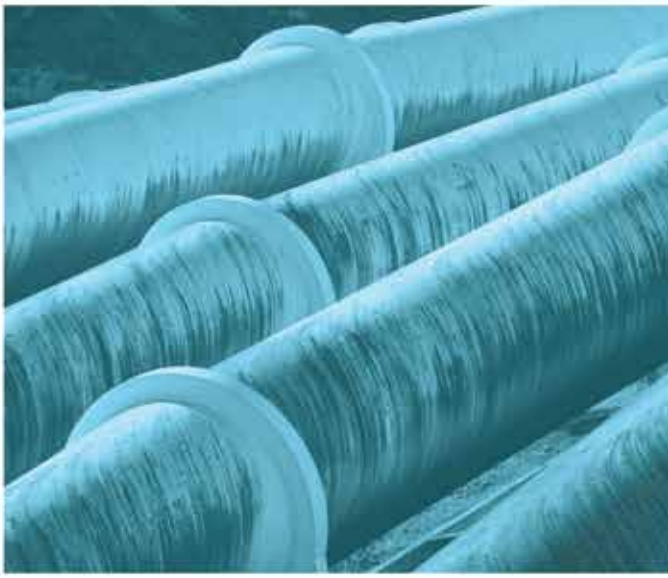



APA East Coast Grid Expansion

Moomba to Wilton Pipeline - Modification Report

Prepared for APA Group
July 2021

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APA East Coast Grid Expansion

Moomba to Wilton Pipeline - Modification Report 1

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Prepared by	**Approved by**
	
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12 July 2021	12 July 2021

Executive Summary

ES1 Introduction

East Australian Pipeline Pty Ltd, part of the APA Group (APA), owns and operates an underground high pressure natural gas transmission pipeline, extending from Moomba (South Australia) to Wilton (New South Wales), a distance of approximately 1,299km. The Moomba to Wilton Pipeline (MWP) is the mainline part of the Moomba Sydney Pipeline (MSP) and was constructed in 1976.

The MWP was gazetted as a State Significant Infrastructure (SSI) project on 11 December 2020 and is authorised by Pipeline Licence No. 16 (PL16). The MWP currently operates at a forward haul capacity of approximately 489 terajoules per day (TJ/day) (AEMC 2021).

APA is one of Australia's largest natural gas infrastructure businesses, owning and/or operating more than 15,000 km of pipeline infrastructure. Its gas transmission pipelines span every State and Territory in mainland Australia, delivering approximately half of the nation's gas usage.

APA's 7,500km East Coast Grid of interconnected gas transmission pipelines provides the flexibility to move gas around eastern Australia, from Otway and Longford in Victoria, to Moomba in South Australia and Mount Isa and Gladstone in Queensland.

ES2 Project overview

NSW imports the majority of its natural gas from other states, and a gas shortfall on Australia's east coast is predicted by Winter 2023, with demand for gas forecast to outstrip supply. Natural gas currently accounts for approximately 25% of primary energy use and about 20% of electricity generation in Australia. The rapid retirement of coal means Australia will increase reliance on gas to provide energy security to industry while providing a stable framework for transition to renewables.

APA is proposing an expansion of gas transportation capacity on its East Coast Grid that links Queensland to southern markets ahead of projected 2023 supply risks. Expansion would be through the construction of additional compressor stations and associated works on both the South West Queensland Pipeline (SWQP) in Queensland and the MWP in NSW.

The expansion will be delivered in a number of stages. The first stage of expansion works includes the construction of a single compressor station on each of the SWQP and MWP and will increase Wallumbilla to Wilton capacity by 12%. The first stage is targeted for commissioning in the first quarter of 2023 ahead of forecast southern state winter supply risks identified in the 2021 Australian Energy Market Operator (AEMO) Gas Statement of Opportunities. The second stage of expansion works (an additional site on the SWQP and on the MWP) will add a further 13% capacity and will be staged to meet customer demand. APA is undertaking engineering and design works on a potential third stage (three additional compressor locations on the MWP) of the East Coast Grid to add a further 25% transportation capacity. The proposed capacity expansions as part of the East Coast Grid Expansion would mean that the entirety of NSW peak demand could be met by gas flowing from northern sources.

The proposed East Coast Grid Expansion is an ideal opportunity to maximise gas supply via existing infrastructure with minimal impact.

This modification report (Modification Report 1) has been prepared to assess the environmental, social and economic impacts of Stage 1 and Stage 2 of the East Coast Grid Expansion (the project).

Planning approval for the works on the MWP will be sought by way of two modifications. The first modification (Stages 1 and 2 of expansion works included in this report) will include two sites and the second modification (Stage

3) will be made later in the year for the remaining three sites. Each of the three stages are subject to separate Financial Investment Decisions (FID) with the final decision on the delivery of each stage based on demand projections for gas.

The five compressor stations for the East Coast Grid Expansion are proposed to be constructed at the following locations on the MWP, all on land owned by APA:

- Modification 1 (this project):
  - Stage 1:
    - MW880 – Milne approximately 35 km south-west of Condobolin.
  - Stage 2:
    - MW433 – Round Hill approximately 103 km north of Wilcannia.
- Modification 2:
  - Stage 3:
    - MW162 – Binerah Downs approximately 68 km north-west of Tibooburra.
    - MW300 – Mecoola Creek approximately 70 km south-east of Tibooburra.
    - MW733 – Gilgunnia approximately 63 km south-west of Nymagee.

This modification report has been prepared in accordance with Section 5.25 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) and the guideline Preparing a Modification Report – State Significant Infrastructure Guide (DPIE 2020a) and includes supporting technical assessments.

APA has engaged EMM Consulting Pty Limited (EMM) to manage environmental approvals for the project.

ES3 Project description

ES3.1 Construction

Construction of Stage 1 at MW880 is scheduled to begin in Q1 2022, pending relevant approvals. Construction is expected to begin at MW433 in Q4 2022 once the FID for Stage 2 has been made and pending relevant approvals.

The construction of each compressor station will take approximately nine months, followed by the commissioning stage, which will take approximately three months at each site.

Each compressor station will include:

- an enclosed gas turbine driven compressor unit;
- microturbine;
- compressor inlet / scrubber;
- a control equipment building;
- two fuel gas skids;

- air compressors and receivers;
- associated piping, electrical equipment, instrumentation, and controls;
- a station vent; and
- small accommodation and maintenance buildings for operations.

All facilities will be installed on driven piles or supported on structural steel skids over gravel sheeting, with the exception of the accommodation and maintenance buildings which will likely be constructed on concrete slab.

At MW433, the temporary construction workforce required to build the compressor station will be accommodated in an on-site temporary accommodation camp, with mobilisation and demobilisation of the workforce to and from Broken Hill airport for each roster.

At MW880, there are two options for the accommodation of the construction workforce. The preferred option is to house the workforce in short-term accommodation in Condobolin, with potential overflow accommodation in West Wyalong if required. Workers will be driven to and from site each day. The alternative option is to use a temporary accommodation camp on site (as per MW433), where mobilisation and demobilisation of the workforce will be to and from Dubbo airport for each roster.

Waste water from the construction camp will be treated and disposed of via spray irrigation on site.

Construction materials and supplies (including food and services for the temporary accommodation camps) will be sourced from relevant suppliers and transported to site. APA will use local suppliers where practicable.

At MW880, water will likely be purchased under a commercial arrangement from Lachlan Shire Council, or another local provider and transported to site by 25 kilolitre (kL) water truck. At MW433, there are two options for water supply – accessing groundwater on site, and/or purchasing water under a commercial arrangement from a local water provider. APA is investigating options to access groundwater under the relevant water sharing plans and regulations. If accessing groundwater at MW433 is feasible, then all regulatory requirements for water licences will be met, and any further assessments and approvals will be undertaken and applied for prior to water abstraction. If accessing groundwater is not feasible for all or part of the project, then the commercial purchase and transport will become the default water supply option.

The majority of construction activities will take place between 7:00 am and 6:00 pm, seven days per week. During the commissioning phase, activities will also take place between 7:00 am and 6:00 pm, seven days per week, however for the final two weeks, commissioning activities will be 24-hours per day.

ES3.2 Operation

The compressor stations are designed to operate remotely without onsite staff for most of their working life. They will be operated remotely from APA's control centre in Brisbane, and can operate up to 24 hours per day, seven days per week.

Typical operational activities requiring onsite presence will involve minor maintenance, calibrations, inspections, equipment performance checks, or equipment repair if needed. Regulatory compliance checks will be carried out on different equipment as prescribed in applicable standards but will typically vary from one to four-year intervals subject to the equipment types. Major services and engine overhauls will be carried out at five-to-ten-year intervals subject to equipment condition, manufacturer's recommendations and run hours.

Once complete, the compressor stations will have an average design life of approximately 25 years. Continued operation beyond the nominal design life will be subject to specific equipment condition and plant fitness

assessments. The compressor station will be decommissioned when there is no further economic potential for continued use.

ES4 Impact assessment

ES4.1 Air quality and greenhouse gas

An air quality impact assessment (AQIA) was completed by EMM to assess the predicted air quality impacts and generation of greenhouse gases associated with the project. The AQIA was prepared in general accordance with the guidelines specified by the NSW EPA in the Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales (EPA 2016) (the Approved Method).

The key findings of the AQIA are as follows:

- The compressor stations are both located in sparsely populated rural areas. MW880 has seven receptor locations (ie occupied residences) within 5 km (two of which are within 2.5 km), while MW433 has no receptor locations within 5 km.
- For the construction phase, the key emissions will be dust (in the form of total suspended particulate matter, particulate matter less than 10 micrometres (µm) in aerodynamic diameter (PM_{10}), and particulate matter less than 2.5 µm in aerodynamic diameter ($PM_{2.5}$).
- For the operational phase, the key pollutants associated with the combustion of natural gas (to power the compressor) are oxides of nitrogen (NO_x), carbon monoxide (CO), sulphur dioxide (SO_2) and volatile organic compounds (VOCs). Operational emissions will be emitted from the ventilation stack for the compressor.
- The impact assessment found that construction-related impacts as a result of dust and particulate generation will be negligible due to a lack of nearby sensitive receptors.
- Operation-related impacts as a result of combustion of natural gas to power the compressor station will be negligible, as emissions will be compliant with the most conservative air quality criteria at all locations under worst-case scenarios.
- Annual average greenhouse gas (GHG) emissions during construction of MW433 and MW880 represent approximately 0.001% of total GHG emissions for NSW and 0.0002% of total GHG emissions for Australia. Annual average GHG emissions for Stage 1 operations represents approximately 0.02% of total GHG emissions for NSW and 0.006% of total GHG emissions for Australia. Annual average GHG emissions for Stage 2 represents approximately 0.05% of total GHG emissions for NSW and 0.01% of total GHG emissions for Australia.
- Mitigation measures to be implemented during the construction and operation phases will reduce these impacts further.

ES4.2 Noise

A Noise Impact Assessment (NIA) was completed by EMM to address potential noise impacts associated with the construction and operation of the project. The assessment considered potential noise impacts in accordance with the methods outlined in the NSW Department of Environment and Climate Change 2009, Interim Construction Noise Guideline (ICNG) (DECC 2009), the NSW Department of Environment and Conservation (DEC) 2006, Assessing Vibration: a technical guideline (AVTG) (DEC 2006) and the NSW Environmental Protection Authority 2017, Noise Policy for Industry (NPfI) (EPA 2017).

The NIA presented a quantitative assessment of potential construction noise impacts, undertaken in accordance with the relevant guidelines. This includes potential impacts from the initial site preparation works and construction of the compressor station itself. Operational noise levels from the project were predicted using a detailed 3-D computer generated noise model.

The key findings of the NIA are as follows:

- Specific noise targets were based on the minimum background noise levels provided in the NPfI, given the remote location of MW433 and MW880.

- An assessment of construction noise generated at MW433 and MW880 indicated compliance with the standard construction hours criteria. Construction outside of standard construction hours will also be compliant at each location, with the exception of impact piling at MW880.

- Operational noise from MW433 was addressed using a conservative screening noise model for a receiver at 10 km. The model considers noise propagation under worst-case noise-enhancing conditions. Predicted noise levels from the operation of this site is expected to be less than 9dB, which is 26dB below the 35dB $L_{Aeq\ 15min}$ NPfI night-time noise criterion.

- Operational noise from MW880 were modelled for noise-enhancing meteorological conditions. Predicted noise from the operation of MW880 at the nearest affected assessment location is 31dB $L_{Aeq\ 15min}$ which complies with the 35dB $L_{Aeq\ 15min}$ night-time noise criterion.

- Noise associated with the general operation of the compressor stations was addressed for potential sleep disturbance during the night time period. Predicted noise levels indicate compliance with the sleep disturbance criteria for both MW433 and MW880.

- Noise associated with blowdowns during commissioning and operation will occur rarely, and for a short duration. Noise impacts from these events will be managed by consultation with nearby landholders.

ES4.3 Water

A surface water assessment (SWA) was undertaken by EMM to assess potential surface water impacts arising from the construction and operation of the proposed compressor stations. The SWA was prepared in general accordance with the relevant government assessment requirements, guidelines, and policies. The SWA also considered water licencing and approval requirements.

The key findings of the SWA are as follows:

- The sensitivity of the receiving environment downstream of MW433 is considered high due to the presence of the Paroo-Darling National Park and the Paroo River Wetlands Ramsar site.

- Flooding and water quantity impacts during construction and operations are considered minor and manageable with proposed management measures in place.

- Impacts to water quality during construction and operation are considered minor and manageable with proposed management measures in place.

- Disturbance of existing watercourses will be minimised at all sites through considered design and impacts will be avoided where practicable.

- Management measures will appropriately address impacts to flooding and water quantity, water quality, and watercourses.

ES4.4 Soil

A desktop soil and erosion hazard assessment (SEHA) was undertaken by EMM to assess impacts to soil and land resources and the potential for soil loss as a result of the project. The SEHA was prepared in accordance with relevant best-practice guidelines including Best Practice Erosion and Sediment Control (IECA 2008), Managing Urban Stormwater: Soils and Construction Volume 1 (Landcom 2004) ("blue book"), and Managing Urban Stormwater, Soils and Construction Volume 2A Installation of Services (DECC 2008).

The key findings of the SEHA are as follows:

- Both sites possess a low erosion hazard due to the flat gradient and typically low rainfall.
- Erosion risks will be greatest when soils are exposed to wind and rain during the clearing and early construction phases of the project but can be managed through the application of mitigation measures.
- A soil and water management plan incorporating primary erosion and sediment control plans for each site will be prepared for the project to set a framework for managing erosion risks.
- The greatest influence on reducing water erosion hazard is through the adoption of a drainage design that is appropriate for dispersive and non-cohesive soils. This includes maintaining sheet flow conditions where possible, avoiding concentration of flow, and the excavation of dispersive subsoils.
- Maintaining and/or re-establishing soil surface cover will be fundamental for wind erosion control. Suitable controls include stabilisation of exposed soils and hardstand areas with trafficable and non-trafficable soil stabilising polymers; and the placement of woody debris and application of biologically activated hydraulic growth mediums on areas of temporary and permanent rehabilitation.
- If the drainage design is undertaken as described, there is very low erosion risk during the operational phase of the project with most of the site to be covered by sealed hardstands, buildings or subject to progressive rehabilitation.

ES4.5 Biodiversity

A biodiversity development assessment report (BDAR) was prepared by EMM to assess the potential impacts on biodiversity associated with the construction and operation of the project. The BDAR was prepared in accordance with the Biodiversity Assessment Method (the BAM, DPIE 2020b), and included strategies to offset any residual impacts in accordance with the rules of the Biodiversity Offsets Scheme (BOS).

The BDAR carried out these objectives by undertaking a desktop review of previous and related studies, key publications and databases, analysis of spatial data and site surveys for targeted species. The BDAR was also used to inform a constraints analysis to refine the proposed layout of the permanent and temporary infrastructure so that it would avoid significant impacts to biodiversity.

They key findings of the BDAR are as follows:

- MW433 is considered highly connected, with the site located on private land surrounded by the Paroo Darling National Park. PCT 153 – Black Bluebush low open shrubland of the alluvial plains and sandplains of the arid and semi-arid zones was mapped as occurring on the majority of the site. The remainder is non-native vegetation as a result of the construction of the original MWP.
- MW433 is located adjacent to the Paroo Darling National Park and the Paroo River Wetlands of international significance.

- MW880 is considered highly fragmented, with the site located within a highly modified landscape of predominantly agricultural land. PCT 72 - White Cypress Pine - Poplar Box woodland on foot slopes and peneplains mainly in the Cobar Peneplain Bioregion was mapped as occurring on part of the northern section of the site. The remainder is non-native vegetation, as a result of the construction of the MWP, or as land used for dryland cropping.

- Site surveys indicated the following threatened species were either recorded on site, or assumed to occur:

  - MW433

    - Stimson's Python (*Antaresia stimoni*);
    - Australian Bustard (*Ardeotis australis*);
    - a saltbush (*Atriplex infrequens*); and
    - Crowned Gecko (*Lucasium stenodactylum*).

  - MW880

    - Superb Parrot (*Polytelis swainsonii*);
    - Grey-crowned Babbler (*Pomatostomus temporalis*);
    - a spear-grass (*Austrostipa metatoris*);
    - Pine Donkey Orchid (*Diuris tricolor*); and
    - Silky Swainson-pea (*Swainsona sericea*).

- The project will result in direct impacts to no more than 3.22 ha of PCT 153 at MW433, and no more than 0.75 ha of PCT 72 at MW880.

- Direct impacts to native vegetation at both sites will be mitigated through offsets, and indirect impacts will be mitigated through a range of management measures.

- Following implementation of offsets and other management measures, direct and indirect impacts to biodiversity as a result of the project, including potential impacts to the Paroo Darling National Park, will not be significant.

- Following implementation of management measures, direct and indirect impacts to matters of national environmental significance as listed under the EPBC Act, including the Paroo River Wetlands, will not be significant.

ES4.6 Heritage

An Aboriginal cultural heritage assessment (ACHA) was undertaken by EMM to assess the potential impacts on Aboriginal cultural heritage associated with the construction and operation of the project. The ACHA was prepared in consultation with registered Aboriginal parties (RAPs), Heritage NSW and DPIE, and in accordance with the relevant guidelines.

The key findings of the ACHA are as follows:

- MW433 and MW880 are located within the lands of the Barkandji and Wirajduri people respectively, who were consulted and represented throughout the ACHA process.
- Archaeological field surveys of MW433 and MW880 were undertaken by an EMM archaeologist and representatives of the RAP organisations. The field survey conducted a general overview of the project area and targeted areas with high visibility and exposure.
- Both sites exhibited levels of disturbance from construction of the original MWP and ancillary infrastructure, and cropping is evident across the southern portion of MW880.
- MW433 was identified by RAPs as being part of the broader Round Hill site centred ~1.2 km east of the site and comprised a quarry site and extensive artefact scatter (over 3,000 stone artefacts were identified).
- One new Aboriginal site was identified at MW433. MW433-OS1 was identified as a site with high scientific values based on the research potential, rarity and representativeness, and integrity of the site. The site consists of >100 stone artefacts scattered across the northern portion of the project site along the ridge crest and upper slope, which decreases in density moving downslope towards the south.
- The proposed site layout at MW433 was refined to minimise impacts to the more sensitive parts of the site along the crest and upper slope. Relocation of the construction camp and waste water treatment spray field reduced the disturbance of the highly sensitive area by approximately 46%.
- The implementation of management measures, including an ACHMP will reduce impacts to Aboriginal cultural heritage and intergeneration equity at MW433 to levels considered acceptable by the RAPs.
- There were no areas of cultural value identified near MW880, and no artefacts were identified during the field survey, therefore there will be no impacts to Aboriginal cultural heritage or intergenerational equity from the project at this site.

ES4.7 Traffic and transport

A traffic impact assessment (TIA) was completed by EMM to assess the potential traffic and transport impacts associated with the construction and operation of the project. The TIA was prepared in general accordance with the relevant government assessment requirements, guidelines, and policies. Traffic associated with the operation of the compressor stations will be negligible, therefore the TIA related primarily with the construction phase of the project.

The key findings of the TIA are as follows:

- Existing traffic volumes are low, and the addition of project-related traffic during the construction phase will have a negligible impact on the capacity and safety of the existing road network.
- No specific management measures are required as a result of the project, but commitments, including a traffic management plan will assist to reduce potential impacts when operating vehicles on public roads.

- Permits from the National Heavy Vehicle Regulator will be acquired prior to mobilisation for any vehicles that exceed the length or weight limits for the relevant roads.

ES4.8 Visual

A visual impact assessment (VIA) was completed by EMM to assess the potential visual impacts associated with the construction and operation of the project. The method for the VIA was based on a desktop review of available information, fieldwork observations and photography and analysis of geographic information systems (GIS).

The key findings of the VIA are as follows:

- The significance assessment determined that there will be no significant visual impacts as a result of the project.
- At MW433, the majority of views of the project will be transient views from Wilcannia-Wanaaring Road where motorists will be travelling at speed, and there will only be glimpsed views of project elements through intervening vegetation and terrain.
- At MW880, elements of the project will be partially visible from five residences within 5 km of the site. The most impacted receiver will be receptor R1 from viewpoint 2, where the project will be visible from the driveway, however the distance of 2.5 km will reduce the scale and degree of contrast for visible elements of the compressor station. The visual impact is not considered significant; however, vegetation can be planted to screen views in consultation with the landholder if requested. Mitigation measures incorporated into the design of the compressor station will further mitigate any impacts.

ES4.9 Hazard and risk

A preliminary hazard assessment (PHA) was completed by Sherpa Consulting in accordance with Hazardous Industry Planning Advisory Paper (HIPAP) No. 6: Hazard Analysis (DoP 2011a), and HIPAP No. 4: Risk Criteria for Land Use Safety Planning (DoP 2011b) to assess the potential hazards associated with the construction and operation of the project.

In addition to the PHA, EMM undertook a high-level bushfire assessment to determine any risks bushfires present to the project, and how to mitigate those risks. This included a review of the project in accordance with the NSW Rural Fire Service (RFS) guideline Planning for Bush Fire Protection 2019 (RFS 2019).

The key findings of the PHA and bushfire assessment are as follows:

- The quantitative risk assessment shows that the relevant HIPAP No. 4 risk criteria are met for the most sensitive land uses.
- The risk of fatalities and property damage as a result of the project at MW433 and MW880 is negligible.
- Mitigation measures have been incorporated into the design of the compressor station and processes and procedures to reduce risk.
- The project will be constructed and operated in accordance with the NSW RFS guideline Planning for Bush Fire Protection 2019 (RFS 2019).

ES4.10 Socio-economic

A socio-economic assessment (SEA) was completed by EMM to assess the potential socio-economic benefits and impacts to the local area, region and state, associated with the construction and operation of the project.

The key findings of the SEA are as follows:

- The compressor station locations have been selected partly based on their distance from sensitive receptors, including regional towns and private residences, and local impacts will be limited.

- Key benefits include potential economic growth and employment opportunities associated with an increase in job opportunities locally, regionally, and state-wide. Given the comparatively high levels of unemployment within local LGAs, and a regional workforce with resource industry experience, there is potential to employ workers from within the local community.

- The use of the on-site temporary accommodation camp at MW433 for the construction workforce will limit the potential impacts on local accommodation and housing, however there will be limited opportunities for local accommodation providers or services.

- The potential use of local accommodation in Condobolin for the construction workforce at MW880 will create significant economic benefits for local accommodation providers as well as businesses such as restaurants, food suppliers and recreational services.

- APA will engage with local accommodation providers to ensure the provision of short-term accommodation for project use will not negatively impact the capacity of local accommodation providers to serve additional guests.

- APA will require the relevant construction contractor(s) to implement a workforce management strategy that will include measures such as a workforce code of conduct in line with APA's 'Values and Behaviours Guide' to ensure appropriate workforce behaviour.

- Economic and social benefits within the local and regional area will occur through procurement of appropriate goods and services from local businesses, where available. This will create some benefits during construction, and these may continue, but at a lesser level during operations.

- Key benefits of the project include the potential economic growth associated with local, regional, and state-wide procurement. Over 70% of the capital expenditure spent of labour, goods and service is expected to be sourced from within the local, NSW, and Australian markets. It is likely that these economic opportunities will create flow on benefits for the Australian economy as a whole, as well as bringing benefits to the local and regional area.

- Project operation, and the indirect economic benefits of increased capacity of the MWP will provide additional annual gas sales of approximately $262 M per year, based on current market values.

- In the context of the strategic importance of energy supply, increasing the availability of affordable natural gas supply is likely to improve energy security across the country, as well as creating significant economic opportunities within the market.

- Overall, the East Coast Grid Expansion will have a positive impact on local communities and economies as a result of project construction, and there will be several economic and social benefits at the regional, NSW and Australian level.

ES4.11 Waste

EMM undertook a high-level waste assessment to determine any applicable regulatory requirements to waste management, and to identify the waste management approach for the project.

Key findings of the waste assessment are as follows:

- Project related waste will likely include general waste (putrescible and non-putrescible) and some hazardous waste.
- Waste will be managed in accordance with Waste Classification Guidelines: Part 1 Classifying Waste (EPA 2014b) and as defined in Schedule 1, Part 3, Clause 49 of the POEO Act.
- The implementation of mitigation measures will minimise the potential impacts of the project on the surrounding environment.

ES4.12 Cumulative

A cumulative impact assessment was undertaken to assess the potential for project impacts to have compounding interactions with similar impacts from other projects.

A desktop review was undertaken which included a search of DPIE's Major Planning website to identify proposed and approved developments in Central Darling Shire and Lachlan Shire which may have compounding interactions with similar impacts from this project.

The following projects were identified as having the potential for cumulative impacts:

- Central Darling Shire:
  - Wilcannia Weir Replacement.
- Lachlan Shire:
  - Sunrise Nickel/Cobalt Mine (Modification 7).
  - Owendale Scandium Mine.
  - Western Slopes Pipeline.
  - Flemington Cobalt Scandium Mine.

The key findings of the cumulative assessment indicate the following:

- There may be minor cumulative impacts to traffic on the Barrier Highway between Broken Hill and Wilcannia if the construction of MW433 coincides with the construction of the proposed Wilcannia Weir. However, these combined traffic levels are unlikely to exceed the level of service and safety standards for the Barrier Highway.
- There may be minor cumulative socio-economic benefits and impacts to Wilcannia if the construction of MW433 coincides with the construction of the proposed Wilcannia Weir. However, APA will consult with local businesses when procuring services at MW433 and will take into account any issues raised in consultation.

- Cumulative impacts as a result of developments in Lachlan Shire are unlikely due to the timing and location of other projects.

ES5 Justification and conclusion

APA currently operates the MWP, a high-pressure natural gas transmission pipeline constructed in 1976, gazetted as SSI in 2020, and authorised by PL16. The MWP forms a key part of APA's East Coast Grid.

The East Coast Grid Expansion will increase winter peak capacity of the east coast gas grid by 25% with the first stage of expansion works targeted ahead of forecast southern state winter supply risks in 2023.

APA understands the concerns that surround a potential shortage of gas in southern markets and believes the best infrastructure solution for the market is achieved through the timely expansion of capacity by incremental additional compression of existing infrastructure. A shortage of natural gas supply has the potential to cause significant negative economic and social impacts throughout NSW and Australia.

Stage 1 and Stage 2 of the East Coast Expansion as described in this modification report is anticipated to generate significant economic benefits and strategic energy security throughout NSW and the wider east coast of Australia by increasing the capacity of the MWP through the proposed new compressor stations.

Should the modification go ahead, it will achieve the following objectives:

- The first stage of expansion works will increase Wallumbilla to Wilton capacity by 12%. These works are targeted for commissioning in the first quarter of CY2023 ahead of forecast southern state winter supply risks identified in the 2021 AEMO Gas Statement of Opportunities.
- The second stage of the expansion works, which will add a further 13% of capacity, will be staged to meet customer demand.
- These investments will boost economic activity in regional NSW, creating construction jobs and expenditure on services such as supplies and maintenance. The project is also expected to see further expenditure of wages in regional NSW.

The project has been studied from many perspectives and its final design is considered the most sustainable response to economic, social, environmental and cultural values that exist in the area. The predicted economic and strategic benefits will strongly outweigh, primarily minor and manageable adverse impacts in the locality. This modification report demonstrates that the project has been designed such that impacts are either avoided, or appropriate management measures identified so that the residual impacts are reduced and, on balance, the project is justifiable.

The project has strong economic justifications due to the strategic importance of gas and the economic stimulus it will provide locally, regionally and to NSW and Australia as a whole. Importantly, the project involves an ideal opportunity to maximise gas supply via existing infrastructure with minimal impact. Contributions to the state and national economy will include direct economic activity (eg direct employment and wages) and expenditure on materials that can be sourced from Australia and NSW.

The project has been assessed in accordance with the principles of ecologically sustainable development in order for it to be considered for approval.

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1 Introduction

1.1 Background

East Australian Pipeline Pty Ltd, part of the APA Group (APA), currently operates an underground high pressure natural gas transmission pipeline, extending from Moomba (South Australia) to Wilton (New South Wales), a distance of approximately 1,299 kilometres (km). The Moomba to Wilton Pipeline (MWP) is the mainline part of the Moomba Sydney Pipeline (MSP) and was constructed in 1976.

Initially, the pipeline was owned and operated by the Pipeline Authority, a Commonwealth Agency, and generally regulated under the Pipeline Authority Act (Cth). The MWP is now owned and operated by APA, was gazetted as a State Significant Infrastructure (SSI) project on 11 December 2020 and is authorised by Pipeline Licence No. 16 (PL16).

The MWP currently operates at a forward haul capacity of approximately 489 terajoules per day (TJ/day) (AEMC 2021).

1.2 Project overview and context

NSW imports the majority of its natural gas from other states, and a gas shortfall on Australia's east coast is predicted by Winter 2023, with demand for gas forecast to outstrip supply.

APA is proposing an expansion of gas transportation capacity on its East Coast Grid that links Queensland to southern markets ahead of projected potential 2023 supply risks. Expansion would be through the construction of additional compressor stations and associated works on both the South West Queensland Pipeline (SWQP) in Queensland and the MWP in NSW.

The expansion will be delivered in a number of stages. The first stage of expansion works includes the construction of a single compressor station site on each of the SWQP and MWP and will increase Wallumbilla to Wilton capacity by 12%. The first stage is targeted for commissioning in the first quarter of 2023 ahead of forecast southern state winter supply risks identified in the 2021 Australian Energy Market Operator (AEMO) Gas Statement of Opportunities. The second stage of expansion works (an additional site on the SWQP and on the MWP) will add a further 13% capacity and will be staged to meet customer demand. APA is undertaking engineering and design works on a potential third stage (three additional compressor locations on the MWP) of the East Coast Grid to add a further 25% transportation capacity. The proposed capacity expansions as part of the East Coast Grid Expansion would mean that the entirety of NSW peak demand could be met by gas flowing from northern sources.

The proposed East Coast Grid Expansion is an ideal opportunity to maximise gas supply via existing infrastructure with minimal impact.

This modification report (Modification Report 1) has been prepared to assess the environmental, social and economic impacts of Stage 1 and Stage 2 of the East Coast Grid Expansion (the project).

The project is fully described in Chapter 2, the statutory context is presented in Chapter 3, and the justification for the project is presented in Chapter 18.

1.3 Approvals approach

Planning approval for the works on the MWP will be sought by way of two modifications. The first modification (Stages 1 and 2 of expansion works included in this report) will include two sites and the second modification (Stage 3) will be made later in the year for the remaining three sites. Each of the three stages are subject to separate

Financial Investment Decisions (FID) with the final decision on the delivery of each stage based on demand projections for gas.

The five compressor stations for the East Coast Grid Expansion are proposed to be constructed at the following locations on the MWP:

- Modification 1 (this project):
  - Stage 1:
    - MW880 – Milne approximately 35 km south-west of Condobolin.
  - Stage 2:
    - MW433 – Round Hill approximately 103 km north of Wilcannia.
- Modification 2:
  - Stage 3:
    - MW162 – Binerah Downs approximately 68 km north-west of Tibooburra.
    - MW300 – Mecoola Creek approximately 70 km south-east of Tibooburra.
    - MW733 – Gilgunnia approximately 63 km south-west of Nymagee.

The proposed locations of Stage 1 and Stage 2 compressor stations are presented in Figure 1.1.

This modification report for Stages 1 and 2 of the East Coast Grid Expansion has been prepared in accordance with Section 5.25 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) and the guideline Preparing a Modification Report – State Significant Infrastructure Guide (DPIE 2020a) and includes supporting technical assessments.

APA has engaged EMM Consulting Pty Limited (EMM) to manage environmental approvals for the project.

