 m/s at the southern boundary.
- PMF event – The entire JGN offtake facility at existing contours and a substantial area of finished pad level is inundated, with maximum depth up to 6.3 m at the southern boundary. There is extensive overtopping of Lenaghans Drive which contributes to high flood velocities up to 8 m/s across the site. The combined flood depth and velocity distributions provide for a high flood hazard category (Hazard category 6). The PMF event represents the largest flood conceivable that could occur at a location.

6.2.2 Water Use and Supply

Estimates of water use during construction have been amended to reflect changes to transmission and storage pipeline lengths, changes to HDD lengths and internal lining of the storage pipeline.

Non-potable water will be required for dust control of the construction ROW and access tracks (with the quantity dependent on conditions and proximity to sensitive receivers), as well as for hydrostatic testing of both pipelines during construction. Water supply will be obtained from a non-potable water service provider or existing landholders with available allocations. Existing clean water dams on the Bloomfield Mine leases, Hunter Water reservoirs and the existing reticulated supply to the HPP site are the most likely sources.

It is estimated that dust control will require 110 kL/km for each pipeline, or approximately 5 ML in total.

Hydrotesting is estimated to require a maximum of 14.5 ML of non-potable water, assuming water will be reused between test sections of the storage pipeline.

Approximately 7.3 ML of water will be required during HDD operations for mixing of drilling fluids. This estimate is based on pipeline construction experience of 0.146 ML per 100 m of HDD and a total HDD length of approximately 5,000 m.

The total estimated water volume required for the construction phase of the Project is 27 ML, a reduction from the 33 ML estimated in the EIS.

6.2.3 Impact assessment

6.2.3.1 Flooding

Potential impacts on flooding regimes are typically related to changes to existing flow distributions and/or loss of temporary flood storage. These changes in hydraulic conditions may provide for localised increases in peak flood levels or flow velocities thereby increasing flood hazard.

The 1 % AEP design flood magnitude is typically the flood planning event applied for setting design flood levels and considering potential flood impacts of the development proposal. The 1 % AEP design flood inundation extent provides for only a small area of inundation of existing contours within the JGN offtake facility boundary. This inundation is limited to the low point in the local topography at the southern boundary. Given the limited inundation extent, any proposed works within the JGN offtake facility boundary will have not have any significant impacts on the existing 1 % AEP flooding condition.

It is noted that flood inundation within the JGN offtake facility boundary increases with the larger design flood magnitudes. However, even up to the 0.2 % AEP flood magnitude the flood inundation across the site remains limited in extent. Any localised filling of existing flood storage for these higher flood magnitude events would not have any significant impact on existing flood conditions given the small flood storage area within the JGN offtake facility boundary compared to the overall flood volumes derived from the wider catchment area and flood storage within Hexham Swamp immediately downstream.

6.2.3.2 Hydrology

The Project could potentially affect hydrology (frequency, volume, rate, duration and velocity) and increase peak stormwater flows during storm events as a result of additional impervious surfaces. The site infrastructure layout and associated stormwater drainage would be confirmed in detailed design.

Stormwater runoff from the offtake facility area discharges directly to the minor watercourse just downstream of Lenaghans Drive, and conveyed a short distance to the broader Hexham Swamp area. Given that JGN offtake facility area represents a relatively small proportion of the overall catchment area, the potential impacts to hydrology as a result of the Project are not considered significant.

6.2.4 Management and mitigation strategies

No additional water management and mitigation measures to those identified in the EIS are proposed for the amended Project.

6.3 Biodiversity

The BDAR prepared for the Project has been revised and updated to assess the amendments to the Project design and address the comments received on the exhibited BDAR (refer to **Appendix C3**). As a result of proposed amendments to the Project footprint, additional areas that were not assessed or fully covered in the BDAR for the exhibited Project were identified. Additional surveys were undertaken during June, July and August 2022 to assess the biodiversity values of these areas.

6.3.1 Survey results

The results of the additional surveys and assessment of amendments to the Project construction footprint are generally consistent with the findings of the exhibited BDAR.

The Plant Community Types (PCTs) and vegetation identified within the amended construction footprint are listed below including the area of each that would be impacted. This includes vegetation within the footprint of both alignment alternatives on the Broaden Management industrial estate but excludes vegetation that has been approved for clearing and legally offset on the Stevens Group Hunter Business Park. The PCTs identified within the amended construction footprint comprise:

- 1071 *Phragmites australis* and *Typha orientalis* coastal freshwater wetlands of the Sydney Basin Bioregion (0.09 ha)
- 1568 Blackbutt - Turpentine - Sydney Blue Gum mesic tall open forest on ranges of the Central Coast (0.89 ha)
- 1590 Spotted Gum - Broad-leaved Mahogany - Red Ironbark shrubby open forest (14.1 ha)
- 1592 Spotted Gum - Red Ironbark - Grey Gum shrub - grass open forest of the Lower Hunter (5.77 ha, excluding 3.1 ha which has been approved for clearing and lawfully offset for other developments)
- 1594 Cabbage Gum-Rough-barked Apple grassy woodland on alluvial floodplains of the lower Hunter (2.28 ha)
- 1598 Forest Red Gum grassy open forest on floodplains of the lower Hunter (1.72 ha)

- 1600 Spotted Gum - Red Ironbark - Narrow-leaved Ironbark - Grey Box shrub-grass open forest of the lower Hunter (30.91 ha)
- 1619 Smooth-barked Apple - Red Bloodwood - Brown Stringybark - Hairpin Banksia heathy open forest of coastal lowlands (1.07 ha)
- 1633 Parramatta Red Gum - Narrow-leaved Apple - Prickly-leaved Paperbark shrubby woodland in the Cessnock-Kurri Kurri area (2.93 ha)
- 1728 Swamp Oak - Prickly Paperbark - Tall Sedge swamp forest on coastal lowlands of the Central Coast and Lower North Coast (0.72 ha)
- 1736 Water Couch - Tall Spike Rush freshwater wetland of the Central Coast and lower Hunter (4.06 ha)
- Planted native vegetation (0.01 ha)
- Non-native vegetation (14.39 ha)
- Cleared/disturbed areas (23.51 ha).

Threatened ecological communities (TECs) identified within the amended construction footprint are described in **Table 6.3**.

Table 6.3 Threatened ecological communities within the amended construction footprint

Threatened ecological community	Act and Listing Status	Area within construction footprint (ha)
Freshwater wetlands on coastal floodplains of the NSW North Coast| Sydney Basin and South East Corner bioregions	Endangered Ecological Community Listed under the BC Act	4.16 ha
Lower Hunter Spotted Gum Ironbark Forest in the Sydney Basin and NSW North Coast Bioregions	Endangered Ecological Community Listed under the BC Act	50.09 ha
River-Flat Eucalypt Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions	Endangered Ecological Community Listed under the BC Act	1.2 ha
River-Flat Eucalypt Forest on Coastal Floodplains of southern NSW and eastern Victoria	Critically Endangered Ecological Community Listed under the EPBC Act	1.2 ha
Hunter Lowland Redgum Forest in the Sydney Basin and NSW North Coast Bioregions	Endangered Ecological Community Listed under the BC Act	1.72 ha
Swamp oak floodplain forest of the NSW North Coast, Sydney Basin and South East Corner bioregion	Endangered Ecological Community Listed under the BC Act	0.72 ha

6.3.2 Impact assessment

The Project design has sought to avoid and minimise biodiversity impacts through strategically locating Project components on land that has been cleared and/or disturbed, is lawfully approved for clearing for other projects, or is adjacent to existing linear infrastructure, wherever practicable. This approach has continued through development of the Project amendments.

The biodiversity impacts associated with the amended Project remain generally in accordance with those identified in the exhibited BDAR. Following the application of avoidance and mitigation measures, and the completion of seasonal biodiversity surveys, the biodiversity credits required under the NSW Biodiversity Assessment Method (BAM) to offset the impacts of the amended Project are identified in **Table 6.4**.

Table 6.4 Project biodiversity credit requirement

Entity	Impact Credits Generated
PCT 1071 *Phragmites australis* and *Typha orientalis* coastal freshwater wetlands of the Sydney Basin Bioregion	2
PCT 1568 Blackbutt - Turpentine - Sydney Blue Gum mesic tall open forest on ranges of the Central Coast	26
1590 Spotted Gum - Broad-leaved Mahogany - Red Ironbark shrubby open forest	412
PCT 1592 Spotted Gum - Red Ironbark - Grey Gum shrub - grass open forest of the Lower Hunter	203
PCT 1594 Cabbage Gum-Rough-barked Apple grassy woodland on alluvial floodplains of the lower Hunter	59
PCT 1598 Forest Red Gum grassy open forest on floodplains of the lower Hunter	58
PCT 1600 Spotted Gum - Red Ironbark - Narrow-leaved Ironbark - Grey Box shrub-grass open forest of the lower Hunter	493
PCT 1619 Smooth-barked Apple - Red Bloodwood - Brown Stringybark - Hairpin Banksia heathy open forest of coastal lowlands	23
PCT 1633 Parramatta Red Gum - Narrow-leaved Apple - Prickly-leaved Paperbark shrubby woodland in the Cessnock-Kurri Kurri area	54
PCT 1736 Water Couch - Tall Spike Rush freshwater wetland of the Central Coast and lower Hunter	78
regent honeyeater (*Anthochaera phrygia*)	24
squirrel glider (*Petaurus norfolcensis*)	204
small-flower grevillea (*Grevillea parviflora* subsp. *parviflora*)	416
Eucalyptus parramattensis subsp. *decadens*	22
netted bottlebrush (*Callistemon linearifolious*)	30

6.3.3 Management and mitigation strategies

No additional biodiversity management and mitigation measures to those identified in the EIS are proposed for the amended Project.

6.4 Aboriginal cultural heritage

As a result of proposed amendments to the Project footprint, discrete additional areas that were not assessed or fully covered in the Aboriginal Cultural Heritage Assessment (ACHA) for the exhibited Project were identified. Additional surveys were undertaken in June and August 2022 and an ACHA Addendum was prepared to assess the impacts of the Project amendments.

A copy of the ACHA Addendum is attached in **Appendix C4** and a summary of the amended impacts is provided in the section below. The ACHA Addendum should be read in conjunction with the previous investigations documented in the ACHA and EIS.

6.4.1 Survey results

The results of the additional survey work carried out in June and August 2022 remained consistent with the expectations set out through the environmental and archaeological context of the wider Project area (see Section 3.0 and 4.0 of the ACHA report). There were no newly recorded Aboriginal sites found during the additional surveys for the amended Project. Four previously registered site areas were located and three new areas of archaeological potential were identified within the amended Project footprint:

- KK10, KK11, KK12 – Artefact scatters and an isolated artefeact on an existing east west access track associated with a power line easement north of the interconnect pipeline HDD pad. These sites have previously been assessed as being demonstrative of Aboriginal occupation in the area, however, not individually representative of specific cultural significance to the Aboriginal community (AMBS 2009). During the current inspection there were no artefacts found at these site areas.

- Hydro AS22 14 – Artefact scatter on an existing access north south access track that connects the interconnect pipeline HDD pad with the access track and power easement on which kk10, KK11 and KK12 are located. There were approximately 20 red and red/yellow silcrete flakes and flaked pieces identified during the current inspection.

- Survey Unit (SU) 11 – An area of PAD (KKLP PAD 08) was identified at the western extent of the JGN Offtake facility construction footprint on an elevated landform adjacent to a minor drainage line that flows into Hexham Swamp. The western section of the construction footprint for the JGN offtake facility overlaps with this PAD. The PAD was not able to be surveyed on foot due to access and safety restrictions and as such was identified based on the landform type and proximity to a major resource area. The area has previously been cleared and subject to cattle grazing. It is likely that some of the topsoil has been disturbed as a result of prior land-use. However, intact A horizon may still exist. The Registered Aboriginal Parties (RAPs) in attendance during the survey identified that test excavation should be undertaken in this area to determine the presence of archaeological material, and its nature and extent.

- SU17 – An area of PAD (KKLP PAD 10) was identified on a gently inclining slope to the south-west of a small unnamed tributary of Buttai Creek, to the north of SU16. Due to limited visibility across the survey area, an assessment of the extent of prior disturbance could not be undertaken, however, in the context of the wider landscape it is likely that the area has been subject to extensive disturbance in relation to the historic and contemporary agricultural land use. The location would have represented an elevated area in proximity to a perennial water course (Buttai Creek), suitable for occupation or as a camping location. The amended Project construction footprint will require disturbance to the area, with the north-eastern and eastern extent of the PAD to be traversed by the transmission pipeline alignment between approximately KP 13.2 and KP 13.4.

- SU18 – An area of low to moderate archaeological potential was identified along the northern and southern banks of an unnamed ephemeral tributary of Four Mile Creek transecting SU18. The transmission pipeline traverses this tributary near KP 6.7. Due to extensive vegetation growth along the banks of the creek line, and safety concerns, the creek bank was not inspected. Similarly, the northern bank and sloping landform was only inspected from a distance. Discussions with RAPs in the field raised concerns regarding the potential significance of the area due to its elevated nature and proximity to a watercourse. It was noted that the general area showed evidence of prior disturbance relating to historic land use and timber felling. Minimal mature growth remains, and although revegetation has taken place, the vast majority of vegetation was juvenile. This would suggest that the wider area has been impacted, potentially in a subsurface context during clearance activities. The RAPs requested that, where possible, impacts to the creek line be minimised. The RAPs further discussed the preference of undertaking trench excavations along the crestline in order to achieve an exploratory sample of the landform and where this is not possible, that works in proximity to the creek line be monitored by a suitable Aboriginal representative.

6.4.2 Impact assessment

Where possible, in amending the Project footprint, APA has endeavoured to avoid identified Aboriginal sites and areas identified as possessing archaeological potential. As a result, the following previously identified Aboriginal sites/PADs are no longer considered at risk of disturbance in relation to the amended Project:

- Hydro-AS29-14 (#37-6-3071)
- Ironbark 1 (#38-4-0338)
- ISF3/ISF4 (#38-4-0376)
- TH-PAD-001 (#38-4-1997)
- Woods Gully (#38-4-0410)
- Northern Swamp Tributaries 1 (#37-6-1653 (alt))
- Northern Swamp Tributaries 2 (#37-6-1652)
- KKLP IA1
- KKLP IA2

- KKLP IA3
- KKLP IA4
- KKLP IA5
- KKLP IA6
- KKLP IA7
- KKLP AS1
- KKLP AS2.

As illustrated in Figure 6.1 A-F of Appendix C4, a total of 11 identified PADs will be impacted by the amended Project footprint, inclusive of the newly identified PADs. The impact assessment for identified Aboriginal sites/PADs is provided in **Table 6.5**.

Table 6.5 Impacted Sites/PADs

AHIMS ID	Site Name	Site Type	Impact Assessment
June/August 2022 surveys			
37-6-1960	KK12	Artefact	Site area identified during survey; no artefactual material found. Site located on proposed access track and will be impacted.
37-6-1959	KK11	Artefact	Site area identified during survey; no artefactual material found. Site located on proposed access track and will be impacted.
37-6-1958	KK10	Artefact	Site area identified during survey; no artefactual material found. Site located on proposed access track and will be impacted.
37-6-3065	Hydro AS22 14	Artefact	Site area identified during survey with artefactual material identified. Highly disturbed. Site located on proposed access track and will be impacted.
Not registered	KKLP PAD 11	PAD	Site located on elevated area either side of the drainage line. Will be partially impacted.
Not registered	KKLP PAD 12	PAD	Site located on elevated area either side of the drainage line. Will be partially impacted.
Not registered	KKLP PAD 10	PAD	Site located on upper crest near tributary of Buttai Creek. Site is located within the impact footprint.
Not registered	KKLP PAD 08	PAD	Site located on upper slope/crest near minor tributary. Site is partially located within the impact footprint.
Previously identified sites/PADs			
37-6-3054	Hydro AS11 14	Artefact scatter	Site not identified during survey but may remain extant. Site located within impact footprint for proposed access track.
Not registered	Hydro IA09 14	Isolated artefact	Site not identified during survey but may remain extant. Site located within impact footprint for storage bottle workspace.
37-6-3063	Hydro AS20 14	Artefact scatter	Site not identified during survey but may remain extant. Site located within impact footprint for proposed access track.

AHIMS ID	Site Name	Site Type	Impact Assessment
37-6-1957	KK09	Isolated artefact	Site not inspected but may remain extant. Site located within impact footprint for proposed access track.
Not registered	Hydro IA24 14	Isolated artefact	Not inspected as part of current survey. Assumed to remain extant. Site located within impact footprint for proposed access track.
Not registered	Hydro IA25 14	Isolated artefact	Not inspected as part of current survey. Assumed to remain extant. Site located within impact footprint for proposed access track.
Not registered	KKLP PAD 07	PAD	Site located on gently inclined lower slope to the west of Swamp Creek. Located within impact footprint.
Not registered	KKLP PAD 06	PAD	Site located on a low elevation spur on the eastern edge of Swamp Creek/Wentworth Swamp. Located within impact footprint.
Not registered	KKLP PAD 05	PAD	Site located on a low elevation spur on the eastern edge of Swamp Creek/Wentworth Swamp. Located within impact footprint.
Not registered	KKLP PAD 04	PAD	Site located on an elevated section of lower slope to the north of Testers Hollow. Located within impact footprint.
38-4-1997	TH PAD 002	PAD	Site located on upper slope from Testers Hollow. Located within impact footprint.
Not registered	KKLP PAD 02	PAD	Site located on mid to lower slope between Wallis and Buttai Creek. Located within impact footprint.
38-4-1008	A21/A	Artefact scatter	Site remains extant 30 m from original recorded coordinate. Part of site may extend into impact footprint for proposed transmission pipeline.
38-4-0959	A20/A	Artefact scatter	Site remains extant 20 m from original recorded coordinate. Part of site may extend into impact footprint for proposed transmission pipeline.
Not registered	KKLP PAD 01	PAD	Extension of Woods Gully site (#38-4-0410). Located within impact footprint.

6.4.3 Management and mitigation strategies

The recommendations for the amended Project are consistent with the recommendations of the exhibited Project (refer to Section 10.0 of ACHA report).

The mitigation methodologies presented in Section 11.0 of the ACHA report also apply to the additional three areas of low to moderate and moderate archaeological potential identified in SU11, SU17 and SU18 and the previously recorded archaeological site in SU23 (Hydro-AS22-14).

In summary, the ACHA proposed a management strategy which avoided impacts where possible, however where impacts cannot be avoided, community collection of identified artefacts is recommended. Where impacts are proposed to occur within the 11 identified areas of PAD, prior to the commencement of construction works an updated inspection of the PADs will be undertaken by an appropriately qualified archaeologist in order to clearly demarcate the impact area and extent of excavation required (refer to Section 11.2 of the ACHA).

6.5 Air quality and odour

An Addendum to the Air Quality Impact Assessment (AQIA) has been prepared by GHD to assess the amendments to the Project design and is attached in **Appendix C5**. A summary of results is provided below. The AQIA Addendum should be read in conjunction with the previous investigations documented in the AQIA and EIS.

The Project amendments which affect the construction air quality impacts reported in the EIS are:

- JGN offtake facility
- Transmission pipeline realignment – Buchanan Road east
- Additional access track – Valley View Lane to construction footprint
- Additional access track – Main Road to construction footprint
- Additional access track – Bishops Bridge Road to HDD construction footprint.

Assessment of the impacts of each of these design changes was undertaken to determine impacts on the nearest sensitive receptors. This included all previously identified sensitive receptors as identified in Section 3.4 of the AQIA and any additional sensitive receptors identified within the buffer distances calculated in Section 5.3 of the AQIA.

The AQIA identified dust during construction (PM_{10}) as the primary emission of concern for the Project. The buffer distances calculated in Section 5.3 of the AQIA were used to determine where compliance with PM_{10} criteria would be achieved, or where additional mitigation would be required, based on the construction activity scenario for that location.

Buffer distances were calculated based on the assumption that Level 1 watering (2 L/m^2/h) would be applied during construction works at all locations, except for under activity scenario 5, which assumes no watering is undertaken. Scenario 5 is general construction of compressor and delivery stations and general construction of the JGN Offtake facility and JGN delivery facility. Where receptors are located within the calculated buffer distance, additional mitigation would be required, as identified in **Table 6.4** below. No additional modelling was completed.

6.5.1 Impact assessment

Results for each of the Project design amendments are provided in **Table 6.6** below. Construction activity scenarios are described in Section 5 of the AQIA. In summary, Level 2 watering is sufficient to meet air quality criteria at all locations with the exception of 325 Mount Vincent Road for which additional measures have been recommended.

Table 6.6 Air quality assessment results

Amendment	Activity scenario[2]	Affected sensitive receptor	Buffer distance required	Discussion
Additional access track - Valley View Lane to construction footprint	1	R25	Level 1: 80 m Level 2: 50 m	232 Valley View Lane is located 65 m from the access track therefore Level 2 watering is required along a section of the access track to mitigate any impacts.
Additional access track - Main Road to construction footprint	1	R12 and R13	Level 1: 230 m Level 2: 110 m	527 and 532 Main Road are located 175 m and 125 m from the access track respectively therefore Level 2 watering is required along the entire access track to mitigate any impacts.
Additional access track - Bishops Bridge Road to HDD construction footprint	1	No receptors within buffer distance	Level 1: 230 m Level 2: 110 m	All receptors are further than 230 m from the access track therefore Level 1 watering is sufficient to mitigate any impacts.
Buchanan Road East	2	R16 (residential cluster)	Level 1: 190 m Level 2: 110 m	537 and 538 Louth Park Road and 311 and 319 Mount Vincent Road are within 190 m from the transmission pipeline therefore Level 2 watering is required along a section of the transmission pipeline to mitigate any impacts.
				325 Mount Vincent Road is located 70 m from the transmission pipeline therefore Level 2 watering is not sufficient. Additional mitigation is required when working within 110 m of the receptor.
JGN offtake facility	5	No receptors within buffer distance	Level 1: 160 m	All receptors are further than 160 m from the JGN Offtake facility therefore no additional mitigation is required.

Note: 2 Activity scenario 1 - Combined light and heavy vehicles on unpaved roads
Activity scenario 2 - General construction of transmission pipeline and light vehicles on unpaved roads
Activity scenario 5 – General construction of associated surface facilities.

Operational and cumulative air quality impacts (including odour) are unchanged. These remain as described in Sections 5.4.2 and 5.4.3 of the AQIA.

The residual air quality risks associated with the Project remain minor.

6.5.2 Management and mitigation strategies

General mitigation should be applied throughout construction as described in Section 6.1 of the AQIA, and in other areas requiring specific dust mitigation as described in Section 6.2 of the AQIA.

For the Project amendments, Level 2 watering is recommended at three locations:

- Along a section of the Valley View Lane access track
- Along the entire Main Road access track
- Along a section of the realigned transmission pipeline – Buchanan Road east.

The Buchanan Road east amendment of the transmission pipeline alignment at KP12.0 requires works to be completed within 110 m of the nearest sensitive receptor (325 Mount Vincent Road). Measures in addition to Level 2 watering are required at this location, including minimising construction works (including vehicle traffic) when the wind is blowing towards the receptor and dust is observed leaving construction site boundary.

6.6 Greenhouse gas

The amended Project would result in a minor reduction in the amount of vegetation clearing required during construction as well as a small increase in the length of transmission pipeline to be constructed. The reduction in vegetation clearing would result in a minor decrease in the Scope 1 emissions due to a reduced loss of carbon sink, while the increase in length of transmission pipeline would require more fuel use during construction with a marginal increase in resulting Scope 1 construction emissions. Overall, the highly conservative emissions estimate identified in the EIS remains valid and construction emissions would not meet the threshold for application for National Greenhouse and Energy Reporting or the Emissions Reduction Fund Safeguard Mechanism.

No changes to the operational emissions are anticipated as a result of the amended Project.

6.6.1 Management and mitigation strategies

No additional management and mitigation measures to those identified in the EIS are required for the amended Project.

6.7 Noise and vibration

An Addendum to the Noise Impact Assessment (NIA) has been prepared to assess the Project amendments that have the potential for noise impacts. The NIA Addendum is attached in **Appendix C6** with a summary of the results provided below. The NIA Addendum should be read in conjunction with the previous investigations documented in the NIA and EIS.

The Project amendments which affect the noise impacts reported in the EIS are:

- JGN offtake facility
- Compressor and delivery station
- Transmission pipeline and storage pipeline realignment – construction scenarios.

6.7.1 Impact assessment

6.7.1.1 JGN offtake facility

The noise prediction model for the JGN offtake facility was updated to reflect the latest design information and location of the facility. As described in Section 6.3.2 of the NIA submitted with the EIS, the pressure control valves (PCVs) are the primary operational noise source for the JGN offtake facility.

The updated predicted noise levels at nearby sensitive receivers are presented in **Table 6.5** along with the applicable night-time noise criteria. A +5 dB penalty has been conservatively applied to the noise predictions to account for the potential for low-frequency characteristics, depending on the final valve selection.

Table 6.7 Predicted Operational Noise Levels LAeq(15min) from the JGN Offtake Facility, dB(A)

Receiver ID	Night Period Criteria LAeq(15min) dB(A)	Predicted Noise Level LAeq(15min) dB(A) [1] Based on Vendor Supplied Data	Predicted Noise Level LAeq(15min) dB(A) [1] Based on Library Reference Spectrum	Exceedance
R8-1	38	< 20	< 20	Nil
R8-2	38	< 20	28	Nil
R8-3	38	< 20	33	Nil
R8-4	38	33	35	Nil
R8-5	38	30	33	Nil
R8-6	38	24	28	Nil
R8-7	38	< 20	< 20	Nil
R8-8	38	< 20	< 20	Nil

Note: [1] A modifying factor of +5 dB(A) has been applied to the prediction results.

As indicated in **Table 6.7**, the noise levels for the change of location, latest design and proposed equipment are predicted to comply with the applicable noise criteria nominated in the NIA at all receivers. A sensitivity analysis undertaken indicates that an increase in the low-frequency noise energy content for the PCVs would increase the predicted noise levels. However, with the inclusion of the reference spectrum, the noise levels are still predicted to comply with the noise criteria at all receivers.

During the detailed design phase for the project, it is recommended that the final equipment selections are confirmed and the potential noise emissions from the facility are updated, if different from the noise data presented in **Appendix C6**.

6.7.1.2 Compressor and delivery station

The rearrangement of the Compressor and Delivery Station equipment has been incorporated into the noise model. The updated noise level predictions are unchanged from the results previously presented in the NIA and EIS.

6.7.1.3 Transmission pipeline and storage pipeline realignment – construction scenarios

Alignment changes for the transmission pipeline and storage pipeline has resulted in the pipeline being located nearer to some sensitive receivers and further from other sensitive receivers. This has the potential to increase the construction-related noise impacts at some locations and decrease the potential impacts at other locations along the alignment. An update to the locations of HDD entry and exit points has also been incorporated within the assessment of the construction noise.

For the updated noise assessment, the areas of interest were the following:

- Changes to the transmission pipeline alignment between KP 0.0 and KP 6.0, including the relocation of the JGN Offtake Facility and HDD under the M1 Pacific Motorway.
- Changes to the transmission pipeline between KP 11.5 and KP 15.7, including on the eastern side of Buchanan Road, between Buchanan Road and Main Road and on the western side of Main Road.
- A reduction in the east-west length of the storage pipeline construction footprint.

Based on the design changes noted above, the noise prediction results have been updated for the following construction scenarios that were previously presented in the EIS:

- Scenario 1: Combined construction activities during standard hours.
- Scenario 2: HDD and horizontal drilling/boring activities that occur outside of standard hours.
- Scenario 3: Storage Pipeline activities outside of standard hours.

The updated results for each scenario are discussed in the following sections. The revised summary tables for the predicted noise impacts are presented in **Appendix C6**, along with updated noise impact category maps.

Scenario 1 – Standard Hours Construction Activities

The predicted noise levels for construction Scenario 1 indicate a range of potential noise levels across each Noise Catchment Area (NCA). A number of sensitive receivers are predicted to experience noise levels above the applicable noise management levels. The change in noise level perception categories from the EIS to the amended Project for standard hours is summarised in **Table 6.6**.

Table 6.8 Summary of receivers within noise level perception category for Scenario 1

Period	Perception Category	Previous No. Receivers	Updated No. Receivers	Change
Standard hours	Highly intrusive	1	3	+2
	Moderately intrusive	17	23	+6
	Clearly Audible	1,074	1,065	-9
	Total	**1,092**	**1,091**	**-1**

These results represent a net reduction in the overall number of receivers that may be affected by the Project, although there is a small increase in the number of receivers in the highly intrusive category and the moderately intrusive category.

The noise modelling results and analysis for average noise levels indicate that reasonable and feasible noise mitigation measures are required to minimise the potential impacts on the communities surrounding the Project.

The predicted noise levels at the Industrial and Infrastructure land-use type receivers indicate a range of potential noise levels across each NCA. The noise levels are predicted to comply with the noise management level of 75dB(A) LAeq(15min) for these receivers.

The predicted noise levels at the Kurri Kurri Tafe are 49 dB(A) LAeq(15min) which comply with the applicable noise management level of 55 dB(A) LAeq(15min). Similarly, the predicted noise levels at the Kurri Kurri High School are 42 dB(A) LAeq(15min) which comply with the applicable noise management level of 55 dB(A) LAeq(15min).

Scenario 2 – Outside Standard Hours HDD and Horizontal Boring Activities

The predicted noise levels for construction Scenario 2 for construction activities occurring outside of standard hours indicate a range of potential noise levels across each NCA. A number of sensitive receivers are predicted to experience noise levels above the applicable noise management levels in each period. The change in noise level perception categories from the EIS to the amended Project for each construction period is summarised in **Table 6.9**.

Table 6.9 Summary of receivers within noise level perception category for Scenario 2

Period	Perception Category	Previous No. Receivers	Updated No. Receivers	Change
Day	Highly Intrusive	0	0	0
	Moderately Intrusive	1	2	+1
	Clearly Audible	62	44	-18
	Noticeable	658	514	-144
	Total	**721**	**560**	**-161**
Evening	Highly Intrusive	0	1	+1
	Moderately Intrusive	12	4	-8
	Clearly Audible	620	508	-112
	Noticeable	960	1,027	+67
	Total	**1,592**	**1,540**	**-52**
Night	Highly Intrusive	0	1	+1
	Moderately Intrusive	29	12	-17
	Clearly Audible	1,150	991	-159
	Noticeable	1,582	1,591	+9
	Total	**2,761**	**2,595**	**-166**

These results represent a net decrease in the overall number of receivers that may be affected by the Project. While there is a small increase in the number of receivers in the highly intrusive category, there is a decrease in the number within the moderately intrusive and clearly audible categories.

The predicted sleep disturbance noise levels (LAmax) are summarised in **Appendix C6**. The modelling results indicate that 96 receivers (an increase from 64) across NCAs 4a, 6a, 6c and 8a are predicted to receive noise levels above the sleep disturbance noise management level of 52 dB(A) LAmax.

The noise modelling results and analysis for both the average noise levels and the sleep disturbance noise levels indicate that reasonable and feasible noise mitigation measures are required to minimise the potential impacts on the communities surrounding the Project.

The predicted noise levels at the Industrial and Infrastructure land-use type receivers indicate a range of potential noise levels across each NCA. The noise levels are predicted to comply with the noise management level of 75dB(A) LAeq(15min) for these receivers.

The predicted noise levels at the Kurri Kurri Tafe are 40 dB(A) LAeq(15min) which comply with the applicable noise management level of 55 dB(A) LAeq(15min). Similarly, the predicted noise levels at the Kurri Kurri High School are 35 dB(A) LAeq(15min) which comply with the applicable noise management level of 55 dB(A) LAeq(15min).

Scenario 3 – Outside Standard Hours Storage Pipeline Activities

The predicted noise levels for construction Scenario 3 for construction activities outside of standard hours indicate a range of potential noise levels across each NCA. A number of sensitive receivers are predicted to experience noise levels above the applicable noise management levels in each period. The change in noise level perception categories from the EIS to the amended Project for each construction period is summarised in **Table 6.10**.

Table 6.10 Summary of receivers within noise level perception category for Scenario 3

Period	Perception Category	Previous No. Receivers	Updated No. Receivers	Change
Day	Noticeable	4	1	-3
Evening	Noticeable	31	4	-27
Night	Clearly Audible	5	2	-3
	Noticeable	261	134	-127

These results represent a net reduction in the overall number of receivers that may be affected by this activity. Consistent with the NIA presented in the EIS, no receivers are expected to experience moderately intrusive noise levels or greater during any time period for construction work outside of standard hours.

The predicted sleep disturbance noise levels (LAmax) are predicted to comply with the applicable sleep disturbance noise management levels of 52 dB(A) LAmax (or 53 dB(A) LAmax for NCA 2a).

The noise modelling results and analysis for both the average noise levels and the sleep disturbance noise levels indicate that reasonable and feasible noise mitigation measures are required to minimise the potential impacts on the communities surrounding the Project.

The predicted noise levels at the Industrial and Infrastructure land-use type receivers for the various construction activities indicate a range of potential noise levels across each NCA. The noise levels are predicted to comply with the noise management level of 75dB(A) LAeq(15min) for these receivers.

The predicted noise levels at the Kurri Kurri Tafe are 39 dB(A) LAeq(15min) which comply with the applicable noise management level of 55 dB(A) LAeq(15min). Similarly, the predicted noise levels at the Kurri Kurri High School are less than 35 dB(A) LAeq(15min) which comply with the applicable noise management level of 55 dB(A) LAeq(15min).

6.7.2 Management and mitigation strategies

No additional management and mitigation measures to those identified in the EIS are required for the amended Project.

6.8 Transport

An Addendum to the Traffic Impact Assessment (TIA) has been prepared by GHD to assess the Project amendments that have the potential to impact traffic and transport. The TIA Addendum is attached in **Appendix C7** with a summary of the results provided below. The TIA Addendum should be read in conjunction with the previous investigations documented in the TIA and EIS.

The Project amendments considered in the updated TIA are as follows:

- JGN offtake facility relocation.
- Limited use of a 3 km section of Black Hill Road during from John Renshaw Drive to the Broaden Management industrial estate access track for limited truck deliveries during construction:
    - Nine truck deliveries of line pipe from the stockpile on Donaldson Coal Mine over one day.
    - Five truck deliveries for mobilisation of HDD equipment over one day (delivered on a different day to pipe deliveries).
    - Five truck deliveries for de-mobilisation of HDD equipment over one day (HDD will take approximately 1 month to complete).
    - All deliveries using this section of Black Hill Road would be carried out outside of peak traffic periods and school drop-off times.
- Construction delivery haulage routes:
    - Equipment skids (for associated surface facilities) to be delivered from Port Kembla rather than the Port of Newcastle.
    - New haulage route – M1 Pacific Motorway > Hunter Expressway > Harts Road > compressor station/delivery station.

