Mereenie Oil and Gas Field

Environment Management Plan

9900-630-PLN-0004

CTP 6-4

Document control

Version	Description	Authored	Approved	Date
6-1	Initial submission	Environmental Specialist / Enviro-Value	Risk and HSE Manager	9 Dec 2022
6-1	Update for DEPWS acceptance	Environmental Specialist	Risk and HSE Manager	15 December 2022
6-2	Update post DEPWS Reg 10 / Reg 11 notices	Environmental Specialist / Enviro-Value	Risk and HSE Manager	5 June 2023
6-3	Update post DEPWS Reg 10 / Reg 11 notices	Environmental Specialist	Risk and HSE Manager	14 July 2023
6-4	Update post DEPWS Reg 11 notice	Environmental Specialist	Risk and HSE Manager	21 November 2023

Disclaimer

This document has been prepared on behalf of the interest holders using the skill and care expected from persons who have professional qualifications, training, skills and experience on the subject matter of environment, safety, risk management and petroleum development and operations to provide factual and technical information and reasonable solutions to identified risks.

Whilst every care has been taken to prepare figures presented in this report, the interest holders make no representations or warranties about the accuracy, reliability, completeness or suitability for any particular purpose and does not accept liability and responsibility of any kind (whether in contract, tort or otherwise) for any expenses, losses, damages and/or costs (including indirect or consequential damage) which are or may be incurred by any party as a result of the illustration being inaccurate, incomplete or unsuitable in any way and for any other reason. The figure is for informational purposes only and is subject to change.

Document ownership and revision

CP as the operator is the custodian of this EMP and has overall responsibility for its implementation, compliance, and revision. The operator will ensure that this EMP is reviewed and if necessary revised:

- When there is a significant change to normal operations for the activities covered by this EMP;
- When there is a significant change to the regulatory framework within which the activities under this EMP are carried out;
- When recommendations or comments from the government approval process are made;
- If there is a new environmental impact or environmental risk not provided for in the current plan for the activity or an increase, not provided for in the current plan for the activity; and
- In the event an incident causing significant environmental harm or loss occurs.

This document shall not be issued and / or revised without the express approval of the interest holders.

Executive Summary

Operated by Central Petroleum under petroleum titles Operating Licence 4 and Operating Licence 5, the Mereenie Field is an oil and gas field located west of Alice Springs in a remote part of the Northern Territory (Figure 1-1). The field has been operated by Central Petroleum since 2015.

This Environment Management Plan (EMP) relates to the continuation of production activities from existing wells using the gathering networks, processing facilities and associated infrastructure already established. In addition, it includes the ongoing workover program within the field, including the upgrade of above-ground infrastructure with new wellhead equipment, safety systems and gathering lines to be replaced or installed where none currently exist. All works covered under this EMP are within existing disturbance footprints. No drilling, hydraulic fracturing/stimulation or clearing of native vegetation outside of the existing disturbance footprint is proposed.

This EMP provides a detailed description of how operator proposes to manage the environmental impacts and risks associated with its activities including how it will:

- remain consistent with the principles of ecologically sustainable development
- comply with regulatory obligations including requirements of the Code of Practice for Petroleum Activities in the Northern Territory (the Code)
- reduce impacts and risks to as low as reasonably practicable and acceptable levels.

Key contacts

Central Petroleum is the operator of the Mereenie Field, and the nominated liaison is the Chief Operating Officer who can be contacted via mail: 7/369 Ann Street, Brisbane QLD 4000, phone: +61 (0)7 3181 3800 or e-mail: info@centralpetroleum.com.au.

Description of the activity

The Mereenie Field is an operating oil and gas field. The EMP covers the activities required to operate the field in a safe and responsible manner as outlined in Table 0-1.

Table 0-1 Activities proposed under this EMP

Activity	Brief description
Civil and project activities	Includes maintenance of firebreaks, well pads, roads and access tracks, and repair of ESC devices. Also includes installation of new equipment within existing disturbance footprint.
Well operations	All activities required to produce the resource from the reserves below ground and process the product for transport and sale.
Production facilities	All activities associated with the gathering and processing of hydrocarbons for processing to sales point.
Well workovers	Well maintenance to ensure production of the wells can be operated safely and the integrity well is maintained.
Wellhead equipment, safety systems and gathering line replacement	Installation of upgraded wellhead equipment, safety systems and infield flowlines to improve safety and operability controls systems.
Progressive rehabilitation	Rehabilitation of previously disturbed areas and removal of/or make safe infrastructure no longer required for production operations.
Support activities	Includes the activities required to support all operator activities at the Mereenie Field, including accommodation, waste and wastewater handling, power generation, water supply and chemical storage and handling.
Mereenie Alice Springs Pipeline	Care and maintenance activities associated with the suspended pipeline.
Brewer Estate Crude Oil Terminal Yard	Care and maintenance activities associated with the non-operational site.
Activities not within scope	Exploration and development (drilling) Hydraulic fracturing Planned venting Native vegetation clearing outside of existing cleared / disturbed areas

Description of the environment

A summary of the physical and social environment for the field is provided in Table 0-2.

Table 0-2 Summary of the environment

Attribute	Description
Climate	Semi-arid to arid, influence from monsoonal wet season occurring November to March with highest mean rainfall occurring in January (45.7mm) and a 30-year annual total average of ~310mm. Annual total evaporation average is 2910mm.
Geology	Located within the Amadeus Basin, an east-west trending sedimentary basin extending across the southern part of the Northern Territory and into Western Australia. The basin covers an area of approximately 170,000km2 and a maximum sediment thickness of 14,000m. Existing wells and workovers target the Pacoota Sandstone and Stairway Sandstone formations.
Regional soils	AB31 – Chief soils are red earthy sands on the plains and swales. Red siliceous sands on the sand rises. Small areas of sandy red earths occur on the plains, in the swales and on the alluvial flats. Other soils include shallow stony on the stone covered ridge. AB62 – Chief soils are red earthy sands. BA28 – Chief soils are shallow stony sands.
Land systems	Simpson (covers 45% of Mereenie Field) – Extensive dune fields with hard spinifex pastures. Red sands to red clayey sands and locally red earths. Low erosion hazard. Gillen (covers 45% of Mereenie Field) – Sandstone mountains with mulga or witchetty bush country. Shallow stony or gravelly soils and some red sands or red clayey sands. Moderate erosion hazard. Krichauff (covers 10% Mereenie Field) – Flat lying sandstone, siltstone, and conglomerate. Shallow stony or gravelly soils and some red sands or red clayey sands. Moderate erosion hazard.
Groundwater	The field includes a series of stack regional scale formations that have groundwater potential supply, including the Hermannsburg Sandstone, Mereenie Sandstone and Pacoota Sandstone. The Hermannsburg Sandstone is eroded at the well sites and is not penetrated by the wells. Mereenie Sandstone is a regionally extensive formation and a significant groundwater supply source. At the Mereenie wells, the Mereenie Sandstone occurs at a depth of 0-286 m TVD and has a thickness ranging from 320-649m. Groundwater was observed at depths of 86-384 mTVD at the Mereenie wells. The Pacoota Sandstone is an oil and gas reservoir with saline groundwater and is a target formation for the Mereenie wells. Mereenie well completions include two strings of steel casing, conductor casing and two cement columns as barrier protection around the Mereenie Sandstone.
Groundwater bores	Groundwater for operations and workovers is to be sourced from RN017898, RN017657, RN004620, RN013861, and/or RN018955, all of which access the Mereenie Sandstone. A groundwater extraction licence (M10001) has been granted allowing 52.8ML per annum for use throughout the field which includes groundwater for workovers. Baseline assessments conducted and results were below drinking water and stock watering guidelines with no detection of hydrocarbon gases or products.
Surface water	Streams in the Mereenie Field are ephemeral and subject to short flow duration and high turbidity. No perennial surface water occurs. In OL4 the lack of a drainage pattern indicates that runoff seldom, if ever, occurs although some ponding may occur in inter-dunal swales where small areas of clayey soils and red earths may be present. This is in contrast to the majority of OL5 where infiltration is slow, and a dendritic drainage pattern is evident. Streams in OL5 and small section of OL4 eventually connect into Parke Creek.
Bioregion	OL4 is located within the MacDonnell Ranges and Great Sandy Desert Interim Biogeographical Regionalisation for Australia, while OL5 is within the MacDonnell Ranges bioregion.
Sites of Conservation Significance/Sites of Botanical Significance	No Sites of Conservation Significance within the Mereenie Field though George Gill Range and Surrounds is located approximately 6 km to the south and Greater MacDonnell Ranges approximately 14 km north at closest point. Field located within the Laycock Sandplain and Mereenie Site of Botanical Significance
Conservation Significant Fauna	46 conservation significant fauna species identified as potentially occurring within the Mereenie Field, eight of which have been confirmed during site surveys.

Attribute	Description
Conservation Significant Flora	45 conservation significant flora species identified as potentially occurring within the Mereenie field, 15 of which have been confirmed during site surveys.
Weeds/Pests	No declared or Weeds of National Significance found within the Mereenie Field. Buffel grass, a priority weed under the Alice Springs Regional Weed Strategy 2021-2026 detected during 2021 site survey, along with three other environmental weeds.
National Parks and Reserves	No National Parks or Indigenous Protected Areas within or immediately adjacent to the Mereenie Field.
Fire history	Typically, low fire fuel load however majority of OL4 was burnt extensively in 2011 due to a high fuel load following high rainfall season. The Meerenie Field is not within a declared fire protection zone but is within the Alice Springs Fire Management Zone.
Surrounding land tenure/Use	Haasts Bluff Aboriginal Land Trust/Aboriginal land and petroleum activities. The interest holder leases OL4 and OL5 under the Mereenie Agreement 2013 with the Central Land Council as representatives of the site's Indigenous Traditional Owners. The conditions applied to the operator's activities are outlined in the Agreement and the Mereenie Sacred Sites Clearance Certificate (SSCC) (SSCC C2013-046, renewed April 2022). The proposed activities are consistent with current land use of the field and will not impact on Aboriginal land use (authorised under the Mereenie Agreement 2003) beyond the existing day-to-day operations at Mereenie.
Surrounding populated places	Mereenie Field located in a remote location of the Northern Territory. Alice Springs located approximately 280 km west and Hermannsburg approximately 110 km east. Seven Aboriginal communities near to, or who have ties to, the Mereenie Field – Kulpidjara, Areyonga, Underana, Undandita, Haasts Bluff, Papunya, Ipolera
Roads/Traffic	Access to Mereenie Field from Alice Springs is via network of sealed and unsealed public and private roads: head west from Alice Springs along Larapinta Drive/Red Centre Way to Hermannsburg; continuing towards Kings Canyon; turn off to the Mereenie Field is to the left off Red Centre Way; approximately 175 km past Hermannsburg.
Heritage Areas identified EPBC Protected Matters Search Report	No National Heritage Places identified within or surrounding the Mereenie Field.
Archaeological surveys	Activities limited to existing disturbance footprint which has been historically surveyed and assessed as part of the Mereenie SSCC (SSCC C2013-046, renewed April 2022) obtained under the Mereenie Agreement, 2003. The activities involve minor ground disturbance at the well lease sites (grading, if necessary, civil works for flare pit and small drain/trench around workover fluid tanks). No additional surveys are required as all activities within existing, surveyed distance area and there is no work in the cultural heritage exclusion or restricted zones.
CLC Sacred Sites Clearance Certificate	Central Petroeum operates the Mereenie Field under SSCC C2013-046. Activities in this plan do not trigger additional assessments as the SSCC permits installation of pipelines, flowlines and connections, use of existing laydown areas, building and maintenance of leases, and drilling and petroleum engineering operations. All activities to be conducted within SSCC assessed area and all works to be conducted in accordance with the SSCC conditions, including the restricted and exclusion zone areas, and liaison meetings and stakeholder engagement requirements. Protocol to be followed in event of a sacred sites discovery to meet Essential Condition 7 of the SSCC.
Aboriginal Areas Protection Authority (AAPA) Certificate	A new AAPA Certificate, covering the entire field and all the works described in this EMP has been applied for. Activities will comply with conditions of the approved certificate.

Risk assessment summary

The interest holder has undertaken a risk assessment that is consistent with the requirements of ISO 31000 for the activities under this EMP. The risk assessment has considered both the inherent and residual risk of an activity. For residual risks that have a risk score of 'Low' these are considered as low as reasonably practicable and acceptable. For residual risks that have a risk score that is not 'Low' the risk assessments have included discussions on whether these are as low as reasonably practicable. Table 0-3 provides a

summary of the residual risks for activities under the environmental management plan. All risks are considered by the interest holder to be as low as reasonably practicable and are accepted.

Table 0-3 Risk assessment summary

	Residual Risk			
	Low	Medium	High	Very High
Count	35	5	0	0

The 'Medium' residual risks for activities under this environment management plan are:

- Injury or death of conservation significant fauna from civil works, vehicle movements and earthworks
- Increased occurrence of weeds (including weeds of national significance)
- Contamination of soil from release of hydrocarbons and formation water, including wastewater to ground
- Loss of places or items of cultural significance from fire as a result of activities under this EMP
- Subsurface loss of contaminants during workovers contaminating surface water and/or groundwater and reducing groundwater pressure.

Stakeholder consultation

Initial consultation with the Central Land Council who are the only stakeholders as per the stakeholder definition in the *Petroleum (Environment) Regulations 2016* for the field operations and workover EMP was undertaken by the operator at the Liaison Committee Meetings held in September 2022.

Under the SSCC and Mereenie Agreement, Formal Liaison Committee Meetings are the method by which the Central Land Council and traditional owners are to be engaged.

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Operated by Central Petroleum Limited (the operator) under petroleum titles Operating Licence 4 and Operating Licence 5, the Mereenie Field is an oil and gas field located west of Alice Springs in a remote part of the Northern Territory (Figure 1-1). The field has been operated by Central Petroleum since 2015.

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This EMP provides a detailed description of how the operator proposes to manage the environmental impacts and risks associated with its activities including how it will address its regulatory obligation that underpin the *Code of Practice for Petroleum Activities in the Northern Territory* (the Code).

1.1 Mereenie Oil and Gas Field

Mereenie was discovered in 1963 and commenced production in 1984. The field produces oil, condensate, and gas, with all oil and condensate produced onsite being trucked to interstate prior to export. Gas is processed on-site for supply to commercial markets in the Northern Territory and elsewhere.

The field is comprised of OL4 and OL5 tenement areas (123km^2 and 158km^2 respectively) and contains a fleet of multiple conventional wells. The active wells, produce both oil and gas with several wells being used for gas re-injection. Those wells not in production are classified as suspended or have been decommissioned. The principal oil and gas reservoirs are the P1 and P3 units of the Ordovician Pacoota Sandstone. The overlaying Horn Valley Siltstone is both the source and seal. Many flank wells deviate naturally (up to 45%) through the hard-abrasive rock to intersect the narrow oil rim which surrounds the gas cap. Reserves have also been identified in the Pacoota P4 unit and in the Stairway Sandstone.

There are approximately 210 km of infield gathering networks and flow lines connecting the field to the two processing facilities, the Central Treatment Plant (CTP) and Eastern Satellite Station (ESS). Sales gas is exported via a pipeline owned and managed by a third party. Crude oil and condensate produced in the field is transported via road tanker trucks to a third party for sale to customers. Formation water is a by-product of the oil and gas extraction. Formation water and gas are comingled and flowed via flowlines to the CTP and ESS where any produced fluids are separated into gas, formation water and oil. Oil and formation water are separated, and the formation water is piped to a solar evaporation pond treatment system for final precipitation. Oil is separated from the formation water and is collected to be stored with the oil and condensate prior to shipping out to the market.

1.2 Interest Holders

Table 1-1 provides details of the registered OL4 and OL5 titleholders and contacts details. The most up-to-date contact details are available on each company's website. As detailed in joint venture agreements, Central Petroleum is the designated operator.

Table 1-1 Interest holders

OL4 / OL5 Titleholders	
Name: Central Petroleum Mereenie Pty Ltd **ABN**: 95 009 718 183 **Website:** www.centralpetroleum.com.au **Liaison:** General Manager Operations	**Name**: NZOG Mereenie Pty Ltd **ABN:** 72 650 386 360 **Website:** www.nzog.com **Liaison:** Amadeus Assets Manager
Name: Macquarie Mereenie Pty Ltd **ABN:** 36 616 486 974 **Email**: mereenie@macquarie.com **Liaison:** Associate Director, Energy Markets	**Name:** Cue Mereenie Pty Ltd **ABN:** 22 650 385 336 **Website**: www.cuenrg.com.au **Liaison:** Chief Executive Officer

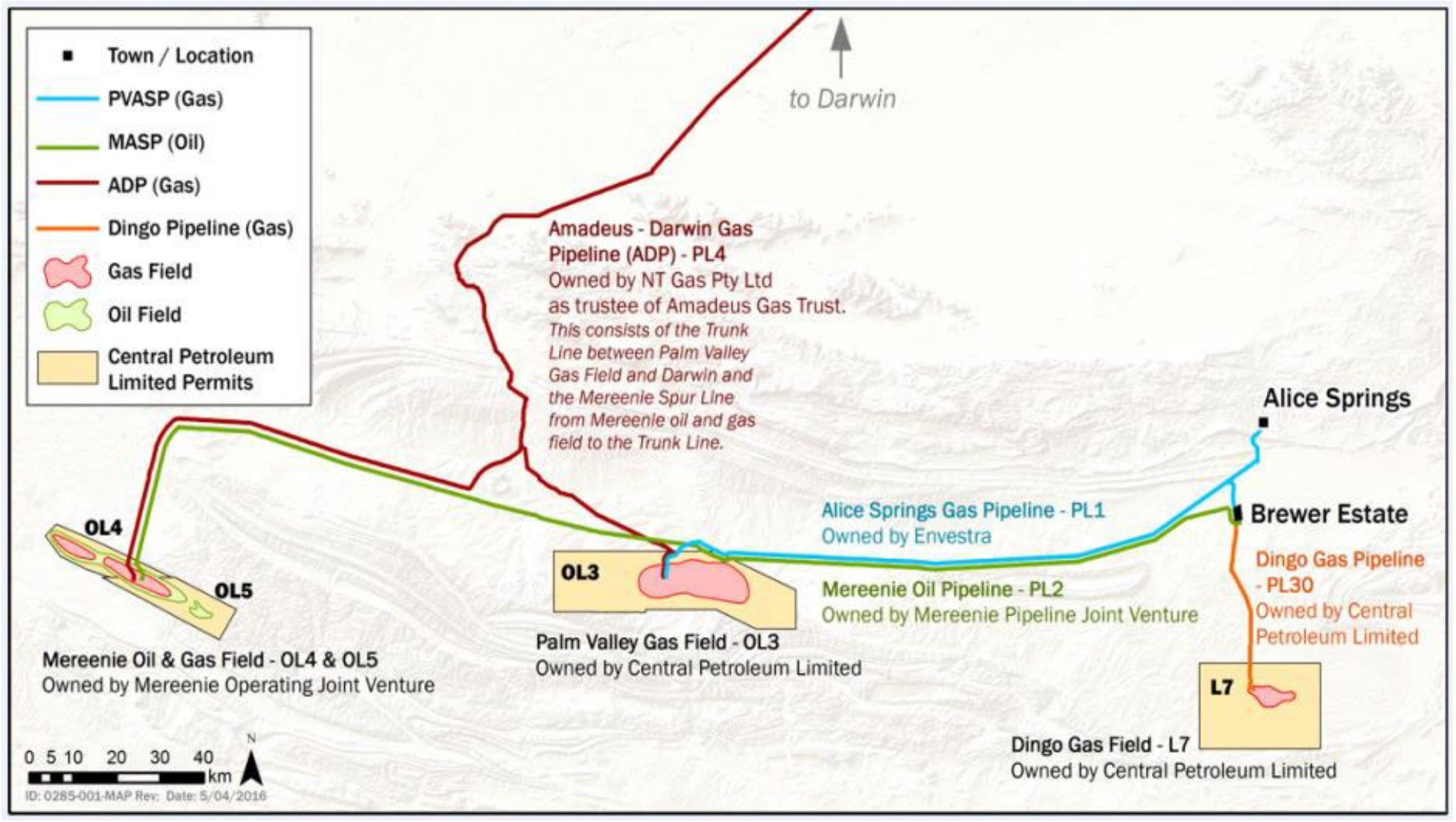


Figure 1-1 Location of Mereenie oil and gas field

1.3 Purpose

The purpose of this EMP is to demonstrate how the operator will conduct their scope of activities under the EMP in a manner consistent with the principles of ecologically sustainable development such that impacts and risks are reduced to as low as reasonably practicable and acceptable levels.

More specifically, this EMP aims to:

- Provide a framework for daily production operations across the wells and processing facilities in the Mereenie Field.
- Provide a framework for gas well workovers and wellhead equipment, safety systems and gathering line activities at existing production well sites.
- Address regulatory requirements.
- Provide impact management strategies to assist the operator and interest holders in maintaining a positive position in the local community throughout the activities.
- Provide a description of the existing environment (physical, biological and social).
- Be a practical and usable document, with environmental management principles that are easily implemented and effective.

1.4 Scope

This EMP covers all aspects directly associated with the day-to-day operations of the Mereenie Oil and Gas Field including campaign activities associated with well workover, upgrade of wellhead equipment, safety systems and gathering lines. The detailed ‘description of activities’ is listed in Section 3.

2 Environmental Legislation and Other Requirements

2.1 Key legislation

Legislation of relevance to the Mereenie Field operations activities and well intervention activities and its application in daily operations is provided in Table 2-1.

2.2 Key Codes of Practice and Guidelines

In addition to legislative requirements, the operator works to codes of practice, standards and guidelines in its production operations. These include, but are not limited to:

- *Code of Practice: Onshore Petroleum Activities in the Northern Territory (2021)*
- *Schedule of Onshore Petroleum Exploration and Production Requirements (2021)*
- *Australian Pipeline Industry Association Code of Environmental Practice – Onshore Pipelines (2017)*
- *APPEA Code of Environmental Practice (2008)*
- *Best Practice Erosion and Sediment Control (2008)*
- DEPWS Onshore Petroleum Guidelines (various)
- *ISO 31000 Risk Management – Principles and guidelines*
- *Australian and New Zealand Guidelines for Fresh and Marine Water Quality, 2000*
- *National Environment Protection (Assessment of Site Contamination) Measure, 1999*
- Australian Standards
- *Northern Territory Noise Management Framework Guidelines (2018)*

2.3 Ecologically Sustainable Development

Ecologically Sustainable Development (ESD) is a concept based on implementing practices and principles that meet the needs of ecological process and people today without impeding on future generations to meet theirs. There is no universally accepted definition of ESD, however the Commonwealth Government of Australia suggested the following:

'Using, conserving and enhancing the community's resources so that ecological processes, on which life depends, are maintained, and the total quality of life, now and in the future, can be increased' (Ecological Development Steering Committee, 1992).

