Appendix C

Surface water assessment

APA East Coast Grid Expansion, Moomba to Wilton Pipeline - Modification Report 1

Surface Water Assessment

Prepared for APA Group
July 2021

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APA East Coast Grid Expansion, Moomba to Wilton Pipeline - Modification Report 1

Surface Water Assessment

Report Number

J200919 RP#8

Client

APA Group

Date

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Version

v2 Final

Prepared by	**Approved by**
	
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6 July 2021	6 July 2021

Executive Summary

ES1 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 in South Australia to Wilton in New South Wales, a distance of approximately 1,300 kilometres (km). The Moomba to Wilton Pipeline (MWP) is the mainline part of the Moomba Sydney Pipeline, and was constructed in 1976 and gazetted as state significant infrastructure (SSI) in December 2020.

APA is proposing the East Coast Grid Expansion project (the project) as a way to increase the available gas to the NSW and Victorian markets by expanding the capacity of the MWP. The increase in capacity will be facilitated by the installation of compressor stations at the following five sites in NSW:

- MW162 – Binerah Downs approximately 68 km north-west of Tibooburra.
- MW300 – Mecoola Creek approximately 70 km south-east of Tibooburra.
- MW433 – Round Hill approximately 103 km north of Wilcannia.
- MW733 – Gilgunnia approximately 63 km south-west of Nymagee.
- MW880 – Milne approximately 35 km south-west of Condobolin.

Approval for the project will be sought through an SSI modification process under Section 5.25 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) over two modifications, the first (Modification 1) addressing MW880 (Stage 1) and MW443 (Stage 2), and the second (Modification 2) addressing the remaining three sites (Stage 3).

This surface water assessment (SWA) addresses issues relating to MW433 and MW880, and supports Stage 1 and Stage 2 of the expansion works in Modification Report 1. A separate report will be prepared to support Stage 3 in Modification Report 2.

The existing surface water environment at each site is described in Section 3.

ES2 Project description and proposed water management approach

Each compressor station site will involve very similar operational infrastructure and construction works. Section 2 describes generic details of project construction and operations that would apply to each of the two sites.

The proposed water management approach will also be generally consistent across all compressor station sites. Section 4 provides an overview of the proposed water management approach that will be applied, which broadly encompasses stormwater management, site water usage and sources of supply, and wastewater management.

During construction the total water demand for each site totals approximately 20 megalitres (ML). APA is currently investigating water supply options to determine the most appropriate water source(s) for each site, secure access and water entitlements, and obtain necessary licences and approvals that may be required.

During operations site water usage is expected to be minimal. Construction phase water supply arrangements will likely be extended to cover operations. If this is impractical, water will be imported to site as required.

ES3 Key findings

ES3.1 Residual impacts

Potential surface water impacts were considered in terms of changes to:

- water quantity and flooding;
- water quality; and
- impacts to watercourses.

Overall, potential surface water impacts during both construction and operation are considered minor and manageable with the proposed water management approach in place, as described in Section 4.

ES3.2 Water licensing and approvals

No specific additional water licensing or approvals are currently identified. Exemptions to approved SSI projects apply to various licensing and approvals that may otherwise be required.

APA is currently investigating water supply options for the construction phase of the project. Further requirements for water licensing and approvals will be confirmed and obtained as an outcome of this exercise.

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Figures

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 1973*. The MWP is now owned and operated by APA; it was gazetted as State Significant Infrastructure (SSI) 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 compressions stations and associated works on both the South West Queensland Pipeline (SWQP) and 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 site of compression 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 (AEMO 2021).

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. All up, these proposed capacity expansions would mean that the entirety of NSW peak demand could be met by gas flowing from northern sources.

The proposed East Coast Grid Expansion (the project) presents an optimal opportunity to maximise gas supply via existing infrastructure with minimal impact.

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

- Modification 1:
  - 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 compressor stations on the MWP are shown in Figure 1.1.