- New haulage route – M1 Pacific Motorway > Lenaghans Drive > JGN Offtake facility.
- 70 % of equipment skid deliveries to compressor station/delivery station; 30 % of equipment skid deliveries to JGN offtake facility.
- Pipe segment deliveries would still occur from the Port of Newcastle.

- Sight distance at new site access points for the JGN offtake facility and Broaden Management access track:
  - Lenaghans Drive. To access the JGN offtake facility, two potential access points are being considered. These are a direct access off Lenaghans Drive (referred to as Lenaghans Drive south) , or use of approximately 50m of Wayaba Road prior to using a service road that runs parallel to Lenaghans Drive (referred to as Leneghans Drive north).
  - Black Hill Road turnoff to Broaden Management access track.

6.8.1 Impact assessment

6.8.1.1 JGN offtake facility relocation

The relocation of the offtake facility would not impact vehicle routes for both light and heavy vehicles.

This design update is not expected to affect the outcomes of the original TIA (GHD, March 2022) in terms of vehicle traffic and LOS for Lenaghan's Drive.

6.8.1.2 Limited use of Black Hill Road during construction

All truck deliveries along Black Hill Road would be carried out outside of peak traffic periods and school drop-off/pick-up times. Additionally, the deliveries would not occur during the same day, and are not expected to coincide with the peak construction period.

To assess the potential impact to the Level of Service (LOS) for Black Hill Road, a mid-block assessment was undertaken assuming four truck deliveries per hour (equivalent to eight vehicle movements per hour). This conservatively assumes 20 truck deliveries per day delivered across a 5-hour off-peak window between 10:00 am–3:00 pm.

For the year 2023, even with additional traffic from the construction activities, Black Hill Road would continue to operate at LOS A. The use of Black Hill Road for limited truck deliveries would not negatively impact road operations.

6.8.1.3 Construction delivery haulage routes

The original TIA (GHD, March 2022) indicated that, even with construction traffic in 2023, the M1 Pacific Motorway would continue to operate at the range of LOS A to B and Hunter Expressway would continue to operate at LOS A. Both roads would have ample capacity to accommodate the additional vehicles associated with the change in haulage route for equipment skids.

The change in haulage route would divert approximately 94 truck deliveries (over the entire course of the construction period) away from local roads and New England Highway (currently operating at LOS B to D) to the higher-capacity M1 Pacific Motorway and Hunter Expressway. This change would reduce traffic impacts to the immediate road network and minimise use of local roads near the Port of Newcastle.

6.8.1.4 Site distance at new access points

The site distances for the new access points were reviewed with regard to the requirements identified in *Austroads Guide to Road Design Part 4A: Unsignalised and Signalised Intersections* (Austroads, 2021). The results are presented in **Table 6.11**.

Table 6.11 Sight distance requirements for the new access points.

Location	Design Speed (km/h)	ASD (minimum requirement)			SISD (minimum requirement)		
		Required (m)		Measured (direction from access)	Required (m)		Measured (direction from access)
		Cars	Trucks		Cars	Trucks	
Lenaghans Drive (north)	80	114	131	300 m (north)	181	216	300 m (north)
				270 m (south)			270 m (south)
Lenaghans Drive (south)	80	114	131	120 m (north)	181	216	230 m (north)
				70 m (south)			190 m (south)
Black Hill Road	80	114	131	60 m (west)	181	216	160 m (west)
				100 m (south)			150 m (south)

Requirements derived from Austroads Guide to Road Design Part 4A: Unsignalised and Signalised Intersections (Austroads, 2021)

As shown, the measured sight distances for Lenaghans Drive south access and Black Hill Road do not meet minimum sight distance requirements. Both access points are located near road crests, with tall grass and/or trees obscuring the view. Traffic management measures would be required to mitigate potential safety impacts during use of these access points.

6.8.2 Management and mitigation strategies

The following modified or additional management and mitigation strategies would be implemented for the amended Project:

- Use of Black Hill Road by Project construction traffic will be limited to the following:
    - The M1 overpass and north of the roundabout connecting to the M1 on-ramp for traffic accessing the construction footprint at KP 0.9.
    - Between John Renshaw Drive and the access track entry point to the Broaden Management industrial estate. This section of Black Hill Road will only be used for deliveries of pipe segments and mobilisation and demobilisation of HDD equipment. Hours of use will be limited to weekdays between the hours of 9am and 2pm.
- The following guidance will be incorporated into the Traffic Management Plan for the Project:
    - Vehicles accessing the JGN Offtake facility site from the north should preferentially utilise the northern access point from Lenaghans Drive and Wayaba Road.

6.9 Hazards and risks

The EIS included a Preliminary Hazard Analysis (PHA) prepared in accordance with the SEARs, relevant guidelines and legislative requirements. As some of the Project amendments may have the potential to alter the hazards and risks identified in the EIS, an addendum to the PHA (attached in **Appendix C8**) has been prepared to re-assess hazards and risks where applicable. The Project amendments considered in this assessment are for the associated surface facilities, transmission pipeline and storage pipeline. The additional access tracks are not considered likely to alter any hazards and risks identified in the EIS.

As per the EIS, the key guidance material for assessing hazards and risks associated with the Project amendments is *Hazardous Industry Planning and Advisory Paper No 4 – Risk Criteria for Land Use Safety Planning (HIPAP 4)* (NSW Department of Planning, 2011). The following section contains a summary of the key outcomes of the PHA addendum.

6.9.1 JGN offtake facility

The location of the JGN offtake facility presented in the EIS was within a rural residential area with no dwellings located within the hazardous event fatality impact extent, i.e. the jet fire thermal radiation contour adopted as having a 100 % fatality impact (12.6 kW/m^2), and assessed based on HIPAP 4 risk criteria for active open space land use. The cumulative risk of a flange jet fire within the JGN offtake facility and the transmission pipeline was estimated to be 9.89 x 10-7 fatalities /year which is below the HIPAP 4 risk criteria for active open space land use of 10 x 10-6 fatalities/year.

The relocated JGN offtake facility is also in a rural residential area with no dwellings within the fatality or injury impact zones. The facility boundary is approximately 180 m from the nearest dwelling to the north east and approximately 240 m from the nearest dwelling to the south. As such, the relocated JGN offtake facility has been assessed based on HIPAP 4 criteria for active open space.

There are no changes assumed in the operating pressures or pipe mechanical design (including the number and size of pipe fittings such as flanges) associated with the relocation of the JGN offtake facility for this analysis. As such, there is no change to the worst case hazard event consequences or frequency of hazardous events. Therefore, the individual fatality risk associated with the relocated JGN offtake facility is considered to remain unchanged and below HIPAP 4 criteria, i.e. 10 x 10-6 fatalities/year. Note that HIPAP 4 injury risk criteria does not apply to active open space land use.

6.9.1.1 Transmission pipeline realignments

The cumulative risks associated with all credible transmission pipeline failure modes and leak sizes at any point along the transmission pipeline alignment was estimated to be 2.39 x 10-7 fatalities/year and 3.87 x 10-7 injuries/year which are below the HIPAP 4 criteria for residential land use of 1 x 10-6 fatalities/year and 50 x 10-6 injuries/year respectively.

Most of the transmission pipeline realignments are relatively minor and not located in proximity to residences or other sensitive land uses. The key transmission pipeline realignment to be assessed is east of Buchanan Road as the transmission pipeline will be closer to residences clustered around the intersection of Louth Park Road and Mount Vincent Road.

The realignment of the transmission pipeline east of Buchanan Road does not result in a change to:

- the land use category and therefore the HIPAP 4 risk criteria that applies
- the range in credible loss of containment scenarios
- the extent of hazardous event impacts, including the jet fire thermal radiation contour adopted as having a 100 % fatality impact (12.6 kW/m^2) and the jet fire thermal radiation contour adopted as having an injury impact (4.7 kW/m^2)
- the frequency of credible hazardous events.

Therefore, the risk of injury and fatality associated with the transmission pipeline realignment is considered to remain unchanged and below HIPAP 4 criteria, i.e. 1 x 10-6 fatalities/year and 50 x 10-6 injuries/year.

6.9.1.2 Storage pipeline amended footprint

The cumulative risk associated with all credible storage pipeline failure modes and leak sizes at any point along the storage pipeline was estimated to be 1.98 x 10-5 fatalities/year which is below the HIPAP 4 criteria for residential land use of 10 x 10-6 fatalities/year. Note that HIPAP 4 injury risk criteria does not apply to active open space land use.

The refined storage pipeline amended footprint does not result in a change to:

- the land use category and therefore the HIPAP 4 risk criteria that applies
- the range in credible loss of containment scenarios
- the extent of hazardous event impacts, including the jet fire thermal radiation contour adopted as having a 100 % fatality impact (12.6 kW/m^2)
- the frequency of credible hazardous events.

Therefore, the risk of injury and fatality associated with the transmission pipeline realignment is considered to remain unchanged and below HIPAP 4 criteria, i.e. 10 x 10-6 fatalities/year.

6.9.1.3 Compressor and delivery station

The rearrangement of the Compressor and Delivery Station equipment results in the compressors and aftercoolers being closer to the northern site boundary which adjoins the HPP. Hazardous events associated with the compressors and aftercoolers were a compressor enclosure vapour cloud explosion (VCE) and a jet fire due ignition of a gas release from an aftercooler pipe rupture. The fatality consequences associated with these hazard events did not extend off-site for the original Compressor and Delivery Station arrangement assessed in the EIS. However, the amended layout results in potential fatality impacts due to overpressure and thermal radiation extending off-site into the neighbouring property to the north that is for industrial land use with a HIPAP 4 risk criteria of 50 x 10^{-6} fatalities/year.

The EIS assessed the cumulative individual fatality risk on the neighbouring industrial land based on a DN400 flange jet fire (associated with the Compressor and Delivery Station pipework), a jet fire from the transmission pipeline (for all failure modes) and a jet fire from the interconnect pipeline (for all failure modes). Given the proposed rearrangement of the Compressor and Delivery Station, the cumulative off-site individual fatality risk also needs to account for a compressor enclosure VCE and aftercooler jet fire. The cumulative individual fatality risk at the neighbouring industrial property associated with the rearranged Compressor and Delivery Station is estimated to be 7.11×10^{-6} which is below the HIPAP 4 risk criteria of 50×10^{-6} fatalities/year.

6.9.2 Management and mitigation strategies

No additional management and mitigation measures to those identified in the EIS are required for the amended Project.

6.10 Visual

The visual impacts of the amended Project remain generally as described in the exhibited EIS with the exception of two changes as follows:

- Relocation of the JGN offtake facility to the eastern side of Lenaghans Drive.
- Potential increase in vent height at compressor/delivery station.

The potential impact related to these project changes is discussed below.

6.10.1 Impact assessment

6.10.1.1 JGN offtake facility relocation

A photomontage has been prepared from Viewpoint Location 1, as identified in Figure 7.21 of the EIS, looking north along Lenaghans Drive towards the amended location of the JGN offtake facility on the eastern side of Lenaghans Drive. Photomontages 1A and 1B illustrate the view from Viewpoint Location 1 after construction without mitigation and after construction with vegetation screening established respectively.

Photomontages 2A and 2B are taken from outside of the nearest dwelling to the relocated offtake facility looking in a south west direction. Photomontage 2A is prior to construction and Photomontage 2B is post construction.

APA has committed to establish landscape screening (planting) at the JGN offtake facility to reduce the visibility of the facility to users of Lenaghans Drive and nearby residences. As such, it is considered that the visual impacts associated with the amended location of the JGN offtake facility are suitably manageable and acceptable.

Photomontage 1A: view north along Lenaghans Drive towards the JGN offtake facility – no vegetation screening

Photomontage 1B: view north along Lenaghans Drive towards the JGN offtake facility – with vegetation screening

Photomontage 2A: view south west towards location of the JGN offtake facility – prior to construction

Photomontage 2B: view south west towards location of the JGN offtake facility – post construction with no vegetation screening

6.10.1.2 Compressor/delivery station vent height

The EIS identified that the vent associated with the compressor/delivery station would be comprised of DN250 pipe (approximately 27 cm diameter) with a height of up to 30 m. As a result of some fine scale rearrangement of equipment within the compressor station and delivery station the vent height may increase to 35 m to meet specified safety requirements.

The Landscape Character and Visual Amenity Assessment undertaken for the HPP as part of the HPP EIS (Jacobs, 2021a) identified that overall, the visual impact of the HPP was considered to be low to negligible due to the limited visibility of the HPP from sensitive receivers. Furthermore, the DPIE assessment of the HPP EIS found that the visual impact would be low due to the existing industrial landscape character and sensitivity and limited visibility and distance from accessible viewpoints (DPIE 2021a). The HPP includes two turbine exhaust stacks approximately 36 m in height and around 11 m in diameter.

The EIS concluded a low to negligible visual impact for the Project components for reasons similar to that of the HPP and that the Project vent stack would be considerably smaller in diameter compared to those of the HPP. As the amended Project involves a relatively minor increase in height of the vent stack and no change to its diameter, it is considered that the visual impact remains low to negligible.

6.10.2 Management and mitigation strategies

No additional management and mitigation measures to those identified in the EIS are required for the amended Project.

6.11 Waste management

A waste inventory was presented in Section 7.15 of the EIS, with the estimated total volume of waste produced during the construction phase of the Project of 1,096 m^3. Two items in the waste inventory, cuttings generated during HDD and material excavated from the base of the turkey nest dam post-hydrotesting, accounted for around 84 % of estimated waste generation during construction.

The waste inventory has been updated to reflect the amended Project design, with material changes restricted to a 56 % increase to the total HDD length (3.2 km to 5.0 km) and elimination of the requirement to periodically excavate the turkey nest dam base material as amendments to the Project design include the internal lining of the storage pipeline. The volume of HDD cuttings has consequently increased from approximately 628.3 m^3 to 992 m^3, and the volume of excavated material has reduced from 292 m^3 to zero. In aggregate, the total waste inventory for the construction phase has marginally increased by 72 m^3 to an estimated 1,168 m^3.

Quantities of wastes generated during operation of the Project will be minor compared to the construction phase, and remain as described in Section 7.15 of the EIS. Waste disposal options remains as described in the EIS.

6.11.1 Management and mitigation strategies

No additional management and mitigation measures to those identified in the EIS are required for the amended Project.

7.0 Justification of Amended Project

This section provides a justification of the amended Project, taking into consideration the biophysical, social and economic impacts, the suitability of the Project area and whether or not the amended Project is in the public interest. The Project is also considered in the context of the principles of ecologically sustainable development (ESD) as defined in Schedule 2 of the *Environmental Planning and Assessment Regulation 2000* (EP&A Regulation).

7.1 Amended Project justification

Although the Project is subject to separate assessment and approval processes, it was included in the CSSI declaration for the HPP and is necessary for the operation of that project. Approval for the HPP was granted under the NSW planning system, subject to conditions, on 17 December 2021.

In its evaluation of the merits of the HPP outlined in the Environmental Assessment Report, DPIE (2021c) states:

The Department considers that the development of a gas-fired power station in the Hunter region would contribute to energy reliability and security in the NEM as it transitions away from coal-fired power station power generation over the next 10-15 years. The project is recognised as a committed project in the recent 2021 Electricity Statement of Opportunities as it would provide firming capacity to supplement the increasing supply of renewable energy and contribute to overall system reliability in the NEM (DPIE, 2021c).

The Project is proposed to facilitate the HPP by providing infrastructure to transfer gas from the SNP. Therefore, the HPP could not provide the benefits described above without the Project proceeding.

The amended Project remains generally as described in the EIS, however, several changes have been made in response ongoing consultation with directly affected landholders, agency submissions received during the exhibition period, and opportunities to reduce or avoid environmental impacts. The amended Project would provide some benefits over the original project in that it is more responsive to the affected landowners needs and further mitigates environmental impacts.

The amended Project would facilitate the HPP in the same manner as described in the EIS.

7.2 Suitability of the site

As described in Section 5.0 of the EIS, a range of design concepts and alignments for the Project were evaluated based on detailed consideration of the landscape and land uses in the area. The design concept and alignment selected was considered the most suitable option as it provided an acceptable degree of construction complexity, the greatest potential to minimise environmental and social impacts, as well as providing an economic solution with the lowest cost of all feasible design concepts considered. The amended Project has further considered these aspects with several amendments proposed as a result of consultation with landowners as to how the Project could be best accommodated within their individual landholdings. As such, it is considered that site suitability has been progressed and improved from that identified in the EIS.

7.3 Ecologically sustainable development

Clause 7(1) (f) of the EP&A Regulation requires a justification for a development with specific reference to the principles of ESD as set out in the Regulation. To justify the Project with regard to the principles of ESD, the benefits of the Project in an environmental and socio-economic context should outweigh any negative impacts. The principles of ESD encompass the following:

- the precautionary principle
- intergenerational equity
- conservation of biological diversity
- valuation, pricing and incentive mechanisms.

An assessment of the amended Project against the principles of ESD is provided in the sections below.

7.3.1 The precautionary principle

The EP&A Regulation defines the precautionary principle as:

> *'if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation. In the application of the precautionary principle, public and private decisions should be guided by:*
>
> - *careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment*
> - *an assessment of the risk-weighted consequences of various options.'*

In order to achieve a level of scientific certainty in relation to potential impacts associated with the amended Project, extensive evaluation of all the key components of the Project has been undertaken at the EIS and Amendment Report stages. Detailed assessment of all key issues and necessary management procedures has been conducted and is comprehensively documented in the EIS and this Amendment Report.

The assessment process has involved detailed studies of the existing environment, and where applicable the use of scientific modelling to assess and determine potential impacts as a result of the amended Project. To this end, there has been careful evaluation to avoid, where possible, irreversible damage to the environment.

The decision-making process for the design, impact assessment and development of management processes has been transparent through the consultation process with both government authorities, landowners and the community.

Consistent with the precautionary principle, the environmental assessment of the Project has sought to minimise environmental impact through the avoidance of impacts and a range of mitigation measures are proposed to address identified residual impacts.

7.3.2 Intergenerational equity

The EP&A Regulation defines the principle of intergenerational equity as:

> *'... that the present generation should ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations.'*

Intergenerational equity refers to equality between generations. It requires that the needs and requirements of today's generations do not compromise the needs and requirements of future generations in terms of health, biodiversity and productivity.

The amended Project is considered to be consistent with the principle of intergenerational equity as it can be carried out in a way that would maintain the health, diversity and productivity of the environment now and into the future. The key benefit of the amended Project remains the facilitation of the HPP which will contribute to energy reliability and security in the transition away from coal-fired power generation to renewables. The Project amendments are generally proposed as they provide for the best land use fit for existing landowners to allow for ongoing use for future landowners.

7.3.3 Conservation of Biological Diversity

The EP&A Regulation identifies that the principle of conservation of biological diversity and ecological integrity should be a fundamental consideration in the decision-making process. The conservation of biological diversity refers to the maintenance of species richness, ecosystem diversity and health and the links and processes between them.

The amended Project includes measures to minimise impacts on the abundance and distribution of flora, fauna and ecological communities for the short and long term, including:

- Design of a Project construction footprint that uses existing disturbed areas (for the JGN offtake facility, compressor station, delivery station and storage pipeline) or areas approved for disturbance by other projects (Stevens Group Hunter Business Park) wherever practicable.
- Design of a Project construction footprint that almost entirely avoids mapped important habitat for the regent honeyeater and swift parrot.
- Trenchless crossing of the proposed Regrowth Kurri Kurri stewardship area and a population of around 269 individuals of the threatened Grevillea parviflora subsp. parviflora north of the HPP.
- The transmission pipeline alignment and storage pipeline construction footprint have been amended to mitigate impacts to roosting habitat for the Southern Myotis, the Sydney Freshwater Wetlands endangered ecological community on the Wallis Creek floodplain, and a stand of the critically endangered ecological community River-flat eucalypt forest at the north-eastern extremity of the storage pipeline construction footprint.
- Development and implementation of biodiversity offsets strategy in accordance with the requirements of applicable state and Commonwealth polices and regulations.

All environmental components, ecosystems and habitat values potentially affected by the Project have been assessed in the BDAR with the amended Project expected to have minor adverse impacts on biodiversity.

7.3.4 Valuation principle

The goal of improved valuation of natural capital is included in Agenda 21 of Australia's Intergovernmental Agreement on the Environment. The principle has been defined in the EP&A Regulation as follows:

> *… that environmental factors should be included in the valuation of assets and services, such as:*
>
> *(i) polluter pays, that is, those who generate pollution and waste should bear the cost of containment, avoidance or abatement;*
>
> *(ii) the users of goods and services should pay prices based on the full life cycle of costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any waste; and*
>
> *(iii) environmental goals, having been established, should be pursued in the most cost effective way, by establishing incentive structures, including market mechanisms, that enable those best placed to maximise benefits or minimise costs to develop their own solutions and responses to environmental problems.*

The amended Project is considered to be consistent with the valuation principle of ESD as APA will be required to pay the full costs associated with:

- Ensuring the Project is designed and implemented in accordance with the relevant standards, including AS2885.
- Offsetting residual impacts to biodiversity in accordance with state and Commonwealth guidelines.
- Managing any waste produced by the Project in a safe and sustainable way in accordance with the NSW government's waste minimisation hierarchy.
- Meeting obligations in relation to compensation for directly affected landholders as require under the *Pipelines Act 1967* and the *Land Acquisition (Just Terms Compensation) Act 1991*.

Implementing the mitigation measures for the amended Project would impose an economic cost on APA, increasing both the capital and operating costs of the Project. In this manner, environmental resources have been given appropriate valuation.

The EIS and Amendment Report have incorporated the ESD principles. The mitigation measures in **Appendix B** provide an auditable environmental management commitment to these parameters. The Project is considered ecologically sustainable, due to the social, economic and environmental benefits discussed, and the mitigation measures put in place to protect from adverse impacts on the environment.

7.4 Conclusion

The Project has been assessed against the principles of ESD as required by the EP&A Regulation. This assessment has indicated that while the amended Project, like any large-scale development, would have impacts, these impacts can be effectively managed, mitigated and offset and the development will result in significant social and economic benefits. The assessment concludes that the Project is consistent with the principles of ESD.

In addition to providing long-term, strategic benefits to the State of NSW through provision of regional investment, reliable electricity generation and facilitation of increased renewable generation by providing infrastructure that enables gas to be supplied to the approved HPP, the Project will also provide direct financial benefits to the regional and local community, including:

- Infrastructure investment of the Project is approximately $264 million.
- Employment generation creating a peak of up to around 398 jobs during the construction phase with up to around 5 full time equivalent (FTE) jobs during the operational phase.
- Indirect benefits to local services through the construction and operation phases.

With the implementation of the management, mitigation and offset measures proposed by APA, the assessment has concluded that the amended Project would result in a net benefit to the NSW community.

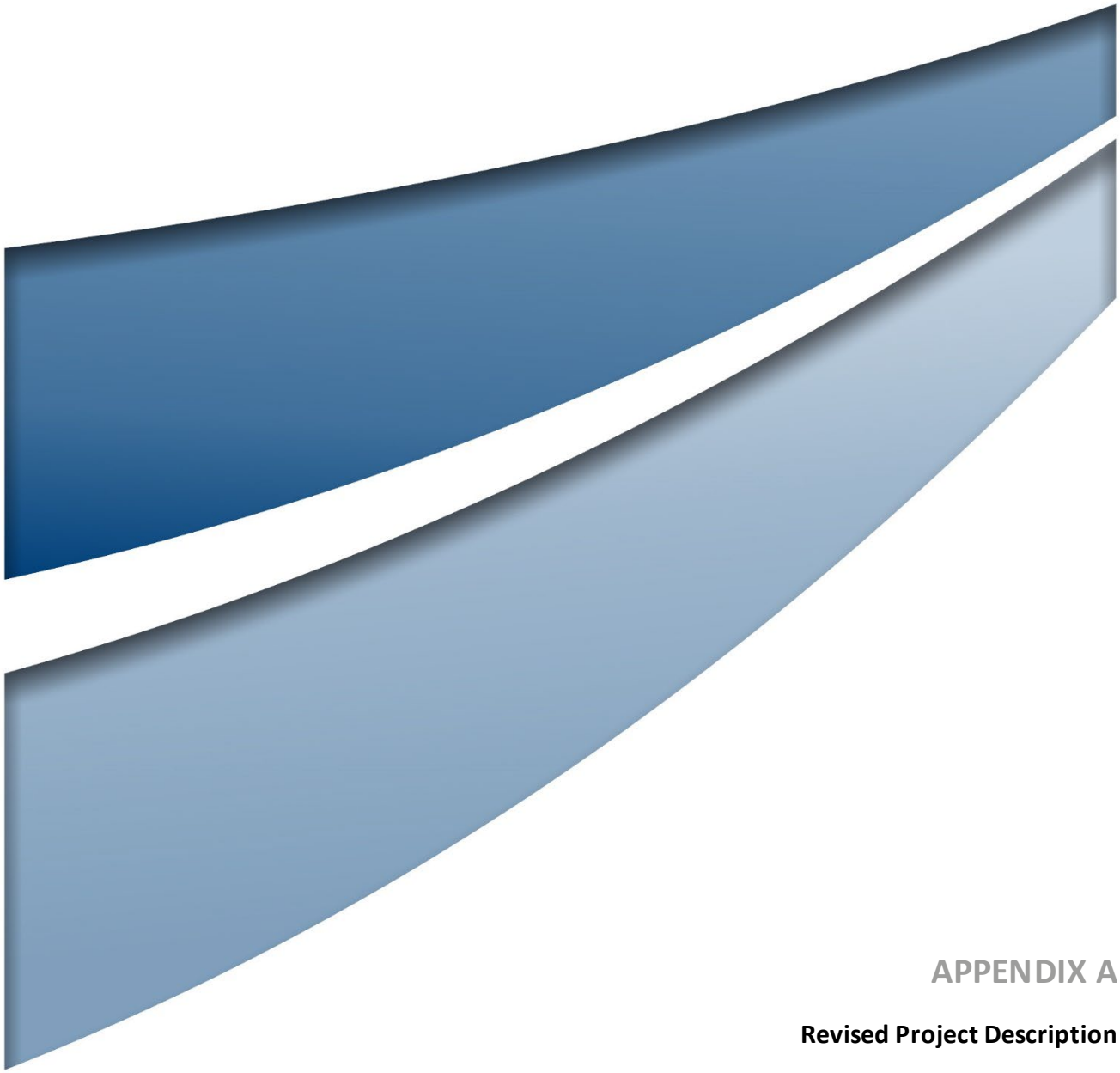
8.0 References

AECOM, 2021. Aboriginal Cultural Heritage Assessment Report Addendum – Hydro Aluminium Kurri Kurri Smelter.

Australian Energy Market Operator Limited (AEMO), (2022a). Update to 2021 Electricity Statement of Opportunities. April 2022.

Australian Energy Market Operator Limited (AEMO), (2022b). 2022 Electricity Statement of Opportunities. August 2022.

Australian Energy Market Operator Limited (AEMO), (2022c). 2022 Integrated System Plan.



APPENDIX A

Revised Project Description

2.0 Project Description

This section describes the layout, location, and function of all infrastructure to be constructed and operated as part of the Project. Descriptions of the construction, operation and decommissioning phases of the Project are also provided.

2.1 Project Summary

An overview of the Project, listing details of the development for which approval is sought, is summarised in **Table 2.1**.

Table 2.1 Project Summary

Project element	Summary	Section and Figure reference
The Project	The Project will involve the construction, operation and maintenance of: • a buried, medium diameter (up to DN350), medium pressure (up to 6.9 MPag) transmission pipeline of approximately 21.1 km long • a buried, medium diameter (up to DN350), high pressure (up to 15.3 MPag) interconnect pipeline of approximately 1.3 km. • a buried, large diameter (up to DN1050), high pressure (up to 15.3 MPag) storage pipeline of approximately 24.4 km • associated surface facilities such as a compressor station, delivery station and offtake station.	**Section 2.3, Figure 2.1A to 2.1H**
Location	The Project is located in the rural locality of Lenaghan, approximately 15 km northwest of Newcastle to approximately 2 km north of Kurri Kurri, NSW. The Project's transmission pipeline traverses the three Local Government Areas (LGAs) of Cessnock, Maitland and Newcastle.	**Section 2.2,**
The Project area	The Project area is defined as the Project's combined construction footprint located over approximately 106 ha and incorporates: • the construction right of way (ROW) for the transmission, interconnect and storage pipelines • construction workspaces required for the transmission, interconnect and storage pipelines, truck turnarounds, vegetation storage, HDD entry and exit locations, horizontal bore entry and exit locations, watercourse crossing workspaces and line pipe storage areas • access tracks to provide access to the construction footprint • construction footprints for the offtake facility, compressor station and delivery station.	**Section 2.2, Figure 2.1A to 2.1H**
Operational footprint	Approximately 5 ha for the JGN offtake facility, compressor station, delivery station and surface facilities associated with the storage pipeline.	**Section 2.4, Table 2.5**
Schedule of land	The Project is located across some 73 cadastral lots, with a full list of the parcel numbers provided in the Schedule of Lands.	**Appendix 1**
Construction footprint	Approximately 106 ha	**Section 2.4, Table 2.5**

Project element	Summary	Section and Figure reference
Construction water use and supply	The Project's estimated total water usage during construction is 27 ML. Non potable water for dust control and hydrotesting will be sourced from non-potable water service providers or existing landholders with available allocations.	**Section 2.8.6**
Off-site supporting infrastructure	• Existing road network • Water supply (non-potable) • Waste and wastewater disposal facilities	**Section 2.8.5** **Section 2.8.6** **Section 2.8.8**
Construction hours	Transmission pipeline and JGN offtake facility: 7 am to 6 pm Monday to Friday and 8am to 1pm Saturdays Storage pipeline: 6 am to 6 pm seven days per week Compressor station and delivery station: 6am to 6pm weekdays and 8am to 1pm Saturdays • Limited construction activities outside standard hours.	**Section 2.8.4.2**
Construction workforce	Approximately 398 personnel during peak construction (around one month duration) Up to 330 personnel over the remainder of the 12-month construction period	**Section 2.8.4**
Construction duration	Approximately 12 months	**Section 2.8.4**
Commencement of operation	Anticipated in Q4 2023	**Section 2.8.4**
Operational workforce	Approximately 5 personnel	**Section 2.9.3**
Project life	Approximately 30 years	**Section 2.9**
Capital Investment Value	Approximately $264 million	**Section 2.5**

2.2 Project Area and Location

The Project area is situated in the Lower Hunter region of New South Wales, encompassing the Local Government Areas (LGAs) of Cessnock, Maitland and Newcastle.

The Project area encompasses an area of approximately 106 ha from the rural locality of Lenaghan, approximately 15 km northwest of Newcastle to approximately 2 km north of Kurri Kurri.

The Project area considered for this EIS comprises the following:

- The construction right of way (ROW) for the transmission, interconnect and storage pipelines
- Extra workspaces required for construction of the transmission interconnect and storage pipelines for truck turnarounds, vegetation storage, HDD entry and exit locations, horizontal bore entry and exit locations, watercourse crossing workspaces and line pipe storage areas
- Access tracks to provide access to the construction footprint
- Construction footprints for the offtake facility, compressor station and delivery station.
- The compressor station and delivery station are located within the HPP project site boundary.

A map series showing the alignments of the transmission and storage pipelines, and locations of the offtake facility, compressor station, and delivery station is provided in **Figure 2.1A to 2.1H**.

A schedule of all land parcels directly affected by the Project is included as **Appendix 1**.

2.2.1 Transmission Pipeline Alignment

The alignment of the transmission pipeline is approximately 21.1 km in length, extending from the proposed JGN offtake facility to the compressor station (refer to **Figure 2.1A to 2.1H**). The construction ROW for the transmission pipeline would generally be 25 m wide, with additional workspaces required for truck turnarounds, storage of cleared vegetation, HDD entry and exit locations, horizontal bore entry and exit locations, watercourse crossing workspaces and line pipe storage areas.

The local context of the transmission pipeline alignment is described in the following sections.

2.2.1.1 KP0 to KP13

The transmission pipeline alignment joins the JGN offtake facility near Lenaghan, on the eastern side of Lenaghans Drive, approximately 15 km north-west of Newcastle, at Kilometre Point (KP) 0 (**Photo 2.1**). The SNP pipeline is approximately 400 m east of the JGN offtake facility near the western edge of Hexham Swamp. The alignment crosses under Lenaghans Drive immediately west of the JGN Offtake Facility then traverses in a northerly direction on the westerly side of Lenaghans Drive, to approximately KP0.3. A HDD is proposed between KP0.3 and KP 0.9 to cross the M1 Pacific Motorway (**Photo 2.2**). The alignment then traverses north within the lots to the west of M1 Pacific Motorway road reserve to approximately KP1.4.