The aim of ESD for interest holders is to utilise the natural environment to meet the current needs without jeopardising the environment for future operations or other land managers. All aspects of environmental impacts have been assessed with appropriate preventative and mitigation measures implemented to ensure that all aspects of the OL areas are managed and developed in accordance with the ESD concepts and this EMP.

Forward planning and adaptation of ESD concepts from inception of development will ensure that the environmental impacts of daily operations activities are minimised. Further assessment of the consideration of ESD, the environmental values of Mereenie and the potential impacts is presented in Section 6.

2.4 Central Land Council Agreement and Sacred Sites Certificates

The interest holders have an agreement with the Central Land Council (CLC) for use of OL4 and OL5 land for petroleum activities under the *Mereenie Agreement 2003*. The CLC act as a representative of the Indigenous Traditional Owners. *The Mereenie Agreement 2003* includes land access and other matters such as royalties, administration and Sacred Sites protection.

Under the *Mereenie Agreement 2003*, the interest holders have obtained a Sacred Sites Clearance Certificate from the CLC (SSCC C2013-046), which was renewed in April 2022. This certificate was issued following an assessment of the current and future activities to be conducted by the interest holders at Mereenie, a cultural heritage assessment and survey, and delineation of cultural heritage restricted work and exclusion zones.

Table 2-1 Key legislation

Legislation	Requirement	How the operator meets the requirement	Administered by
Commonwealth			
Environment Protection and Biodiversity Conservation Act 1999	Referral of proposed action/ ministerial approval	A self-assessment of the activities to be undertaken within this EMP has been conducted and determined that significant impacts to MNES are not likely to occur and a referral is not required at this stage.	Department of Climate Change, Energy, Environment and Water (DCCEEW)
National Greenhouse and Energy Reporting Act 2007 (NGER Act)	Reporting under National Greenhouse and Energy Reporting Scheme where thresholds are exceeded	The Mereenie facility energy consumption, production and greenhouse gas emissions are reported as one of the facilities under the Operational Control of Central Petroleum in accordance with the *NGER Act*.	Clean Energy Regulator
National Environment (National Pollution Inventory Protection) Measure 1998	Reporting under the National Pollution Inventory (NPI) where trigger thresholds are exceeded	The operator's operational and workover activities may contribute to triggering the threshold for NPI reporting. The operator reports usage against the potential 93 NPI substances where required.	DCCEEW
Native Title Act 1993		the operator works alongside Traditional Owners, represented by the Central Land Council regarding all activities undertaken on the Aboriginal Freehold Land on which the Mereenie Field is located. *Mereenie Agreement 2003* in place.	Attorney General's Department
Northern Territory			
Bushfire Management Act 2016 / Bushfire Management Planning Guideline: Onshore Petroleum Projects	Bushfire Management Plan/Permit to burn	The operator has included a Bushfire Management Plan consistent with the requirements of the Act and guideline. The Mereenie Field is not within a fire protection zone, though permits to burn may be required during a fire danger period where the fire danger area includes the Mereenie Field.	Department of Environment, Parks and Water Security (DEPWS)
Petroleum Act 1984	Petroleum titles	The operator has obtained the necessary petroleum titles (Operating Licence 4; Operating Licence 5) to undertake the activities listed in this EMP.	Department of Industry, Tourism and Trade (DITT)
	Land Access and Compensation Agreements	Land access agreements are in place with the Central Land Council for Mereenie as per the *Mereenie Agreement, 2003*.	Central Land Council (CLC)
Petroleum (Environment) Regulations 2016 (PER)	Approved FEMP	This EMP provides a revision and renewal of the Mereenie Field EMP (FEMP) previously approved in 2018 and incorporation of the Mereenie Field Workover and Wellhead Equipment, Safety Systems and Gathering Line Activities EMP, approved in 2020. The previous Mereenie FEMP was prepared prior to implementation of the Code in 2019. EMP activities seek to comply with requirements of the Code and Schedule 1 of the regulations.	DEPWS
Environmental Protection Act 2019 and associated Environment Protection Regulations 2020	Referral of proposed action/ environmental approval	The activities within the scope of EMP do not constitute any material change of use. The EMP presented is a renewal of production operations and workover activities. No new development areas are proposed, and the operator is of the view that the continued operations activities covered by this EMP do not have a significant effect on the environment and that any new assessment under the *Environment Protection Act 2019* is not required.	NT Environmental Protection Agency (EPA)

Legislation	Requirement	How the operator meets the requirement	Administered by
Northern Territory Aboriginal Sacred Sites Act 1989	Must not enter, damage or interfere with a Sacred Site (even if not registered)/Authority Certificate	The activities within the scope of EMP do not constitute any material change of use or extension of already disturbed areas. The operator is of the view that the activities covered by this EMP do not have a significant effect on the environment and that additional assessment under the Act is not required. Restricted work areas and no-go areas have been identified across the Mereenie Field. All personnel and visitors are educated about these areas, and they are clearly delineated on maps and with signage. Central Land Council Sacred Sites Clearance Certificate (SSCC C2013-046 (renewed April 2022); A new AAPA Certificate, covering the entire field and all the works described in this EMP has been applied for. Activities will comply with conditions of the approved certificate.	AAPA / CLC
Heritage Act 2011	Work approval (for removal or damage of archaeological sites)	All activities outlined in this EMP will be conducted within the exiting operational footprint of Mereenie Field therefore the operator does not anticipate an additional work approvals will be required.	NT Heritage
Radiation Protection Act 2004	Disposal of Naturally Occurring Radioactive Material (NORM)sources	The operator to undertake NORM testing. If limits specified in the act are exceeded, disposal of the material to be in accordance with the Act.	NT Health
Territory Parks and Wildlife Conservation Act 1976	Protects wildlife and listed threatened species in the NT Feral animal management	EMP activities to be conducted within existing Mereenie operational footprint and on existing disturbed areas so significant impacts to wildlife and listed threatened species are unlikely. The operator responds to feral animal management as required for those species identified at Mereenie.	DEPWS
Public Health and Environmental Act 2011	Wastewater management	On-site systems meet requirements of *Code of Practice for Onsite Wastewater Management*.	NT Health
Water Act 1992	Groundwater extraction licence	The operator has a groundwater extraction licence in place (M10001) and approved until 30 June 2023. A renewal application will be prepared prior to expiration.	DEPWS
Waste Management and Pollution Control Act 1998	General environmental duty	Where activities occur outside of OL4 and OL5 (e.g. during transportation), The operator and its operators must abide by the general environmental duty. An example of this would be following the NT *Contaminated Land Guideline (2017)* if a contamination event occurred.	NT EPA
	Licensed waste contractors	Any listed waste generated during operations or as part of workover and systems works is removed using a licensed waste transporter.	NT EPA
Weeds Management Act 2001	Weed declarations and statutory weed management plans	The operator ensures that its activities are consistent with statutory weed management plans and undertakes weed management activities consistent with weed declaration classes.	DEPWS
Transport of Dangerous Goods by Road and Rail (National Uniform Legislation) Regulations 2011	Transport of dangerous goods by licensed persons within licensed vehicles	The operator ensures that any dangerous goods transportation that occurs above the trigger levels are done so by appropriately licensed transportation personnel (including vehicles)	NT Worksafe
Code of Practice: Onshore Petroleum Activities in the	Activities to be performed under an approved EMP are to be	The EMP activities are subject to Code of Practice (the Code) compliance and this EMP has	DEPWS

Legislation	Requirement	How the operator meets the requirement	Administered by
Northern Territory 2019	consistent with the Code	been prepared to meet those requirements. In highlighting our commitment to complying with the Code, the majority of the Mereenie Field was developed, infrastructure installed, and has been in operation prior to the introduction of the Code. As a result, there are instances where some equipment and processes in place do not achieve the minimum standards of the Code. There are also instances of the Code not being applicable to the activities at the Mereenie Field namely section D. The scope of Section D, as defined in D.2 is specific to "onshore shale gas fields". The Mereenie Field is a conventional gas field. Where infrastructure and or processes are not aligned with the Code, the operator will ensure that any new facilities or upgrades are aligned with code requirements.	
Energy Pipelines Act 1981	Construction, operation, maintenance and abandonment of pipeline for energy-producing hydrocarbons.	The operator operates and maintains the Mereenie to Alice Springs Pipeline in accordance with the requirements of the Act.	DITT
Agricultural and Veterinary Chemicals (Control of Use) Act 2004	Use of chemicals to control weed and pest species across operations	The operator ensures the application of weed control products is in alignment with the Act.	DITT
Work Health and Safety (National Uniform Legislation) Act 2011	Activities to be performed under an approved EMP are to be compliant	The operator's field operations described in this EMP are subject to *Work Health and Safety (National Uniform Legislation) Act 2011* and associated Regulations	NT WorkSafe

3 Description of Activity

3.1 Introduction

A total of 73 wells have been drilled in the field and are maintained based on the needs of the field and the domestic market. Wells may be active, shut-in, converted to re-injection wells, suspended or decommissioned. All wells, regardless of status are included within this EMP. Safe and reliable production of the hydrocarbon resources present at Mereenie is facilitated via the following infrastructure:

- Permanent wellhead facilities for producing and suspending wells
- Approximately 200km of flowlines and pipelines
- Central Treatment Plant (CTP) and Eastern Satellite Station (ESS) for processing
- Separation, gas dehydration, compression, low temperature separation and liquid hydrocarbon stabilisation at the CTP and ESS
- Water treatment and evaporation ponds at the ESS and CTP
- Liquid hydrocarbon storage facilities at the CTP and ESS
- Gas reinjection facilities
- Roads, access track, water bores, camp, workshops, and an air strip
- Export sales receiver to APA gas transmission pipeline

Oil was previously exported through a 200mm diameter 270km pipeline (Mereenie to Alice Springs Pipeline (MASP)) to Brewer Estate, near Alice Springs but is currently being trucked from Mereenie to interstate. Both the MASP and Brewer Estate Oil Yard are suspended and under a care and maintenance program as future needs and options are ascertained.

3.2 Activities and Indicative Timetable

The Activities under this Field EMP relate to all aspects directly associated with the day-to-day operations of the Mereenie Oil and Gas Field. An indicative timetable for these activities is outlined in Table 3-1 and detailed in the sections further below. Operations occur 24 hours a day, 365 days per year including the wetter months of the year (October to April). Weather conditions are monitored daily to allow reassessment of operational needs to be addressed.

Table 3-1 Indicative Timetable

Activities	Indicative yearly timetable
Civil and project activities	Early & late dry season is preferred timing for civil related works under this EMP for maintenance and rehabilitation however may occur year-round
Well Operations	Monitoring and maintenance may occur year-round as scheduled in Well Operations Management Plans (WOMP) and the operator's Well Integrity Management System and on an as needs basis for producing wells
Production facilities	Monitoring and maintenance may occur year-round as scheduled in operator's pipeline and processing facility integrity maintenance systems and on an as needs basis for corrective active actions
Well workovers	Maintenance activity used to restore well bore integrity in compliance with the Code and/or increase production rates on an as needs basis and in accordance with the operator's Well Integrity Management System annual scheduling and well decommissioning program schedule
Well head equipment	Wellhead equipment, safety systems and gathering lines works to allow tie in of new wells and replacement of equipment where required under the operator's pipeline and processing facility integrity maintenance systems schedule
Progressive rehabilitation	Progressive rehabilitation and closure of areas in the field will be conducted in accordance with the Rehabilitation Plan as outlined in Section 7.5
Supporting activities	Operational support activities occur year-round including workforce provision, power production, traffic & transport, product export, chemical storage and use, wastewater management, waste management & supporting field logistics
Mereenie to Alice Springs Pipeline	Suspended and in ongoing care and maintenance regime
Brewer Estate Crude Oil Terminal Yard	Suspended and in ongoing care and maintenance regime

3.3 Civil and project activities

Examples of the scope of work for civil and project activities are provided in Table 3-2 below. The scope of work will vary based on the forward planning for the field, along with capital expenditure availability.

Table 3-2 Potential civil and project activities

Activities	Examples of scope of work
Road and access track maintenance	▪ Grading of access tracks and roads to maintain 24-hour / 365-day access to all assets via light and heavy vehicles ▪ Installation of erosion and sediment controls
Well pad and operational area maintenance/ upgrade	▪ Re-instatement of hardstand ▪ Re-instatement of flare pits / installation of flare tanks ▪ Installation of trenches and diversion drains to support rig infrastructure/layout ▪ Installation and maintenance of containment, erosion and sediment controls
Land and vegetation management	▪ Maintenance of vegetation boundaries and fire breaks at least 4m. Firebreaks use previously disturbed areas, including former seismic lines and access tracks to provide a barrier around key infrastructure such as the CTP and camp facilities ▪ Erosion and sediment control works including repair of eroded areas, installation of diversion and dissipation devices, particularly after wet weather events ▪ Reinstatement of waterway crossings where erosion or sedimentation has occurred including from flooding or vehicle movements ▪ Vegetation clearing along existing gathering networks/pipelines to maintain flowline integrity ▪ Installation and maintenance of fencing /gates / grids to deter fauna interactions
Use of borrow pits	▪ Extraction of raw materials from existing pits (Figure 3-1) to support hardstand, access track and in-field road upgrades and maintenance ▪ There are currently 29 borrow pits across the Mereenie oil and gas field – - 12 Active - 9 Inactive - 8 Under rehabilitation ▪ No new borrow pits will be established ▪ Rehabilitation activities from well pads reclaim hardstand material for future use, rather than using new material ▪ Volumes of new material use vary but will be limited where possible ▪ Stockpiling of raw or recovered materials for future use
Projects	▪ Activities to facilitate asset / plant upgrades or replacement of existing or installation of new infrastructure within the current disturbance footprint ▪ Progressive rehabilitation and closure of redundant facilities/infrastructure ▪ Environmental monitoring and groundwater monitoring
Site mobilisation and demobilisation	▪ Movement of rig and other heavy machinery, equipment and facilities to and from wells, operational areas of laydown in-field ▪ Installation of temporary mobile support services such as camp, office and power generation

3.4 Well operations

Operational phase well activities include:

- Ongoing production activities
- Maintenance of surface well barriers
- Integrity testing of surface well barriers
- Integrity testing of subsurface well barriers
- Annular pressure monitoring
- Visual inspection and general well surveillance

3.4.1 Well operation activities

As of December 2022, a total of 73 wells have been drilled at the Mereenie Field, these well have been drilled at various times from the early 1960s. All the wells have been constructed in line with the requirements in effect at the time of drilling. There are approximately 37 wells that are active producers, approximately three gas injection wells, 17 shut-in wells, five cased and suspended wells and 11 plugged and abandoned wells. The arrangement of the Mereenie field is shown in Figure 3-2 A.

The production from the wells is mixed hydrocarbon – gas, liquefied petroleum gas (LPG), crude oil, and water. The relative amount of the constituents varies across the field and from well to well; some with a high gas to oil ratio, some with a low gas to oil ratio; others that that are high / low gas to water ratio. Some of the wells are gas injection wells to boost reservoir pressure, while others are gas injection for gas lift to increase crude oil production.

Most oil and gas wells in the Mereenie Field flow free to surface through natural reservoir drive mechanisms and are therefore considered “conventional” in terms of the *Petroleum (Environment) Regulations 2016*. There are some gas-lifted wells and some monitoring (or observation) bores. The flow rate from wells is adjusted in line with production and sales market needs.

All of the wells in the field are operated in accordance with DITT approved (WOMPs for each well across the Mereenie Field. The WOMPs detail all operational and intervention phases including well designs, subsurface information, construction, barriers in place, monitoring, maintenance, integrity, decommissioning, etc.

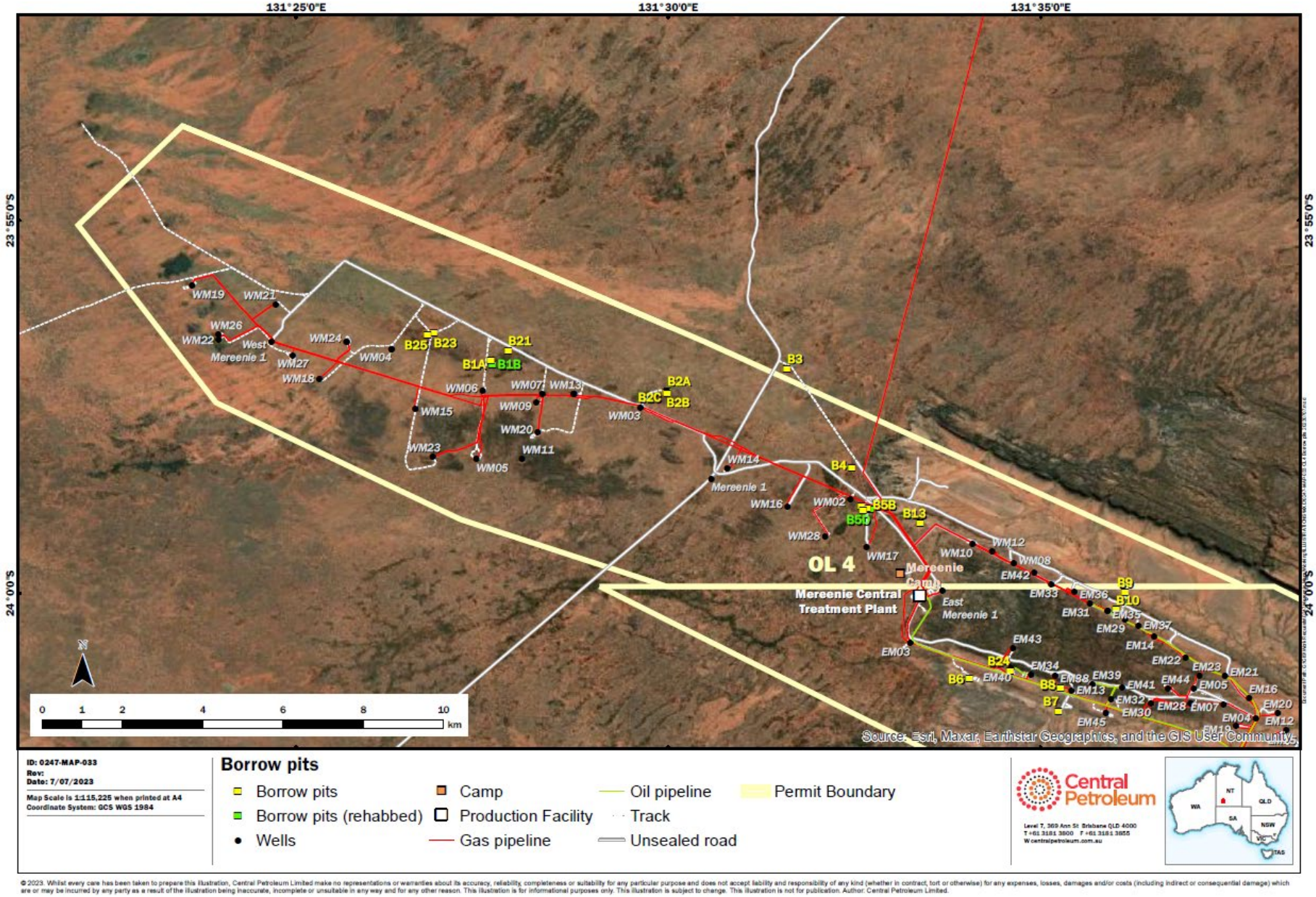


Figure 3-1 Arrangement of borrow pits within West Mereenie oil and gas field (OL4)

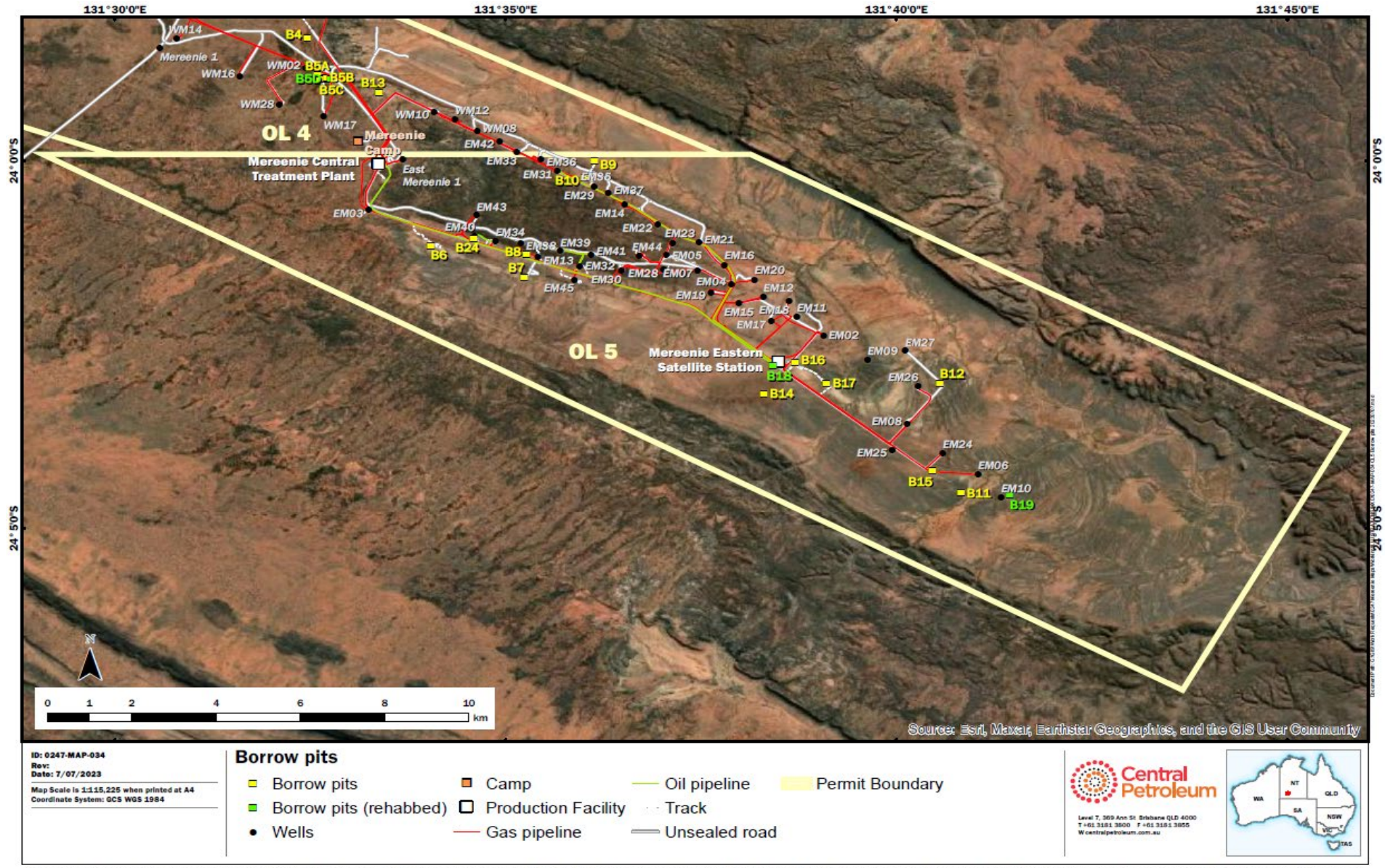


Figure 3-2 Arrangement of borrow pits within East Mereenie oil and gas field (OL5)

3.4.2 Well barriers and aquifer protection

An example of the typical well barriers that currently exist in the Mereenie Field (MRN) relative to stratigraphy is provided in Figure 3-3. It shows that there are two strings of steel casing, conductor casing and two cement columns installed over the Mereenie Sandstone and its associated groundwater to isolate and protect it from oil and gas migration from the target reservoirs. The Mereenie Sandstone is the only aquifer in the MRN as per the definition of aquifer under the Code. The Pacoota Sandstone, which contains saline water and is the target formation for oil and gas, and the other formations penetrated by the well contain very limited groundwater resources and are not defined as aquifers under the Code.