1.3 Report purpose and method

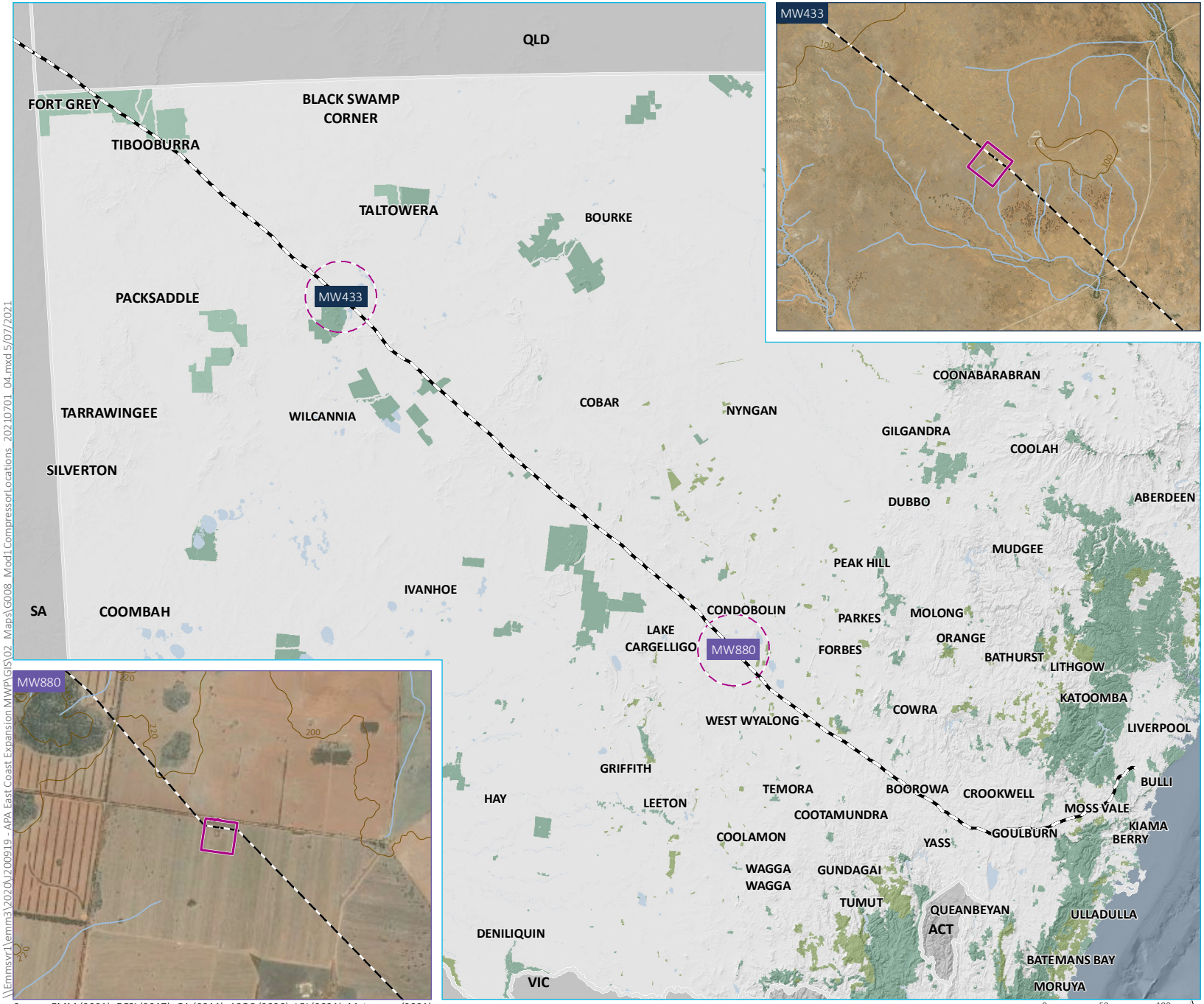
EMM Consulting Pty Limited (EMM) has been engaged by APA to assess potential surface water impacts arising from the construction and operation of the proposed compressor stations.

This surface water assessment (SWA) has been prepared to address the surface water impacts for Stage 1 and 2 of the expansion works and to support Modification Report 1. As such, only the surface water impacts at MW433 and MW880 have been assessed in this report. A separate report will be prepared to support Stage 3 in Modification Report 2.

The modification reports and supporting technical assessments will be prepared in accordance with Section 5.25 of the EP&A Act and the guideline Preparing a Modification Report – State Significant Infrastructure Guide (DPIE 2020).

A briefing letter to DPIE dated 5 March 2021 outlined the proposed scope of technical assessments. Consistent with this letter, this SWA is based on 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.



KEY

- Compressor site 30 km buffer
- State boundary
- Moomba to Wilton pipeline
- NPWS reserve
- State forest

INSET KEY

- Compressor site boundary
- Contour (10 m)
- Watercourse

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

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Figure 1.1

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Secretary's Environmental Assessment Requirements (SEARs) have not been issued for the proposed modifications.

A Soil and Erosion Hazard Assessment (SEHA) (EMM 2021a) has also been prepared to support the modification, and closely relates to this SWA in terms of assessing the potential for soil erosion and associated surface water quality impacts and describing proposed mitigation and management measures.

1.4 Report structure

This report is structured as follows:

- **Executive summary** provides a brief overview of the project and the key findings of the SWA;
- **Section 1** provides an overview of the project, report purpose and assessment approach;
- **Section 2** provides a brief description of the project;
- **Section 3** describes the existing surface water environment at each site;
- **Section 4** describes the proposed water management approach for the project, which is also presented generically and applicable to all sites;
- **Section 5** assesses the residual impacts on surface water resources; and
- **Section 6** addresses water licensing and approval requirements.

2 Project description

2.1 Overview

Each compressor station site will involve very similar operational infrastructure and construction works. This section describes generic details of project construction and operations that would apply to MW433 and MW880. Site locations and descriptions are provided in Section 3.

2.2 Compressor station details

The East Coast Grid Expansion in NSW will be facilitated by the construction of five compressor stations 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 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.

2.2.1 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 (if used) 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 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. All roles are likely to be drive-in-drive-out (DIDO) or fly-in-fly-out (FIFO) and based at the construction camp when on site. The anticipated roster is three weeks on followed by one week off on a rotational basis.