Legend

- Project Construction Footprint
- Transmission Pipeline Alignment
- Kilometre Point
- Broaden Alternative
- JGN Offtake Facility
- HDD Entry
- HDD Exit
- Turnaround
- Vegetation Stockpile
- Access Tracks
- Roads
- Watercourses

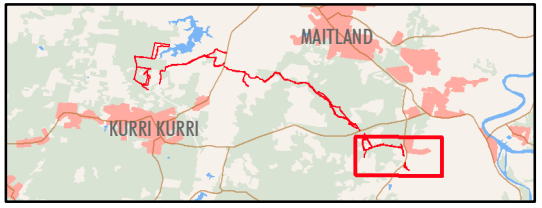
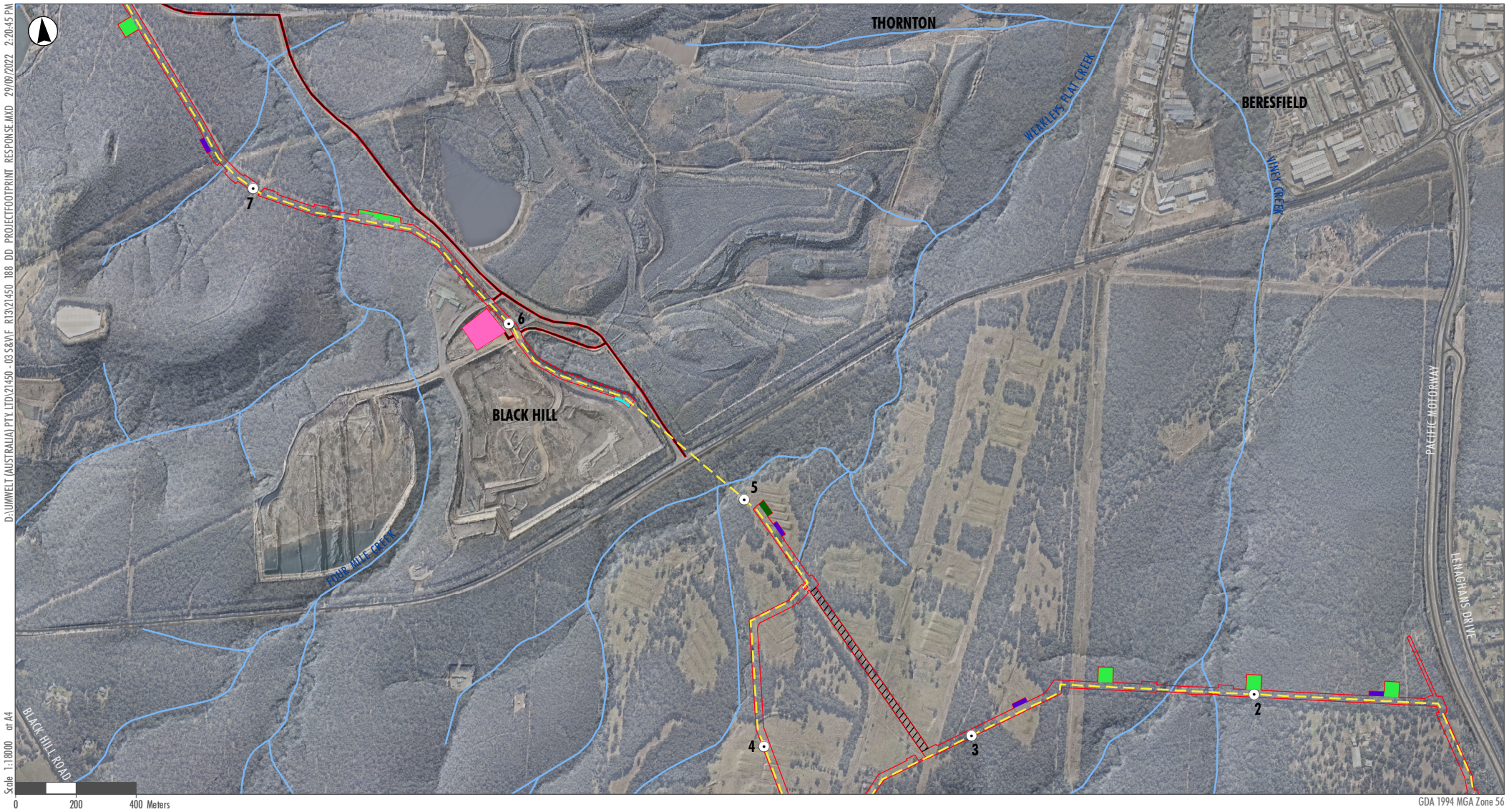


FIGURE 2.1A

Project Alignment and Construction Footprint

Image Source: Neamap (August 2021) Data source: NSW LPI (2020;2021)



Legend

- Project Construction Footprint
- Transmission Pipeline Alignment
- Kilometre Point
- Broaden Alternative
- HDD Entry
- HDD Exit
- Pipe and Equipment Laydown Area
- Turnaround
- Vegetation Stockpile
- Access Tracks
- Roads
- Watercourses

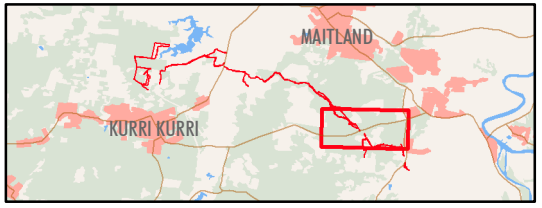
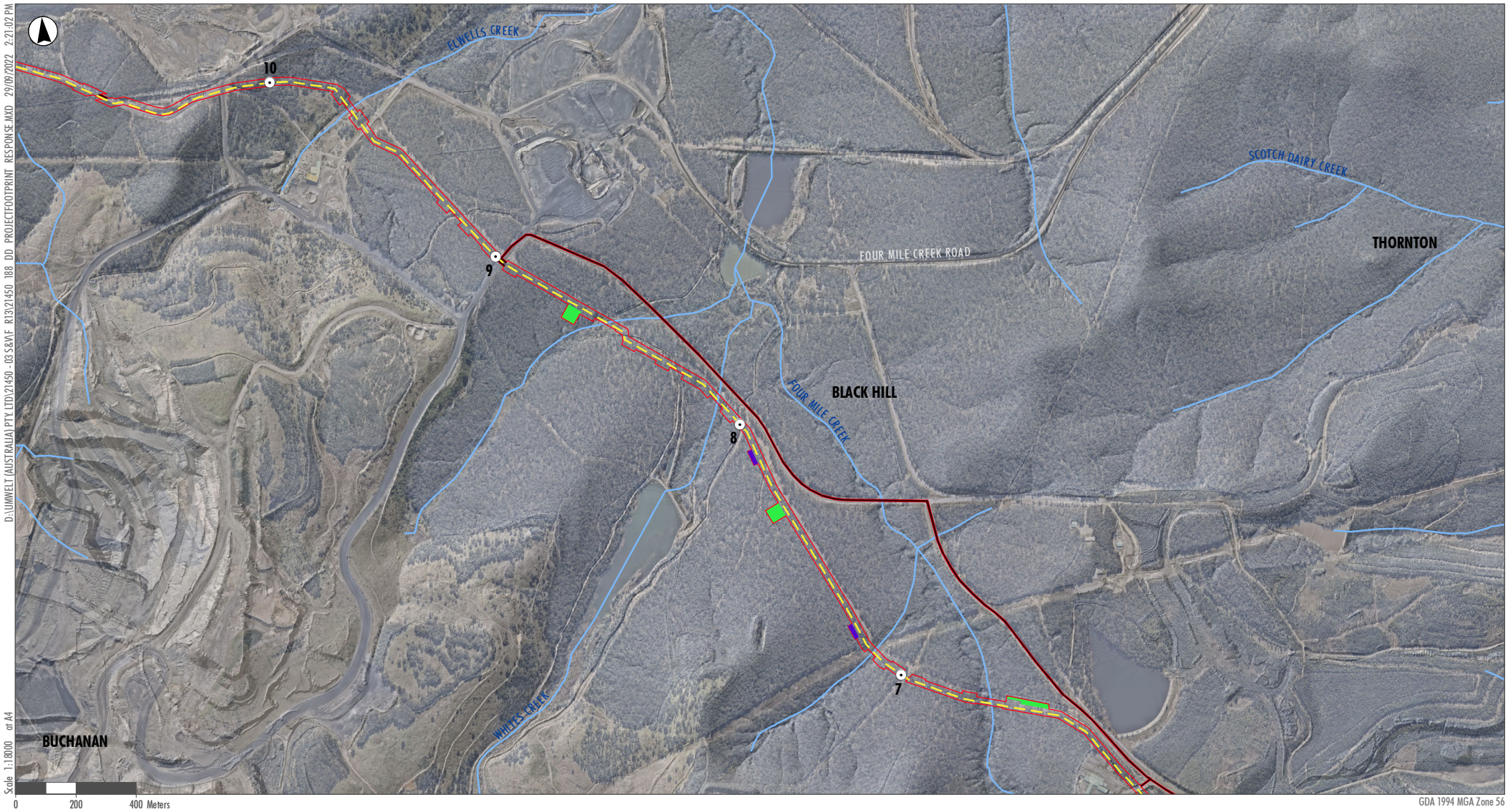


FIGURE 2.1B

Project Alignment and Construction Footprint

Image Source: Neamap (August 2021) Data source: NSW LPI (2020;2021)



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GDA 1994 MGA Zone 56

Legend

- Project Construction Footprint
- Transmission Pipeline Alignment
- Kilometre Point
- Turnaround
- Vegetation Stockpile
- Access Tracks
- Roads
- Watercourses

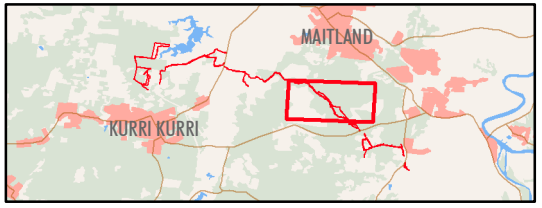


FIGURE 2.1C

Project Alignment and Construction Footprint

Image Source: Neamap (August 2021) Data source: NSW LPI (2020;2021)

Legend

- Project Construction Footprint
- Transmission Pipeline Alignment
- Kilometre Point
- HDD Entry
- Turnaround
- Vegetation Stockpile
- Access Tracks
- Roads
- Watercourses

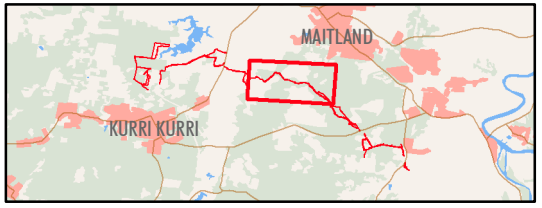
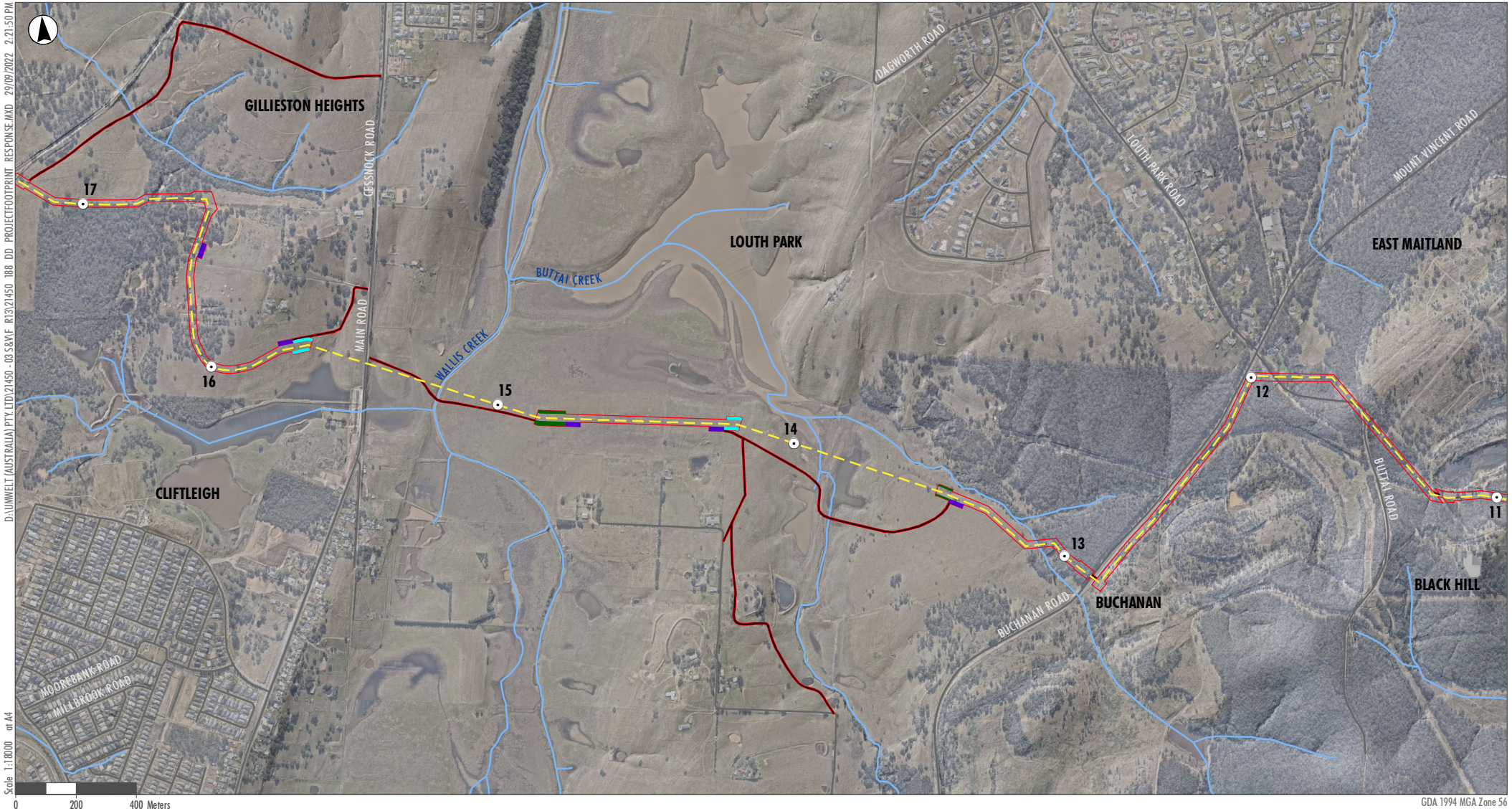


FIGURE 2.1D

Project Alignment and Construction Footprint

Image Source: Neamap (August 2021) Data source: NSW LPI (2020;2021)



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Legend

- Project Construction Footprint
- Transmission Pipeline Alignment
- Kilometre Point
- HDD Entry
- HDD Exit
- Turnaround
- Access Tracks
- Roads
- Watercourses

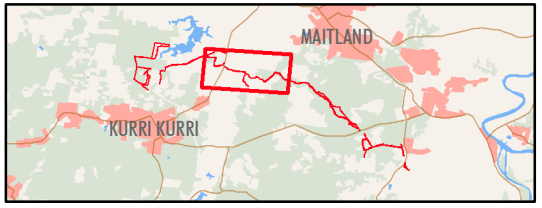
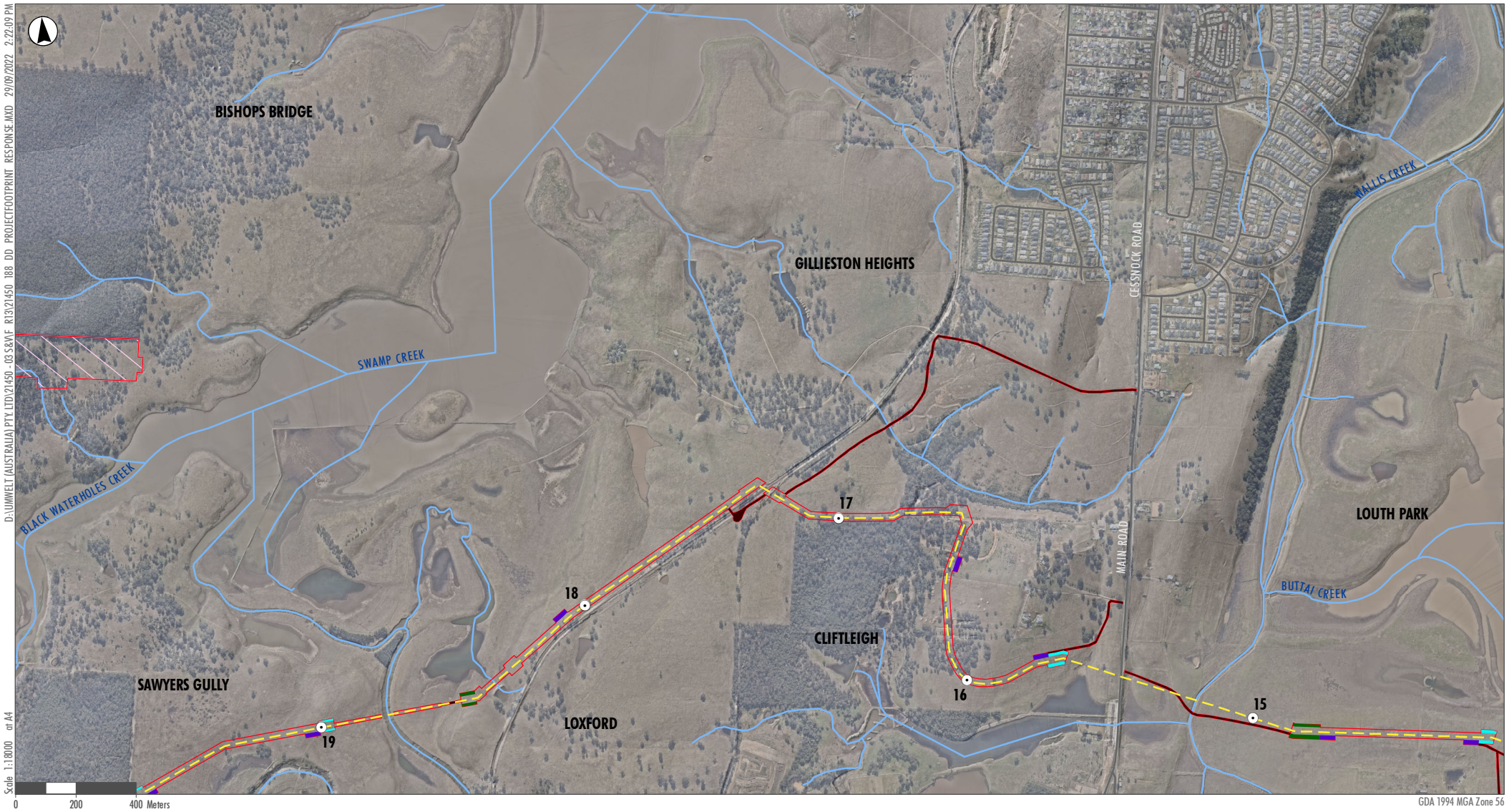


FIGURE 2.1E

Project Alignment and Construction Footprint

Image Source: Neamap (August 2021) Data source: NSW LPI (2020;2021)



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Legend

- Project Construction Footprint
- Transmission Pipeline Alignment
- Kilometre Point
- HDD Entry
- HDD Exit
- Turnaround
- Storage Pipeline
- Access Tracks
- Roads
- Watercourses

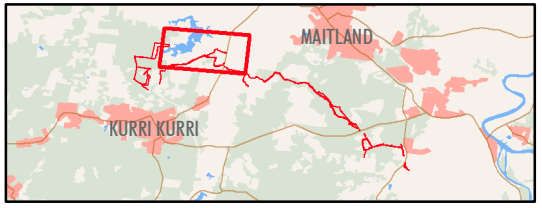
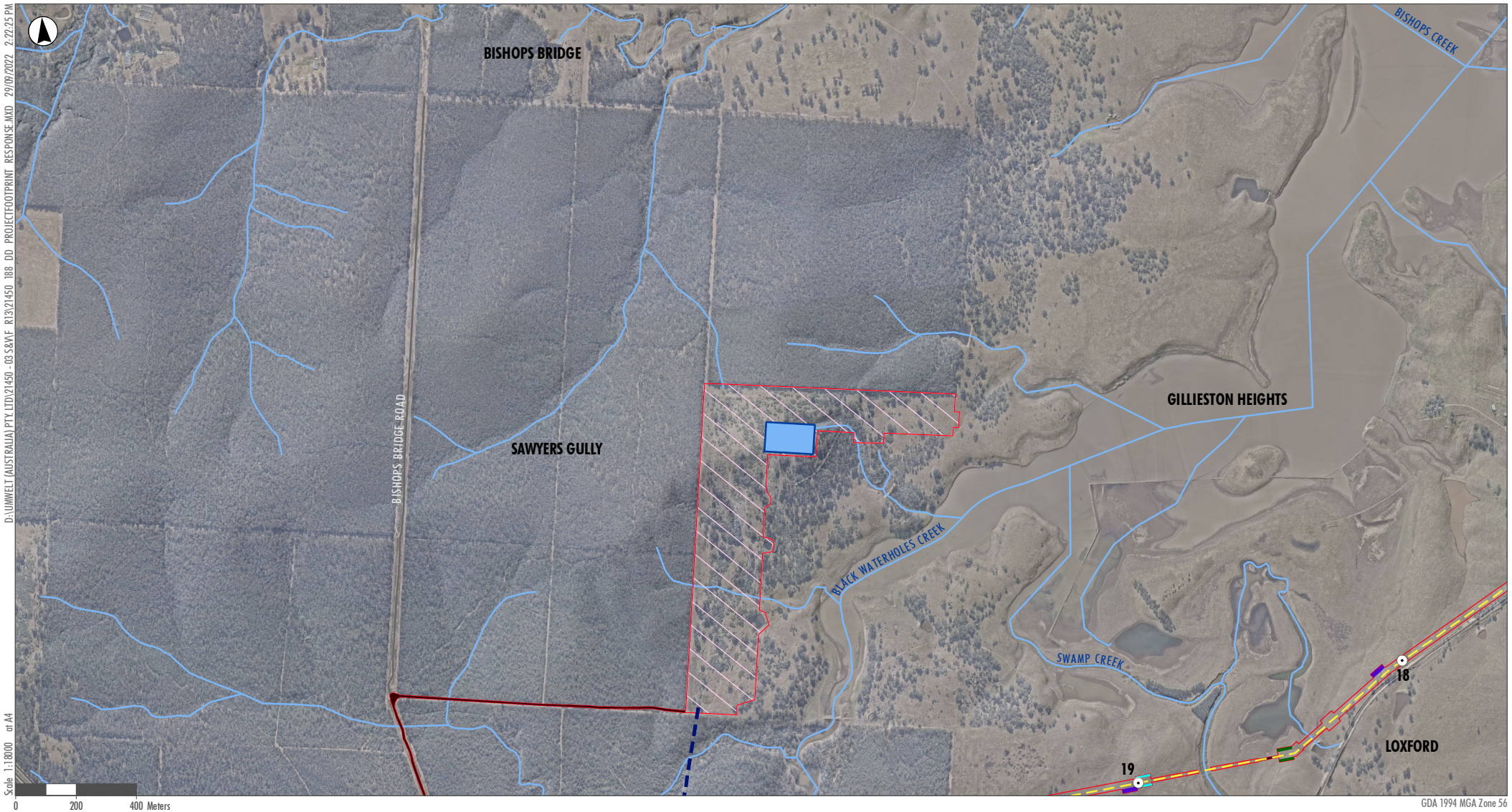


FIGURE 2.1F

Project Alignment and Construction Footprint

Image Source: Neamap (August 2021) Data source: NSW LPI (2020;2021)



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Scale 1:18000 at A4

Legend

- Project Construction Footprint
- Transmission Pipeline Alignment
- Kilometre Point
- HDD Entry
- HDD Exit
- Turkeys Nest Dam
- Turnaround
- Storage Pipeline
- Access Tracks
- Interconnect Pipeline
- Roads
- Watercourses

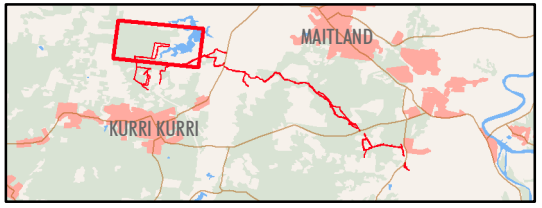
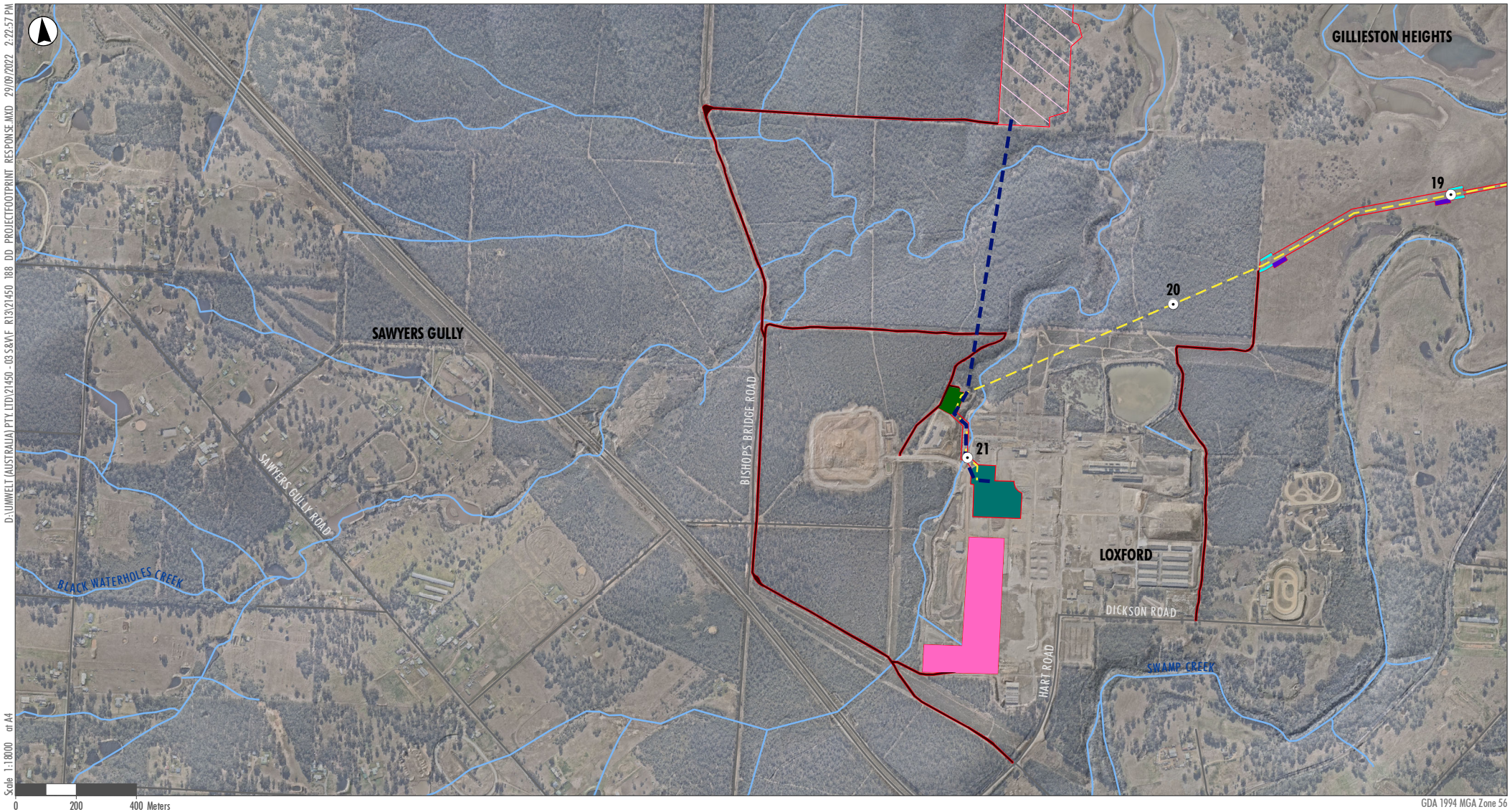


FIGURE 2.1G

Project Alignment and Construction Footprint

Image Source: Neamap (August 2021) Data source: NSW LPI (2020;2021)



Legend

- Project Construction Footprint
- Transmission Pipeline Alignment
- Kilometre Point
- HDD Entry
- HDD Exit
- Pipe and Equipment Laydown Area
- Turnaround
- Compressor and Delivery Station
- Storage Pipeline
- Access Tracks
- Interconnect Pipeline
- Roads
- Watercourses

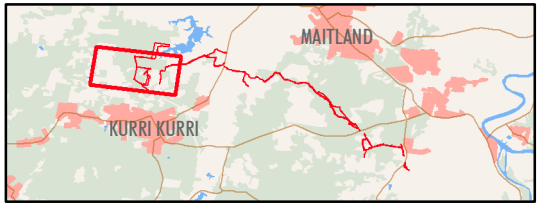


FIGURE 2.1H

Project Alignment and Construction Footprint

Image Source: Neamap (August 2021) Data source: NSW LPI (2020;2021)

Photo 2.1 JGN Offtake Facility Location at KP0, view to the south with Lenaghans Drive to the west

Photo 2.2 M1 crossing location at KP0.4, view to east

The alignment then turns west to traverse the southern boundary of the Stevens Group Hunter Business Park industrial development, crossing Viney Creek and a Transgrid easement hosting a 330kV overhead powerline, to approximately KP2.7.

Stages 1A and 1B of the Hunter Business Park have been approved under state (DA2020/01497) and Commonwealth (EPBC number 2008/4603) planning processes. These approvals provide for vegetation clearing for the footprint of the entire 183ha lot, excluding the riparian corridor of Viney Creek and 20m vegetated buffers of the eastern and southern lot boundaries.

The original Concept Approval (MP10_0093) for this site was issued on 19 November 2013, by the NSW Planning Assessment Commission, as delegates of the Minister for Planning, Infrastructure and Environment. The consent conditions for this concept approval required the dedication of 2,411ha of land at Stockrington and Tank Paddock to the NSW government for permanent conservation as an offset package, which is consistent with the EPBC Act 2008/4603 referral decision. This land transfer occurred during 2016. Subsequent to this, an order made by the NSW Department of Planning and Environment on 26 October 2018, pursuant to clause 34A(3) of the Biodiversity Conservation (Savings and Transitional) Regulation 2017, confirmed that conservation measures to offset residual impacts of the development have been secured.

The construction footprint of the transmission pipeline is sited within the approved clearing footprint of the industrial development, excluding crossings of Viney Creek and the 20m vegetated buffer on the eastern boundary of the lot. The construction footprint is offset from the southern boundary of the industrial development to maintain a vegetated buffer zone in accordance with the development consent.

From here the alignment continues southwest following the southern boundary of the proposed Broaden Management industrial development and former chicken broiler farm, crossing an Ausgrid easement hosting a 66kV overhead powerline to approximately KP3.1.

The alignment then continues west to KP3.7 before turning north to KP4.4, then east to KP4.6. The alignment then runs adjacent and to the east of a lot containing a Hunter Water Corporation reticulation main to KP4.9. An alternative option runs adjacent and to the east of the Hunter Water Corporation lot from approximately KP3.1. Both options traverse predominantly cleared land (**Photo 2.3**).

Photo 2.3 View from KP3.1 to northwest along the alternative alignment proposed for the Broaden Management industrial estate

Weakleys Flat Creek and John Renshaw Drive are crossed by a HDD between approximately KP4.9 and KP5.5. The alignment of this HDD is close to but slightly west of the Hunter Water Corporation Chichester Trunk Gravity Main (CTGM), a critical public water supply pipeline from the Chichester Dam, supplying the Stony Pinch Reservoir and, in turn, the city of Newcastle.

Between Viney Creek and John Renshaw Drive the alignment passes above previously mined sections of the Yancoal underground Abel Coal Mine, which is currently under care and maintenance. From John Renshaw Drive until KP13.8 the alignment traverses land managed as rehabilitated or active coal mining operations by Donaldson Coal Pty Limited (a subsidiary company of Yancoal) and The Bloomfield Group. The alignment generally traverses this land in a north westerly direction, located adjacent to a lot containing Hunter Water Corporation trunk mains (**Photo 2.4**). Four Mile Creek, Whites Creek and Elwells Creek are crossed in this section. Trunk mains that connect the CTGM to the Stony Pinch reservoir are also crossed in this section, as well as an Ausgrid easement with a 132kV overhead powerline. The alignment reaches Buchanan Road near KP12.9.

Photo 2.4 View to south-east from near KP6.8. CTGM crossing the gully of Four Mile Creek. The transmission pipeline alignment is to the west (right) of the water pipeline

The alignment crosses the following roads in this section:

- M1 Pacific Motorway
- Black Hill Road
- John Renshaw Drive
- Buchanan Road.

The alignment crosses the following named watercourses in this section:

- Woods Gully
- Viney Creek
- Weakleys Flat Creek
- Four Mile Creek
- Whites Creek
- Elwell's Creek.

Five unnamed watercourses are also crossed in this section.

2.2.1.2 KP13 to KP21

After crossing Buchanan Road, the alignment continues west and crosses Buttai Creek by HDD at KP14, then entering the Wallis Creek floodplain (**Photo 2.5**). Wallis Creek and Main Road are also crossed by HDD between KP14.8 and KP15.7.

A temporary culvert crossing is proposed to be installed at Wallis Creek during the transmission pipeline construction phase, at the site of an existing rubble weir. The temporary culvert crossing will enable heavy machinery to access both sides of Wallis Creek and eliminate a 14 km round trip on public roads between the Valley View Lane and Main Road adjacent to Testers Hollow.

Photo 2.5 KP14.2, Wallis Creek floodplain. View along the transmission pipeline alignment to west with Testers Hollow roadworks in distance

Photo 2.6 KP15.2, Wallis Creek. View upstream to existing rubble weir and proposed temporary culvert crossing location

The HDD of Wallis Creek and Main Road exits the floodplain on the northern side of Testers Hollow at KP15.7. From here the alignment curves to the north following the southern and western boundary of the proposed residential development on Lot 2 DP1249763 then turns west to follow the southern boundary of the Gillieston Heights South – Western Precinct residential development, prior to entering the buffer zone[1] of the former Hydro aluminium smelter. The South Maitland Railway is crossed at KP17.3 (**Photo 2.7**). **Photo 2.8** provides a view of the buffer zone of former Hydro aluminium smelter (looking southwest) from KP17.5. The alignment then turns to the south-west adjacent to the South Maitland Railway, prior to turning west and crossing Swamp Creek by HDD between KP18.5 and KP19.0 (**Photo 2.9**).

[1] The Buffer Zone is land owned and managed by Hydro as part of the former smelter operations. The smelter closure was announced in May 2014 and Hydro is now preparing land for future divestment and redevelopment. The Buffer Zone has been segmented into Parcels for redevelopment. These Parcels are proposed to be rezoned for a range of uses, including residential, commercial/ industrial and environmental conservation, and remediation of the land for these purposes is required.

Photo 2.7 KP17.3, crossing location of the South Maitland Railway. View to south

Photo 2.8 View to southwest from KP17.5 of the buffer zone of former Hydro aluminium smelter. The South Maitland Railway is left (east) of the fence

Photo 2.9 KP18.9, HDD crossing location of Swamp Creek. View to the east

The HDD between KP19.7 and KP20.8 allows the alignment to traverse beneath remnant vegetation comprising the Kurri Sand Swamp Woodland endangered ecological community (**Photo 2.10**) and proposed as part of a stewardship area for the Regrowth Kurri Kurri development. This HDD also enables an Ausgrid easement containing multiple high voltage overhead power lines at KP20.3 (**Photo 2.11**) and an unnamed tributary of Black Waterholes Creek at KP20.7 to be crossed without surface disturbance prior to a short section of open trenched pipeline construction to reach the compressor station at KP21.1.

Photo 2.10 Remnant Kurri Sand Swamp Woodland west of the HDD workspace at KP19.7

Photo 2.11 KP20.3, easement hosting multiple overhead HV power lines. View to west

The alignment crosses the following roads and railway in this section:

- Main Road/Cessnock Road
- South Maitland Railway

The alignment crosses the following named watercourses in this section:

- Buttai Creek
- Wallis Creek
- Swamp Creek.