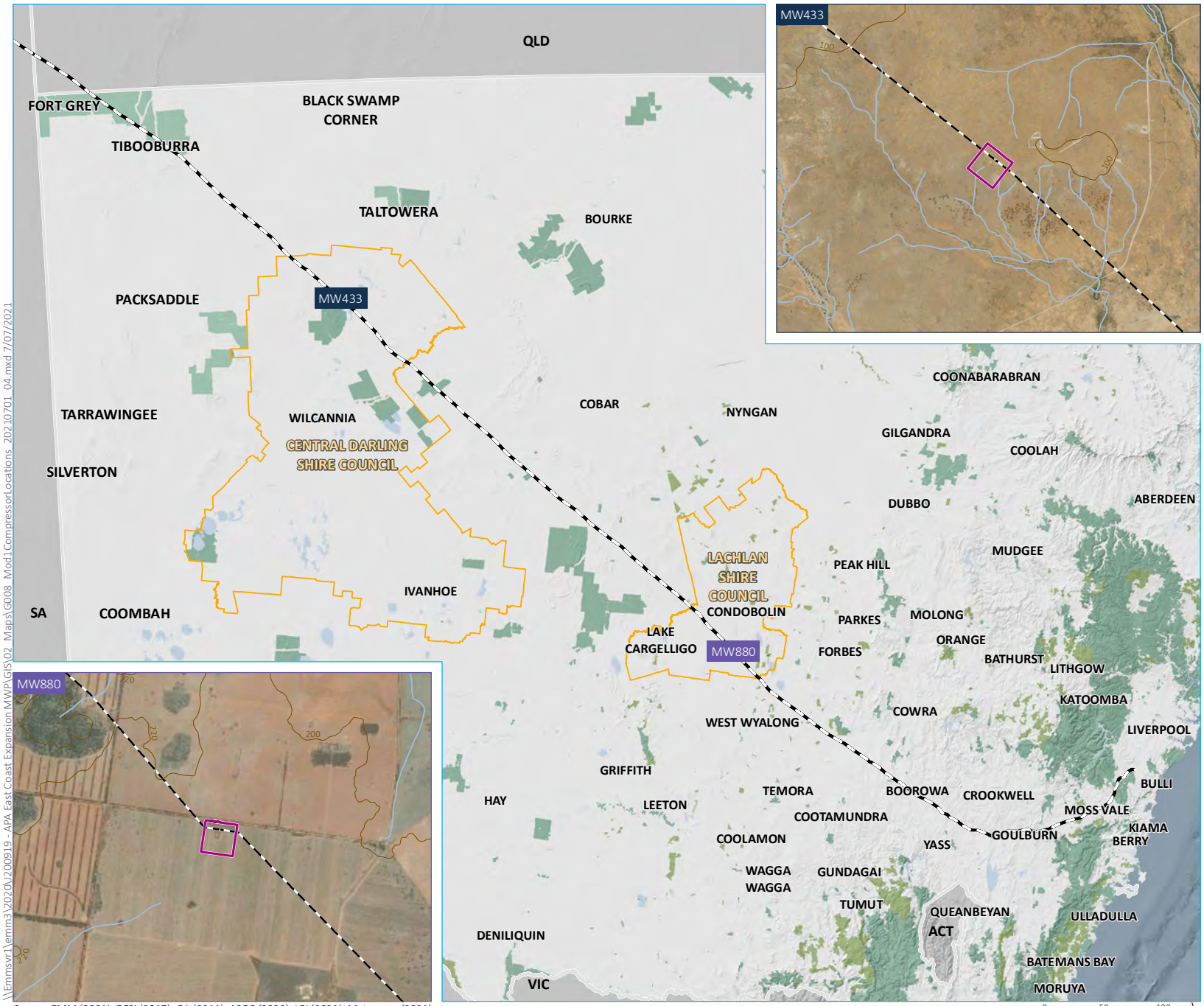
1.4 The applicant

The applicant is East Australian Pipeline Pty Ltd, part of APA Group (APA). APA is one of Australia's largest natural gas infrastructure businesses, owning and/or operating more than 15,000 km of pipeline infrastructure. Its gas transmission pipelines span every State and Territory in mainland Australia, delivering approximately half of the nation's gas usage.

APA also has ownership interests in, and operates, the Allgas gas distribution network as well as operating the Australian Gas Networks (formerly Envestra Limited) assets, which together comprise approximately 27,000 km of gas mains and approximately 1.4 million gas consumer connections. APA also owns other energy infrastructure assets such as gas storage facilities, gas-fired power stations, and solar and wind farms. In total, APA owns and/or operates around $22 billion of energy assets.

APA's 7,500km East Coast Grid of interconnected gas transmission pipelines provides the flexibility to move gas around eastern Australia, from Otway and Longford in Victoria, to Moomba in South Australia and Mount Isa and Gladstone in Queensland.

APA has direct management and operational control over the majority of its assets and investments.



Source: EMM (2021); DFSI (2017); GA (2011); ASGC (2006); LPI (2021); Metromap (2021)

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Proposed location of compressor stations on the MWP

APA - East Coast Grid Expansion
Modification report 1
Figure 1.1

EMM
creating opportunities

2 Project description

2.1 Overview

The East Coast Grid Expansion in NSW will be facilitated by the construction of five compressor stations, through a staged approach, along the length of the MWP. This modification report addresses the construction and operation of two compressor stations: Stage 1 (MW880) and Stage 2 (MW433).

Each compressor station will include:

- an enclosed gas turbine driven compressor unit;
- microturbine;
- compressor inlet/scrubber;
- a control equipment building;
- two fuel gas skids;
- air compressors and receivers;
- associated piping, electrical equipment, instrumentation, and controls;
- a station vent; and
- small accommodation and maintenance buildings for operations.

All facilities will be installed on driven piles or supported on structural steel skids over gravel sheeting, with the exception of the accommodation and maintenance buildings which will likely be constructed on concrete slab.

Both of the proposed sites for the compressor stations are on land owned by APA, with MW433 being approximately 380 m x 400 m with an area of 15.5 hectares (ha), and MW880 being approximately 400 m x 400 m with an area of 16 ha. The compressor station will have a final footprint of approximately 1.5 ha.

An indicative schematic of the proposed compressor station layout is shown in Figure 2.1 and an example of a compressor and ventilation stack is shown in Plate 2.1.

Figure 2.1 Indicative compressor station layout

Plate 2.1 Example compressor station

2.2 Existing pipeline

The MWP is the mainline part of the Moomba Sydney Pipeline (MSP) and was constructed in 1976 to link the Cooper Basin gas fields near Moomba in South Australia to gas distribution systems in Sydney, Newcastle, Wollongong, Canberra and some NSW regional centres.

The MWP was initially proposed by the Australian Gas Light Company (AGL) in the early 1970s following the discovery of natural gas in the Cooper Basin. The Australian Government established The Pipeline Authority (TPA) as part of a plan to facilitate the establishment of an interconnected national gas pipeline system and assumed control of the project in 1974 (ACCC 2003).

The MWP was approved for construction in 1973 by the TPA under the *Pipeline Authority Act 1973* (Cth) as a 1299 km pipeline with a diameter of 864 mm and was commissioned in 1976. The MWP has been augmented with several lateral pipelines, and compressor stations at Bulla Park (near Cobar) and Young, built in 1986 (TPA 1990). The MWP can also transport gas sourced from Queensland's Bowen-Surat Basin (APGA 2021a).

East Australian Pipeline Pty Ltd (EAPL) purchased the MWP from TPA in June 1994. At the time, and until December 1999, EAPL was owned by AGL (51 per cent) and Gasinvest Australia Pty Ltd (49 per cent). AGL's ownership of the MWP (and other transmission pipelines wholly or partly owned by AGL) was subsequently transferred to the Australian Pipeline Trust (APT) (a precursor to APA) when the company was floated in June 2000 (ACCC 2003).

The MWP is owned and operated by APA and is authorised by Pipeline Licence No. 16 (PL16) issued in 1997 under the *Pipelines Act 1967* (NSW) and the *Pipelines Regulation 1993* (NSW). The MWP was gazetted as SSI on 11 December 2020 (SSI-15548591).

The Moomba to Sydney Ethane Pipeline (MSEP) was constructed in 1996, is located adjacent to the MWP, and shares the easement for most of its length. The MSEP transports ethane from Moomba to a petrochemical facility in Botany Bay.

2.3 Site descriptions

2.3.1 MW433 – Round Hill

MW433 is located in far north-west NSW in the Barwon Darling catchment, approximately 103 km north of Wilcannia in Central Darling Shire Local Government Area (LGA). The site is bordered on three sides by the Paroo-Darling National Park. The site is located at Lot 3/DP593787, and is zoned as RU1, primary production under the Central Darling Local Environmental Plan (LEP) (Central Darling Shire Council 2012). There are no residences (sensitive receptor locations) within 5 km of the site.

i Natural environment

The historical annual mean rainfall at the site is less than 250 mm, with generally a wet summer and dry winter (BOM 2020). Site topography generally slopes gently from north-east to south-west at a slope of 0.5–1.5% (DTA 2021), with a small hill ("Round Hill") located immediately to the east of the site. Poloko Lake and Peery Lake, ephemeral lakes fed by the Darling River, are located 5 km to the south and south-east of the site.

ii Built features

MW433 hosts existing infrastructure related to the construction and operation of the MWP and the MSEP, including the following:

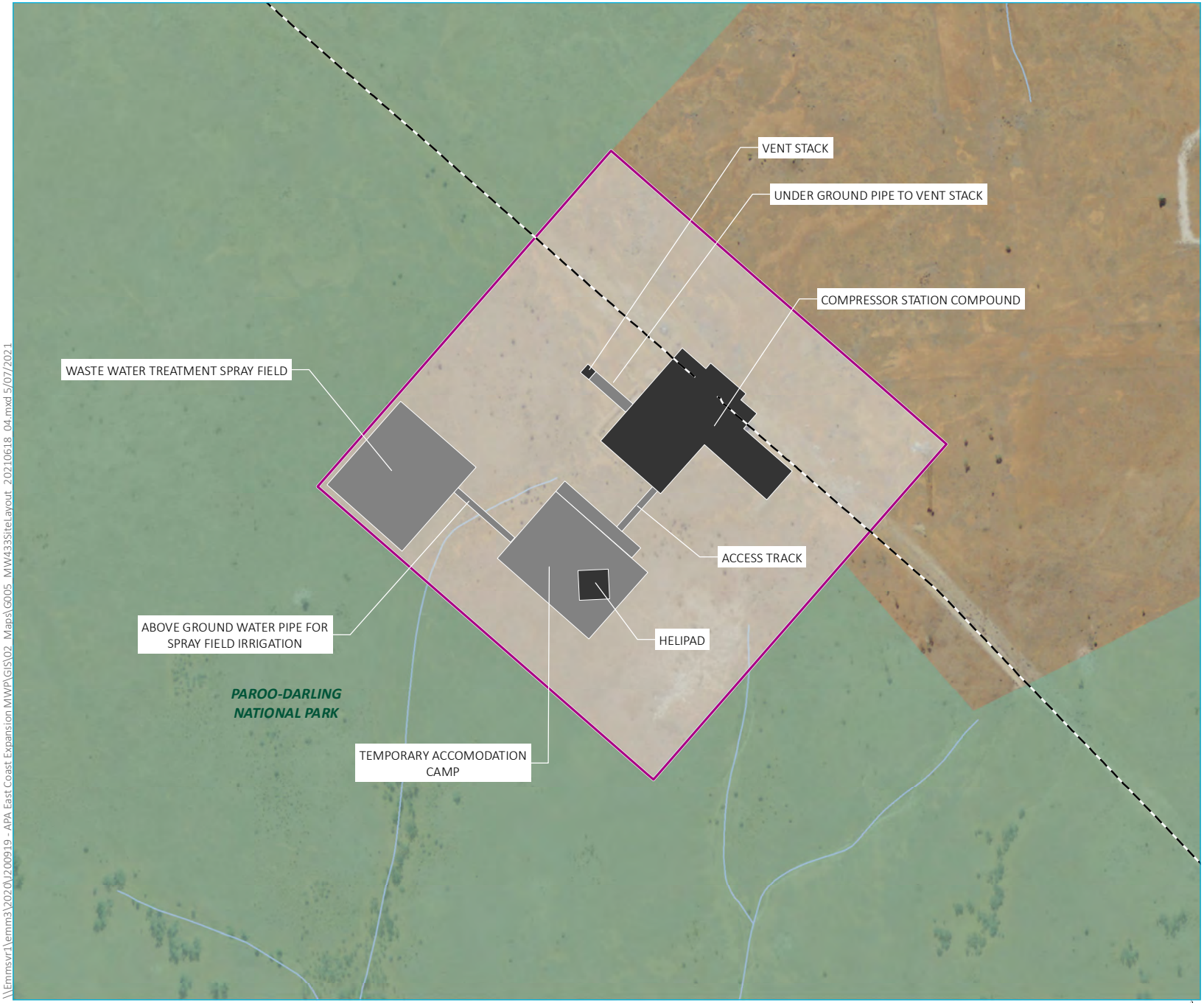
- infrastructure to remain after the modification:
  - pig catcher and launcher for the MWP;
  - pig catcher and launcher for the MSEP;
  - small amenities building with water tank; and
  - 3 m high wire fencing (will be replaced with similar fencing around whole compressor station site).
- infrastructure to be removed during construction:
  - historical water retention structure.

There is a communications tower located 30 m north-east of the site boundary that will remain. This tower is approximately 100 m high, of steel lattice construction, and is operated by Telstra.

Wilcannia-Wanaaring Road is an unsealed local road located 1.85 km to the south-east of the site boundary, and approximately 2.1 km from the site of the proposed compressor station.

An aerial photo of MW433 is presented in Plate 2.2, and the layout is presented in Figure 2.2.

Plate 2.2 Aerial photo of MW433 looking north-east



KEY

- Compressor site
- Site boundary/construction envelope
- Moomba to Wilton pipeline

Proposed site layout

- Permanent
- Temporary
- Watercourse/drainage line
- NPWS reserve

INSET KEY

- State forest

Source: EMM (2021); DFSI (2017); GA (2011); ASGC (2006); LPI (2021)

0 100 200 m

GDA 1994 MGA Zone 54

N

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Site layout MW433 – Round Hill

APA - East Coast Grid Expansion
Modification report 1
Figure 2.2

EMM creating opportunities

2.3.2 MW880 – Milne

MW880 – Milne is located in central NSW in the Lachlan River catchment, approximately 35 km south-west of Condobolin, in Lachlan Shire LGA. The site is located at Lot 1/DP580284, and is zoned as RU1, primary production under the Lachlan LEP (Lachlan Shire Council 2012). The southern part of the site is used for dryland cropping. There are seven residences (sensitive receptor locations) within 5 km of the site. Sensitive receptor locations were established based on a desktop review of satellite imagery.

i Natural environment

The historical annual mean rainfall at the site is less than 450 mm, with generally a wet summer and dry winter (BOM 2020). Site topography slopes gently from west to east at 0.5–2%. Slopes to the north of the site can reach approximately 6% (DTA 2021).

ii Built features

MW880 hosts existing infrastructure related to the construction and operation of the MWP and the MSEP, including the following:

- infrastructure to remain after the modification:
    - pig catcher and launcher for the MWP;
    - pig catcher and launcher for the MSEP;
    - small amenities building;
    - 3 m high wire fencing (will be replaced with similar fencing around whole compressor station site); and
    - communications tower, approximately 100 m high of steel lattice construction, operated by Telstra.
- infrastructure to be removed during construction:
    - historical water retention structure.

Crown Camp Road is an unsealed local road located adjacent to the northern site boundary.

An aerial photo of MW880 is presented in Plate 2.2, and the layout is presented in Figure 2.3. A figure showing the nearby sensitive receptor locations is presented in Figure 2.4.

Plate 2.3 Aerial photo of MW880 looking south

KEY

- Compressor site
- Site boundary/construction envelope
- Moomba to Wilton pipeline

Proposed site infrastructure

- Permanent
- Temporary

Existing environment

- Major road
- Waterbody

INSET KEY

- NPWS reserve
- State forest

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Source: EMM (2021); DFSI (2017); GA (2011); ASGC (2006); LPI(2021)

0 100 200 m

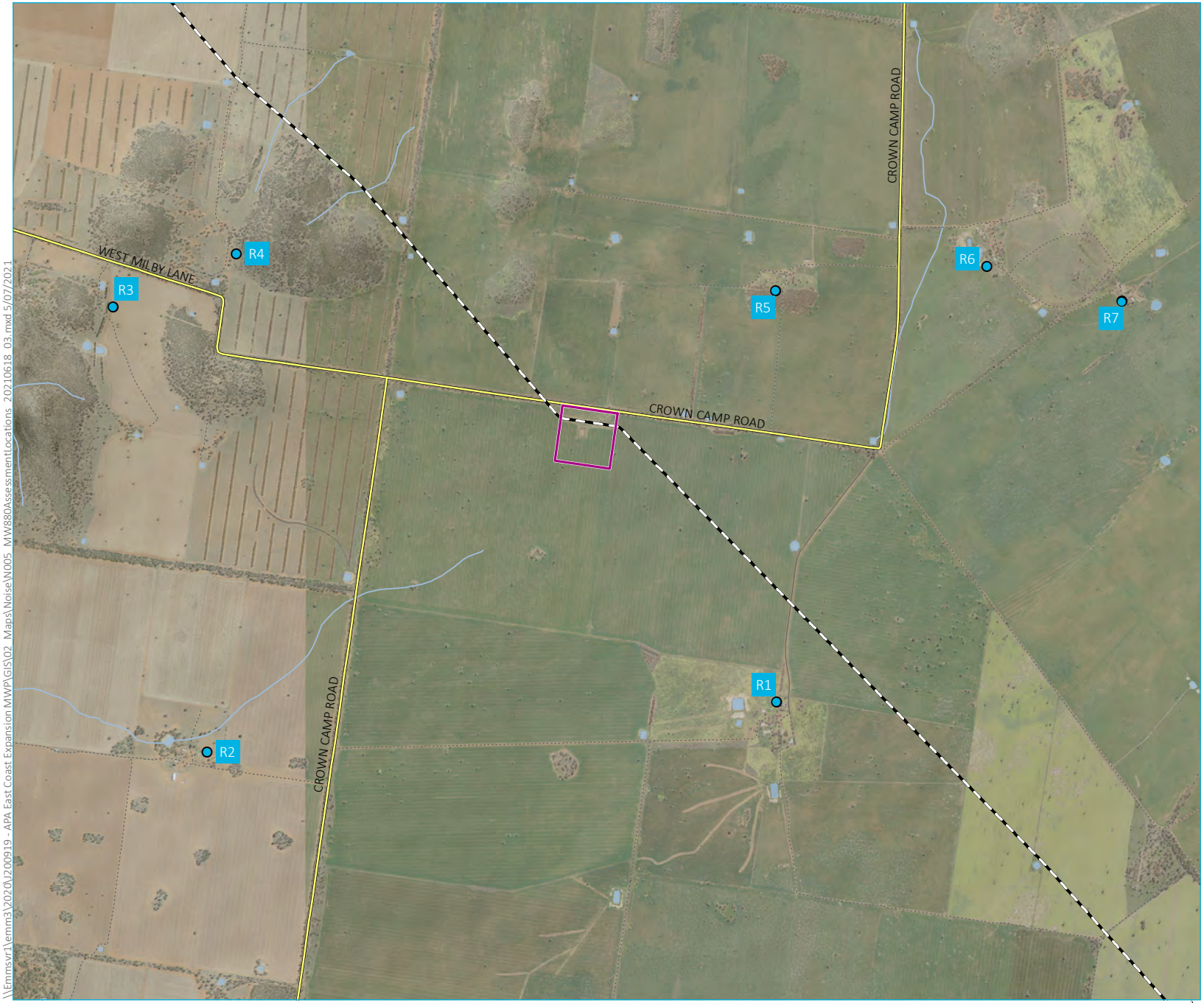
GDA 1994 MGA Zone 55

N

Site layout MW880 - Milne

APA - East Coast Grid Expansion
Modification report 1
Figure 2.3

EMM creating opportunities



KEY

- Compressor site
- Sensitive receiver location
- Moomba to Wilton pipeline
- Major road
- Minor road
- Vehicular track
- Watercourse/drainage line
- Waterbody

INSET KEY

- NPWS reserve
- State forest

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Source: EMM (2021); DFSI (2017); GA (2011); ASGC (2006); LPI (2021)

0 0.5 1 km

GDA 1994 MGA Zone 55

N

Assessment locations surrounding the Milne site

APA - East Coast Grid Expansion
Modification report 1
Figure 2.4

EMM creating opportunities

2.4 Proposed modification

2.4.1 Timeframes

FID has been made for the commencement of Stage 1 at MW880. Construction is scheduled to begin in Q1 2022, pending relevant approvals. Construction is expected to begin at MW433 in Q4 2022 once the FID for Stage 2 has been made and pending relevant approvals.

The construction of each compressor station will take approximately nine months, followed by the commissioning stage, which will take approximately three months at each site. Construction will take place sequentially.

2.4.2 Construction

Each compressor station will require a construction footprint of approximately 3.5 ha, which will be reduced to approximately 1.5 ha for operations.

At MW433, the temporary construction workforce required to build the compressor station will be accommodated in a temporary accommodation camp, with mobilisation and demobilisation of the workforce to and from Broken Hill airport for each roster. The temporary accommodation camp will measure approximately 100 m x 100 m, with an additional 100 m x 100 m for waste water treatment. A smaller accommodation unit for operations will be included within the operational footprint on the compressor station.

At MW880, there are two options for the accommodation of the construction workforce. The preferred option is to house the workforce in short-term accommodation in Condobolin (42 km by road from the site), with potential overflow accommodation in West Wyalong (85 km by road from the site), if required. Workers will be driven to and from site each day, with between one and four buses and between five and eight cars required per day, depending on workforce numbers. The alternative option is to use a temporary accommodation camp on site (as per MW433), where mobilisation and demobilisation of the workforce will be to and from Dubbo airport for each roster.

Waste water from the construction camp will be treated by a suitably designed, manufactured, installed, commissioned and operated aerated wastewater treatment system, pre-approved by the NSW Department of Health in order to satisfy the requirements of Section 68 of the NSW Local Government Act 1993 and Australian Standard (AS) 1547: On-site domestic wastewater management. Once the treatment is constructed, local government will provide an approval to operate. The waste water treatment system will use sedimentation and anaerobic digestion to separate biomass from waste water effluent. The biomass will be periodically pumped out for disposal by an authorised waste contractor. The effluent will be disinfected to remove any residual pathogens then pumped to the irrigation spray field on site for disposal.

Construction materials and supplies (including food and services for the temporary accommodation camps) will be sourced from relevant suppliers and transported to site. APA will use local suppliers where practicable.

At MW880, water will likely be purchased under a commercial arrangement from Lachlan Shire Council, or another local provider and transported to site by 25-kilolitre (KL) water truck. At MW433, there are two options for water supply – accessing groundwater on site, and/or purchasing water under a commercial arrangement from a local water provider and transporting it to site by 25-KL water truck. APA is investigating options to access groundwater under the relevant water sharing plans and regulations. If accessing groundwater at MW433 is feasible, then all regulatory requirements for water licences will be met, and any further assessments and approvals will be undertaken and applied for prior to water abstraction. If accessing groundwater is not feasible for all or part of the project, then the commercial purchase and transport will become the default water supply option.

The majority of construction activities will take place between 7:00 am and 6:00 pm, seven days per week. During the commissioning phase, activities will also take place between 7:00 am and 6:00 pm, seven days per week, however for the final two weeks, commissioning activities will be 24-hours per day.

i Construction activities

Construction of the compressor stations will include the following activities:

- mobilisation of construction equipment;
- establishment of access (where required);
- establishment of construction camp accommodation and associated facilities;
- establishment of access to water supply;
- site bulk earthworks including build up to match existing levels;
- installation of steel piles;
- installation of all equipment items, skids and buildings;
- installation of associated steel structures, prefabricated piping, electrical equipment, instrumentation and controls;
- supply and install communication and controls infrastructure;
- demobilisation of construction equipment;
- rehabilitation of temporary disturbance areas; and
- pre-commissioning and commissioning of compressor station.

ii Workforce

The construction of the compressor stations will require an average workforce of 40 with a peak of 80 personnel over the 12-month period (including commissioning). All roles are likely to be drive-in-drive-out (DIDO) or fly-in-fly-out (FIFO) and based at either construction camp on site, or in Condobolin. The anticipated roster is three weeks on followed by one week off.

There are expected to be five contracts put out to tender for the construction and commissioning of the compressor stations:

- earthworks and civil works;
- establishment of the construction camp and associated waste water treatment system;
- piling;
- structural, mechanical, piping, electrical and instrumentation construction (SMPEI); and
- compressor station pre-commissioning and commissioning.

In addition to the contractor workforce, APA will have a project team on site to manage the works.

The anticipated workforce associated with each contract is outlined in Table 2.1 below.

Table 2.1 Construction and commissioning workforce

Entity	Average workforce	Peak workforce
APA Project Team	4	10
Earthworks	10	15
Piling	6	6
SMPEI Construction	30	50
Construction Camp	8	16
Pre-commissioning and Commissioning	10	14

The anticipated workforce distribution over the 12-month construction and commissioning program is presented in Table 2.2.

Table 2.2 Monthly construction and commissioning workforce distribution

1	2	3	4	5	6	7	8	9	10	11	12
20	28	28	37	47	65	68	59	49	39	18	18

2.4.3 Operation

i Activities

The compressor stations are designed to operate remotely without onsite staff for most of their working life. They will be operated remotely from APA's control centre in Brisbane, and can operate up to 24 hours per day, seven days per week.

Typical operations activities will involve minor maintenance, calibrations, inspections, equipment performance checks, or equipment repair if needed. Operation activities will be typically carried out during daylight hours, unless an emergency requires urgent works at night. Site personnel will carry out inspections ranging from daily inspections to more rigorous inspections that may vary from one month to 4 years apart, dependent on the works. Detailed maintenance plans will be prepared for all sites.

Regulatory compliance checks will be carried out on different equipment as prescribed in applicable standards but will typically vary from one to four-year intervals subject to the equipment types. Compliance checks may include emissions testing, hazardous area compliance assessments, pressure vessel inspections, and electrical safety checks.

Major services and engine overhauls will be carried out at five-to-ten-year intervals subject to equipment condition, manufacturer's recommendations and run hours.

Once complete, the compressor stations will have an average design life of approximately 25 years. APA will continue to monitor the condition of equipment up to and beyond the end of life to ensure equipment is sound and fit for further service. Continued operation beyond the nominal design life will be subject to specific equipment condition and plant fitness assessments. The compressor station will be decommissioned when there is no further economic potential to continued use.

ii Workforce

The compressor stations are designed to operate as unmanned facilities. The typical site workforce for operation activities is expected to be one to two people.

Larger groups of up to five people associated with major services or overhauls will be required to minimise the time the compressor station is offline.

The operations workforce will comprise existing APA employees, who are unlikely to be resident locally. Additional specialist servicing will be carried out by a mix of local contractors and interstate/international based depending on the complexity of the task.

3 Statutory context

3.1 Introduction

Initially, the pipeline was owned and operated by the Pipeline Authority, a Commonwealth Agency, and generally regulated under the *Pipeline Authority Act 1973* (Cth). The MWP is now owned and operated by APA, and was authorised by Pipeline Licence No. 16 (PL16) in 1997 under the *Pipelines Act 1967* (NSW) and the *Pipelines Regulation 1993* (NSW).

The conditions of PL16 require that APA must operate and maintain the pipeline in accordance with recognised standards and practices and must meet the requirements of the *Pipelines Act 1967*, the *Pipelines Regulation 1993*, and Australian Standard (AS) 2885: Pipelines – Gas and liquid petroleum.

The MWP was gazetted as SSI on 11 December 2020 (SSI-15548591) under Part 5 of the EP&A Act, which includes infrastructure that is considered to be significant due to potential impacts, size or strategic and economic value.

To augment the MWP with proposed compressor stations, APA must obtain development consent under Section 5.25 of the EP&A Act. This chapter describes the relevant NSW and Commonwealth regulatory and policy framework under which the project will be assessed and determined.

3.2 Environmental Planning and Assessment Act 1979

The NSW EP&A Act and the NSW EP&A Regulation form the statutory framework for land-use planning decisions in NSW. Implementation of the EP&A Act is the responsibility of the Minister for Planning and Public Spaces, State government authorities and local government authorities.

The project will be assessed as an SSI modification under section 5.25 of the EP&A Act. Section 5.25(3) of the act requires that a request for the Minister's approval of a modification be lodged with the Planning Secretary, and that the Planning Secretary may notify the proponent of environmental assessment requirements.

APA submitted a modification scoping letter to DPIE on 5 March 2021, identifying the environmental assessment requirements for this modification report. The assessment requirements were endorsed by DPIE on 18 March 2021. This modification report addresses these requirements, so that the Minister may consider (and grant approval to) the proposed modification under section 5.25(4) of the EP&A Act.

Pursuant to Section 5.23 of the EP&A Act, the following authorisations under other NSW legislation are not required for an approved SSI project:

- a permit under Section 201, 205 or 219 of the NSW *Fisheries Management Act 1994* (FM Act);
- an approval under Part 4, or an excavation permit under Section 139, of the NSW *Heritage Act 1977* (Heritage Act);
- an Aboriginal heritage impact permit under Section 90 of the NSW *National Parks and Wildlife Act 1974* (NPW Act)*;*
- a bushfire safety authority under Section 100B of the NSW *Rural Fires Act 1997* (RF Act); and
- a water use approval under Section 89, a water management work approval under Section 90 or an activity approval (other than an aquifer interference approval) under Section 91 of the WM Act.

Pursuant to Section 5.24 of the EP&A Act, the following authorisations under other NSW legislation cannot be refused if it is necessary for carrying out an approved SSI project:

- an aquaculture permit under Section 144 of the *Fisheries Management Act 1994;*
- an approval under Section 15 of the *Mine Subsidence Compensation Act 1961*;
- a mining lease under the *Mining Act 1992;*
- a production lease under the *Petroleum (Onshore) Act 1991;*
- an environment protection licence under Chapter 3 of the *Protection of the Environment Operations Act 1997* (for any of the purposes referred to in Section 43 of that Act);
- a consent under section 138 of *the Roads Act 1993*; and
- a licence under the *Pipelines Act 1967*.

3.3 Pipelines Act 1967

A licence to construct, operate and maintain a pipeline is required under the *Pipelines Act 1967* (NSW). Licence No. 16 was granted for the MWP by the Minister of Energy on 28 May 1997.

A number of variations to Pipeline Licence No. 16 have since been granted, to allow for construction and operation of laterals. A further amendment to Licence No. 16 will be undertaken for the operation of the proposed modification following determination of the modification.

3.4 Other relevant legislation and policies

3.4.1 Legislation

i Biodiversity Conservation Act 2016

An assessment of the impacts to biodiversity from the project is required under Section 7.9 of the *Biodiversity Conservation Act 2016*. A biodiversity development assessment report (BDAR) has been prepared to address this requirement, and is presented in Appendix F.

ii Biosecurity Act 2015

The act provides for the prevention, elimination, minimisation and management of biosecurity risk, including the introduction, spread or increase of weed or pest into NSW through identification, classification and control of priority weeds. Weeds found within the proposed modification area were documented as part of the BDAR. APA has duties under the act to manage biosecurity risks relevant to the project.

iii National Parks and Wildlife Act 1974

The NPW Act provides for nature conservation in NSW, including the conservation of places, objects and features of significance to Aboriginal people and protection of native flora and fauna. A person must not harm or desecrate an Aboriginal object or place without an Aboriginal heritage impact assessment under section 90 of the NPW Act. However, a Section 90 permit is not required for SSI authorised by a development consent by virtue of Section 5.23 of the EP&A Act.

iv Protection of the Environment Operations Act 1997

The purpose of this act is to protect land, air or water. Relevant regulations under the Act include Protection of the Environment Operations (Noise Control) Regulation 2017 and Protection of the Environment Operations (Waste) Regulation 2014. Appropriate measures will be included in the Construction Environmental Management Plan (CEMP) to address relevant requirements of the regulations.

Section 5.24 of the EP&A Act mandates that an application for an EPL for an approved SSI project cannot be refused and is to be substantially consistent with the terms of the development consent for the SSI.

v Water Management Act 2000

The WM Act requires a water licence be obtained for controlled activities that may cause aquifer interference, including for example obstruction to water flow, or taking of water, is required. Groundwater will not be impacted as a result of direct construction activities, however if groundwater is used as a source of water during the construction phase, a licence under the WM Act will be required. APA is currently investigating options for water sourcing, and the requirement for a water licence will be determined prior to construction.

3.4.2 Policies

i State Environmental Planning Policy (Infrastructure) 2007

State Environmental Planning Policy (Infrastructure) 2007 (the Infrastructure SEPP) aims to facilitate the effective delivery of infrastructure across the State.

Clause 66A of the Infrastructure SEPP permits development for the purpose of a pipeline without consent on any land if the pipeline is subject to a licence under the *Pipelines Act 1967*. The proposed modifications are part of the MWP which is subject to Pipeline Licence No. 16 under the *Pipelines Act 1967*.

ii State Environmental Planning Policy (State and Regional Development) 2011

State Environmental Planning Policy (State and Regional Development) 2011 (the State and Regional Development SEPP) aims to identify types of development of State, regional and environmental significance that should be assessed and approved by Minister for Planning and to confer planning assessment and approval functions on the Planning Assessment Commission.

Under clause 14 in the State and Regional Development SEPP, development that does not require consent under Part 4 of the EP&A Act and is of a type specified in Schedule 3 to the policy is classified SSI. Clause 5 in Schedule 3 includes development for the purpose of a pipeline licensed under the *Pipelines Act 1967*. This means that any development associated with a licensed pipeline is considered SSI that requires approval from the Minister for Planning, therefore the State and Regional Development SEPP does not apply.

iii Koala Habitat Protection State Environmental Planning Policy 2021

State Environmental Planning Policy (Koala Habitat Protection) 2021 (Koala SEPP 2021) aims to encourage the conservation and management of areas of natural vegetation that provide habitat for Koalas to ensure a permanent free-living population over their present range and reverse the current trend of Koala population decline. It applies to development applications on land which is greater than 1 ha on its own, or together with adjoining land in the same ownership, whether or not the development application applies to only part of the land, and which are within council areas listed in Schedule 1 of Koala SEPP 2021.

The project is not a development application and does not require approval from Council, and thus consideration of the Koala Habitat Protection SEPP is not triggered under Part 2 of the SEPP. Nonetheless, consideration has been given to the potential occurrence and impacts upon the koala in the BDAR (Appendix E).

iv State and Environmental Planning Policy No 33 – Hazardous and Offensive Development

A Preliminary Hazard Assessment was undertaken in accordance with SEPP No 33 and is provided in Appendix I.

v Central Darling Shire LEP 2012 and Lachlan Shire LEP 2013

Pursuant to the Central Darling Shire LEP and Lachlan Shire LEPs the compressor station sites are located on land zoned RU1 Primary Production, which includes a list of industries permissible with and without consent. However, these industries are only referenced to the extent that they are not regulated by an applicable SEPP. As the project is permitted under the Infrastructure SEPP, therefore the Central Darling Shire and Lachlan Shire LEPs do not apply.

3.5 Commonwealth legislation

3.5.1 Environment Protection and Biodiversity Conservation Act 1999

The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) provides the legal basis to protect and manage internationally and nationally important flora, fauna, ecological communities, heritage places and water resources which are deemed to be matters of national environmental significance (MNES). MNES, as defined under the EPBC Act are:

- World Heritage properties;
- places listed on the National Heritage Register;
- wetlands of international significance listed under the Ramsar Convention;
- threatened flora and fauna species and ecological communities;
- migratory species;
- Commonwealth marine areas;
- Great Barrier Reef Marine Park;
- nuclear actions (including uranium mining); and
- water resources, in relation to coal seam gas or large coal mining development

Under the EPBC Act, actions that will, or are likely to, have a significant impact on a MNES are deemed to be controlled actions and can only proceed with the approval of the Commonwealth Minister for the Environment. An action that may potentially affect a MNES has to be referred to the Commonwealth Minister for determination as to whether it is a controlled action. If deemed a controlled action the modification is assessed under the EPBC Act, and a decision made as to whether or not to grant approval.