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

2.2.2 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.

2.3 Potential sources of impact

Key potential sources of impact to surface water resources comprise the following:

- construction stage impacts, including:
    - ground disturbance during bulk earthworks and other site activities leading to exposure of soils and potential erosion and mobilisation of sediment into receiving watercourses;
    - contamination of surface waters as a result of accidental spillage of materials such as fuel, lubricants, herbicides and other chemicals used to support construction activities;
    - contamination of surface waters as a result of poor or ineffective wastewater management practices;

- disturbance of watercourses to support construction activities including clearing, bulk earthworks and civil works, installation of infrastructure and site establishment; and

- partial blockage or redirection of floodwaters as a result of poorly considered construction activities, fencing or storage/stockpile areas, resulting in inundation of construction areas or downstream properties, damage to plant and equipment, and potential risk to life;

- operational stage impacts, including:

  - potential ongoing erosion of soils and mobilisation of sediment into receiving watercourses;

  - contamination of surface water as a result of accidental spillage of materials such as washdown water, fuel, lubricants, herbicides and other chemicals used to support site activities, or through poor site management practices;

  - contamination of surface waters as a result of poor or ineffective wastewater management practices; and

  - partial blockage or redirection of floodwaters as a result of poorly considered permanent facilities resulting in inundation of facilities or downstream properties, damage to plant and equipment, and potential risk to life.

The proposed water management approach described in Section 4 has been developed to address these issues. Residual impacts are assessed in Section 5.

3 Existing environment

3.1 MW433 – Round Hill

3.1.1 Overview

MW433 – Round Hill is located in the Central Darling Shire local government area (LGA), approximately 103 km north of Wilcannia. The site location and relevant hydrologic context as described in this section are presented in Figure 3.1.

The site is 15.27 hectares (ha) in size and bordered on all sides by the Paroo-Darling National Park. There are no residential properties within 5 km of the site.

The topography generally falls gently from north to south with slopes typically in the range 0.5−1.5%. The site is slightly elevated when compared to surrounding ground levels based on available terrain data.

Local soils are mapped as Sodosols under the ASC based on available regional mapping (EMM 2021a). These soils will generally exhibit low agricultural potential, low fertility and land capability, and low runoff potential due to high infiltration rates.

Long-term climate data (SILO 2021) shows the mean annual rainfall at the site is less than 250 millimetres (mm), with most rainfall occurring during summer. Mean annual evaporation of approximately 2,500 mm far exceeds rainfall. Mean monthly maximum temperatures range from 18°C in June and July to 37°C in January, and mean monthly minimum temperatures range from 5°C in July to 22°C in January.

3.1.2 Hydrologic context

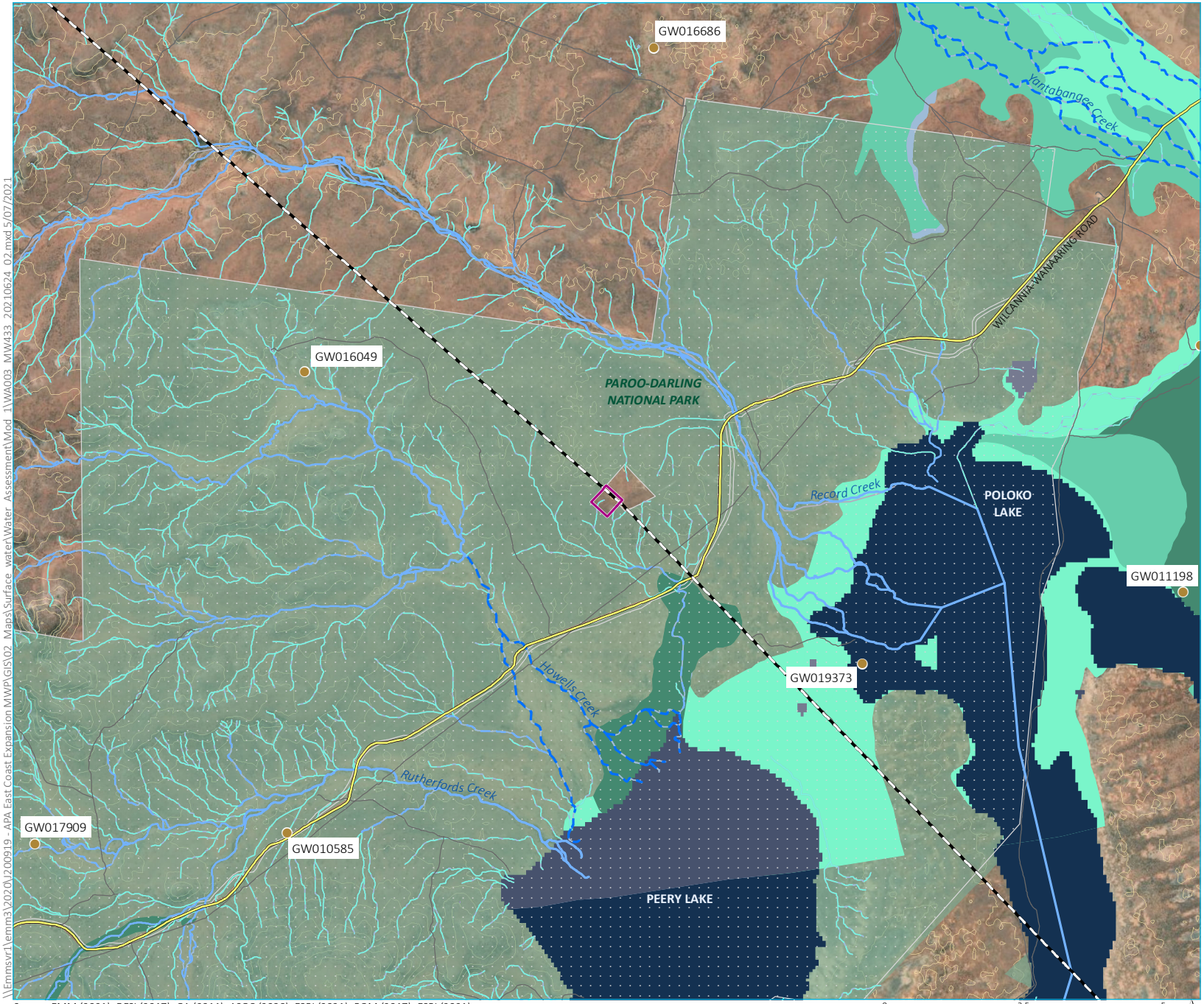
The site is located at the headwaters of two mapped unnamed 1st order watercourses. These drain to the south, ultimately into Peery Lake on the Paroo River. The Paroo River in turn joins the Darling River upstream of Wilcannia.