A single unnamed watercourse is crossed in this section.

2.2.2 Storage Pipeline Alignment

The storage pipeline is proposed to be located to the north of the HPP within buffer zone land of the former Hydro aluminium smelter. The proposed location of the storage pipeline is west of Wentworth Swamp, on land that has predominantly been previously cleared (**Photo 2.12**), as shown on **Figure 2.1G**. Review of historic aerial imagery indicates that the storage pipeline construction footprint was cleared by 1976 and maintained to be predominantly free of regrowth vegetation until at least 2001 (**Photo 2.13**).

Photo 2.12 Typical vegetation in the storage pipeline construction footprint. Predominantly cleared land, with areas of shrub regrowth and scattered mature trees

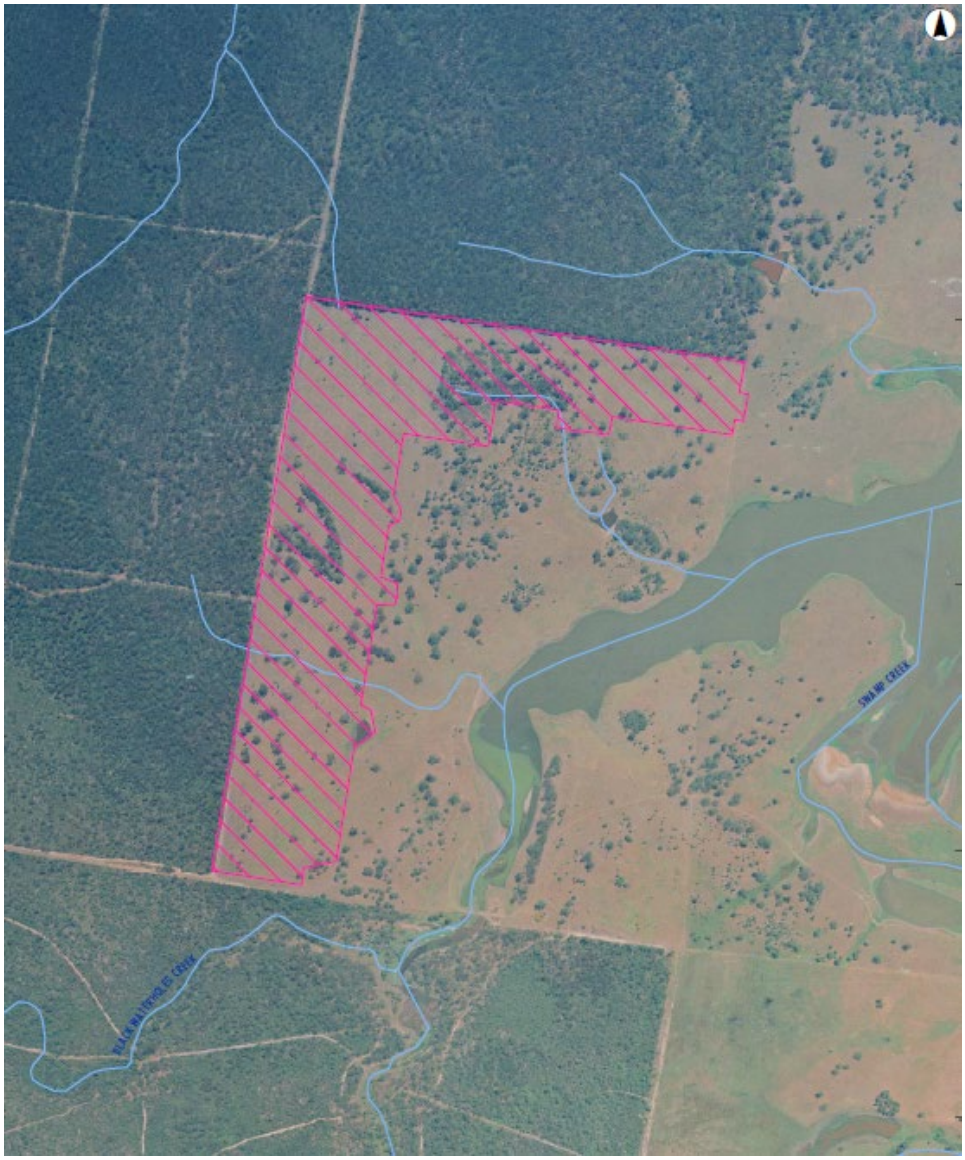


Photo 2.13 2001 aerial image of storage pipeline construction footprint, illustrating predominantly cleared land

The storage pipeline will require a total length of approximately 24.4 km. The configuration of the storage pipeline comprises two primary storage pipeline loops each made of a series of internal sub-loops, as shown in **Figure 2.2**.

This design concept enables the length of the construction footprint to be significantly reduced, relative to a single linear pipeline, to approximately 2 km. The reduction in length allows surface disturbance impacts during construction to be concentrated into a localised area supporting primarily cleared and regrowth vegetation between Wentworth Swamp and large blocks of remnant vegetation to the west. The width of the construction footprint for the storage pipeline is approximately 230 m.

A single interconnect pipeline of DN350 diameter will provide a connection between the storage pipeline and the compressor station and delivery station, a length of approximately 1.3 km. The DN350 interconnect pipeline will connect to the primary storage pipeline loops by an above ground connection header assembly

comprised of above ground DN350 piping, isolation valves, a scraper station and associated loading and venting pipework arrangements.

The storage pipeline alignment crosses three unnamed watercourses and does not cross any roads or railways.

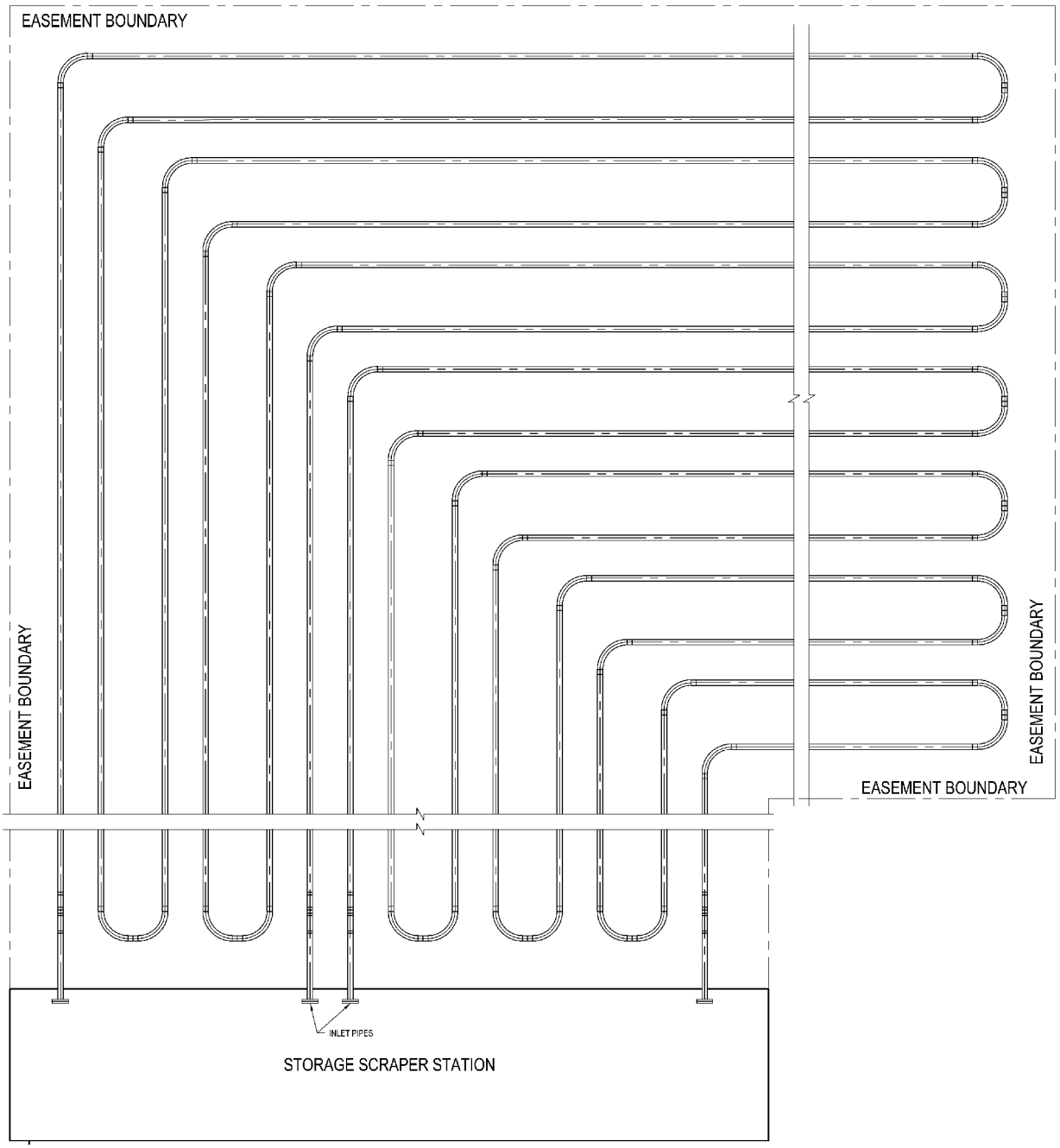
The DN350 interconnect pipeline crosses a HV overhead power easement, Black Waterholes Creek and an access track by HDD.

2.2.3 Associated surface facilities

The proposed locations of associated surface facilities are as follows, and as shown on **Figure 2.1A to 2.1H**:

- The JGN offtake facility is located on cleared grazing land at Lot 453 DP80777851, on the eastern side of Lenaghans Drive (**Photo 2.1**).
- The compressor station and delivery station are located on the existing hard stand of the former Hydro aluminium smelter directly adjacent to, and within the project site of the HPP (**Photo 2.14**).

Photo 2.14 The former Hydro aluminium smelter site, where the compressor station and delivery station will be located



Note: Not to Scale

FIGURE 2.2

Storage Pipeline Design

Image Source: APA (2021) Data source:

2.3 Project Components

The transmission pipeline, interconnect pipeline and storage pipeline have varying characteristics required to fulfil separate functions, as described in the following sections. All pipelines, however, will be designed in accordance with the *Australian Standard (AS) 2885* and designed and constructed in accordance with the Australian Pipeline and Gas Association *Code of Environmental Practice 2017*. The AS 2885 series includes the following:

- AS 2885.0 Part 0 – Pipelines, Gas and liquid petroleum, General requirements
- AS/NZS 2885.1 Part 1 – Design and Construction
- AS/NZS 2885.2 Part 2 – Welding
- AS 2885.3 Part 3 – Operations and Maintenance
- AS/NZS 2885.5 Part 5 – Field Pressure Testing
- AS/NZS 2885.6 Part 6 – Safety Management Studies.

The design of the storage pipeline will also incorporate requirements of API 579-1:2016 Fitness-For-Service and BS 7910:2019 Guide to methods for assessing the acceptability of flaws in metallic structures to address stress intensity factors for fatigue design.

A summary of specifications for the transmission, interconnect and storage pipelines is provided in **Table 2.2**. Further details regarding pipeline design are outlined in the following sections. All specifications are subject to refinement during detailed design.

Table 2.2 Pipeline Specifications

	Transmission pipeline	Interconnect pipeline (compressor station to storage pipeline to delivery station)	Storage pipeline
Pipeline Length	Approximately 21.1 km	Approximately 1.3 km	Approximately 24.4 km
Nominal and outside diameter	DN350, 355.6 mm Outer Diameter (OD)	DN350, 355.6 mm OD	DN1050, 1066.8 mm OD
Material	High strength steel, Electric resistance welded (ERW)	High strength steel, Electric resistance welded (ERW)	High strength steel, submerged arc welded (SAWL)
Grade	Nominally API 5L PSL2 Grade X52	Nominally API 5L PSL2 Grade X52	Nominally API 5L PSL2 Grade X60
External coating	Dual Layer Fusion bonded epoxy, with abrasion resistant overlay coating on pipe segments for HDD	Dual Layer Fusion bonded epoxy, with abrasion resistant overlay coating on pipe segments for HDD	Dual Layer Fusion bonded epoxy
MAOP	6.9 MPag	15.3 MPag	15.3 MPag
Operational Capacity	Nominally up to 50 TJ per day	Nominally up to 165 TJ per day to the HPP.	Approximately 70 TJ of useable gas storage
Wall-thickness	Standard wall 8.6 mm	Standard wall 12.7 mm	Standard wall 28 mm Heavy wall 31 mm

	Transmission pipeline	Interconnect pipeline (compressor station to storage pipeline to delivery station)	Storage pipeline
Pipe segment lengths	12 or 18 m	12 or 18 m	12 m
Number of pipe segments	Around 1,200 triple random lengths (18 m) and 15 pipe segments of double random lengths (12 m) for bends	Around 78 triple random (18m) pipe segments and 10 bend segments	Around 2,090 pipe segments and more than 50 bend segments
Typical construction footprint width	25 m	25 m	Between 140 m and 230 m.
Typical easement width	Nominally 20 m	Nominally 20 m	Nominally 175 m

2.3.1 Transmission pipeline

The transmission pipeline will be constructed of high strength steel line pipe. The wall thickness of the pipe will be determined during detailed design and is likely to be 8.6 mm, as detailed in **Table 2.2**. This pipe wall thickness is considered suitable for road and river crossings, as per the requirements specified in AS 2885.

Pipe segments will be factory coated with dual layer fusion bonded epoxy for corrosion protection purposes except at each end to allow welding. Post welding, the uncoated weld margins will be grit blasted and coated with spray applied epoxy coating.

2.3.1.1 Depth of Cover

The transmission pipeline will be buried for its entire length other than at surface facility locations. At locations where the pipeline is potentially exposed to increased erosional forces, such as watercourse crossings and floodplains, additional protection will be provided by increased depth of cover. The transmission pipeline would also be buried deeper beneath roads, watercourses and 3rd party infrastructure such as water pipelines, communication cables and access tracks. Larger watercourses that are highly likely to hold water during construction will be crossed using horizontal directional drilling (**Section 2.8.1.8**).

Minimum depths of cover for the transmission pipeline, measured from top of pipe to ground level, are summarised in **Table 2.3**. These minimum depths are based on AS 2885 requirements, including location classification analysis.

Table 2.3 Minimum Depth of Cover (mm)

Location	Depth of Cover
Typical	900 mm
Road crossings	1,200 mm
Watercourse crossings	1,500 mm
Rail crossings	2,000 mm

2.3.1.2 Scraper Stations

The routine operation of gas pipelines requires the periodic running of a pipeline inspection gauge (PIG) to clean and/or inspect the internal wall surface. The PIG is loaded into an unpressurised launcher vessel at a scraper station, which is closed and pressurised to equal the pipeline pressure. The PIG is then sent down the pipeline using the flowing gas as the driving force. The PIG is collected by a receiver vessel at a downstream scraper station. The receiver vessel is isolated, depressurised and opened to retrieve the PIG.

Scraper stations with a PIG launcher/receiver will be located at the JGN offtake facility, the compressor station and at the storage pipeline above ground connection header assembly.

The final design configuration will enable the transmission pipeline and the DN350 interconnect pipeline to the storage pipeline to be inspected during its' operational life. A photograph of a typical scraper station is shown in **Photo 2.15**.

Photo 2.15 Photograph of a scraper station

2.3.1.3 Mainline Valve (MLV)

A MLV is an above ground facility comprised of an in-line buried block valve that can be closed to isolate sections of the transmission pipeline for maintenance or during emergency conditions. MLVs are designed for either manual or remote activation depending on the outcomes of safety studies undertaken in accordance with AS 2885.

The Project will require one MLV, proposed to be located near KP12.6. The exact location of the MLV is subject to confirming design requirements and consultation with landholders.

A maximum temporary disturbance footprint of 25 m x 40 m will be required for the construction of the MLV, contained within the construction footprint of the transmission pipeline. The final permanent footprint of the MLV will be approximately 12 m x 18 m and fully contained within the pipeline easement. The MLV would be located on a hardstand area with a chain wire fence on the perimeter. The MLV will have venting apparatus for emergency use.

A photograph of a typical MLV is shown in **Photo 2.16**.

Photo 2.16 Photograph of a typical MLV

2.3.1.4 Cathodic protection

The primary corrosion protection system for the transmission pipeline will be a pipeline external coating. Each pipe length will be coated with dual layer fusion bonded epoxy for corrosion protection purposes except at each end to allow welding. Post welding, the uncoated weld margins will be cleaned and coated with spray applied epoxy coating.

One hundred percent integrity testing will be undertaken on the pipeline coating in both the factory and just prior to the pipe being installed in the trench to ensure the integrity of the coating. In addition, a Direct Current Voltage Gradient (DCVG) survey will also be undertaken following completion of construction to

further verify coating integrity. DCVG involves traversing by foot over the top of the pipeline and measuring the voltage gradient in the soil using a pair of probes.

As a secondary protection against corrosion, an impressed current cathodic protection system (ICCP) will be used to protect the transmission pipeline from any undetected coating imperfections and monitor the condition of the coating remotely. The ICCP system utilises a limited number of anodes connected to an external power source, which applies an electrical current onto the pipe. The current changes the environment around the pipe to prevent a corrosive reaction from occurring on the pipeline surface.

The anode bed would include a transformer rectifier, buried sacrificial anodes and a power supply. The proposed location of the anode bed is within the perimeter of the compressor and delivery station.

Upstands for monitoring of the CP system will be required at approximately 2 km spacing along the transmission pipeline alignment, adjacent to the pipeline. An upstand consists of a small metal box on a post, containing terminals for connecting and monitoring the CP system to the pipeline. Upstands are typically located in readily accessible locations, adjacent to sealed roads and fence crossings, or similar locations which provide access for monitoring.

Interfaces with existing infrastructure such as fences, pipes and HV towers are considered during the detailed design of the CP system to prevent any unintended interface issues. Inspection of the CP system will typically be undertaken annually in accordance with AS 2832 *Cathodic protection of metals Pipes and cables*. The effectiveness of the CP system will be monitored remotely and supplementary measures may be required over the life of the pipelines.

2.3.1.5 Marker signs

Pipeline marker signs, as shown in **Photo 2.17**, will be installed along the length of the transmission pipeline, to indicate the pipeline location in accordance with AS 2885.1.

Photo 2.17 Typical pipeline marker sign

The markers will be placed at a frequency to ensure continual line of sight along the alignment and will also be located at any bends, at property boundary fences and either side of crossings such as roads or watercourses.

Text on the signs will describe the presence of a high-pressure gas pipeline and provide the name and contact details of the operator.

2.3.1.6 Mine subsidence considerations

The transmission pipeline traverses three mine subsidence districts, as follows:

- Black Hill, between KP1.0 and KP5.2
- Louth Park, between KP11.6 and KP14.2
- Maitland West, between KP15.5 and KP17.1

In these areas the transmission pipeline will be designed and constructed, in consultation with Subsidence Advisory NSW, to ensure the pipeline is capable of withstanding subsidence, strains and tilts associated with nearby planned and/or previous underground mining activities.

2.3.1.7 Electricity transmission easements

The transmission pipeline alignment crosses active high voltage electricity transmission easements in four locations. High voltage electrical transmission infrastructure has the potential to affect the safe construction, operation and maintenance of the transmission pipeline due to potential induction effects, and power line fault conditions. Appropriate pipeline cathodic protection and current mitigation measures would be installed as required to ensure the safety of the pipeline and maintenance staff. A detailed assessment would be conducted during the detailed design phase to ensure compliance with relevant Australian Standards and confirm whether the installation of discrete and/or continuous earthing points along the pipeline is necessary.

2.3.2 Storage Pipeline

The storage pipeline will provide around 70 TJ of useable gas storage, at operating pressures of between approximately 5,320 and 15,320 kPag. This will provide sufficient gas supply for the HPP to operate at full output for up to 10 hours. It is also proposed to configure the offtake facility and delivery station so that gas can flow from the storage pipeline back to the east coast grid via the JGN offtake facility and Sydney to Newcastle Pipeline.

The design concept being developed for the storage pipeline comprises two primary storage pipeline loops each comprised of a series of internal sub-loops, as shown in **Figure 2.2**. The total storage capacity of the storage pipeline will be shared between the two primary loops on an approximate 40/60 basis. This design concept allows for each primary loop to be constructed, commissioned and operated separately. The key benefits of this approach are as follows:

- Minimise requirements for above ground pipework to connect pipeline loops.
- Better align Project scheduling with the commencement of HPP operations, by requiring only the construction and commissioning of a single primary loop to prior to provision of a gas supply.
- Allow either primary loop to be isolated during operations, so that maintenance can occur whilst still maintaining a gas supply to the HPP.

Due to the nested nature of the pipeline loops, they need to be constructed in a specific planned sequence.

As with the transmission pipeline, the storage pipeline will be constructed of high strength steel line pipe and coated with fusion bonded epoxy or similar for corrosion protection. Wall thickness will be 28 mm and 31 mm, as detailed in **Table 2.2**.

2.3.2.1 Depth of cover

The storage pipeline will be buried for its entire length, other than at the above ground connection header assembly. At locations where the pipelines are potentially exposed to increased erosional forces, such as watercourses and floodplains, additional protection will be provided by increased depth of cover.

Minimum depths of cover for the storage pipeline, measured from top of pipe to natural ground level and based on AS 2885 requirements, are summarised in **Table 2.4**.

Table 2.4 Minimum Depth of Cover (mm)

Pipeline specifications	Storage Pipeline
Typical (per AS 2885)	900 mm
Watercourse crossings	1,500 mm

2.3.2.2 Cathodic protection

The storage pipeline will be protected from external corrosion by the external coating and either an ICCP system or a sacrificial anode cathodic protection system (SACP). The system will also accommodate the need to mitigate stray currents from any parallel electricity transmission lines, in accordance with AS 4853 *Electrical hazards on metallic pipelines*.

A SACP system uses sacrificial anodes, connected by metallic conductors to the pipeline, as a source of electrons that are preferentially consumed to prevent corrosive reactions occurring on the pipeline surface. If a SACP is used a bed of sacrificial anodes, typically made of magnesium or zinc, will be required proximal to the storage pipeline.

Cathodic protection test points will be installed along the storage pipeline. Insulated joint test points with reference electrodes will be installed at the pipeline insulating joints.

2.3.2.3 Integrity inspections

The routine cyclic operation of gas storage pipelines requires the periodic inspection by either a PIG or by hydrotesting to certify that the pipeline is fit for service. Integrity inspections during the operational life of the storage pipeline are proposed to be undertaken every 5 to 10 years.

2.3.2.4 Fencing and marker signs

APA proposes to purchase or register an easement for an area of approximately 34 ha to encompass the storage pipeline. This area may be fenced with a typical four strand wire stock fence or similar, based on consultation with the landholder.

The above ground connection header assembly will be fenced with ring lock mesh with multiple barbs type wire or similar security fencing.

Pipeline marker signs will also be installed in accordance with AS 2885.1 to identify the location of the pipeline.

2.3.3 Pipeline Design Considerations for Hydrogen

The transmission pipeline will be designed, constructed and commissioned in accordance with the requirements of *ASME B31.12-ASME Design code for Hydrogen Piping and Pipelines*, in order to maintain readiness for potential use of hydrogen in the east coast gas network. There is currently a high level of uncertainty with regard to means and the timeline in which the SNP and associated gas network would be able to convey hydrogen blended natural gas.

With regards to the gas storage pipeline, a significant increase in capital expenditure would be required to construct the storage pipeline for it to be capable of storing a hydrogen blended fuel. This is due to the dimensions of the gas storage pipeline, and construction materials and methods required to mitigate the

increased embrittlement of pipeline material when storing a hydrogen blended fuel. Snowy Hydro have advised that the associated level of capital expenditure would be uneconomic, and consequently the storage pipeline will not be built to specifications that would enable it to store hydrogen blended fuel.

Snowy Hydro have also advised that the HPP will remain hydrogen ready through the allocation of sufficient land for the looping of the storage bottle using design and construction methods in accordance with the requirements of *ASME B31.12-ASME Design code for Hydrogen Piping and Pipelines*, together with the transmission pipeline already constructed to this standard. This modification to the storage bottle would be subject to a later submission for planning approval, initiated when the economics of delivering a hydrogen blended gas fuel allow, and when hydrogen blended fuel is received from the SNP.

2.3.4 Associated Surface Facilities

The Project will require the construction of the following surface facilities to support the operation of gas transmission, interconnect and storage pipelines:

- JGN offtake facility — to control the flow of gas between the storage pipeline and the SNP via the delivery station and transmission pipeline.
- Compressor station – to increase gas pressure prior to delivery to the storage pipeline. Located at the termination of the transmission pipeline.
- Delivery station — to receive gas from the storage pipeline and control temperature, pressure and flow rate for delivery of gas to the HPP. Located adjacent to the HPP.

All associated surface facilities will be encircled with 2.4 m high security fences comprised cyclone mesh topped by barbed wire. Access to associated surface facilities will be via vehicle and personnel gates.

These facilities are further described in the sections below.

In addition to these facilities, a facility to control the flow of gas between the east coast grid and the transmission pipeline will be required, referred to as the JGN delivery facility. Located near the connection of the transmission pipeline and the existing SNP, the JGN delivery facility will be constructed and operated by Jemena. This facility will enable Jemena to meet regulatory obligations regarding transfer of gas between the SNP and the transmission pipeline. Jemena would be responsible for the design, planning approvals, construction and operation of this facility, as well as the approximately 400m section of piping to connect the facility to the SNP. APA will complete civil earthworks for the access track, construction pad and laydown areas as well as foundation installation for both the JGN offtake facility and JGN delivery facility. This will enable efficiencies to be realised during construction.

2.3.4.1 JGN offtake facility

The JGN offtake facility is an above ground facility that will provide an interface between the JGN delivery facility and the Project, and monitors and regulates the flow of gas from the Project back into the SNP. The JGN offtake facility will operate when gas is flowing from the storage pipeline back into the SNP via the transmission pipeline.

Infrastructure at the JGN offtake facility will include the following:

- Access track
- PIG launcher/receiver
- Dry gas filters
- Gas chromatograph
- Flow metering
- Flow/pressure control and isolation valves
- Venting apparatus located approximately 250 m east of the JGN offtake facility (for both maintenance and emergency use).
- Control hut, with Station Remote Terminal Unit (RTU) and associated communications.

The JGN offtake facility would be automated and designed so that it is capable of operating unmanned under normal operating conditions.

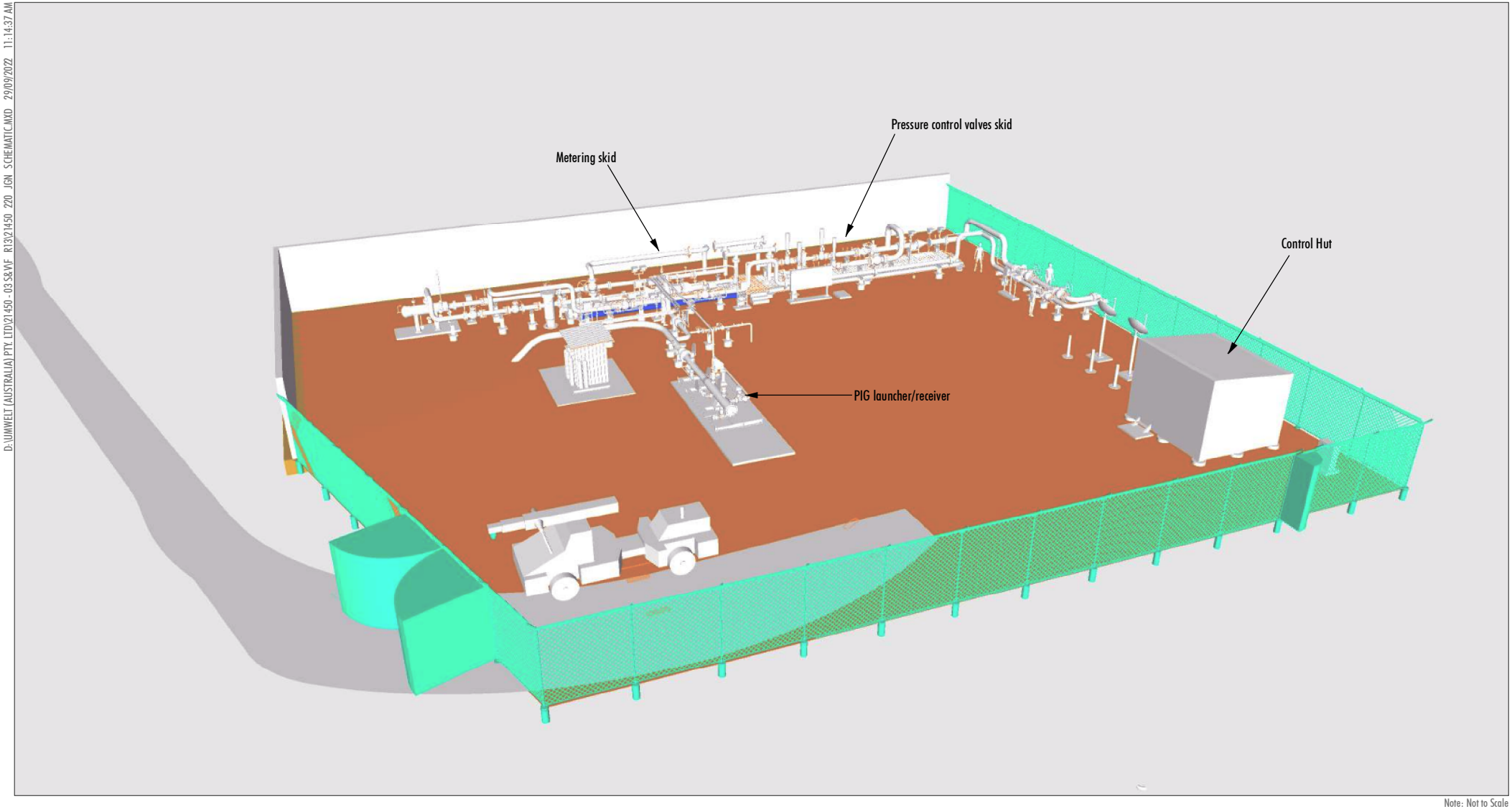
It is likely that that the site will be monitored by two technicians on-site during daylight hours, and available for 24 hour call out to site as required.

Lighting would be provided for security and emergencies at the facility as required.

The JGN offtake facility will require a construction disturbance footprint of 0.75 ha, and an operational area of approximately 0.2 ha. A schematic depicting the typical layout of the offtake station is provided in **Figure 2.3**.

The total operational area required for the co-located APA and Jemena offtake and delivery facilities is estimated to be around 0.32 ha.

A combined APA and Jemena facility with capacity for bi-directional flow would reduce the overall disturbance footprint required for separate offtake and delivery facilities. Such a design was investigated and determined to be unsuitable for the Project. This was primarily because this configuration would not comply with receipt and metering requirements specified by the Australian Energy Regulator, as prescribed in the Access Arrangements for this section of the east coast grid. Modifications to the Retail Market Procedures published by AEMO would also be required to operate a combined facility with bi-directional flow.



Note: Not to Scale

FIGURE 2.3

Schematic of a typical layout for the Offtake Station

Image Source: APA (2022)

2.3.4.2 Compressor station

The compressor station is an above ground facility that will receive and compress gas from the transmission pipeline, prior to transfer to the storage pipeline at a higher pressure. The compressor station will be located directly adjacent to the HPP.

The compressor station is proposed to consist of two reciprocating compressor units (which use pistons to compress the gas), operating on a 2 x 50% arrangement. The compressors station will receive gas from the transmission pipeline at pressures between 1,500 to 5,000 kPag and discharge gas to the storage pipeline at pressures between 5,300 to 15,320 kPag. The compressor station will enable the storage pipeline to be recharged with approximately 70 TJ of gas over a 33hour period.

The compressors will be electrically driven with a power demand of up to 7.5 MW. Electrically driven compressors are typically more efficient and reliable than gas driven compressors, as well as having significantly lower noise emissions and negligible air emissions.

The compressor station will require a high voltage power supply to provide the required power demand. This power supply is proposed to be supplied by connection to the HPP station services switchboards at 6.6kV by underground cable distribution feeders within the HPP building envelope. The high voltage supplies will be distributed internally within the compressor station by dedicated high voltage switchgear located within a high voltage substation building.

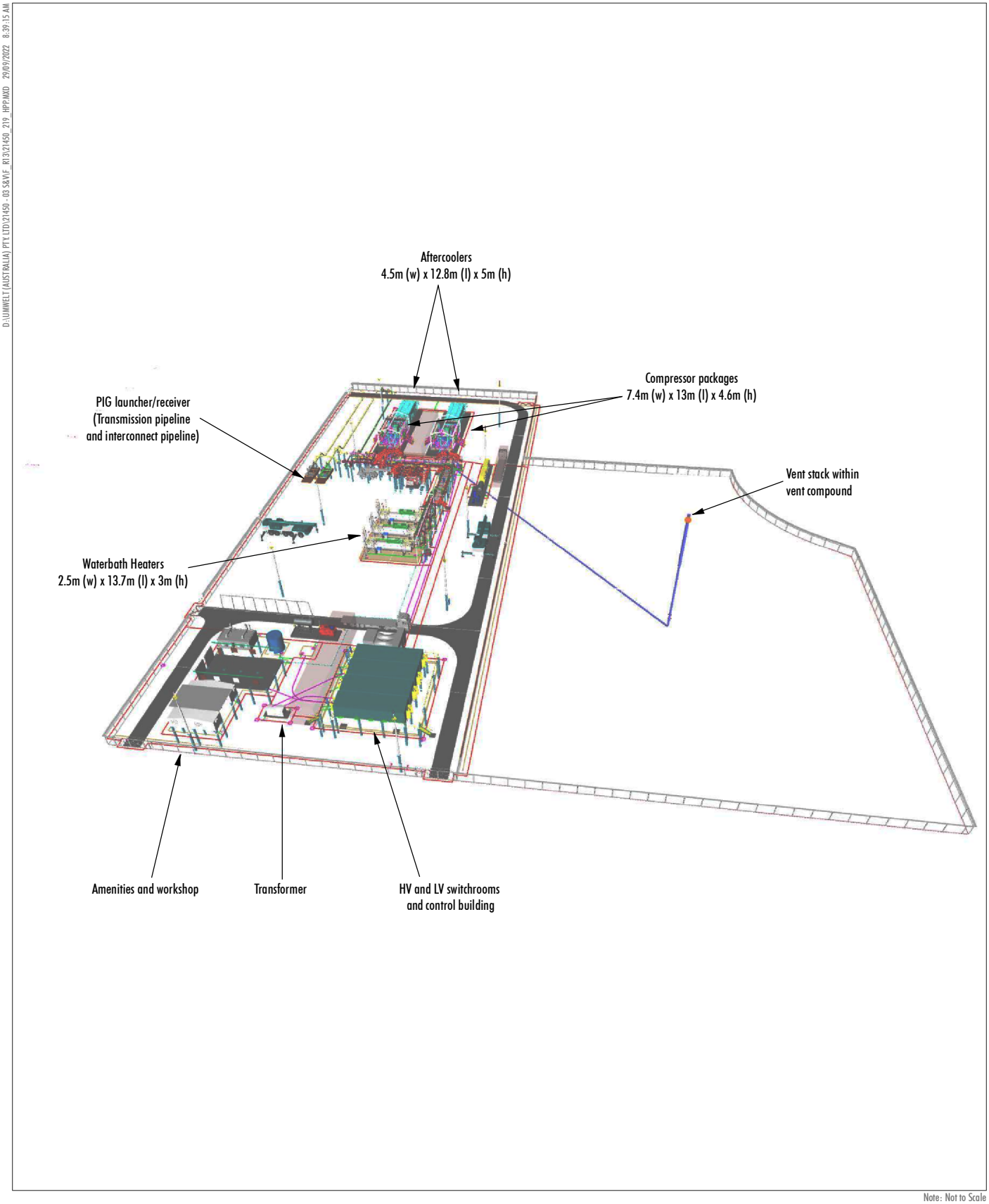
Low voltage equipment will be supplied by an internal distribution transformer, supplied from the high voltage switchgear. The low voltage switchgear and ancillaries will be located within switchrooms as required. An emergency low voltage supply will also be provided to the compressor station for critical loads from the HPP essential services supply.