Of the nine MNES that are regulated by the EPBC Act, the following have the potential to be associated with the modification, and BDAR has evaluated whether these MNES are applicable:

- wetlands of international importance; and

- nationally threatened flora and fauna species.

The modification will be referred to the Commonwealth Minister for the Environment and is expected to be determined not a controlled action.

The BDAR is included in Appendix E.

3.5.2 Native Title Act 1993

The Commonwealth *Native Title Act 1993* recognises and protects native title rights in Australia. It allows a native title determination application (native title claim) to be made for land or waters where native title has not been validly extinguished, for example, extinguished by the grant of freehold title to land.

Applications for compensation for extinguishment or impairment of native title rights can also be made. All native title claims are subjected to a registration test and will only be registered if claimants satisfy several conditions. A register of native title claims is maintained by the National Native Title Tribunal.

Proposed activities or development that may affect native title are called 'future acts'. Claimants whose native title claims have been registered have the right to negotiate about some future acts, including mining and granting of a mining lease over the land covered by their native title claim. Where a native title claim is not registered, a development can proceed through mediation and determination processes, though claimants will not be able to participate in future act negotiations.

There is one active (ie non finalised) claim encompassing the MW433 project area – Barkandji Malyangapa People (Tribunal No NP2020/001). Representatives of this organisation were consulted as part of the ACHA. There are no claims encompassing the MW880 project area. Representatives of these organisations were consulted as part of the ACHA as detailed in Chapter 10: Heritage.

4 Stakeholder engagement

4.1 Introduction

A stakeholder engagement plan (SEP) was prepared for the project by APA to outline the project's approach to stakeholder engagement. This plan includes an overview of consultation objectives, consultation principles, key issues, and key stakeholders. The establishment of a comprehensive plan for the project's stakeholder engagement facilitates:

- a relevant engagement approach throughout the project;
- compliance with statutory requirements and expectations;
- an informed community and key stakeholders;
- an understanding of, and incorporation of community feedback and key issues into the design of the project; and
- the successful completion of the East Coast Grid Expansion project in line with the priorities and values of key stakeholders.

4.2 Consultation method

4.2.1 Stakeholder identification

Initial stakeholder identification focused on the following key groups which APA has committed to ongoing consultation and engagement with throughout the life of the project:

- Commonwealth Government agencies;
- State Government agencies;
- local government agencies;
- Federal, State and locally elected representatives;
- directly affected local landholders;
- neighbouring and adjacent landholders;
- private businesses;
- utility operations and providers;
- local communities, community groups, emergency services and environmental groups; and
- Aboriginal representative groups.

Table 4.1 outlines the key project stakeholders included in the SEP in further detail.

Table 4.1 Key project stakeholders

Stakeholder Group	New South Wales
Government Stakeholders	
Commonwealth Government Agencies	Department of Agriculture, Water and the Environment
State Government Agencies	• Department of Planning, Industry and Environment • Transport for NSW including Roads and Maritime Services • Heritage NSW • Biodiversity Conservation Division (BCD) • NSW National Parks and Wildlife Service • Local Land Services
Local Government	• Central Darling Shire Council • Lachlan Shire Council
Elected Representatives	• Federal Member - Member for Parkes • State Members – Member for Barwon; Member for Orange
Landholders (Directly affected)	Owners or leaseholders of land directly affected by the proposed project.
Neighbouring landowners	Neighbouring owners and occupiers of land impacted by the project.
Private businesses	Various private businesses within the broader project region including within towns close to the project.
Utility owners/operations	Telstra (land adjoining proposed sites)
Local communities, community groups, emergency services, environmental groups and general public	Residents and community groups in the following local government areas: • Central Darling • Lachlan
Aboriginal representative groups	• Barkandji Native Title Group • Wilcannia Local Aboriginal Land Council (LALC) • Condobolin LALC • Bundyi Aboriginal Cultural Knowledge • Wiradjuri Condobolin Corporation

4.2.2 Stakeholder engagement methods

Stakeholder engagement activities have been and will continue to be delivered through a variety of communication tools and approaches, including through both face-to-face and remote consultation methods, as well as a project website, a fact-sheet and a 1800 number.

Communication methods have included face-to-face and video conference meetings, phone calls, stakeholder presentations and media releases. APA will also employ their standard media, crisis communications, complaints management and corporate communications strategies and protocols to the project.

4.3 Findings

Initial consultation and engagement activities were undertaken by APA and/or EMM and will continue throughout the planning, construction, and operational phases of the project. Lachlan Shire Council and Central Darling Shire Council both raised the matter that although they appreciated being briefed on the project, they felt as though they would have little input.

Key landholders surrounding the project sites have been consulted, and APA noted that no issues or concerns have been raised. Further consultation and engagement will be undertaken to gain a more comprehensive understanding of stakeholder interests and key issues. These key issues will be used to inform ongoing stakeholder engagement activities.

5 Air quality

5.1 Introduction

An air quality impact assessment (AQIA) was completed by EMM to assess the predicted air quality impacts and generation of greenhouse gases associated with the project. The AQIA was prepared in general accordance with the guidelines specified by the NSW EPA in the Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales (EPA 2016) (the Approved Method).

The AQIA is provided in full in Appendix A.

5.2 Assessment requirements and method

The AQIA presented a qualitative risk-based assessment of potential air quality impacts for construction and a quantitative assessment of potential air quality impacts and greenhouse gas emissions for operations, and included the following:

- a description of the existing air quality and meteorological environment;
- identification of potential emissions to air during construction and operation of the project;
- an assessment of potential impacts arising from emissions to air during construction and operation of the project, using the AERMOD model system to model the dispersion of emissions during operation;
- an estimation of greenhouse gas (GHG) emissions and benchmarks against GHG accounts for NSW and Australia; and
- identification of appropriate mitigation measures to reduce the impacts from the project.

The compressor stations are both located in sparsely populated rural areas. MW880 has seven receptor locations (ie occupied residences) within 5 km (two of which are within 2.5 km), while MW433 has no receptor locations within 5 km.

The construction and operation activities will be consistent across both compressor station sites, however only MW880 has sensitive receptors nearby, therefore if compliance is demonstrated at MW880, compliance can also be assumed at MW433. Likewise, any mitigation measures will be most applicable to MW880.

The full method, including a description of relevant assessment criteria is included in Appendix A.

5.3 Existing environment

5.3.1 Meteorology

Meteorological mechanisms such as wind and rain affect the generation, dispersion and eventual removal of pollutants from the atmosphere. Analysis of meteorology for the AQIA was based on automatic weather stations (AWS) operated by the Bureau of Meteorology (BoM) in White Cliffs (for MW433) and Condobolin Airport (for MW880)

Wind at MW433 is predominantly from the south and south-east, with an average wind speed of 4.9 m/s, and is calm (wind speeds of less than 0.5 m/s) less than 1% of the time. Wind at MW880 is predominantly from the south-west and has a lower average wind speed of 3.8 m/s, and is calm 10% of the time.

Rainfall at both sites is typically moderate to low, with an average annual rainfall of 255 mm/year at MW433 and an average annual rainfall of 437 mm/year at MW880. Dry periods typically result in increased generation of atmospheric pollutants from dust storms and bushfires. Rainfall also acts as a removal mechanism, which helps to reduce pollutant concentrations.

5.3.2 Baseline air quality

The air quality environment for the proposed sites is expected to be primarily influenced by fugitive dust during dry conditions, from agricultural activity and continental scale wind erosion from exposed ground, and to a lesser extent, local traffic travelling along sealed and unsealed roads, seasonal emissions from wood heaters or burning and episodic emissions from bushfires.

To demonstrate compliance with impact assessment criteria, consideration of cumulative impacts is required to assess how a project will interact with existing and future sources of emissions. There are no proposed or existing major projects in the vicinity of the proposed sites that would result in cumulative impacts during the construction or operation of the project. Similarly, there are no commercial or industrial facilities in the vicinity of the proposed sites that either report to the National Pollutant Inventory (NPI) or hold an environment protection licence (EPL) issued by the NSW EPA. Assessment of cumulative impacts therefore focuses on the existing baseline or background air quality.

5.4 Project-related emissions sources

The key emissions sources and pollutants applicable to project construction include:

- dust from clearing, excavation, movement of plant and equipment, and wind erosion of exposed surfaces, comprising:
  - total suspended particulate matter (TSP);
  - particulate matter less than 10 micrometres (µm) in aerodynamic diameter (PM_{10}); and
  - particulate matter less than 2.5 µm in aerodynamic diameter ($PM_{2.5}$);
- diesel exhaust emissions from construction equipment, comprising:
  - $PM_{2.5}$;
  - oxides of nitrogen (NO_x)[1], including nitrogen dioxide (NO_2);
  - sulphur dioxide (SO_2);
  - carbon monoxide (CO); and
  - volatile organic compounds (VOCs).

For the operational phase, the key pollutants associated with the combustion of natural gas (to power the compressor) are oxides of nitrogen (NO_x), carbon monoxide (CO), sulphur dioxide (SO_2) and volatile organic compounds (VOCs). Operational emissions will be emitted from the ventilation stack for the compressor.

[1] By convention, NO_x = Nitrous oxide (NO) + NO_2.

5.5 Impact assessment

5.5.1 Construction phase

Dust emissions will likely occur during the preparation of the land (eg vegetation clearing and earthmoving) and during construction itself. Dust emissions can vary substantially from day to day depending on the level of activity, the specific operations being undertaken, and the weather conditions.

For the assessment of construction related air quality impacts, the assessment followed the *Guidance on the Assessment of Dust from Demolition and Construction* published by the Institute of Air Quality Management in the United Kingdom (IAQM 2014). This guidance has been applied for construction projects in NSW and accepted by the NSW EPA as a progressive approach to assessing the particulate matter impact risk associated with short term construction projects.

There are no human receptors located within 350 m of either of the compressor station sites. There are also no sensitive ecological receptors within 50 m of the sites or construction routes. Therefore, the risk assessment does not proceed past the screening threshold for the IAQM assessment, and the risk of adverse effects due to construction dust is considered negligible for both sites. Regardless of risk levels, it is good practice to ensure that mitigation measures are in place to minimise construction dust as far as possible.

5.5.2 Operation phase

The operation of the gas pipeline and compressor stations will vary according to gas demand, which is often driven by weather conditions (ie higher heating demand in winter) and working days (ie less demand on weekends). Gas flows (and the associated operation of compressor stations) will therefore vary on a seasonal, weekly and daily basis. Demand will be highest during the winter period, typically April through to late September, and during this window there may be periods when both compressor stations will need to be operational. Variation in demand will also dictate the operational load under which the turbines operate.

Emissions data were provided by the turbine supplier (Solar Turbines) for the Mars100-C65 which will be used at both MW880 and MW433. These data were then used in dispersion modelling to predict the likely impacts on ground level concentrations (GLCs) of relevant emissions at sensitive receptors near to MW880.

GLC were expressed as a percentage of the impact assessment criteria at the nearest affected location under a worst-case emissions scenario. Maximum 1-hour concentrations and annual average concentrations and their respective criteria are presented in Table 5.1 and Table 5.2.

Table 5.1 Maximum 1-hour ground level concentrations (GLC) (µg/m^3)

Pollutant	Impact assessment criteria (µg/m^3)	Predicted GLC (µg/m^3)	Prediction as % of criteria
NO_2	246	2.2	0.9%
CO	30,000	16.7	0.1%
SO_2	570	0.003	0.0005%
Total VOCs	NA	23.0	NA
Benzene	29	0.2	0.6%
Formaldehyde	20	1.2	6.1%
Toluene	360	0.1	0.02%
Xylenes	190	0.03	0.02%

Table 5.2 Annual average ground level concentrations (GLC) (µg/m³)

Pollutant	Impact assessment criteria (µg/m³)	Predicted GLC (µg/m³)	Prediction as % of criteria
NO_2	62	0.05	0.1%
SO_2	60	0.04	0.1%

The modelling results for operation of the compressor stations under worst-case conditions show a negligible increase in GLCs, and demonstrate that the project will comply with impact assessment criteria at all locations.

5.6 Greenhouse gases

A GHG assessment was undertaken for the project. Scope 1 emissions during construction are associated with the combustion of fuel (diesel) by onsite plant and equipment and the commissioning of the compressor station, which will involve venting. Scope 1 emissions during the operation phase of the project includes emissions associated with the combustion of gas within the compressor stations and venting during maintenance or blowdowns. The sites are designed to operate as unmanned facilities with compliance and maintenance checks occurring infrequently. Therefore, other Scope 1 emissions from maintenance are expected to be minor. There will be no electricity consumed during construction or operations, therefore Scope 2 emissions are not assessed. Scope 3 emissions during construction and operation are also expected to be minimal and not assessed.

Scope 1 GHG emissions generated by the construction of each compressor station over the 9-month construction period and 3-month commissioning period is approximately 1,139 tonnes CO_2-e.

Scope 1 GHG emissions generated by the operation of Stage 1 (MW880) (including annual venting for maintenance) will be 31,899 t CO_2-e per year. Once Stage 2 is complete (MW880 and MW433), scope 1 emissions will rise to 63,817 t CO_2-e per year.

A summary of the GHG emissions for construction and operations are presented in Table 5.3. The significance of the project's GHG emissions is assessed by comparing with GHG accounts for NSW (131,685 kt CO_2-e) and Australia (537,446 kt CO_2-e) (AGEIS 2021).

Table 5.3 Summary of Scope 1 emissions for operations (t CO_2-e) per year

Stage	Source	t CO_2-e per year	% of NSW GHG accounts	% of Australian GHG accounts
Stage 1 construction	Fuel consumption (MW880)	1,125	0.001%	0.0002%
Stage 1 operation	Gas combustion and venting (MW880)	31,899	0.02%	0.006%
Stage 2 construction	Fuel consumption (MW433)	1,125	0.001%	0.0002%
Stage 2 operation	Gas combustion and venting (MW880 and MW433)	63,817	0.05%	0.01%

5.7 Commitments and management measures

The following commitments informed by management measures recommended in the AQIA will minimise air quality and greenhouse gas impacts associated with the project. These commitments will be detailed in the construction environmental management plan (CEMP) and operational environmental management plan (OEMP) where relevant.

Table 5.4 Summary of commitments – air quality and greenhouse gas

Stage	Commitment ID	Commitment
Construction	GE-01	The approved construction footprint, including vegetation clearing extent and environmental or heritage features within the construction footprint, will be clearly demarcated and identified during the construction stage with survey pegs and at some locations with flagging, bunting, barrier mesh or similar. No go zones will be clearly marked and communicated as such.
Construction	GE-03	Rehabilitation of disturbed areas will commence progressively as soon as practicable during and after construction, and will be carried out in accordance with the SWMP and Landcom (2004).
Construction Operation	GE-04	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; • actions to minimise risk of reoccurrence; and • name of person(s) responsible for undertaking the required actions.
Construction	GE-05	All project personnel will complete an induction that will include environmental and heritage management requirements.
Construction Operation	GE-06	Nearby landholders will be provided a dedicated point of contact for the duration of the project.
Construction	AQ-01	Stabilisation of exposed soils will be undertaken as soon as practicable, and dust suppression undertaken as required using water sprays, water extension agents, soil stabilising polymers or other media on: • unpaved work areas subject to traffic or wind; • exposed soil; • main haulage routes, as required; • sand, spoil and aggregate stockpiles; and • during the loading and unloading of dust generating materials. When water is used for dust suppression, it will not be applied in a way that causes ponding or runoff.
Construction	AQ-02	Construction vehicles with potential for loss of loads (such as dust or litter) will not be overloaded and will be covered when using public roads.
Construction Operation	AQ-03	Plant and equipment will be maintained in good condition to minimise ignition risk, fuel consumption, spills and air emissions that may cause nuisance.
Construction Operation	AQ-04	Plant, equipment and vehicle engines will be switched off when not in use.
Design Construction Operation	SE-01	The existing stakeholder engagement plan will continue to be implemented to facilitate ongoing consultation with relevant stakeholders, including local businesses, throughout the project so that stakeholders have access to information regarding the nature of the proposed project activities and their likely impacts.
Construction	GH-01	Material handling will be efficiently scheduled and planned to minimise fuel consumption.
Construction Operation	GH-02	10% blended ethanol fuel will be used for petrol-powered light vehicles, where practicable.
Construction	GH-03	Services and materials (aggregates etc.) will be sourced locally, where practicable.

Table 5.4 Summary of commitments – air quality and greenhouse gas

Stage	Commitment ID	Commitment
Design, Construction	GH-04	Low carbon alternatives will be procured where practicable (use of lower carbon cement alternatives etc.).

5.8 Conclusion

The key findings of the AQIA are:

- Construction-related impacts as a result of dust and particulate generation will be negligible due to a lack of nearby sensitive receptors.
- Operation-related impacts as a result of combustion of natural gas to power the compressor station will be negligible, as the GLCs will be compliant at all locations under worst-case scenarios.
- Annual average GHG emissions during construction of MW433 and MW880 represent approximately 0.001% of total GHG emissions for NSW and 0.0002% of total GHG emissions for Australia. Annual average GHG emissions for Stage 1 operations represents approximately 0.02% of total GHG emissions for NSW and 0.006% of total GHG emissions for Australia. Annual average GHG emissions for Stage 2 represents approximately 0.05% of total GHG emissions for NSW and 0.01% of total GHG emissions for Australia.
- Management measures will reduce these impacts further.

6 Noise

6.1 Introduction

A Noise Impact Assessment (NIA) was completed by EMM to address potential noise impacts associated with the construction and operation of the project. The assessment considered potential noise and vibration impacts in accordance with the methods outlined in the NSW Department of Environment and Climate Change 2009, Interim Construction Noise Guideline (ICNG) (DECC 2009), the NSW Department of Environment and Conservation (DEC) 2006, Assessing Vibration: a technical guideline (AVTG) (DEC 2006) and the NSW Environmental Protection Authority 2017, Noise Policy for Industry (NPfI) (EPA 2017).

The NIA is provided in full in Appendix B.

6.2 Assessment requirements and method

The NIA presents a quantitative assessment of potential construction noise impacts, undertaken in accordance with the relevant guidelines. This includes potential impacts from the initial site preparation works and construction of the compressor station itself. Operational noise levels from the project were predicted using a detailed 3-D computer generated noise model.

The assessment of noise impacts from each site included the following:

- identification of suitable noise emission criteria to govern the construction and operation of each site;
- identification of the predominant sources of noise associated with each compressor station;
- modelling of noise associated with the construction of the compressor station;
- modelling of noise associated with the operation of the compressor station; and
- noise mitigation measures which may be employed to achieve noise emission criteria applicable to each site.

6.3 Existing environment and noise criteria

The compressor stations are both located in sparsely populated rural areas. MW880 has seven receptor locations (ie occupied residences) within 5 km, while MW433 has no receptor locations within 5 km. There are no commercial or industrial premises within 5 km of either site. There are no significant sources of noise that would contribute to background noise levels at either site. Background noise is likely to be influenced by road traffic, insect and bird noise and agricultural activities (at MW880). Given the rural and remote locations of the proposed compressor stations, minimum assumed rating background noise levels (RBL) were adopted.

6.3.1 Construction noise criteria

Construction noise criteria were determined in accordance with the ICNG. This guideline promotes a clear understanding of ways to identify and minimise noise from construction, and to identify ‘feasible’ and ‘reasonable’ work practices.

The guideline recommends standard construction hours where noise from construction activities is audible at residential premises:

- Monday to Friday 7.00 am to 6.00 pm;

- Saturday 8.00 am to 1.00 pm; and
- no construction work is to take place on Sundays or public holidays.

Noise management levels (NMLs) were established for residential properties for standard and outside of standard hours. Construction NMLs for standard and out of hours periods are presented in Table 6.1.

Table 6.1 Project noise criteria (construction)

Period	RBL, dB(A)[1]	NML, $L_{Aeq,15min}$, dB	HNL[2]
Day (standard ICNG hours)	35	45	75
Day (Outside standard ICNG hours – Sundays, public holidays and Saturday between 1.00pm and 6.00pm)	35	40	-
Evening and night (Outside standard ICNG hours)	30	35	-

1. Based on the day period RBL established in Table 6.2
2. HNL – highly noise affected level

A full explanation of all noise assessment criteria and how they were derived is presented in Appendix C.

6.3.2 Operation noise criteria

Intrusive noise criteria, amenity criteria, project-specific noise trigger levels (PNTL) and sleep disturbance criteria were determined for the operation of the project in accordance with NPfI, as presented in Table 6.2. These criteria are designed to protect the community from excessive intrusive noise, to prevent sleep disturbance, and to protect amenity at residential locations.

Table 6.2 Project noise criteria (operation)

Assessment location	Assessment period[1]	Minimum assumed RBL, dBA	Intrusiveness noise level, $L_{Aeq,15min}$, dB	Amenity noise level[2], $L_{Aeq,15min}$, dB	PNTL[3], $L_{Aeq,15min}$, dB	Sleep disturbance, dB	
						$L_{Aeq,15min}$	L_{Amax}
All residential premises	Day	35	40	53	40	n/a	n/a
	Evening	30	35	48	35	n/a	n/a
	Night	30	35	43	35	40	52

Notes. 1.The daytime is 7.00 am to 6.00 pm; evening 6.00 pm to 10.00 pm; night-time 10.00 pm to 7.00 am. On Sundays and Public Holidays, the daytime is 8.00 am to 6.00 pm; evening 6.00 pm to 10.00 pm; night-time 10.00 pm to 8.00 am.

6.4 Impact assessment

Given the distance between each site and surrounding assessment locations, construction vibration impacts are expected to be negligible. As such, construction vibration has not been addressed further.

6.4.1 Construction phase

The main sources of noise during construction are expected to be associated with:

- bulldozers, excavators, graders and vibratory rollers during site preparation; and
- impact piling, smaller hand tools and impact wrenches for fixing of equipment.

The results of noise modelling for MW880 indicate that:

- construction noise levels during the site preparation, piling and construction stages will comply with the daytime 'noise affected' NMLs at all assessment locations for a worst-case scenario;
- for construction noise levels from activities undertaken outside of standard constructions hours:
  - the cumulative noise level from site preparation plant will comply with the daytime out of hours NMLs at all assessment locations;
  - impact driven piles will exceed the daytime out of hours NML at sensitive receptor R5 (see Figure 2.4); and
  - the cumulative noise level from the construction phase will comply with daytime out of hours NMLs at all locations.

For MW433, the worst-case construction works (impact piling) will result in noise levels in the order of 12dB L_{Aeq} at the nearest assessment location 10 km from MW433. This level is 28dB L_{Aeq} below the daytime out of hours NML. All other construction noise levels will comply with NMLs at all assessment locations for a worst-case scenario.

Construction noise during the evening and night time periods during the commissioning phase will include the running of plant consistent with the general operation of the facility. The construction NML for the evening and night is the same as the operational PNTL for the evening and night. As such, compliance with the PNTLs for noise associated with the general operation of the compression stations will also indicate compliance with the construction NMLs during the commissioning phase.

6.4.2 Operation phase

i MW433 – Round Hill

Noise impacts from the operation of MW433 were assessed using a screening noise model for a receiver at 10 km. The model considered noise propagation under noise-enhancing meteorological conditions such as temperature inversions.

The noise model was prepared assuming the following:

- the turbine exhaust incorporates a silencer; and
- there is no additional attenuation on the turbine exhaust, ventilation inlet and outlet.

The combined sound power level (SWL) for the equipment operating under normal conditions is 124dBA. The predominant source of noise will be due to the untreated turbine exhaust.

Predicted noise levels from the operation of these sites will be at minimum 30dB below the 35dB $L_{Aeq\ 15min}$ NPfI night-time noise criterion. Due to the distance between MW433 and the nearest sensitive receptor location (10 km), a detailed acoustic model was not required. The predicted noise level from MW433 will be at least 30 dB below the night-time noise criteria, and as such, noise impacts will be highly unlikely.

ii MW880 - Milne

Operational activities were conservatively modelled at MW880 for noise-enhancing meteorological conditions (temperature inversions).

The noise model was prepared assuming the following:

- the turbine exhaust incorporates a silencer;
- the turbine intake incorporates a silencer; and
- there is no attenuation on the ventilation inlet and outlet.

The noise model assumed an additional silencer on the intake at MW880 as it was assumed that this would be required in order to comply with relevant criteria.

The combined sound power level (SWL) for the equipment operating under normal conditions will be 116dBA. The predominant source of noise will be due to the untreated ventilation openings.

Predicted noise from the operation of MW880 at the nearest affected assessment location will be 30dB $L_{Aeq\ 15min}$ which complies with the 35dB $L_{Aeq\ 15min}$ night-time noise criterion.

Predicted noise levels from the operation of MW880 are provided in Table 6.3. Predictions adopted worst-case noise enhancing conditions, compared against the PNTL for the night-time period which presents the most stringent noise criteria applicable.

Table 6.3 Predicted noise levels – MW880

Assessment location	Predicted noise levels, dB $L_{Aeq\ 15min}$	PNTL, dB[1] $L_{Aeq\ 15min}$
R1	26	35
R2	20	35
R3	20	35
R4	19	35
R5	31	35
R6	21	35
R7	17	35

Note: 1. Predicted noise levels have been compared against the PNTL for the night-time period which will be the most stringent noise criteria applicable to the site.

Predicted noise levels indicated that noise from MW880 will be 4dB less than the night-time PNTL at the worst affected assessment location based on a conservative noise model. The recommended silencers on the turbine intake and discharge are to be incorporated into the compressor station design to ensure no additional acoustic treatment is required.

6.4.3 Blowdown events

The loudest potential noise source associated with gas compression stations is that associated with compressor blowdowns. Blowdowns of gas compression stations may be required during the life of the pipeline but would be an extremely rare activity.

Blowdowns involve the controlled expulsion of gas from the compression station system and can occur for several minutes to sufficiently purge the system. During these times, other items of plant will cease operation. Blowdowns will be used to clear compressed gas from the system during an emergency or for rare maintenance purposes. Such scenarios are an extremely rare activity, occurring during 4-yearly inspections and possibly for periodic repairs of compressor units. As such, noise from such events is atypical of the general operation of the compressor station.

Blowdowns of varying volume and length are expected to occur during the commissioning stage of the gas compression station but are not expected to generate as much noise as a full-system blowdown. Noise levels during blowdowns are not expected to exceed 70dB $L_{Aeq\ 15min}$ at the nearest assessment location to MW880 (2 km) or 45dB $L_{Aeq\ 15min}$ at the nearest assessment location to MW433. These levels will exceed the standard construction hours NML, but would not exceed the 'highly noise affected' NML.

Such high intensity, infrequent noise events will be managed via community consultation in accordance with the ICNG.

6.5 Commitments and management measures

The following commitments informed by management measures recommended in the NIA will minimise noise impacts associated with the project. These commitments will be detailed in the CEMP and OEMP where relevant.

Table 6.4 Summary of commitments – noise

Stage	Commitment ID	Commitment
Construction Operation	GE-04	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; • actions to minimise risk of reoccurrence; and • name of person(s) responsible for undertaking the required actions.
Construction Operation	GE-06	Nearby landholders will be provided a dedicated point of contact for the duration of the project.
Construction	NV-01	Standard daytime construction hours of 7:00am to 6:00pm daily will be applied, excluding travel to and from site, and extenuating circumstances beyond the control of the project. Any activities whichrequire extension beyond standard construction hours will be discussed with relevant affected landholders.
Construction	NV-02	Impact piling at MW880 will not be conducted outside of Interim Construction Noise Guideline standard construction hours (Sundays, public holidays and Saturday between 1.00pm and 6.00pm) unless agreed with potentially impacted landholders.
Operation	NV-03	Turbine intakes and exhausts will be fitted with silencers consistent with those assessed in Table 4.1 of the noise impact assessment.

Table 6.4 Summary of commitments – noise

Stage	Commitment ID	Commitment
Construction Operation	NV-04	Relevant affected landholders will be notified of any blowdown events scheduled to take place and informed of the potential noise impacts, including timing and duration.
Design Construction Operation	SE-01	The existing stakeholder engagement plan will continue to be implemented to facilitate ongoing consultation with relevant stakeholders, including local businesses, throughout the project so that stakeholders have access to information regarding the nature of the proposed project activities and their likely impacts.

6.5.1 Construction hours

ICNG guidelines state that a strong justification would typically be required to undertake works outside of the standard hours:

- Monday to Friday 7.00 am to 6.00 pm;
- Saturday 8.00 am to 1.00 pm; and
- no construction work is to take place on Sundays or public holidays.

Impact piling will be the activity that generates the greatest amount of noise, which will cause the daytime out-of-hours NML at one sensitive receiver by 2dB (which is defined as negligible in the NPfI). All other noise generating activities will be compliant with out-of-hours NMLs.

While construction activities outside of standard hours could be limited, this would result in the construction timeframe being significantly extended, which would have further implications for the environmental impact of the project. The construction and commissioning timeframe of 12 months is based on construction activities being undertaken for 10 hours per day, seven days a week. If construction activities are limited to standard hours, then 1.5 of every 7 days will be unproductive. This reduction in hours would extend the nominal construction timeframe by approximately three months, which would have consequential impacts on air quality, soil and water. The advantages of limiting construction activities to standard hours do not outweigh the disadvantages of an extended construction timeframe. With the project proposing to work outside of standard hours, the impacts on sensitive receptors are limited in both number and duration. Therefore, limiting general construction to standard hours is not proposed. APA will limit impact piling at MW880 to only be carried out within standard hours in order to maintain compliance with NMLs, and will inform potentially affected landholders of any activities which will occur outside of standard hours.

It should also be noted that the ICNG include provisions for construction works outside of standard hours on public infrastructure, including gas utilities. While the MWP and associated compressor stations are not necessarily public infrastructure, they do provide for increased service of gas resources to the greater community and should be considered accordingly.

6.6 Conclusion

The key findings of the NIA are as follows:

- Given the remote location of MW433 and MW880, specific noise targets were based on the minimum background noise levels provided in the NPfI.

- An assessment of construction noise generated at MW433 and MW880 indicated compliance with the standard construction hours NML. Construction outside of standard construction hours will be feasible at each location, with the exception of impact piling at MW880.

- Operational noise from MW433 was addressed using a conservative screening noise model for a receiver at 10 km. The model considers noise propagation under worst-case noise-enhancing conditions. Predicted noise levels from the operation of this site is expected to be less than 9dB, which is 26dB below the 35dB $L_{Aeq\ 15min}$ NPfI night-time noise criterion.

- Operational noise from MW880 were modelled for noise-enhancing meteorological conditions. Predicted noise from the operation of MW880 at the nearest affected assessment location is 31dB $L_{Aeq\ 15min}$ which complies with the 35dB $L_{Aeq\ 15min}$ night-time noise criterion.

- Noise associated with the general operation of the compressor stations was addressed for potential sleep disturbance during the night time period. Predicted noise levels indicate compliance with the sleep disturbance criteria for both MW433 and MW880.

- Noise associated with blowdowns during commissioning and operation will occur rarely, and for a short duration. Noise impacts from these events will be managed by consultation with nearby landholders.

7 Water

7.1 Introduction

A surface water assessment (SWA) was undertaken by EMM to assess potential surface water impacts arising from the construction and operation of the proposed compressor stations. The SWA was prepared in general accordance with the relevant government assessment requirements, guidelines, and policies. The SWA also considers water licencing and approval requirements.

The SWA is provided in full in Appendix C.

7.2 Assessment requirements and method

The SWA used desktop and qualitative assessment methods to:

- characterise the existing surface water environment;
- identify potentially sensitive receptors;
- describe the project and potential impact mechanisms;
- qualitatively assess potential impacts during construction and operation; and
- recommend management and mitigation measures to minimise residual surface water impacts.

The SWA also sets out the proposed water management approach during construction and operation and considers the potential for residual impacts including impacts to flooding and water quantity, water quality and watercourses.

7.3 Existing environment

7.3.1 MW433 – Round Hill

The terrain of MW433 falls gently from north to south with slopes typically in the range 0.5-1.5%. The site is slightly elevated relative to surrounding ground levels. Soils are mapped as sodosols which are characterised as having low runoff potential due to high infiltration rates. Average annual rainfall at the site is less than 250 mm, and the mean average evaporation is approximately 2,500 mm which far exceeds rainfall.

The site is located at the headwaters of two mapped unnamed 1st order watercourses. These drainage features are ephemeral in nature and will flow only following significant rainfall. Aquatic habitat potential within the site and immediately downstream is minimal. The watercourses drain to the south, ultimately into Peery Lake on the Paroo River. Paroo River joins the Darling River upstream of Wilcannia.

The sensitivity of the receiving environment downstream of the site is considered high as:

- the Paroo Darling National Park, which is part of the Paroo River Wetlands Ramsar Site, borders the site on three sides;
- Peery Lake (located approximately 5 km downstream of the site) forms part of the Paroo River Wetlands, Ramsar Site;
- Paroo River Wetland system supports artesian springs and several protected plant species;

- Paroo River Wetland system supports the Murray-Darling Basin's healthiest native fish communities and has significant cultural importance for traditional owners (DPIE 2018);
- Peery Lake is registered as a high-potential aquatic groundwater dependent ecosystem (GDE) (BoM 2021);
- the artesian springs in Peery Lake are listed as GDEs, which incorporate several groundwater dependent plant communities in the area; and
- there are several high potential terrestrial GDEs also mapped between the site and Peery Lake.

7.3.2 MW880 – Milne

The terrain of MW880 falls gently from west to east at slopes of between 0.5-2%. Soils are mapped as Kandosols and Chromosols which are characterised as having moderate runoff potential. Average annual rainfall at the site is approximately 440 mm, and the mean average evaporation is approximately 1,850 mm which far exceeds rainfall.

The nearest mapped watercourse to the site is an unnamed 3rd order watercourse to the south of the site. All local drainage features are ephemeral in nature and will flow only following significant rainfall. Aquatic habitat potential within the site and immediately downstream is minimal.