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.

Peery Lake is located approximately 5 km downstream of the site. Peery Lake makes up part of the *Paroo River Wetlands*, which is listed under the Convention of Wetlands of International Importance (Ramsar Convention). The Ramsar wetland boundary excludes the site itself but surrounds the site on all sides, similar to the Paroo-Darling National Park.

Ramsar wetlands are recognised as a Matter of National Environmental Significance (MNES) under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). Referral to the Commonwealth Department of Agriculture, Water and the Environment (DAWE) for assessment and approval is necessary when a proposed action will, or is considered likely to, have a significant impact on the ecological character of a Ramsar wetland. Significant impact criteria are described in *Matters of National Environmental Significance: Significant Impact Guidelines 1.1 – Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth of Australia 2013) (Significant Impact Guidelines). This is addressed further in Section 5, which concludes that the project will not have a significant impact on the Paroo River Wetlands Ramsar site.

The Paroo Wetlands on the Paroo River are large inland arid lakes, which are usually dry but fill episodically during periods of high rainfall. The Paroo River Wetland system is a unique ecological environment and includes artesian springs, as well as several protected plant species. It also supports the Murray-Darling Basin's healthiest native fish communities and has significant cultural importance for traditional owners (DPIE 2018).



KEY

- Compressor site
- Moomba to Wilton pipeline
- Major road
- Minor road
- Contour (10 m)
- Waterbody
- NPWS reserve
- Ramsar wetland

Strahler stream order

- 1st order
- 2nd order
- 3rd order
- 4th order
- 5th order
- 6th order

Groundwater bore (type)

- Stock and domestic

Aquatic groundwater dependant ecosystem

- Known GDE (regional studies)
- Unclassified potential GDE (regional studies)
- High potential GDE (national assessment)
- Moderate potential GDE (national assessment)
- Low potential GDE (national assessment)
- Unclassified potential GDE (national assessment)

Terrestrial groundwater dependant ecosystem

- High potential GDE (national assessment)
- Moderate potential GDE (national assessment)
- Low potential GDE (national assessment)

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

0 2.5 5 km

GDA 1994 MGA Zone 54

N

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MW433 – Site location and relevant water features

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Figure 3.1

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Flooding at the site is expected to occur generally as broad, shallow overland flow given the lack of relief and defined drainage features and relatively small upstream catchment, with flows concentrating where defined drainage lines commence. The specific nature of flooding conditions and risks at the site is unknown, however flood risk is expected to be low on the basis of its slightly elevated position and headwater location. There are no sensitive receptors or infrastructure located close to the site with the exception of the existing MWP and associated vehicular access tracks.

Management of surface water resources falls under the WSP for the Intersecting Streams Unregulated and Alluvial Water Sources 2011. The site is located in the Paroo River Water Source, which has existing allocations for town water supply, unregulated river water access licenses and stock and domestic purposes. Existing surface water users are not anticipated to be relying on water immediately downstream of the site.

The nearest registered groundwater bores (GW016049, GW019373) are located approximately 6 km from the site. These bores are approximately 85 m deep and suggest the water bearing zone may be as shallow as 4.6 mBGL in unconsolidated shallow groundwater stores, and deeper than 70 mBGL in the deeper, consolidated rock.

Peery Lake is registered as a high-potential aquatic GDE (BoM 2021). The artesian springs in Peery Lake are also listed as GDEs, and there are several groundwater dependent plant communities in the area. There are several high potential terrestrial GDEs also mapped between the site and Peery Lake.