The compressor station will be co-located with the delivery station within a site of approximately 2.2 ha. A compound housing a cold vent stack will located adjacent to the compressor station. The vent stack will be available for use during operations, maintenance and emergency situations.

The compressor station would be automated and designed so that it is remotely monitored and capable of operating unmanned under normal operating conditions.

It is likely that that the site will be monitored by two technicians on-site during daylight hours, and available for 24 hour call out to site as required.

Lighting would be provided for security and emergencies at the facility as required. The layout of the compressor station is provided in **Figure 2.4**.



Note: Not to Scale

FIGURE 2.4

Layout of the Compressor Station and Delivery Station

Image Source: APA (2022)

2.3.4.3 Delivery Station

The delivery station is an above ground facility to control delivery of gas from the storage pipeline to the HPP. The delivery station monitors and regulates the temperature, pressure and flow rate of gas exiting the storage pipeline to meet the delivery specifications of the HPP. Note that the delivery station is referred to in the HPP EIS as the 'gas receiving station'.

Gas temperature is proposed to be controlled using three water bath heaters, in a 3 x 50% configuration, on 2 duty/1 standby arrangement. Each water bath heater would be approximately three metres high, excluding the vent outlets. The energy source for the water bath heaters is proposed to be process gas sourced from the storage pipeline.

Multiple parallel control valves would control the pressure and flow rate of gas from the water bath heaters into the HPP. The control valves would reduce the pressure from the storage pipeline operating pressure to the lower HPP operating pressure. In the event of an equipment failure, overpressure protection safeguards are in place.

Custody transfer metering would be installed as part of the delivery station to measure the energy flow of gas being delivered to the HPP.

A vent stack for use during operations, maintenance and emergency situations would be shared with the compressor station. The vent stack may also be used during occasional maintenance of the storage pipeline.

In addition to HPP supply, the delivery station would also connect to the transmission pipeline to enable flow of gas from the storage pipeline back into the SNP and therefore the east coast grid. Flow direction would be controlled by on/off switching. Currently, gas being supplied to the NSW load centres (spanning Newcastle to Wollongong) must be imported via the Eastern Pipeline or the Moomba to Sydney pipeline. During periods of tightness in the NSW gas market having a storage pipeline that can inject gas back into the network will help provide greater gas system security and will help with managing the peaks in NSW gas customer demand.

The delivery station would be automated and designed so that it is remotely monitored capable of operating unmanned under normal operating conditions. It is likely that that the site will be monitored by two technicians on-site during daylight hours, and available for 24 hour call out to site as required. Lighting would be provided for security and emergencies at the facility as required. The layout of the delivery station is provided in **Figure 2.4**.

2.3.4.4 Vent Compound

The vent compound adjacent to the compressor station and delivery station is proposed to comprise a 45 m x 45 m fenced area surrounding a vent stack. The vent stack is likely to comprise DN250 pipe (approximately 27 cm diameter) with a height of no greater than 35 m.

The primary purpose of the vent compound and vent stack is to provide a safe mechanism for depressurising the compressor station or delivery station in the event of an emergency shutdown. The proposed dimensions of the vent compound and vent stack have been designed to meet safety requirements specified in AS2885 for this worst case emergency shutdown scenario. The vent stack may

also be used during maintenance activities for the compressor station, delivery station, interconnect pipeline and storage pipeline, or during emergency venting of the transmission pipeline.

2.3.5 Oily water and stormwater management

Equipment and machinery at associated surface facilities that contain potential contaminants (such as fuel, oil, grease and chemicals) will be covered and/or bunded in accordance with relevant Australian Standards to prevent contaminated runoff leaving the site. Runoff captured in bunded areas will be disposed offsite at appropriately licenced facilities.

The hardstand footprint of associated surface facilities outside of covered and bunded areas will be designed to appropriately manage stormwater runoff in accordance with relevant standards as follows:

- Best Practice Erosion and Sediment Control (IECA 2008)
- Managing Urban Stormwater: Soils and Construction Volume 1 (Landcom 2004) (blue book)
- Managing Urban Stormwater, Soils and Construction Volume 2A Installation of Services (DECC 2008).

Typically, these hardstand areas will comprise an appropriately graded and stabilised sub-base covered with gravel sheeting. Erosion and pollution control principles that will be applied to hardstand areas will follow the “treatment train” approach and seek to avoid the additional disturbance and risks to shallow groundwater associated with sediment control basins, wherever practicable.

Basic stormwater control principles will include:

- separate oily water and stormwater catchments
- avoid changes to existing flow paths wherever practicable
- divert upslope runoff around hardstand areas
- minimise hardstand footprint
- minimise sediment generation by appropriately stabilising and sheeting hardstand areas
- implement scour protection where flow concentrations cannot be avoided
- appropriate primary treatment of stormwater prior to release, where required
- selection of appropriate stormwater release locations.

2.3.6 Temporary Ancillary Facilities

A range of temporary facilities will be required during the construction phase of the Project, as described in the following sections.

2.3.6.1 Pipe Laydown Areas

Laydown areas will be used to store pipe segments for the transmission pipeline, interconnect pipeline and storage pipeline following delivery to the Port of Newcastle and prior to delivery to construction areas. A single laydown area of 1 ha is proposed to store transmission pipeline pipe segments. Storage pipeline pipe segments will be stored within a 6.5 ha laydown area adjacent to the compressor station, as described in

Section 2.3.6.3. Pipe segments of both pipelines may also be stored at the Port of Newcastle for a period of time prior to transportation to laydown areas. Proposed laydown area locations are shown in **Figure 2.1A to 2.1H**.

Further information on the importation of pipes and transport to site is detailed in **Section 2.8.3.1**.

2.3.6.2 Access Tracks

Equipment and personnel will require daily access to the ROW and worksites during construction. Access to the ROW will generally be achieved through a combination of local roads and the ROW as a thoroughfare, where appropriate.

Use will also be made of access tracks across private property where suitable access to the ROW is constrained or there is a lack of public roads in the vicinity. The requirement for any additional access tracks will be assessed in consultation with landholders as site-specific access requirements along the alignment are identified.

Fifteen access tracks are proposed for use during construction, located as described below and shown on **Figure 2.1A to 2.1H**.

- Construction of 200 m of access track to the east of Lenaghans Road to provide access to the JGN Offtake Facility.
- Construction of 70 m of access track from the west of Lenaghans Drive to the transmission pipeline ROW north of the JGN Offtake Facility.
- Construction of 55 m of access track from the service road for Lot 10 DP829154 to the transmission pipeline ROW at KP0.9.
- Use of an existing sealed track of around 500m on Lot 2 DP1260203, to connect Black Hill Road with the construction footprint on the Broaden Management industrial estate.
- Use of existing sealed haul roads associated with the Abel Coal Mine (under care and maintenance) and the rehabilitated Donaldson Coal Mine.
- Use of 800 m of existing access track at Buchanan Road entrance to the Bloomfield Coal Mine
- Construction of 920 m of access track between entry and exit points of the Buttai Creek HDD crossing.
- Construction of 400 m of access track from Valley View Lane to the western side of Buttai Creek.
- Construction of 600 m of access track and refurbished culvert crossing at the Wallis Creek crossing.
- Use, upgrade and construction of 350 m of existing access tracks west of Main Road to KP15.7
- Upgrade of 940 m of existing access tracks between Dickson Road and the HDD entry and exit points directly north of the former aluminium smelter site.
- Use and, where required, upgrade of approximately 1,000 m of existing access tracks to the north-west of the smelter site to the HDD pad at KP20.8.
- Upgrade of 190 m of existing access track to connect the storage pipe laydown area with the access track described below.

- Use and where required, upgrade of 3,600 m of existing access tracks from Hart Road, along HV power easements and Bishops Road to the storage pipeline construction footprint.

Construction or upgrade of the above access tracks will be undertaken to a suitable all-weather standard for heavy vehicles with typically a 6 m wide surface and gravel sheeting where required, such as in areas subject to ponding. Design of access tracks will be undertaken as necessary in consultation with the relevant landholder. APA will seek agreement from landholders to grant suitable access rights to these tracks for construction access and ongoing operational access where required.

2.3.6.3 Additional Workspaces

Construction laydown area adjacent to compressor station

A construction laydown area of up to 6.5 ha will be constructed adjacent to the compressor station and delivery station for storage of equipment, materials and pipe segments. The construction laydown area will be located on existing hardstand of the former Kurri Kurri aluminium. The exact dimensions of the laydown area is subject to ongoing discussion between APA and Snowy Hydro, Hydro Aluminium and the Regrowth Kurri Kurri project, as all of these stakeholders have an interest in the use of this land during the construction period. The indicative design of the 6.5 ha laydown area is shown in **Figure 2.1H.**

Cleared Vegetation Stockpiles

Additional workspaces are required adjacent to heavily vegetated sections of the alignment to store felled vegetation and/or mulch which cannot be accommodated on the ROW. These additional workspaces will require a footprint of 50 m x 50 m in addition to the ROW. Six locations for cleared vegetation stockpiles have been identified as shown in **Figure 2.1A to 2.1H**. Three of these locations are located on land approved for the Stevens Group Hunter Business Park industrial development, and so will be located on land that has been approved for clearing. These three vegetation stockpiles will not be required if clearing for the industrial estate occurs prior to pipeline construction.

Truck Turnarounds

Truck turnarounds are turning bays that are required along the ROW to allow trucks delivering pipe and other materials to be able to turn around and return to an appropriate exit point. Fourteen truck turnarounds are proposed to be located approximately every 2 km along the alignment unless there are accessible intersecting roads, as indicated on **Figure 2.1A to 2.1H**. Truck turnarounds will be an additional 15 m width of the ROW for a length of about 50 m.

Horizontal Directional Drilling Entry and Exit Points

HDD is generally used for the crossing of watercourses with permanent water where standard open cut methods are less preferable due to width of crossing, volume of water present or other environmental considerations. HDD may also be used for road or railway crossings as an alternative to boring. Further details on HDD, including indicative locations, are contained in **Section 2.8.1.8**.

Work areas at the HDD entry (drill site) and exit points are required on either side of the feature being crossed. The entry and exit point of each HDD will generally require a disturbance footprint of approximately 20 m x 50 m and 15 m x 50 m respectively, in addition to the ROW.

Trenched/Bored Crossings

Crossings of watercourses and roads not requiring HDD will be constructed by open cut trenching or horizontal boring.

Unsealed roads and minor watercourses will typically be crossed using open cut trenching. Sealed bitumen roads and rail lines will typically be crossed by horizontal boring.

Horizontal boring involves construction of a bell hole either side of the crossing with a horizontal bore hole for installation of the pipeline beneath sensitive surface features. The additional disturbance footprint required for horizontal boring crossings would generally be an area of approximately 5 m x 50 m adjoining each side of the ROW.

2.3.6.4 Hydrotesting

Hydrotesting of the transmission, interconnect and storage pipelines, as further described in **Section 2.3.6.4**, will require water storages to be constructed near the break point of each hydrotest section. Water storages are likely to be break tanks located on the ROW near the centre of the transmission pipeline, near the compressor station if the existing reticulated water supply to the former Hydro smelter is used as a water source, and a turkeys nest dam located near the centre of the storage pipeline construction footprint. The turkeys nest dam may be retained following construction. The estimated area required for the turkeys nest storage is 1.2 ha.

2.4 Land Requirements

Construction of the Project would require an estimated of 106 ha of land. Approximate land requirements for components of the project during construction are as follows; 50 ha for the transmission pipeline including extra workspaces, 35 ha for the storage pipeline including turkeys nest dam and header assembly, 3.3 ha for associated surface facilities, 7.5 ha for pipeline and equipment laydown areas and 10.2 ha for access tracks including existing tracks.

During operations the Project would require an estimated 5 ha of land.

The estimated land requirements for construction and operational phases of the Project are outlined in **Table 2.5**.

Table 2.5 Estimated Disturbance Area

Project components	Disturbance Area (ha)	
	Construction	Operations
Transmission pipeline construction footprint (including truck turnarounds, vegetation storage, HDD and bore entry and exit workspaces, watercourse crossing workspaces)	49.7	0
Mainline valve (MLV)	0.1[2]	0.02
Access Tracks	10.2[3]	0.2
Pipeline and Equipment Laydown Areas	7.5	0
Storage pipeline construction footprint including turkeys nest dam and above ground connection header assembly	35.2	2.5
JGN Offtake facility (including construction of the vent apparatus and earthworks for the JGN delivery facility)	1.1	0.2
Compressor station and delivery station	2.2	2.2
Total	**105.9**	**5.1**

[2] MLV footprint contained within disturbance footprint of the transmission pipeline ROW
[3] Sealed mining haul roads and other existing tracks are included in the construction footprint

2.5 Expenditure

The estimated capital investment value for the Project is $ 264 million.

2.6 Project Schedule

The schedule provided in **Table 2.6** is indicative and will be confirmed based on a final investment decision.

Table 2.6 Indicative Project Schedule

Milestone	Target Date
Environmental assessment and approvals	Q2 2021-Q4 2022
Design and procurement	Q1 2021-Q4 2022
Project construction	Commence Q1 to Q2 2023 Finish Q4 2023
Project commissioning and operations	Q4 2023

2.7 Alignment Changes Post-EIS Approval

It is likely that minor changes to the transmission pipeline alignment and storage pipeline construction footprint would be required post-EIS approval as a result of both ongoing landholder negotiations and the outcomes of detailed design activities. These changes will be undertaken in accordance with the alignment refinement process as outlined in **in Section 5.3.4 of the EIS.**

2.8 Construction Methodology

2.8.1 Transmission and storage pipelines

Construction of both the transmission, interconnect and storage pipelines will use typical methods for modern gas pipelines. Given the larger diameter pipe required for the storage pipeline, there will be some differences in construction methodology relative to the transmission pipeline. Notably construction equipment will be larger, the construction rate will be slower and welding and weld testing methods appropriate for the increased wall thickness will be implemented. The construction footprint for the storage pipeline will also be cleared and reinstated incrementally to match construction progress, and to minimise the area of exposed ground during construction.

The construction sequence is shown in **Photo 2.18**, and will involve the following key steps, which are described in greater detail in subsequent sections:

- Preliminary survey works (including geotechnical surveys, installation of temporary gates in fences)
- Clearing of vegetation and grading the ROW
- Stripping and stockpiling of topsoil
- Delivery of pipe segments to the ROW and welding into ‘strings’
- Non-destructive testing (NDT) and coating of welds
- Excavating a trench and any necessary bell holes in which to lay the pipe

- Lowering the pipeline strings into the trench and welding strings together
- Backfilling the trench with excavated material
- Crossing watercourses and roads by open cut trench, horizontal boring or HDD methods
- Installing pipeline markers at fences, road crossings and other locations as required by AS 2885
- Testing the structural integrity of the pipeline by hydrostatic testing
- Installing permanent gates in fences, where required
- Rehabilitating the construction footprint.

A typical layout for the construction ROW is shown in **Photo 2.19**.

Photo 2.18 Typical construction sequence

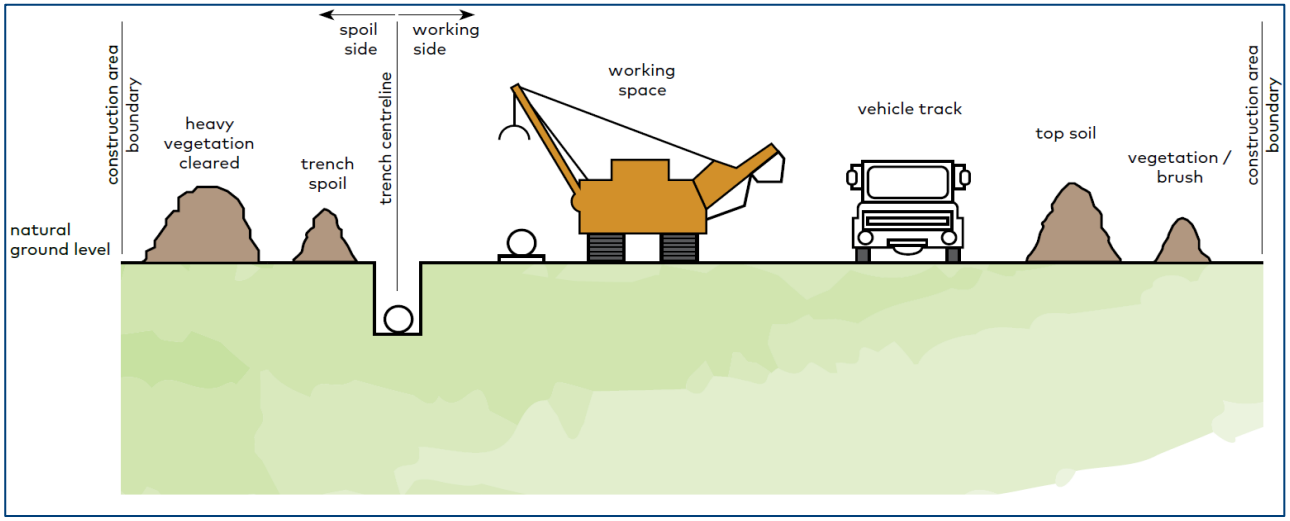


Photo 2.19 Typical layout for the construction Right of Way

2.8.1.1 Preliminary Survey Works

Preliminary survey works will be undertaken to mark the extent of approved work areas. Markers will be placed along the alignment to identify the pipeline centreline, the boundaries of the ROW, any additional workspaces and access roads, if required.

Fencing crossing the ROW will be strained and cut and temporary gates and fencing will be installed.

2.8.1.2 Clearing and Grading

Clearing and grading of the construction footprint will be undertaken to provide a safe and efficient area for construction activities. Clearing will be required to remove trees, shrubs and groundcover vegetation. Graders, bulldozers and excavators are generally used to clear and level the construction footprint. A ROW width of 25 m will generally be cleared and graded for the transmission pipeline, and up to 230 m for the storage pipeline.

In areas of woody vegetation, trees and shrubs will be mulched or stockpiled as cleared. The method will depend upon the type and density of the vegetation. Rootstock of trees will generally be removed. Large rocks, hollow bearing logs and large tree stems removed from areas of woody vegetation will generally be stockpiled for later respreading as part of the rehabilitation process.

Ground cover vegetation in areas supporting native or derived grasslands will generally be removed by bulldozers or graders. Cleared vegetation will be stockpiled on one or both sides of the ROW. Breaks will be left in stockpiled vegetation to allow continued access for stock, fence lines, tracks and drainage lines.

Topsoil will be stripped to depths defined by soil surveys, typically over the full width of the ROW. In soil types with topsoil depth of 30 cm or greater, the stripping depth may be reduced to ensure stockpiles can be accommodated within the ROW width. Topsoil will be stripped to the full depth above the trench to avoid mixing with subsoil. Stripped topsoil will be stockpiled on one or both sides of the ROW adjacent to vegetation stockpiles.

Access tracks, pipe laydown areas and extra workspaces will be constructed during the clear and grade phase.

Setting up temporary facilities such as work areas for equipment and pipe delivery and storage, borrow pits and access tracks, if required, would be undertaken during this phase.

The width of the construction ROW can be reduced in areas supporting sensitive environments and/or watercourses to minimise disturbance to these features. In some cases, due to the presence of areas of high ecological significance or other constraints, the pipeline will be constructed using alternative construction techniques such as HDD or horizontal boring, to avoid construction disturbance within the sensitive area.

The construction footprint for the storage pipeline will be cleared and reinstated in a number of discrete sections, as construction work progresses. This will enable the area of vegetation removal and exposed soil to be restricted to the current area of construction, with a subsequent reduction in erosion and sedimentation risks.

2.8.1.3 Pipe Stringing and Bending

Stringing involves distributing pipe segments along the ROW in preparation for welding.

Pipe segments will generally be transported to the ROW from pipe laydown areas by extendable semi-trailers. Pipe segments will be lifted from trucks by excavators, side-booms or cranes fitted with lifting hooks or vacuum lifters and laid adjacent to the marked trench location in a defined order. Pipe segments will be positioned on wooden skids and sandbags to protect the pipe coating from damage.

Where required, transmission pipeline pipe lengths will be bent using a hydraulic bending machine to match changes in either elevation or direction of the alignment.

Due to the large pipe diameter of the storage pipeline, bends will be manufactured at the manufacturing facility prior to sections being transported to site.

2.8.1.4 Welding

Specialised construction crews will weld pipe segments together manually or using an automated welding process. Manual welding will likely be used for the transmission pipeline whereas automated welding will primarily be used for the storage pipeline.

Pipe segments will be welded into strings of up to approximately 1,000 m in length for the transmission pipeline and approximately 200 m in length for the storage pipeline. Breaks in welded strings for stock and landholder will be provided where required.

All welds will be subjected to 100% NDT by x-ray analysis, ultrasonic testing or other methods to check structural integrity. Non-compliant welds will either be repaired or replaced.

Following welding, the weld joints will be cleaned by grit blasting with garnet. An external coating (compatible with the factory applied external coating) will be applied to the weld to prevent corrosion.

2.8.1.5 Trench Excavation

A wheel trencher, rocksaw or excavator will be used to dig the trench to lay the pipelines in. Trenches for the transmission pipeline will be excavated to a depth of approximately 1,350 mm to achieve a depth of cover of 900 mm and approximately 1,950 mm to achieve a depth of cover of 1,500 mm. Trenches for the

storage pipeline will be excavated to a depth of approximately 2,100 mm to achieve a depth of cover of 900 mm and approximately 2,700 mm to achieve a depth of cover of 1,500 mm.

Spoil generated during trench excavation will be stockpiled on the nonworking side of the ROW, separate from vegetation and topsoil stockpiled earlier in the construction program.

Breaks in the open trench will be included to facilitate stock and wildlife crossings and agricultural vehicle movements. Breaks will also be included at fences and drainage lines as required.

Blasting of rock to excavate the trench will only be undertaken if conventional excavation, rock hammering or trenching equipment is found to be ineffective. This is considered unlikely to occur due to favourable geology across the transmission and storage pipeline alignments. In the case that blasting is required an operational procedure will be prepared in accordance with Australian Standards, detailing the proposed blasting method.

2.8.1.6 Lowering In and Backfilling

Following trench excavation, the welded pipe strings will be lifted off skids and lowered into the trench using side-boom tractors. The pipe coating is inspected and tested for defects as each welded pipe string is lifted. After lowering-in, the strings are welded together (a 'tie-in') in the trench.

In some areas, it may be necessary to protect the pipe coating from abrasion damage by placing a layer of padding material in the trench prior to lowering in of the pipeline as well as to cover the pipeline (shading). Padding machines are used to generate padding material by sieving the excavated trench subsoil to remove rocks and coarse materials and depositing the fine material in the base of the trench. This method minimises, but may not eliminate, the need for importing padding material from other locations.

Where required, trench blocks (also known as trench or sack breakers) will be installed prior to backfilling of the trench to control lateral water movement along the trench. Trench breakers are commonly installed for a number of environmental conditions, such as adjacent to watercourses and wetlands, on steep slopes or where drainage patterns change. Trench breakers are constructed typically from sacks of soil or sand, stabilised sand or spray applied polyurethane foam (**Photo 2.20**). The trench will then be backfilled with trench spoil and compacted to minimise the risk of settlement.

Tie-ins (i.e. the joining together of ‘strings’) is undertaken via the excavation of a bellhole of sufficient size to allow a welder into the trench to cut off overlapping pipe lengths and to weld the two strings together.

Photo 2.20 Trench breakers

2.8.1.7 Rehabilitation

Rehabilitation of the construction footprint will be undertaken in accordance with the current revision of the APGA Code of Environmental Practice and good pipeline construction principles with the aim of:

- Returning land to its previous productivity within a reasonable timeframe
- Re-establishing topsoil cover
- Returning all land and waterways to a stable condition
- Ameliorating construction impacts to soil texture, structure and chemical composition, where required
- Reinstating natural drainage patterns
- Spreading of mulch or timber, where appropriate
- Application of seed and fertiliser, where appropriate
- Installing permanent erosion control measures (such as contour banks, filter strips) in erosion prone areas

- Ensuring the pre-construction environment is reinstated and disturbed habitats recreated where they do not affect pipeline operation and integrity (trees and shrubs are discouraged over and near the pipeline to maintain integrity of the pipe coatings) and to enable operational access.

Given that the pipelines will be underground, land users will be able to continue regular land use activities above the pipeline provided that they do not undertake unapproved excavation activities or erect structures in the easement. Shallow-rooted vegetation can be re-established across the entire easement, although tall and deep-rooted vegetation and mature trees cannot be located close to the pipelines, due to the potential to damage the pipeline coating and impediments to operational access requirements.

Shallow-root grassland re-establishment is encouraged. Grass and pasture species, and seeding requirements, will be selected based on the desired final land use and in consultation with the landholder.

An example of an APA pipeline near Cootamundra in NSW during construction (January 2017) and 7 months after construction (July 2017) is shown in **Photo 2.21** and **Photo 2.22** respectively.

Photo 2.21 ROW during construction (Jan 2017)

Photo 2.22 ROW approximately 7 months after construction (July 2017)

2.8.1.8 Horizontal Directional Drilling (HDD)

HDD will be used for the crossing of selected watercourses, or other features of high sensitivity, where standard open cut methods are less desirable. HDD may also be used for road crossings as an alternative to boring.

The installation of a pipeline by HDD involves drilling a pilot hole, at a shallow angle beneath the surface, from an entry point on one side of the crossing to an exit point on the other side of the crossing.
A schematic showing the typical layout of an HDD entry and exit point is presented in **Figure 2.5**. The hole is then enlarged by reaming to allow for the welded pipe string to be pulled back through the drill hole from the exit point to the entry point without damaging the coating. The pipeline string is then welded to adjoining sections of the pipeline. Once the pipe string is installed and tied into the main section of the pipeline, the entry and exit points are remediated. Refer to **Figure 2.6** for an illustration of the typical process for HDD.

Drilling is conducted by a specific HDD rig, operated by a specialist contractor. The size of the HDD rig and its associated footprint depends upon the size of the pipe, the nature of the subsurface geology and the length of the drill. Drilling mud (typically bentonite) is used to hydraulically drive the drilling head, as a coolant, to wash in-situ material (cuttings) from the drilled hole and to seal and line the hole to facilitate insertion of the pipe. Additives are also sometimes used in the drilling mud to aid in the drilling process depending on the geologic formation or substrate being drilled through. These additives may include soda ash (sodium carbonate) for pH control and surfactants to disperse clay particles.

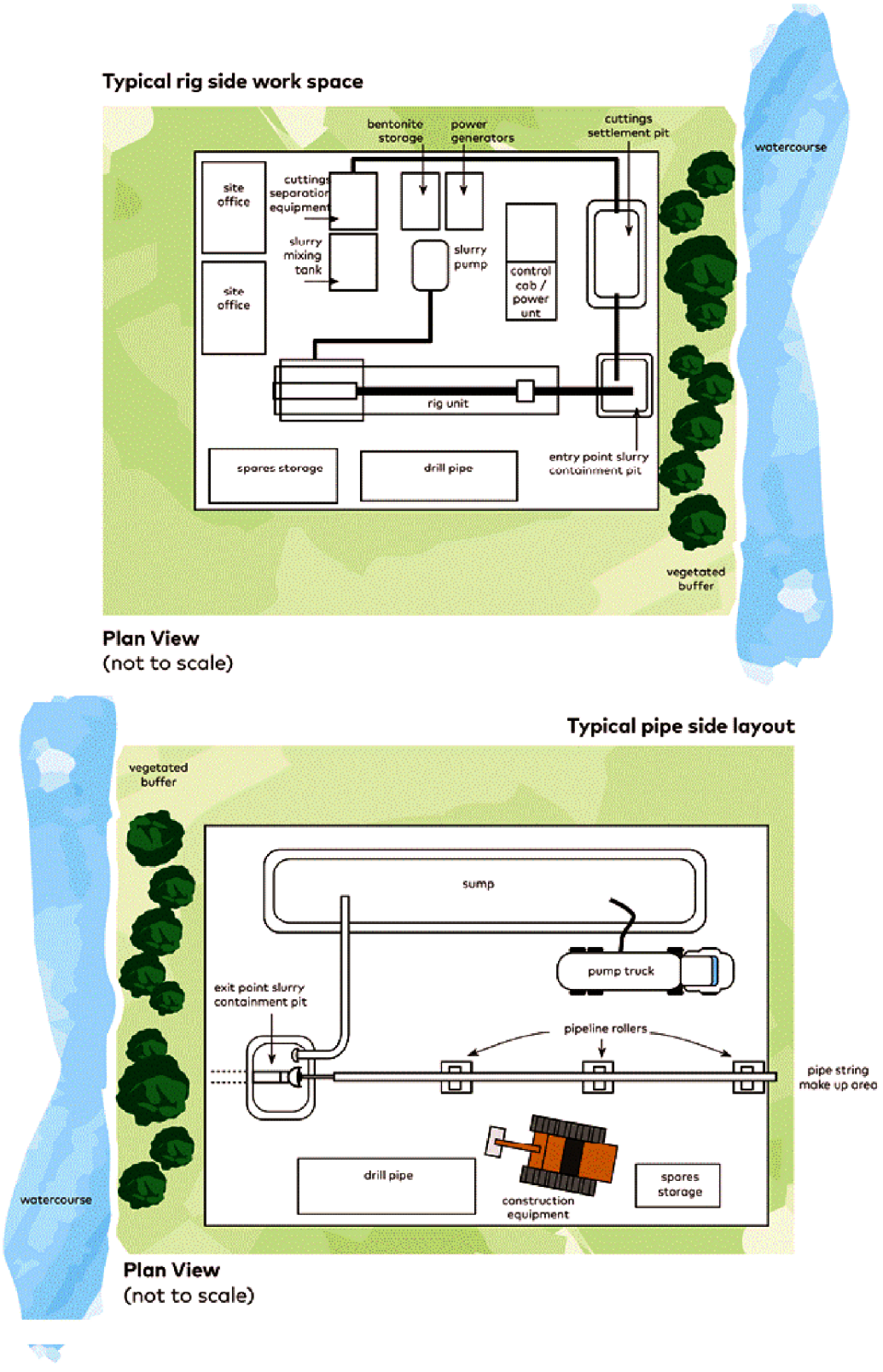
Cuttings are screened at the HDD rig to remove drilling mud, which is recycled. Screened cuttings are typically diverted to skip bins, though settlement pits may also be used, prior to disposal in landfill.

The preferred method of circulating drilling mud between the HDD exit and entry point is though return lines made of small diameter high density polyethylene pipe. No clearing or ground disturbance is required for surface return lines as they will be laid on the ground surface within existing cleared areas and along access tracks. Surface return lines will be removed once the HDD is complete.

Where laying return lines on the surface is not practicable, such as the proposed HDD of John Renshaw Drive, drilling mud can either be transported between the exit point and entry point by vacuum truck or an additional pilot hole can be drilled between the exit point and entry point to house the return line.

The HDDs of Wallis Creek, Swamp Creek and Black Waterholes Creek may intercept acid sulfate soils during drilling and reaming of the borehole. Drilling fluids are monitored and adjusted to a mildly alkaline state around pH 9 by addition of sodium carbonate to ensure correct efficiency and effectiveness. Maintenance of pH of the drilling fluid effectively neutralises any acid sulfate soils produced as cuttings.

HDD avoids surface disturbance to the relevant feature but introduces other technical and environmental risks which must be managed. HDD activities typically have to be undertaken continuously, so noise impacts during night periods can be increased and require careful management. Geotechnical constraints (fissures and cracks, unconsolidated substrata and subsurface scour potential) may prevent this method being suitable for application at all locations due to the risk of inadvertent release of drilling mud from the drill bore to the ground surface. Where HDD is proposed, the open trenching method is generally maintained as a contingency until geotechnical studies have demonstrated feasibility of HDD.