The unnamed watercourse is considered to drain generally to the north-east towards Humbug Creek. Drainage between the site and Humbug Creek has been heavily modified to suit the surrounding agricultural development. Humbug Creek in turn feeds into Banar Lake, Wallaroi Creek and ultimately the Lachlan River further to the north.

There are no significant GDEs close to the site. Further downstream Humbug Creek is identified as a moderate potential terrestrial GDE, and Banar Lake is identified as a high-potential aquatic GDE. The sensitivity of the receiving environment downstream of the site is considered low.

7.4 Project water considerations

7.4.1 Stormwater management

The objectives of the stormwater management approach at both MW433 and MW880 is to avoid impacts to receiving waters on and off-site.

The key features of the proposed stormwater management approach at MW433 and MW880 include measures to:

- locate proposed infrastructure within each site boundary and avoid disturbance to existing watercourses and overland flow paths;
- undertake grading to minimise earthworks and minimise changes to existing flow paths;
- divert upslope runoff around infrastructure;
- implement surface drainage measures to control runoff generated within the site;
- implement rock rip rap where flow concentrations cannot be avoided;
- control stormwater discharge and existing overland flow paths to avoid proposed wastewater effluent management areas;
- stabilise disturbed and operational areas, favouring use of hardstand and equivalent impervious surfaces;

- implement sediment and erosion controls; and
- capture runoff from buildings in rainwater tanks for use on site, to minimise demand for imported water.

7.4.2 Water demand and supply

Water demand for each site will be approximately 20 ML during the 12-month construction and commissioning phases. This will be used during construction for general construction and dust suppression purposes, as well as to service the temporary accommodation camps. If the preferred accommodation approach at MW880 is implemented (local accommodation) then the water demand for that site will reduce to 17 ML.

APA is currently investigating water supply options for the project, but the primary option will be to purchase water through a commercial arrangement at both MW880 and MW433. APA is also considering options to access groundwater under the relevant water sharing plans and regulations at MW433, if practicable. Water licences and any further approvals will be sought and obtained prior to construction.

During operation, site water usage is expected to be minimal and construction phase water supply arrangements may be extended to cover operations, if practicable. If this is impractical, water for potable use and maintenance/cleaning purposes during operations will be imported to site as required. The permanent accommodation building will have a rainwater tank to collect and reuse water if needed.

7.4.3 Waste-water management

Construction wastewater from the temporary accommodation camps will be managed by a two-stage process involving treatment followed by effluent disposal at surface via spray irrigation. Waste water will be suitably treated prior to discharge to ensure there are no impacts to ecology or surface water off-site. The waste-water treatment system will be suitably designed, manufactured, installed, commissioned and operated to satisfy the requirements of Section 68 of the NSW Local Government Act 1993 and Australian Standard (AS) 1547: On-site domestic wastewater management. Once the treatment is constructed, local government will provide an approval to operate. The waste water treatment system will use sedimentation and anaerobic digestion to separate biomass from waste water effluent. The biomass will be periodically pumped out for disposal by an authorised waste contractor. The effluent will be disinfected to remove any residual pathogens then pumped to the irrigation spray field on site for disposal. This will ensure there are no impacts to ecology or surface water off-site.

Following completion of construction activities, all temporary wastewater management infrastructure will be decommissioned and removed from each site. Disturbed areas, including effluent spray fields where infrastructure is removed, will be appropriately stabilised and rehabilitated.

Operational wastewater will be managed using a septic leach system. A Vermeer trailer-mounted vacuum (or equivalent) will be available on each site during maintenance to contain and remove any contaminated water produced during washdown. Captured water will be appropriately disposed off-site.

The full details of the proposed stormwater management approach to be used at MW433 and MW880 is detailed in Section 4.2 of Appendix C.

7.5 Impact assessment

7.5.1 Flood risk

Flooding at MW433 is expected to occur generally as broad, shallow overland flow given the lack of relief and defined drainage features and relatively small upstream catchment. Flood risk at the site is expected to be low on the basis of its slightly elevated position and headwater location. Additionally, there is no infrastructure at risk of flooding located close to the site with the exception of the existing MWP and associated vehicular access tracks.

Flooding at MW880 is also expected to occur as broad, shallow overland flow for the same reasons. The specific nature of flooding conditions and risks at the site are unknown, however there is no infrastructure at risk of flooding located close by, with the exception of the existing MWP, associated vehicular access tracks to the site and the adjacent Crown Camp Road.

The sites are not located near to any major watercourses and are therefore not expected to be subject to mainstream flooding.

The project will consider the local hydrologic context and make appropriate design provisions to manage upslope runoff by avoiding existing flow paths where possible or otherwise directing runoff through and/or around proposed infrastructure, as appropriate.

The project will introduce compacted and stabilised surfaces to each site during construction and operations, and some limited hardstand areas. This will result in a small increase in surface water runoff potential when compared to existing conditions. However, the potential for increases in stormwater runoff volumes and peak flow rates leaving each site are considered minor as these areas represent only a small proportion of the total site area, and also of the total catchment area draining to the downstream receiving environment. The design of site drainage systems will minimise changes to existing flow paths and avoid offsite impacts.

Flood risks during construction and operations are considered minor and manageable with proposed management measures in place.

7.5.2 Water quality

i Construction

The project has potential for risks to water quality during construction as a result of:

- soil erosion and transport of sediment into receiving watercourses;
- accidental spillage of fuel or other hazardous materials used to support construction activities; and
- poor or ineffective wastewater management practices.

If unmanaged, ground disturbance during bulk earthworks and other site construction activities may lead to exposure of soils and potential erosion and mobilisation of sediment into receiving watercourses. The soil and erosion hazard assessment assesses these risks (see Chapter 8) and concludes that risks to downstream water quality will be effectively managed by mitigation measures.

There is a risk of contamination of surface water as a result of accidental spillage of materials such as fuel, lubricants, herbicides, and other chemicals used to support construction activities. Appropriate controls to manage these activities will be incorporated in the surface water management plan (SWMP), and will reduce this risk to an acceptable level.

The project also has the potential to impact on water quality as a result of poor or ineffective construction wastewater management practices. This risk will be addressed by further design development to confirm the most appropriate system for each site based on the preferred site layout, site conditions and constraints, and to implement each system in accordance with best practice and all relevant guidelines and requirements.

Overall, potential impacts to water quality during construction are considered minor and manageable with proposed management measures in place.

ii Operation

During operations the primary risks to water quality will occur as a result of ongoing soil erosion and transport of sediment into receiving watercourses, or accidental spillage of fuel or other hazardous materials used to support maintenance activities. These potential impacts will be minimised through considered design and construction practices, and through ongoing implementation of the SWMP during operations.

Water quality could also be impacted during operations as a result of poor or ineffective wastewater management practices. This risk will be addressed by further design development to confirm the most appropriate permanent system for each site based on the preferred site layout, site conditions and constraints, and to implement each system in accordance with best practice and all relevant guidelines and requirements.

Washdown activities will not impact on water quality as washdown water will be captured and disposed of off-site.

Overall, potential impacts to water quality during operations are considered minor and manageable with proposed management measures in place.

7.5.3 Watercourses

Disturbance of existing watercourses will be minimised at all sites through considered design. Impacts will be avoided where practicable. Where impacts cannot be avoided, all proposed works will be undertaken in accordance with relevant guidelines, including *Guidelines for controlled activities on waterfront land* (NRAR 2018).

7.5.4 Downstream environments

As noted in Section 7.3.1, MW433 is considered as having a highly sensitive receiving downstream environment due to the presence of the Paroo River Wetlands Ramsar site, Paroo-Darling National Park, Peery Lake and associated GDEs. Impacts to flooding and water quantity, water quality, and watercourses are considered minor with proposed management measures in place. Therefore, potential adverse impacts to watercourses and water bodies further downstream of MW433 are not anticipated.

7.6 Commitments and management measures

Given the interrelation of water and soil impacts, the management measures described in Section 8.5 are considered appropriate to also address impacts to flooding and water quantity, water quality, and watercourses.

7.7 Conclusion

The key findings of the SWA are as follows:

- the sensitivity of the receiving environment downstream of MW433 is considered high due to the presence of the Paroo-Darling National Park and the Paroo River Wetlands Ramsar site;
- flooding and water quantity impacts during construction and operations are considered minor and manageable with proposed management measures in place;
- impacts to water quality during construction and operation are considered minor and manageable with proposed management measures in place;
- disturbance of existing watercourses will be minimised at all sites through considered design and impacts will be avoided where practicable; and

- management measures described in Section 8.5 and in the SEHA are considered appropriate to also address impacts to flooding and water quantity, water quality, and watercourses.

8 Soil

8.1 Introduction

A desktop soil and erosion hazard assessment (SEHA) was undertaken by EMM to assess impacts to soil and land resources and the potential for soil loss as a result of the project. The SEHA was prepared in accordance with relevant best-practice guidelines including:

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

The SEHA is provided in full in Appendix D.

8.2 Assessment requirements and method

The SEHA identified the characteristics of the existing soil resource and topography and identified erosion and sediment control constraints at the proposed compressor station sites. The desktop-based assessment was undertaken using publicly available soil and soil environment information.

The report provided an overview of the modelled land and soil capability (LSC) classes, soil landscapes and soil types likely to be present at MW433 and MW880, and commentary on the constraints relevant to erosion risk.

Based on this information, an erosion hazard analysis was provided to calculate the potential for soil loss from water and wind forces. The assessment set out project-specific management and mitigation measures to minimise the potential for short and long-term soil erosion during project construction and operation, particularly the potential for sediment transport causing environmental harm and damage to assets.

The full methodology is presented in Appendix D.

8.3 Existing environment

8.3.1 MW433 – Round Hill

The soils at MW433 are mapped as sodosols (Isbell 2016) - described as soils with strong texture contrast between horizons that are not strongly acidic. Sodosols generally possess very low agricultural potential, and soils at the site are considered to possess moderately low fertility (ie capable of only supporting vegetation suited to grazing if heavily fertilised).

The *Land and Soil Capability Assessment Scheme* (OEH 2012) assesses the capacity of subject land to support a range of land uses by the inherent biophysical features of the land and soil, and their associated hazards and limitations. Each hazard is given a rating between 1 (best, highest capability land) and 8 (worst, lowest capability land).

The soils at MW433 have a land and soil capability (LSC) class of 5 (moderate-low capability land). This class indicates that the site has limitations for high-impact land uses, and would be largely restricted to grazing, some horticulture, forestry and nature conservation (OEH 2012).

The soils at MW433 are part of the Questa Park (QP) land system (Walker 1991) with potential erosion hazards of surface water sheeting and localised gullying.

8.3.2 MW880 – Milne

The soils at MW880 are mapped as kandosols and chromosols (Isbell 2016) – described as non-calcareous soils with strong texture contrast between horizons. Kandosols are mapped as occurring on the northern part of the site, and generally possess low to moderate agricultural potential, and soils are considered to possess moderately low inherit soil fertility. However, chromosols (mapped as occurring on the southern part of the site) generally possess moderate agricultural potential, and are considered to possess moderate inherent soil fertility (ie requiring some fertiliser for arable use). This corresponds with the current land use for the site, where the southern part is used for dryland cropping, while native vegetation remains on the northern part.

The soils at MW880 possess a LSC class of 3 (high capability land). This class indicates that the site is capable of sustaining high-impact land uses, such as cropping with cultivation, using more intensive, readily available and widely accepted management practices.

The soils at MW880 comprise Weelah and Eulgo soil landscapes with potential erosion hazards of minor sheet erosion on slopes and moderate to high wind erosion hazard.

8.4 Impact assessment

8.4.1 Soil erosion potential and erosion hazard analysis

The erosion potential for soils is determined by its physical and chemical properties and is expressed as its K-Factor. K-Factors between 0.02 and 0.04 are considered to possess moderate erosion potential and K-Factors greater than 0.04 are considered to possess high erosion potential (Rosewell 1993). The modelled K-Factors for the project areas were determined from the eSpade 2.1 database (OEH 2016; OEH 2017) and are:

- MW433 – Round Hill: 0.04-0.06; and
- MW880 – Milne: 0.04-0.07.

Both sites are assessed as having high erosion potential. To account for a worst-case scenario, a K-Factor of 0.071 was adopted to determine the erosion hazard of project subsoils.

Erosion hazard was determined through consideration of land slope and rainfall erosivity (R-Factor).

MW433 was assessed as possessing a high erosion risk due to the predominantly arid nature of the sites and due to low rates of annual rainfall. These factors result in a high erosion risk as protective surface vegetation cannot readily be established.

MW880 was assessed as possessing a low erosion risk due to higher rates of annual rainfall allowing vegetation to successfully establish.

8.4.2 Wind erosion hazard

Movement of highly erosive soils typically starts at a wind velocity of 25–30 km/h (Hopkins *et al.* 1937). The presence of soil surface cover (vegetation, rock, timber debris) is also critical as it reduces wind speeds. The generally low rainfall and high evaporation at MW433 limits the ability to germinate and sustain vegetation cover, and significant areas of soil disturbance were observed. Vegetation of 50% for sandy-loams and 70% for sands provides adequate protection from wind erosion in agricultural cropping areas (Government of SA 2020), as observed at MW880.

Daily mean wind velocities measured at BoM weather stations close to each site are typically below those that would cause wind erosion; however, higher wind velocities during weather events can initiate wind erosion. This can be exacerbated during periods of low rainfall, as observed by the occurrence of regional dust storms during periods of drought in 2019.

Accordingly, specific management and mitigation measures are recommended to reduce erosion risk.

8.4.3 Erosion hazard impact assessment

Soil disturbance as a result of vegetation clearance and bulk earthworks during the preparation of the site is likely to occur as a result of the construction of the compressor stations and associated facilities at MW433 and MW880. The likelihood of erosion can vary depending on the erosive potential of the soil, the type of activity being undertaken, the extent of disturbance and weather conditions including wind and rain.

The overall erosion hazard of the compressor stations and associated facilities at MW433 and MW880 is generally low due to the flat gradient of the proposed construction areas and volume and intensity of rainfall. Erosion risk will be greatest when soils are exposed to wind and rain during the clearing and early construction phases of the project.

Site MW433 has a slightly higher erosion hazard due to the potential presence of dispersive subsoils and lower annual average rainfall making it more challenging to establish vegetation to provide short- and long-term soil surface cover. This can be managed through mitigation measures.

8.5 Commitments and management measures

The following commitments informed by management measures recommended in the SWA and SEHA will minimise soil and water impacts associated with the project. These commitments will be detailed in the CEMP and OEMP where relevant.

Table 8.1 Summary of commitments – soil and water

Stage	Commitment ID	Commitment
Construction	GE-01	The approved construction footprint, including vegetation clearing extent and environmental or heritage features within the construction footprint, will be clearly demarcated and identified during the construction stage with survey pegs and at some locations with flagging, bunting, barrier mesh or similar. No go zones will be clearly marked and communicated as such.
Construction	GE-02	All temporary infrastructure will be decommissioned and removed at the completion of construction
Construction	GE-03	Rehabilitation of disturbed areas will commence progressively as soon as practicable during and after construction, and will be carried out in accordance with the SWMP and Landcom (2004).
Construction	AQ-01	Stabilisation of exposed soils will be undertaken as soon as practicable , and dust suppression undertaken as required using water sprays, water extension agents, soil stabilising polymers or other media on: • unpaved work areas subject to traffic or wind; • exposed soil; • main haulage routes, as required; • sand, spoil and aggregate stockpiles; and • during the loading and unloading of dust generating materials. When water is used for dust suppression, it will not be applied in a way that causes ponding or runoff.

Table 8.1 Summary of commitments – soil and water

Stage	Commitment ID	Commitment
Design Construction Operation	WS-01	A soil and water management plan (SWMP) will be prepared for the project and underpinned by primary erosion and sediment control plans (PESCPs) for all discrete disturbance areas, prepared and updated in accordance with Landcom (2004) and certified by a CPESC. Soil characterisation will be required at each compressor station site to accurately determine site-specific erosion risk to inform PESCPs. Surface water and runoff management to be considered in the final engineering design will be detailed in the SWMP and PESCPs. PESCPs will include construction, inspection and maintenance requirements for all drainage, erosion, and sediment control measures. PESCPs will include appropriate erosion and sediment controls for all stages of soil disturbance will be appropriate for the erosion risk posed by potentially dispersive or non-cohesive site soils, and adjusted to account for weather events such as high winds or rainfall. PESCPs will also set out roles and responsibilities for personnel and procedures to be followed if there is a failure in the adopted control measures.
Design Construction	WS-02	Any required cut and fill will employ slope design rules and stabilisation measures guided by material erosion and agronomic characterisation of the site soils.
Design Construction	WS-03	Major land disturbance works will be scheduled to avoid periods of high wind, where practicable. Soil and erosion control measures will be adjusted to ensure appropriate management of erosion and sediment during adverse weather.
Design Construction	WS-04	Site drainage will be designed to maximise sheet flow where possible. Construction of diversion drains, channels and table drains will be minimised to the maximum possible extent where practicable.
Construction	WS-05	Following removal of temporary infrastructure, the waste water spray field at MW433 will be appropriately rehabilitated.
Design Construction	WS-06	Minimise disturbance to the existing watercourses at MW433 and avoid the use of excavated drains where dispersive soils are expected to be present. Constructed landforms will be located to utilise the natural drainage features to the maximum practicable extent.
Design Construction	WS-07	Priority will be given to the prevention or minimisation of soil erosion rather than allowing erosion to occur and relying on sediment control measures to trap and contain sediment and turbid runoff.
Construction	WS-08	Soils will be ameliorated by the incorporation of gypsum into the soil at rates determined by site-specific soil testing. Hardstands will be gravel sheeted or concreted, and stabilised or strengthened where required.
Construction	WS-09	Organic and woody wastes should be considered for soil erosion protection purposes on stockpiles and rehabilitated areas. This is especially important at MW433, where annual rainfall is less than 300 to 350 mm/y and vegetation cannot be relied on for short- or long-term erosional stability.
Design Construction	WS-10	All reasonable and practicable measures needed to protect downstream waters and adjacent properties from the adverse effects of sediment and turbid water discharge will be implemented.
Construction Operation	WS-11	Site areas containing potential contaminants (such as fuel, oil, grease and chemicals) will be covered and/or bunded in accordance with Australian Standard AS1940: The storage and handling of flammable and combustible liquids to prevent contamination of stormwater runoff, with offsite disposal of captured water/contaminants.

Table 8.1 Summary of commitments – soil and water

Stage	Commitment ID	Commitment
Design Construction Operation	WS-12	Temporary and permanent onsite wastewater management systems will: • be appropriate for each site based on consideration of the site layout, site conditions and relevant environmental constraints; and • be designed, constructed, operated, maintained and decommissioned in accordance with best practise and relevant guidelines (including WaterNSW 2019), applicable standards (including AS/NZS 1547:2012 On-site domestic wastewater management) and local Council requirements.
Construction Operation	WS-13	All required water licensing and approvals will be obtained to support water supply arrangements for each site during construction and operation.
Design Construction Operation	WS-14	Stormwater runoff from buildings will be captured in rainwater tanks for use on site, to minimise demand for imported water.

8.6 Conclusion

The key findings of the soil and erosion hazard assessment are as follows:

- Both sites possess a low erosion hazard due to the flat gradient and low rainfall.
- Erosion risks will be greatest when soils are exposed to wind and rain during the clearing and early construction phases of the project, but can be managed through the application of mitigation measures.
- A SWMP will be prepared for the project and incorporate PESCPs for each site.
- The greatest influence on reducing water erosion hazard is through the adoption of a drainage design that is appropriate for dispersive and non-cohesive soils. This includes maintaining sheet flow conditions where possible, avoiding concentration of flow, and the excavation of dispersive subsoils.
- Maintaining and/or re-establishing soil surface cover will be fundamental for wind erosion control. Suitable controls include stabilisation of exposed soils and hardstand areas with trafficable and non-trafficable soil stabilising polymers; and the placement of woody debris and application of biologically activated hydraulic growth mediums on areas of temporary and permanent rehabilitation.
- If the drainage design is undertaken as described, there is very low erosion risk during the operational phase of the project with most of the site to be covered by sealed hardstands, buildings or subject to progressive rehabilitation.

9 Biodiversity

9.1 Introduction

A biodiversity development assessment report (BDAR) was prepared by EMM to assess the potential impacts on biodiversity associated with the construction and operation of the project. The BDAR was prepared in accordance with the Biodiversity Assessment Method (the BAM, DPIE 2020b), and included strategies to offset any residual impacts in accordance with the rules of the Biodiversity Offsets Scheme (BOS).

The BDAR is provided in full in Appendix E.

9.2 Assessment requirements and method

The NSW BC Act requires that an SSI modification must be accompanied by a BDAR. The BAM 2020 and version 1.3.0.00 of the BAM calculator were used to assess the biodiversity impacts of the project.

The specific objectives of the BDAR were to:

- describe biodiversity values of the study area;
- assess the likelihood that threatened species, populations, habitats and communities (threatened biodiversity) listed under the BC Act, NSW *Fisheries Management Act 1994* (FM Act) and/or EPBC Act could occur within, or adjacent to, the study area;
- document the strategies implemented to avoid and/or minimise impacts of the modification on threatened biodiversity;
- assess residual threatened biodiversity impacts, after avoidance and minimisation strategies have been implemented; and
- provide environmental safeguards to mitigate threatened biodiversity impacts during construction and operation.

The BDAR carried out these objectives by undertaking a desktop review of previous and related studies, key publications and databases, analysis of spatial data and site surveys for targeted species.

In addition to the above objectives, the BDAR was used to inform a constraints analysis to refine the proposed layout of the permanent and temporary infrastructure so that it would avoid significant impacts to biodiversity.

9.3 Existing environment

9.3.1 MW433 – Round Hill

i Overview

MW433 is located within the Interim Biogeographic Regionalisation of Australia (IBRA) Mulga Lands bioregion and the White Cliffs Plateau subregion.

As presented in Section 7.3, MW433 is located within the Paroo River catchment, and is located at the headwaters of two mapped unnamed 1st order watercourses which drain to the south-southeast along 3rd order and 6th order waterways into Peery Lake, which then flows into the Paroo River during major flood events. The Paroo River joins the Darling River upstream of Wilcannia, more than 70 km downstream of Peery Lake. All local drainage features are ephemeral in nature and generally only flow following substantial rainfall.

MW433 is bordered on three sides by the Paroo Darling National Park and the Paroo River Wetlands, listed as wetlands of international significance (#65) (DAWE, 2019). However, it should be noted that the site itself has been excised from the mapped wetlands and national park boundary, with the official wetlands area surrounding the site on the north-western, south-western and part of the south-eastern sides.

The Paroo Darling National Park is largely vegetated, and consists of arid shrubland, woody shrubland and floodplains with a high degree of connectivity.

ii Native vegetation

Vegetation mapping included the stratification of plant community types (PCTs) into vegetation zones and integrity assessments. Native vegetation at MW433 was mapped as PCT 153: Black Bluebush low open shrubland of the alluvial plains and sandplains of the arid and semi-arid zones. Vegetation was characterised by patchy ground cover species, a sparse mid layer and no canopy species (see Plate 9.1). No weeds were detected, however there was evidence of widespread historic surface disturbance resulting in sparse vegetation cover. Much of the site had been modified by past disturbances associated with construction of the MWP and MSEP, as well as degradation as a result of intense grazing by feral goats which were observed nearby during site visits. No threatened ecological communities listed under the BC Act were present at MW433.

Plate 9.1 Sparse, rocky habitat at MW433

iii Threatened species

A threatened species assessment of the species likely to be present was undertaken based on vegetation mapping. The shrubby groundcover consisted of patchy coverage, lacking suitable coverage for a number of threatened fauna species. The ephemeral watercourses provided little potential habitat due to absence of water and vegetation. No nests were observed within the communications tower.

iv Field surveys

Candidate species with potential to occur at each site were determined based on PCT and habitat quality (for example presence or absence of foraging resources etc.). Targeted flora and fauna surveys were undertaken during December 2020.

Candidate species for MW433 included Stimson's Python (*Antaresia stimsoni*), Australian Bustard (*Ardeotis australis*), a saltbush species (*Atriplex infrequens*) and Crowned Gecko (*Lucasium stenodactylum*).

As surveys were taken outside the flowering period of the saltbush making identification difficult and some fauna species could not be completely discounted, therefore, for the purposes of the BDAR, it was assumed that all candidate flora and fauna species were present at MW433.

v Aquatic ecology

Due to the presence of two 1st order ephemeral streams at MW433, a desktop aquatic ecology assessment was undertaken.

Both waterways at MW433 were characterised by a lack of channel or defined bank, and a lack of typical riparian vegetation (see Plate 9.2). No key fish habitat was present as 1st and 2nd order watercourses are not considered to contain suitable fish habitat.

MW433 is located within the internationally significant Paroo River Wetlands, albeit as an enclave. The Paroo River Wetlands are one of the most important wetland systems for waterbirds in eastern Australia, supports several threatened plants and animals, is a significant refuge for biological diversity (particularly during drought), and supports one of the healthiest native fish communities in the Murray-Darling Basin (DAWE, 2019).

Three threatened aquatic species, Silver Perch (*Bidyanus bidyanus*), Darling River Snail (*Notopala sublineata*), and Murray Cod (*Maccullochella peelii*), have the potential to occur within 50 km of MW433, however none of these have the potential to occur within or adjacent to the site.

Plate 9.2 Unnamed 1st order watercourse at MW433

vi Matters of national environmental significance

The BDAR considered impacts on species and ecological communities listed under the Commonwealth EPBC Act.

No threatened ecological communities or migratory species listed under the EPBC Act were identified or likely to occur at MW433. The Paroo River Wetlands described above is a wetlands of international importance, and as such is listed under the EPBC Act.

A likelihood of occurrence assessment was undertaken for potential species of national environmental significance, and it was determined that the following species had a moderate likelihood to occur at MW433:

- a saltbush *Atriplex infrequens*; and
- Grey Falcon (*Falco hypoleucos*);

9.3.2 MW880 – Milne

i Overview

The north-western part of MW880 is located within the NSW South Western Slopes bioregion and Lower Slopes subregion, while the south-western portion of the site is located within the Cobar Peneplain bioregion and Lachlan Plains subregion. The majority of the impacts will occur in the Cobar Peneplain and Lachlan Plains bioregion and subregion, therefore these have been used to determine impacts for the purposes of the BDAR.

As presented in Section 7.3, MW880 is located within the Lachlan River catchment, and the nearest mapped watercourse is an unnamed 3rd order watercourse to the south, which drains north-east toward Humbug Creek. However, it should be noted that drainage surrounding the site and Humbug Creek has been significantly modified as a result of agricultural development.

The surrounding landscape is highly modified with cleared agricultural land and scattered native vegetation, including a narrow strip of woodland located on the northern boundary of MW880 along Crown Camp Road. There is limited connectivity within the site which is only suitable for mobile arboreal fauna such as birds.

ii Native vegetation

Native vegetation at MW880 was mapped as PCT 72: White Cypress Pine - Poplar Box woodland on footslopes and peneplains mainly in the Cobar Peneplain Bioregion, with the canopy present along Crown Camp Road, and the remainder featuring derived grassland (where no canopy or shrub layer remains). The majority of MW880 is currently used for dryland cropping. Remnant vegetation, including derived natural grassland is present in the northern section of the site (north of the MWP). Derived natural grassland contained a high diversity of native and exotic vegetation. A narrow strip of semi-arid woodland was present along Crown Camp Road, and a single paddock tree (Cypress Pine) was recorded in the cropped area, and will not be impacted by the development (see Plate 9.3). No threatened ecological communities listed under the BC Act or the EPBC Act were present at MW880.

Plate 9.3 Derived natural grassland (foreground) with line of trees along Crown Camp Road and communications tower in the background

iii Threatened species

Areas of derived natural grassland at MW880 provided suitable understory foraging resources and potential habitat for some threatened flora species. The row of canopy trees along Crown Camp Road included species such as White Cypress Pine, Poplar Box and Western Grey Box, a number of which contained small to medium sized hollows, capable of providing potential roosting or breeding habitat for several hollow dependent species. No nests were observed in the communications tower.

iv Field surveys

Candidate species with potential to occur at each site were determined based on PCT and habitat quality (for example presence or absence of foraging resources, etc.). Targeted flora and fauna surveys were undertaken during December 2020 and May 2021 in accordance with relevant guidelines.

Candidate species for MW880 included a spear-grass (*Austrostipa metatoris*), Pine Donkey Orchid (*Diuris tricolor*), Koala (*Phascolarctos cinereus*) Superb Parrot (*Polytelis swainsonii*) and Silky Swainson-pea (*Swainsona sericea*).

As surveys were taken outside the flowering period of the spear-grass, Pine Donkey Orchid and Silky Swainson-pea making identification difficult, for the purposes of the BDAR, they were assumed to be present.

A Superb Parrot (*Polytelis swainsonii)* was recorded off-site in the line of trees adjacent to Crown Camp Road, and two hollow bearing trees considered to provide suitable breeding habitat for Superb Parrot were identified within the study area (also along Crown Camp Road). Therefore, the Superb Parrot has been assumed present and breeding within 100 m of the suitable trees. A Grey-crowned Babbler (*Pomatostomus temporalis*) was also recorded adjacent to the site, however this is an ecosystem credit species, therefore does not require species-specific offsets.

No Koalas or Koala scat were detected, and the Koala is considered to have a low likelihood of occurrence, especially as the vegetation is derived.

v Aquatic ecology

There are no watercourses on site, and the closest watercourses include a 3rd order watercourse approximately 1 km south-west, and Humbug Creek approximately 9 km east.

Neither watercourse intersects the proposed disturbance footprint., and the area immediately adjacent to the proposed disturbance footprint comprises highly modified agricultural land, meaning that any impacts occurring within the proposed disturbance footprint are highly unlikely to indirectly impact on these watercourses. As MW880 is located within highly modified agricultural land and away from any waterways, no riparian vegetation is present, and there is no key fish habitat present.

Nine threatened aquatic species have the potential to occur within 50 km of MW880: Flathead Galaxias (*Galaxias rostratus),* Silver Perch (*Bidyanus bidyanus),* Trout Cod (*Maccullochella macquariensis),* Macquarie Perch (*Macquaria australasica),* Southern Purple-spotted Gudgeon (*Mogurnda adspersa),* Western population of Olive Perchlet (*Ambassis agassizii),* Hanleys River Snail (*Notopala hanleyi),* Murray Cod (*Maccullochella peelii),* Murray-Darling Basin population of Eel tailed Catfish (*Tandanus tandanus).* It is unlikely that any of these species are likely to use the watercourses near the site.

vi Matters of national environmental significance

No threatened ecological communities or migratory species listed under the EPBC Act were identified or likely to occur at MW880.

A likelihood of occurrence assessment was undertaken for potential species of national environmental significance, and it was determined that the following species were either recorded on site, or had a moderate likelihood to occur at MW880:

- Superb Parrot (*Polytelis swainsonii*) (recorded on site);
- Grey Falcon (*Falco hypoleucos*); and
- Corben's Long-eared Bat (*Nyctophilus corbeni*).

9.4 Impact assessment

9.4.1 Direct impacts

The main direct impacts of the project will be associated with the clearing of vegetation and earthworks for construction. Vegetation clearance is listed as a Key Threatening Process under the BC Act and EPBC Act.

A construction envelope has been established to assist with final layout and provide flexibility for potential design changes. The construction envelope for each site comprises the area within the site boundary. This will allow the disturbance footprint to be moved within the construction envelope with the following limitations:

- direct impacts to native vegetation at MW443 will not exceed the total amount, 3.22 ha;
- direct impacts to native vegetation at MW880 will not exceed the total amount, 0.75 ha;
- direct impacts will be restricted to PCTs 153 and 72 described in the BDAR;
- no mature trees with a diameter breast height (DBH) of greater than 5 cm will be removed; and
- a memorandum will be prepared for DPIE and BCD once the final disturbance footprint has been confirmed and will include the total area of direct and indirect impacts, including figures illustrating the final disturbance footprint.

Direct impacts to biodiversity will be limited to clearance of on-site native vegetation, to a maximum of 3.22 ha of PCT 153 at MW433, and a maximum of 0.75 ha of derived PCT 72 at MW880. These impacts will be mitigated by offsetting, as described in Section 9.5. Overall direct impacts to biodiversity will be negligible following mitigation (offsetting).

9.4.2 Indirect impacts

In addition to the direct impacts, potential indirect impacts that could occur as a result of the project include:

- during construction:
    - increased noise, vibration, dust and night lighting causing disturbance of fauna species;
    - increase in weeds and pathogens, resulting in degradation of native vegetation and habitat;
    - increase in predatory and pest animal species, resulting in increased predation and competition and a consequent reduction in populations;
    - inadvertent disturbance of retained habitats;
    - removal of habitat resources for threatened fauna;
    - displacement of threatened fauna;
    - runoff, scouring, erosion and sedimentation impacts to retained native vegetation, threatened species habitat and the Paroo-Darling National Park and Paroo River Wetlands at MW433;
    - changes to water quality and volume within the Paroo River Wetlands from spray irrigation of wastewater; and

- vehicle strikes causing mortality of threatened species;

- during operation:
  - increased noise, vibration, dust and night lighting causing disturbance of fauna species.

MW433 is situated immediately adjacent to the Paroo Darling National Park and the Paroo River Wetlands. In addition to construction and ongoing operational works being conducted close to a national park, access to the site will be via the existing MWP pipeline easement which runs through the national park. This has the potential to cause indirect impacts to the national park, including erosion and sedimentation, stormwater runoff, weeds and pest species and noise, vibration and lighting.

i Weeds, pathogens and feral animals

Movement of vehicles and people have the potential to transport weeds and pathogens on to the site and surrounding area. Weeds can result in degradation of native vegetation and fauna habitat, and infection of native plants by pathogens such as *Phytophthora cinnamomi* can lead to devastation of native ecosystems (DoEE 2018 and DoE 2014). Increased human activity can also attract feral animals, including goats and red foxes at MW433 and wild dogs at MW880.