Overall, the sensitivity of the receiving environment downstream of the site is considered high due to the presence of the Ramsar site, Peery Lake and associated GDEs.

3.2 MW880 – Milne

3.2.1 Overview

MW880 – Milne is located in the Lachlan Shire LGA in central NSW, approximately 35 km south-west of Condobolin. The site location and relevant hydrologic context as described in this section are presented in Figure 3.2.

The site is 16.22 ha in size and is located immediately south of Crown Camp Road. Local land use is characterised by grazing with some dryland cropping and related horticulture. The nearest residential properties are located 1.7 km to the north-east and 2.5 km to the south-east.

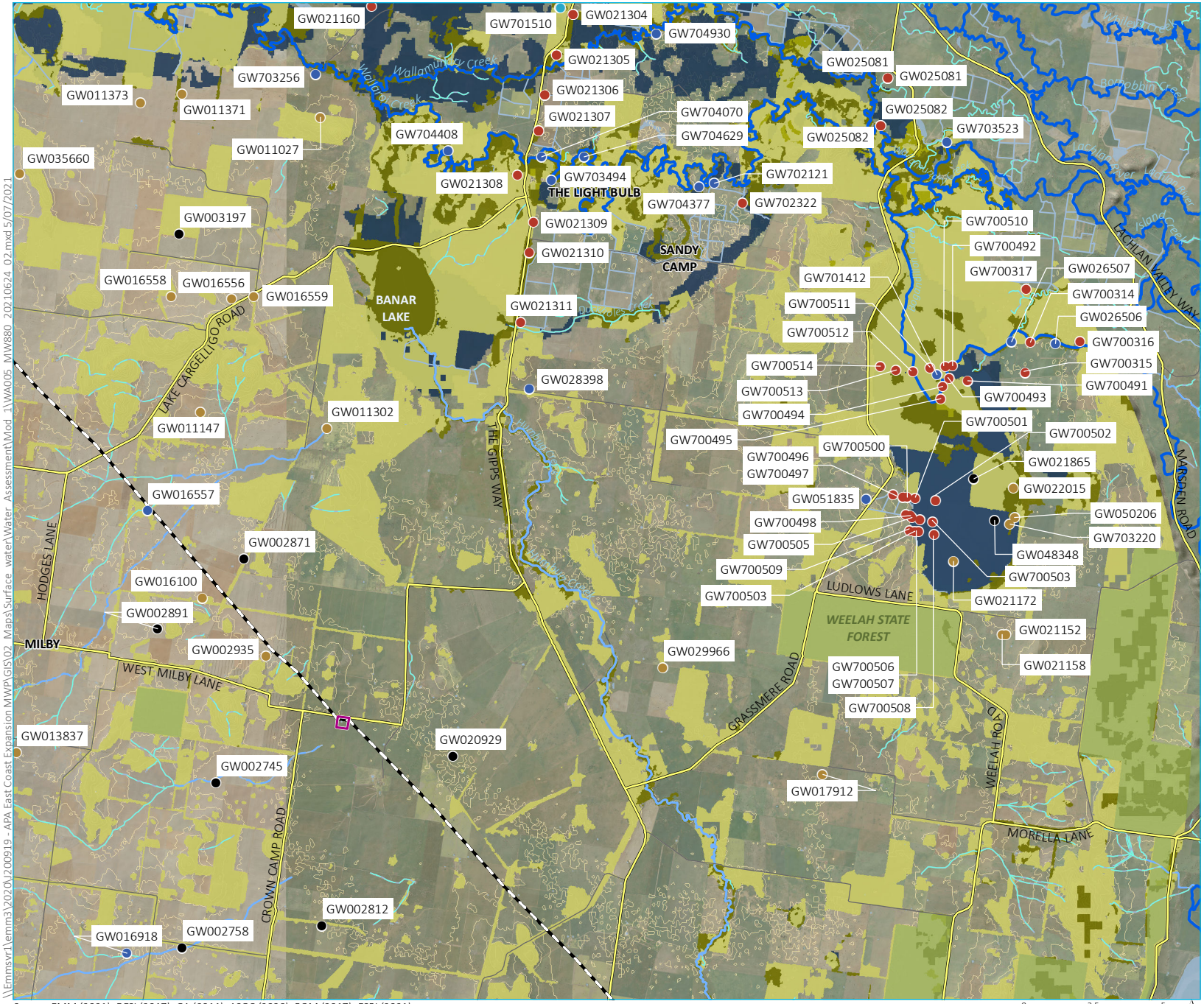
The site topography falls gently from west to east at slopes of between 0.5−2%.

Local soils are mapped as Kandosols and Chromosols under the ASC based on available regional mapping (EMM 2021a). These soils will generally exhibit low to moderate agricultural potential, low to moderate fertility and land capability, and moderate runoff potential.

Long-term climate data (SILO 2021) shows the mean annual rainfall at the site is approximately 440 mm, with most rainfall occurring during summer. Mean annual evaporation of approximately 1,850 mm per year far exceeds rainfall. Mean monthly maximum temperatures range from 15°C in July to 34°C in January, and mean monthly minimum temperatures range from 3°C in July to 19°C in January.