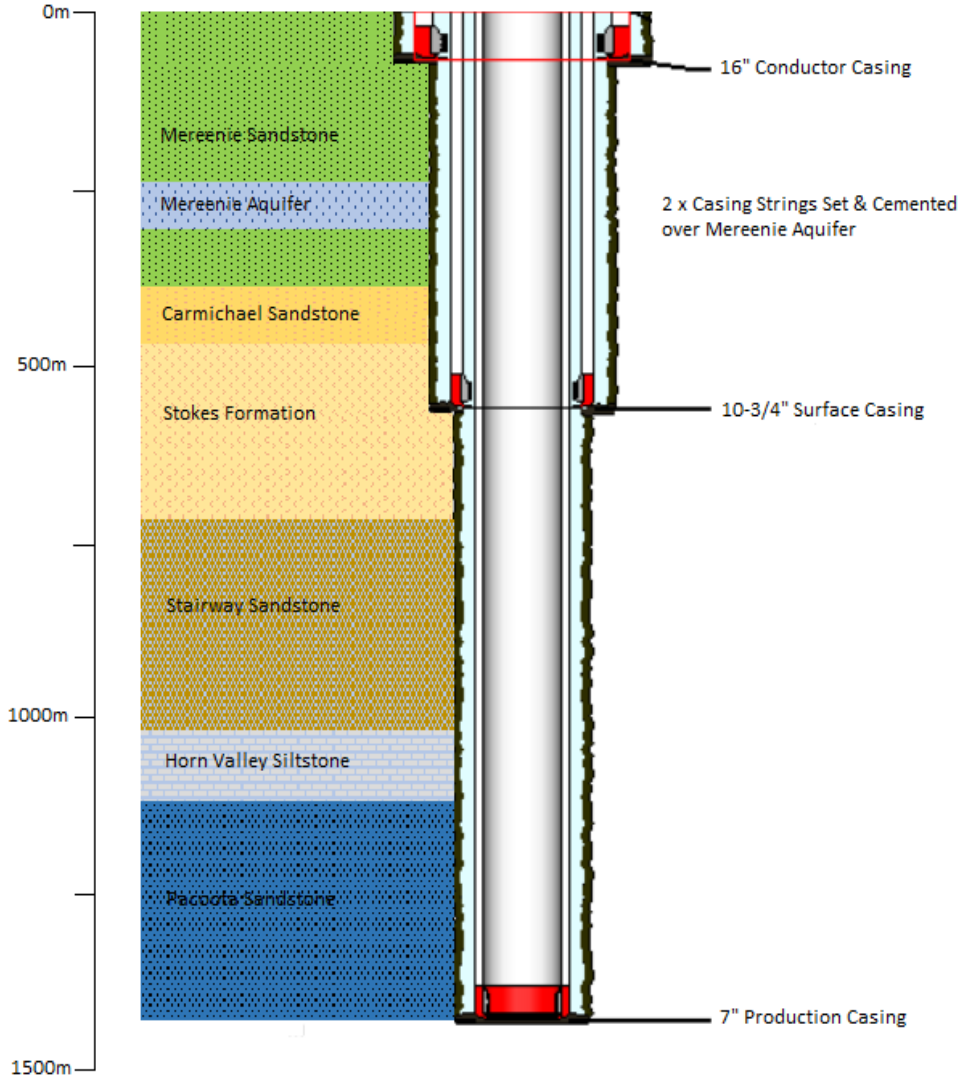


Figure 3-3 Typical Mereenie well barriers relative to stratigraphy

3.4.3 Well maintenance and integrity

Well integrity related maintenance and testing processes during the operational phase involves engaging specialist third party service providers to conduct servicing, maintenance, function testing, comprehensive bleed downs, top ups, pressure testing and data recording activities. Well maintenance and integrity testing will be carried out in accordance with DITT approved WOMPs and the operator's Well Integrity Management System which in turn is based on *ISO 16530-1:2017 Well Integrity Lifecycle Governance*.

Well integrity management terminates downstream of the production wing valve (PWV).

Wellhead maintenance includes testing and servicing of surface components of the wellhead and production tree which are collectively referred to as wellhead components. This process does not extend past the production wing valve (PWV) and covers both flow-wetted and non-flow wetted valves.

Subsurface Integrity Testing (SIT) encompasses a combination of annuli and wellhead seal testing of barrier envelope integrity for both downhole and surface barrier components.

3.5 Production facilities

3.5.1 Gathering and boosting systems

Wellhead equipment, safety systems and gathering lines works allow the well to be connected to the existing gas gathering line for processing before transfer to market. A gathering network of approximately 210km of above and below ground flow lines is in place across Mereenie.

Wells from the western area of the Mereenie Field (OL4) are connected to two spine lines terminating at the CTP. The eastern part of the Mereenie Field is subdivided into three areas:

- North flank wells are connected into one of two lines, with some wells capable of being switched to either the ESS or the CTP depending on operational requirements.
- South flank wells are connected into a line terminating at the ESS.
- Eastern wells are gathered into a test header at the ESS with some of the wells equipped with a dedicated flow line and the remaining wells sharing a flow line to the ESS.

Gas and water are separated at the ESS, the two streams are managed as described below:

- Infield flowlines transport gas to the injection wells in the eastern nose and the north flank to increase pressure in the reservoir. Gas not required for re-injection is transported to the CTP for processing and transport to market in the sales gas pipeline.
- The small volume of formation water that is removed from the gas is transported to the ESS pond for evaporation.

External corrosion of buried pipelines is controlled by cathodic protection systems which are regularly monitored and maintained. Spine line and flow line rights of way (ROW) are inspected in accordance with pipeline integrity and maintenance systems. All spine lines are equipped with biocide injection facilities and are pigged regularly to eliminate stagnate water pooling in low sections of the lines and subsequent corrosion and potential asset failure.

3.5.1.1 Flowline integrity

The integrity of all gathering lines and flowlines within the field is managed in accordance with the operator's Integrity Management System and associated plans and procedures and to comply with the requirements of AS2885. Integrity of the flowlines is via a program of monitoring, inspection and materials sampling of both internal and external components of the flowlines.

Pigging activities are conducted as part of maintenance of the flowlines. All material and debris from pigging is captured and directed to the evaporation ponds and via the processing facilities.

Corrosion inhibitors, biocide treatment and cathodic protection are used to maintain the integrity of flowlines.

The only above ground wastewater flow line within the field is between the CTP evaporation pond and the Grizzly pond. When wastewater transfers take place, the flow line is driven and inspected daily to ensure wastewater is passing between each pond without issue. All other underground wastewater lines (between CTP and the evaporation pond and between ESS and the evaporation pond) are monitored by ensuring freeboard levels align with wastewater production shown on Daily Production Reports.

3.5.2 Oil and gas processing

3.5.2.1 Central Treatment Plant

The Central Treatment Plant (CTP), Figure 3-4, comprises:

- Oil processing: crude/water separation, condensate stabilisation, crude/condensate storage and crude pumping facilities.
- Gas processing: field compression, inlet slug catchers, gas dehydration and separation, hydrocarbon dew point control and pipeline compression.

The CTP main functions, shown in Figure 3-66 are as follows:

- Remove gas from various crude oil and condensate streams to produce a stabilised crude oil.
- Separate free water and liquid hydrocarbons from the raw gas stream. Water that is saturated in the gas is removed by a column using glycol dehydration (mono ethylene glycol (MEG) and triethylene glycol (TEG)). Hydrocarbon dew-point control is achieved by a refrigeration and low temperature separation process using a series of heat exchangers, a propane refrigeration circuit and a low temperature separator.
- Blend condensed hydrocarbon liquids from the gas stream with the crude oil for sale.

- Compress the sales quality gas from a plant inlet pressure of ~700kPag to the pipeline pressure of ~ 10,000kPag. Excess or out of specification gas from the CTP is reinjected into the main oil reservoir to maintain reservoir pressure.

The CTP evaporation ponds receive discharge from the wash down bay, the CTP and from water/crude oil mixes collected from the remote well facilities. The system comprises four ponds: an interceptor pond, two holding ponds and an evaporation pond. Further detail is provided in Section 3.9.2.

Source: Google Earth, 2022

Figure 3-4 Aerial view of Central Treatment Plant

3.5.2.2 Eastern Satellite Station

The ESS (Figure 3-5) contains liquid gas separation and gas compression. It processes most of the crude oil production from the eastern part of the field. The separated crude oil is stabilised and either transferred either to the CTP or directly transported from ESS to trucks for export. The gas gathered at ESS is compressed and dehydrated and either used for gas reinjection/gas lift or transferred to the CTP where condensates are removed before compression to export pressure. Figure 3-7 shows the process flow through the ESS.

The ESS evaporation ponds receive water from the ESS process area. The system comprises a primary interceptor pond and an evaporation pond, with both ponds lined. Further details on the evaporation ponds are provided in Section 3.9.2.

Figure 3-5 Aerial via of Eastern Satellite Station

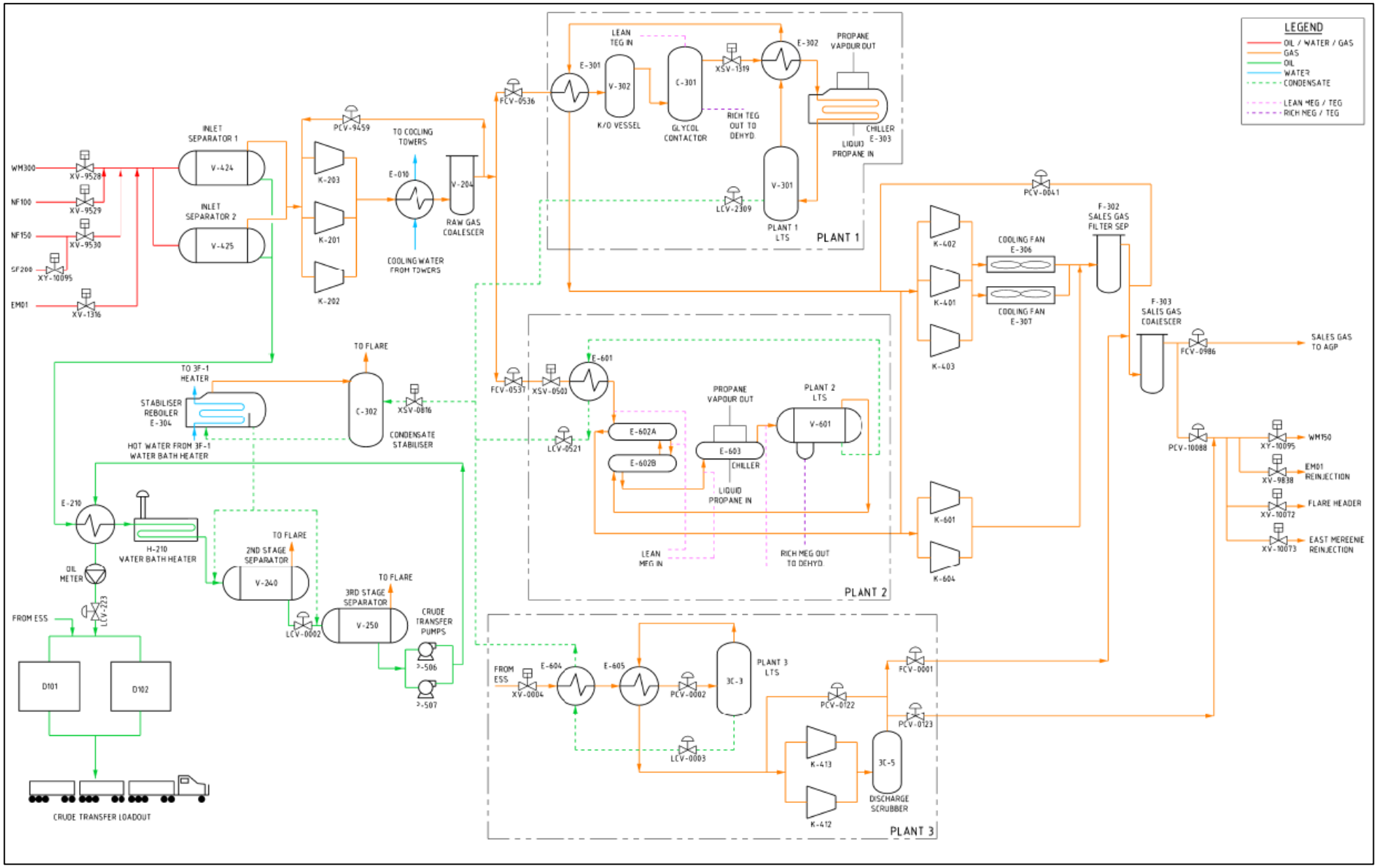


Figure 3-6 Process Flow Diagram – Central Treatment Plan

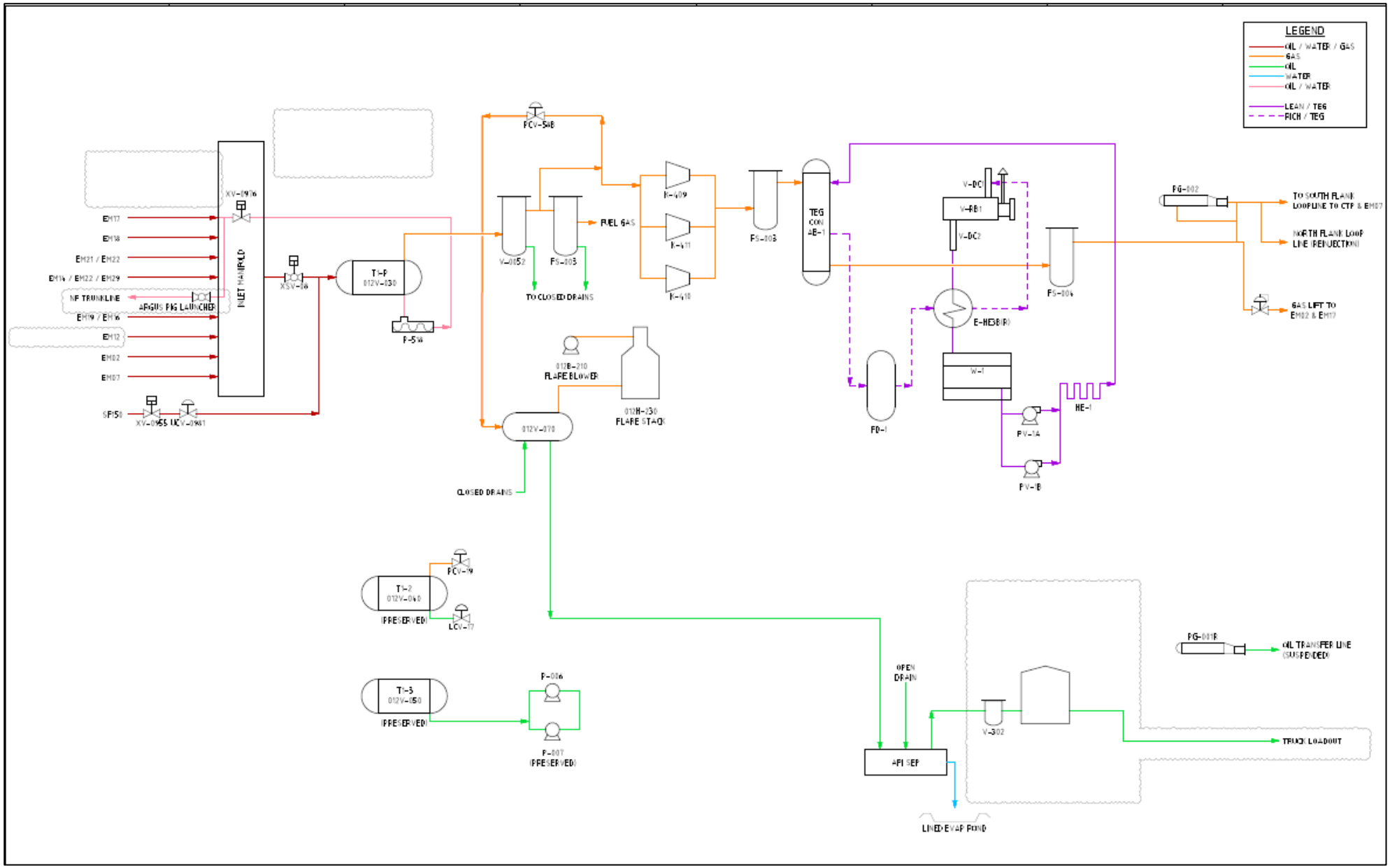


Figure 3-7 Process Flow Diagram – Eastern Satellite Station

3.5.3 Condensate and oil storage and load out

Two crude oil floating roof storage tanks of 1600m^3 capacity each are located within the operational area of the CTP. The tanks are steel vessels with an epoxy coating across the floor and extending up the walls of the tank. The underfloor is bare steel, bedded on oil-soaked sand and maintained with an impressed current cathodic protection system to maintain the integrity of the tanks. The tanks sit within a large clay lined earthen bund.

A loadout facility is located adjacent to the tanks where quad trailer road trains are loaded with crude oil for transport interstate for processing.

3.5.4 Venting and flaring

The safe operation of the Mereenie production facilities requires some flaring of gas at the CTP and ESS to maintain a positive purge and disposal of volatile ends produced during crude and condensate stabilisation. Recovery of the volatile ends is currently not done due to the small volumes produced.

Venting may occur in the event of loss of asset integrity or an emergency shutdown situation. In circumstances where, for safety reasons, infrastructure, such as compressors, need to be purged of gas for maintenance and repair, gas may also be vented if it cannot be bled to the processing plant via the gathering network.

The operator maintains records of all flaring and venting activities to support greenhouse gas reporting as part of the NGER Act and as part of monthly reporting to DITT.

With the development of the gas resources being a primary objective of the current development plan, gas flaring has been evaluated with a focus on reducing any flaring to a minimum. To that end, the operator is examining opportunities to improve efficiencies across the production facilities and reduce the volume of flaring undertaken.

3.5.5 Plant and equipment maintenance and upgrade

All assets are recorded in the maintenance management system and programmed to have a planned maintenance frequency. Work orders are created from the system which enables the operator personnel to undertake maintenance inspections of assets in a systemic manner.

Where the work order requires a test or inspection to be performed on an asset it is recorded on a proforma / checklist and retained in the operator’s document management system for future reference. Corrective actions and additional work orders, along with Management of Change procedures are implemented where required.

Where plant and equipment has reached the end of its design life, a program of replacement and upgrade is implemented. Equipment is replaced like for like, or with newer technologies.

3.6 Well workover

Workover is a maintenance activity used to restore well bore integrity and / or increase production rates, although the term workover is also used to describe re-completion activities when an existing production well is being completed in a new zone or work is being carried out on an existing zone. Workovers can cover several activities depending on the nature of the well and the issue being addressed. Workovers are usually conducted at the respective existing well site (or well pad) which are established prior to construction of the well.

Major workovers can include cleaning sand or other impurities such as wax or scale, fishing to recover original production equipment, installing equipment to prevent sand from entering the well, replacing liners, plugging the well, repairing casing, drilling or milling any obstructions in the well, stimulating intervals and re-perforating existing or new zones.

Some Mereenie wells have been subjected to varying degrees of minor integrity issues; therefore, workover activities at MRN have previously included casing inspection and repair activities. Some of the early wells drilled at MRN encountered difficulty with the primary cementing work, and so remedial cementing activities have been conducted.

Deterioration in wellbore condition is monitored through an established surveillance program that includes monitoring of annuli pressures and fluid contents; the results of which are critical for the performance of safety and environmental risk assessments that provide a basis for scheduling workover priorities.

For some workovers, limited equipment is required (for example, wireline equipment to lower tools into the hole to conduct operations), whilst others require rotation of the tubing or drill pipe, requiring a full workover

rig. Pumps and storage tanks may be required for associated activities that involve circulation of workover fluids.

3.6.1.1 Barrier protection

Workover activities are an important measure to ensure well integrity during the operation of the well, especially given the age of the Mereenie Field. Workover activities will replace or repair casing strings and liners, and remedial cementing aims to maintain well barrier integrity at the aquifer (as defined by the Code) location and throughout the well.

The use and verification of well barriers that will be used and installed during workovers is prescribed by the Code. Given that final determination of wells undergoing workover has not been made for this EMP, the well barrier schematics are not yet developed, however the operator will ensure compliance with Section B.4.14 Workover and Intervention of the Code, which requires any workover or well modification to be designed to ensure the well is operated within the maximum expected pressures and load conditions until final decommissioning.

The operator will ensure that well integrity is maintained, as set out in section B.4.1 of the Code.

3.6.1.2 Fluid systems

In accordance with the code, the operator will aim to conduct workover activities in an underbalanced state (i.e. without the use of workover fluid). This will be achieved by using an air / mist fluid system to clean out the well and bring up debris (including sand, fill, fines and some metal from milling and fishing of down hole equipment).

The air / mist fluid system uses air compressors and a booster pump to inject air, and small amounts of foaming agent and water (mist), into the well. Debris, fill and other material attaches to the mist and is brought back to the surface, along with any encountered gas, and directed to the flare pit via the blooie line where gas is flared. Fluid evaporates from the flare pit and fill particles combust/settle to flare pit floor.