Mitigation measures related to biosecurity including washdowns and weed control measures, and management of waste will appropriately mitigate the potential impacts that weeds, pathogens or feral animals may have on biodiversity as a result of the project.

ii Noise, vibration lighting and dust

Construction activities will result in increased levels of noise, dust and lighting, and once operational, the compressor stations will generate noise. Dust may cover adjacent vegetation and inhibit growth. Light spill may cause disturbance to fauna species in adjacent habitat areas, with the potential to cause species to abandon habitat (Davies et al. 2014, Schroer et al. 2016). Noise has been observed to modify animal behaviour (Hoskin and Goosem 2010), however it is unlikely that there will be a significant impact on threatened species at MW433 given the availability of connected habitat for species to move into. Noise impacts at MW880 may cause birds to partially avoid the area, however they may become acclimatised over time, move through the site or not use the site.

Mitigation measures related to air, noise and visual impacts will appropriately mitigate the potential impacts that air, noise and lighting may have on biodiversity as a result of the project.

iii Erosion and sedimentation

Without appropriate mitigation measures in place, construction works will likely result in erosion and sedimentation, causing impacts to vegetation and threatened species habitat on site, as well as potential aquatic habitat off-site. Erosion hazard at both sites is generally low due to the flat gradient and low rainfall, however erosion and sedimentation may occur when soils are exposed to wind and rain during clearing and earthworks activities during the early construction phases of the project.

Mitigation measures related to soil and water impacts will appropriately mitigate the potential impacts that erosion and sedimentation may have on biodiversity as a result of the project.

iv Water discharge

During the construction phase, waste water will be generated by the construction camp and associated facilities. Waste water will be treated using sedimentation, anaerobic digestion, biological treatment, clarification and disinfection, then treated effluent will be discharged on site using spray irrigation on a treatment field of approximately 0.9 ha.

During operation, a permanent ablutions facility will be maintained on site, using a septic leach system. Waste water will be treated by sedimentation and anaerobic digestion, and treated effluent will be pumped to a below-ground trench where it will gradually seep into the surrounding soil.

Despite proximity to the Paroo Darling National Park and Paroo River Wetlands, potential impacts as a result of waste water discharge are expected to be minor due to the distance from watercourses and the design, construction and operation of the waste water treatment systems for both construction and operation in accordance with Australian Standard AS 1547: On-site domestic wastewater treatment and local Council requirements. Once construction is complete, the waste water treatment system associated with the construction camp will be decommissioned and removed, and the septic leach system will become operational.

During operations, maintenance of infrastructure, including machinery washdowns will occur. A trailer-mounted vacuum truck will be used during maintenance to capture and remove any contaminated water produced during water, and captured water will be appropriately disposed of off-site at a licenced facility.

In addition to these design measures, mitigation measures related to soil and water impacts will appropriately mitigate the potential impacts that water discharge may have on biodiversity as a result of the project.

v Vehicle strike

There is the potential for additional movement of vehicles during construction to cause mortality of threatened fauna species as a result of vehicle strikes. There will not be a significant increase in traffic on the local road network as a result of the project (see Chapter 11), and the majority of traffic movements will occur during daylight hours, therefore potential impacts of vehicle strike are considered negligible.

9.4.3 Matters of national environmental significance

The BDAR also assessed impacts to matters and species of national environmental significance, as listed under the EPBC Act.

The BDAR determined that impacts to *Atriplex infrequens* and Grey Falcon at MW433, and impacts to Superb Parrot and Corben's Long-eared Bat at MW880 as a result of the project will not be significant.

The BDAR also determined that following the implementation of mitigation measures, it would be unlikely that indirect impacts to the Paroo River Wetlands as a result of erosion, sedimentation or wastewater discharge associated with the project would occur.

9.5 Commitments and management measures

The following commitments informed by management measures recommended in the BDAR, as well as other technical studies, will minimise impacts to biodiversity associated with the project. These commitments will be detailed in the CEMP and OEMP where relevant.

Table 9.1 Summary of commitments – biodiversity

Stage	Commitment ID	Commitment
Construction	GE-01	The approved construction footprint, including vegetation clearing extent and environmental or heritage features within the construction footprint, will be clearly demarcated and identified during the construction stage with survey pegs and at some locations with flagging, bunting, barrier mesh or similar. No go zones will be clearly marked and communicated as such.
Construction	GE-02	All temporary infrastructure will be decommissioned and removed at the completion of construction
Construction	GE-03	Rehabilitation of disturbed areas will commence progressively as soon as practicable during and after construction, and will be carried out in accordance with the SWMP and Landcom (2004).
Construction	GE-05	All project personnel will complete an induction that will include environmental and heritage management requirements.
Construction	AQ-01	Stabilisation of exposed soils will be undertaken as soon as practicable , and dust suppression undertaken as required using water sprays, water extension agents, soil stabilising polymers or other media on: • unpaved work areas subject to traffic or wind; • exposed soil; • main haulage routes, as required; • sand, spoil and aggregate stockpiles; and • during the loading and unloading of dust generating materials. When water is used for dust suppression, it will not be applied in a way that causes ponding or runoff.
Design Construction Operation	WS-01	A soil and water management plan (SWMP) will be prepared for the project and underpinned by primary erosion and sediment control plans (PESCPs) for all discrete disturbance areas, prepared and updated in accordance with Landcom (2004) and certified by a CPESC. Soil characterisation will be required at each compressor station site to accurately determine site-specific erosion risk to inform PESCPs. Surface water and runoff management to be considered in the final engineering design will be detailed in the SWMP and PESCPs. PESCPs will include construction, inspection and maintenance requirements for all drainage, erosion, and sediment control measures. PESCPs will include appropriate erosion and sediment controls for all stages of soil disturbance will be appropriate for the erosion risk posed by potentially dispersive or non-cohesive site soils, and adjusted to account for weather events such as high winds or rainfall. PESCPs will also set out roles and responsibilities for personnel and procedures to be followed if there is a failure in the adopted control measures.
Construction	WS-05	Following removal of temporary infrastructure, the waste water spray field at MW433 will be appropriately rehabilitated.
Design Construction	WS-06	Minimise disturbance to the existing watercourses at MW433 and avoid the use of excavated drains where dispersive soils are expected to be present. Constructed landforms will be located to utilise the natural drainage features to the maximum practicable extent.
Design Construction	WS-07	Priority will be given to the prevention or minimisation of soil erosion rather than allowing erosion to occur and relying on sediment control measures to trap and contain sediment and turbid runoff.
Design Construction	WS-10	All reasonable and practicable measures needed to protect downstream waters and adjacent properties from the adverse effects of sediment and turbid water discharge will be implemented.

Table 9.1 Summary of commitments – biodiversity

Stage	Commitment ID	Commitment
Construction Operation	WS-11	Site areas containing potential contaminants (such as fuel, oil, grease and chemicals) will be covered and/or bunded in accordance with Australian Standard AS1940: The storage and handling of flammable and combustible liquids to prevent contamination of stormwater runoff, with offsite disposal of captured water/contaminants.
Design Construction Operation	WS-12	Temporary and permanent onsite wastewater management systems will: • be appropriate for each site based on consideration of the site layout, site conditions and relevant environmental constraints; and • be designed, constructed, operated, maintained and decommissioned in accordance with best practise and relevant guidelines (including WaterNSW 2019), applicable standards (including AS/NZS 1547:2012 On-site domestic wastewater management) and local Council requirements.
Construction	BI-01	A biodiversity chapter within the CEMP will be prepared to enable implementation of measures to avoid, minimise and mitigate impacts that may arise during the construction phase of the project.
Design Construction	BI-02	APA has established a construction envelope which includes all of the site boundary to assist with final design and account for potential design changes. This allows siting of the disturbance footprint within the construction envelope with the following limitations: • Direct impacts to native vegetation at MW433 will not exceed the total amount, 3.22ha, as stated in the report; • Direct impacts to native vegetation at MW880 will not exceed the total amount, 0.75ha, as stated in the report; • Direct impacts will be restricted to the following vegetation zones offset as part of the Biodiversity Development Assessment Report (Mod Report 1); – MW433 – PCT 153 Disturbed condition; – MW880 – PCT 72 DNG; and • No mature trees (with a DBH >5 cm) are to be removed at MW433 or MW880.
Design Construction	BI-03	Native vegetation and fauna habitat will be retained wherever possible, with clearing minimised to the extent required to construct and maintain the modification
Design Construction	BI-04	Final design of the disturbance footprint will take into consideration native vegetation and where feasible avoid or reduce impacts to native vegetation.
Construction	BI-05	Prior to any vegetation clearing activities, the following areas within the site will be temporarily fenced (with barrier mesh, bunting or similar) and marked as 'No-go zones': • Paroo-Darling National Park and Paroo River Wetlands (MW433); and • Retained native vegetation within sites (MW433 and MW880).
Construction	BI-06	Where feasible at MW880, tree protection zones (TPZs) in accordance with the Australian Standard AS 4970-2009 Protection of trees on development sites (Standards Australia Committee 2009), will be set up around all trees to be retained within and immediately adjacent to the impact area.

Table 9.1 Summary of commitments – biodiversity

Stage	Commitment ID	Commitment
Construction	BI-07	Prior to undertaking vegetation clearing, pre-clearance inspections will be undertaken by appropriately qualified ecologists. The pre-clearing inspections will: • confirm the biodiversity values identified in this report; • check for the evidence of the presence of flora and fauna species; • flag key habitat features, including (but not limited to) nests or hollow logs; • relocate of nests and/or hollow logs to adjacent habitat; • identify nearby habitat suitable for the release of any species that may be encountered during the clearing works; and • contact a wildlife carer or veterinarian to inform them of the vegetation clearing works that are to occur.
Construction	BI-08	Cleared native vegetation will be retained and reused for on-site rehabilitation where it doesn't present a fire risk.
Construction Operation	BI-09	To prevent the introduction and/or spread of weeds on site, the following controls will be implemented: • weed control in key areas prior to construction works, to minimise the impacts of weeds during construction and to minimise the requirements for disposal and management of weeds on-site; • appropriate identification, management and disposal of weed species during clearing works, in accordance with the biodiversity management plan; • active and intensive weed control in areas where significant weeds are known to occur to reduce the cover of weeds adjacent to the construction activities, preventing the spread of weeds into other areas; • all vehicles, plant and equipment will be cleaned down (wash/blow down) and certified weed free prior to initial entry to site; all vehicles, plant and equipment will strictly adhere to the approved roads, tracks, easements and work areas to minimise contact with vegetation; • all vehicles, plant and equipment breaching protocol and travelling outside of approved areas will be re-certified as weed free; • biosecurity certifications will be kept with the vehicle and plant at all times; • a weed and pathogen monitoring program will be implemented, with a weed control program to be implemented if weeds are identified within the site boundary; and • rehabilitation of cleared areas as quickly as possible following construction works in an area.
Construction	TT-02	Transport routes will be clearly marked or communicated, and speed limits enforced.
Construction	TT-03	After arrival at the project site all vehicles, plant and equipment will remain within the construction footprint and on approved roads and tracks.
Construction	VI-02	Light generated during construction will be managed in general accordance with the requirements in Australian Standard AS 4282-1997 Control of the Obtrusive Effects of Outdoor Lighting.
Construction Operation	WA-02	Waste containers will be lidded to mitigate fauna access. No waste will be left outside in open areas accessible to feral animals.

9.6 Conclusion

They key findings of the BDAR are as follows:

- MW433 is considered highly connected, with the site located on private land surrounded by the Paroo Darling National Park. PCT 153 – Black Bluebush low open shrubland of the alluvial plains and sandplains of the arid and semi-arid zones was mapped as occurring on the majority of the site. The remainder is non-native vegetation as a result of the construction of the original MWP.
- MW433 is located adjacent to the Paroo Darling National Park and the Paroo River Wetlands of international significance.
- MW880 is considered highly fragmented, with the site located within a highly modified landscape of predominantly agricultural land. PCT 72 - White Cypress Pine - Poplar Box woodland on foot slopes and peneplains mainly in the Cobar Peneplain Bioregion was mapped as occurring on part of the northern section of the site. The remainder is non-native vegetation, as a result of the construction of the MWP, or as land used for dryland cropping.
- Site surveys indicated the following threatened species were either recorded on site, or assumed to occur:
  - MW433
    - Stimson's Python (*Antaresia stimoni*);
    - Australian Bustard (*Ardeotis australis*);
    - a saltbush (*Atriplex infrequens*); and
    - Crowned Gecko (*Lucasium stenodactylum*);
  - MW880
    - Superb Parrot (*Polytelis swainsonii*);
    - Grey-crowned Babbler (*Pomatostomus temporalis*);
    - a spear-grass (*Austrostipa metatoris*);
    - Pine Donkey Orchid (*Diuris tricolor*); and
    - Silky Swainson-pea (*Swainsona sericea*).
- The project will result in direct impacts to no more than 3.22 ha of PCT 153 at MW433, and no more than 0.75 ha of PCT 72 at MW880.
- Direct impacts to native vegetation at both sites will be mitigated through offsets.
- Indirect impacts to biodiversity will be mitigated through a range of management measures.
- Following implementation of offsets and other management measures, direct and indirect impacts to biodiversity as a result of the project, including potential impacts to the Paroo Darling National Park, will not be significant.

- Following implementation of management measures, direct and indirect impacts to matters of national environmental significance as listed under the EPBC Act, including the Paroo River Wetlands, will not be significant.

10 Heritage

10.1 Introduction

An Aboriginal cultural heritage assessment (ACHA) was undertaken by EMM to assess the potential impacts on Aboriginal cultural heritage associated with the construction and operation of the project. The ACHA was prepared in consultation with registered Aboriginal parties (RAPs), Heritage NSW and DPIE, and in accordance with the following guidelines:

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

The ACHA is provided in full in Appendix F.

10.2 Assessment requirements and method

Based on the potential for Aboriginal objects to be present at MW433 and MW880, an ACHA was undertaken to present the findings of the Aboriginal community consultation, previous investigations regarding Aboriginal cultural and archaeological heritage values, and physical investigation and ground-truthing of the project area.

The ACHA provided information on the location, distribution, and significance of Aboriginal objects within the project area; and the potential impacts as a result of the project; and recommendations for the management of impacts.

The ACHA included:

- consultation and involvement with key Aboriginal community members and knowledge holders to identify areas and places of cultural value within or in the vicinity of the project;
- a review of existing environmental, historical and archaeological information for the project area;
- identification of potential Aboriginal objects, places, cultural values areas, or areas of archaeological potential present (or likely to be present) within the project footprint, through ground-truthing, including field survey and test excavations;
- identification of the type, nature, and extent of any Aboriginal sites, objects, archaeological deposits, potential archaeological deposits, and cultural values areas within the project footprint;
- maps of the locations of known and potential Aboriginal sites, objects and deposits and cultural values areas identified;
- an assessment of the archaeological and cultural significance of the project footprint;
- identification of heritage constraints and opportunities and the potential impacts of the project; and
- identification and recommendation of measures to mitigate or manage any heritage impacts and risks to the project.

The full method, including details of survey and impact assessment methods used are included in Appendix F.

10.3 Existing environment

Both MW433 and MW880 are situated in semi-arid and arid environments. They are generally characterised as flat peneplains dominated by ephemeral creeks and clay pans. These characteristics strongly influence the potential cultural material that may be present. These would likely be surface and shallow buried stone artefacts with some potential for culturally modified trees. Sites such as rock shelters, engravings, or grinding grooves would not be expected based on the local geography.

Acacia seeds (such as mulga and wattles) provided a food source for Aboriginal people, as the seeds of the plants could be ground into a paste or cooked. The red berries from the ruby saltbush could be eaten while the wood of the belah tree could be used for manufacturing spears. White cypress pine produces a sticky sap that was used to haft handles to tools or cement the heads of reed spears. The bark from river red gums and black box trees were used to make coolamons and canoes and their leaves used in smoking ceremonies. Sedge grass was used to weave baskets and tools. This represents a very small sample of the flora that would have been used by Aboriginal people for food, medicine, tools, and ceremonial purposes (HO and DUAP 1996).

Information about the socio-cultural structure of Aboriginal society prior to European contact largely comes from ethno-historical accounts made by colonial settlers. These accounts and observations were often made after significant social disruption due to disease and displacement. As a result, this information is often contentious, particularly in relation to language group boundaries. Therefore, it is likely that language group boundaries were far more diffuse than the arbitrary demarcations drawn by colonial observers.

10.3.1 MW433 – Round Hill

i Natural setting

MW433 is situated within the White Cliffs Tablelands and Downs land system, which is comprised of gently undulating stony plateau escarpments (Mitchell 2002). Soils are predominantly shallow and acidic with small areas of deeper desert loams and shallow gilgai. This landscape features ephemeral watercourses and lakes, as well as claypans, which would have formed temporary areas of resources for past Aboriginal activity.

MW433 features extensive outcropping silcrete, a stone material favoured by Aboriginal people for the purposes of crafting tools and weapons (LLSWR 2016). Outcropping silcrete would have been targeted by Aboriginal people for resource exploitation, and as a result Aboriginal quarry sites and open artefact scatters can be predictively modelled at these locations.

ii Ethnography and archaeological context

MW433 is within the lands of the Barkandji people, who's traditional lands covered 128,000 km^2 extending from Wanaaring in the north to Wentworth in the south, and Tilpa in the east to the South Australian border in the west. MW433 was identified by RAPs as being part of the broader Round Hill site centred ~1.2 km east of the project area and comprised a quarry site and extensive artefact scatter where over 3,000 stone artefacts were identified.

The Barkandji used several tools and weapons. Their primary fishing tools were fishnets and duck-nets (*mulkka*), the fish spear (*tintee*), spades (*boppara*), digging sticks (mainly for yams), wooden bowls, mats, baskets, and other nets. The Barkandji also used ground-edge axes hafted with string and gum to handles, chisels, and knives as well as bone utensils such as emu-bone and kangaroo bone knives and shell knives (Teulon 1886:193). The Barkandji used numerous clubs (such as nulla-nullas) and two types of boomerangs, ones that return and ones that did not. Shields were cut and coloured with red ochre and sometimes carved. Food was cooked in hearths or underground ovens (*wong-a*).

Europeans arrived in the region in the 1800s due to the discovery of gold in Milparinka. The subsequent depopulation of Aboriginal people from traditional lands resulted in a significant disruption of cultural practices and knowledge. Pastoralism began in the 1860s with Aboriginal people still living on their own country but often engaged to work on stations in return for food, clothing and tobacco (Beckett and Hercus 2009:6). Aboriginal men were employed as shearers and cattlemen whilst the women were predominantly hired as domestic helpers in homesteads. Initially, the settlers did not obstruct or interfere with Aboriginal people's way of life and ceremony and in some cases encouraged larger gatherings of different clans (Beckett and Hercus 2009:6). However, the introduction of pastoral stations and fences inhibited Aboriginal people's ability to forage and over the large areas as was required to obtain enough sustenance. These changes significantly impacted Aboriginal peoples' ability to continue traditional ways of life if they were to survive, regularly leading to conflict with pastoralists and often resulting in the movement of Aboriginal people to off-country missions or reserves, or more permanently onto stations.

Areas of cultural significance near MW433 include Round Hill, located 1.3 km to the east, and consists of a culturally and scientifically significant quarry site and extensive artefact scatter. Consultation with Barkandji representative Gerald Quayle confirmed that the quarry site extends along the ridge-crest north-east of MW433 but is concentrated north of the communications tower and further east towards Lake Poloko.

A search of the Aboriginal Heritage Information Management System (AHIMS) returned 20 Aboriginal sites over a 70 km^2 area centred on MW433. The closest site to the project area is Round Hill (AHIMS #15-6-0047) located 1.2 km to the east comprising a quarry site and open artefact scatter consisting of over 3,000 artefacts.

Based on an analysis of previous studies, ethno-historical information, landscape features and advice from Aboriginal knowledge holders, the Aboriginal cultural heritage of MW433 was predicted to be of high sensitivity for artefact scatters and potential quarries. This was due to its location on a hillcrest close to a previously identified quarry and extensive artefact scatter.

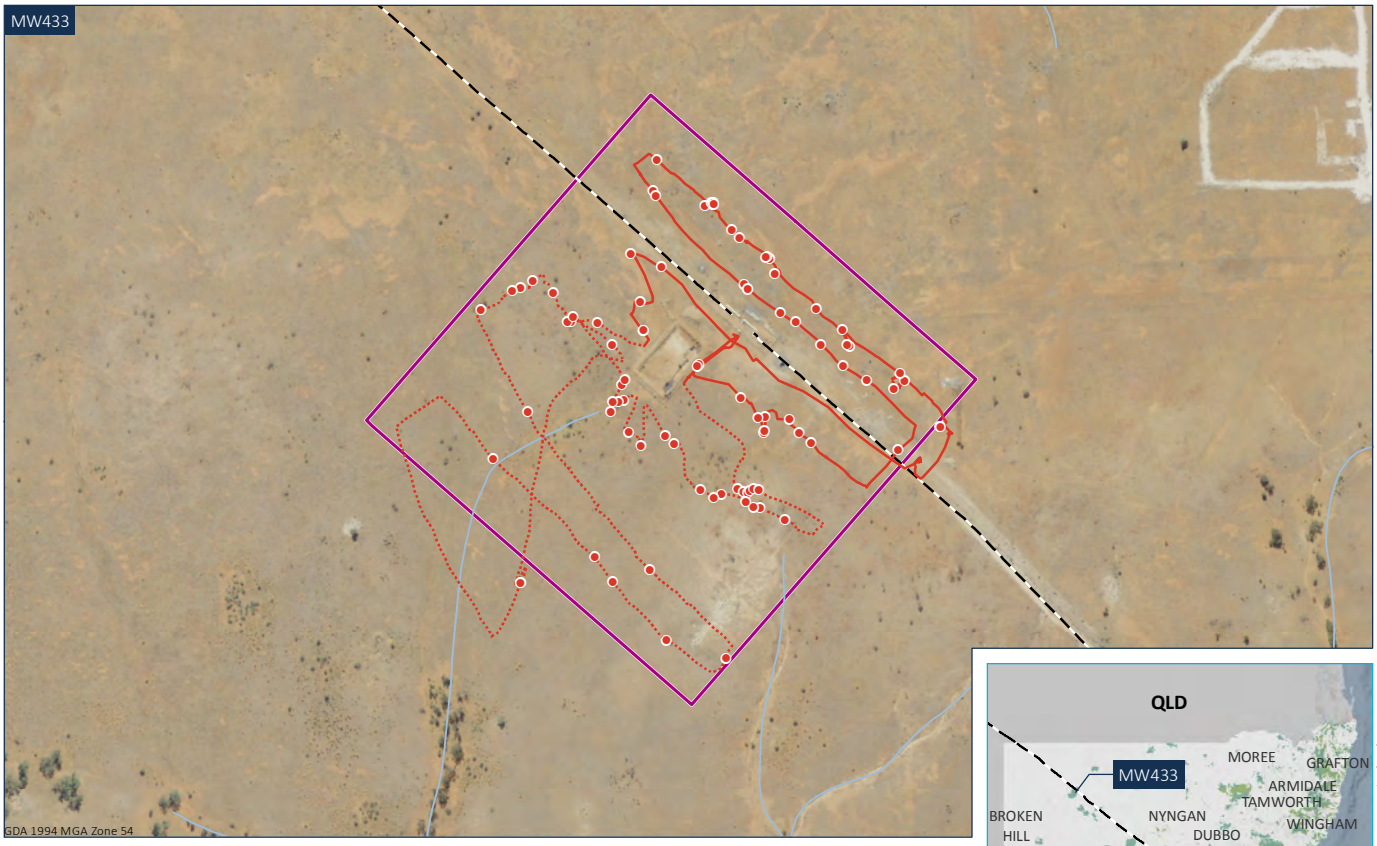
iii Field investigation

EMM conducted an archaeological field survey of MW433 with the assistance of RAP representatives on 21 May 2021. The survey was directed by Taylar Reid (EMM archaeologist) with assistance from the Barkandji Native Title Group (Barkandji Malyangapa People)/ Barkandji Native Title PBC. The survey comprised two transects across the site with a total distance of 5 km walked by each participant.

The surveyed area at MW433 consisted of red sandy soils and outcropping silcrete gravels, stones, and cobbles. Due to the erodible nature of the soils the potential for subsurface artefacts across the project area was considered to be very low. The high exposure and visibility and generally low levels of disturbance for the majority of the project area enabled the easy identification of surface artefacts.

The survey team identified one previously unidentified Aboriginal site, named MW433-OS1, during the archaeological field survey. This site consists of an extensive low-density artefact scatter, associated with the broader Round Hill cultural landscape, with approximately 100 artefacts identified within the project area. Artefact densities ranged from 1-2 artefacts/m^2 up to 5 artefacts/m^2. The dominant raw material was silcrete (95%) with quartzite and chert comprising the remaining 5% of identified artefacts.

Artefacts were identified across MW433, decreasing in frequency and density moving downslope in a south to south-westerly direction. Plate 10.1 and Plate 10.2 demonstrate the surveyed terrain, and the results of the archaeological survey are presented in Figure 10.1.



Source: EMM (2021); DFSI (2017); GA (2011); ASGC (2006)); LPI (2021)

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KEY

- Compressor site
- Moomba to Wilton pipeline
- Artefact location

EMM survey track

- Crest
- Hillslope 1
- Plain

Heritage survey results

APA - East Coast Grid Expansion
Modification report 1
Figure 10.1

EMM creating opportunities

Plate 10.1 MW433 crest showing visibility and exposure, view south

Plate 10.2 MW433 slope showing exposure and visibility, view north

The artefact types identified reflect different phases of activity occurring across the project area. There was a distinct difference between artefact types along the crest versus artefacts on the downslope. Artefacts along the crest were predominantly retouched and/or reworked tools such as silcrete adzes, scrapers, blades, knives, and other retouched flakes, all indicative of more intense and/or repeat activity. These artefacts were representative of a tool workshop or men's teaching area (Barkandji Elder and RAP Owen Whyman, pers. comms) (see Plate 10.3 and Plate 10.4).

Artefact types identified changed downslope to a general background scatter of larger flakes and cores and a decrease in complete tools. This was more representative of flaking techniques where the tool being produced was kept, while the waste material was discarded.

Plate 10.3 Large yellow silcrete complete flake found on crest at MW433

Plate 10.4 Chert flakes of various colours found on slope at MW433

10.3.2 MW880 – Milne

i Natural setting

MW880 is situated within the Lower slopes Bimbi Plains land system (Mitchell 2002). This land system is characterised by Quaternary alluvial plains composed of gravelly clay loams and red-brown clays. This landscape has a history of being cleared and cultivated. Lake Cowal, located 42 km south-east of the project area, is the largest ephemeral lake in NSW and an archaeologically rich landscape for the Wiradjuri people with an extensive artefact scatter, culturally modified trees, and potential burials.

The landscape surrounding MW880 is characterised by alluvial plains surrounded by elevated, incised ridges and rises. Sandstone, siltstone and mudstone comprise the dominant geology of these landforms, and these formations likely provided past Aboriginal people with raw materials required to produce stone tools. The highly erodible nature of the soils and history of agricultural land clearance within MW880 decreases the potential for artefacts to be located in situ and artefacts, if present, will be exposed on the ground surface close to water features.

ii Ethnography and archaeological context

MW880 is within the lands of the Wiradjuri people, the largest language group in NSW, which extends west from the Great Dividing Range to Hay in the west, Nyngan in the north and south as far south as Albury. The closest site of cultural value identified for MW880 is the Manna Mountain site, which is located 28 km east of the project area. The site comprises grinding grooves, a water hole/well and scar trees and has cultural values extending to the pre-contact period.

The Wiradjuri are amongst some of the oldest cultures that lived in Australia, likely thriving on country as early as 45,000 years ago (Pardoe 2013). The Wiradjuri lands are referred to as the 'land of three rivers' since the Murrumbidjeri (Murrumbidgee), Kalari (Lachlan) and Wombol (Macquarie) Rivers border this area (Niche 2018). This sustained a varied diet consisting of shellfish and fish, which was supplemented with kangaroo, emu, fruit, nuts, yam daisies, wattle seeds, and orchid tubers (HO and DUAP 1996). Large gatherings of up to 500 people with neighbouring groups for ceremonies, initiation, and trade were used to foster social and cultural exchange amongst different groups, which would have been paramount for the social and cultural stability of the Wiradjuri (Kabaila 2005).

Wiradjuri country was highly sought after by Europeans who were drawn to the area in search of fertile soils for agriculture and farming, which lead to open conflict for several years during the early 1800s (Niche 2018). Termed the 'Wiradjuri wars', these conflicts generally involved the Wiradjuri people culling cattle and spearing stockmen in response to the killing of their people, destruction of fishing grounds, and desecration of ceremonial grounds and sacred sites resulting from colonisation of the land (HO and DUAP 1996). Ethnohistorical information indicates that despite this period of upheaval, the Wiradjuri still maintained strong kinship ties with their neighbours, reinforced through trade, economy, movements and participating in ceremonies (Kabaila 2005). The Wiradjuri maintain strong cultural connections to, and knowledge of, their land to this day.

Nearby areas of cultural significance to MW880 include grinding groove and waterhole sites at Manna Mountain located 28 km east of the project area, Billy's Lookout/Lake View located 38 km to the south; and Lake Cowal located 42 km to the south-east. Discussion with RAPs indicated Manna Mountain was a sacred place for Wiradjuri people and they would sharpen their spears and axe-heads on the sandstone platforms. Water sources are regarded as important cultural landscapes in Wiradjuri country and Lake Cowal was not only an important resource but also served as a meeting place for ceremony with neighbouring clans.

The MW880 AHIMS search returned 52 Aboriginal sites over a 3,828 km^2 area centred on the project area. The closest AHIMS sites are #43-1-0003 and #43-1-0042, both open campsites, located 12 km north-east of the project area.

Based on an analysis of previous studies, ethno-historical information, landscape features and advice from Aboriginal knowledge holders, the Aboriginal cultural heritage of MW880 was predicted to be of low sensitivity. This was due to its location away from reliable water sources and other landscape features such as hillcrests and ridges.

iii Field investigation

EMM conducted an archaeological field survey of MW880 with the assistance of RAP representatives on 18 May 2021. The survey was directed by Taylar Reid (EMM archaeologist) with assistance from the Wiradjuri Condobolin Corporation (WCC) and the Callara Culture and Aboriginal Heritage Corporation. The survey comprised one transect across the site with a total distance of 5 km walked by each participant.

The surveyed area at MW880 consisted of a ploughed and cultivated paddock with shallow red sandy soils. The thin soil profile in combination with historical farming practices indicated that the site contained low archaeological potential for subsurface artefacts. The high exposure and visibility enabled sufficient coverage of the site, and a robust evaluation of surface and subsurface archaeological potential.

No Aboriginal sites were identified during the survey. MW880 lacks desirable environmental features such as reliable water sources, shelters, or rises that would have been targeted by Aboriginal people in the past. Although this does not negate the potential for sporadic, isolated artefacts, the high visibility and high exposure indicated a low likelihood that Aboriginal artefacts would be present. Discussion with Aboriginal participants on site confirmed that this area was unlikely to be targeted by Aboriginal people in the past, rather they would have primarily targeted reliable watercourses and elevated hillcrests outside of the project area.

Plate 10.5 and Plate 10.6 demonstrate the surveyed terrain, and Figure 10.1 demonstrates the area surveyed.

Plate 10.5 **MW880 showing high levels of exposure and visibility, view south**

Plate 10.6 **MW880 showing different levels of exposure and visibility, view south**

10.4 Impact assessment

All Aboriginal objects in NSW are protected under the *National Parks and Wildlife Act 1974*. It is recognised that the destruction of sites may be necessary to allow other activities or developments to occur. In order for the consent authority to make informed decisions on such matters, an important element of cultural resource management is determining the significance of cultural heritage places and objects to understand what may be lost; and how best it can be mitigated.

10.4.1 Project impacts

Each compressor station will require a construction footprint of 3.5 ha reduced to 1.5 ha for operations.

Construction activities are likely to impact the top 1 m of the upper soil profile. These would include direct impacts such as impact piling, and indirect impacts such as driving light vehicles across access tracks. The likelihood for any subsurface cultural material at either site is considered low, but any surface impacts would likely impact cultural materials if present. As such, direct impacts are anticipated in areas where cultural material has been observed or is considered likely within the footprint of proposed permanent and temporary activities.

10.4.2 MW433 – Round Hill

i Significance of MW433-OS1

MW433-OS1 was identified as a site with high scientific values based on the research potential, rarity and representativeness, and integrity of the site.

Stone artefact sites are common in the region where landscape elements (ie water sources, available raw materials, and certain landforms) provide environmental features desirable for Aboriginal people to exploit. Stone artefact sites such as tool manufacturing sites such as MW433-OS1 are a rarer site type, particularly as MW433-OS1 exhibits a transition of activities between the tool workshop on the crest versus the activities taking place on the slope; and includes a wide range of technological attributes. There is research potential with this site, particularly as other sites around Peery and Poloko lakes represent significantly different activities to the Round Hill quarry site. The site remains largely intact however evidence of ground disturbance activities including construction of the MWP and communications tower, and associated access tracks has impacted the integrity of the site. It should be noted that despite this, there are still artefacts situated around the disturbed area. In addition, the site has been identified as of high cultural significance based by Aboriginal participants based on its proximity and relationship to Round Hill. This site contains a significant quarry site, and as such likely had extensive past occupation and activity across the region.

Based on the significance of MW433-OS1, the archaeological sensitivity of different parts of MW433 were classified as high, medium and low. This sensitivity is presented in Figure 10.2.