3.2.2 Hydrologic context

The nearest mapped watercourse to the site is an unnamed 3rd order watercourse to the south of the site. Based on available terrain and Geofabric data this unnamed watercourse, and the site itself, drains 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.



KEY

- Compressor site
- Moomba to Wilton pipeline
- Major road
- Minor road
- Contour (10 m)
- State forest
- Waterbody

Strahler stream order

- 1st order
- 2nd order
- 3rd order
- 4th order
- 5th order
- 7th order
- 8th order

Groundwater bore (type)

- Irrigation
- Monitoring
- Stock and domestic
- Unknown
- Water supply

Aquatic groundwater dependant ecosystem

- High potential GDE (national assessment)
- Moderate potential GDE (national assessment)

Terrestrial groundwater dependant ecosystem

- High potential GDE (regional studies)
- Moderate potential GDE (regional studies)
- Low potential GDE (regional studies)

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

0 2.5 5 km

GDA 1994 MGA Zone 55

N

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MW880 - Site location and relevant water features

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Figure 3.2

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Drainage from the site will likely occur as shallow sheet flow concentrating in informal gullies and flow paths, rather than following any defined drainage line or watercourse. 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.

Flooding at the site is expected to occur as broad, shallow overland flow given the lack of relief, poorly defined drainage features and lack of significant upstream catchment. The specific nature of flooding conditions and risks at the site are unknown, however there are no sensitive receptors or infrastructure located close by, with the exception of the existing MWP, associated vehicular access tracks to the site and the adjacent Crown Camp Road.

Management of surface water resources falls under the WSP for the Lachlan Unregulated River Water Sources 2012. The site is located in the Humbug Creek Water Source. In the 2020-21 financial year, all water allocations from this source were made to properties in the township of Ungarie which is located upstream on Humbug Creek approximately 28 km south-west of the site. No licensed surface water users are located immediately downstream of the site.

There are three registered groundwater bores (GW002935, GW020929, and GW002745) within 3 km of the site, registered for stock and domestic or unknown purposes. These bores show that the water bearing zone in the area surrounding the site is deeper than 26 metres below ground level (mbgl).

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.

Overall, the sensitivity of the receiving environment downstream of the site is considered low.

4 Proposed water management approach

4.1 Overview and objectives

This section provides an overview of the proposed water management approach, which will be generally consistent across all compressor station sites. This encompasses:

- stormwater management;
- site water usage; and
- wastewater management.

Overarching water management objectives comprise:

- minimising disturbance to existing watercourses and overland flow paths;
- minimising changes to existing downstream flow paths and peak flow rates;
- minimising water quality risks to the downstream receiving environment; and
- minimising water use and demand for imported water.

4.2 Stormwater management

4.2.1 General principles and approach

The general approach to stormwater management will involve:

- appropriate siting of proposed infrastructure within each site boundary, which will minimise (and avoid where possible) disturbance to existing watercourses and overland flow paths;
- grading to minimise earthworks and consistent with the existing prevailing grade and landforms at each site and to fall to existing drainage lines, to minimise changes to existing flow paths;
- provision of surface drainage infrastructure comprising:
    - diversion of upslope runoff around infrastructure;
    - surface drainage measures as required to control runoff generated within the site, minimise soil erosion potential and direct runoff towards receiving drainage lines. Sheet flow conditions will be maximised, and construction of diversion drains, channels and table drains to be minimised to the extent practicable;
    - rock rip rap will be used to armour earthwork batters and site drainage as needed for scour protection where flow concentrations cannot be avoided; and

- control of stormwater discharge and existing overland flow paths to avoid proposed wastewater effluent management areas (refer Section 4.4);

- all works will seek to minimise offsite flooding impacts to the extent practicable;
- stabilisation of disturbed and operational areas. Use of hardstand and equivalent impervious surfaces will be minimised in favour of gravel or similar pervious treatments to promote infiltration where practical and minimise the increase in runoff potential and consequent impacts to downstream peak flow rates;
- minimising potential impacts to receiving water quality by:
  - implementing sediment and erosion controls in accordance with best practice, including Managing Urban Stormwater: Soils and Construction Volume 1 (Landcom 2004);
  - prompt stabilisation of disturbed and operational surfaces;
  - areas containing potential contaminants (ie fuel, oil and grease) will be covered and/or bunded in accordance with relevant standards to prevent contamination of stormwater runoff, with offsite disposal of captured water/contaminants;
  - maintaining spill kits onsite at all times during construction and operation; and
  - minimising the need to store oil on site, and the need for subsequent change-out during operations, will be considered as part of further design development; and
- stormwater runoff from buildings will be captured in rainwater tanks for use on site, to minimise demand for imported water.

These principles will be applied to the extent practicable as part of further design development.

4.2.2 Erosion and sediment control

Specific recommendations and proposed management measures around drainage measures, erosion and sediment control and stabilisation of disturbed surfaces during construction and operations are contained in the SEHA. This will include development of an overarching soil and water management plan (SWMP) for the project, underpinned by progressive erosion and sediment control plans (PESCPs) for all discrete disturbance areas.