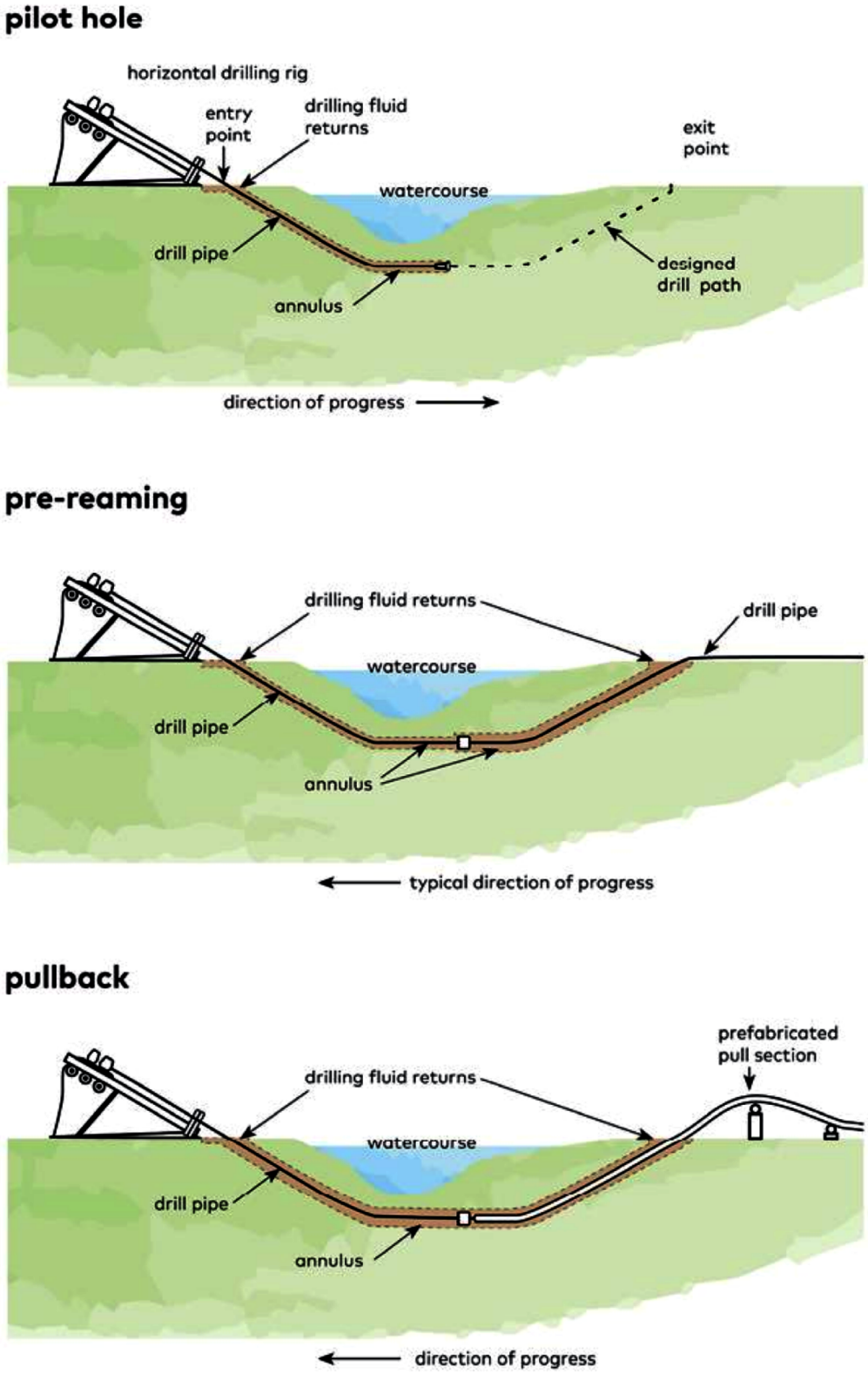


Note: Not to Scale

FIGURE 2.5

HDD Entry and Exit Point Schematic

Image Source: APA (2021)



Note: Not to Scale

FIGURE 2.6

Illustration of Typical HDD Process

Image Source: APA (2021)

HDD is proposed to be undertaken at the following six locations, with approximate HDD lengths listed. The total length of HDD proposed for the Project is approximately 5,000 m:

- KP 0.5, M1 Pacific Motorway, 600m,
- KP 5.2, John Renshaw Drive, including Weakleys Flat Creek, 560 m.
- KP 13.8, Buttai Creek, 700 m.
- KP 15.2, Wallis Creek, 800 m.
- KP 18.8 Swamp Creek, 430 m.
- KP 19.7, Entry to the compressor station to avoid disturbance to remnant vegetation forming part of the proposed stewardship area for the Regrowth Kurri Kurri development and HV overhead power lines, 1,000 m.
- Section of the DN350 interconnect pipeline between the compressor station and storage pipeline, to avoid disturbance to remnant vegetation forming part of the proposed stewardship area for the Regrowth Kurri Kurri development, HV overhead power lines and Black Waterholes Creek, 900m.

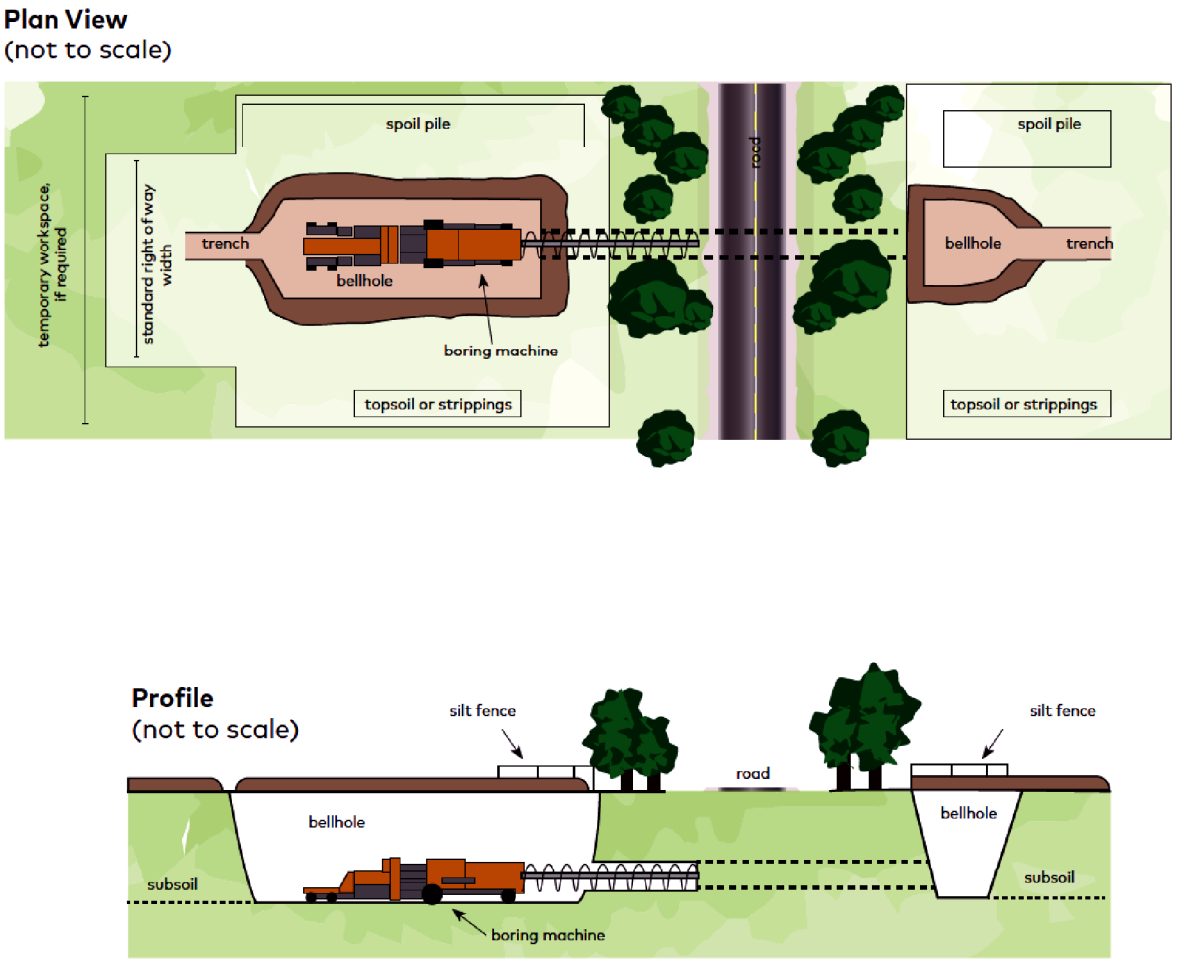
Final locations will be dependent upon the type and nature of the crossing, and geotechnical conditions. The alignment of the HDD and circulation of drilling muds are monitored throughout the HDD operation for indications of an inadvertent drilling mud release.

2.8.1.9 Horizontal boring

Horizontal boring (also referred to as thrust boring or micro-tunnelling) involves construction of a horizontal bore hole for installation of the pipeline beneath surface features which typically cannot be open cut, such as sealed roads and underground services. A typical set up for a thrust bored crossing is shown in **Figure 2.7**.

Bell holes are excavated on both sides of the feature to the depth of the adjacent trench and graded to match the proposed slope of the pipeline. A bell hole is an enlarged hole allowing a boring machine wider than the width of the trench to operate within it to tunnel under the relevant constraint. Entry bell holes will be approximately 10 metres long, four metres wide, and up to four metres deep. The exit bell hole will typically be seven metres long, four metres wide and up to four metres deep. Horizontal boring is proposed to be undertaken at the following eight locations:

- KP 0.1, Lenaghans Drive
- KP 3.2 and KP 4.6, Hunter Water Corporation pipeline on Lot 1 DP1260203
- KP 7.0, Connecting pipe between the CTGM and Stony Pinch Reservoir
- KP 9.0, Haul road of the Bloomfield Coal Mine
- KP 10.6, Hunter Water Corporation trunk main
- KP 11.2, Hunter Water Corporation trunk main
- KP 12.9, Buchanan Road
- KP 17.3, South Maitland Railway (with concrete casing and grouting of bore).



Note: Not to Scale

FIGURE 2.7

Typical Horizontal Boring Schematic

Image Source: APA (2021)

2.8.1.10 Watercourse Crossings

The transmission pipeline alignment will cross 19 watercourses the interconnect pipeline will cross two watercourses and the storage pipeline will cross two watercourses. The pipeline connecting the JGN offtake facility to the venting apparatus will cross one watercourse.

Watercourse crossings will be constructed by open cut trenching or HDD depending upon the geomorphic and environmental characteristics and sensitivity of the watercourses, and geotechnical conditions. HDD is proposed for crossings of six watercourses as described below.

- KP5.1, Weakleys Flat Creek, as part of the HDD of John Renshaw Drive
- KP13.8, Buttai Creek
- KP15.2, Wallis Creek
- KP18.8, Swamp Creek
- KP 20.6, an unnamed tributary of Black Waterholes Creek,
- DN350 interconnect pipeline between the compressor station and the storage pipeline, Black Waterholes Creek

Open trenching is proposed for all other watercourses however watercourses with steep banks will be characterised as special crossings and specific construction techniques applied. The remaining ephemeral watercourses will typically be crossed using open cut trenching using standard pipeline construction methods.

The decision framework used to determine the crossing methodology for watercourses, and the standard mitigation measures for each crossing type, is shown in **Figure 2.99**.

Open Trenching with Flow Diversion

Flow diversion will need to be undertaken for trenched crossings where there is water (standing or flowing) in the watercourse (**Figure 2.1010**). Flow diversion techniques may include:

- Diverting the flow through a pipe to prevent siltation problems that may be created during trenching, lowering in and backfilling. This technique is not suitable for watercourses with broad channels, low gradients or permeable substrates.
- Pumping of water around the construction area. This is appropriate for low gradient streams, with discharges less than 1,000 L per second. Barrier dykes or head wells are constructed above and below the construction area which is pumped dry.
- Controlling water running into the watercourse from the surrounding catchment by contour banks may be required to protect the creek banks from erosion.

Special crossings

Watercourse crossings with steeper banks that are proposed to be open trenched will require banks to be battered to a suitable angle to enable access to and across the watercourse for construction machinery. These watercourses will be treated as special crossings (**Figure 2.1111**).

Two such watercourses have been identified being Viney Creek (KP2.8) and Four Mile Creek (KP6.7). A range of mitigation measures will be applied at these watercourses to mitigate impacts associated with increased disturbance of banks or wetlands, given the greater potential for erosion of the bank or sedimentation of the watercourse.

Initially, disturbance within these watercourses will be restricted to all weather running track with a maximum disturbance width of 10 m wide. Construction of the pipeline crossing will not occur as part of the standard pipeline construction sequence of separate tasks described above. Rather, clearing of the ROW, trenching, installation of the pipeline and reshaping to stable landform will be undertaken as a consolidated construction project in order to reduce the duration of activities within the watercourse, within a restricted time period of 20 days.

The access track will be removed and reinstatement completed within five days of the access track no longer being required. The access track may remain in place until all pipeline construction activities are completed.

Specific erosion and sediment control plans will to be developed for each special crossing.

Wallis Creek temporary crossing

A temporary vehicle crossing of Wallis Creek is proposed to be installed near KP 15.2 of the transmission pipeline for the duration of the construction period. The crossing location is adjacent to an existing rubble weir as shown in **Figure 2.5**. The temporary crossing will enable construction staff, vehicles and machinery the access either side of Wallis Creek without undertaking a 14 km round trip on public roads between Valley View Lane and Main Road adjacent to Testers Hollow with subsequent efficiency, amenity and traffic impacts. The crossing would be removed at the conclusion of the construction period.

The location of the proposed temporary crossing is located in a reasonably straight stretch of Wallis Creek, where the channel width is narrow at approximately 10 m. The site assessment undertaken for the water technical report (as described in **Section 7.4**) identified that this section of Wallis Creek has a defined channel with incised banks and gentle bank slopes on the adjoining flats.

Structural integrity of any crossing design at this location during flood conditions is a key consideration. Flood extent and velocity modelling indicates that the crossing and tracks either side would be submerged during a 50% AEP event though flood velocities are low at less than 0.5 m/s (WMAwater 2019).

These morphology and flooding conditions indicate use of multi-cell box culverts may be the most feasible crossing design at this location. Multi-cell box culverts can closely replicate the shape and area of the natural channel, minimise bank damage during construction and removal, provide greater structural integrity during flooding and enable passage of fauna through the waterway. Pipe culverts and temporary bridges are also options, however structural integrity during flooding would be reduced and hydraulic capacity may be insufficient for pipe culverts.

Access tracks connecting to the temporary crossing would be designed to minimise generation of sediment and sheeted with appropriately sized aggregate. Additional sediment controls required for the crossing would be determined as part of detailed design. The design and construction method for the proposed temporary crossing is subject to detailed design in consultation with the DPIE water group.

Storage Pipeline Watercourse Crossings

The storage pipeline traverses two minor unnamed watercourses which have formed reasonably steep sided gullies within the construction footprint. These gullies have been formed by 1st order streams with very small upstream catchments, which extend to a maximum distance of around 250m upstream (west) of the storage pipeline construction footprint. Site survey data demonstrates that height differences between the top of bank and gully bases are variable, with the greatest difference being approximately 6 m of fall across 18m of horizontal distance

Given the larger diameter and thicker wall diameter of the storage pipeline, the ability to bend pipe segments to match natural contours is limited relative to the smaller diameter transmission pipeline. Given this, it is likely that battering of some areas of gullies to achieve a reduction in slope to match bending limits will be required where the crossed by the storage pipeline.

In one area of the construction footprint the storage pipeline runs parallel to a gully. In this area side slope benching will be required using cut and fill method to provide a level area for trenching, then benched again to provide a level area for pipe stringing, welding and lower in. An illustration of side slope benching is provided in **Figure 2.8**.

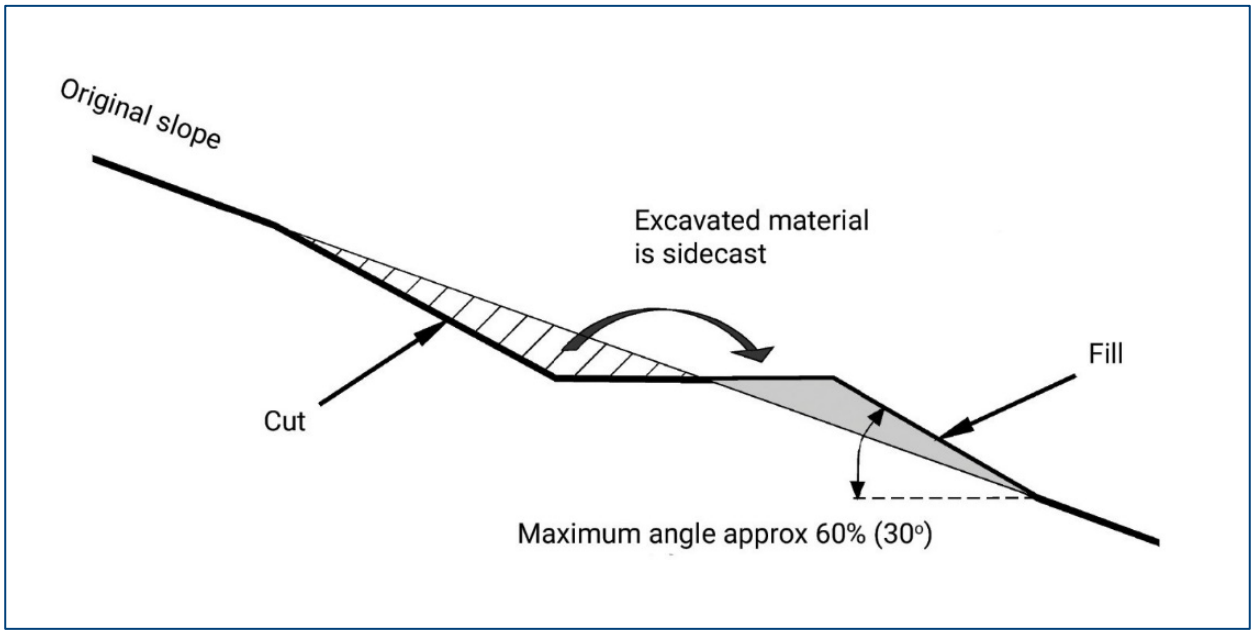
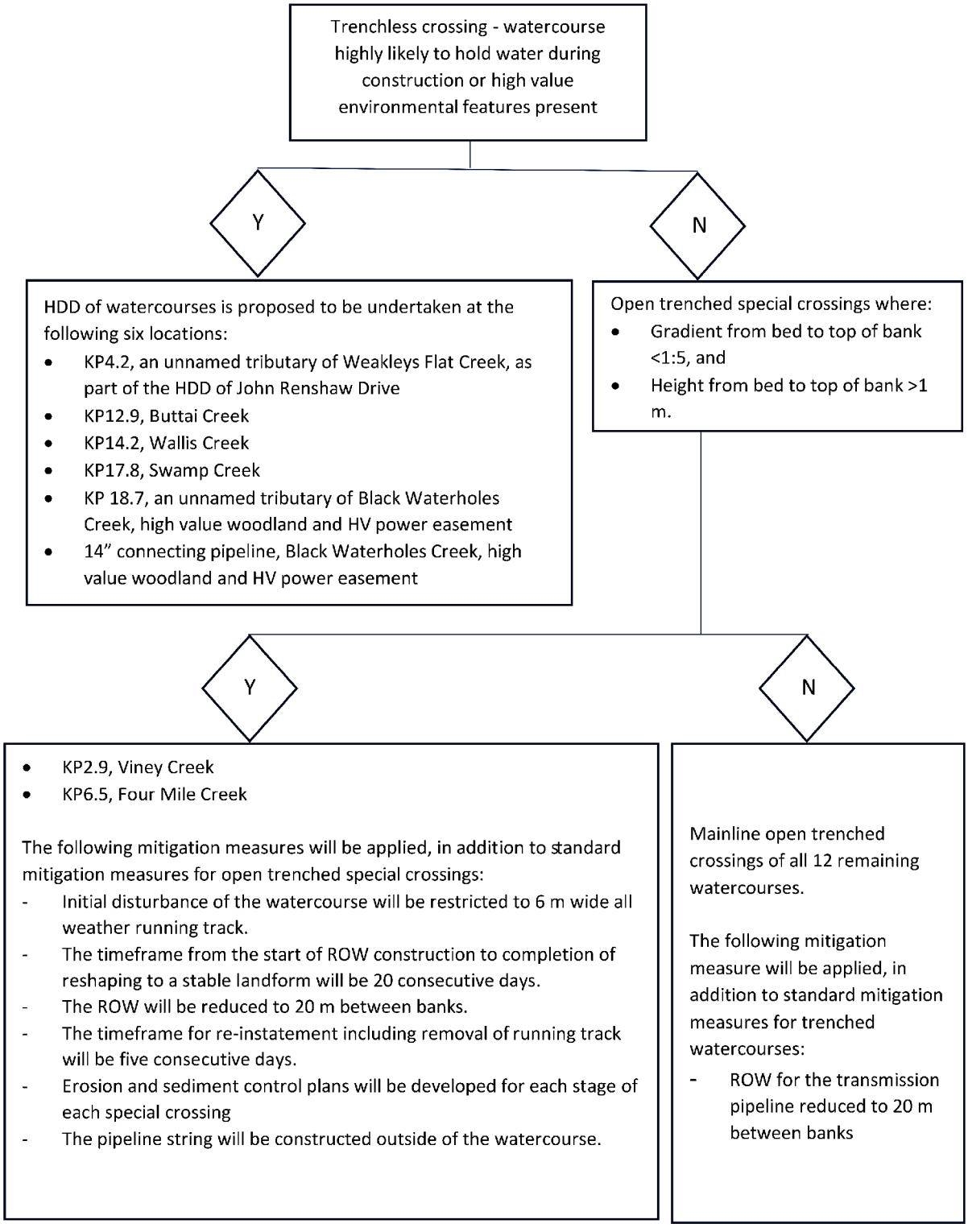


Figure 2.8 Side slope benching

Reinstatement to a stable landform of any sections of gullies that have been battered or side slope benched will be undertaken post construction. This stabilisation may include geofabric and rock placement, rock chutes in areas of concentrated flow, wing banks to direct runoff, erosion matting, seeding with a cover crop and suitable permanent perennial pasture mix and management of grazing access.

Implementation of a monitoring and maintenance program will be undertaken during Project operations.

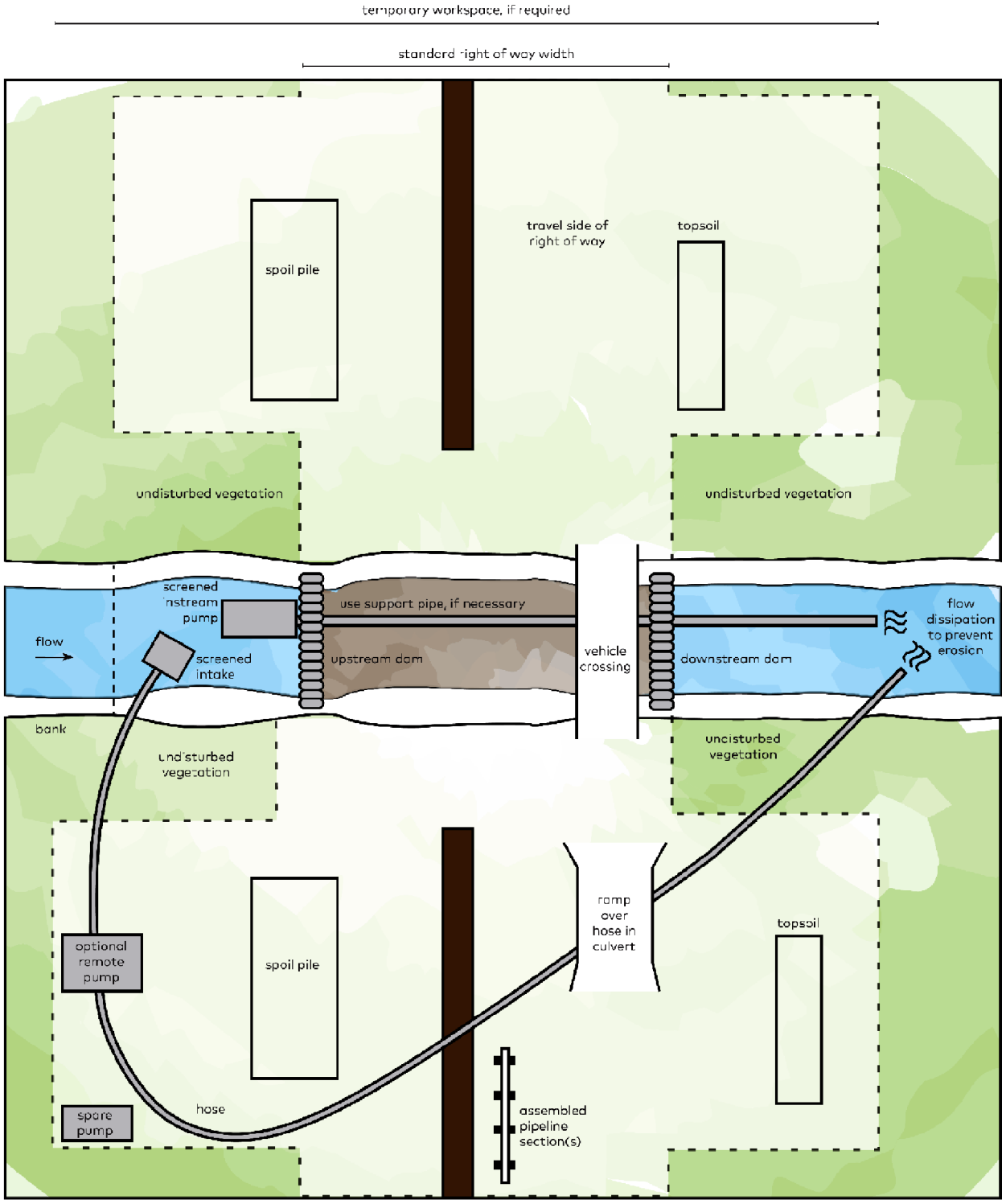


Note: Not to Scale

FIGURE 2.9

Decision Framework for Watercourse Crossings

Image Source: APA (2021) Data source:

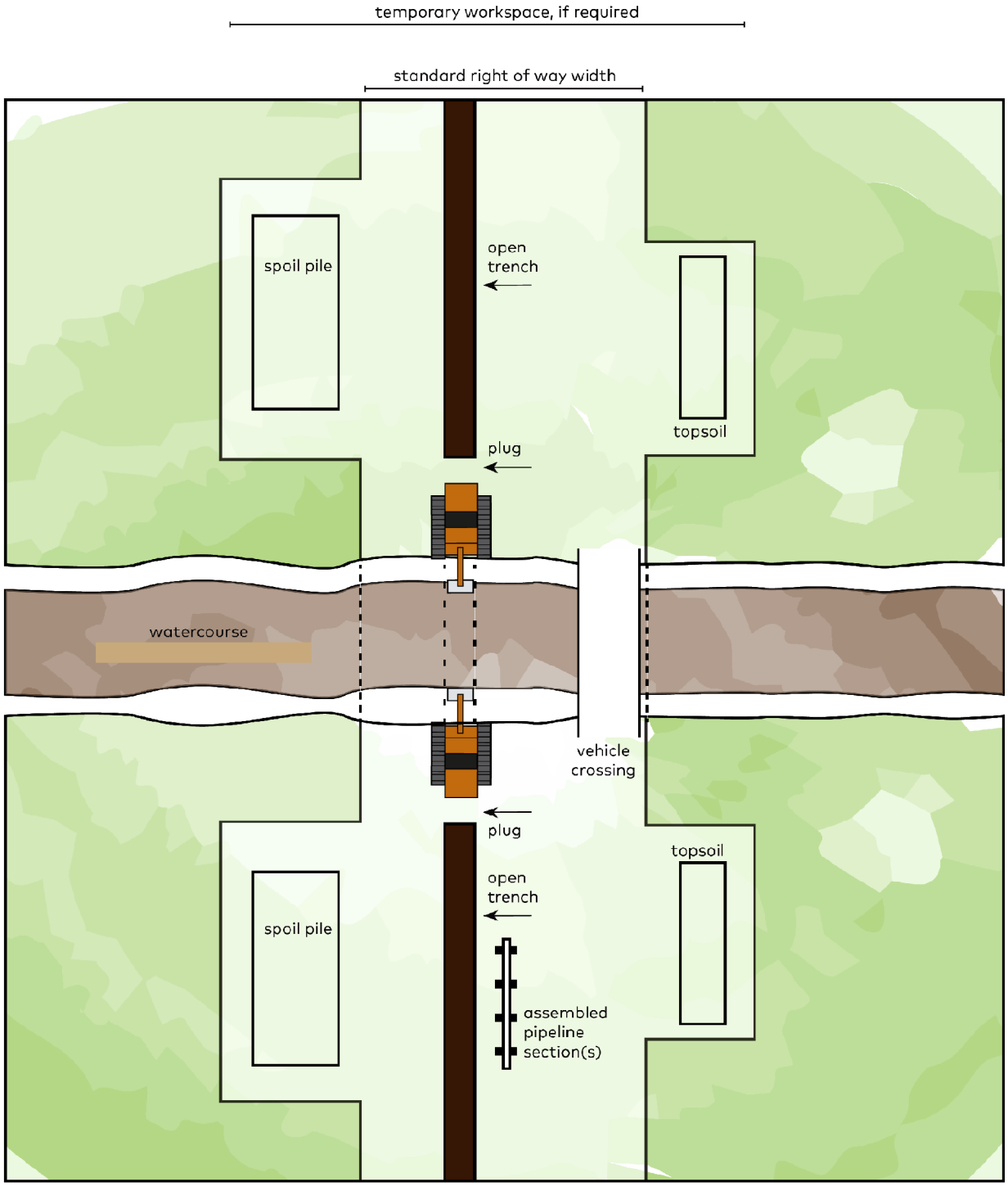


Note: Not to Scale

FIGURE 2.10

Typical Open Trenching with Flow Diversion Schematic

Image Source: APA (2021)



Note: Not to Scale

FIGURE 2.11

Schematic of Typical Special Crossing

Image Source: APA (2021)

2.8.1.11 Road and Rail Crossings

The transmission pipeline alignment crosses five sealed public roads and one railway line.

Crossings of sealed public roads will be constructed by horizontal boring or HDD depending upon the type and nature of the crossing, and geotechnical conditions. Crossing methodology will also take into account any technical requirements, such as design requirements of the infrastructure owner, for example, local council.

Unsealed private roads will typically be crossed using open cut trenching, as described in **Section 2.8.1.5**. The primary haul road for the Bloomfield Coal Mine will be crossed by horizontal boring to avoid impacting mining operations.

Horizontal boring is proposed for the following road and rail crossings:

- KP 0.1, Lenaghans Drive
- KP 9.0, Main haul road for the Bloomfield Coal Mine
- KP 12.9, Buchanan Road
- KP 17.3, South Maitland Railway (with concrete casing and grouting of bore).

2.8.1.12 Water pipeline crossings

The transmission pipeline alignment crosses existing water pipelines owned and operated by the Hunter Water Corporation at five locations, as described below.

- KP 0.05 – 200mm reticulation main adjacent to Lenaghans Road.
- KP 7.0 – 900 mm and 750 mm trunk mains connecting the CTGM to the Stony Pinch reservoir
- KP 10.6 – 600 mm, 500mm, 500 mm, and 375 mm trunk mains
- KP11.2 – 375 mm and 375 mm trunk mains connecting to the Buttai Reservoir
- KP15.5 – 200 mm reticulation main adjacent to Main Road.

Trunk mains will be crossed by horizontal boring, except for the crossing at KP15.5, which is by HDD. Small diameter (200 mm) reticulation mains will be crossed by open trenching with hand or vacuum excavation around the water pipeline. All water pipelines crossed by the transmission pipeline alignment will remain operational during pipeline construction. Mitigation measures to protect the water pipelines during construction will be determined in consultation with Hunter Water Corporation.

2.8.1.13 Testing and Commissioning

Gas transmission pipelines in Australia are required to be designed strictly in accordance with AS 2885, which requires that, “every pipeline shall be leak tight and have the necessary capability to safely withstand all reasonably predictable influences to which it may be exposed during the whole of its design life”.

Hydrostatic Testing

The transmission pipeline and storage pipeline will be pressure tested prior to commissioning to ensure that the pipeline passes strength and leak tests. This is done through a process called hydrostatic testing

whereby sections of the pipelines (test sections) are filled with water and then pressurised to a minimum of 1.25 times the maximum allowable operating pressure (MAOP) for the storage pipeline and 1.5 times the MAOP for the transmission pipeline.

Temporary manifolds are welded to each end of the pipeline test section, which is cleaned internally by PIGs propelled by compressed air. The test section is then filled with water and pressurised. Pressure is then increased above the MAOP for approximately four hours to assess the strength of the test section. The pipeline is then subjected to a leak test for a minimum of 24-hours to determine that the section is leak free. The hydrostatic testing process will take approximately eight days for a single test section, with the majority of that time required to fill the test section with water.

It is anticipated that the transmission pipeline will be hydrostatically tested as a two test sections, requiring approximately 2 ML of water in total.

The storage pipeline will be tested as two sections. Approximately 12.5 ML of water would be required to hydrotest the storage pipeline as reuse between test sections is proposed. The exact number of test sections, test sequence and timing of hydrostatic testing is subject to change based on the final schedule for construction, availability of water and the final hydraulic design of the pipeline.

A water storage to transfer water between test sections of the storage pipeline will be required and a turkeys nest storage adjacent to the storage pipeline construction footprint is proposed to provide for water transfer. Depending on the final configuration of hydrotest sections and the availability of water, it is possible that chemicals to control biological growth and corrosion may be added to the hydrotest water.

Potential sources of water for hydrostatic testing are described in **Section 2.3.6.4** and include clean water dams associated with the Bloomfield Mine, the Stony Pinch and Buttai Reservoirs operated by Hunter Water Corporation, reticulated municipal supplies to the former Hydro Aluminium suite or local watercourses. All water use would occur under agreements and/or licences/permits with relevant stakeholders and authorities.

Following testing of the transmission pipeline, the water will be released onto adjoining land with appropriate slope, soil and groundcover characteristics. Water release will occur through a dewatering structure designed to slow the flow of water.

Disposal of water from the storage pipeline will be dependent on design of the pipeline. Specifically, if the pipeline is internally unlined then mill scale (iron oxide) will be removed from the internal pipeline wall during the hydrotesting process. Water from the hydrotest in this scenario would be returned to the turkeys nest for storage and evaporation. Mill scale and in-situ material at the base of the pond would then be excavated and disposed to an appropriately licensed landfill. If the storage pipeline was internally lined, then hydrotest water would be released to adjoining land through an appropriate dewatering structure.

Drying and Calliper Pigging

When the dewatering process is complete the pipelines will be dried using compressed air.

Following pipeline testing and drying, the pipelines will be gauged using an approved geometry PIG capable of measuring the internal surface of the pipe and inspecting the internal diameter for ovality and dents. Any defects will be located, removed as a cylinder, and replaced with a length of pretested pipe.

Pipeline Commissioning

The transmission and storage pipelines will be commissioned following completion of hydrostatic testing. Commissioning will proceed sequentially from the point where commissioning gas is available and subsequently on completion of the nominated sections.

Commissioning will be in accordance with a procedure prepared during the detailed design and construction phase of the Project and will include the following activities:

- Instrument calibration
- Gas filling
- Testing and commissioning of the pipelines, stations and valves.