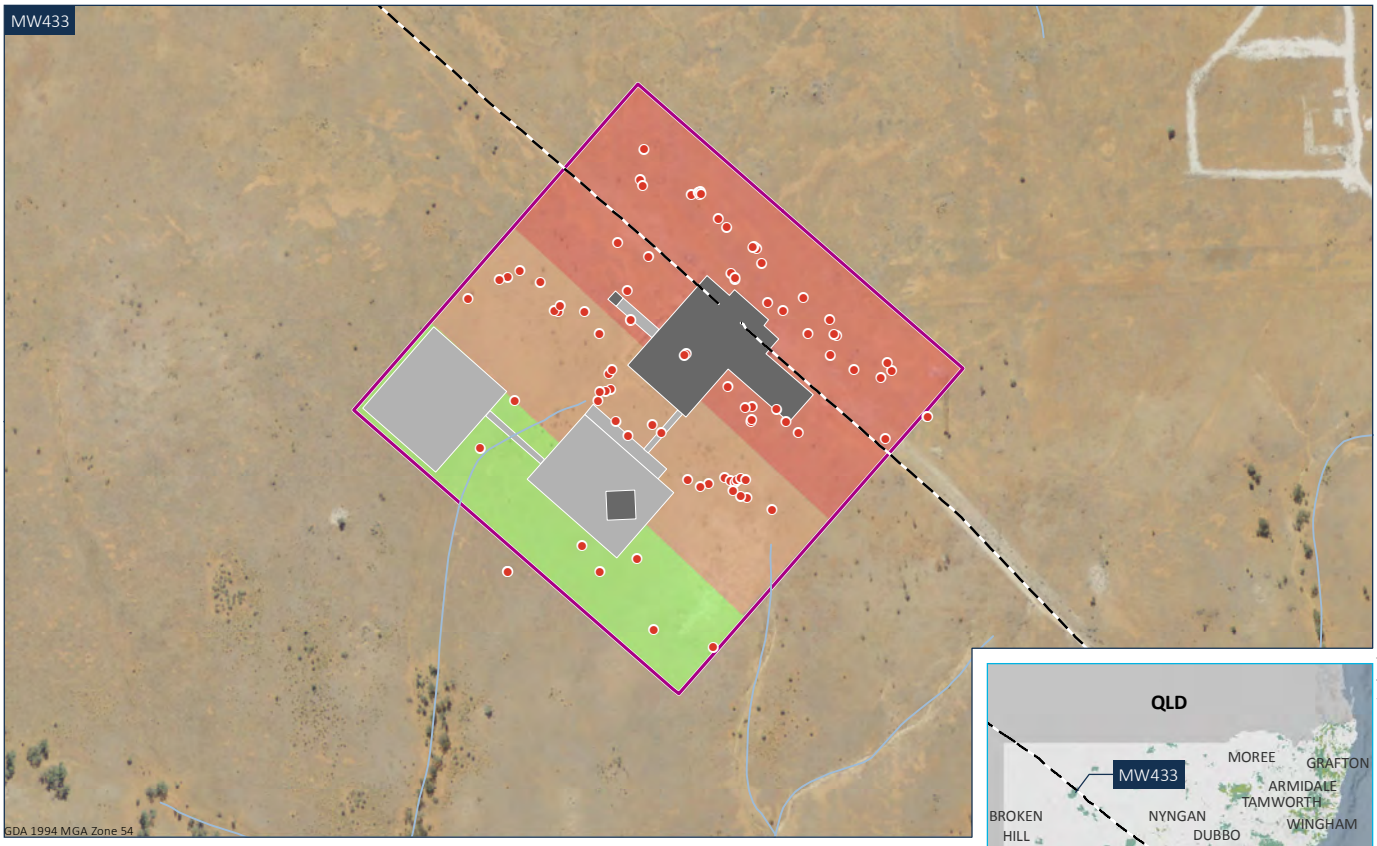
ii Impact assessment

a Impacts to Aboriginal heritage

At MW433, proposed project activities will intersect with the artefact scatter MW433-OS1. The original compressor station layout indicated disturbance of approximately 42,000 m^2 of the crest and upper slope, which is an area of high archaeological sensitivity.

Following the identification of MW433-OS1, the project layout was refined to reduce impacts to the more sensitive parts of the site along the crest and upper slope. Relocation of the construction camp and waste water treatment spray field reduced the disturbance of the highly sensitive area to approximately 19,200 m^2, a reduction of approximately 46%.

Following the layout refinement, a number of activities will still adversely affect parts of MW433-OS1, however this has been reduced as far as practicable as the compressor compound itself needs to be adjacent to the existing pipeline. Overall, the project will now only impact 11,800 m^2 of the crest and upper slope of MW433-OS1, and this will occur predominantly within previously disturbed areas from construction of the original MWP (see Figure 10.2).



Source: EMM (2021); DFSI (2017); GA (2011); ASGC (2006); LPI (2021)

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KEY

- Compressor site
- Moomba to Wilton pipeline
- Proposed site infrastructure
  - Permanent
  - Temporary
- Artefact location
- Achaeological sensitivity
  - High
  - Moderate
  - Low

Archaeological sensitivity and management recommendations

APA - East Coast Grid Expansion
Modification report 1
Figure 10.2

EMM creating opportunities

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b Impacts to intergenerational equity

Intergenerational equity is the principle whereby the current generation should maintain the health, diversity and longevity of the environment for the benefit of future society. For management of Aboriginal heritage, intergenerational equity can be considered primarily in terms of the cumulative impacts to Aboriginal objects, sites and/or places in a region. If few Aboriginal objects and places remain in a region (eg due to development impacts), there are fewer opportunities for future generations of Aboriginal people and the broader community to enjoy the cultural benefits.

Project activities at MW433 will result in some impacts to Aboriginal sites at Round Hill. While an iterative design process has sought to reduce these impacts, cultural material will be adversely affected. It should be noted that the site has already been subject to extensive previous disturbances, and the primary context of significant portions of the site have likely already been subject to historical and modern change. It is however, acknowledged that the project will cause impacts to MW433-OS1, and as such management strategies are recommended to offset the potential impacts through preservation in record, and increased opportunities for Aboriginal people to engage with their cultural and landscape during the project. Following implementation of the proposed management measures, the project will have negligible intergenerational impacts to cultural heritage.

10.4.3 MW880 - Milne

No cultural materials were identified or are considered probable at MW880. As such, it is considered that there will be no impacts to Aboriginal cultural heritage or intergenerational equity from the project at this site. The original design of MW880 project area remains unchanged (see Figure 10.2).

10.5 Commitments and management measures

Through project re-design, impacts to significant portions of MW433-OS1 will be avoided. However, parts of it will be partially impacted by the construction and operation activities. Where feasible, APA has already modified the project design and development footprint to avoid identified Aboriginal objects within the project footprint.

The following commitments informed by management measures recommended in the ACHA will further minimise impacts to heritage and offset impacts to intergenerational loss associated with the project. These commitments will be detailed in the CEMP and OEMP where relevant.

Table 10.1 Summary of commitments – heritage

Stage	Commitment ID	Commitment
Construction	GE-01	The approved construction footprint, including vegetation clearing extent and environmental or heritage features within the construction footprint, will be clearly demarcated and identified during the construction stage with survey pegs and at some locations with flagging, bunting, barrier mesh or similar. No go zones will be clearly marked and communicated as such.
Construction	GE-05	All project personnel will complete an induction that will include environmental and heritage management requirements.

Table 10.1 Summary of commitments – heritage

Stage	Commitment ID	Commitment
Construction Operation	AH-01	Prior to ground disturbance, a separate Aboriginal Cultural Heritage Management Plan (ACHMP) for each of the two sites must be developed by a heritage specialist in consultation with the RAPs and consent authority to provide the post-approval framework for managing Aboriginal heritage within the project area. The ACHMP will include the following aspects: • processes, timing, communication methods and project involvement (eg on-site activities) for maintaining Aboriginal community consultation and participation through the remainder of the project. This will include a grievance mechanism that is readily available and designed for use by the local Aboriginal community; • detailed descriptions and methods of any additional investigative and/or mitigative archaeological actions that may be required prior to works commencing or during the project. These will include, but not be limited to, archival recording of all identified Aboriginal objects, sites and places; archaeological recovery of cultural materials (eg MW433-OS1) where direct impacts are proposed; and subsurface investigations/recovery (eg archaeological excavation and/or cultural monitoring) for any ground disturbance within areas or archaeological sensitivity identified at MW433. Further details of these activities are presented in Section 10.2 of the ACHA. For these activities, details of location/s, methods, personnel, and timing will be included; • description and methods of actions to minimise any inadvertent impacts to identified Aboriginal objects and/or sites and areas of archaeological sensitivity outside of the construction footprint. This will include, but not be limited to, cultural inductions for all personnel and subcontractors outlining their location and significance, fencing and clear marking of heritage sites and zones of interest close to proposed works, appropriate screening for sensitive and gender-specific areas, and any additional requirements identified by the Aboriginal community. A suitable regime of monitoring these activities will also be outlined, including locations, methods, personnel and timing; • description and methods for undertaking further Aboriginal heritage assessment, investigation and mitigation of any areas of the project footprint that have changed following completion of the ACHA and/or during the final design and construction phases of the project; • description and methods of post-excavation analysis and reporting of the archaeological investigations and activities implemented as part of the ACHMP. For excavations, these will include suitable collection and processing of stone artefacts, and chronological, soil, and environmental samples; • procedures for managing the unexpected discovery of Aboriginal objects, sites and/or human remains during the project; • procedures for the curation and long-term management of cultural materials recovered as part of the works outlined in the ACHMP and any preceding stages associated with the project; and • processes for reviewing, monitoring, and updating the ACHMP as the project progresses.
Construction Operation	AH-02	Consultation will be maintained with the RAPs during the finalisation of the assessment process and throughout the project.
Construction	AH-03	A copy of the ACHA will be lodged with AHIMS and provided to each of the RAPs.
Construction	AH-04	AHIMS Site Recording Forms for the newly identified Aboriginal objects and/or sites within the project area and areas of archaeological sensitivity will be submitted to the AHIMS database once their validation has been completed.
Construction Operation	AH-05	Where the heritage consultant changes through the project, suitable hand over will be undertaken to minimise loss or mistranslation of the intent of the information, findings and future steps in heritage management occur.

10.6 Conclusion

The key findings of the ACHA are as follows:

- MW433 and MW880 are located within the lands of the Barkandji and Wirajduri people respectively, who were consulted and represented throughout the ACHA process.
- Archaeological field surveys of MW433 and MW880 were undertaken by an EMM archaeologist and representatives of the RAP organisations. The field survey conducted a general overview of the project area and targeted areas with high visibility and exposure.
- Both sites exhibited levels of disturbance from construction of the original MWP and ancillary infrastructure, and cropping is evident across the southern portion of MW880.

10.6.1 MW433 – Round Hill

- MW433 was identified by RAPs as being part of the broader Round Hill site centred ~1.2 km east of the site and comprised a quarry site and extensive artefact scatter (over 3,000 stone artefacts were identified).
- One new Aboriginal site was identified at MW433. MW433-OS1 consists of >100 stone artefacts scattered across the northern portion of the project site along the ridge crest and upper slope, which decreases in density moving downslope towards the south.
- MW433-OS1 was identified as a site with high scientific values based on the research potential, rarity and representativeness, and integrity of the site.
- The proposed site layout at MW433 was refined to minimise impacts to the more sensitive parts of the site along the crest and upper slope. Relocation of the construction camp and waste water treatment spray field reduced the disturbance of the highly sensitive area by approximately 46%.
- The implementation of management measures, including an ACHMP will reduce impacts to Aboriginal cultural heritage and intergeneration equity at MW433 to levels considered acceptable by the RAPs.

10.6.2 MW880 – Milne

- There were no areas of cultural value identified near MW880.
- No artefacts were identified at MW880, therefore there will be no impacts to Aboriginal cultural heritage or intergenerational equity from the project at this site.

11 Traffic and transport

11.1 Introduction

A traffic impact assessment (TIA) was completed by EMM to assess the potential traffic and transport impacts associated with the construction and operation of the project. The TIA was prepared in general accordance with the relevant government assessment requirements, guidelines and policies. Traffic associated with the operation of the compressor stations will be negligible, therefore the TIA relates primarily with the construction phase of the project.

The TIA is provided in full in Appendix G.

11.2 Assessment requirements and method

The TIA included:

- a review of relevant statutory and policy information;
- a high-level assessment of the construction traffic site access;
- a desktop traffic assessment based on publicly available information;
- identification and consideration of traffic-related issues and constraints; and
- a review of relevant information to determine the need for a cumulative traffic impact assessment.

The TIA was prepared using available information, including satellite imagery, photographs taken at each site location and information provided by APA. Due to the remote location of the sites and minimal construction traffic generated, traffic surveys were not performed. Traffic data from Transport for New South Wales (TfNSW) Traffic Volume Viewer website was also used for MW433, however was not available for MW880.

The report focused on general descriptions of the existing road and intersection geometry at each site location, a description of the construction activities and related construction traffic volumes, and any likely traffic impacts and potential road safety risks. Based on low traffic volumes and remote site locations, the threshold for Signalized Intersection Design and Research Aid (SIDRA) modelling and assessment of intersection upgrades was not met, therefore these assessments were not undertaken. There is minimal operational traffic anticipated as a result of this project, therefore this TIA only considered construction traffic.

The full method is included in Appendix G.

11.3 Existing environment

11.3.1 MW433 – Round Hill

The MW433 site is accessed via the pipeline easement from Wilcannia-Wanaaring Road, located 2 km to the south-east, and the Barrier Highway which connects Wilcannia with Broken Hill to the west, and Cobar to the east.

i Wilcannia-Wanaaring Road

Wilcannia-Wanaaring Road is a local road which carries local and regional traffic between Wilcannia (100 km to the south-west) and Wanaaring (120 km to the north-east). Wilcannia-Wanaaring Road is variable in width and condition, but is typically unsealed with one lane each way, a posted speed limit of 100 km/h and is approved for heavy vehicles up to 19 m long and under 50 tonnes (see Plate 11.1).

Wilcannia-Wanaaring Road (Woore Street) intersects with the Barrier Highway (Myer Street) in Wilcannia town centre. Wilcannia-Wanaaring Road carries fewer than 100 vehicles per day, and currently meets Austroads design standards for safety and capacity (Austroads 2016).

Source: APA

Plate 11.1 Wilcannia-Wanaaring Road (looking south) near MW433

ii Barrier Highway

The Barrier Highway is a State road which carries regional and interstate traffic in an east-west alignment from Nyngan, NSW to Gawler, SA. The Barrier Highway is sealed with one lane each way, a posted speed limit of 110 km/h, and is suitable for heavy vehicles (See Plate 11.2).

Traffic data for the Barrier Highway was obtained from the TfNSW website, for a location east of Broken Hill. Traffic at this location comprises approximately 600 vehicles per day, of which approximately 30% comprises heavy vehicles. The Barrier Highway currently meets Austroads design standards for safety and capacity.

Source: Google Maps

Plate 11.2 Barrier Highway (looking west) near Wilcannia

11.3.2 MW880 – Milne

The MW880 site is accessed via Crown Camp Road, located immediately to the north of the site, and The Gipps Way, which connects Condobolin to the north with West Wyalong to the south. There is also a short (1.2 km) stretch of road where The Gipps Way merges with the Lachlan Valley Way, and then returns to The Gipps Way. The Lachlan Valley Way has similar features to The Gipps Way.

i Crown Camp Road

Crown Camp Road is a local road which carries local traffic between The Gipps Way (8 km to the north east) and Ungarie (28 km to the south). Crown Camp Road has a mix of sealed and unsealed road surfaces, with no lane markings on unsealed sections. It has a posted speed limit of 100 km/h and is approved for heavy vehicles up to 19 m long and under 50 tonnes (see Plate 11.3).

Crown Camp Road intersects with The Gipps Way 8 km north-east of the site, and carries fewer than 100 vehicles per day. Crown Camp Road currently meets Austroads design standards for safety and capacity.

Source: EMM

Plate 11.3 Crown Camp Road (looking west) near MW880

ii The Gipps Way

The Gipps Way is a regional road which carries local and regional traffic between Condobolin to the north and West Wyalong to the south. The Gipps Way is sealed with one lane each way, a posted speed limit of 110 km/h, and is approved for heavy vehicles up to 19 m long and under 50 tonnes (see Plate 11.4).

The Gipps Way intersects with the Lachlan Valley Way immediately to the south of Condobolin, and is estimated to carry fewer than 400 vehicles per day. The Gipps Way currently meets Austroads design standards for safety and capacity.

Source: EMM

Plate 11.4 The Gipps Way (looking south-east) near junction with Crown Camp Road

11.4 Project activities

11.4.1 Construction equipment

The majority of construction activities and associated traffic movements will take place in daylight hours between 7:00 am and 6:00 pm.

A variety of heavy and light vehicles will be required, including semi-trailers, prime movers and floats, tippers, water trucks, loaders, dozers, excavators, drill rigs, a 25 tonne franna crane and hiab trucks. The largest construction vehicle will either be a semi-trailer or a prime mover and float and will not exceed 26 m in length. Construction traffic will also include transport of construction workers from local accommodation to site at MW880.

At MW433, equipment will be mobilised from South Australia via Broken Hill, or from the east coast via Cobar and Dubbo or Orange. If on-site water cannot be used, water will be trucked to site from Wilcannia.

At MW880, equipment will be mobilised from the east coast via Condobolin and either Dubbo or Orange. Water will be trucked to site from Ungarie or Condobolin.

11.4.2 Construction workforce

The construction workforce for each site will be an average of 40 workers, with a peak workforce of 80 workers on a three-weeks-on, one-week-off roster on a rotational basis.

i MW433 – Round Hill

At MW433, the construction workforce will be accommodated in a temporary construction camp located within the footprint of the site. Mobilisation and demobilisation of workers will be by bus to and from Broken Hill airport for each roster. The temporary construction camp will be entirely self-contained, featuring dining, leisure and recreational facilities on site. Workers will likely stay on site during their rosters, and there will be negligible workforce travel to nearby population centres.

ii MW880 – Milne

At MW880, there are two options for the accommodation of the construction workforce. The preferred option is to house the workforce in short-term accommodation in Condobolin (42 km by road from the site), with potential overflow accommodation in West Wyalong (85 km by road from the site), if required. Workers will be driven to and from site each day, with between one and four buses and between five and eight cars required per day, depending on workforce numbers. The preferred travel route will be from MW880 to The Gipps Way along Crown Camp Road, and then either north to Condobolin along The Gipps Way, or south to West Wyalong along The Gipps Way, West Wyalong-Condobolin Road and Ungarie Road.

The alternative option is to use a temporary accommodation camp on site (as per MW433), where mobilisation and demobilisation of the workforce will be to and from Dubbo airport for each roster.

The TIA assessed the movement of workers between MW880 and local accommodation, however this will not occur if on-site accommodation is used.

11.4.3 Peak daily traffic – construction

Traffic associated with the construction phase of the project will involve the daily movement of a range of light and heavy vehicles to and from the compressor station sites. This will include movement of workforce at MW880, and trucking of water to both sites. Peak daily traffic movements will vary from day-to-day, depending on construction activities, and are summarised in Table 11.1 and Table 11.2.

Table 11.1 Peak daily traffic generation – MW433

Construction stage	Daily light vehicle trips	Daily heavy vehicle trips
Mobilisation of construction equipment and establishment of access	8	4
Earthworks, piling and establishment of construction accommodation	6	8
Installation of structural, mechanical and piping structures, and electrical and instrumentation equipment	12	7
Pre-commissioning and commissioning of compressor station	4	0
Demobilisation of construction and commissioning equipment	8	4

Table 11.2 Peak daily traffic generation – MW880

Construction stage	Daily light vehicle trips	Daily heavy vehicle trips
Mobilisation of construction equipment and establishment of access	13	6
Earthworks, piling and establishment of construction accommodation	13	11
Installation of structural, mechanical and piping structures, and electrical and instrumentation equipment	20	11
Pre-commissioning and commissioning of compressor station	11	2
Demobilisation of construction and commissioning equipment	13	5

11.5 Impact assessment

11.5.1 MW433 – Round Hill

Existing traffic volumes are low, and the addition of project-related traffic during the construction phase will have a negligible impact on the capacity and safety of the existing road network. Wilcannia-Wanaaring Road and the Barrier Highway will continue to meet Austroads design standards for safety and capacity with project related traffic taken into account.

Access to the site via the pipeline easement is located at a straight section of road, therefore there are no traffic safety issues related to sight-distance for traffic entering or exiting the easement from Wilcannia-Wanaaring Road.

Some vehicles associated with the mobilisation and demobilisation of construction equipment may exceed the maximum weight or length limits for Wilcannia-Wanaaring Road, and may need permits from the National Heavy Vehicle Regulator (NHVR) to use this road.

11.5.2 MW880 – Milne

Existing traffic volumes are low, and the addition of project-related traffic during the construction phase will have a negligible impact on the capacity and safety of the existing road network. Crown Camp Road and The Gipps Way will continue to meet Austroads design standards for safety and capacity with project related traffic taken into account.

Access to the site via Crown Camp Road, and the intersection of The Gipps Way and Crown Camp Road are located at straight sections of road, therefore there are no traffic safety issues related to sight-distance for traffic entering or exiting the site from Crown Camp Road, or at the intersection of Crown Camp Road and The Gipps Way.

Some vehicles associated with the mobilisation and demobilisation of construction equipment may exceed the maximum weight or length limits for The Gipps Way and Crown Camp Road, and may need permits from the NHVR to use these roads.

11.6 Commitments and management measures

As a result of the negligible impact on road capacity and safety as a result of the project, there is no requirement for project-specific mitigation or management measures. However, the following commitments informed by the TIA and other technical studies will minimise traffic and transport related impacts associated with the project. These commitments will be detailed in the CEMP and OEMP where relevant.

Table 11.3 Summary of commitments – traffic and transport

Stage	Commitment ID	Commitment
Construction	AQ-02	Construction vehicles with potential for loss of loads (such as dust or litter) will not be overloaded and will be covered when using public roads.
Construction Operation	GH-02	10% blended ethanol fuel will be used for petrol-powered light vehicles, where practicable.
Construction	TT-01	A Traffic Management Plan (TMP) will be prepared for the project, and will incorporate all traffic related requirements from the CEMP.
Construction	TT-02	Transport routes will be clearly marked or communicated, and speed limits enforced.
Construction	TT-03	After arrival at the project site all vehicles, plant and equipment will remain within the construction footprint and on approved roads and tracks.
Construction Operation	TT-04	Any oversized or over weight loads will be transported in accordance with the requirementsof the relevant road authority.

11.7 Conclusion

The key findings of the TIA are as follows:

- Existing traffic volumes are low, and the addition of project-related traffic during the construction phase will have a negligible impact on the capacity and safety of the existing road network.
- No specific management measures are required as a result of the project, but commitments including a TMP will assist to reduce potential impacts when operating vehicles on public roads.
- Permits from the NHVR will be acquired prior to mobilisation for any vehicles that exceed the length or weight limits for the relevant roads.

12 Visual

12.1 Introduction

A visual impact assessment (VIA) was completed by EMM to assess the potential visual impacts associated with the construction and operation of the project.

The VIA is provided in full in Appendix H.

12.2 Assessment requirements and method

There are no Australian Federal, NSW State Government or Local Government Authority planning policies, guidelines or standards applicable to this assessment. This VIA was therefore assessed in accordance with Australian best practice guidance:

- Guidelines for Landscape and Visual Impact Assessment (GLVIA) (United Kingdom Landscape Institute of Environmental Management and Assessment 2013); and
- Guidance Note for Landscape and Visual Assessment (Australian Institute of Landscape Architects 2018).

The method for the VIA was based on a desktop review of available information, fieldwork observations and photography and analysis of geographic information systems (GIS).

The assessment was undertaken in seven stages:

- **stage 1: view type and context** – the existing landscape character was described;
- **stage 2: visibility assessment** – this was the baseline visibility assessment identifying the zone of visibility for the project and was established using GIS analysis to determine locations where views of the project elements would be theoretically possible;
- **stage 3: view-point selection** – key public and private viewpoints of the project were selected;
- **stage 4: magnitude of change** – the magnitude of visual change as a result of the project was assessed;
- **stage 5: visual sensitivity** – the capacity of the landscape to absorb change without a loss of quality was determined;
- **stage 6: evaluation of significance** – the significance of visual change in the landscape was determined as a function of the magnitude of visual change and the sensitivity of a receptor; and
- **stage 7: mitigation** – if the visual change was considered to be significant, visual aspects of the project could be modified and mitigated, and residual visual impacts be determined.

The full method is described in Appendix H.

12.3 Existing environment

12.3.1 MW433 – Round Hill

i Natural environment

MW433 is located within the Mulga Lands bioregion and the White Cliffs Plateau subregion. The bioregion is characterised by flat to undulating plains with strips of low hills. The dominant vegetation types are mulga and eucalypt woodlands.

ii Built features

MW433 hosts existing infrastructure related to the construction and operation of the MWP and the MSEP. A communications tower operated by Telstra is located 30 m north-east of the site boundary, of steel lattice construction with an approximate height of 100 m.

Wilcannia-Wanaaring Road is an unsealed local road located approximately 2.1 km from the site of the proposed compressor station.

iii Landscape character

With the exception of the existing pipeline infrastructure on site, the communications tower and the pipeline easement, the landscape surrounding MW433 is not significantly modified, and retains its open, natural features. The terrain is generally flat with some sparse vegetation that acts to break up the uniformity of the view.

The view towards the existing infrastructure from the communications tower is presented in Plate 12.1.

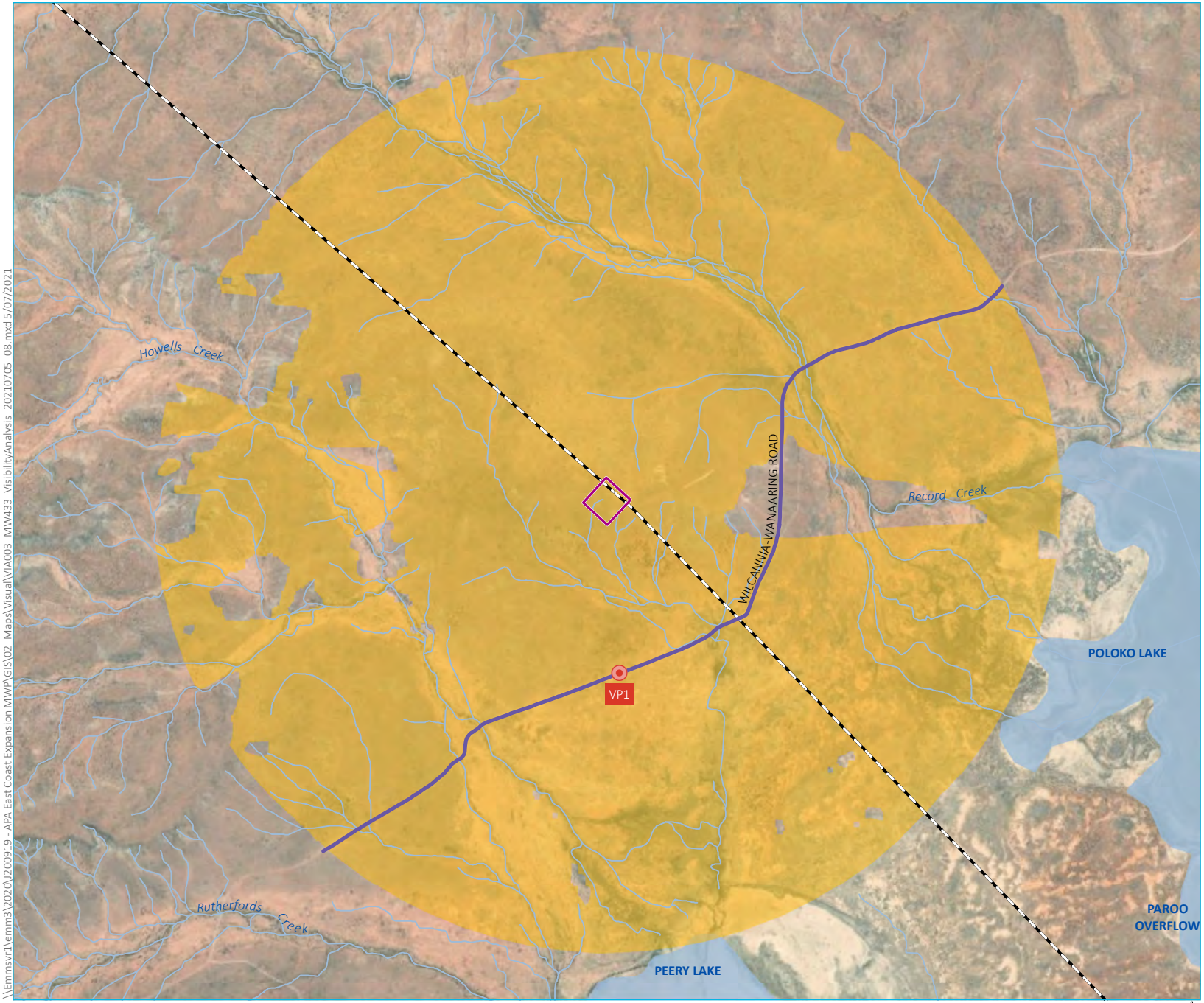
Plate 12.1 View of existing infrastructure and landscape character at MW433 from communications tower looking south-west

iv Visibility and visual sensitivity

There are no residences within 5 km, but the compressor station will be visible to motorists on Wilcannia-Wanaaring Road, to the south of MW433. Wilcannia-Wanaaring Road is a local road which carries local and regional traffic, with a posted speed limit of 100 km/h.

The only sensitive receptors for visual impacts at MW433 will be motorists driving along Wilcannia-Wanaaring Road. Therefore, viewpoint VP1 has been selected for the visibility analysis at MW433 as it is representative of views experienced by motorists travelling on this road.

The visibility analysis for MW433 is presented in Figure 12.1.



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Source: EMM (2021); DFSI (2017); GA (2011); ASGC (2006); ESRI (2021)

MW433 Round Hill - visibility analysis

APA - East Coast Grid Expansion
Modification 1
Figure 12.1

EMM
creating opportunities

12.3.2 MW880 – Milne

i Natural environment

MW880 is located within the South Western Slopes bioregion and Lower Slopes subregion. The bioregion is characterised by undulating and hilly ranges and isolated peaks set in wide valleys at the apices of the Riverina alluvial fans. Dominant native vegetation is grey box woodlands with yellow box, white cypress pine and belah, however the surrounding landscape is predominantly cleared and cultivated, with lines of trees along roads and fence lines.

ii Built features

MW880 hosts existing infrastructure related to the construction and operation of the MWP and the MSEP, and a communications tower operated by Telstra, of steel lattice construction with an approximate height of 100 m.

Crown Camp Road is an unsealed local road located adjacent to the northern site boundary.

iii Landscape character

In addition to the existing pipeline infrastructure on site, the communications tower and the pipeline easement, the landscape surrounding MW880 has been significantly modified by vegetation clearance and agriculture. The terrain is generally flat with vegetation along roads and fence lines that acts to break up the uniformity of the view.

The view towards the existing infrastructure from the access to the site, west of the proposed compressor station location is presented in Plate 12.2.

Plate 12.2 View of existing infrastructure and landscape character at MW880 showing line of trees along Crown Camp Road and existing Telstra tower

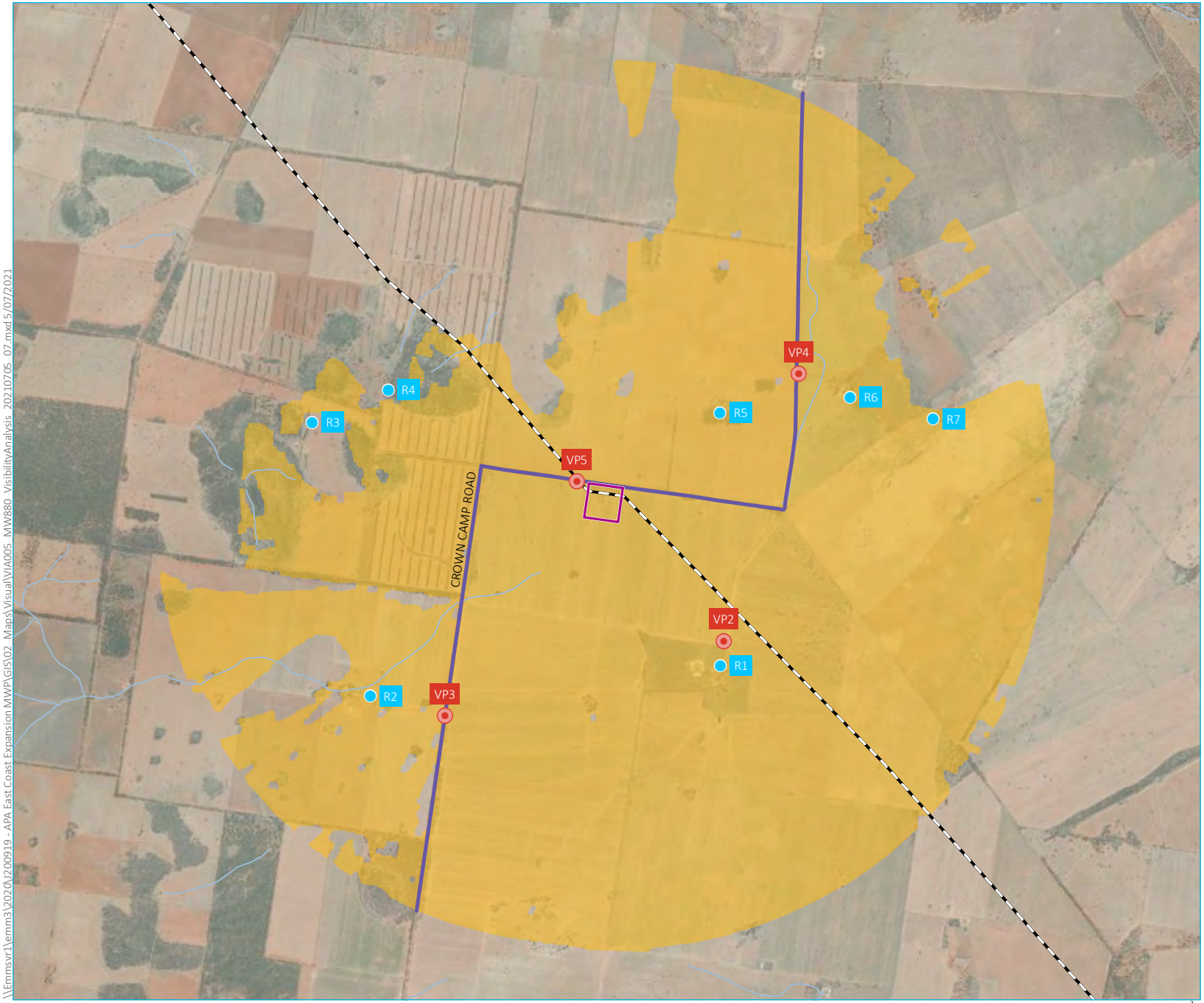
iv Visibility and visual sensitivity

There are seven residences located within 5.0 km of MW880, and built elements of the site may be visible or partly visible from five of these residences (R1, R2, R5, R6 and R7). Views from all residences will be partly screened by vegetation. Built elements will also be visible to motorists travelling along Crown Camp Road, a local road with a posted speed limit of 100 km/h.