At the end of the construction phase, the project footprint requirement at each site will be approximately half that required during construction. Construction areas no longer required to support the operational phase will be rehabilitated. A principal aim of site rehabilitation will be to stabilise disturbed areas and minimise the potential for ongoing soil erosion and subsequent mobilisation/transport downstream of each site. Recommended rehabilitation principles and approaches are described in the SEHA.

4.3 Site water usage

4.3.1 Construction

i Water demands

During the construction phase, the estimated water demand for each site is as follows:

- bulk earthworks water demand (primarily dust suppression) = 6 megalitres (ML);

- general construction activity water demand = 11 ML; and
- construction camp water demand = 3 ML.

The water demand for each site totals approximately 20 ML over the 12-month construction period (including commissioning).

ii Water supply options

Water supply options for each site have been considered in a Water Availability Assessment (EMM 2021b). This investigated a range of potential water sources that could be accessed, including both surface water and groundwater resources. Options were evaluated with consideration to the applicable regulatory environment and framework to secure water in NSW, available pathways to secure water allocations, water availability, water market constraints and preference to minimise physical transport of water to the extent possible.

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 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.

4.3.2 Operations

During the operations phase, site water usage is expected to be minimal. Construction phase water supply arrangements will likely be extended to cover operations. If this is impractical, water for potable use and maintenance/cleaning purposes during operations will be imported to site as required.

4.4 Wastewater management

4.4.1 Construction

During the construction phase, wastewater will be produced at the construction camp accommodation and associated facilities/amenities at each site. The workforce at each site will reach a peak of 80 people, and average 40 people over an estimated 12-month construction period (including commissioning).

The indicative wastewater load at each site will be 13.6 kilolitres per day (kL/day) during peak periods, and on average 5.1 kL/day.

Wastewater produced by each accommodation camp will be managed by a two-stage process involving secondary level treatment followed by effluent disposal at surface via spray irrigation. Treatment will be via aerated wastewater treatment system involving staged processes of sedimentation, anaerobic digestion, biological treatment, clarification and disinfection. Treated effluent will be pumped to the surface for spray irrigation.

The proposed application area for the spray irrigation system will be contained within the footprint of each site. A preliminary spray field sizing of 0.9 ha for each site has been identified, which is in the order of 5−6% of the total area of each site.

The onsite wastewater management system for each site is subject to further design development and will:

- consider and confirm the most appropriate system for each site based on the preferred site layout, site conditions and 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.

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 (refer Section 4.2.2).

4.4.2 Operations

During the operations phase, personnel presence will be minimal and infrequent. However, permanent amenities including ablutions will be maintained on each site.

Wastewater produced by permanent facilities at each site will be managed using a septic leach system. Septic leach systems involve directing wastewater to an underground septic tank. In a septic tank, solid waste settles to the bottom of the tank and is broken down through biological processes under anaerobic conditions, where it forms a sludge. Effluent (ie partially treated liquid waste) is pumped to a below-ground leach drain (ie absorption trench), where it gradually seeps into the surrounding soil.

The proposed application area for the absorption system will be contained within the footprint of each site.

Similar to construction phase arrangements, the permanent onsite wastewater management system for each site is subject to further design development and will:

- consider and confirm the most appropriate system for each site based on the preferred site layout, site conditions and 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.

The operations phase will also include routine and unplanned maintenance of infrastructure, as well as washdown activities. Washdown of the gas compressor clears away any dust, aerosols or water which may be deposited on the compressor blades to maintain efficient operation. 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.

5 Impact assessment

5.1 Overview

Section 4 describes the proposed conceptual water management approach for the project.

The following sections describe predicted residual impacts (ie assuming the proposed water management approach is implemented for each site) to surface water resources in terms of:

- flooding and water quantity;
- water quality; and
- impacts to watercourses, water bodies and the downstream receiving environment.

Section 5.2 describes predicted residual impacts that apply generically to the project and are relevant to all sites.

Section 5.3 describes predicted residual impacts that are site-specific.

5.2 Residual impacts relevant to all sites

5.2.1 Flooding and water quantity

There is low potential for any significant flood impacts to occur at each site on the basis that:

- sites are not located close to any major watercourses, and are therefore not expected to be subject to mainstream flooding;
- local catchment flooding at each site is expected to occur primarily as broad, shallow overland flow given the lack of relief, poorly defined drainage features and lack of significant upstream catchment for each site; and
- there are no sensitive receptors or infrastructure located close to the sites with the exception of the existing MWP, associated vehicular access tracks to the site and existing roads.

As described in Section 4.2, future development of site layouts and infrastructure designs 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 introduction of compacted and stabilised surfaces to each site during construction and operations, including some limited hardstand areas where required around key operational equipment, will result in a small increase in runoff potential when compared to existing conditions. However, potential 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. Design of site drainage systems will seek to minimise changes to existing flow paths and offsite impacts.

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

5.2.2 Water quality

i Construction

The primary risks to water quality during construction will occur 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 SEHA has assessed these impacts in detail and concludes that the key risks to the soil and land resources associated with construction at each site, and risks to downstream water quality, can be effectively managed by proposed mitigation measures that are summarised in Section 4.2. Further details are included in the SEHA. These measures will be further developed, documented and formalised in a SWMP for the project.