There are however situations in which workover fluid may be required including well cleaning, fishing and milling and well control.

In these instances, the operator will use a water-based workover fluid during workover. It will be separated from fill, milled / fished material and / or debris using separator equipment (shale shaker or separator) at the surface. The fill and material, along with any gas present, will be directed to the flare pit via the blooie line and workover fluid returned to the mud tank system for re-use where possible. Where it cannot be collected, workover fluid and any kill fluid will be directed to the flare pit and evaporated. To ensure all incidental debris / fill / material or residual fluids are contained and disposed of a flare tank will be attached to the end of the blooey line during routine[1] workovers. For larger workovers (ie. flow rate > 5TJ/day anticipated) a flare pit will be utilised which will be lined with an impervious clay material and hydrotested prior to operation. Only once the flare pit has passed a hydro test will workover activities be able to commence. In both cases, volume markers will be applied to the flare tank / pit to ensure visual inspections can accurately determine whether a leak has / is occurring. Visual inspections will be undertaken, at minimum, daily.

Where utilised, flare pits will remain at the well site as permanent infrastructure. Fill, material and debris will be removed from the flare pit and disposed of at an approved waste facility. Metal waste generated will be tested for NORMs and recycled at an approved facility as scrap metal (provided no NORMs are identified).

3.6.2 Well suspension

Suspension activities are intended to be ‘temporary’, in that they are designed to secure conditions in a well so that any environmental or safety hazards are adequately controlled until the well undergoes either recompletion or final decommissioning. Suspension activities are closely dependent on the condition of the well and as a result, vary in their complexity.

The primary considerations for suspension of a petroleum well are to ensure that:

- Well integrity is maintained at all times as set out in section B.4.1 of the Code,
- Monitoring requirements can be met, and production can readily be resumed and
- All safety requirements are met.

[1] Routine workovers include all wells with a flow rate of less than or equal to 5TJ/day

3.6.3 Well decommissioning

Emergency decommissioning may be required in the event of unplanned circumstances (i.e. when safety tests/monitoring determine a well needs to be killed). All decommissioning activities will be conducted in accordance with the Code and DITT approved WOMPs

Where a well is to be decommissioned, the activities will be done in accordance with the principles of the Code section B.4.15.1 and specifically the mandatory sections B.4.15.2 and B.4.15.3. The two-stage decommissioning process as per table 4 of section B.4.15.1 will be followed with well integrity maintained as per section B.4.1. All aquifers will be isolated from each other and the surface by a minimum of one well barrier and from any permeable hydrocarbon bearing zones by a minimum of two well barriers.

Complete and accurate records of the entire decommissioning procedure will be kept and submitted as part of the legislative reporting requirements for the decommissioning of petroleum wells.

The potential for accumulation of NORMs in well equipment will be assessed and appropriate measures put in place to reduce risks to the health and safety of people and the environment.

3.7 Wellhead equipment, safety systems and gathering line replacement

Wellhead equipment, safety systems and gathering lines works allow the well to be connected to the existing gas gathering line for processing before transfer to market. Activities undertaken as part of the wellhead equipment, safety systems and gathering line replacement works include:

- Tie-in to the wellhead, installation of new well head equipment and safety systems such as metering instruments, control valves and/or shutdown skids within the existing well lease pad area.
- Installation of new pipelines to connect the wellhead equipment, safety systems and gathering lines and wellhead to existing pipelines. Pipelines will be above ground and installed within the existing disturbance footprint.
- Installation of pipework will be undertaken in accordance with *Australian Standard 2885.0:2018 Pipelines – Gas and liquid petroleum – General requirements.*

All wells have an existing wellhead located on a well lease which will be used as the work area during the installation. No ground disturbance will be required. No flaring or venting is required as the well is isolated, and gas bled into the existing field gathering network. Pipes are then isolated at the gathering line and there may be a very small amount of gas trapped residual gas released when handling pipework.

Installed wellhead equipment, safety systems and gathering lines will undergo hydrostatic testing as required (using freshwater) for integrity and leak detection during commissioning.

Leak detection monitoring will occur as per the Methane Emissions Monitoring Plan and Code on recommissioning of the well. Removed pipework will be tested for NORMs as per Section B.4.14.2. of the Code and recycled at an approved facility (provided no NORMs are present).

3.8 Progressive rehabilitation and closure planning

Progressive rehabilitation and closure of areas will be conducted in accordance with the Rehabilitation Plan as outlined in Section 7.5

3.9 Support activities

3.9.1 Services

Table 3-3 outlines the services that support the conduct of all activities at MRN.

Table 3-3 Services across the Mereenie Field

Activity	Description
Buildings: ▪ Administration ▪ Warehouse and Workshop	▪ Adjacent to CTP and houses main control room, meeting rooms, office and utilities ▪ North-east of CTP, houses storage areas, warehouse, workshop, washdown bay, diesel refuelling bay, designated waste storage area, bunded chemical store.
Workforce and facilities	▪ Permanent workforce of up to 20 personnel, using local Alice Springs region-based employees supplemented with fly-in fly out employees depending on required skills sets. ▪ Workforce increases via contractor and visitors as required and approved via the operator's internal approval processes to meet CLC permit requirements ▪ Permanent camp

<table>
<tr><th>Activity</th><th>Description</th></tr>
<tr><td></td><td>
- 85-person camp incorporating accommodation, kitchen and mess, recreation areas, communications systems and water and wastewater systems
▪ Temporary camps
- Temporary facilities may be brought to the field to accommodate additional personnel during key projects and workover activities at wells and laydown areas.
</td></tr>
<tr><td>Procurement</td><td>Where available and economic, items / products used at site are sourced locally.</td></tr>
<tr><td>Laydown areas</td><td>Cleared areas, including former well pads, used to house materials, temporary camps or machinery</td></tr>
<tr><td>Power generation</td><td>
▪ A combination of gas and diesel fuel generators located at both the CTP and ESS to power production and accommodation facilities.
▪ Small scale diesel fuel generator sets are used for remote operations in the Mereenie Field when required, such as workover activities and groundwater bore pumps. In addition, telemetry systems for well infrastructure and flowlines are powered by individual solar systems with battery storage
</td></tr>
<tr><td>Water supply</td><td>
Water Extraction Licence (M10001):
▪ extraction of 52.8ML/year
▪ valid until 30 June 2023 (renewal application underway)
Water Bores
<table>
<tr><th>Bore Name</th><th>Bore ID</th><th>Water use</th></tr>
<tr><td>CTP</td><td>RN17657</td><td>Drinking water</td></tr>
<tr><td>Production Bore No2</td><td>RN017898</td><td>Camp facilities water; Raw water for CTP process; Fire water</td></tr>
<tr><td>EM2</td><td>RN004620</td><td>Raw water for ESS</td></tr>
<tr><td>ESS</td><td>RN013861</td><td>Stock water; Fire water ESS</td></tr>
<tr><td>WM15</td><td>RN018955</td><td>Stock water; exploration and development; civil works; dust control</td></tr>
</table>
</td></tr>
<tr><td>Air strip and helipad</td><td>
▪ Fenced airstrip
▪ Emergency helipad located adjacent to the Mereenie Field emergency vehicles
▪ No aircraft refuelling facilities are provided at either of these locations
</td></tr>
<tr><td>Waste services</td><td>Waste services are provided by licensed waste transporters and disposers. Refer to Section 3.9.5 for further details</td></tr>
<tr><td>Traffic and transport</td><td>
▪ Coordinated logistics activities including movement of crew and visitors to and from Alice Springs
▪ The operator’s travel approval process in place for managing all visitors and contractors
▪ Light vehicles access along the sealed and unsealed Larapinta Drive via Hermannsburg
▪ Heavy vehicles (and wet weather access) via Stuart Highway, Lasseter Highway and Luritja Road
▪ Oversized loads are accompanied by an accredited pilot
▪ Traffic management plans are developed for rig movements to and from the field in consultation with rig owner, the operator and authorities
<table>
<tr><th>Travel movements</th><th>Operations (avg / month)</th><th>Workovers (avg / day)</th></tr>
<tr><td>Light vehicles</td><td>Approx. 40</td><td><10</td></tr>
<tr><td>Heavy vehicles including fuel / oil, materials delivery, rig mobilisation and demobilisation, civil plant and machinery delivery</td><td>Approx. 20</td><td><5 mobilisation/ demobilisation
<2 during workovers</td></tr>
</table>
</td></tr>
<tr><td>Wet weather operations</td><td>Operations occur 365 days per year including the wetter months of the year (October to April). Weather conditions are monitored daily to allow reassessment of operational needs to be addressed.</td></tr>
<tr><td>Naturally Occurring Radioactive Materials</td><td>
▪ The operator’s radiation licence (permit number 1902650L)
▪ Previous surveys have indicated that site emits a negligible level radiation hazard
▪ All works are conducted in accordance with the operator’s safe work standards including a NORMS (Radiation) Management Plan alongside a Job Hazard Analysis
▪ Materials with the potential for NORMs exposure from operational activities are tested prior to storage or disposal via an appropriately licensed transporter
</td></tr>
</table>

3.9.2 Chemical storage and use

In addition to the requirements under this EMP, the storage, handling and use of chemicals is to comply with the NT's workplace, health and safety legislation, relevant Australian Standards, the Code (including clause A.3.8) and the SDS for each chemical. All sites have been designed to minimise the risk of spills

With regards to secondary containment and the requirements of A 3.8.(g) of the Code, for all operational activities, chemicals are stored within designated bunded or enclosed chemical storage areas within the warehouse and production facilities until required for use. These areas and specific worksites such as the CTP and ESS use a combination of permanent concrete bunds, or temporary bunds where use is required at specific worksites / wells. All diesel is stored in double lined tanks at the workshop fuel facility.

During workovers, chemical use and storage on existing wellsite (lease) areas will maintain secondary containment requirements as per A.3.8(g) of the Code and use the following storage solutions depending on storage requirements:

- A compacted and impermeable High-Density Polyethylene (HDPE) lined hardstand bulk bag chemical storage area within the existing well site (lease), including bunding to contain 100% of the largest container stored plus 10%.
- A fully enclosed portable storage trailer stored in the bunded chemical storage area established at the well site. Absorbent spill mats will be used when the trailer is moved around the well site (lease).
- A fully enclosed workshop area that includes capacity to contain 100% of the volume of the largest container in the workshop plus 10%.
- All secondary containment (when in use) will be inspected weekly, unless being operated through the wet season during which period it will be monitored daily. Inspection and maintenance records will be kept on secondary containment areas in use.
- In the event materials escape from secondary containment or are otherwise spilled onto secondary containment they shall be recorded, removed as soon as possible, and reported as required.

In terms of lifecycle chemical handling, given the remoteness of the location, chemicals are transported from offsite locations in the volumes required for safe operation plus contingency within onsite storage capability to meet any operational requirements and road access limitations. The aim is to minimise the frequency of deliveries to reduce transportation risks while allowing the necessary quantities to be appropriately stored onsite for access as required. Table 3-4 shows the types of chemicals and quantities typically used or stored.

Table 3-4 Typical chemicals used during operations and workovers

Substance	Hazardous material	Dangerous good	Typical quantity*
Anti-corrosives	Yes	Yes	200L
Adhesives/glues	Yes	No	500L
Acetone	Yes	Yes	100L
Thinners	Yes	Yes	200L
Acetylene	Yes	Yes	100L
Biocides	No	No	200L
Truck wash	Yes	No	100L
Priming fluids	Yes	Yes	200L
Diesel	Yes	Yes	25,000L
Pipe cement	Yes	Yes	100L
Degreaser	Yes	Yes	100L
Paint	Yes	Yes	100L
Soaps	No	No	50L
Sealant	No	No	200L
Herbicide	Yes	No	200L
Coolant	Yes	No	100L
Engine oil	No	No	20L–1,000L
Compressor oil	No	No	1,000L
Hydraulic oil	No	No	20L
Grease	No	No	100L

Nitrogen	Yes	Yes	100kg
Oxygen	Yes	Yes	100kg
Propane	Yes	Yes	50kg
Methanol/ethylene glycol	Yes	Yes	6,000L
Helium	Yes	Yes	100kg

** Quantities in stock will vary depending on the activities occurring at points in time.*

3.9.3 Workover fluids

The proposed workover fluid is comprised predominately of water (extracted groundwater) with the remaining made up of chloride salts and fluid additives. Water for workover fluid will be stored at the well site in the engineered steel mud tank system. There may be two to three mud tanks on site with a total volume of up to 650bbls, but only approximately 400bbls (0.063ML) of workover fluid is required.

The main chemicals added to the water to make up the workover fluid and the primary role of the additive is as follows:

- KCl (Potassium Chloride): a soluble salt that is an extremely efficient shale and clay stabiliser. If not used the clays swell with water and effectively block the reservoir and often permanently damage the well often severely impacting the well production ability. Inhibition is provided through ion exchange; the potassium ion enters between the individual clay platelets in the shale so that they are held together, thus eliminating entry of water from the completion fluid.
- AMC Resi Drill: a biodegradable micronized cellulose polymer that is added to the workover fluid to act like a skin on the wellbore to help minimise the fluid invasion into the surrounding formations. It reduces dynamic filtration loss, stabilises wellbores and protects reservoirs from damage. The product is formulated to reduce fluid loss and stabilise shale by preventing filtrate invasion into permeable structures. Filter cake and differential sticking are therefore minimised and weak formations are stabilised.
- AMC Biocide G: is a specifically designed biodegradable, broad spectrum biocide designed to reduce and prevent bacterial and fungal activity in water-based fluids. This is added to ensure that any surface bacteria are not transferred to the reservoir.
- AMC Xan Bore: when water is not viscous enough to carry reservoir or other debris to surface, Xan bore is added to the water to increase viscosity. This product is specifically used as it passes the Standards Australia Test AS4351 for biodegradability.
- Caustic soda/acid: used to alter the pH of the workover fluid.

The predicted quantities of chemicals used is provided in Table 3-5. The workover fluid chemicals are stored in an enclosed purpose-built portable trailer, which keeps chemicals isolated, dry and safe. The portable trailer is located in a designated chemical storage area within the well lease which is bunded and can contain 100% of the largest container stored plus 10%.

Batch mixing of the fluid chemicals occur within steel mud tanks which will have temporary spill absorbent mats placed under them to capture any spills which may occur. Chemicals will be added to the workover fluid (water) using the mixing hopper and the ~100L batch of made-up workover fluid (water plus additives) returned to the mud tanks. Two options are proposed for secondary containment of mud tanks during workover activities.

Option 1 – A lined sump still exists on the well pad

In the event a lined sump exists on the work over well pad mud tanks will be positioned adjacent, and a lined drain and pipe will be put in place to direct any spills to the sump at which point it will be collected via vacuum truck / equipment which will be on standby during all workover activities. The sump in use will include capacity to contain 100% of the volume plus 10% of largest the mud tank.

Option 2 – A sump no longer exists on the well pad

Where the sump has been filled on or rehabilitated on the work over well pad, a propriety temporary bund product (e.g. plastic liner with foam bund) or HDPE lined bund will be installed to capture any unplanned spills from the mud tanks. Similarly, any secondary spill containment will be sized to contain 100% of the volume plus 10% of largest the mud tank. A vacuum truck / equipment which will be on standby during all workover activities.

In either scenario, additional controls will be implemented to control spill / leaks from the mud tanks including regular routine inspection of the tanks during the 12 or 24-hour shift, regular checks of tank fittings and valves, and installation of devices to control the flow of any potential spills / leaks away from water courses, drainage lines or vegetation.

As discussed further in Section 4.1.3 the depth of the groundwater and the presence of the impervious Parke Siltstone above the Mereenie Sandstone also provides additional aquifer protection against contamination from any potential significant surface level spills. In the event of spills occurring at a wellsite / workover area, the potential impact to soil will be assessed and any contaminated soils will be removed (and disposed of at an approved facility) or remediated according to the *National Environment Protection (Assessment of Site Contamination) Measure 2013* (NEPM)contaminated soil guidelines. No workover fluid chemicals that are used in the workover process contain benzene, toluene, ethylbenzene and xylene (BTEX).

Table 3-5 Potential workover fluid additives for each well

Product name*	Dangerous good	Hazardous substance	Estimate quantity/well	Concentration	Container size	Storage location
AMC BIOCIDE G	No	Yes	35L	0.02	20L package	Portable storage trailer in the chemical storage area
AMC RESI DRILL	No	No	0-710kg	0-15kg/m3	25kg package	
AMC XAN BORE (Guar Gum)	No	No	142kg	1-3kg/m3	25kg package	
Potassium Chloride	No	No	2,066kg	7.1	25kg Package	
Caustic Soda	Yes	No	200–1000kg	pH adjustment	25kg	
Acid (Hydrochloric or Citric Acid)	Yes	No	50–500kg	pH adjustment	25kg	

*Similar products may be utilised in the event a suitable alternative is identified subject to an environmental and safety risk assessment against the applicable Material Safety Data Sheet (MSDS).

At each workover, a small volume (80–150bbls) of completion brine (2% KCl solution with 0.2lbs/bbl biocide) will be left above the topmost packer. Completion brine will be mixed on site using the bunded mixing hopper before use.

3.9.4 Wastewater management

3.9.4.1 Formation wastewater

Water produced at MRN is not defined as “produced water” for the purposes of the Regulation or the Onshore Petroleum Code of Practice as all the wells are conventionally developed and do not require hydraulic fracturing.

Formation water at MRN is high in salinity, which results in total dissolved solids too high for beneficial reuse. Therefore, the formation water is sent to an end-point treatment system using lined solar evaporation ponds and precipitation of chloride salts and trace levels of metals, similar to evaporated seawater, in the endpoint isolation pond (see Figure 3-8.). This in-field treatment system is characteristic of many onshore petroleum developments and has been the practice at Mereenie since the petroleum field inception in the early 1980s.

3.9.4.2 Water management system

The gathering network of in-field pipelines at MRN connects the fleet of petroleum wells to the Central (CTP) or Eastern (ESS) processing facilities. Separators at these facilities separate any water co-produced from the petroleum formation, flowing under pressure from each of the producing wells. The separated process wastewater is discharged to an end-point treatment and isolation system of solar evaporation ponds at these two facilities. The ponds are designed as above-ground turkey nests with engineered and compacted bunds approximately 1.5m in height that are lined with impervious 2mm thick welded HDPE geo-membrane. The Grizzly Pond is a demountable 6ML above ground pond with a similar HDPE liner located to the south of the CTP. This pond provides additional surplus containment for wastewater if it is ever required. The total amount of wastewater produced and evaporated annually from the field (<~16ML) is modest compared to shale gas exploration wells, which is the primary focus of the NT Code. Because of the aridity of the region, the predictable modest volumes of wastewater from the field and the existing surplus pond capacity to evaporate, means secondary covered ponds for wastewater are superfluous and have not been utilised over the past 35+ years of operation in the Mereenie field.

All formation water produced from operation is directed to one of three wastewater treatment systems at the:

The **CTP wastewater treatment system** receives discharge from the separators at the CTP along with other process and cleaning water from areas such as the wash down bay and warehouse. The system also receives water from workover activities and other remote activities across the field where fluids management is required. The CTP system comprises four ponds: an interceptor pond, two holding ponds and an endpoint precipitation pond, with a total surface area of 4,835m^2 for the evaporation ponds and total volume of 7,250m^3. The system receives between 20 to 30kL/day from the CTP inlets, depending on activities across the field. Additional water volumes enter from the washdown bay located between the treatment system and the warehouse / workshop area. A total of <10ML/annum wastewater enters the CTP system. Annual average precipitation into the CTP system is <2.5ML. The annual evaporative capacity of the CTP system is >20ML/annum in this arid environment.

The CTP ponds have been progressively upgraded and relined with a HDPE 2mm thick liner since 2009. The CTP wastewater treatment system was constructed prior to the enacting of the Code and as such no leak detection system is in place. Given the longevity of the infrastructure (decades) and the engineered and highly compacted impervious clay nature of the substrate, which gives an additional high level of protection makes a long-term leak detection system reliant on electronic signal, in a hypersaline environment redundant from a risk perspective. The operator has a comprehensive ongoing inspection program of the CTP wastewater treatment system including inspection of liner integrity and the surrounding environment for evidence of leaks or seepage. The system is built as an engineered compacted earth (>30% clay) bunded pond system with impermeable liners and situated above natural surrounding ground level, so any leaks would be visible as seepage at the foot of the bund. The system is fully fenced and gated to prevent large fauna entry. Fauna matting is located in each section of the pond system to allow fauna egress. The final evaporation/ precipitation pond operates as a saturated hypersaline fluid (~350,000 mg/l TDS) in which ongoing precipitation of a mixture of chloride salts onto the floor of the containment system occurs, year-round. This is a similar process to that occurring as an “endpoint” in naturally occurring drainage salt pans which are frequent in the region.

Figure 3-8: CTP Wastewater solar evaporation ponds

The ESS wastewater treatment system receives water from the ESS process area. The system comprises a primary interceptor pond and an evaporation pond, with both ponds lined and an approximate holding capacity of 5ML. A total of <1ML/annum wastewater enters the ESS system. Recent changes to the arrangement of flowlines and processing at the ESS has meant that volumes entering the ESS have been decreasing in recent years. Annual average precipitation into the ESS system is <2.5ML. The annual evaporative capacity of the ESS system is >20ML/annum in this arid environment.

The ESS wastewater treatment system was constructed prior to the enacting of the Code and as such no leak detection system is in place. Although no electronic leak detection system is in place for reasons as discussed for CTP, the operator has a comprehensive ongoing inspection program of the ESS wastewater

treatment system liner integrity and surrounding environment for evidence of leaks or seepages. The system is built as an engineered compacted earth bunded pond system with impermeable liners and situated above natural surrounding ground level, so any leaks would be visible as seepage at the foot of the bund. The system is fully fenced and gated to prevent large fauna entry. Fauna matting is located in each section of the pond system to allow fauna egress. The final evaporation/precipitation pond operates as a saturated hypersaline fluid (~350,000 mg/l TDS) in which ongoing precipitation of a mixture of chloride salts onto the floor of the containment system occurs, year-round. This is a similar process to that occurring in naturally occurring drainage salt pans which are frequent in the region.

Figure 3-9: ESS Wastewater solar evaporation ponds

The Grizzly Pond is a surplus capacity evaporation pond located to the south of the CTP. The pond receives flows from the CTP evaporation pond and acts as a secondary containment and evaporation point when the capacity at the CTP pond needs to be increased. Transfer between the ponds is via pump and a series of surface flowlines. The Grizzly Pond has a total volume of approximately 5,500m^3.