2.8.2 Associated surface facilities

Construction of the JGN offtake facility, compressor station and delivery station will be undertaken by specialist crews across several stages of works. These stages broadly comprise site set up, earthworks and civil construction, mechanical, electrical and instrumentation works and testing and commissioning.

Site set up within the construction footprint of each associated surface facility is required to provide a safe and efficient area for construction activities. This includes constructing temporary access to the construction sites, clearing vegetation, installation of temporary fencing and site offices, set up of lay down areas, and relocating existing services if required.

A construction laydown area of up to 6.5 ha will be required adjacent to the compressor station and delivery station during the construction of these facilities for storage of equipment and materials. The construction laydown area will be located on existing hardstand of the former Kurri Kurri aluminium smelter between the pipe laydown area and the compressor station. The exact location of the laydown area is subject to ongoing discussions between APA and Snowy Hydro, Hydro Aluminium and the RKK project, as all of these stakeholders have an interest in the use of this land during the construction period. As the exact location of the construction laydown area has not been finalised it is not shown on maps of the Project construction footprint presented in this EIS. The 6.5 ha area, however, is accounted for as part of the compressor station and delivery station construction footprint in all area calculations throughout the EIS.

Earthworks will then be undertaken to modify existing ground levels to the required design levels. The topsoil may be required to be replaced with engineered fill or pilings installed to minimise ground settlement. Steel reinforced concrete foundations and piled steel footings will then be installed for fixing surface facility equipment and supports on to.

Following installation of foundations and footings, work to install structural, mechanical, piping, electrical and instrumentation (SMPEI) components can be undertaken. Specialist crews will install structural supports, mechanical equipment, piping spools, electrical equipment, cabinets and panels, cabling, instrumentation, buildings, and walkways.

The majority of major equipment and SMPEI components will be manufactured outside of Australia, although fabrication of skids and installation of equipment will be undertaken within Australia where equipment is shipped as separate components. The major equipment and SMPEI components will be

transported to the Port of Newcastle or Port Kembla by ship, then transported by semi-trailer to the relevant associated surface facility site for installation.

Testing and commissioning of the associated surface facilities may involve hydrostatic testing of pipework, as well as testing of mechanical and electrical equipment to make sure they have been installed correctly and are ready for commissioning. Commissioning involves fine tuning of equipment and instrumentation by running the facilities through various operating ranges. Once each facility passes all checks following a commissioning plan, it is ready to commence operations.

Construction and commissioning of the associated surface facilities to completion is estimated take approximately 9 months and five months respectively. Note that commissioning will occur sequentially and overlap with the construction phase, such that construction and commissioning of associated surface facilities is estimated to require 11 months in total.

2.8.3 Logistics

Logistics considered as part of construction activities for the project include:

- Pipe importation, transport to site and transport to the ROW
- Delivery of construction plant and equipment
- Delivery of infrastructure for associated surface facilities
- Transport of construction crew.

2.8.3.1 Pipe Importation, Transport to the Project area and Transport to the ROW

Line pipe of the size and specification required for the transmission and storage pipelines, and storage pipeline bend sections, is not manufactured by any existing Australian steel mill. As such, the line pipe for the Project will be manufactured overseas, imported into Australia by ship (HandyMax Class or similar) and unloaded at a suitable port. The Port of Newcastle is likely to be the most suitable option and has been adopted for the purposes of assessment in this EIS. Although a single ship will have sufficient capacity to deliver all transmission and storage pipeline pipe segments to the port, it is likely that transmission and storage pipe will be delivered on separate ships as manufacturing is likely to occur at different steel mills.

Some temporary stockpiling of pipe may be required at the port prior to transportation to site. Pipe could be transported from port to the Project site by one of two possible scenarios as described below.

Truck Straight to ROW

Pipe could be transported by truck on roads from the port straight to the construction ROW as required. This may occur opportunistically, however, due to the logistics involved it is considered necessary to stockpile the majority of line pipe at laydowns within vicinity of the alignment.

Truck to Laydown Areas and Trucked to ROW When Required

The most likely pipe transport method is road transport by truck from the port to centralised laydown areas, then trucked to the ROW when required.

Laydown areas are proposed for the transmission pipeline on existing cleared hardstand near KP5 and for the storage pipeline near the compressor facility.

The most likely road transport route from the port would follow Selwyn Street, Industrial Drive (A43), Maitland Road/Pacific Highway (A43), New England Highway (A1), John Renshaw Drive (B68) for both transmission and storage pipeline segments. Transmission pipeline segments are then proposed to be stored on an existing hardstand associated with the former Donaldson Open Cut Coal Mine, with access off John Renshaw Drive. Storage pipeline segments would be transported further along John Renshaw Drive, then the Hunter Expressway (M15) and Hart Road to the proposed laydown areas at the site of the former Hydro aluminium smelter.

Approximately 1,062 truck movements would be required to transport pipe segments from the Port to the laydown areas for the storage pipeline (including the DN350 interconnect pipeline and pipe bends) and 60 truck deliveries for the transmission pipeline. The significantly higher number of truck movements for the storage pipeline is primarily due to only two large diameter pipe segments to be transported on a single truck. Deliveries for the transmission pipeline and storage pipeline to laydown areas are likely to require approximately three and 43 days of pipe delivery operations respectively, assuming 25 truck deliveries for each pipeline per day.

Pipe will be transported from each laydown area to the required location on the ROW by extendable semi-trailers. Approximately three round trips per day by extendable semi-trailers will be required to deliver 56 pipe lengths from the laydown area to the transmission pipeline ROW, based on a construction rate of 1 km/day. Approximately six round trips per day by extendable semi-trailers will be required to deliver 12 pipe lengths from laydown areas to the storage pipeline construction footprint, based on a construction rate of 200 m/day.

Transport by truck from the port to centralised laydown is the most likely pipe delivery scenario to be adopted and is assessed in this EIS given that it also has the potential to have the greatest impact on road users and the road network within and surrounding the Project. Adoption of direct delivery to the ROW would result in reduced impacts on the road network.

2.8.3.2 Delivery of pipeline construction plant and equipment

Construction equipment and heavy machinery for the transmission and storage pipelines will be mobilised directly to the construction footprint, once initial clearing and grading operations have commenced and sufficient space is available. It is estimated that 140 pieces of heavy construction equipment would be required during the construction phase of the pipelines. To enable a conservative assessment of traffic impact, it is assumed that heavy construction equipment will be transported over a three to four week period from either Queensland (via the Pacific Highway), Sydney (via the M1 Pacific Motorway), Dubbo (via the Golden Highway) or Victoria (via the Hume Highway). It is likely, however, that some common earthmoving equipment such as graders and dozers would be sourced and mobilised from the local area.

Construction equipment would be mobilised by 50-tonne floats and would generate approximately five heavy vehicle trips per day over four weeks. Equipment will be demobilised progressively following core construction.

2.8.3.3 Delivery of associated surface facilities plant, equipment and materials

As with pipeline construction, associated surface facility construction equipment and heavy machinery will be mobilised directly to the relevant construction site. It is estimated that around 24 pieces of heavy construction equipment will be required for the construction phase of associated surface facilities.

Estimated deliveries by heavy vehicles to associated surface facilities during the construction phase is summarised below:

- 50-tonne floats: 12 deliveries of large heavy machinery during mobilisation, and the same during demobilisation.
- Cranes: Five Franna cranes distributed across the associated surface facility construction sites, one 150 t crane servicing both the compressor station and delivery station and one pile driving crane, all self-mobilised.
- Semi-trailers (2 and 3-axle): 133 deliveries of structural, mechanical and electrical equipment, temporary offices and lunchrooms, and major equipment skids. The majority of these deliveries (94) are for the compressor station and delivery station.
- Heavy rigid trucks: 72 deliveries of bulk materials including gravel and concrete.

2.8.3.4 Transport of construction crew

Daily travel by construction crews between accommodation in the region surrounding the Project and the relevant work area will typically be undertaken by light vehicles. During work shifts, light vehicles will be parked on the construction footprint at the relevant work area. Use of buses to transport construction crews between accommodation and the work area is not considered practicable due to the proposed use of a range of accommodation providers in the region, the number and geographic spread of work areas that will be active at any one time, and the use of light vehicles to transport tools and equipment required to undertake various pipeline and facility construction tasks.

It is estimated that around 248 daily light vehicle movements will be required to transport construction crews between accommodation and work areas for both pipelines and 156 daily light vehicle movements for associated surface facilities, during peak construction periods.

2.8.4 Scheduling and Resourcing

The core construction phase for each Project component is expected to require approximately 10 months for associated surface infrastructure, 10 months for the storage pipeline and 6 months for the transmission pipeline. Mobilisation, demobilisation and commissioning activities will be completed prior to and following core construction respectively. The full construction and commissioning of the Project will require approximately 12 months.

Exact timing of the commencement of construction is contingent on receipt of environmental approvals, pipeline licensing, completion of design and procurement and progress of the HPP.

Construction activities for the transmission pipeline will typically be undertaken from 7 am to 6 pm Monday to Friday on a 5 days on 2 days off basis. To mitigate noise impacts to residential areas in proximity to the transmission pipeline construction footprint, work will not typically be undertaken during weekends unless noise limits can be met or continuous work is required as described below. Should construction activities be required over weekends, these would typically be within the standard hours for weekends which is 8 am to 1 pm Saturdays.

Construction activities for the storage pipeline are proposed to be undertaken between 6 am and 6 pm, seven days per week, given the much larger separation distances to residential areas. Construction crews

will typically work a rostered cycle of 21 days on/7 days off, as per the pipeline industry standard, with 10 cycles likely to be required during the construction phase.

Construction shifts for the compressor station and delivery station are likely to comprise 6 days/week, with no work Sundays. Typical working hours are 6 am to 6 pm weekdays and 8 am to 1 pm Saturdays. Construction shifts for the JGN offtake facility will be the same as the transmission pipeline, given the proximity of residences.

Activities which may require construction outside the hours of 6 am and 6 pm are listed in **Table 2.7** below. In addition, extended construction hours may be worked where an agreement is reached with the affected landholder in order to reduce the duration of construction activities and/or manage other disturbances.

Table 2.7 Activities Which May Require Extended Construction Hours

Activity	Justification
Construction of road crossings	Extended construction hours for road crossings will minimise the time that roads are closed.
Horizontal Directional Drilling (HDD)	Drilling of a HDD bore is required to be completed without interruption in order to maintain the integrity of the bore. This may require extended work hours and 24-hour operations.
Horizontal Boring	As with HDD, boring may need to be continued uninterrupted until completion to ensure the integrity of the bore.
Hydrostatic testing and drying	Hydrostatic testing must be completed as a single process and cannot cease midway as it is imperative that the pipeline is maintained at pressure during the testing procedures.
Non-destructive testing	Some NDT works including Ultrasonic Testing (UT) and Radiographic Testing (RT) may be completed outside standard construction hours to minimise the duration that the trench remains open.
Transportation by oversized trucks	The transportation of plant, equipment and pipe by oversized trucks as required for safety reasons.
Unexpected circumstances	In the unlikely event of an emergency, extended hours may be required.

2.8.4.1 Pipeline construction spreads

The pipeline construction activities set out in the sections above would each be undertaken by a different crew. The series of crews are referred to as a 'spread'. For the purpose of the EIS assessment, two spreads have been assumed for construction. The first construction spread would construct the transmission pipeline, commencing at KP0 and continuing in a generally north-western direction to KP21. The second construction spread would simultaneously construct the storage pipeline.

Additional small work teams will be required for areas involving specialised construction techniques such as HDD, hard rock extraction and surface facility installation.

The general rate of construction for the transmission pipeline and storage pipeline will be approximately 1 km/day and 200 m/day respectively. Some crews will move at a faster rate, such as survey at approximately 4 km/day, fencing at approximately 5 km/day and vegetation clearing at approximately 1.5 km/day.

Periods of wet weather may reduce this rate and continuation of construction during wet weather will depend on the severity of the weather event, site conditions and the nature of the activity being undertaken.

The length of the spread for the transmission pipeline will be at around 14 km with approximate distances between the main crews of 2 km.

2.8.4.2 Construction Workforce

The construction workforce is estimated to peak at around 398 personnel over one month when core construction of the transmission pipeline, storage pipeline and compressor station overlaps. Workforce numbers are estimated to be below 330 personnel over the remainder of the 12 month construction period. Estimated construction workforce numbers for each month of the construction phase are shown in the workforce histogram below (**Figure 2.1212**).

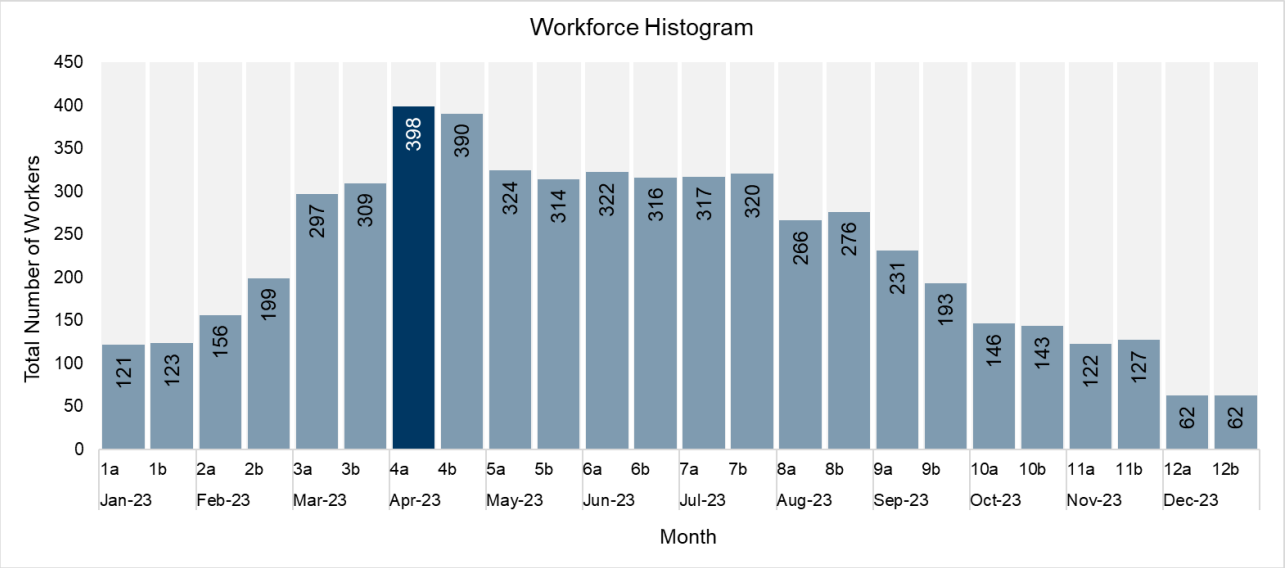


Figure 2.12 Workforce histogram

2.8.5 Roads and Transport

Access to the ROW for will be achieved using the ROW as the primary thoroughfare, with local roads and access tracks used where necessary, such as transporting equipment across HDD locations.

Upgrades of some existing access tracks and construction of some new access tracks will be required.

2.8.6 Water Use and Supply

Water will be required during the construction phase. Non-potable water will be required for dust control of the construction ROW and access tracks (with the quantity dependent on conditions and proximity to sensitive receivers), as well as for hydrostatic testing of both pipelines during construction. Water supply will be obtained from a non-potable water service provider or existing landholders with available allocations. Existing clean water dams on the Bloomfield Mine leases, Hunter Water reservoirs and the existing reticulated supply to the HPP site are the most likely sources.

It is estimated that dust control will require 110 kL/km for each pipeline, or approximately 5 ML in total.

Hydrotesting of the transmission, interconnect and storage pipelines is estimated to require a maximum of 14.5 ML of non-potable water, assuming water will be reused between test sections of the storage pipeline (**Section 2.8.1.14**).

Approximately 7.3 ML of water will be required during HDD operations for mixing of drilling fluids. This estimate is based on pipeline construction experience of 0.146 ML per 100 m of HDD and a total HDD length of approximately 5,000 m.

The total estimated water volume required for the construction phase of the Project is 27 ML.

In the event of construction occurring during severe drought, measures will be employed to avoid increasing demands on local water supplies. Alternative sources of water may include transport from non-drought affected areas, groundwater or other supplies of non-rainfall dependent water.

2.8.7 Energy Use and Supply

Electricity for construction activities such as welding, and HDD equipment would be supplied by diesel generators.

Based on similar scale projects undertaken by APA, approximately 2.6 ML of diesel (including vehicle and equipment fuel) is estimated to be required for the construction of both pipelines and associated surface facilities. A fuel tank of approximately 60 kL capacity will be installed at a central location, likely to be near the compressor station, and used for the duration of the construction period. Fuel trucks will transport diesel from the 60 kL fuel tank to work crews and construction machinery on the transmission and storage pipelines and surface facility construction sites.

2.8.8 Waste management

The Project would generate a range of wastes, mainly through the construction phase.

2.8.8.1 Construction waste management

A range of wastes would be generated during construction activities for the Project, mainly during pipeline construction, which include:

- General wastes from transportation and storage of pipe (packaging, pallets, ropes, bevel protectors)
- Wastes from clearing the construction area (vegetation)
- Pipeline coating waste
- HDD drilling cuttings
- Excess soil and rock from pipeline trench excavation
- Laying, welding and grinding waste (for example, scrap metal, spent welding rods)
- Water from dewatering and stormwater
- Machinery waste.

Cleared vegetation, topsoil and subsoil would be generated during construction of both pipelines and the JGN Offtake Facility. Subsoil and topsoil materials generated during pipeline construction are generally returned to the trench or used for rehabilitation of the construction footprint as a fundamental part of backfilling and rehabilitation they are not considered to be wastes.

Excavated sub-soils would be stockpiled to be re-used in backfilling. The volume of material reused would vary location to location based on soil profile and quality. In the event that the excavated material cannot be reused, the spoil would be disposed of according to the requirements of the CEMP.

Project construction wastes would be reused or recycled where practicable or collected and transported by licensed waste contractors for disposal at appropriately licensed facilities. Any contaminated or hazard materials identified on site would be disposed in accordance with NSW EPA waste classification and transport requirements.

Dewatering of trenches and bellholes due to rainfall or groundwater ingress would be collected and treated, if required, prior to discharge to land or reused where appropriate such as for dust suppression. Dewatering of excavated trenches or bell holes would be managed to minimise sedimentation, including the use of sediment control devices to remove suspended solids and dissipate flow. Sediment control devices would be listed in the CEMP.

2.8.8.2 Operation waste management

During operation of the Project, wastes would include:

- Small volumes of waste oils and grease
- Dust and mill scale (steel flakes) from infrequent maintenance or pigging activities.

Waste generated from pigging is typically dust and mill scale from inside the pipe and volumes are expected to be less than one cubic metre for the transmission pipeline and approximately three cubic metres for the storage pipeline. This waste would be collected at scraper station locations approximately every 10 years as part of maintenance activities. Pigging waste would be tested for waste classification before disposal at a suitable general solid waste or hazardous waste management facility. Pigging waste management would be undertaken in accordance with EPA waste classification and transport requirements in place at the time of generation.

Project operation wastes would be reused or recycled where practicable or collected and transported by licensed waste contractors for disposal at appropriately licensed facilities in accordance with EPA waste classification and transport requirements.

2.9 Operation and Maintenance

The Project is expected to have an operational life of 30 years. A limited range of activities will be required to operate the Project, as described in the following sections.

2.9.1 Pipeline Inspections and Maintenance

A routine inspection and maintenance program will be implemented for the transmission and storage pipelines during the operation of the Project. Inspection of the easements for issues such as erosion,

weeds, subsidence, revegetation and unauthorised third party activity will be undertaken on a regular basis by ground and aerial patrols.

Aerial patrols of the pipelines will typically be undertaken monthly with ground patrols conducted annually. Frequency of inspections may vary depending upon the particular issue being inspected, or in response to specific conditions such as major rainfall events. Ground patrols of the easement will be generally undertaken by travelling along accessible sections of the easement in light vehicles. Landholder issues will be factored into planning and scheduling of ground patrols including consideration of sensitive periods such as lambing and harvest.

Ongoing activities to maintain pipeline integrity will include mainline valve and scraper station inspection and maintenance, cathodic protection surveys and scheduled internal pipeline inspections. Monitoring of the mainline valve and scraper stations will typically occur monthly, or more frequently where required, where they will be tested to ensure they operate correctly, and the fenced compound maintained.

Inspection of the CP system will typically be undertaken annually in accordance with AS 2832.

Pigging of the transmission pipeline will be undertaken at a low frequency of approximately every 10 years. Minor amounts of gas will be vented during pigging activities to depressurise the PIG launcher/receiver.

Testing of the storage pipeline will be undertaken approximately every seven to 10 years. Prior to testing, gas held in the storage pipeline will be transferred to the HPP or into the SNP. The subsequent reduction in storage pipeline pressure will prevent all stored gas from being transferred, and approximately 5TJ of residual gas will remain in the storage pipeline. The residual gas is proposed to be vented at the vent compound adjacent to the compressor station or at a vent located at the above ground connection header assembly. During detailed design APA will also investigate the option of flaring the residual gas using a temporary flare at the above ground connection header assembly. Once venting is completed, testing of the storage pipeline will occur.

Regular contact will be maintained with landholders of all properties traversed by the transmission and storage pipelines during operation in accordance with the requirements of AS 2885.

2.9.2 Associated Surface Facilities Inspections and Maintenance

The associated surface facilities are designed to be automated and will be operated unmanned under normal operating conditions. Site inspections would typically be undertaken on a monthly basis.

2.9.3 General Operations Resourcing

Operation of the pipelines and associated surface facilities would require an incremental increase in APA's existing operational workforce consisting of five field and control room staff.

Field staff will be responsible for day-to-day operations and maintenance activities, ground patrols, communication with local stakeholders and facilitation of third-party access to the easement.

Contractors operating under APA's supervision would be responsible for activities including:

- Easement maintenance, such as vegetation control, weed management, erosion and subsidence monitoring

- Specialist pigging operations, if required
- CP surveys.

Field staff will access the pipelines to conduct operations and maintenance activities as required, in consultation with relevant landholders. Field staff are likely to be based in the lower Hunter Valley.

Both pipelines and all associated surface facilities will be monitored from APA's Integrated Operations Centre currently located at the APA office at Spring Hill, Brisbane. Control room staff will also coordinate maintenance and management activities.

2.10 Decommissioning

Decommissioning of the Project will occur at the end of its useful life. A decommissioning plan for the Project and associated infrastructure will be prepared in advance of decommissioning in consultation with the relevant regulatory authorities and landholders. The basis of the plan will be that the Project and associated infrastructure are to be decommissioned in line with the applicable legislative requirements and best practice guidelines existing at that time, including any current version of the APGA Code.

The following options for the transmission and storage pipelines will be considered as part of this process, although other options may also be identified:

- Suspension – The transmission and storage pipelines would be depressurised, capped and filled with an inert gas such as nitrogen, or water with corrosion inhibitors. The cathodic protection system would be maintained to prevent the pipeline corroding. Surface facilities would be removed or left in place if further service is envisaged.
- Abandonment – The pipelines would be disconnected from all sources of hydrocarbons and surface facilities. All remaining natural gas would be purged from the pipelines with a non-flammable liquid. Sections of the pipelines may then be filled with water, filled with cementitious mud, or removed. All surface facilities would be removed.

Both identified decommissioning options would result in small scale disturbance and environmental impacts. It is anticipated that relinquishment of the applicable Pipeline Licence (and associated easement) would not be possible until such time as any decommissioning issues are resolved.

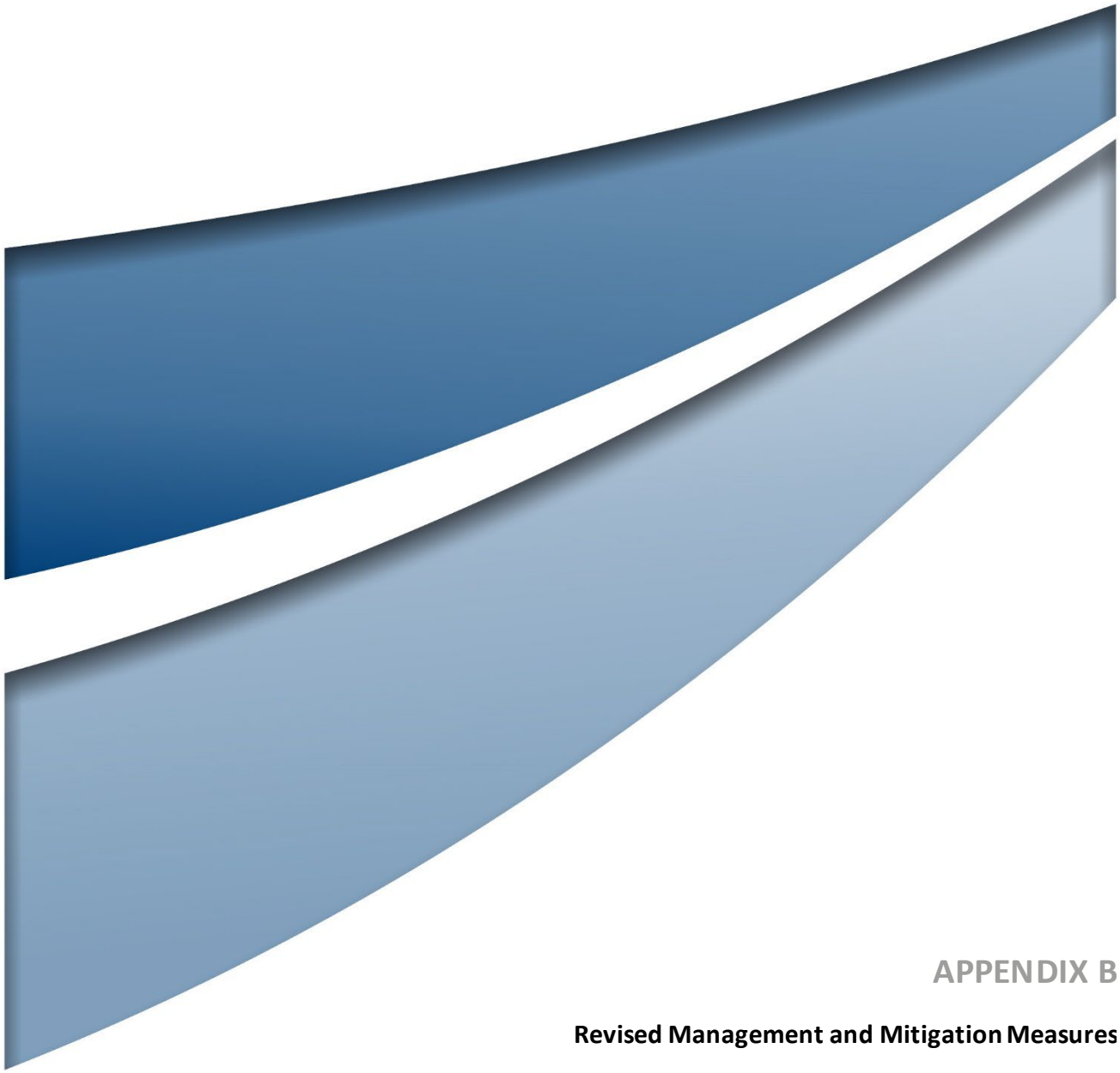
Removal of the pipelines as part of abandonment would result in significant disturbance and environmental impacts and is therefore not preferred.

APPENDIX 1

SCHEDULE OF LAND

Lot	Deposited Plan
1	DP1045719
1	DP1045723
1	DP1206034
1	DP1260203
1	DP136865
1	DP166625
1	DP241097
1	DP42349
1	DP456769
1	DP456946
1	DP456999
1	DP543057
1	DP62332
1	DP722209
1	DP724270
1	DP73597
1	DP779342
1	DP797210
1	DP976896
10	DP456946
10	DP829154
105	DP1131098
119	DP1154904
12	DP241097
13	DP241097
13	DP1141781
1392	DP1126633
14	DP241097
15	DP241097
16	DP1082775
19	DP998606
2	DP1045720
2	DP1249763
2	DP1260203
2	DP233125
2	DP601226

Lot	Deposited Plan
2	DP62332
2	DP779342
2	DP976895
22	DP1181574
29	DP755237
3	DP1045720
3	DP456769
3	DP456946
3	DP71130
30	DP1113350
30	DP870411
31	DP755237
316	DP755231
317	DP755231
318	DP755231
319	DP755231
37	DP755237
38	DP755237
39	DP755237
4	DP1249763
4	DP456946
4	DP62332
41	DP755231
415	DP755231
451	DP573791
453	DP807778
5	DP456946
51	DP1158920
54	DP975994
55	DP975994
6	DP241097
69	DP975994
7	DP456946
70	DP975994
769	DP755231
8	DP456946
9	DP456946



APPENDIX B

Revised Management and Mitigation Measures

1.0 Summary of Commitments

This section addresses the requirement in the SEARs for a consolidated summary of all proposed management and mitigation measures for the Project. The environmental commitments for the Project are summarised in **Table 1.1** and incorporate all the commitments made in the EIS, in response to submissions made on the EIS and for amendments presented in the Amendment Report. The summary identifies the technical discipline that the commitment is relevant to, a unique ID, the commitment itself and the stage of the Project when the commitment will be implemented.

Management and mitigation measures for the Project will be incorporated into the construction environmental management plan (CEMP) and operations environmental management plan (OEMP), and sub plans, as appropriate. The CEMP and OEMP will be centralised, scope-specific documents that describe all environmental risks related to the Project and required actions to manage those risks, including conditions of approval.

The CEMP and OEMP will be supported by a number of sub-plans which provide detailed environmental controls to manage key environmental issues. The CEMP and OEMP shall be reviewed and updated as necessary throughout the relevant phases of the Project.