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 could also adversely impact water quality. Appropriate controls to manage these activities will also be incorporated in the SWMP.

Water quality could also be impacted during construction as a result of poor or ineffective 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 practise 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 Operations

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 can 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 practise and all relevant guidelines and requirements.

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

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

5.2.3 Watercourses

It is expected that disturbance of existing watercourses can 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).

5.3 Site-specific issues

5.3.1 MW433 – Round Hill

Section 3.1.2 identifies that the relative sensitivity of the receiving environment downstream of the MW433 – Round Hill site is considered high due to the presence of the Paroo River Wetlands Ramsar site, Peery Lake and associated GDEs.

Section 5.2 concludes that potential impacts to water quantity and flooding, water quality and watercourses in general at all sites are considered minor with proposed management measures in place.

By extension, potential adverse impacts to watercourses and water bodies further downstream of MW433 – Round Hill within the Paroo River Wetlands, are also not anticipated. With respect to the Significant Impact Guidelines, there is no direct impact to the Ramsar wetland and no measurable change to hydrology or water quality owing to the very small contribution of the site to the overall wetland catchment area.

5.3.2 MW880 – Milne

No additional site-specific issues are considered to apply to this site. Residual impacts are described in Section 5.2.

5.4 Summary of commitments

The following commitments will minimise impacts to water associated with the project:

Table 5.1 Summary of commitments – surface 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.
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.

Table 5.1 Summary of commitments – surface 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 5.1 Summary of commitments – surface 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.

6 Water licensing and approvals

6.1 Overview

This section sets out water licensing and approval requirements for the project.

6.2 Water licensing

Stormwater runoff from roof areas will be captured by rainwater tanks for onsite reuse. Water extraction (or water take) from rainwater tanks is an 'excluded work' under the WM Regulation (Schedule 1, Item 5 – *"rainwater tanks collecting water from roofs only"*) and therefore licensing is not required.

A similar water licensing exemption would also apply to any sediment basins established during the construction phase on any site, including for reuse of water from a basin, which are considered to satisfy the 'excluded work' definition under the WM Regulation (Schedule 1, Item 3 – *"dams solely for the capture, containment or recirculation of drainage…"*).

As described in Section 4.3.1ii, APA is currently considering water supply options for the construction phase of the project. Further requirements for water licensing will be confirmed as an outcome of this exercise.

6.3 Water approvals

6.3.1 Impacts to waterfront land

Depending on the layout and extent of proposed works that is developed for each site, there is potential for some works at MW433 to be located on waterfront land. A mapped watercourse is located within the boundary of this site. For the purposes of the WM Act, waterfront land is defined as the bed and bank of any river, lake or estuary and all land within 40 m of the highest bank of the river, lake or estuary mean high water mark.

Under provisions within the EP&A Act, approved SSI projects are exempt from requiring a controlled activity approval to permit works on waterfront land.

Regardless, all proposed works on waterfront land would be undertaken in accordance with relevant guidelines, including NRAR 2018. Where practical, disturbance to waterfront land will be avoided through considered design and construction practices.

6.3.2 Other approvals

As described in Section 4.3.1ii, APA is currently considering water supply options for the construction phase of the project. Further requirements for water approvals will be confirmed as an outcome of this exercise.

It is noted that a similar exemption under the EP&A act for approved SSI projects also applies to a water supply work approval that would otherwise be required under the WM Act.

6.4 Summary

No specific additional water licensing or approvals are currently identified. Exemptions to approved SSI projects apply to various licensing and approvals that may otherwise be required. APA is currently considering water supply options for the construction phase of the project. Further requirements for water licensing and approvals will be confirmed and obtained as an outcome of this exercise.

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Abbreviations

APA	APT Pipelines (NSW) Pty Limited
ASC	Australian Soil Classification
DPIE	Department of Planning Industry and Environment
DPIE-Water	Department of Planning, Industry and Environment – Water Division
SEHA	Soil and Erosion Hazard Assessment
EMM	EMM Consulting Pty Ltd
EP&A Act	*Environmental Planning and Assessment Act 1979* (NSW)
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth)
GDE	groundwater dependent ecosystem
Geofabric	Australian Hydrological Geospatial Fabric
ha	hectare
kL/day	kilolitres per day
km	kilometre
LGA	local government area
m	metre
mBGL	metres below ground level
ML	megalitre
mm	millimetre
MNES	matter of national environmental significance
MSP	Moomba Sydney Pipeline
MWP	Moomba to Wilton Pipeline
NRAR	Natural Resources Access Regulator
NSW	New South Wales
PESCP	progressive erosion and sediment control plan
PL	Pipeline Licence
SILO	Scientific Information for Land Owners
SSI	state significant infrastructure
SWA	surface water assessment
SWMP	soil and water management plan

SWQP	South West Queensland Pipeline
TJ/day	terrajoules per day
WM Act	*Water Management Act 2000* (NSW)
WM Regulation	*Water Management (General) Regulation 2018* (NSW)