Figure 3-10: Grizzly pond Wastewater solar evaporation pond

Table 3-6 Mereenie production wastewater facilities specifications and water analysis

Specification	CTP	ESS	Grizzly
Geo-membrane Liner Material	HDPE - 2000µ	HDPE - 2000µ	HDPE - 2000µ
Liner coefficient of Permeability	< 10-9 m/s	< 10-9 m/s	< 10-9 m/s
Resistance to tearing	>0.5kN	>0.5kN	>0.5kN
Static puncture	>0.5kN	>0.5kN	>0.5kN
Volume (m3)	7,250	5,000	5,500
Area (m2)	4,835	5,000	2,500
Capacity (m3) with 50cm freeboard	~5,000	~5,000	~5,000
Annual Input (m3)	<10,000	<1,000	Surplus
Annual average evaporation capacity (m3)	>20,000	>20,000	>10,000
Minimum freeboard_90 day (cm)	50	50	50
Total dissolved solids (mg/l)	330,000	384,000	
Chloride (mg/l)	147,000	167,000	
Calcium (mg/l)	43,100	47,400	
Sodium (mg/l)	50,200	45,000	
Potassium (mg/l)	8,780	21,600	
Total petroleum hydrocarbons (ug/l)	27,800	68,300	
Total PAH	N.D.	N.D.	
BTEX	N.D.	N.D.	

3.9.4.3 Freeboard management

The Code (C.7.1.1) requires an estimate of the 1 in 1000 ARI (0.1% Average Exceedance Probability (AEP)) rainfall rate using Australian Rainfall methodologies (Ball *et al*., 2019) to maintain a freeboard for wastewater storage for the critical period resulting in the highest risk of overtopping.

The 1 in 1000 (0.1%) year AEP for a 90-day cumulative rainfall event for MRN, based on available historical daily rainfall records at Watarrka covering a period from 1990 to 2022 (BOM Site 015652), is estimated to be approximately 500mm as shown in Figure 3-11. The equivalent highly conservative (P10%) evaporation estimate occurring over the same 90-day period is 340mm, resulting in a calculated freeboard requirement (maximum 90-day potential cumulative net depth increase) of 160mm, should such an extreme event occur.

The operator has implemented the maintenance of a conservative freeboard of 500mm across all the evaporation ponds at MRN. This is good practice to manage potential risk of overspray from pond wavelets during periods of high winds. This freeboard exceeds the Code requirements based on a 90-day 0.1%AEP for rainfall in the region.

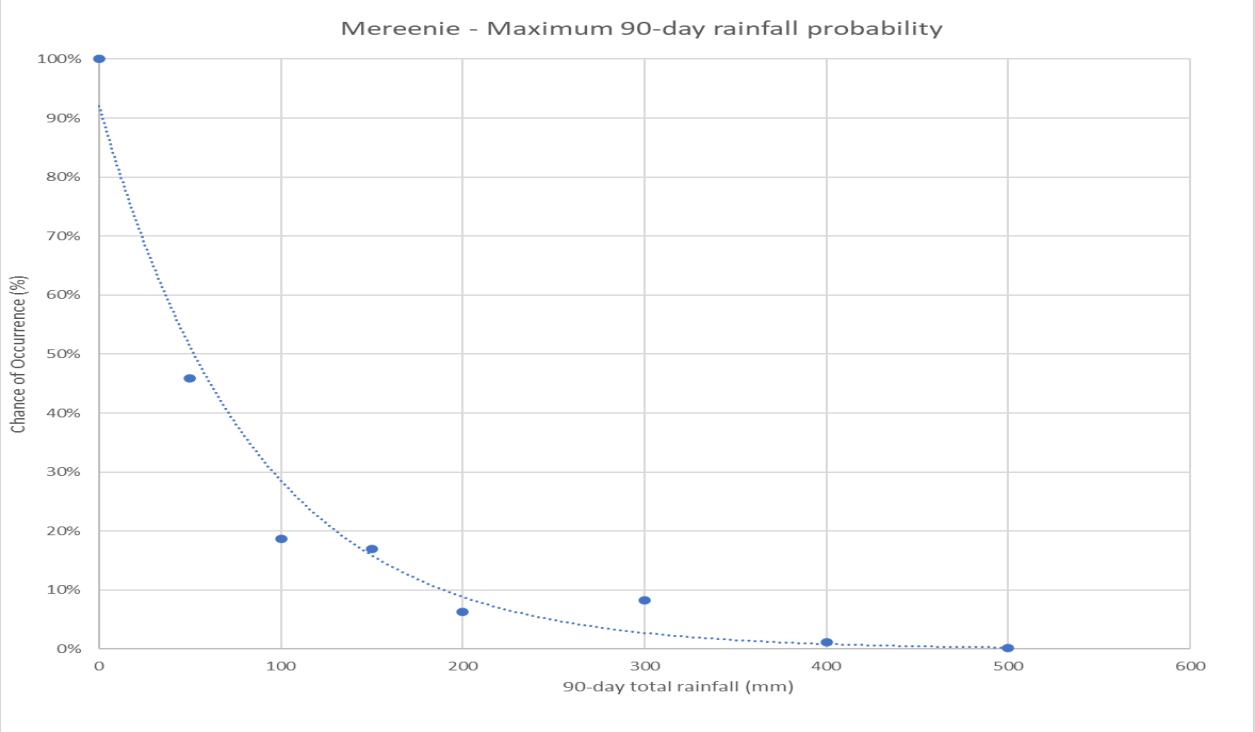


Figure 3-11: 90-day total rainfall probability estimates for Mereenie based on Watarkka 1990 to 2022 (BOM Site 015652).

3.9.4.4 Monitoring of Process Wastewater Systems

The formation water that is extracted from the reservoir together with petroleum at MRN is not defined as "produced water" for the purposes of the *Regulation of the Onshore Petroleum Code of Practice*. The Code specifically requires *all "produced water and flowback fluid" from hydraulic fracturing operations to be held in above-ground enclosed tanks*. The monitoring required in the Code is also aligned with wastewater arising specifically from hydraulic fracturing. This clause is not relevant at MRN where all the petroleum wells are conventionally developed and do not require hydraulic fracturing.

A general characterisation of the proximate analysis of the formation water in the treatment systems, prior to precipitation of salt, is provided in Table 3-6. As noted, it is a saturated chloride salt solution with trace hydrocarbons. There are no elevated metals or other contaminants of potential concern. Given that the endpoint in the MRN process wastewater treatment systems is isolation of in-situ precipitated salts, ongoing analysis of this wastewater will provide no new information. The quality of the salt is most unlikely to vary significantly.

As noted previously, daily inspections of system integrity, fauna interaction and freeboard levels are taken at each wastewater treatment system. Anomalies are logged in the operator's HSE system for corrective action if required. Wastewater tracking will be provided annually with required environmental reporting.

3.9.4.5 Workovers

Workover fluids are likely to be the only wastewater produced during workovers at existing well sites. DITT requires the operator to ensure enough workover fluid and a weighting agent at the wellsite is available to "kill" the well in the event of an emergency/loss of containment during workovers.

the operator will use water sourced from onsite bores for use in workover fluid, along with a small amount of biodegradable biocide and potassium chloride (KCl). Workover fluid will not be mixed with any oil or BTEX based additives.

If the work over fluid is not required at a particular well site, the unused water will be used at another well site in the mud tank or disposed of in one of the field evaporation ponds. The anticipated total volume of workover fluid required is approximately 400bbls (0.063ML) per annum.

While undertaking routine[2] air/mist workovers at a well site, retrieved debris/fill/materials will be discharged into a flare tank (via the blooie line) at the well site. Once flaring commences any incidental small volumes of liquid within the flare pit is vaporised (not expecting water to be discharged as little water is present in gas cap at MRN). For larger workovers (i.e. flow rate > 5TJ/day anticipated) a flare pit will be utilised which will be lined with an impervious clay material and hydrotested prior to operation. Only once the flare pit has passed a hydrotest will workover activities be able to commence. Upon completion of the workover, discharged materials can be removed from the flare tank / pit and disposed or recycled at an approved facility. In both cases, volume markers will be applied to the flare tank / pit to ensure visual inspections can accurately determine whether a leak has / is occurring. Visual inspections will be undertaken, at minimum, daily.

3.9.5 Waste management

3.9.5.1 Solid waste

Typical wastes and the approach to their management are outlined in Table 3-7.

Table 3-7 Waste management approaches

Typical waste	Waste management approach
Comingled waste/general waste (including food, paper, plastics)	**Dispose** Skip bins contain comingled waste for disposal via licensed waste contractor to Alice Springs disposal facility.
Chemical storage containers	**Dispose** ▪ Dispose via licensed waste contractor to disposal facility ▪ Return to suppliers for re-use where suitable
Contaminated soil	**Treatment** Dispose to bio-remediation pit for landfarming
Drink containers (glass, aluminium, plastic)	**Recycle/Donate** Plastic drink containers are donated to social enterprises within the Alice Springs area under the Container Deposit Scheme
Glass and cans	**Recycle** Store in recycling bins for transport to approved recycling facility
Integrated Bulk Containers (IBC)	**Reuse/Dispose** ▪ Re-used/re-purposed where possible as storage containers for other waste materials ▪ Return to suppliers or disposed at approved facility
Oily rags, oil contaminated material, filters, greases and any other hydrocarbon containing material	**Recycle/Dispose** Stored in a secure area for collection and transport to an approved recycling facility or disposal facility
Scrap metal	**Recycle/Reuse** ▪ Stored in recycling bins or designated laydown areas for collection and transport to an approved recycling facility ▪ Transported off-site for re-use where vendors are identified ▪ Re-used/re-purposed within the field where possible

[2] Routine workovers include all wells with a flow rate of less than or equal to 5TJ/day

Sewage, grey water	**Treat / Dispose** ▪ Greywater and sewage are treated using an on-site wastewater system to secondary level prior to disposal of treated effluent to a small pond for evaporation/dust suppression. ▪ Temporary facilities may be installed at well facilities. ▪ Biosolids are removed by a licensed waste contractor and disposed of at an approved facility. ▪ Any portable greywater and sewage treatment systems and disposal of treated effluent (via irrigation or evaporation) will be as per the Department of Health's Code of Practice for onsite wastewater management.
Timber (including pallets)	**Recycle / Dispose** Stored in a secure area and either re-used on site, returned to supplier where possible, or transported and disposed at an approved disposal facility
Used production tubing, well lines, pipes, wellhead equipment, safety systems	**Dispose** Storage (e.g. pipe racks) and containment (e.g. skip bins) facilities for replaced production tubing, well liners and other wastes from the activity
Used spill kit materials	**Dispose** Stored in a secure waste disposal area/container for collection and transport to an approved disposal facility
Workover fill/cuttings	**Recycle/Treat/ Dispose** Remaining fluids stored in lined sump/flare pit and evaporated. Solids disposed either off site at an approved facility.

3.9.5.2 Waste laydown area

A waste laydown area is located to the south of the CTP. This area is used for the storage of scrap metal, timber and redundant plant and infrastructure for re-use or until bulk removal can occur.

3.9.5.3 Bioremediation (landfarm)

Approximately 2.6km south-east of the CTP are the bio-remediation pits ('bio-pits'). This facility comprises three cells of approximate dimensions 60m x 6m, with a depth of 1 to 2m (one active, one suspended from new material, one closed). The bio-pits are used for the rotation of potentially contaminated soil (including those which are contaminated with hydrocarbons from spills) and some liquid wastes such as cooking fats. Cell contents are periodically worked. Where appropriate, nutrients (fertiliser) and kitchen wastes are mixed into the soils to assist in the bio-remediation process.

3.9.5.4 Sewage / grey water

Grey and black water from the camp is directed to an on-site wastewater system. Wastewater is treated to a secondary level. The treated effluent is then transferred to a small dam for evaporation/irrigation/dust suppression, or if required, excess wastewater is transported for off-site disposal by an approved waste contractor. Grey and black water from the CTP and ESS areas are treated by individual septic systems, with excess water released through underground rock drainage irrigation fields.

Temporary facilities may be established as required for workovers at well locations. Any portable greywater and sewage treatment systems installed at the workover wellsite office facilities will be operated as per the Department of Health's Code of Practice for onsite wastewater management.

3.9.5.5 Waste tracking

Any listed wastes or by-products from on-site wastewater systems that require disposal off site are transported and disposed of in accordance with the requirements of the *Waste Management and Pollution Control Act 1998* and the *Radiation Protection Act 2004*.

3.9.6 Greenhouse gas emissions

The forecast emissions from operations and workovers at Mereenie over the next five years is 270,700 tCO_2e. Across all fields this is estimated to be 334,815 tCO_2e. Emissions are based on calculated FY22 NGERs data and assumes:

- Six successful workovers in FY23 at Mereenie
- Two successful development wells in FY24 at Mereenie
- Averaged production over the period of 35TJs (gas) and 140k bbls (oil) per annum
- Increased production at Palm Valley from the recently drilled well

- Steady production from our Dingo field

A breakdown of the forecast emissions at Mereenie for the next five years is outlined in Table 3-8. All emissions are calculated using NGERs measurement determination requirements.

Table 3-8 Forecast emissions for Mereenie Field

Mereenie emissions	Forecast volume t CO_2e					Methodology and assumptions
	FY23	FY24	FY25	FY26	FY27	
Fuel gas	35,000	35,000	35,000	35,000	35,000	Steady state
Diesel usage	1,200	1,200	1,200	1,200	1,200	Steady state
Development wells including associated activities	-	10,000	-	-	-	Anticipated in CY24 but not yet approved, aligned with actual numbers from WM27/28
Fugitive	300	300	300	300	300	Steady state
Workovers	5,500	-	-	-	-	Diesel usage an additional 37,000ltrs = 100, Flaring approximately 300 per well x 3 days x 6 wells = 5,400
Wells	300	300	300	300	300	Steady state
Gathering	2,500	2,500	2,500	2,500	2,500	Steady state
Flaring	13,900	11,200	11,200	11,200	11,200	Reduced flaring due to flare gas compressor project 7% - FY23 / 25% - FY24 forward
Total	**58,700**	**60,500**	**50,500**	**50,500**	**50,500**	

As displayed in Figure 3-12, at no time during the next five-year period does the operator of three sites breach the threshold as a large emitter.

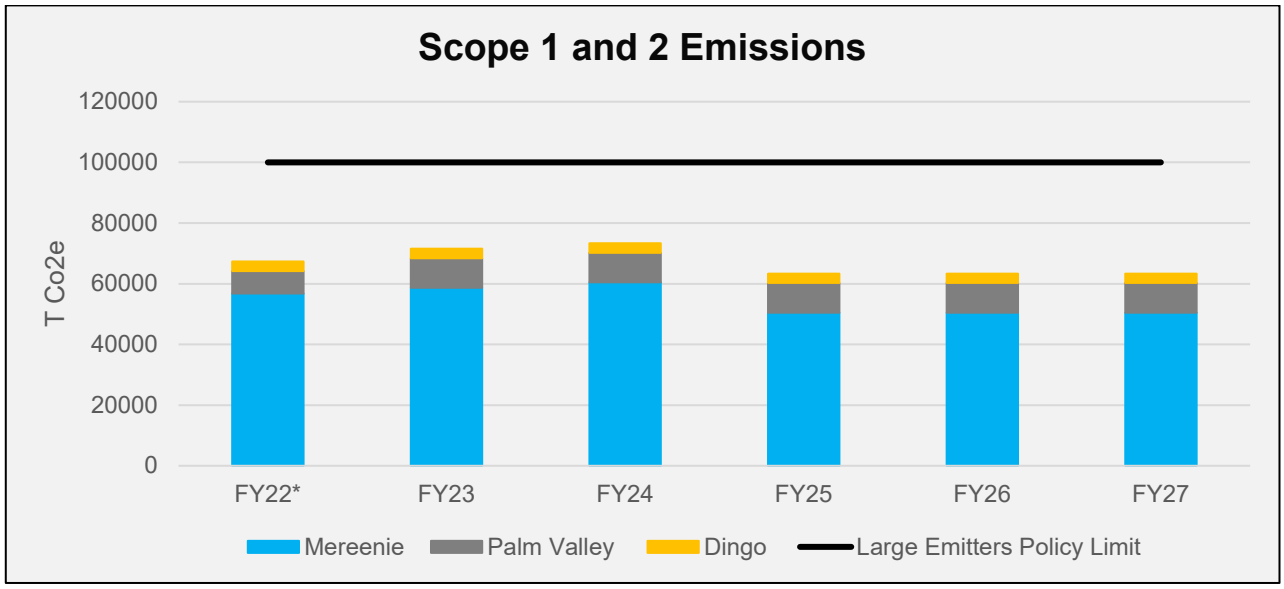


Figure 3-12 Forecast emissions aligned with NT Large Emitters Policy

Greenhouse gas emissions generation will be mitigated through adoption of the Code requirements as required and implementation of a Methane Emission Management Plan (MEMP) (Section 7.8).

3.10 Mereenie to Alice Springs Pipeline

The Mereenie to Alice Springs Pipeline (MASP) was used to transfer the produced crude oil from Mereenie to the Brewer Estate Crude Oil Terminal at Alice Springs for on-shipment by road or rail to refineries. The pipeline was commissioned in 1986.

The MASP is a 269km 8” nominal diameter steel pipe coated with a protective tape wrap. The MASP facilities consisted of a pumping station at the Mereenie CTP, a scraper station midway along the pipe, automatic isolation valves at river crossings, and a back-pressure control system at the pipeline terminal at Brewer Estate Crude Oil Terminal. The pipe has cathodic protection, powered by three solar impressed current units located along the length of the pipeline.

The MASP was hydro-suspended in 2009 and is currently in a state of care and maintenance. All oil was previously flushed from the MASP and replaced with a mix of groundwater, biocide and corrosion inhibitor. The pipeline is managed in accordance with the Pipeline Management Plan – Mereenie to Alice Springs Pipeline (9940-200-PLN-0001).

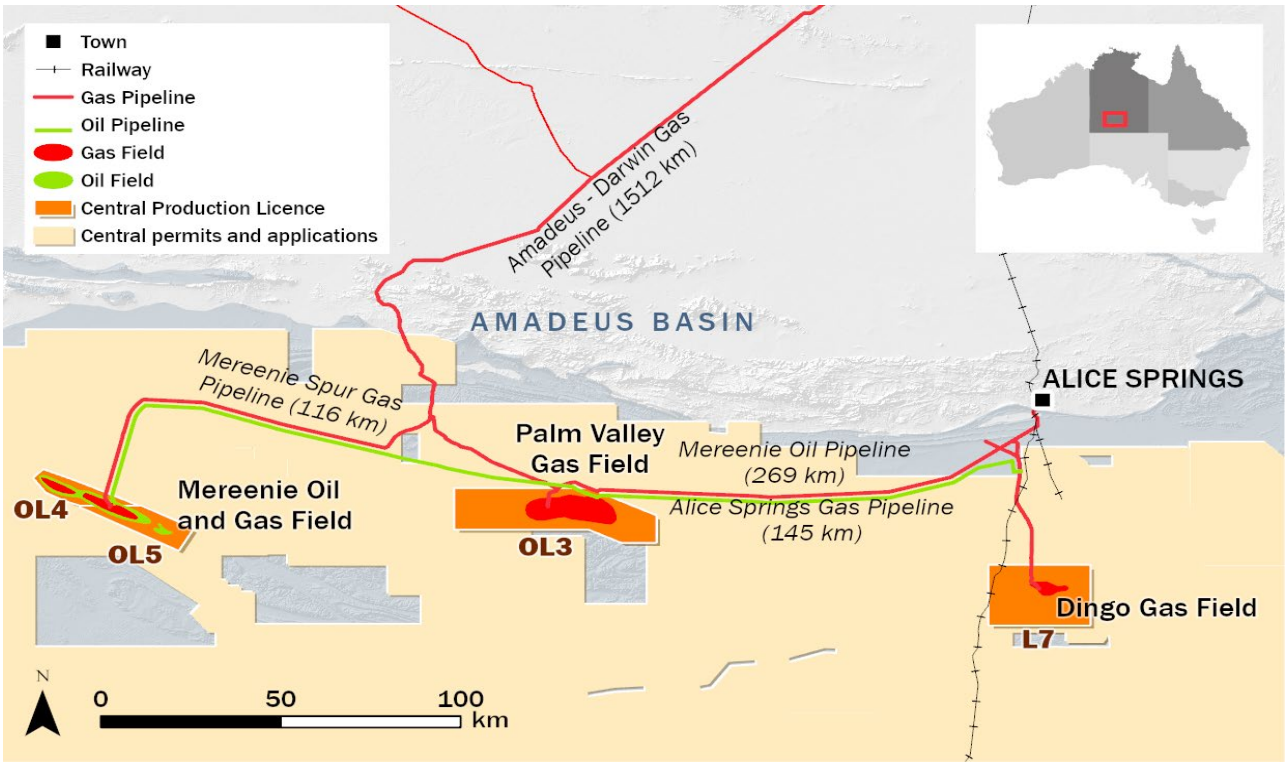


Figure 3-13 Amadeus Basin Energy Pipelines (including MASP)

3.11 Brewer Estate Crude Oil Terminal Yard

The Brewer Estate Crude Oil Terminal Yard is located within the Brewer Estate area, approximately 19km south of Alice Springs. The facility covers an area of approximately 50ha. The yard was developed in the mid-1980s and received crude oil via the MASP until 2009 when the MASP was subsequently suspended. Crude oil was transferred via the MASP to a number of bunded oil storage tanks prior to loadout via rail for export to refineries interstate.

The yard consists of:

- Oil storage tanks (decommissioned)
- Rail loadout infrastructure and siding connecting to the adjacent rail line
- Buildings including administration, workshops and storage areas
- Laydown areas
- Associated infrastructure including water, electricity and fire water systems.

The yard has been under a care and maintenance regime since the MASP was suspended and is used as a temporary laydown and storage area for materials prior to transfer to the operator's facilities.

4 Existing environment

A description of the physical, natural, and socio-economic environment across the Mereenie Field is provided in the following sections. A combination of desktop and baseline historical understanding from the long-term exploration and production across the field to develop a description of the current environment to provide context for the environmental management of the activities conducted under this EMP. Where changes to the existing environment arise for the duration of the EMP, these will be reviewed in conjunction with environmental risk assessment and addressed in accordance with the *Petroleum (Environment) Regulations 2016*.

Previous identification of the existing environment and the potential for impact from the development of the Mereenie Field has been completed as the field has been developed. The area has been subject environmental assessment since the 1980s, with the most recent assessment conducted in 2020 for assessment of the West Mereenie 27 and West Mereenie 28 wells (NT Drilling Campaign EMP, Central Petroleum, 2020).