Viewpoints VP2 to VP5 were selected for the visibility analysis at MW880 as they are representative of views likely to be experienced by local residents, or experienced by motorists travelling on Crown Camp Road. These are presented in Table 12.1 and Figure 12.2.

Table 12.1 Selected viewpoints for MW880

Viewpoint	Address	Reason for selection
VP2	3208 Crown Camp Road	This viewpoint is from sensitive receptor MW880-R1 located 2.5 km south-east of the proposed compressor station location. This view is representative of that experienced by residents at MW880-R1.
VP3	2557 Crown Camp Road	This viewpoint is from sensitive receptor MW880-R2 located 3.6 km south-west of the proposed compressor station location. This view is representative of that experienced by residents at MW880-R2.
VP4	3368 Crown Camp Road	This viewpoint is from sensitive receptor MW880-R6 located 3.1 km north-east of the proposed compressor station location. This view is representative of that experienced by residents at MW880-R6.
VP5	Crown Camp Road	This viewpoint is from Crown Camp Road located adjacent to MW880. This view is representative of that experienced by motorists travelling along Crown Camp Road.



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Source: EMM (2021); DFSI (2017); GA (2011); ASGC (2006); ESRI (2021); ESRI (2021)

MW880 Milne - visibility analysis

APA - East Coast Grid Expansion
Modification 1
Figure 12.2

EMM
creating opportunities

12.4 Impact assessment

The most visible element of the compressor station will be the exhaust stack, which will have a maximum height of 17.25 m above ground level.

12.4.1 MW433 – Round Hill

While the landscape surrounding MW433 is predominantly natural, there are existing industrial and infrastructure elements on and adjacent to the site, such as the Telstra communications tower, that allow the landscape to absorb similar development without a significant change in its character. The flat terrain and sparse vegetation allow the site to be visible from further away, however the lack of high and moderate sensitive receptors means that the visual sensitivity of the view from VP1 remains as low sensitivity.

Visible elements of the compressor station will have low levels of contrast and scale and will integrate moderately well with the existing natural and built features of the landscape. The magnitude of change in the view that will occur as a result of the construction and operation of the compressor station will be moderate.

Most motorists will experience a transient view of the compressor station from VP1 while travelling along Wilcannia-Wanaaring Road at the posted speed limit of 100 km/h. Due to the flat terrain and limited vegetation, the site will experience limited screening, however the distance from VP1 to the site will reduce the scale and degree of contrast of the compressor station, and it will be difficult to discern the change in landscape while travelling at speed. Any night time lighting will be potentially visible by passing motorists during the short (three-month) commissioning phase. Therefore, the visual impact of the project from VP1 will be slight/moderate and is considered not significant.

12.4.2 MW880 – Milne

The landscape surrounding MW880 has been significantly modified, and there are existing industrial and infrastructure elements on and adjacent to the site, such as the Telstra communications tower that allow the landscape to absorb similar development without a significant change in its character. Views of the site will also be partially screened by terrain and vegetation, and distance from viewpoints will reduce the scale and degree of contrast for visible elements of the compressor station.

Visible elements of the compressor station will have moderate levels of contrast and scale and there will be some level of integration with the existing natural and built features of the landscape.

Any night time lighting will be potentially visible by nearby residences and passing motorists during the short (three-month) commissioning phase.

The visual sensitivity, magnitude of change and significance assessment for each viewpoint at MW880 is presented in Table 12.2. The existing view from VP2, is presented in Plate 12.3.

Table 12.2 Visual impact assessment at MW880

Viewpoint	Visual sensitivity	Magnitude of change	Significance assessment
VP2	Moderate	Moderate	There is vegetation screening present that will screen the development from most locations at property R1. The visible elements of the compressor station will make up a small extent of the view from VP2, and the distance from VP2 to the site, and the presence of trees along Crown Camp Road will reduce the scale and degree of contrast for visible elements of the compressor station. The proposed compressor station will have some degree of visual integration due to the muted colour scheme of the vent stack, and the presence of existing built elements at the site, particularly the Telstra communications tower. The visual impact of the project from VP2 will be moderate and is considered **not significant**.
VP3	Moderate	Moderate	The presence of vegetation around property R2 and along Crown Camp Road will act to screen the compressor station from VP3, and the distance from VP3 to the site will reduce the scale and degree of contrast for visible elements of the compressor station. The proposed compressor station will have some degree of visual integration due to the muted colour scheme of the vent stack, and the presence of existing built elements at the site, particularly the Telstra communications tower. The visual impact of the project from VP3 will be slight/moderate and is considered **not significant**.
VP4	Moderate	Moderate	The presence of vegetation around property R6 and along Crown Camp Road will act to screen the compressor station from VP4, and the distance from VP4 to the site will reduce the scale and degree of contrast for visible elements of the compressor station. The proposed compressor station will have some degree of visual integration due to the muted colour scheme of the vent stack, and the presence of existing built elements at the site, particularly the Telstra communications tower. The visual impact of the project from VP4 will be slight/moderate and is considered **not significant**.
VP5	Low	Moderate	Most motorists will experience a transient view of the compressor station from VP5 while travelling along Crown Camp Road at the posted speed limit of 100 km/h, and it will be difficult to discern the change in landscape from glimpsed views through vegetation while travelling at speed. The visual impact of the project from VP5 will be slight/moderate and is considered **not significant**.

Plate 12.3 View of MW880 from VP2

12.5 Commitments and management measures

While the views from VP1 to VP5 have been assessed as not significant, the following commitments will minimise visual impacts associated with the project. These commitments will be detailed in the CEMP and OEMP where relevant.

Table 12.3 Summary of commitments – visual

Stage	Commitment ID	Commitment
Design	VI-01	The design of the compressor station and associated infrastructure will include colour tones and material finishes that are sympathetic to existing buildings, background vegetation or landscape;
Construction	VI-02	Light generated during construction will be managed in general accordance with the requirements in Australian Standard AS 4282-1997 Control of the Obtrusive Effects of Outdoor Lighting.
Construction	VI-03	Vegetation can be used to screen views of visible elements of the compressor station at MW880 if requested by, and in consultation with the landholder at sensitive receptor R1.

12.6 Conclusion

The key findings of the VIA are as follows:

- The significance assessment has determined that there will be no significant visual impacts as a result of the project.

- At MW433, the majority of views of the project will be transient views from Wilcannia-Wanaaring Road where motorists will be travelling at speed, and there will only be glimpsed views of project elements through intervening vegetation and terrain.

- At MW880, elements of the project will be partially visible from five residences within 5 km of the site. The most impacted receiver will be receptor R1 from VP2, where the project will be visible from the driveway, however the distance of 2.5 km will reduce the scale and degree of contrast for visible elements of the compressor station. The visual impact is not considered significant, however vegetation can be planted in consultation with the landholder if requested. Mitigation measures incorporated into the design of the compressor station will further mitigate any impacts.

13 Hazard and risk

13.1 Introduction

A preliminary hazard assessment (PHA) was completed by Sherpa Consulting in accordance with Hazardous Industry Planning Advisory Paper (HIPAP) No. 6: Hazard Analysis (DoP 2011a), and HIPAP No. 4: Risk Criteria for Land Use Safety Planning (DoP 2011b) to assess the potential hazards associated with the construction and operation of the project. In addition to the PHA, EMM undertook a high-level bushfire assessment to determine any risks bushfires present to the project, and how to mitigate those risks.

The PHA is provided in full in Appendix I.

13.2 Assessment requirements and method

A quantitative risk assessment was undertaken in accordance with the requirements of HIPAP No. 6 to determine the risk posed by the compressor stations on the surrounding land use, and to determine whether the risk posed by the project complied with the risk criteria specified in HIPAP No. 4.

The PHA included:

- a review of information on the new compressor stations, including:
  - locations;
  - equipment to be installed;
  - process parameters (pressures and temperatures);
- details of AS2885 to inform the context of the study;
- a review of any risk criteria requirements from HIPAP No. 4;
- a review of available information for compressor station hazard identification;
- confirmation of likely hazard scenarios;
- a consequence and frequency assessment of the identified scenarios, with key assumptions fully documented;
- a risk assessment that combined the results of the consequence and frequency assessment and the risk to neighbouring land uses;
- use of Gexcon Effects[2], DNV GL Phast[3] and Gexcon Risk Curves[4] modelling software to generate risk contours; and
- recommendations for risk reduction measures.

[2] For more information see https://www.gexcon.com/au/products-services/effects/

[3] For more information see https://www.dnv.com/software/services/phast/index.html

[4] For more information see https://www.gexcon.com/au/products-services/riskcurves-software/

In addition, EMM's high-level bushfire assessment included a review of the project in accordance with the NSW Rural Fire Service (RFS) guideline Planning for Bush Fire Protection 2019 (RFS 2019).

13.3 Existing environment

13.3.1 Process

The proposed compressor stations will take gas from the MWP upstream of the existing pig receiver, pass through the Mars 100 gas turbine driven compressor and discharge into the MWP downstream of the existing pig launcher.

Hazards may arise as a result of the use of natural gas, which is flammable.

13.3.2 Risk criteria

DPIE describe risk criteria with the following general principles:

- the avoidance of all avoidable risks;
- the risk from a major hazard should be reduced wherever practicable, even where the likelihood of exposure is low;
- the effects of significant events should, wherever possible, be contained within the site boundary; and
- where the risk from an existing installation is already high, further development should not pose any incremental risk.

DPIE then prescribes risk levels and limits of exposure for different land uses, including:

- Sensitive: Hospitals, child-care facilities, and old age housing.
- Residential: Residential developments and places of continuous occupancy such as hotels and tourist resorts.
- Commercial: Commercial developments, including offices, retail centres and entertainment centres.
- Recreational: Sporting complexes and active open space areas.
- Industrial: Limit of exposure at site boundary.

These criteria are used to inform the risk and consequential permissibility of hazardous developments in areas with sensitive land uses.

13.3.3 Bushfire

The NSW RFS bushfire prone land check tool (RFS 2021) was used to determine if either of the sites were located within a designated bushfire prone area. The tool indicated that MW433 is located within a designated bushfire prone area, however MW880 is not.

This means that the development at MW433 will need to comply with the guideline Planning for Bush Fire Protection 2019 (RFS 2019).

The existing infrastructure related to the MWP and MSEP are covered under APA's Bushfire Management Plan (BMP) (APA 2020b). The BMP sets out roles, responsibilities and procedures to minimise the risk of causing a bushfire, and to minimise the risk of damage to APA assets as a result of bushfire. This BMP will apply to the construction and operation of the project.

13.4 Hazard risk assessment

The PHA identified hazards, determined the consequences of the hazard being realised and the frequency of the hazard occurring to determine the overall risk.

13.4.1 Hazard identification

Hazard identification established scenarios from the operation of the compressor station that could result in adverse impacts. The potential for external natural hazards or environmental conditions (such as earthquakes or storm events) that could impact the compressor station was also assessed, but no adjustments were required to be considered for the assessment.

Potential hazardous scenarios identified in the PHA included the release and combustion of natural gas from the compressor station itself, or inlet/outlet piping to connect the compressor station to the MWP.

13.4.2 Risk analysis

Risk analysis software was used to generate site-specific contours which represented the risk of fatality and property damage at distances from the compressor station.

For MW433 the most conservative (sensitive land use) contour extends beyond the site boundary but does not intersect with any residential or commercial properties or public spaces, therefore the risk of fatality at MW433 is negligible.

For MW880 the most conservative (sensitive land use) contour extends beyond the site boundary but does not intersect with any residential or commercial properties, or other sensitive land uses. The contour does intersect with Crown Camp Road for a distance of 760 m, however motorists travelling along this road at the posted speed limit of 100 km/h will only be within this contour for a period of approximately 28 seconds. Crown Camp Road is a local road carrying low levels of traffic (less than 100 vehicles per day), therefore the risk of fatality at MW880 is negligible.

For both sites, the risk contour for property damage did not extend beyond the site boundary, therefore there is no risk to property as a result of this project.

Both MW433 and MW880 were found to comply with DPIE's most conservative risk criteria.

13.4.3 Bushfire risk

The potential ignition of unplanned bushfires from the project are likely to be from the following sources:

- inadequate storage of flammable liquids (eg fuel) and other chemicals;
- vehicle and machine movement over vegetation;
- sparks generated from permitted hot works (eg welders and grinders);
- human error, such as non-compliance of hot works procedures;

- diesel generators, causing ignition of vegetation;
- electrical equipment failure, causing ignition of vegetation.

13.5 Commitments and management measures

While the PHA determined that safety risks as a result of the project are negligible, the following commitments will further minimise risks and improve safety outcomes associated with the project. These commitments will be detailed in the CEMP and OEMP where relevant.

Table 13.1 Summary of commitments – hazard and risk

Stage	Commitment ID	Commitment
Construction Operation	HR-01	Emergency Response Plans will be developed and implemented for both the construction and operations phases of the project.
Construction Operation	HR-02	Dangerous goods, as defined by the Australian Dangerous Goods Code, and flammable and combustible liquids will be stored and handled in accordance with all relevant Australian Standards.
Construction Operation	HR-03	Routine visual monitoring and recording of chemicals and fuel storage facilities will occur.
Design Construction Operation	HR-04	Project design, construction and operation, including designated asset protection zones will comply with APA's existing Bushfire Management Plan.
Construction Operation	HR-05	Open fires, including open barbeques, billy fires, and brush burning, will not be permitted on site.
Construction Operation	HR-06	Contractors undertaking hot work operations will have access to a validated portable fire extinguisher.
Construction Operation	HR-07	The project will implement the APA HSE Management System.

13.6 Conclusion

The key findings of the PHA are:

- The quantitative risk assessment shows that the relevant HIPAP No. 4 risk criteria are met for the most sensitive land uses;
- The risk of fatalities as a result of the project at MW433 and MW880 is negligible.
- The risk of property damage as a result of the project at MW433 and MW880 is negligible.
- Mitigation measures have been incorporated into the design of the compressor station and processes and procedures to reduce risk.

The high-level bushfire assessment concluded that the project will be constructed and operated in accordance with the NSW RFS guideline Planning for Bush Fire Protection 2019 (RFS 2019).

14 Socio-economic

14.1 Introduction

A socio-economic assessment (SEA) was completed by EMM to assess the potential socio-economic benefits and impacts to the local area, region and state, associated with the construction and operation of the project.

The SEA is provided in full in Appendix J.

14.2 Assessment requirements and method

A broad scale desktop assessment of key socio-economic impacts and benefits was prepared in accordance with guidance provided by DPIE. The assessment focused on:

- determination of the benefits that would be brought to NSW through increasing the capacity of the MWP;
- consideration of the impacts of construction, including how the construction workforce would be accommodated;
- consideration of the operational impacts in the vicinity of each site.

The assessment included:

- a review of the existing social environment surrounding the project locations;
- a desktop assessment of potential socio-economic impacts and benefits including:
    - project workforce;
    - housing and accommodation;
    - local and regional procurement; and
    - employment opportunities.

The SEA was prepared using the available information through desktop research in conjunction with project information provided by APA.

14.3 Existing environment

The compressor station locations have been selected partly based on their distance from sensitive receptors, including regional towns and private residences.

MW433 is located within the Central Darling Shire LGA and MW880 within Lachlan Shire LGA. Due to the large project area and distance between each site location and between the compressor station sites and local towns, the SEA focused predominantly on regional LGAs, and less so on individual towns and communities surrounding the proposed compressor stations.

14.3.1 Socio-economic baseline

Located between approximately 400 and 1,000 km west and north-west of Sydney, Central Darling LGA and Lachlan LGA are predominately characterised as a rural and remote areas with a total population of 8,027 (ABS 2016). The top three industries of employment across the two LGAs are agriculture, forestry and fishing; government administration and defence; and education. Unemployment within the two LGAs (9%) is high in comparison to broader NSW (6.6%), particularly in Central Darling Shire LGA where the unemployment rate is 11.2%.

The Far West Regional Plan (DPIE 2017a) and Central West and Orana Regional Plan (DPIE 2017b) are both 20-year strategies for the development of western NSW. The Far West Regional Plan covers the Central Darling LGA where MW433 is located, and the Central West and Orana Regional Plan covers the Lachlan LGA where MW880 is located. The plans have been developed by DPIE and provide insight towards the land use planning priorities and the future of the Far West and Central West regions.

The goals of the Far West Regional Plan include a diverse economy with efficient transport and infrastructure networks, preservation of the exceptional semi-arid landscape and strong and connected communities.

The goals of the Central West and Orana Regional Plan include a diverse regional economy, a stronger, healthier environment, quality infrastructure networks and dynamic, vibrant and healthy communities.

14.4 Impact assessment

14.4.1 Workforce and employment

i Construction

The project's construction workforce is likely to be comprised of a mix of local employees from surrounding regional communities and FIFO and DIDO employees, due to the remoteness of the site and the highly specialised nature of the work. It is anticipated that a significant proportion of the project's overall workforce will be sourced from within NSW, ensuring that employment opportunities and related economic benefits remain within the State.

While the FIFO-DIDO workforce is unlikely to create opportunities for socio-economic benefits through direct employment within the local LGAs, the project is likely to procure a range of services from local businesses to support the construction process. These are likely to include services such as earth moving, fencing, and supply of water and food to the construction camps.

At MW433, workforce related social impacts to the community will be avoided due to the remote location of the workforce. At MW880, the workforce will likely be housed in existing local short-term accommodation such as hotels, motels and caravan parks in Condobolin, with potential overflow accommodation in West Wyalong if required. This accommodation strategy is expected to bring significant direct economic benefits to local accommodation providers, as well as flow-on economic opportunities for businesses such as food, drink and recreation providers.

Therefore, the construction workforce is likely to have a small positive impact on local employment, and a larger positive impact on Australian and NSW employment.

ii Operation

Following the construction of the compressor stations, the workforce required for the operation and maintenance of the project will be minimal and likely consist of APA's existing operational workforce. Some local employment may occur with local companies providing appropriate services such as fencing and weed management.

Therefore, the operational workforce will have limited impacts on local, State or Australian employment.

14.4.2 Housing and accommodation

i Construction

At MW433, a temporary accommodation camp will be constructed within the compressor station sites to house the project's construction workforce. At MW880, APA's preferred option is to house the construction workers in short-term accommodation in Condobolin with potential overflow accommodation in West Wyalong if required. If local accommodation cannot be used, the secondary option will be to use an on-site temporary accommodation camp.

a MW433 – Round Hill

At MW433 (and as a secondary option at MW880), FIFO-DIDO employees will be entirely accommodated within the temporary accommodation camps. The proposed temporary accommodation camps will be entirely self-contained, featuring dining, leisure, and recreational facilities onsite. Workers will likely stay on-site during their shifts, therefore there will be negligible impacts on housing and accommodation in local communities. Procurement of services and food is likely from local businesses where practicable. Use of on-site workforce accommodation will also alleviate concerns regarding workplace health and safety associated with driver fatigue and exhaustion amongst employees. The temporary accommodation camps will be completely removed following the construction phase. As a result of the temporary accommodation camp at MW433, the likely impact of project construction on housing and accommodation will be negligible.

b MW880 - Milne

Initial consultation with accommodation providers in Condobolin indicated that local capacity would be able to provide accommodation for a maximum of 46 members of the workforce, with a shortfall of approximately 22 rooms during peak times. However, further consultation with Riverview Caravan Park in Condobolin (owned by Lachlan Shire Council) indicated that additional capacity would be available for a maximum period of two months. Two-bedroom transportable temporary accommodation could be used to house 42 workers on 21 powered sites, which would raise the number of available accommodation units to 88, mitigating any shortfalls during the two-month workforce peak. While Condobolin has been identified as the preferred accommodation location due to its proximity, a further 18 accommodation providers were identified in West Wyalong.

Potential impacts associated with using local short-term accommodation include straining the capacity of local accommodation providers. This could have flow-on negative impacts on local tourism and long-term accommodation users by taking up additional capacity. In addition, the presence of a non-resident workforce could have potential negative impacts on the local community as a result of anti-social behaviour in the town.

In order to minimise impacts and maximise benefits, APA will consistently engage with accommodation providers as the project develops to ensure the provision of short-term accommodation to APA does not negatively impact the capacity of local accommodation providers to serve additional guests. In addition, APA will require the relevant construction contractor(s) to implement a workforce management strategy that will include measures such as a workforce code of conduct to prevent any negative impacts to the community as a result of ant-social behaviour.

Overall, the use of local accommodation is likely to create significant economic benefits for local accommodation providers, as well as businesses such as restaurants, food suppliers and recreational services. The project workforce is likely to spend money in Condobolin if they are housed in the town.

As a result of accommodation of the project workforce in Condobolin (and West Wyalong, if required), there will be a positive economic impact for accommodation, food and service providers. Ongoing consultation will mitigate the potential for negative impacts on accommodation capacity, and a workforce management strategy will prevent anti-social behaviour by the construction workforce. If the option to use the on-site accommodation camp is used at MW880, impacts on local accommodation will be negligible, but the potential economic opportunity for the local area will be lost.

ii Operation

The compressor station compound will include a small permanent accommodation to house any operational or maintenance workers.

Therefore, the likely impact of project operations on housing and accommodation will be negligible.

14.4.3 Local and regional procurement and economic investment

i Construction

The estimated total capital expenditure for each compressor station site will be approximately AUD$61.5 million (M) per site.

Of this, approximately $1.5 M will be spent on labour, goods and services from the local region, $42 M will be spent in the rest of NSW and Australia (outside of the local region) and $18 M will be spent internationally.

There will likely be opportunities for the project to acquire goods and services directly from the regional area during the construction phase, including:

- goods and services for construction camps, such as food and drink supply, waste management and cleaning services;
- fuel;
- vehicle and equipment servicing;
- consumables; and
- local accommodation, food and service providers for the temporary workforce at MW880;
- additional support from local contractors such as vegetation management and rehabilitation, water cartage and traffic management where required.

Project construction will have a positive economic impact on the local and regional area, however this will be limited by the services and expertise available.

ii Operation

Once the construction phase is complete, the annual project expenditure during operations is expected to be $250,000 per site, per year. As with the construction phase, project operation will have a positive economic impact through employment, however this will be limited by the services and expertise available.

The increase in capacity of the MWP with a 25% increase (120 TJ/day) predicted over Stages 1 and 2. This will have an indirect economic impact on the sale of gas. Current gas prices in NSW as of March 2021, are approximately $6/GJ (AER 2021), therefore an increase of 120 TJ per day would increase gas sales by approximately $720,000 per day, or $262 M per year.

14.5 Commitments and management measures

The following commitments informed by the SEA and other technical studies will minimise socio-economic impacts associated with the project. These commitments will be detailed in the CEMP and OEMP where relevant.

Table 14.1 Summary of commitments – socio-economic

Stage	Commitment ID	Commitment
Construction Operation	GE-04	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; • actions to minimise risk of reoccurrence; and name of person(s) responsible for undertaking the required actions.
Construction Operation	GE-06	Nearby landholders will be provided a dedicated point of contact for the duration of the project.
Design Construction Operation	SE-01	The existing stakeholder engagement plan will continue to be implemented to facilitate ongoing consultation with relevant stakeholders, including local businesses, throughout the project so that stakeholders have access to information regarding the nature of the proposed project activities and their likely impacts.
Construction Operation	SE-02	A Local Industry and Indigenous Participation Plan will be developed with theintention of promoting local, regional and Indigenous business and employment opportunities associated with the project.
Construction	SE-03	Local accommodation providers and Lachlan Shire Council will be consulted once construction schedules for MW880 have been confirmed to determine the availability and capacity of appropriate accommodation.
Construction	SE-04	During consultation, accommodation providers will nominate the proportion of their accommodation capacity to be used by the project. If capacity across all providers in Condobolin is reached, additional accommodation will be procured in consultation with local providers in Condobolin and West Wyalong.
Design Construction	SE-05	APA will require the appointed construction contractor to implement a workforce management strategy.

14.6 Conclusion

The key findings of the SEA are as follows:

- The compressor station locations have been selected partly based on their distance from sensitive receptors, including regional towns and private residences, and local impacts will be limited.
- Key benefits include potential economic growth and employment opportunities associated with an increase in job opportunities locally, regionally, and state-wide. Given the comparatively high levels of unemployment within local LGAs, and a regional workforce with resource industry experience, there is potential to employ workers from within the local community.
- The use of the on-site temporary accommodation camp at MW433 for the construction workforce will limit the potential impacts on local accommodation and housing, however there be limited opportunities for local accommodation providers or services.

- The use of local accommodation in Condobolin for the construction workforce at MW880 will create significant economic benefits for local accommodation providers as well as businesses such as restaurants, food suppliers and recreational services.

- APA will engage with local accommodation providers to ensure the provision of short-term accommodation for project use will not negatively impact the capacity of local accommodation providers to serve additional guests.

- APA will require the relevant construction contractor(s) to implement a workforce management strategy that will include measures such as a workforce code of conduct in line with APA's 'Values and Behaviours Guide' to ensure appropriate workforce behaviour.

- Economic and social benefits within the local and regional area will occur through procurement of appropriate goods and services from local businesses, where available. This will create some benefits during construction, and these may continue, but at a lesser level during operations.

- Key benefits of the project include the potential economic growth associated with local, regional, and state-wide procurement. Over 70% of the capital expenditure spent of labour, goods and service is expected to be sourced from within the local, NSW, and Australian markets. It is likely that these economic opportunities will create flow on benefits for the Australian economy as a whole, as well as bringing benefits to the local and regional area.

- Project operation, and the indirect economic benefits of increased capacity of the MWP will provide additional annual gas sales of approximately $262 M per year, based on current market values.

- In the context of the strategic importance of energy supply, increasing the availability of affordable natural gas supply is likely to improve energy security across the country, as well as creating significant economic opportunities within the market.

- Overall, the East Coast Grid Expansion will have a positive impact on local communities and economies as a result of project construction, and there will be several economic and social benefits at the regional, NSW and Australian level.

15 Waste

15.1 Introduction

EMM undertook a high-level waste assessment to determine any applicable regulatory requirements to waste management, and to identify the waste management approach for the project.

15.2 Assessment requirements and method

The Waste and Resource Recovery Strategy 2014-21 (EPA 2014a) provides guidance on how to improve the wellbeing of the environment and community by reducing the environmental impact of waste and using resources efficiently. It also outlines the preferred approach and goals for efficient resource use and management.

Schedule 1, Part 3, Clause 49 of the POEO Act outlines the different types of waste classifications, including general solid waste (non-putrescible), general solid waste (putrescible), hazardous waste, liquid waste, restricted solid waste and special waste.

Waste generated from the project will be classified in accordance with Waste Classification Guidelines: Part 1 Classifying Waste (EPA 2014b) and as defined in Schedule 1, Part 3, Clause 49 of the POEO Act.

15.3 Waste management approach

Waste will be managed in accordance with the hierarchy of waste management set out in Waste Classification Guidelines (EPA 2014b), as described below:

1. reduce;

1. re-use;

2. recycle or compost; and

3. dispose.

Waste streams will be classified in accordance with the Waste Classification Guidelines (EPA 2014b), which outlines a step-by-step process for classifying waste into six waste classes:

- special waste;
- liquid waste;
- general solid waste (putrescible);
- general solid waste (non-putrescible);
- hazardous waste; and
- restricted solid waste.

15.4 Impact assessment

The waste management approach will principally relate to the construction stage of the project as this will generate the highest amount of waste for the project. The operation stage will generate limited amounts of waste, however, during the operation stage, waste will continue to be managed as for the construction stage.

Project related waste will typically comprise:

- general waste;
- waste oil and grease;
- sewage solids;
- scrap metal; and
- recyclables such as plastics, glass, paper and cardboard.

For both sites, waste will be removed from site by a licenced waste contractor, and disposed of in the appropriate facilities. For MW433, the nearest waste management facility is at Wilcannia, while at MW880, the nearest waste management facility is at Condobolin. Both facilities are council operated and licenced to accept business, commercial and industrial waste. The relevant councils will be contacted prior to commencement of construction to confirm APA's waste management approach, and ensure there is appropriate capacity to accept project-related waste.

Table 15.1 outlines likely waste types generated by the project and their classification.

Table 15.1 Proposed waste classification and types

Waste classification	Expected waste types
General solid waste (putrescible)	Household waste that contains putrescible organics, food scraps, sewage wastes etc.
General solid waste (non-putrescible)	Concrete, wood, stone, rubble, soil (topsoil, fill material), glass, cans, plastic bottles, welding rods, ropes and spacers for equipment transport, scrap metal and off-cuts, paper, cardboard, drained oil filters.
Hazardous waste	Chemical and oil containers, synthetic material fibres, batteries, de-greasing and cleaning agents, fusion-bonded epoxy materials.

It is expected that waste soil and cleared vegetation will be used for erosion and sediment control measures, where practicable. Treated waste water effluent will be irrigated on site in the designated waste-water irrigation spray field.

If waste is not appropriately stored, handled or disposed of, it may result in potential impacts to surface and groundwater.

15.5 Commitments and management measures

The following commitments informed by technical studies will minimise waste impacts associated with the project. These commitments will be detailed in the CEMP and OEMP where relevant.

Table 15.2 Summary of commitments – waste

Stage	Commitment ID	Commitment
Construction Operation	WA-01	Waste materials generated during construction and operations will be reused or recycled where practicable, or appropriately stored, collected and transported by licenced contractors for disposal at appropriately licenced facilities.
Construction Operation	WA-02	Waste containers will be lidded to mitigate fauna access. No waste will be left outside in open areas accessible to feral animals.
Construction Operation	WS-11	Site areas containing potential contaminants (such as fuel, oil, grease and chemicals) will be covered and/or bunded in accordance with Australian Standard AS1940: The storage and handling of flammable and combustible liquids to prevent contamination of stormwater runoff, with offsite disposal of captured water/contaminants.

15.6 Conclusion

Key findings of the waste assessment include the following:

- project related waste will likely include general waste (putrescible and non-putrescible) and some hazardous waste;
- waste will be managed in accordance with Waste Classification Guidelines: Part 1 Classifying Waste (EPA 2014b) and as defined in Schedule 1, Part 3, Clause 49 of the POEO Act; and
- the implementation of mitigation measures will minimise the potential waste impacts associated with the project.

16 Cumulative impacts

16.1 Introduction

The objective of the cumulative impact assessment is to assess the potential for project impacts to have compounding interactions with similar impacts from other projects.

The impacts of projects are often assessed by comparing the post-project situation to a pre-existing baseline. Where projects can be considered in isolation, this provides a good method of assessing a project's impact. However, in areas where baselines have already been affected, or where future development will continue to add to the impacts in an area or region, it is appropriate to consider the cumulative effects of development.

16.2 Cumulative impact assessment

A desktop review was undertaken which included a search of DPIE's Major Planning website to identify proposed and approved developments in Central Darling Shire and Lachlan Shire which may have compounding interactions with similar impacts from this project.

The following projects were identified:

- Central Darling Shire:
  - Wilcannia Weir Replacement.
- Lachlan Shire:
  - Sunrise Nickel/Cobalt Mine (Modification 7).
  - Owendale Scandium Mine.
  - Western Slopes Pipeline.
  - Flemington Cobalt Scandium Mine.

The potential impacts of these projects have been summarised below.

16.2.1 Wilcannia Weir Replacement

This project is currently in the planning stage, where a scoping report has been prepared and assessment requirements issued; an EIS is currently being prepared.

WaterNSW proposes to undertake the Wilcannia Weir replacement project, involving construction of a new weir and decommissioning of the existing weir. The project is located on the Darling River near Wilcannia, approximately 105 km south-east of MW433. The original Wilcannia Weir was constructed in 1942, but is highly degraded, so a new weir 4.5 m and 45 m wide is proposed to store 6,610 ML of water downstream of the old weir.

Potential impacts that may compound with the East Coast Grid Expansion are traffic and socio-economic if the construction of the two projects occurs simultaneously. The distance from MW433 means that other cumulative impacts are unlikely.

i Traffic

During construction of the Wilcannia Weir, there will be a temporary increase in heavy vehicle movements on the Barrier Highway between Broken Hill and Wilcannia, which is the proposed transport route for access to MW433. There will be limited cumulative impacts on other roads as the Wilcannia Weir is proposed south of Wilcannia, therefore construction traffic will not use any other roads proposed to access MW433. However, the volumes of construction traffic on the Barrier Highway proposed as a result of the East Coast Grid Expansion are minimal, and even if the construction phases for the two projects occur simultaneously, it is unlikely that the combined traffic will exceed the level of service and safety standards for the Barrier Highway. Therefore, cumulative impacts to traffic at MW433 are unlikely, and no additional mitigation measures are required.

ii Socio-economic

Construction of the Wilcannia Weir will provide employment and business opportunities from construction-related jobs, and revenue for businesses supporting the development. Local employment opportunities as a result of the East Coast Grid Expansion are unlikely at Wilcannia, although there are likely to be opportunities for local businesses supporting the project. If these projects occur simultaneously, there may be cumulative economic benefits to local businesses in Wilcannia, however these businesses may struggle to support both projects without an impact on their ability to support regular customers. While negative cumulative impacts are unlikely, APA will consult with local businesses when procuring services at MW433, and will take into account any issues raised during that consultation.

16.2.2 Sunrise Nickel/Cobalt Mine

Sunrise Nickel/Cobalt Mine is a proposed open cut mine located in Fifield, 75 km north-east of MW880, and is approved, but not yet constructed. Several modifications have been submitted for the project (originally approved in 2001) however project finance is not yet confirmed, and construction has not commenced (Mining.com 2021). The project includes a gas offtake pipeline which will connect to the MWP at or close to MW880. Modification 7 is for an updated Project Execution Plan which includes minor changes to the overall project. The modification assessment is due to be submitted to DPIE in mid-2021, and approval is expected in late 2021 (SEM 2021).

If DPIE approve the modification by the end of 2021, and if the final investment decision is made immediately, it is unlikely that project construction, particularly construction of the gas pipeline will coincide with construction of the compressor station at MW880. If the final investment decision is made, and construction of the project commences before the compressor station at MW880 is complete, there may be some cumulative impacts related to the construction of the gas offtake pipeline. However, due to the staging of the East Coast Grid Expansion where Stage 1 (MW880) is due to commence in Q1 2022, these are unlikely to occur simultaneously. No other cumulative impacts are anticipated to occur in either the construction or operation phase.