Table 1.1 Summary of Project Commitments

Discipline	ID	Mitigation Measure	Timing
General	G01	The Project will be designed, constructed and operated in accordance with AS2885. The transmission pipeline will also be designed, constructed and commissioned in accordance with the requirements of ASME B31.12-ASME Design code for Hydrogen Piping and Pipelines, in order to maintain readiness for potential use of hydrogen in the east coast gas network. • Environmental management measures for the Project will be consistent with the most recent revision of the APGA Code of Environmental Practice (currently 2017).	Planning Construction Operations
General	G02	All Project personnel will undertake an induction that will include environmental and cultural heritage management requirements.	Construction
General	G03	Typical construction hours for the Project will be as follows: • Transmission pipeline and JGN offtake facility: 7 am to 6 pm Monday to Friday and 8am to 1pm Saturdays • Storage pipeline: 6 am to 6 pm seven days per week • Compressor station and delivery station: 6am to 6pm weekdays and 8am to 1pm Saturdays.	Construction
General	G04	The following activities may extend beyond typical construction hours listed in G03: Trenchless crossings, hydrotesting, non-destructive testing (NDT), pipe transport from port to laydown areas, and activities delayed by extenuating circumstances beyond the control of the Project.	Construction
General	G05	The minimum depth of cover, from the top of the transmission and storage pipelines to natural ground level, will be 900 mm.	Construction
Land Use	LU01	All reasonable steps will be undertaken to provide landholders with a dedicated point of contact to provide continuity for the duration of the Project.	Planning Construction Operations
Land Use	LU02	All reasonable steps will be undertaken to enter into an agreement with each landholder on fair and reasonable terms with compensation to be paid as required under the Pipelines Act 1967 and the Land Acquisition (Just Terms Compensation) Act 1991. Agreements will include commitments to agreed measures to minimise the impact of the Project on landholder activities which will be managed in a central database.	Planning Construction
Land Use	LU03	APA will fund the reasonable pre-agreed costs of legal, valuation and other advisory services incurred in negotiating with APA such that landholders can access appropriate independent advice without facing out of pocket costs.	Planning Construction

Discipline	ID	Mitigation Measure	Timing
Land Use	LU04	A Schedule of Landholder Agreements will be compiled and maintained, documenting actions to be carried out on each property.	Planning Construction
Land Use	LU05	Prior to any construction works commencing on a property, consultation will be undertaken with relevant landholders regarding property-specific measures to implement during construction and operations, including where relevant: • Access during construction • Ongoing mining operations • Stock management • Management of overland flow • Biosecurity • Reinstatement.	Planning Construction
Land Use	LU06	A Biosecurity Management Plan will be developed for the construction phase of the Project and incorporated into the CEMP for the Project.	Construction
Land Use	LU07	A Biosecurity Management Plan will be developed for the operations phase of the Project and incorporated into the OEMP for the Project.	Operations
Land Use	LU08	The approved construction footprint will be clearly demarcated and identified during the construction stage with survey pegs and at some locations with flagging, bunting or similar. Environmental features to be retained within the construction footprint will be similarly demarcated and identified.	Construction
Land Use	LU9	All third party services within the Project construction footprint will be identified and marked on the ground in advance of trenching activities.	Construction
Land Use	LU10	All identified third party services and water lines will be managed so that their operation can continue during pipeline construction, wherever practicable.	Construction
Soils and Contamination	SC01	Soil management measures consistent with the APGA Code of Environmental Practice (2017) will be employed during the construction of the Project.	Construction

Discipline	ID	Mitigation Measure	Timing
Soils and Contamination	SC02	Specific erosion and sediment control plans will be developed for each project component (JGN offtake facility, transmission pipeline, storage pipeline, compressor station and delivery station) following completion of geotechnical studies. Erosion and sediment control plans will be prepared in accordance with the APGA Code and will include: • Minimising the area and duration of soil disturbance. • Progressively rehabilitating disturbed areas. • Maintaining sheet flow conditions to the maximum possible extent. • Water velocity reduction measures and redirection of runoff to stable ground. • Transfer of overland flow through the ROW. • Diversion banks at the crest of steep areas such as stream banks to divert flow away from backfilled trenches. • Trench blocks (i.e. trench/sack breakers) and compaction of backfilled soils to be used to prevent subsurface erosion and subsidence along backfilled trench.	Construction
Soils and Contamination	SC03	Construction activities between Buttai Creek and Wallis Creek (KP14.2 to KP14.9) will be undertaken in accordance with the Acid Sulfate Soil Manual (Acid Sulfate Soil Management Advisory Committee, 1998), unless soil surveys demonstrate potential acid sulfate soils are not present.	Construction
Soils and Contamination	SC04	A trench and lay methodology will be applied at areas with potential for shallow groundwater and acid sulfate soils between Buttai Creek and Wallis Creek (KP14.2 to KP14.9) to limit the time between commencement of trench excavation and completion of trench backfilling to three days or less, excluding bellholes at HDD and tie-in locations.	Construction
Soils and Contamination	SC05	If sumps and cuttings settlement pits are required at HDD workspaces between Buttai Creek and Wallis Creek (KP14.2 to KP14.9), or at the western side of Swamp Creek (KP19.0), they will be constructed above ground with no ground disturbance other than stripping of topsoil.	Construction

Discipline	ID	Mitigation Measure	Timing
Soils and Contamination	SC06	The following measures will be implemented to manage topsoil: • Soil management measures will be appropriate to the soil type at each location. • Vegetation will be cleared prior to stripping of topsoil. • Topsoil will not be stripped when saturated. • Topsoil will be stripped across the Project construction footprint, typically to maximum depths determined during pre-construction surveys. In soil types with topsoil depth of 30 cm or greater, the stripping depth may be reduced to ensure stockpiles can be accommodated within the transmission pipeline and storage pipeline ROW widths. Above the trench, topsoil will generally be stripped to the full depth, but to a maximum of 30 cm, to mitigate mixing with subsoil. • Stripped topsoil will be stockpiled separately from woody material and subsoil stockpiles. • Topsoil stockpile heights will not exceed 2 m. • Gaps in the linear topsoil stockpiles will be left at appropriate intervals for drainage and for the movement of vehicles and fauna through the site. • Any topsoil stockpiles to be maintained for an extended period of time (i.e. >4 months) will have the surface left in a rough state and protected with a soil stabilising polymer or seeded with appropriate species and monitored for weed management. • Topsoil stockpiles, other than linear stockpiles on the transmission pipeline ROW, will be clearly signposted. • Topsoil will not be used as a padding material. • Stockpiled topsoil will be respread over the construction footprint to a minimum depth of 100 mm, or to the depth that topsoil was stripped if this was less than 100 mm. • Topsoil will not be respread for rehabilitation when saturated.	Construction

Discipline	ID	Mitigation Measure	Timing
Soils and Contamination	SC07	The following measures will be implemented to manage subsoil: • Subsoil will be excavated and stockpiled separately from topsoil. • The trenches will be compacted to an appropriate density following backfilling with subsoil. • Excess displaced subsoil will be prevented from mixing with topsoil. • Excess subsoil will be stockpiled separately for disposal by appropriate methods, which may include placement elsewhere on the subject property in consultation with the relevant landholder. Monitoring for dispersion and erosion of subsoil stockpiles will be undertaken, particularly for sodic soils. The installation of further ESC or addition of ameliorants, such as gypsum or lime, based on the pH of the soil, will be undertaken as required.	Construction
Soils and Contamination	SC08	Where padding material cannot be provided from trench spoil, clean borrow material of an appropriate quality will be sourced from an established supplier.	Construction
Soils and Contamination	SC09	Any topsoil imported for reinstatement or easement maintenance will be of an appropriate quality and agreed with the landholder.	Construction
Soils and Contamination	SC10	Prior to construction commencing on a property, discussions will be held with the landholder or manager to identify any potentially contaminated sites.	Planning
Soils and Contamination	SC11	Construction of the compressor station and delivery station will not commence until a site audit statement has been prepared by a site auditor accredited by the NSW Environment Protection Authority. Note: This condition has been included because the remediation of the former aluminium smelter site is being carried out under a separate consent.	Planning
Soils and Contamination	SC12	In the event that contaminated sites are uncovered during construction the following measures will be undertaken: • Cessation of ground disturbance at the location and within the immediate vicinity. • Assessment of the site contamination and determination of appropriate remedial action in consultation with the EPA where required.	Construction
Soils and Contamination	SC13	Spills of hazardous materials will be rendered safe (unable to further contaminate) and, where required, collected for treatment and disposal at a designated site, including cleaning materials, absorbents and contaminated soils.	Construction Operations
Water Resources	WA01	Water management measures consistent with the APGA Code of Environmental Practice (2017) will be employed during the construction of the Project.	Planning Construction

Discipline	ID	Mitigation Measure	Timing
Water Resources	WA02	Records will be maintained of the source and volume of water used during construction.	Construction
Water Resources	WA03	The following measures will be applied to all open trenched watercourse crossings, including special crossings: • Where practicable, crossings will be perpendicular to the watercourse. • The transmission pipeline ROW width for open trenched watercourses, including special crossings, will be reduced to 20 m between the banks of the watercourse. • Where practicable, crossings will be constructed during no or low flow conditions. • Crossings will maintain a minimum vertical clearance between the hard invert of the watercourse and the top of the pipeline of 1.5 m. • Flow diversion measures will be installed where construction of crossings during no flow conditions is not feasible. Flow diversion measures may include pumps to enable water to be moved from one side of trench to the other, screened inlets (mesh covers with apertures of 5 mm or less) to minimise the entrapment of aquatic fauna and outlet structures that are designed to avoid scouring of the channel. • Trenches between banks will be backfilled within 5 days of excavation. • All obstructions within watercourses that are installed or generated during construction will be removed as soon as practicable after the pipe has been laid and backfilled and use of any access track across the watercourse has ceased. • Material excavated from the bed of watercourses during establishment of the ROW will be stockpiled separately from other materials, outside the active channel and avoiding riparian vegetation wherever practicable and returned to the watercourse bed during reinstatement. • Crossings will be reinstated such that bank stability at the crossing location is the same or better than prior to construction. Stabilising materials such as rock armouring, hydro mulch, jute matting, or other suitable geotextile materials will be applied to watercourse banks where necessary.	Construction

Discipline	ID	Mitigation Measure	Timing
Water Resources	WA04	The following mitigation measures will be applied to special crossings of Viney Creek and Four Mile Creek, in addition to standard mitigation measures for all open trenched watercourses: • Initial disturbance of the watercourse will be restricted to 6 m wide all weather running track. • The timeframe from the start of ROW construction to completion of reshaping to a stable landform will be 20 consecutive days. • The ROW will be reduced to 20 m between banks. • The timeframe for re-instatement including removal of running track will be five consecutive days. • Erosion and sediment control plans will be developed for each stage of each special crossing • The pipeline string will be constructed outside of the watercourse.	Construction
Water Resources	WA05	Any large woody debris or boulders located within the construction footprint of watercourses to be trenched are to be temporarily relocated during construction and returned to the watercourse during reinstatement, at locations where scour risk to the pipeline can be avoided.	Construction
Water Resources	WA06	The following measures will be applied to management of trench water or bell hole water: • Discharge of trench water or bell hole water to land will only be undertaken where water meets relevant water quality guidelines and after consultation (if appropriate) with the relevant landholder. • Trench water or bell hole water will not be discharged into or within 50m of watercourses. Discharge will be to low gradient, stable, grassed areas and be undertaken in accordance with landholder requirements and so as not to cause scour or erosion. • Release of trench water or bell hole water to land will be undertaken to avoid soil erosion or sedimentation of land or water. Sediment control devices to remove suspended solids and dissipate flow will be used where required.	Construction
Water Resources	WA07	A Site Dewatering Procedure (to include pipeline trenches) will be prepared and incorporated into the Project CEMP, in the event that ephemeral or temporary groundwater is encountered during construction works.	Planning Construction
Water Resources	WA08	HDD will be used to mitigate impacts to Weakleys Flat Creek, Buttai Creek, Wallis Creek, Swamp Creek and Black Waterholes Creek. The final extent of HDD will be informed by further investigation of available entry and exit points.	Construction
Water Resources	WA09	Geotechnical analysis of crossings proposed for trenchless technology (HDD or boring) will be undertaken to inform the design of the trenchless crossing.	Construction

Discipline	ID	Mitigation Measure	Timing
Water Resources	WA10	Potential for lateral flow of water along pipeline trenches shall be mitigated by use of appropriate means such as trench blocks (i.e. trench/sack breakers) and / or by compaction of backfilled soils. Areas with potential for lateral water flow include slopes, watercourses and floodplain areas such as Swamp Creek and Wallis Creek.	Construction
Water Resources	WA11	Backfilling of the trench through floodplain areas will use material excavated from the floodplain to maintain hydraulic conductivity.	Construction
Water Resources	WA12	A Soil and Water Management Plan (SWMP) will be prepared and incorporated into the Project CEMP.	Planning Construction
Water Resources	WA13	The access track crossing of Wallis Creek will be designed, constructed and decommissioned in accordance with relevant NSW guidelines and in consultation with DPIE Water.	Planning Construction
Biodiversity	B01	Offsets will be secured to compensate for unavoidable impacts to biodiversity resulting from the construction and operation of the Project, in accordance with relevant offset guidelines.	Planning Construction Operations
Biodiversity	B02	Clearing of woody vegetation will be undertaken with a suitably qualified wildlife handler present to: • Inspect habitat in advance of clearing and relocate fauna. • Advise on clearing techniques that will minimise fauna impact. • Keep records of fauna interactions, as far as practicable, listing the species concerned, the nature of the interaction and its GPS coordinates.	Construction
Biodiversity	B03	Native fauna that are to be relocated must be relocated by suitably qualified and authorised fauna handlers only. Records of all relocations will be retained in accordance with requirements of the CEMP.	Construction
Biodiversity	B04	Cleared vegetation, which may be mulched or stored as is depending on the rehabilitation requirements for specific areas, will be: • Stockpiled separately from topsoil in windrows in a manner which facilitates respreading or salvaging, avoids damage to adjacent live vegetation and does not unreasonably impede stock or wildlife. • Stockpiled away from watercourses and not stored or felled so as to land in watercourse, where practicable. • Stockpiles will have breaks as required by the landholder for access.	Construction
Biodiversity	B05	Welded pipe strings will be end capped to prevent fauna entry.	Construction

Discipline	ID	Mitigation Measure	Timing
Biodiversity	B06	Potential for fauna entrapment within the pipeline trenches will be minimised by: • Minimising to the extent practicable the period of time the trench is open. • Provide opportunities for fauna to exit the trench such as trench plugs or other appropriate measures, at a minimum of every 500 m. • Installation of fauna shelter devices, such as sawdust filled bags, at 250 m intervals along the trench. • Daily pre-start inspections of the open trench, and removal of trapped fauna by suitably qualified personnel as required.	Construction
Biodiversity	B07	In the event that Koala or Grey-headed Flying-fox are discovered within the construction footprint, all mobile construction equipment in the surrounding area will cease work, excluding use of light vehicles to move staff to and from the area. Mobile construction equipment will not recommence work until a wildlife handler has removed the individual or it has been confirmed that the individual has left the workspace. Any captured individuals will be removed and relocated to nearby adjacent habitat away from the construction area.	Construction
Biodiversity	B08	Understorey vegetation to 1.5 m high will be allowed to regenerate across the transmission pipeline ROW between Four Mile Creek and Elwells Creek, but not within 4m of the pipeline, to improve connectivity for ground-dwelling mammals, reptiles and small birds.	Operations
Biodiversity	B09	Options for avoiding or reducing impacts to the River-flat eucalypt forest vegetation community at the north-eastern extent of the storage pipeline footprint will be investigate and implemented if feasible. Any reduction in length of the storage pipeline construction footprint may require an increase in width	Construction
Aboriginal Heritage	AH01	Archaeological test investigations will be completed prior to construction impacts occurring at areas identified by the ACHA, if areas are proposed to be impacted following finalisation of Project design. Test investigations will be undertaken in accordance with the CHMP.	Planning
Aboriginal Heritage	AH02	A CHMP will be developed and implemented for the Project in consultation with Heritage NSW, the relevant Indigenous stakeholders, and DPIE and will address the following issues: • Methods to be used for avoidance of sites. • Monitoring of areas where potential sites may exist. • Surface collection or salvage excavations. • Management of previously unrecorded CH sites including human remains.	Planning Construction Operations

Discipline	ID	Mitigation Measure	Timing
Aboriginal Heritage	AH03	Avoidance of identified sites of Aboriginal cultural heritage will be achieved where practicable by: • Minor realignments of the transmission pipeline alignment. • Narrowing of the ROW. • Leaving sites intact within the ROW with temporary fencing installed during construction. • Adoption of horizontal directional drilling (HDD) at selected watercourse crossings.	Planning Construction
Aboriginal Heritage	AH04	Where avoidance of Aboriginal sites is not practicable, impacts will be managed in accordance with the CHMP. Mitigation measures may include recording and salvage of information and artefacts prior to impact.	Construction
Historic Heritage	HH01	Detailed survey of the Project construction footprint within the vicinity of the South Maitland Railway will be undertaken and all piles of sleepers and associated fabric will be recorded.	Planning Construction
Historic Heritage	HH02	If any historical heritage sites are identified where avoidance is not practicable, impacts will be mitigated by the recording and salvage of information and artefacts. Recording and salvage will be adopted for all sites where avoidance is not achievable, subject to relevant regulatory approvals.	Construction
Historic Heritage	HH03	Procedures to implement if an unknown historical heritage site, value or object is discovered during construction will be incorporated into the Project CEMP. This will include guidelines on collection or salvage of historical heritage objects.	Planning Construction
Air Quality and Odour	AQ01	A dust control plan will be prepared and incorporated into the Project CEMP.	Planning Construction
Air Quality and Odour	AQ02	Plant and equipment will be maintained in good condition to minimise ignition risk, spills and air emissions that may cause nuisance.	Construction Operations
Air Quality and Odour	AQ03	Vehicle speed within the construction site boundary, including access tracks, will be restricted to a maximum of 40 kph.	Construction
Air Quality and Odour	AQ04	Construction vehicles with potential for loss of loads (such as dust or litter) will be covered when using public roads.	Construction
Air Quality and Odour	AQ05	Dust suppression will be undertaken when a dust hazard is expected or observed. Dust suppression may include using water sprays, water extension agents, soil stabilising polymers or other media: • On unpaved work areas subject to traffic or wind. • On sand, spoil and aggregate stockpiles. • During the loading and unloading of dust generating materials.	Construction

Discipline	ID	Mitigation Measure	Timing
Air Quality and Odour	AQ06	Dust suppression will be undertaken when construction works are in proximity to the following specific receptors and winds are blowing towards them: • Receptor 24 (463-457 Cessnock Rd) – 110 m to an unpaved access track with light and heavy vehicle use. • Receptor 12 (532 Main Rd) – 130 m from the ROW where there will be construction works and light and heavy vehicles. • Receptor 19 (2 Black Hill Rd) - 170 m from the ROW where there will be construction works and light and heavy vehicles. • Receptor 16 (537 and 538 Louth Park Road 311, 319 and 325 Mount Vincent Road) – within 190 m from the ROW where there will be construction works and light and heavy vehicles. When working between KP 11.7 and KP 12.1 the following additional measures will be implemented to minimise impacts to Receptor 16: • Minimise works and the number of vehicles and equipment in the area when the wind is blowing towards the receptor and dust is being generated from the construction footprint.	Construction
Air Quality and Odour	AQ07	When using water for dust suppression the amount of water for dust suppression applied will not exceed what is required to effectively suppress dust. The application of water for dust suppression will: • Not cause on-site ponding or runoff. • Be directly to the area being dust suppressed. • Not harm vegetation surrounding the area being dust suppressed. • Not cause visible salting.	Construction
Air Quality and Odour	AQ08	If the works are creating levels of dust which may significantly impact on residential amenity, the works will be modified or stopped until the dust hazard is reduced to an acceptable level.	Construction
Air Quality and Odour	AQ09	Blasting (if required) will not be undertaken if weather conditions (i.e. wind speed and direction) are likely to result in air quality impacts at sensitive receivers.	Construction
Noise and Vibration	NV01	A Noise and Vibration Management Plan (NVMP) will be prepared and implemented as part of the CEMP. The CEMP and NVMP will be regularly updated to account for any changes in noise and vibration management of the Project.	Planning Construction
Noise and Vibration	NV02	Except in the event of an emergency, construction activities will only be undertaken outside of standard construction hours (defined in the NSW Interim Construction Noise Guideline as 7:00 am to 6:00 pm weekdays and 8:00 am to 1:00 pm on Saturdays at no time on Sundays and public holidays) where feasible and reasonable noise mitigation measures are in place and approval conditions can be complied with.	Planning Construction

Discipline	ID	Mitigation Measure	Timing
Noise and Vibration	NV03	Blasting, if required, will be carried out in accordance with the following measures: • Conducted only where conventional excavation or trenching is ineffective or impractical, or if blasting will provide a reduction in environmental impacts. • Conducted with appropriate dust control measures. • Conducted according to a blast procedure prepared by a qualified person. • Conducted only where consultation has occurred with affected landholders.	Construction
Noise and Vibration	NV04	Broadband reversing alarms will be used in preference to 'beeper' reversing alarms on construction vehicles and machinery.	Construction
Noise and Vibration	NV05	As noise generated by venting at the JGN Offtake Facility, the compressor station, delivery station and storage pipeline is dependent upon the detailed design of these facilities, noise profiles will be reassessed during detailed design and management measures to mitigate noise from venting will be implemented if sensitive receivers are expected to be impacted.	Planning Operations
Noise and Vibration	NV06	Pumps and compressors used for hydrotesting and pigging activities will be muffled or otherwise treated to reduce noise emissions.	Construction
Noise and Vibration	NV07	Additional noise modelling and, if required, mitigation will be undertaken during detailed design for the JGN offtake facility, compressor station and delivery station. Management measures to further mitigate noise emissions will be implemented if impacts to sensitive receivers are predicted to be above the relevant noise criteria.	Planning Operations
Traffic and Transport	TT01	All sealed roads and the South Maitland Railway will be crossed using trenchless construction techniques.	Planning Construction
Traffic and Transport	TT02	Pipeline crossings of unsealed roads will be constructed using methods and depth of cover determined in consultation with the relevant road authority and landholders. Installation of bypass tracks, detours or crossing plates will be undertaken as required.	Planning Construction
Traffic and Transport	TT03	Detailed design of all road and rail crossings will be informed by the requirements of the relevant road authority including obtainment of applicable permits prior to the commencement of construction of the relevant works.	Planning Construction
Traffic and Transport	TT04	The condition of public roads used for transport between pipe laydown areas and the transmission pipeline and storage pipeline construction footprint will be assessed by a Road Dilapidation Report prior to construction commencing and following completion of construction. Any defects attributable to construction activities will be rectified or compensated in consultation with the relevant road authorities.	Planning Construction

Discipline	ID	Mitigation Measure	Timing
Traffic and Transport	TT05	Any oversized or over weight loads will be transported in accordance with the requirements of the relevant road authority.	Planning Construction
Traffic and Transport	TT06	A Traffic Management Plan (TMP) will be prepared as a component of the CEMP and will address, amongst other issues: • Sufficient on-site parking for all vehicles. • Covering or containing heavy vehicles loads. • Minimising dust and/or sediment being tracked onto the public road network. • Minimising traffic noise impacts. • Transport options for workers to the site. • Public notifications for any disruptions to traffic, the closure of roads or other infrastructure, oversize or overmass vehicle use, peak construction periods, and any emergencies. • Driver's Code of Conduct.	Planning Construction
Traffic and Transport	TT07	Access for emergency vehicles will be maintained for the duration of the construction works, in accordance with emergency vehicle requirements.	Construction
Traffic and Transport	TT08	Use of Black Hill Road by Project construction traffic will be limited to the following: • The M1 overpass and north of the roundabout connecting to the M1 on-ramp for traffic accessing the construction footprint at KP 0.9. • Between John Renshaw Drive and the access track entry point to the Broaden Management industrial estate. This section of Black Hill Road will only be used for deliveries of pipe segments and mobilisation and demobilisation of HDD equipment. Hours of use will be limited to weekdays between the hours of 9am and 2pm.	Construction
Hazards, Risks and Bushfire	HR01	Emergency Response Plans consistent with HIPAP No. 1 Emergency Planning (Department of Planning, 2011b) and Planning for Bushfire Protection 2019 (NSW RFS, 2019) will be developed and implemented for both the construction and operations phases of the Project.	Construction Operations
Hazards, Risks and Bushfire	HR02	A qualified person will be appointed as Site Safety Advisor during construction and will have on-site a set of the relevant safety data sheets (SDS) for hazardous and dangerous materials.	Construction

Discipline	ID	Mitigation Measure	Timing
Hazards, Risks and Bushfire	HR03	Dangerous goods, as defined by the Australian Dangerous Goods Code, and flammable and combustible liquids will be stored and handled in accordance with: • The requirements of all relevant Australian Standards. • Within a bunded area with a minimum bund capacity of 110% of the volume of the largest single stored vessel within the bund. • The NSW EPA's Storing and Handling of Liquids: Environmental Protection – Participants Handbook if the chemicals are liquids. In the event of an inconsistency between the requirements in (a) to (c) above, the most stringent requirement shall prevail to the extent of the inconsistency. For the purpose of the above, any tanks or other storage vessels that are interconnected and may distribute their contents either by gravity or automated pumps must be considered a single vessel.	Construction Operations
Hazards, Risks and Bushfire	HR04	Spill kits will be available at all locations where machinery/plant are operating, refuelling points and fuel and chemical storage locations.	Construction
Hazards, Risks and Bushfire	HR05	Where flammable or combustible chemicals are required to be stored on-site, fire-fighting equipment will be available that is proportionate to the risk of the materials stored.	Construction
Hazards, Risks and Bushfire	HR06	Routine visual monitoring and recording of chemicals and fuel storage facilities will occur.	Construction
Hazards, Risks and Bushfire	HR07	Refuelling of vehicles and machinery, other than hand held machinery, will utilise auto shut off valves. Refuelling of vehicles and mobile machinery will not occur within 50 m of a watercourse.	Construction
Hazards, Risks and Bushfire	HR08	Vehicles/plant/machinery/equipment will be maintained in good condition to minimise the potential for leaks/spills to occur.	Construction
Hazards, Risks and Bushfire	HR09	Vehicle and equipment will be inspected daily to check for oil, lubricant or fuel leaks and general wear and tear of hoses.	Construction
Hazards, Risks and Bushfire	HR10	A Bushfire Management Plan (BMP) will be prepared for Project construction and operations, informed by consultation with the Rural Fire Service.	Construction
Hazards, Risks and Bushfire	HR11	Open fires, including open barbeques, billy fires, and brush burning, will not be permitted on site.	Construction Operations
Hazards, Risks and Bushfire	HR12	Hot works activities will only be undertaken during a declared Total Fire Ban where an exemption has been issued by NSW RFS. These works will be undertaken in accordance with the conditions of the exemption.	Construction

Discipline	ID	Mitigation Measure	Timing
Hazards, Risks and Bushfire	HR13	The following precautions will be taken to minimise the possibility of fire due to hot work activities: • The area of the construction ROW over which hot work will take place will be maintained free of combustible material. • Firefighting equipment, including a validated portable fire extinguisher, and trained personnel to be available during all hot work operations. • Water trucks will be available to respond to fire.	Construction
Hazards, Risks and Bushfire	HR14	The Project will implement the APA HSE Management System.	Planning Construction Operations
Hazards, Risks and Bushfire	HR15	Requirements for pipeline buoyancy control in flood risk areas will be assessed during detailed design and implemented as required.	Planning Construction
Hazards, Risks and Bushfire	HR16	Detailed design of the transmission and storage pipelines will give consideration to the following: • Control philosophy for the MLV including potential automation to limit the amount of gas that can escape from a ruptured pipeline. • Protection of above ground structures from inadvertent or deliberate acts, which may cause damage to exposed equipment and piping.	Planning Construction Operations
Hazards, Risks and Bushfire	HR17	Measures to mitigate mine subsidence risks to the transmission pipeline within Mine Subsidence Districts will be determined in consultation with Subsidence Advisory NSW.	Planning Construction Operations
Hazards, Risks and Bushfire	HR18	First aid facilities and a nurse, paramedic or other suitably qualified health care professional will be available to service construction areas.	Construction

Discipline	ID	Mitigation Measure	Timing
Hazards, Risks and Bushfire	HR19	As per the requirements of AS2885 and the APA safety management system the following measures will be implemented: • Surface facilities will be located in secure compounds . • Hazardous area classification will be undertaken for all installations and a hazardous area dossier prepared for the Project. • Atmosphere testing (e.g. Oxygen, LEL) will be undertaken as required (depending on activities) for personnel entry to surface facility compounds and mandatory testing for vehicle entry (as a vehicle is an ignition source). • Compressor acoustic enclosures will be ventilated and have gas detection systems that initiate shut down. • A maintenance system will be implemented that includes routine inspection and maintenance plans in accordance with AS/NZS 2885.3. • Pipeline markers and signage will be placed at a frequency to ensure continual line of sight along the alignment and will also be located at any bends, at property boundary fences and either side of crossings such as roads or watercourses. • Pipeline marker tape will be buried above the along entire length of all underground pipelines to indicate the presence of the pipeline to anyone undertaking an excavation above the pipeline. • The location of all underground pipelines will be registered with Dial Before You Dig.	Planning Construction Operations
Visual amenity	LV01	Light generated during construction and operations will be managed in general accordance with the requirements in Australian Standard AS 4282-1997 Control of the Obtrusive Effects of Outdoor Lighting.	Planning Construction Operations
Visual amenity	LV02	The construction site at the JGN offtake facility will be appropriately screened to mitigate visual impacts to users of Lenaghans Drive and nearby residences.	Construction
Visual amenity	LV03	Landscape screening (planting) will be undertaken at the JGN offtake facility to mitigate visual impacts to users of Lenaghans Drive and nearby residences based on detailed design, additional viewshed analysis and further consultation with potentially affected residents.	Operations
Social Amenity	SA01	A Project-specific Local Industry and Indigenous Participation Plan will be developed with the intention of promoting local, regional and Indigenous business and employment opportunities associated with the Project.	Planning Construction
Social Amenity	SA02	APA will require the appointed construction contractor to implement a workforce management strategy, including strategies for accommodation, employment and procurement.	Planning Construction

Discipline	ID	Mitigation Measure	Timing
Social Amenity	SA03	A stakeholder engagement plan will be implemented to facilitate ongoing consultation with relevant stakeholders throughout the Project so that stakeholders have access to information regarding the nature of the proposed Project activities and their likely impacts.	Planning Construction Operations
Social Amenity	SA04	A complaints management system will be put in place that documents: • Name of persons receiving complaint. • Name of person making the complaint. • Date and time of complaint. • Nature of the complaint. • Actions taken to rectify and timeframe for action. • Actions to minimise risk of reoccurrence. • Name of person(s) responsible for undertaking the required actions.	Construction Operations
Social Amenity	SA05	APA will continue to implement a Community Grants Program that targets proximal communities within the social locality and prioritises investments directly related to identified community needs.	Planning Construction
Waste Management	WR01	Identification of suitable waste disposal locations will occur prior to construction commencing in consultation with local waste sub-contractors and local councils.	Planning Construction
Waste Management	WR02	Waste materials generated during construction and operations will be reused or recycled where practicable or collected and transported by licenced contractors for disposal at appropriately licenced facilities. Any waste proposed to be disposed of to an offsite location will be classified in accordance with the EPA's Waste Classification Guidelines.	Construction Operations
Waste Management	WR03	Waste generated outside the site will not to be received at the site for storage, treatment, processing, reprocessing, or disposal.	Construction
Waste Management	WR04	All general and regulated waste records will be retained for waste tracking purposes.	Construction Operations
Waste Management	WR05	Portable toilet facilities will be available for work construction crews on the construction footprint.	Construction
Waste Management	WR06	Refuse containers will be located at each worksite to enable collection of waste, with regular removal from worksites to designated areas.	Construction
Waste Management	WR07	Refuse containers will be lidded to mitigate fauna access.	Construction

Discipline	ID	Mitigation Measure	Timing
Waste Management	WR08	Use of any excess rock generated during trench excavation will be discussed with the relevant landholder and/or local councils. If uses cannot be identified excess rock will be removed from the construction footprint and disposed of appropriately.	Construction
Waste Management	WR09	APA will investigate options for land disposal of HDD cuttings in consultation with the NSW EPA, and implement if feasible.	Construction
Existing Infrastructure	EI01	APA will undertake a detailed dial before you dig and site investigation regime to define exact locations of services.	Planning
Existing Infrastructure	EI02	Further consultation with service providers will occur to agree to any required protective measures during construction.	Planning Construction
Existing Infrastructure	EI03	Searching for services will be conducted by hand or using service location devices. Once services are located, these will be flagged with signage or coloured tape to ensure they are easily identified for the duration of works in that area. In the event of any unforeseen service discovery, the appropriate utility provider will be contacted, and appropriate remedial actions taken.	Construction
Rehabilitation	R01	Reinstatement will commence progressively post construction and will be undertaken as soon as practicable.	Construction
Rehabilitation	R02	Stockpiled vegetation will be respread over appropriate sections of the construction footprint (but not directly over the pipelines) during rehabilitation, unless other management measures are likely to improve rehabilitation outcomes.	Construction
Rehabilitation	R03	Reasonable landholder requirements regarding respreading of stockpiled vegetation will be considered.	Construction
Rehabilitation	R04	Where seeding is adopted to facilitate prompt revegetation and soil stabilisation, the following principles will be considered: • Seed mixtures to be formulated with consideration of the vegetation composition of the areas adjacent to the construction footprint and in consultation with the relevant landholder. • Sterile seed stock (cover crop) may be used to provide short term surface stability. • Seed to be evenly dispersed over the disturbed area. • Seeding to take place as soon as practicable after reinstatement of the soil profile. • A suitable fertilizer/soil conditioner may be applied depending on soil conditions and any landholder requirements.	Construction
Rehabilitation	R05	The construction footprint will be re-profiled to original contours or to new, stable contours where it is not reasonably practical to re-profile to original contour.	Construction

Discipline	ID	Mitigation Measure	Timing
Rehabilitation	R06	Soil amelioration with fertiliser, gypsum and/or lime will be undertaken where consistent with identified rehabilitation outcomes for the location.	Construction
Rehabilitation	R07	Compaction relief will be implemented by ripping or scarifying areas of the construction footprint which have been compacted by construction activities. Particular attention will be given to areas subject to regular watering and high traffic volume.	Construction
Rehabilitation	R08	Where relevant and practicable arrangements will be made with landholders to exclude or manage stock access to recently reinstated areas.	Construction
Rehabilitation	R09	All access tracks, fences and gates will be reinstated post construction, subject to consultation with landholders and any relevant third parties.	Construction
Rehabilitation	R10	Permanent access gates will be installed post construction, where required at fence intersections.	Construction
Rehabilitation	R11	All temporary above ground infrastructure will be removed at the completion of construction unless required for biosecurity or other environmental controls.	Construction
Rehabilitation	R12	Monitoring of the condition of the ROW and other disturbed areas will be completed post construction and remedial measures undertaken, as required, with the aim that all disturbed areas are re-profiled to a stable landform consistent with original contours and drainage lines and vegetated with a self-sustaining, non-pest species groundcover.	Construction
Rehabilitation	R13	Habitat features removed during construction such as large hollow logs and large rocks will be returned to the ROW during rehabilitation if consistent with rehabilitation objectives at a particular location. Landholder requirements will be considered prior to returning habitat features to the ROW.	Construction
Rehabilitation	R14	During operations, environmental and safety inspections of the alignment will be typically undertaken monthly by air and annually or biennially by on-ground inspection, and at other intervals as informed by Safety Management Studies undertaken in accordance with AS2885. Corrective actions will be implemented as required.	Operations
HDD	HD01	A HDD management plan including drill profile design, work method statement, proposed volumetric drilling fluid tracking program and proposed intervention levels, will be prepared for each HDD prior to the commencement of HDD activities. The management plan will include specific noise mitigation requirements for each HDD.	Planning
HDD	HD02	Natural run-off will be diverted round and away from HDD and bore entry and exit areas to avoid sediment entrainment and mixing with drilling compounds.	Construction

Discipline	ID	Mitigation Measure	Timing
HDD	HD03	Where practicable, sump pits will be constructed at the bottom of the drill site in accordance with the following: The sump pit will be positioned (during site planning) so that all runoff from the drilling compound will flow into it. The sump pit will be of such dimensions as to provide a buffer for the drilling fluid returns. An earth bund will be placed around the sump pit to contain any spillage. Where the HDD site may be subject to flooding or shallow groundwater, the sump pits and cutting settlement pits will instead be constructed above ground or skips will be used.	Construction
HDD	HD04	Drilling will preferentially use non-toxic (e.g. bentonite) and/or biodegradable drilling muds. The composition of HDD drilling muds and an assessment of their environmental risk will be included in the HDD Management Plan required under D1.	Construction
HDD	HD05	Appropriate spill response and clean-up equipment (e.g. sandbags, vac-truck) will be maintained on-site during HDD activities.	Construction
HDD	HD06	Contractor(s) that are suitably qualified and experienced in trenchless installation techniques will be used.	Construction
HDD	HD07	HDD entry and exit workspaces will be microsited to be above the 50% AEP flood level, as far as practical.	Construction
HDD	HD08	HDD return lines will be constructed from high quality HDPE pipe, with heat welded joins between pipe lengths. An ecologist will supervise the placement of surface return lines, which will be micro-sited to avoid threatened plants. Surface return lines will be subject to regular visual inspection during drilling.	Construction
Cleaning, hydrostatic testing	HT01	Pre-cleaning of the transmission pipeline prior to hydrostatic testing will be undertaken to remove weld debris, dust and surface scale. Any waste water will be captured and removed by an EPA licenced waste contractor.	Construction
Cleaning, hydrostatic testing	HT02	Reuse water to conserve water and minimise the number of discharge locations where the hydrotest schedule allows.	Construction

Discipline	ID	Mitigation Measure	Timing
Cleaning, hydrostatic testing	HT03	The following measures will be applied to management of hydrotest water: • If biocides and oxygen scavengers are used during hydrotesting they will be selected to be biodegradable. • Oxygen scavengers and biocides that are used during hydrostatic testing will be neutralised before disposal, in accordance with manufacturer guidelines, to ensure that the water is free from any remaining active biocide and oxygen scavengers before discharge to land. • At the completion of hydrotesting, hydrotesting water will be sampled and analysed, using a NATA accredited laboratory, to ensure that no biocides and oxygen scavengers are detected, and to establish an appropriate method of disposal or reuse. • Discharge of hydrotest water to land will only be undertaken where water meets relevant water quality guidelines and after consultation (if appropriate) with the relevant landholder. • If hydrotest water does not meet relevant water quality guidelines, it may be treated on site or transported by licenced contractors for disposal at an appropriately licenced facility. • Hydrotest water will not be discharged into or within 50m of watercourses. Discharge will be to low gradient, stable, grassed areas and be undertaken in accordance with landholder requirements. • Discharge of hydrotest water to land will be undertaken to avoid scour, soil erosion or sedimentation of land or water. Sediment control devices to remove suspended solids and dissipate flow will be used where required.	Construction
Cleaning, hydrostatic testing	HT04	Dams holding hydrostatic test water may remain for landholders' beneficial use with landholder and regulatory approval if water quality requirements are met.	Planning Construction