Environmental Sensitivity Maps have been prepared (Appendix 4) for each of the wells showing the environmental values of importance around each well and to assist in interpretation of the risks posed and the management controls being implemented across the field.

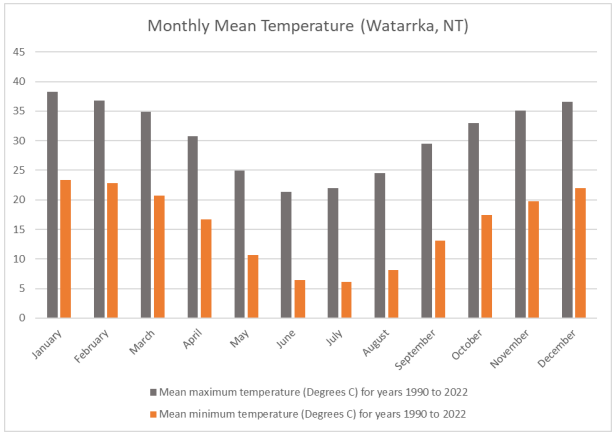
4.1 Physical environment

4.1.1 Climate

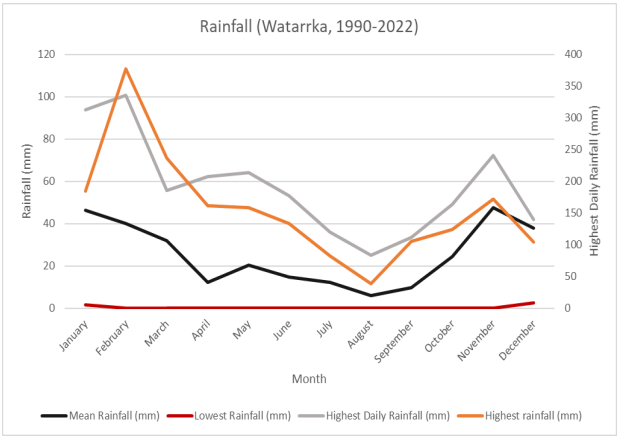
Climate data (Figure 4-1) has been summarised using the available data from the nearest Bureau of Meteorology (BOM) weather station at Watarrka covering a period from 1990 to 2022 (BOM Site 015652) and supplemented by the Alice Springs Airport station (BOM Site 015590) where a verified data set is available.

The Mereenie Field experiences an arid to semi-arid climate which is characterised by hot dry summers and cool dry winters with low average total annual rainfall of approximately 310mm during the last 3 decades. Typically, more rainfall occurs in the summer months associated with monsoonal influences from the north, however the amount of rainfall in the central arid zone has a history of being highly variable as it is influenced by several continental weather systems. Wind direction tends to be from south-easterly direction in the afternoons, with westerly winds evident in late winter and into spring.

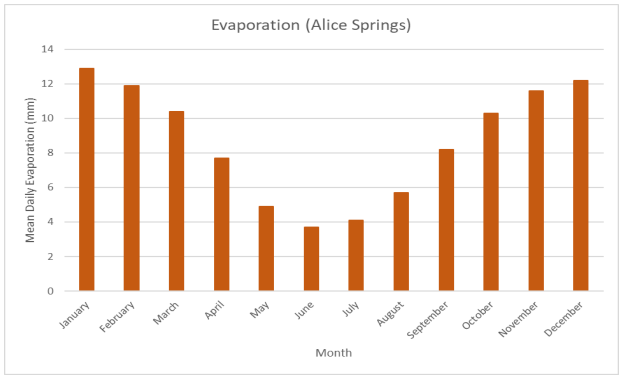
The high variability in climatic conditions has the potential to influence rehabilitation and the occurrence and recovery from bushfire. Long term periods with low rainfall have also been shown to impact biodiversity in the Mereenie Field. In addition, periods of high intense rainfall can impact exposed areas and increase the potential for erosion and sedimentation impacts on the surrounding land and watercourses.



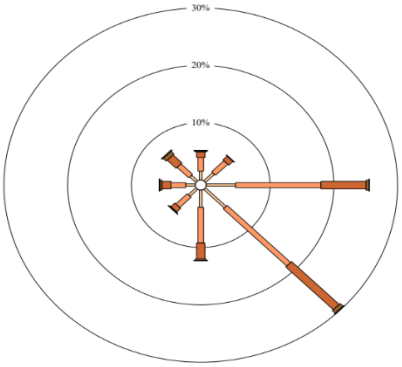
Mereenie average temperatures



Mereenie average rainfall



Mereenie average evaporation rates



Mereenie prevailing wind conditions

(Source: BOM, 2022)

Figure 4-1 Climate indicators for Mereenie Field

4.1.2 Land systems, geology and soil

4.1.2.1 Geology

Mereenie is located within the Amadeus Basin, an east-west trending sedimentary basin extending across the southern part of the Northern Territory and into Western Australia and a known hydrocarbon and groundwater resource, hence the presence of the Mereenie Oil and Gas Field. The basin covers approximately 170,000km^3 and a maximum sediment thickness of 14,000m with several major depocenters including the Idirriki, Carmicheal and Ooraminna Sub-basins and Missionary Plain Trough along the northern margin and the Mount Currie and Seymour Sub-basins in the south (Geoscience Australia, 2020). It is bound in the north by the Arunta complex and in the south by the Musgrave-Mann complex, both containing granite, gneiss and schists, with amphibolite and quartzite. The general stratigraphy of the Amadeus Basin is shown Figure 4-2.

Rocks within the Mereenie Field tend to be sandstones with some siltstones covered by superficial soils. Hydrocarbons occur in the sandstones at depths ranging between 1200 and 1500m in this area.

MASP and Brewer Estate Oil Yard

The majority of the MASP has been constructed on quaternary undifferentiated sediments of aeolian sand and thin deposits of alluvium. Brewer Estate overlies an area characterised by quaternary sediments and conglomerates, sandstones and siltstones.

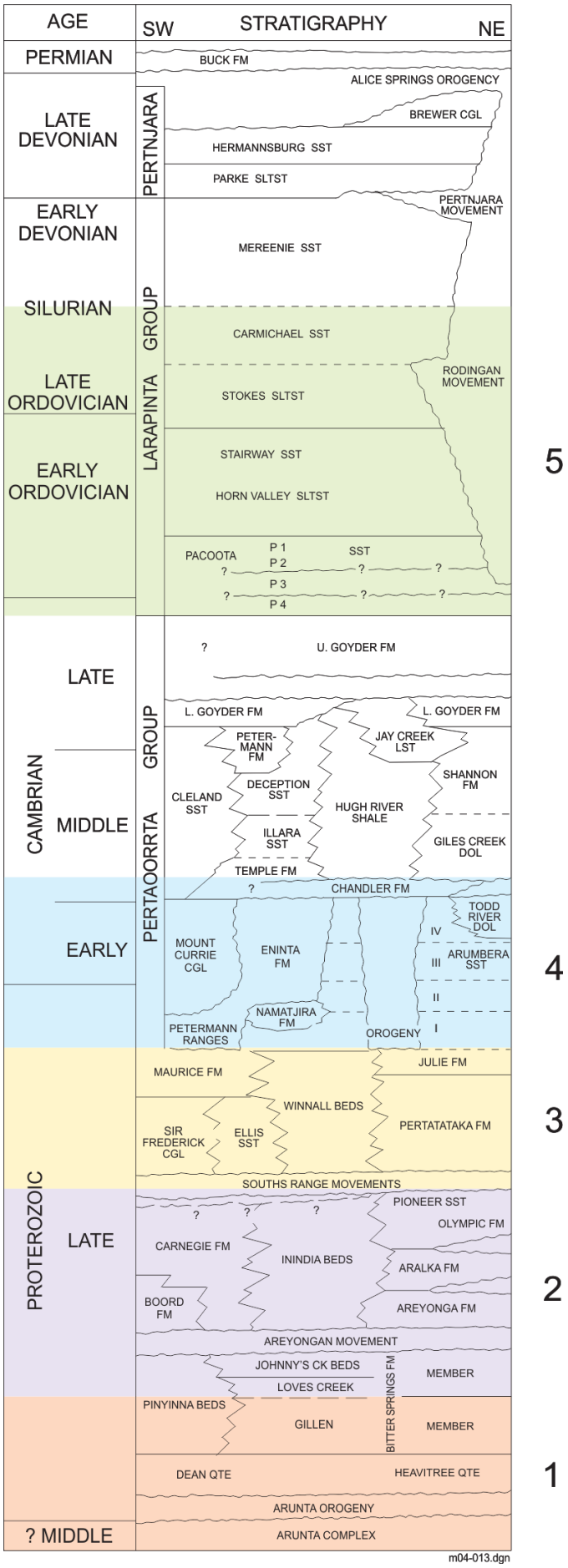


Figure 4-2 Stratigraphy of Amadeus Basin

4.1.2.2 Regional soils

Three soil types, as mapped using data from the Digital Atlas of Australian Soils, (based on Northcote, *et al*. 1960-1968) dominate across the Mereenie field. Table 4-1 provides a description of these soil types with Figure 4-3 showing the location of Mereenie relative to soil types.

Table 4-1 Mereenie soil units

Soil type	Landform	Soils
AB31	Flat to gently undulating sand plains with some low broad sand rises and intervening swales; some small alluvial flats, some clay pans; and some stone – covered	Chief soils are red earthy sands on the plains and swales. Red siliceous sands on the sand rises. Small areas of sandy red earths occur on the plains, in the swales and on the alluvial flats. Other soils include shallow stony on the stone covered ridge.
AB62	Sandy plains with alluvial areas along waterways; occasional dunes	Chief soils are red earthy sands
BA28	Bold ranges, ridges, cuestas and hills on sandstones and quartzites	Chief soils are shallow stony sands

MASP and Brewer Estate Oil Yard

Soils across the length of the MASP have been mapped previously through desktop research and verified through on-ground surveys. The three principal soils identified along the pipeline are red earths, siliceous sands and alluvial soil. Brewer Estate is dominated by calcareous earths.

4.1.2.3 Land systems

A land system is an area or group of areas where a recurring pattern of topography, soil and vegetation occurs (Christian and Stewart, 1968). Land system descriptions provide a general and consistent basis for determining potential habitat types within the region and provide a guide for erosion hazard in the area. The majority of the western section of the Mereenie Field (aligning closely with OL4) is located within the Simpson land system and is characterised by spinifex covered sand dunes where the erosion hazard tends to be low. The eastern field is located predominantly within the Gillen land system which combined with extensive drainage lines results in known areas of moderate erosion potential which continue to be monitored and maintained as part of operational civil activities.

The land systems within Mereenie include the Simpson, Krichauff and Gillen as described in Table 4-2 and shown in Figure 4-4.

Table 4-2 Description of land systems

Extent	Land system	Description	Geology	Topography	Soils	Erosion hazard
10%	Krichauff	Sand plains with dunes, occupying the northwest part of the Mereenie Field	Flat lying sandstone, siltstone and conglomerate. Upper Proterozoic age, Amadeus trough (Heavitree quartzite)	Partially dissected erosional weathered land surface; relief up to 500ft	Shallow stony or gravelly soils and some red sands or red clayey sands	Moderate erosion hazard
45%	Simpson	Sandstone plateaus, eroded and dissected, forming margins to the southeast part of the Mereenie Field	Extensive dune fields with hard spinifex pastures	Sand dunes of varying height and alignment, up to a maximum of 70ft in the Simpson Desert section	Red sands to red clayey sands and locally red earths	Low erosion hazard
45%	Gillen	Sandstone strike ridges and intervening valleys in the southern part of the Mereenie Field	Sandstone mountains with mulga or witchetty bush country	Partially dissected erosional weathered land surface; relief up to 500ft	Shallow stony or gravelly soils and some red sands or red clayey sands	Moderate erosion hazard

Source: Perry, et al., 1962

MASP and Brewer Estate Oil Yard

The MASP crosses the three land systems associated with the Mereenie Field, but also crosses the Singleton, Stokes, Deering, Muller and Finke land systems. Closer to Alice Springs it crosses the Muller and Ewaninga land systems before entering the Brewer Estate Oil Yard.

Threatening processes on the land systems along the MASP include co-location of pastoral activities, recurring fires, grazing from feral pest species including horses and camels and the need to maintain a ROW clear of vegetation to meet industry pipeline integrity standards. These activities combine to increase erosion and sedimentation potential.

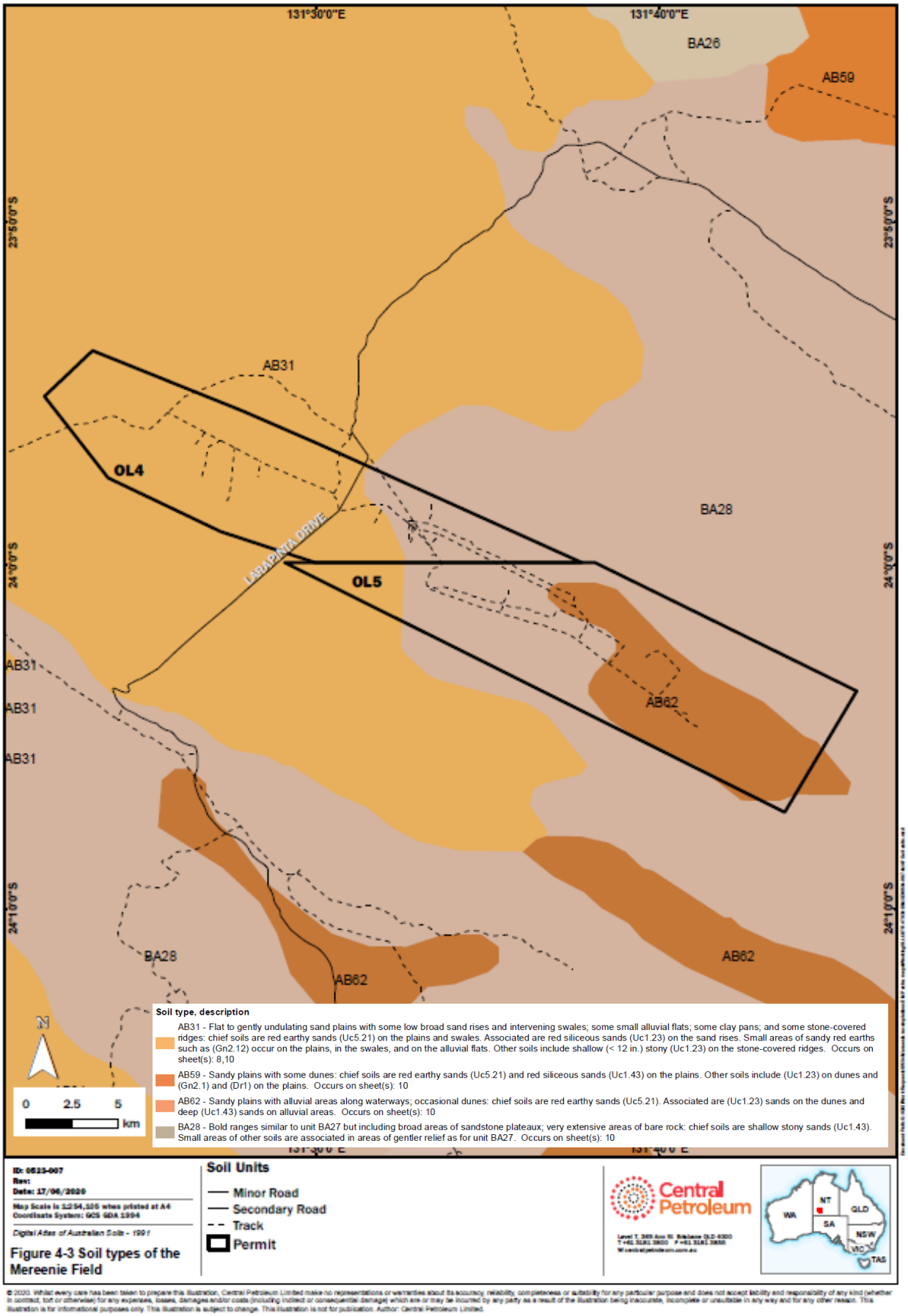


Figure 4-3 Soil types of the Mereenie Field

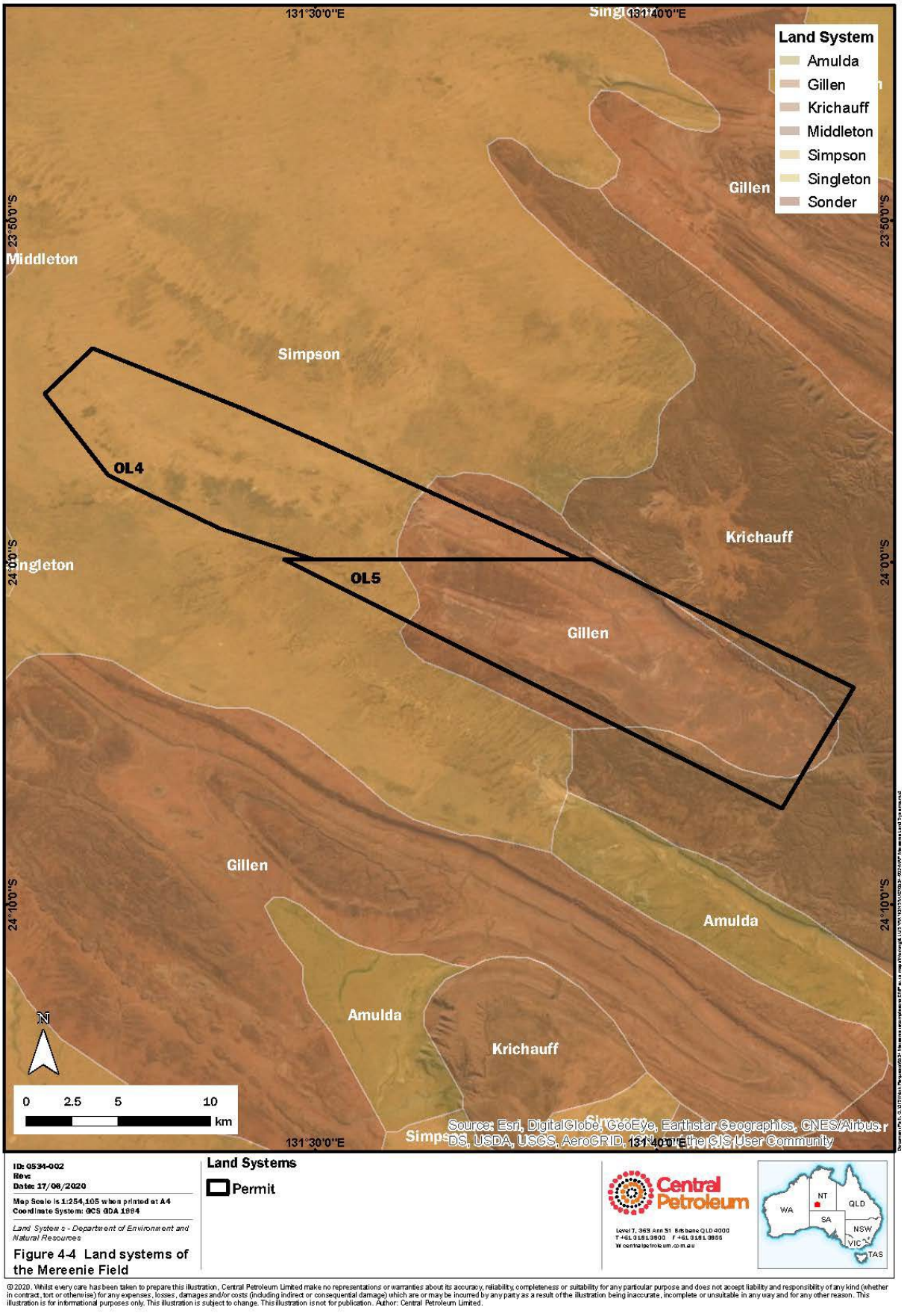


Figure 4-4 Land systems of the Mereenie Field

4.1.3 Groundwater

Mereenie is located in the north-central area of the Amadeus Basin, which is described by Lloyd and Jacobson (1987) as including a series of stacked regional scale formations that have good groundwater supply potential. These formations include the Hermannsburg Sandstone, Mereenie Sandstone and the Pacoota Sandstone, which are shown in the context of the Amadeus Basin stratigraphy in Figure 4-2.

The local surface geology of Mereenie is shown in Figure 4-5. The Hermannsburg Sandstone has been eroded at Mereenie well locations, so it is not penetrated by any of the wells but based upon the elevation of the ridge line on the eastern margin of Mereenie, the Hermannsburg Sandstone is approximately 120m thick.

The Parke Siltstone, which underlies the Hermannsburg Sandstone, has limited thickness and low groundwater potential, however it does provide a low permeable barrier to vertical infiltration to the underlying Mereenie Sandstone (Water Studies, 2001).

The most significant groundwater resource in the area is the Mereenie Sandstone, a loose, fine to very coarse-grained quartz sandstone that reaches a thickness of 320 to 649m in Mereenie and forms the water table beneath the well sites. Groundwater within the Mereenie Sandstone was found to occur at an average measured depth of greater than 200m below ground level at Mereenie wells (see Figure 4-6, which shows the wells which intersected the Mereenie Sandstone groundwater during drilling. Wells not shown (EM10, EM23, EM24, EM41, WM26) did not present any groundwater and therefore are not shown on the map). The generalised flow of the Mereenie Sandstone groundwater resource is in a south-easterly direction, though local features affect this pattern (Water Studies, 2001).

The Mereenie Sandstone is a regionally extensive groundwater resource and is of significance in the north-east of the Amadeus Basin where it provides the water supply for Alice Springs. The Mereenie Sandstone is the only aquifer in Mereenie as defined by the Code. Bore yields of up to 100L/s have been recorded in the aquifer at Roe Creek (Alice Springs), though this is attributed to very high secondary permeability (Macqueen and Knott, 1982) and is not representative of the aquifer regionally.

Locally, Jameison and Wischusen (1998) class the formation as having moderate bore yields (1–5L/s) while Read (2007) reports on range of 1.5–10L/s from 15 bores. Water quality of the Mereenie Sandstone is variable but in Mereenie is generally of good potable drinking water quality. Read (2007) suggests that diffuse recharge accounts for the majority of active recharge to aquifer and estimated rates are in order of 1 mm/year. Aquifer transmissivities of up to 4,000m2/day have been observed in the Mereenie Sandstone though 600m^2/day is considered representative at a regional scale (Macqueen and Knott, 1982).