16.2.3 Owendale Scandium Mine

The Owendale Scandium Mine is a proposed open cut scandium mine located between Fifield and Tullamore, 80 km north-east of Condobolin, with proposed mineral processing occurring on the site of the previous Condobolin Abattoir. The project is currently in the project planning stage, where a scoping report has been prepared and assessment requirements issued; an EIS is currently being prepared.

As the project is still preparing the EIS, which will need to go through the response to submission phase prior to determination, it is highly unlikely that any part of the construction or operation of this project will coincide with the construction of MW880, therefore no cumulative impacts are anticipated during the construction phase. Due to the distance of both the mine and processing sites, no cumulative impacts are anticipated during the construction phase.

16.2.4 Flemington Cobalt Scandium Mine

The Flemington Cobalt Scandium Mine is listed on the Major Projects website, however there is no relevant information (such as a scoping report) available on the Major Projects site, or on the website of the owner – Australian Mines. Therefore, it is unlikely that there will be any cumulative impacts with the construction or operation of MW880.

16.2.5 Western Slopes Pipeline

The Western Slopes Pipeline is a 461 km gas pipeline proposed by APA to link the Narrabri Gas Project with the MWP at Mt Hope, approximately 100 km north-west of MW880. The project is currently in the project planning stage, where a scoping report has been prepared and assessment requirements issued; an EIS is currently being prepared. Due to the staging of the project and the distance from MW880, it is unlikely that the project will commence construction prior to the completion of MW880, therefore cumulative impacts during construction and operation are unlikely.

16.3 Conclusion

The key findings of the cumulative assessment indicate the following:

- There may be minor cumulative impacts to traffic on the Barrier Highway between Broken Hill and Wilcannia if the construction of MW433 coincides with the construction of the proposed Wilcannia Weir. However, these combined traffic levels are unlikely to exceed the level of service and safety standards for the Barrier Highway.

- There may be minor cumulative socio-economic benefits and impacts to Wilcannia if the construction of MW433 coincides with the construction of the proposed Wilcannia Weir. However, APA will consult with local businesses when procuring services at MW433, and will take into account any issues raised in consultation.

- Cumulative impacts as a result of developments in Lachlan Shire are unlikely due to the timing and location of other projects.

17 Summary of commitments

This chapter summarises management and mitigation measures, made as project commitments throughout this modification report to mitigate potential impacts.

Commitments may be revised following submissions on the modification report, and the final list of commitments will be incorporated into the CEMP and operations environmental management plan (OEMP) as appropriate. The CEMP and OEMP will be supported by relevant sub-plans, where appropriate, which will provide detailed environmental controls to manage key environmental issues. The CEMP and OEMP will be reviewed and updated as necessary throughout the relevant phases of the project. Project commitments are presented in Table 17.1.

Table 17.1 Summary of commitments

Stage	Commitment ID	Commitment
General		
Construction	GE-01	The approved construction footprint, including vegetation clearing extent and environmental or heritage features within the construction footprint, will be clearly demarcated and identified during the construction stage with survey pegs and at some locations with flagging, bunting, barrier mesh or similar. No go zones will be clearly marked and communicated as such.
Construction	GE-02	All temporary infrastructure will be decommissioned and removed at the completion of construction
Construction	GE-03	Rehabilitation of disturbed areas will commence progressively as soon as practicable during and after construction, and will be carried out in accordance with the SWMP and Landcom (2004).
Construction Operation	GE-04	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; • actions to minimise risk of reoccurrence; and • name of person(s) responsible for undertaking the required actions.
Construction	GE-05	All project personnel will complete an induction that will include environmental and heritage management requirements.
Construction Operation	GE-06	Nearby landholders will be provided a dedicated point of contact for the duration of the project.
Air quality		
Construction	AQ-01	Stabilisation of exposed soils will be undertaken as soon as practicable , and dust suppression undertaken as required using water sprays, water extension agents, soil stabilising polymers or other media on: • unpaved work areas subject to traffic or wind; • exposed soil; • main haulage routes, as required; • sand, spoil and aggregate stockpiles; and • during the loading and unloading of dust generating materials. When water is used for dust suppression, it will not be applied in a way that causes ponding or runoff.

Table 17.1 Summary of commitments

Stage	Commitment ID	Commitment
Construction	AQ-02	Construction vehicles with potential for loss of loads (such as dust or litter) will not be overloaded and will be covered when using public roads.
Construction Operation	AQ-03	Plant and equipment will be maintained in good condition to minimise ignition risk, fuel consumption, spills and air emissions that may cause nuisance.
Construction Operation	AQ-04	Plant, equipment and vehicle engines will be switched off when not in use.
Greenhouse gas		
Construction	GH-01	Material handling will be efficiently scheduled and planned to minimise fuel consumption.
Construction Operation	GH-02	10% blended ethanol fuel will be used for petrol-powered light vehicles, where practicable.
Construction	GH-03	Services and materials (aggregates etc.) will be sourced locally, where practicable.
Design, Construction	GH-04	Low carbon alternatives will be procured where practicable (use of lower carbon cement alternatives etc.).
Noise		
Construction	NV-01	Standard daytime construction hours of 7:00am to 6:00pm daily will be applied, excluding travel to and from site, and extenuating circumstances beyond the control of the project. Any activities whichrequire extension beyond standard construction hours will be discussed with relevant affected landholders.
Construction	NV-02	Impact piling at MW880 will not be conducted outside of Interim Construction Noise Guideline standard construction hours (Sundays, public holidays and Saturday between 1.00pm and 6.00pm) unless agreed with potentially impacted landholders..
Operation	NV-03	Turbine intakes and exhausts will be fitted with silencers consistent with those assessed in Table 4.1 of the noise impact assessment.
Construction Operation	NV-04	Relevant affected landholders will be notified of any blowdown events scheduled to take place and informed of the potential noise impacts, including timing and duration.
Water and soil		
Design Construction Operation	WS-01	A soil and water management plan (SWMP) will be prepared for the project and underpinned by primary erosion and sediment control plans (PESCPs) for all discrete disturbance areas, prepared and updated in accordance with Landcom (2004) and certified by a CPESC. Soil characterisation will be required at each compressor station site to accurately determine site-specific erosion risk to inform PESCPs. Surface water and runoff management to be considered in the final engineering design will be detailed in the SWMP and PESCPs. PESCPs will include construction, inspection and maintenance requirements for all drainage, erosion, and sediment control measures. PESCPs will include appropriate erosion and sediment controls for all stages of soil disturbance will be appropriate for the erosion risk posed by potentially dispersive or non-cohesive site soils, and adjusted to account for weather events such as high winds or rainfall. PESCPs will also set out roles and responsibilities for personnel and procedures to be followed if there is a failure in the adopted control measures.
Design Construction	WS-02	Any required cut and fill will employ slope design rules and stabilisation measures guided by material erosion and agronomic characterisation of the site soils.

Table 17.1 Summary of commitments

Stage	Commitment ID	Commitment
Design Construction	WS-03	Major land disturbance works will be scheduled to avoid periods of high wind, where practicable. Soil and erosion control measures will be adjusted to ensure appropriate management of erosion and sediment during adverse weather.
Design Construction	WS-04	Site drainage will be designed to maximise sheet flow where possible. Construction of diversion drains, channels and table drains will be minimised to the maximum possible extent where practicable.
Construction	WS-05	Following removal of temporary infrastructure, the waste water spray field at MW433 will be appropriately rehabilitated.
Design Construction	WS-06	Minimise disturbance to the existing watercourses at MW433 and avoid the use of excavated drains where dispersive soils are expected to be present. Constructed landforms will be located to utilise the natural drainage features to the maximum practicable extent.
Design Construction	WS-07	Priority will be given to the prevention or minimisation of soil erosion rather than allowing erosion to occur and relying on sediment control measures to trap and contain sediment and turbid runoff.
Construction	WS-08	Soils will be ameliorated by the incorporation of gypsum into the soil at rates determined by site-specific soil testing. Hardstands will be gravel sheeted or concreted, and stabilised or strengthened where required.
Construction	WS-09	Organic and woody wastes should be considered for soil erosion protection purposes on stockpiles and rehabilitated areas. This is especially important at MW433, where annual rainfall is less than 300 to 350 mm/y and vegetation cannot be relied on for short- or long-term erosional stability.
Design Construction	WS-10	All reasonable and practicable measures needed to protect downstream waters and adjacent properties from the adverse effects of sediment and turbid water discharge will be implemented.
Construction Operation	WS-11	Site areas containing potential contaminants (such as fuel, oil, grease and chemicals) will be covered and/or bunded in accordance with Australian Standard AS1940: The storage and handling of flammable and combustible liquids to prevent contamination of stormwater runoff, with offsite disposal of captured water/contaminants.
Design Construction Operation	WS-12	Temporary and permanent onsite wastewater management systems will: • be appropriate for each site based on consideration of the site layout, site conditions and relevant environmental constraints; and • be designed, constructed, operated, maintained and decommissioned in accordance with best practise and relevant guidelines (including WaterNSW 2019), applicable standards (including AS/NZS 1547:2012 On-site domestic wastewater management) and local Council requirements.
Construction Operation	WS-13	All required water licensing and approvals will be obtained to support water supply arrangements for each site during construction and operation.
Design Construction Operation	WS-14	Stormwater runoff from buildings will be captured in rainwater tanks for use on site, to minimise demand for imported water.
Biodiversity		
Construction	BI-01	A biodiversity chapter within the CEMP will be prepared to enable implementation of measures to avoid, minimise and mitigate impacts that may arise during the construction phase of the project

Table 17.1 Summary of commitments

Stage	Commitment ID	Commitment
Design Construction	BI-02	APA has established a construction envelope which includes all of the site boundary to assist with final design and account for potential design changes. This allows siting of the disturbance footprint within the construction envelope with the following limitations: • Direct impacts to native vegetation at MW433 will not exceed the total amount, 3.22ha, as stated in the report • Direct impacts to native vegetation at MW880 will not exceed the total amount, 0.75ha, as stated in the report • Direct impacts will be restricted to the following vegetation zones offset as part of the Biodiversity Development Assessment Report (Mod Report 1) – MW433 – PCT 153 Disturbed condition – MW880 – PCT 72 DNG • No mature trees (with a DBH of >5 cm) are to be removed at MW433 or MW880.
Design Construction	BI-03	Native vegetation and fauna habitat will be retained wherever possible, with clearing minimised to the extent required to construct and maintain the modification
Design Construction	BI-04	Final design of the disturbance footprint will take into consideration native vegetation and where feasible avoid or reduce impacts to native vegetation.
Construction	BI-05	Prior to any vegetation clearing activities, the following areas within the site will be temporarily fenced (with barrier mesh, bunting or similar) and marked as 'No-go zones': • Paroo-Darling National Park and Paroo River Wetlands (MW433); and • Retained native vegetation within sites (MW433 and MW880).
Construction	BI-06	Where feasible at MW880, tree protection zones (TPZs) in accordance with the Australian Standard AS 4970-2009 Protection of trees on development sites (Standards Australia Committee 2009), will be set up around all trees to be retained within and immediately adjacent to the impact area.
Construction	BI-07	Prior to undertaking vegetation clearing, pre-clearance inspections will be undertaken by appropriately qualified ecologists. The pre-clearing inspections will: • confirm the biodiversity values identified in this report; • check for the evidence of the presence of flora and fauna species; • flag key habitat features, including (but not limited to) nests or hollow logs; • relocate of nests and/or hollow logs to adjacent habitat; • identify nearby habitat suitable for the release of any species that may be encountered during the clearing works; and • contact a wildlife carer or veterinarian to inform them of the vegetation clearing works that are to occur.
Construction	BI-08	Cleared native vegetation will be retained and reused for on-site rehabilitation where it doesn't present a fire risk.

Table 17.1 Summary of commitments

Stage	Commitment ID	Commitment
Construction Operation	BI-09	To prevent the introduction and/or spread of weeds on site, the following controls will be implemented: • weed control in key areas prior to construction works, to minimise the impacts of weeds during construction and to minimise the requirements for disposal and management of weeds on-site; • appropriate identification, management and disposal of weed species during clearing works, in accordance with the biodiversity management plan; • active and intensive weed control in areas where significant weeds are known to occur to reduce the cover of weeds adjacent to the construction activities, preventing the spread of weeds into other areas; • all vehicles, plant and equipment will be cleaned down (wash/blow down) and certified weed free prior to initial entry to site; all vehicles, plant and equipment will strictly adhere to the approved roads, tracks, easements and work areas to minimise contact with vegetation; • all vehicles, plant and equipment breaching protocol and travelling outside of approved areas will be re-certified as weed free; • biosecurity certifications will be kept with the vehicle and plant at all times; • a weed and pathogen monitoring program will be implemented, with a weed control program to be implemented if weeds are identified within the site boundary; and • rehabilitation of cleared areas as quickly as possible following construction works in an area.
Heritage		
Construction Operation	AH-01	Prior to ground disturbance, a separate Aboriginal Cultural Heritage Management Plan (ACHMP) for each of the two sites must be developed by a heritage specialist in consultation with the RAPs and consent authority to provide the post-approval framework for managing Aboriginal heritage within the project area. The ACHMP will include the following aspects: • processes, timing, communication methods and project involvement (eg on-site activities) for maintaining Aboriginal community consultation and participation through the remainder of the project. This will include a grievance mechanism that is readily available and designed for use by the local Aboriginal community; • detailed descriptions and methods of any additional investigative and/or mitigative archaeological actions that may be required prior to works commencing or during the project. These will include, but not be limited to, archival recording of all identified Aboriginal objects, sites and places; archaeological recovery of cultural materials (eg MW433-OS1) where direct impacts are proposed; and subsurface investigations/recovery (eg archaeological excavation and/or cultural monitoring) for any ground disturbance within areas or archaeological sensitivity identified at MW433. Further details of these activities are presented in Section 10.2 of the ACHA. For these activities, details of location/s, methods, personnel, and timing will be included; • description and methods of actions to minimise any inadvertent impacts to identified Aboriginal objects and/or sites and areas of archaeological sensitivity outside of the construction footprint. This will include, but not be limited to, cultural inductions for all personnel and subcontractors outlining their location and significance, fencing and clear marking of heritage sites and zones of interest close to proposed works, appropriate screening for sensitive and gender-specific areas, and any additional requirements identified by the Aboriginal community. A suitable regime of monitoring these activities will also be outlined, including locations, methods, personnel and timing; • description and methods for undertaking further Aboriginal heritage assessment, investigation and mitigation of any areas of the project footprint that have changed following completion of the ACHA and/or during the final design and construction phases of the project;

Table 17.1 Summary of commitments

Stage	Commitment ID	Commitment
		• description and methods of post-excavation analysis and reporting of the archaeological investigations and activities implemented as part of the ACHMP. For excavations, these will include suitable collection and processing of stone artefacts, and chronological, soil, and environmental samples; • procedures for managing the unexpected discovery of Aboriginal objects, sites and/or human remains during the project; • procedures for the curation and long-term management of cultural materials recovered as part of the works outlined in the ACHMP and any preceding stages associated with the project; and • processes for reviewing, monitoring, and updating the ACHMP as the project progresses.
Construction Operation	AH-02	Consultation will be maintained with the RAPs during the finalisation of the assessment process and throughout the project.
Construction	AH-03	A copy of the ACHA will be lodged with AHIMS and provided to each of the RAPs.
Construction	AH-04	AHIMS Site Recording Forms for the newly identified Aboriginal objects and/or sites within the project area and areas of archaeological sensitivity will be submitted to the AHIMS database once their validation has been completed.
Construction Operation	AH-05	Where the heritage consultant changes through the project, suitable hand over will be undertaken to minimise loss or mistranslation of the intent of the information, findings and future steps in heritage management occur.
Traffic		
Construction	TT-01	A Traffic Management Plan (TMP) will be prepared for the project, and will incorporate all traffic related requirements from the CEMP.
Construction	TT-02	Transport routes will be clearly marked or communicated, and speed limits enforced.
Construction	TT-03	After arrival at the project site all vehicles, plant and equipment will remain within the construction footprint and on approved roads and tracks.
Construction Operation	TT-04	Any oversized or over weight loads will be transported in accordance with the requirementsof the relevant road authority.
Visual		
Design	VI-01	The design of the compressor station and associated infrastructure will include colour tones and material finishes that are sympathetic to existing buildings, background vegetation or landscape;
Construction	VI-02	Light generated during construction will be managed in general accordance with the requirements in Australian Standard AS 4282-1997 Control of the Obtrusive Effects of Outdoor Lighting.
Construction	VI-03	Vegetation can be used to screen views of visible elements of the compressor station at MW880 if requested by, and in consultation with the landholder at sensitive receptor R1.
Hazard and risk		
Construction Operation	HR-01	Emergency Response Plans will be developed and implemented for both the construction and operations phases of the project.
Construction Operation	HR-02	Dangerous goods, as defined by the Australian Dangerous Goods Code, and flammable and combustible liquids will be stored and handled in accordance with all relevant Australian Standards.

Table 17.1 Summary of commitments

Stage	Commitment ID	Commitment
Construction Operation	HR-03	Routine visual monitoring and recording of chemicals and fuel storage facilities will occur.
Design Construction Operation	HR-04	Project design, construction and operation, including designated asset protection zones will comply with APA's existing Bushfire Management Plan.
Construction Operation	HR-05	Open fires, including open barbeques, billy fires, and brush burning, will not be permitted on site.
Construction Operation	HR-06	Contractors undertaking hot work operations will have access to a validated portable fire extinguisher.
Construction Operation	HR-07	The project will implement the APA HSE Management System.
Socio-economic		
Design Construction Operation	SE-01	The existing stakeholder engagement plan will continue to be implemented to facilitate ongoing consultation with relevant stakeholders, including local businesses, throughout the project so that stakeholders have access to information regarding the nature of the proposed project activities and their likely impacts.
Construction Operation	SE-02	A Local Industry and Indigenous Participation Plan will be developed with theintention of promoting local, regional and Indigenous business and employment opportunities associated with the project.
Construction	SE-03	Local accommodation providers and Lachlan Shire Council will be consulted once construction schedules for MW880 have been confirmed to determine the availability and capacity of appropriate accommodation.
Construction	SE-04	During consultation, accommodation providers will nominate the proportion of their accommodation capacity to be used by the project. If capacity across all providers in Condobolin is reached, additional accommodation will be procured in consultation with local providers in Condobolin and West Wyalong.
Design Construction	SE-05	APA will require the appointed construction contractor to implement a workforce management strategy, and will use the 'APA Values and Behaviours Guide' to ensure appropriate workforce behaviour.
Waste		
Construction Operation	WA-01	Waste materials generated during construction and operations will be reused or recycled where practicable, or appropriately stored, collected and transported by licenced contractors for disposal at appropriately licenced facilities.
Construction Operation	WA-02	Waste containers will be lidded to mitigate fauna access. No waste will be left outside in open areas accessible to feral animals.

18 Project need and justification

18.1 Introduction

APA's East Coast Grid delivers cost effective, safe and reliable transportation of Australian domestic gas from northern gas producers to southern markets. APA is playing a critical role in delivering additional energy security for southern gas markets through this proposed staged investment for a 25% expansion of the East Coast Grid.

Should the modification go ahead, it will achieve the following objectives:

- The first stage of expansion works will increase Wallumbilla to Wilton capacity by 12%. These works are targeted for commissioning in the first quarter of CY2023 ahead of forecast southern state winter supply risks identified in the 2021 AEMO Gas Statement of Opportunities.
- The second stage of the expansion works, which will add a further 13% of capacity, will be staged to meet customer demand.
- These investments will boost economic activity in regional NSW, creating construction jobs and expenditure on services such as supplies and maintenance. The project is also expected to see further expenditure of wages in regional NSW.

Importantly, the project design includes the implementation of mitigation and management measures to reduce potential adverse impacts and maximise potential positive impacts on the environment and community.

APA believes the modification report demonstrates the importance of the project to carefully justify the project benefits with any potential impacts. This chapter therefore addresses the environmental assessment requirements relating to the reasons why the project should be approved, with regard to:

- relevant matters for consideration under the EP&A Act, including how the principles of ecologically sustainable development have been incorporated in the design, construction and operation of the project;
- the biophysical, economic and social costs and benefits of the project; and
- the suitability of the selected sites.

18.2 Strategic context

18.2.1 Strategic importance of gas

In Australia, natural gas currently accounts for approximately 25% of primary energy use and about 20% of electricity generation (APGA 2021b). The rapid retirement of coal means Australia will increase reliance on gas to provide energy security by delivering high heat capability for Australia's industrial sector and critical firming for variable renewable energy.

That critical role is amplified by the record levels of supply from solar and wind and the firming role gas-powered generation plays in grid stability and reliability.

APA's East Coast Grid Expansion will increase winter peak capacity of the east coast gas grid by 25% with the first stage of expansion works targeted ahead of forecast southern state winter supply risks in 2023, identified in the 2021 AEMO Gas Statement of Opportunities (AEMO 2021).

APA understands the concerns that surround a potential shortage of gas in southern markets and believes the best infrastructure solution for the market is achieved through the timely expansion of capacity by incremental additional compression of existing infrastructure.

A shortage of natural gas supply has the potential to cause significant negative economic and social impacts throughout NSW and Australia.

The project is anticipated to generate significant economic benefits and strategic energy security throughout NSW and the wider east coast of Australia by increasing the capacity of the MWP through the proposed new compressor stations.

18.2.2 Federal gas-fired recovery strategy

The Australian Government has committed to supporting the presence of gas in the market, boosting gas transport networks, and empowering consumers to develop a competitive and robust gas industry, while minimising both costs and emissions.

As part of the Australian Government's plan for a gas-fired recovery, it has committed to boosting the east coast gas market across the entire supply chain (Australian Government 2020). The Government believes gas will help re-establish a strong economy, making energy affordable for families and businesses and supporting jobs as part of Australia's recovery from the COVID-19 recession.

The gas-fired recovery plan aims to develop the National Gas Infrastructure Plan (NGIP) which will identify critical infrastructure such as compression and storage facilities. The Australian Government's interim NGIP reinforces the critical role that natural gas will continue to play as the energy sector transitions, delivering energy security, firming and high heat capability for the industrial sector.

That critical role, helping support the grid, was underscored in the interim NGIP, which noted that "as the Australian electricity grid balances … record levels of supply from solar and wind, the firming role gas-powered generation plays in grid stability and reliability is becoming increasingly important to keep the lights on across Australia."

The interim NGIP focuses on infrastructure projects that can address emerging southern supply constraints (DISER 2020).

APA's East Coast Grid Expansion project offers an ideal opportunity to use existing infrastructure to facilitate and maximise these potential benefits.

18.2.3 Federal energy security strategy

Within the Australian context, energy security is defined as 'the adequate, reliable and competitive supply of energy to support the functioning of the economy and social development' (DRET 2011). The Australian Government has recognised the need to promote energy security and undertake energy security assessments to better understand the risks associated with the adequacy, reliability, and affordability of energy in Australia (DISER 2021). The most recent national energy security assessment, conducted in 2011, found that Australia's energy environment is adequate (Department of Resources, Energy and Tourism 2011).

However, the report identified several issues, namely the transition to reduce greenhouse emissions and energy price pressures that have the potential to implicate the maintenance of Australia's energy security in the long term. Additionally, the report was published 10 years ago, and major changes and shocks within energy supply chains, which have been observable during the COVID-19 pandemic, were recognised as a key concern regarding the maintenance of energy security.

As a result, there is an identified need to encourage supply diversity, interconnection, and efficient markets to establish Australia's energy security and resilience (DRET 2011). The East Coast Grid Expansion will contribute to meeting all of these key goals by increasing the availability of natural gas available for consumption nationwide.

18.2.4 Gas off-take opportunities

The MWP has several locations where an off-take is used to deliver gas to local users. The East Coast Grid Expansion will continue to provide energy security to those direct users, and allow new users to enter into agreements to gain access to the pipeline for secure, direct delivery of gas. This will continue to provide security of supply to existing and proposed industry.

18.3 Economic justification

APA will use local and regional NSW based businesses and suppliers where practicable, for both the construction and operation stages of the project.

18.3.1 Capital and operational expenditure

The estimated total capital expenditure for each compressor station site will be approximately AUD$61.5 M per site; of this, approximately $44 M will be spent in Australia. This would present a total expenditure of $88 M by the end of the 2022/2023 financial year as anticipated by the proposed timeframes.

Once both sites have been commissioned and are operational, maintenance expenditure will amount to approximately $500,000 per year.

18.3.2 Increased sales of natural gas

The construction of compressor stations on the MWP provides an excellent return on investment, with an investment of $123 M over two years increasing the capacity of the MWP by up to 120 TJ per day. Current gas prices in NSW as of March 2021, are approximately $6/GJ (AER 2021), therefore an increase of 120 TJ per day would increase gas sales by $720,000 per day, or $262 M per year.

18.4 Environmental justification

A summary of the key findings of the environmental assessments to support this modification report are detailed in Chapters 5 to 17 and the mitigation and management measures committed to are provided in Chapter 17. This modification report demonstrates that the project has been designed such that impacts are either avoided, or appropriate mitigation measures identified so that the residual impacts are reduced, and on balance, the project can be justifiable.

19 Conclusion

APA currently operates the MWP, a high-pressure natural gas transmission pipeline constructed in 1976, gazetted as SSI in 2020, and authorised by PL16. The MWP forms a key part of APA's East Coast Grid.

APA is proposing an expansion of gas transportation capacity on its East Coast Grid that links Queensland to southern markets ahead of projected potential 2023 supply risks. Expansion will be through the construction of additional compressor stations and associated works on both the SWQP in Queensland and the MWP in NSW.

The expansion will be delivered in a number of stages. Stages 1 and 2 will comprise the construction of one compressor station per stage on each of the SWQP and MWP. A potential third stage is being investigated which will add an additional three compressor stations to the MWP. The first stage is targeted for commissioning in the first quarter of 2023 ahead of forecast supply risks identified in the 2021 AEMO Gas Statement of Opportunities. The second stage will be timed to meet customer demand. Completion of Stages 1 and 2 will provide an additional 25% capacity to the East Coast Grid.

The two compressor stations in NSW proposed for Stage 1 and Stage 2 of the East Coast Grid Expansion are proposed to be constructed at the following locations on the MWP:

- Stage 1: MW880 – Milne approximately 35 km south-west of Condobolin; and
- Stage 2: MW433 – Round Hill approximately 103 km north of Wilcannia.

EMM has prepared this modification report on behalf of APA in accordance with Section 5.25 of the EP&A Act and the guideline Preparing a Modification Report – State Significant Infrastructure Guide (DPIE 2020a) and includes supporting technical assessments.

The project has been studied from many perspectives and its final design is considered the most sustainable response to economic, social, environmental and cultural values that exist in the area. The predicted economic and strategic benefits will strongly outweigh, primarily minor and manageable adverse impacts in the locality. This modification report demonstrates that the project has been designed such that impacts are either avoided, or appropriate management measures identified so that the residual impacts are reduced and, on balance, the project is justifiable.

The project has strong economic justifications due to the strategic importance of gas and the economic stimulus it will provide locally, regionally and to NSW and Australia as a whole. Importantly, the project involves an ideal opportunity to maximise gas supply via existing infrastructure with minimal impact. Contributions to the state and national economy will include direct economic activity (eg direct employment and wages) and expenditure on materials that can be sourced from Australia and NSW.

The modification report has been prepared to allow key stakeholders to make an informed decision as to whether this project should be approved. Should the project go ahead, it will achieve the following objectives:

- Stage 1 capacity increase of 12% from Wallumbilla to Wilton, targeted for commissioning ahead of forecast CY2023 winter supply risks.
- Stage 2 capacity increase of 13%, staged to meet customer demand.
- Investments to boost economic activity in regional NSW, creating construction jobs and expenditure on services. The project is also expected to see further expenditure of wages in regional NSW.

The project has been assessed in accordance with the principles of ecologically sustainable development in order for it to be considered for approval.

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Glossary and Abbreviations

Term	Description
ABS	Australian Bureau of Statistics
ACCC	Australian Competition and Consumer Commission
ACHA	Aboriginal Cultural Heritage Act 2003 (Qld)
AEMC	Australian Energy Market Commission
AEMO	Australian Energy Market Operator
AER	Australian Energy Regulator
AGL	Australian Gas Light Company
APA	East Australian Pipeline Pty Ltd
APGA	Australian Pipeline and Gas Association
APT	Australian Pipeline Trust
AQIA	Air quality impact assessment
AS	Australian Standard
AS2885	Pipelines—Gas and Liquid Petroleum
AVTG	Assessing Vibration: a Technical Guideline
AWS	Automatic weather station
BCD	Biodiversity Conservation Division
BDAR	biodiversity development assessment report
BMP	Bushfire Management Plan
BOM	Bureau of Meteorology
CCC	Community Consultative Committee
CEMP	Construction Environmental Management Plan
CH	Cultural Heritage
CHMP	Cultural Heritage Management Plan
CO	Carbon Monoxide
CO2	Carbon Dioxide
CSIRO	Commonwealth Scientific and Industrial Research Organisation
dBA	A-weighted decibels
DEC	Department of Environment and Conservation (NSW)
DECC	Department of Environment and Climate Change (NSW)
DIDO	Drive-In-Drive-Out
DISER	Department of Industry, Science, Energy and Resources
DPE	Department of Planning and Environment
DPIE	Department of Planning, Industry and Environment
DRET	Department of Resources, Energy and Tourism

Term	Description
DTA	Digital Transformation Agency
EAPL	East Australian Pipeline Pty Ltd
EIS	Environmental Impact Statement
EMM	EMM Consulting Pty Ltd
EPA	Environment Protection Authority
EPBC	Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*
EPL	Environment Protection Licence
FID	Financial Investment Decisions
FIFO	Fly-In-Fly-Out
FM Act	*Fisheries Management Act 1994* NSW
GDE	Groundwater Dependent Ecosystem
GHG	Greenhouse gas
GIS	Geographic Information Systems
GJ	Gigajoule
GLC	Ground Level Concentrations
GLVIA	Guidelines for Landscape and Visual Impact Assessment
Ha	Hectare
HIPAP	Hazardous Industry Planning Advisory Paper
HNL	Highly Noise Affected Level
HSE	Health Safety Environment
IAQM	Institute of Air Quality Management in the United Kingdom
ICNG	Interim Construction Noise Guideline
IECA	International Erosion Control Association
km	kilometre
LALC	Local Aboriginal Land Council
LEP	Local Environmental Plan
LGA	Local Government Area
LNG	Liquefied Natural Gas
LSC	Land and Soil Capability
ML	Megalitre
mm	Millimetre
MNES	Matters Of National Environmental Significance
MSEP	Moomba to Sydney Ethane Pipeline
MSP	Moomba Sydney Pipeline
MW433	Round Hill approximately 103 km north of Wilcannia
MW880	Milne approximately 35 km south-west of Condobolin

Term	Description
MWP	Moomba to Wilton Pipeline
N_2O	Nitrous Oxide
NGIP	National Gas Infrastructure Plan
NHVR	National Heavy Vehicle Regulator
NIA	Noise Impact Assessment
NML	Noise management levels
NOx	Oxides of Nitrogen
NO_2	Nitrogen Dioxide
NPfI	Noise Policy for Industry
NPI	National Pollutant Inventory
NPW	*National Parks and Wildlife Act 1974* NSW
NRAR	Natural Resources Access Regulator
NSW	New South Wales
OEH	Office of Environment and Heritage
OEMP	Operations Environmental Management Plan
PEP	Project Execution Plan
PESCP	Primary Erosion and Sediment Control Plans
PHA	A Preliminary Hazard Assessment
PL16	Pipeline Licence No. 16
PNTL	Project-Specific Noise Trigger Levels
POEO	Protection of the Environment Operations Act 1997
QP	Questa Park
RF	*Rural Fires Act 1997* NSW
RFS	NSW Rural Fire Service
SA	South Australia
SEA	Socio-Economic Assessment
SEHA	Soil and Erosion Hazard Assessment
SEM	Sunrise Energy Metals
SEP	Stakeholder Engagement Plan
SEPP	State Environmental Planning Policy (Infrastructure) 2007
SIDRA	Signalized Intersection Design and Research Aid
SMPEI	Structural, Mechanical, Piping, Electrical and Instrumentation
SO_2	Sulphur Dioxide
SSI	State Significant Infrastructure
SWA	Surface Water Assessment
SWL	Sound Power Level

Term	Description
SWMP	Surface Water Management Plan
SWQP	South West Queensland Pipeline
TfNSW	Transport for New South Wales
TIA	Traffic Impact Assessment
TJ/day	Terajoules per day
TMP	Traffic Management Plan
TPA	The Pipeline Authority
TSP	Total Suspended Particulate Matter
VIA	Visual Impact Assessment
VOC	Volatile Organic Compounds
WM	*Water Management Act* 2000
WSP	Western Slopes Pipeline

Glossary

ABL	The assessment background level (ABL) is defined in the NPI as a single figure background level for each assessment period (day, evening and night). It is the tenth percentile of the measured L_{90} statistical noise levels.
dB	Noise is measured in units called decibels (dB). There are several scales for describing noise, the most common being the 'A-weighted' scale. This attempts to closely approximate the frequency response of the human ear.
K-Factor	Soil erodibility factors, the transportability of the material and the amount and rate of run-off from a particular rain event.
L_{A1}	The A-weighted noise level exceeded for 1% of the time.
L_{A10}	The noise level which is exceeded 10% of the time. It is roughly equivalent to the average of maximum noise level.
L_{A90}	The noise level that is exceeded 90% of the time. Commonly referred to as the background noise level.
L_{Aeq}	The energy average noise from a source. This is the equivalent continuous sound pressure level over a given period. The $L_{eq,15\ minute}$ descriptor refers to an L_{eq} noise level measured over a 15-minute period.
PM_{10}	Particulate Matter Less than 10 Microns in Aerodynamic Diameter
$PM_{2.5}$	Particulate matter less than 2.5 microns in aerodynamic diameter
RBL	The Rating Background Level (RBL) is an overall single value background level representing each assessment period over the whole monitoring period. The RBL is used to determine the intrusiveness criteria for noise assessment purposes and is the median of the ABL's.
R-Factors	Rainfall-runoff erosivity factors
Sound power level (L_w)	A measure of the total power radiated by a source. The sound power of a source is a fundamental property of the source and is independent of the surrounding environment.