The Mereenie Sandstone overlies and is in limited hydraulic connection with the Carmichael Sandstone (Lloyd and Jacobson, 1987), which comprises interbedded sandstone, siltstone and mudstone. The formation contains limited groundwater resources and is of notably lower permeability than the overlying Mereenie Sandstone. Underlying the Carmichael Sandstone is the Stokes Siltstone, which locally is more than 300m thick. Groundwater in the Stokes Siltstone is low yielding and is not commonly used as a water resource. The Stokes Siltstone forms a reservoir seal that isolates gas resources in the underlying Stairway Sandstone from the Mereenie Sandstone.

The Pacoota Sandstone underlies the Horn Siltstone, which separates it from the overlying Stairway Sandstone. The Pacoota Sandstone is both a gas and oil reservoir within Mereenie. Lloyd and Jacobson (1987) report that saline and overpressure groundwater underlies the oil resource in the Pacoota Sandstone. Local flow directions in the vicinity of Mereenie are complex, as a result of compartmentalisation of the aquifer due to cross faulting (Lloyd and Jacobson, 1987).

The potential for groundwater recharge from localised rainfall/runoff events is considered low, and the majority of recharge to aquifer systems is from localised fracture zones, areas of enhanced permeability susceptible to floods or from palaeowater recharged during the late Pleistocene (Water Studies, 2001).

Table 4-3 provides a summary of the formation depth, thickness and groundwater potential of formations beneath Mereenie wells from the Parke Siltstone to the Pacoota Sandstone. In terms of potential impacts to groundwater, the depth of the groundwater (86-384 mTVD but typically >200mTVD) and the presence of the impervious Parke Siltstone above the Mereenie Sandstone provides some protection against contamination from surface level spills.

Table 4-3 Stratigraphy and groundwater across the Mereenie Field

Formation	Depth min/ max (mTVD)*	Thickness Min-max (m)+	Lithology	Groundwater availability	Water quality^
Parke Siltstone	0	5/285	Micaceous siltstone with minor thin interbeds of litho-feldspathic quartz sandstone	Poor	Not known
Mereenie Sandstone	0/285	320/649	Porous quartz sandstone	Regional aquifer	Fresh
Carmichael Sandstone	337/777	58/106	Interbedded sandstone, siltstone and mudstone	Limited	Not known
Stokes Siltstone	418/865	298/379	Claystone, siltstone	Poor (Aquitard)#	Not known
Stairway Sandstone	740/11,184	211/286	Silty sandstone with interbedded siltstone	Gas reservoir	Not known
Horn Valley Siltstone	1001/1,426	58/89	Claystone with interbedded marl and limestone	Poor (Aquitard)#	Not known
Pacoota Sandstone	1076/1,489	278/332	Quartz sandstone with minor claystone	Oil/Gas reservoir	Saline

** TVD = True Vertical Depth, the absolute distance from the top of the borehole at ground elevation to the top of the formation. TVD is always less than measured depth unless the bore is drilled perfectly vertical.*

+ Thickness and depth values taken from existing well penetrations across the field

^ Water quality assessment is based on existing bore data and the regional sources

 # Designation of aquitard based on dominant lithology

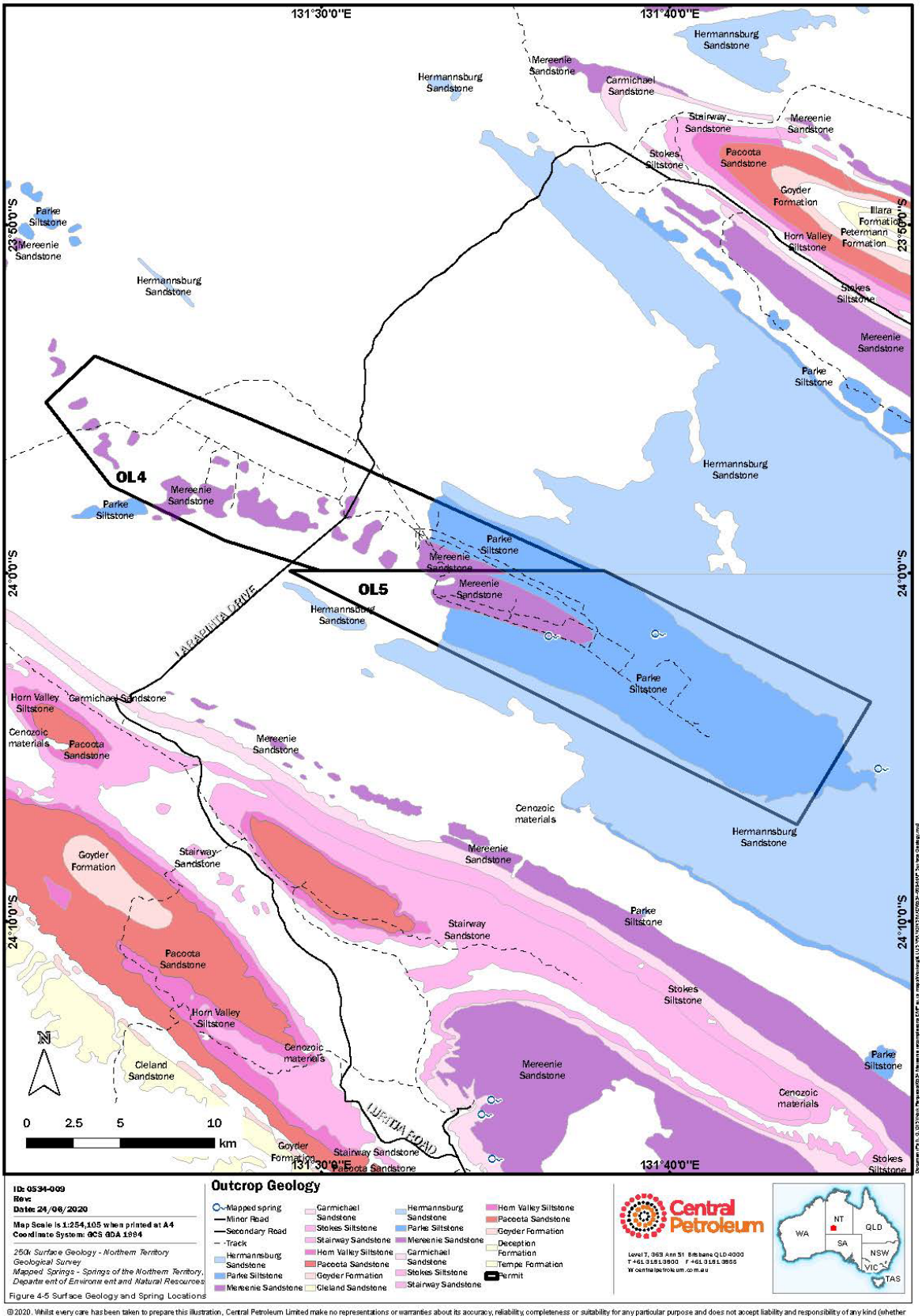


Figure 4-5 Surface Geology and Spring Locations

Figure 4-5 Surface geology and spring locations across Mereenie Field

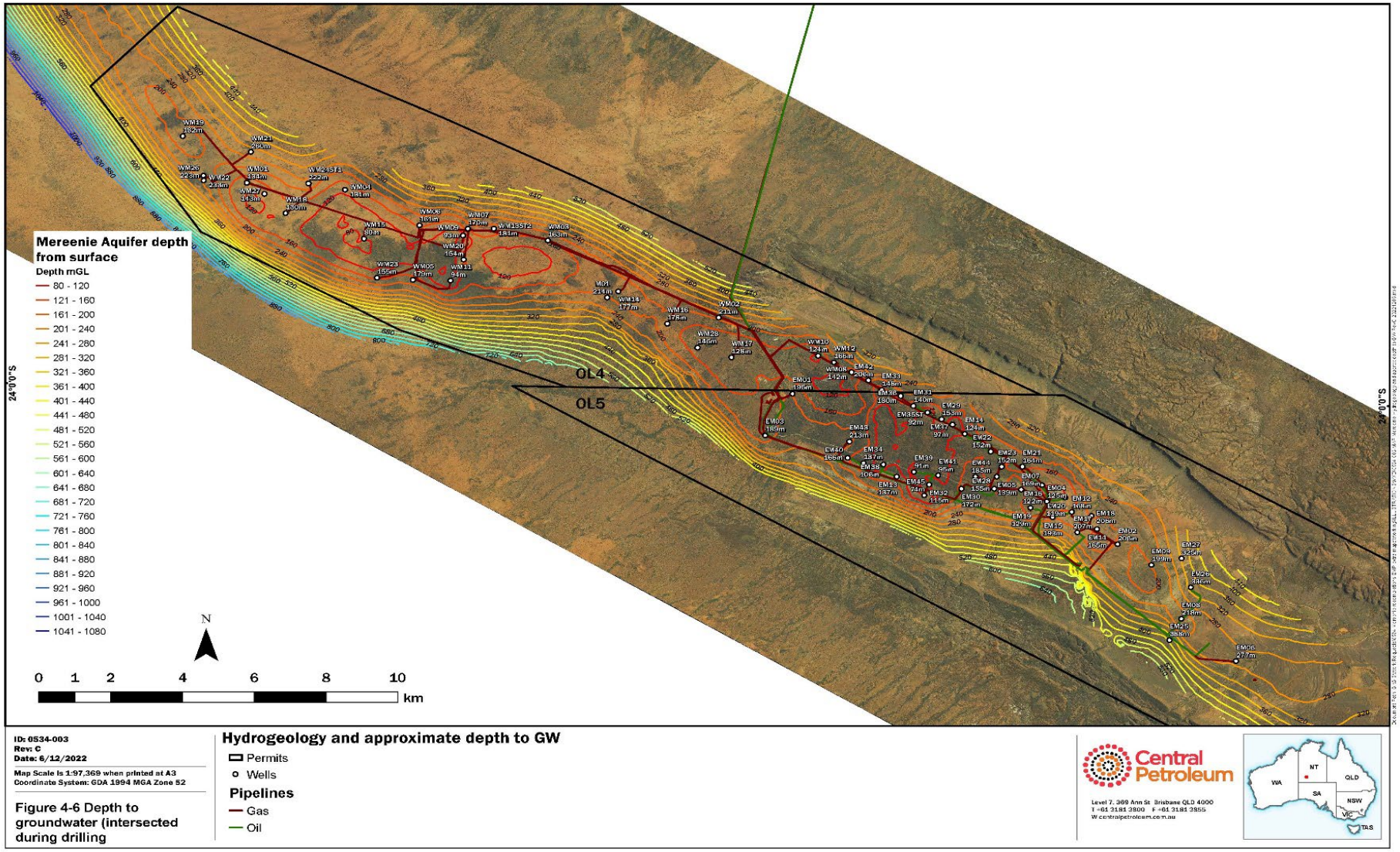


Figure 4-6 Depth to groundwater (intersected during drilling)

MASP and Brewer Estate Oil Yard

Water Studies (2001, 2002) examined the operations of the MASP and Oil Yard and the potential for impact on the surface and ground water environment as part of a wider assessment of the Mereenie Field operations in the early 2000s.

At Brewer Estate Crude Oil Terminal, the geology is dominantly comprised of Brewer Conglomerate, which is characterised by very low permeability, and hence low potential for deep infiltration of fluids released from the site to groundwater. The Roe Creek borefield is located 8km north-west of Brewer Estate. In addition, all suspended oil storage infrastructure is bunded to reduce risk of off-site discharge and impact on groundwater. Given that this facility is currently in care and maintenance the impacts on groundwater values are deemed low.

4.1.3.1 Groundwater bores

A search of water bore data from DEPWS identified 24 registered existing groundwater bores within Mereenie and six groundwater bores within a 10km radius of Mereenie. Figure 4-7 shows the locations of the identified bores.

Table 4-4 provides an overview of each of the existing registered groundwater bores using information taken from the DEPWS water bore data set and associated water bore drilling logs. The current status of the six bores identified within 10km of Mereenie has been taken from the DENR water bore dataset and the operator has provided the current status of the water bores located within Mereenie. The operator is not proposing any changes to the status of the bores identified in Table 4-4. As outlined in Section 3.9, a licence (M10001) to extract groundwater from the following bores, RN017898, RN017657, RN004620, RN013861 and RN018955, is active for the Mereenie Field.

There are no Beneficial Use Declarations (BUDs) in the Mereenie project area under the *NT Water Act 1992* and the bores identified as being within 10km of Mereenie boundary have either been backfilled, abandoned or there was no water interaction was detected during drilling and so the operator considers that they are unlikely to be in use.

There are no other water extraction licences within the immediate area surrounding Mereenie.

4.1.3.2 Groundwater quality

Groundwater quality assessments have been conducted by Golder Associates (2013, 2014 and 2015). A Groundwater Management Plan has been prepared for the Mereenie Field with an associated monitoring program commencing in May 2021. Groundwater quality samples were collected from the approved extraction licence bores: RN017898, RN017657, RN004620, RN013861 and RN018955. Parameters analysed include physical chemistry, major ions, alkalinity, nutrients, silica, dissolved and total metals, dissolved hydrocarbon gases, Polynuclear Aromatic Hydrocarbons (PAH), Total Petroleum Hydrocarbons (TPH), Total Recoverable Hydrocarbons (TRH) and BTEX, along with Gross Alpha/Beta activity.

The results to date (provided to DEPWS) have shown minor exceedances of Gross Alpha and Beta within the Mereenie field and also an exceedance of sulphate levels. Exceedances of Gross Alpha and Beta are not uncommon in the Northern Territory as reported by Power and Water Corporation (2018) and DEPWS (2019). The annual monitoring program results will be reported and published on DEPWS website as part of ongoing monitoring commitments under the Groundwater Management Plan and this EMP.

Table 4-4 Registered bores within Mereenie and 10km radius

Bore ID	Location	Registered to the Operator	Formation screened	Drilled depth (mBGL)	Groundwater		Status
					EC (mS/cm)	Depth to water (mBGL)	
RN018955	OL4	Yes	Mereenie Sandstone	192	360^	159	Extraction Licence: M10001
RN004619	OL4	Yes	Mereenie Sandstone	148	960^	52	Not in use
RN016361	OL4	No	Mereenie Sandstone	277	450	169	Northern Territory government roads bore
RN011189	OL4	Yes	-	1214	-	-	Not in use (abandoned oil well)
RN004167	OL4	Yes	No water intersection	274	-	-	Not in use (abandoned)
RN004168	OL4	Yes	-	226	126	113	Not in use (abandoned)
RN017657	OL4	Yes	Mereenie Sandstone	227	800	190	Extraction Licence: M10001
RN013862	OL5	Yes	No water intersection	-	-	-	Not in use (abandoned, not cased)
RN013863	OL5	Yes	No water intersection	-	-	-	Not in use (abandoned, not cased)
RN017898	OL5	Yes	Mereenie Sandstone	236	440^	164	Extraction Licence: M10001
RN013864	OL5	Yes	Mereenie Sandstone	281	850	183	Not in use
RN005220	OL5	Yes	-	951	-	-	East Mereenie 3 well (oil bore)
RN013389	OL5	Yes	-	-	-		East Mereenie 5 well
RN004620	OL5	Yes	Mereenie Sandstone	152	TDS 840	-	Extraction Licence: M10001
RN013861	OL5	Yes	Mereenie Sandstone	277	445	-	Extraction Licence: M10001
RN016888	OL5	Yes	-	72	-	-	Operator observation bore
RN016889	OL5	Yes	-	72	-	-	Operator observation bore
RN013417	OL5	Yes	Mereenie Sandstone	691	126	-	Not in use
RN004868	Within 10km	No	No water interaction	107		-	Records state the status of the bore is not known, though unlikely to be in use as water was not encountered during drilling
RN004869	Within 10km	No	No water interaction	128			Records state the status of the bore is not known, though unlikely to be in use as water was not encountered during drilling
RN013066	Within 10km	No	-	21	-	-	Records state the bore has been backfilled
RN013064	Within 10km	No	No water interaction	47.2			Records state the status of the bore is not known, though unlikely to be in use as water was not encountered during drilling
RN013065	Within 10km	No	-	37	-	-	Records state the bore has been backfilled
RN006982	Within 10km	No	Pacoota Sandstone	2000	-	-	Records state the bore is abandoned

^ EC based on TDS using a conversion factor of 0.65
- indicates no data

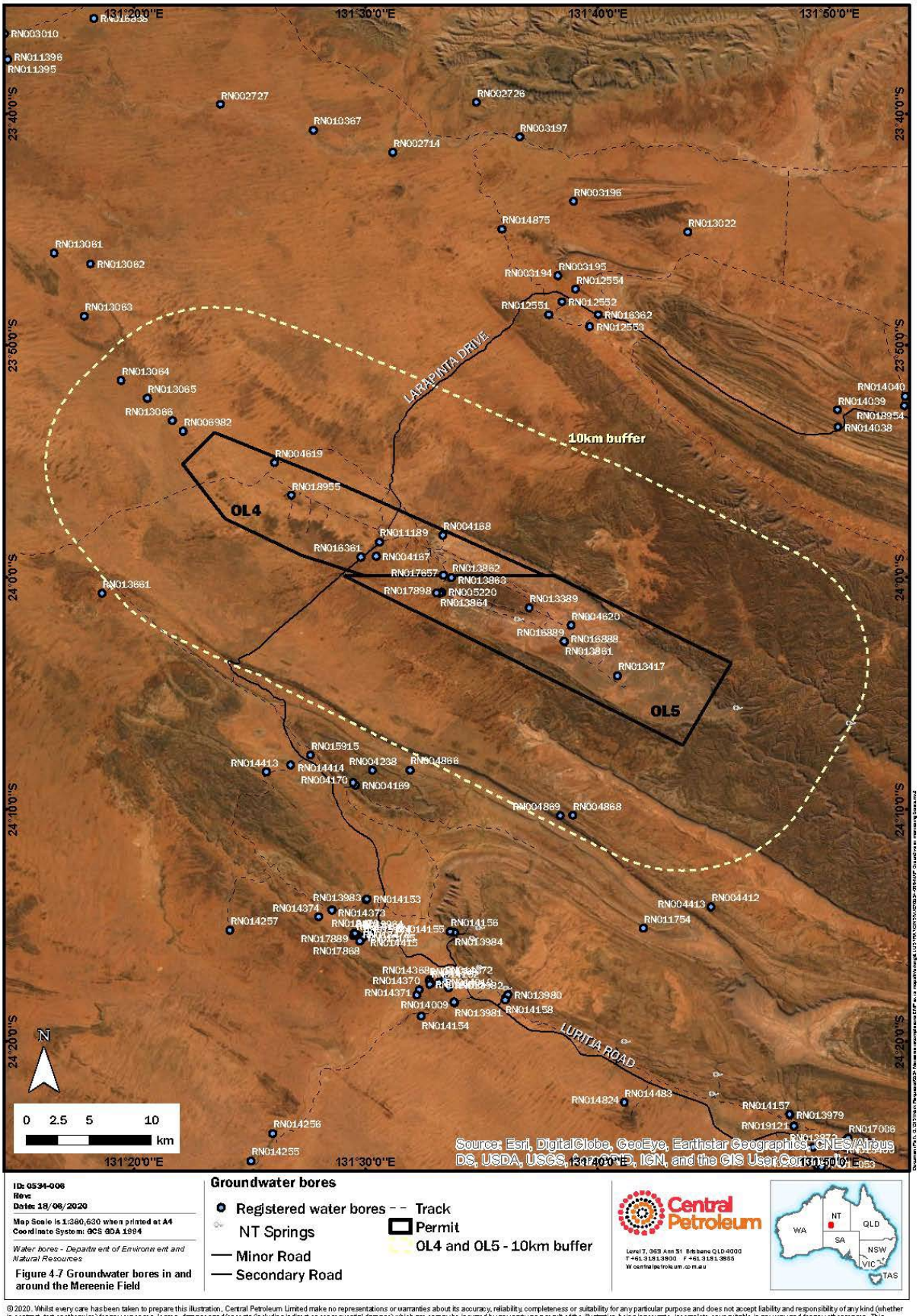


Figure 4-7 Groundwater bores in and around the Mereenie Field

4.1.4 Wetlands, springs and aquatic inflow dependent ecosystems

Two springs are recorded on the DEPWS Springs data in the general vicinity of Mereenie (NR Maps, 2022). The springs are located on OL5 on the south-eastern and north-eastern margin of Mereenie and are positioned on drainage lines that feed into Parke Creek.

DEPWS Springs data identifies the springs as discharge features from the Hermannsburg Sandstone, however, the surface geology and structure suggest they are more likely associated with the Parke Siltstone, as the Hermannsburg Sandstone has been eroded and is not present at their mapped locations. As Mereenie groundwater extraction bores access the Mereenie Sandstone and the closest groundwater bore is approximately 2km or more from Parke Creek, groundwater extraction for activities across the Mereenie Field is not likely to impact on the identified springs.

An assessment of satellite derived datasets –The National Atlas of Groundwater Dependent Ecosystems (GDE) and Geoscience Australia Water Observations from Space (WOFS) – was undertaken to assess regional potential for springs and groundwater dependent receptors. The GDE atlas maps Parke Creek, which runs to the north-east of the Mereenie Field, as having a low potential to support aquatic GDEs. The Geoscience Australia Water Observations from Space (WoFS) product displays the percentage of observations in which surface water was detected and is derived from satellite imagery from 1987 to the present day (GA, 2019).

The WOFS provides an indication of surface water presence, with permanence an indication of groundwater discharge. The only permanent water in the vicinity of the site is associated with water storages/dams used for the operation of the field. All other surface water is ephemeral and is present in a low percentage of images (< 20%).

Due to depth to water in the Mereenie Sandstone in Mereenie there is limited potential for surface water-groundwater interaction and GDEs.

Mereenie is not located within a Northern Territory Government groundwater management area and does not contain any Nationally Important Wetlands or Key Ecological Features (Marine) according to the EPBC Protected Matters Search Report (PMST) (Appendix 3).

4.1.5 Surface water

The surface water hydrology of the Mereenie Field is defined by the ephemeral streams within two regional catchments of OL4 and OL5:

- The majority of OL4 (West Mereenie) is located within the Victoria River – Wiso regional catchment and is devoid of defined drainage lines (Figure 4-8). OL4 is predominantly desert dunefields and sand plains, located in the Great Sandy Desert Bioregion. Water falling in the OL4 area is quickly infiltrated, although some ponding may occur in interdunal swales where small areas of clayey soils and red earths may be present.
- The OL5 area is located within the Diamantina – Georgina Rivers regional catchment and has a dendritic drainage pattern. The series of streams which cover the immediate area eventually drain into Parke Creek, a major drainage line located in OL5 draining to the south-east of the field (Figure 4-9). All creeks in OL5 are ephemeral and responsive to rainfall due to the sandstone strike ridges and intervening of the MacDonnell Ranges Bioregion.

There are a number of well located within approximately 50m to 150m of a creek/drainage line in OL5 (EM11, EM12, EM13, EM14, EM15, EM18, EM19, EM21, EM23, EM26, EM28, EM31, EM36, EM43, EM44, EM45) (refer environmental sensitivity maps, Appendix 4). In addition, there are roads, access tracks and flowlines that intersect with these ephemeral watercourses within this eastern field. The ESS is also located within the eastern field, adjacent to the ephemeral drainage line leading into Parke Creek.

There are no surface water extraction licences within the immediate surrounding area of Mereenie.

MASP and Brewer Estate Oil Yard

The MASP traverses a range of hydrological features from sand dunes, streams, drainage depressions and major ephemeral systems including the Finke River, Ellery Creek and the Hugh River. The MASP is located predominantly sub-surface and interaction with surface hydrology is limited to watercourse crossings where flooding and erosion have the potential to expose the pipeline in significant flooding events. Brewer Estate Oil Yard has been highly disturbed previously to accommodate the loading and unloading infrastructure with no defined surface drainage systems.

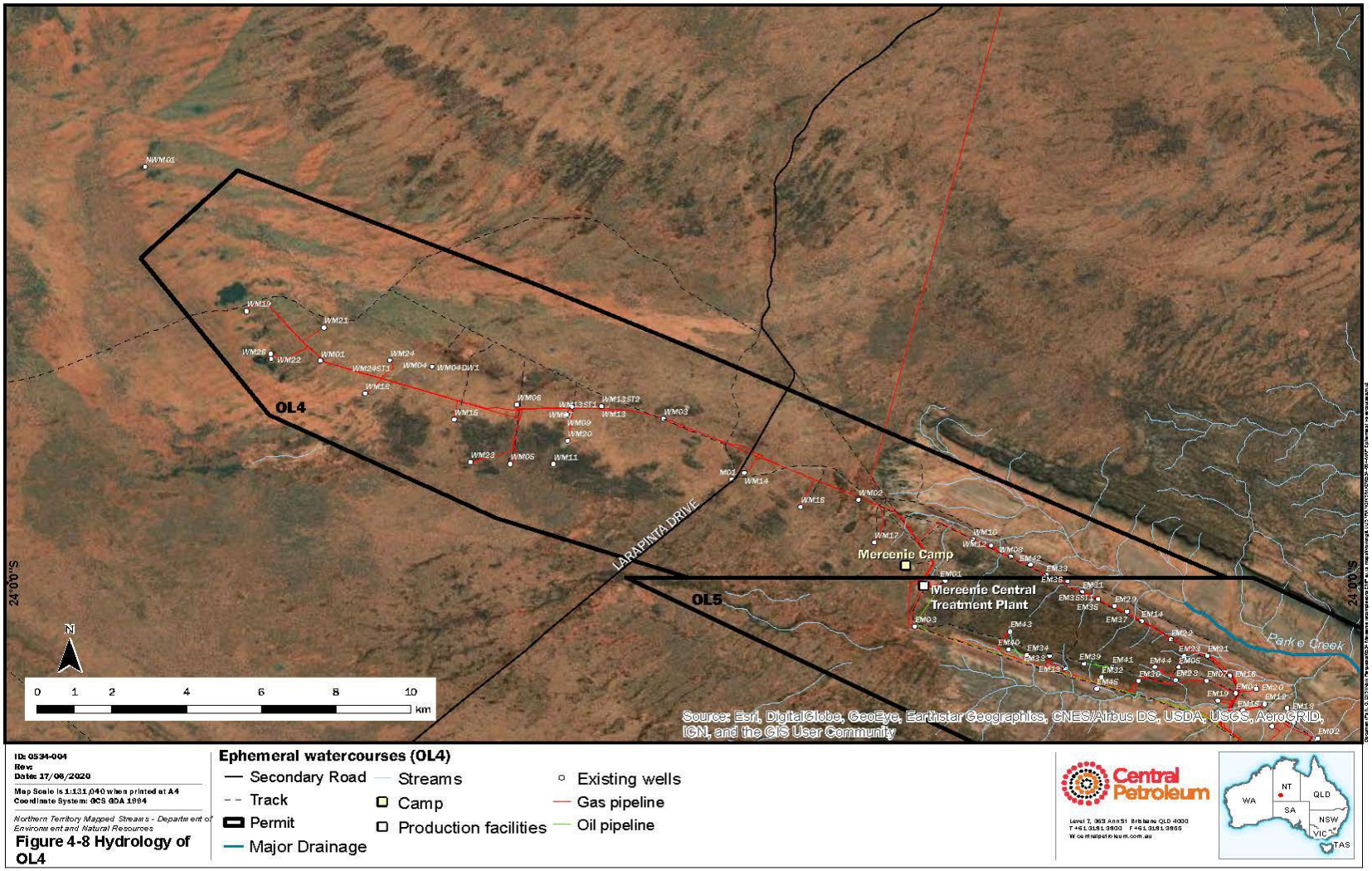


Figure 4-8 Hydrology of OL4

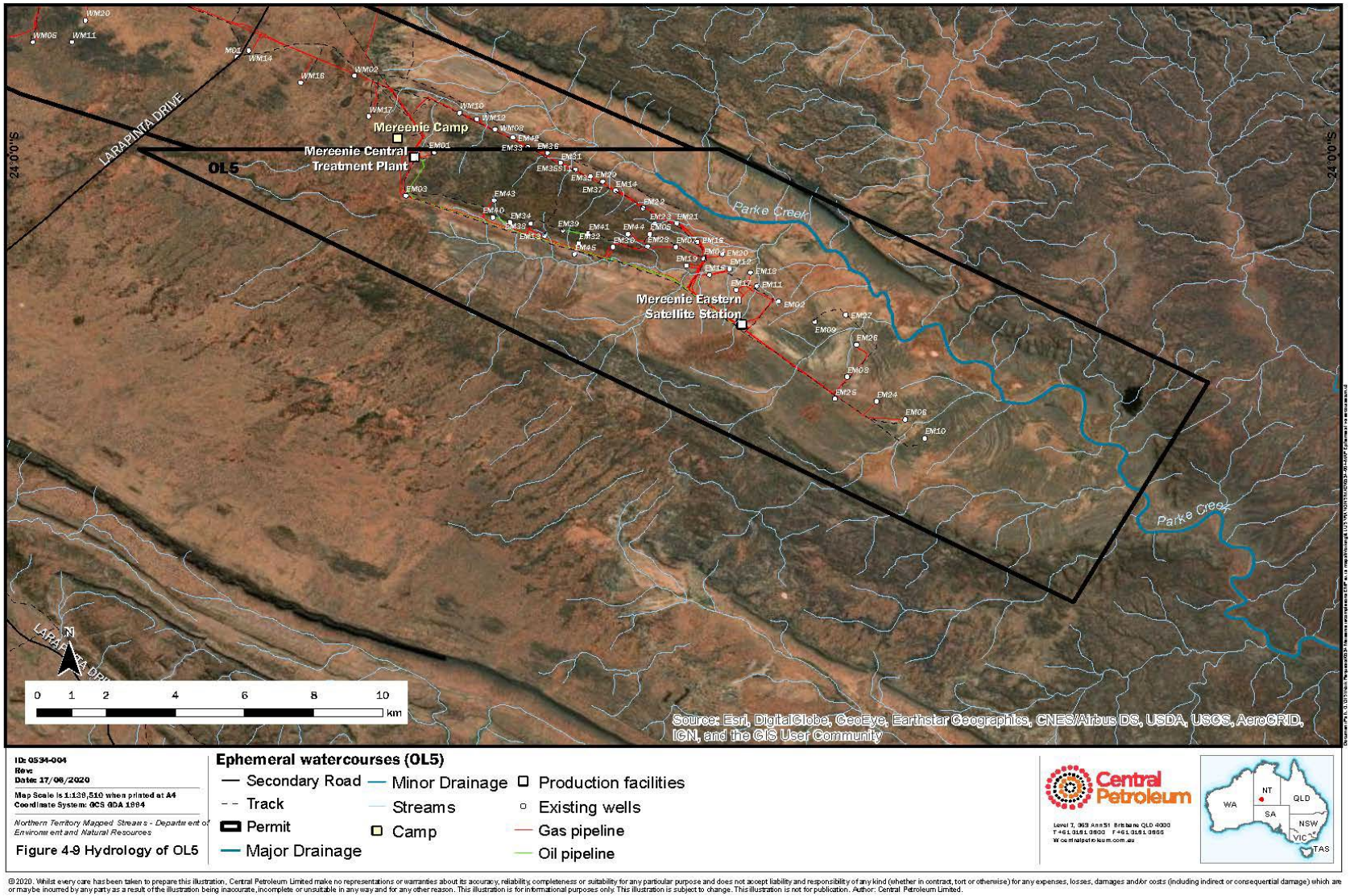


Figure 4-9 Hydrology of OL5

4.1.6 Air and greenhouse gas emissions

The region is pastoral land and nearby national park/conservation areas. Emissions of interest include dust generation, particulate and greenhouse gas emissions. No other industrial land uses contributing to the air environment.

The greenhouse gas emissions of the Mereenie Field are calculated and reported on an annual basis in accordance with the *National Greenhouse and Energy Reporting Act 2007.* In addition, reporting of substance use and emissions from the 93 substances recognised under the NEPM (NPI) is conducted for a limited range of air emissions.

NGER calculations for the FY22 reporting period (July 2021 to June 2022) identified that the activities conducted in the Mereenie Field (including development of the WM27 and WM28 wells) generated 56,743 tCO_2e. This is less than the NT threshold outlined in the large emitters policy.

Flaring from the CTP can present a visible particulate matter emission from the field. Implementation of proposed projects to improve efficiencies at the CTP such as the flare gas compressor installation aim to reduce these amenity and air emission impacts.

The Brewer Estate Oil Yard is located in an industrial area adjacent to gas processing and power station facilities. No greenhouse gas emissions are accounted for at this site, nor for the MASP. Particulate emissions are limited to dust.

4.2 Natural environment

The Mereenie Field required the clearing of vegetation to accommodate the exploration and production programs. Land clearing commenced in the 1960s with the first exploration wells and seismic programs. This clearing has been limited to development areas such as well pads, flowlines, processing areas and support activity areas. Historical records available have indicated that rehabilitation activities have been undertaken across the life of the field, to the standards and best practice at the time of rehabilitation. Assessment of the natural environment is based on available desktop information and is supported by previous field surveys. No new disturbance is proposed beyond existing areas, therefore no additional field surveys have been conducted.

4.2.1 Bioregions

The OL area is in two Interim Biogeographical Regionalisation for Australia (IBRA), split by the OL4 and OL5 boundary. OL5 is located entirely within the MacDonnell Ranges Bioregion, as classified by Baker, *et al*., 2005 and described in Table 4-5. 10-15% of the bioregion is protected within Reserves, none of which occur within the Mereenie Field.

A proportion of OL4 extends into the MacDonnell Ranges bioregion with the remainder located in the Great Sandy Desert IBRA as classified Baker*, et al*., 2005 and described in Table 4-5. The locations of the bioregions relative to Mereenie are shown in Figure 4-10.

Table 4-5 Bioregions of Mereenie Field

Bioregion	Topography	Geology	Soils	Vegetation
Great Sandy Desert	The area is generally flat and arid with few watercourses, although there are several low ranges	Large expanse of horizontally bedded Mereenie Sandstone and associated Cambrian marine sediments – calcareous	Predominantly shallow sands and are influenced by the presence of saline lakes, where mostly saline loams occur	Dominated by hummock grassland with areas of tall- shrubland or low open woodland, Mulga tall open-shrubland and Samphire low open-shrubland fringing salt pans
MacDonnell Ranges	High relief ranges and foothills enclose some broad plains and watercourses	Mostly sedimentary rocks in the Amadeus Basin and crystalline metamorphic rocks in the Arunta Block	Generally skeletal or shallow sands on the rocky hills with earthy sands and deep loamy alluvium on the lowlands	Dominant vegetation spinifex hummock grassland, sparse acacia shrub lands and woodlands along watercourses

4.2.2 Sites of Conservation Significance

Sites of Conservation Significance are areas defined by the Northern Territory government as important sites for biodiversity conservation that need further protecting.

The OL area is not located within a Site of Conservation Significance, but the George Gill Range and surrounds are located approximately 6km to the south and the Greater MacDonnell Ranges are approximately 14km north at their closest points (Figure 4-11).

No impacts on the environmental values of these SOCS are expected given the distance between Mereenie and the SOCS.

4.2.3 Sites of Botanical Significance

A Site of Botanical Significance (SOBS) is an area that has been defined by White *et a*l. (2000) to hold important and/or unique botanical assemblage that requires protection. SOBS are designated as either nationally significant, bioregionally significant, or of undetermined significance. Currently there is no specific legislation attached to SOBS, although protection of the SOBS is administered through other pieces of legislation (e.g., TPWC Act).

The Mereenie Field is located within the Laycock Sandplain SOBS and the Mereenie SOBS (Figure 4-11). Both SOBS are designated as bioregionally significant based on their importance to the evolution of Australian flora, fauna, landscape or climate, geographically and/or ecologically disjunct populations (White *et al*. 2000)

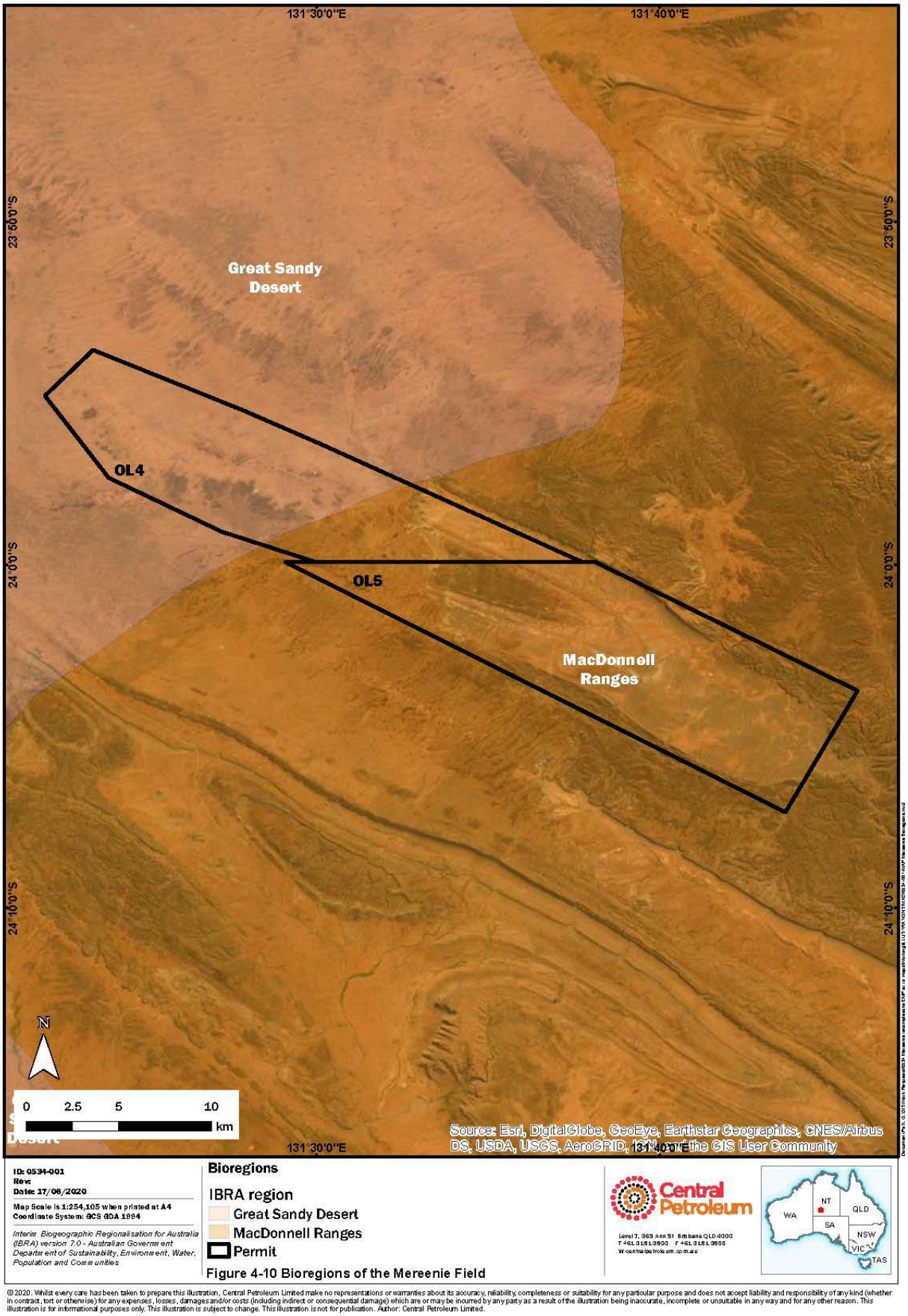


Figure 4-10 Bioregions of the Mereenie Field

Figure 4-10 Bioregions of the Mereenie Field

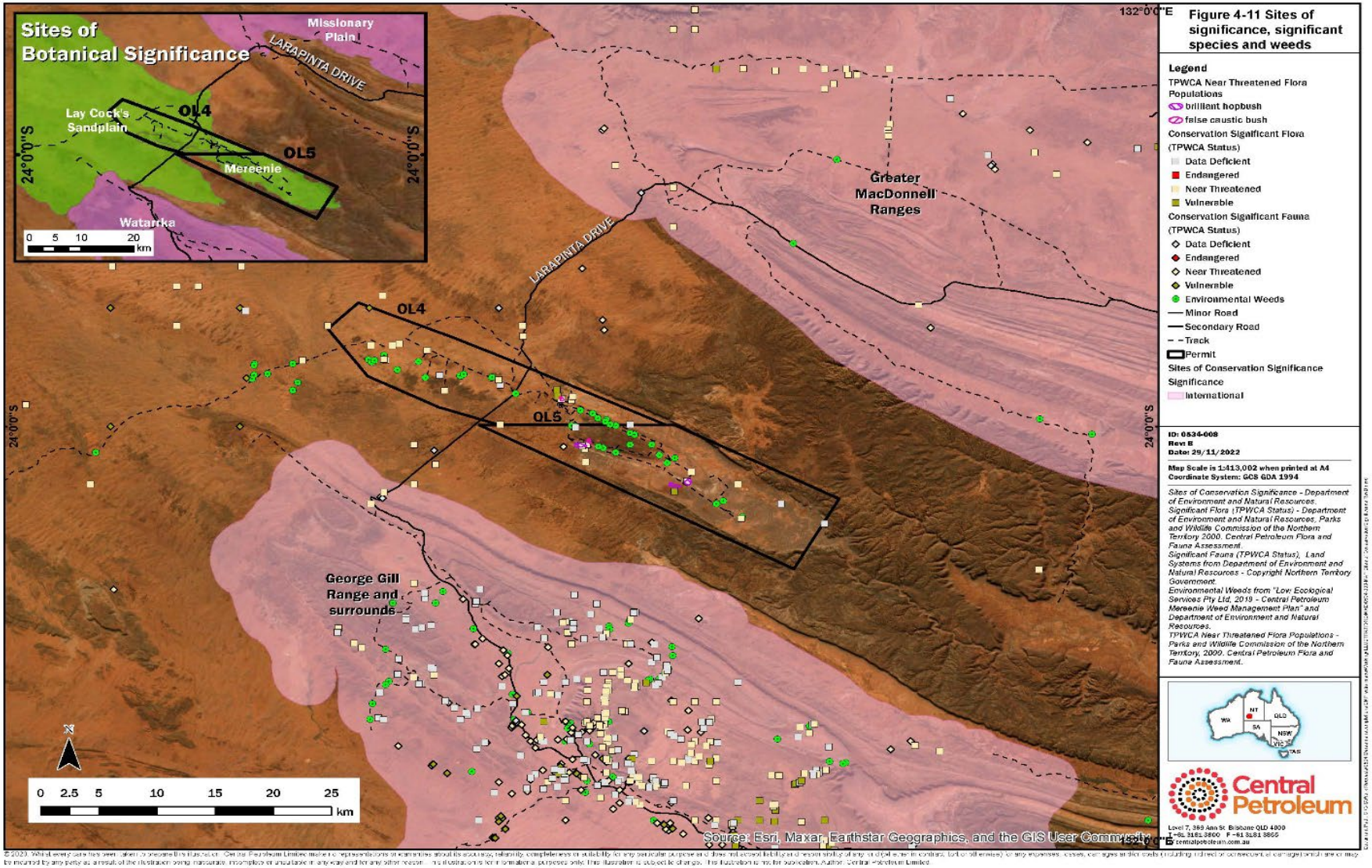


Figure 4-11 Sites of conservation/botanical significance, conservation significant species and weeds

4.2.4 Threatened Ecological Communities

No Threatened Ecological Communities (TEC) have previously been identified within the Mereenie Field across its operating life. A review of the EPBC Protected Matters Search Tool (PMST) Report (Appendix 3) (DCCEEW, 2022) has confirmed no new TECs being listed since the previous EMP was prepared.

4.2.5 Vegetation communities

The vegetation is closely related to the three land systems, outlined in Section 4.1.2, each of which contains characteristic plant associations:

- Simpson land system: distinctive associations characterised by desert oak trees, various myrtaceous and proteaceous shrubs, and grasses including spinifex. Thickets of mulga are common in this land system.
- Krichauff land system: a variable assemblage of plants with relatively few species. Two species of mulga occur among the shrubs.
- Gillen land system: a mosaic of short bunch grass savannah and spinifex steppe with few trees or shrubs; this system also contains extensive bare areas.

The following vegetation communities have been identified within the Mereenie Field:

- *Eucalyptus camaldulensis* (river red gum) – Eucalyptus microtheca (coolabah) fringing woodland
- *Eucalyptus intertexta* (gum coolibah) open woodland/tree savannah
- *Allocasuarina decaisneana* (desert oak) open woodland/tree steppe/tree savannah
- *Acacia estrophiolata* (ironwood) open woodland/tree savannah over various tussock grasses and short grasses
- *Acacia aneura* (mulga) tall open shrubland with short grasses
- *Acacia aneura* – Acacia macdonelliensis tall open shrub land
- *Acacia kempeana* (witchetty bush) tall open shrub land
- *Triodia clelandii* (weeping spinifex) hummock grassland
- *Triodia basedowii* (hard spinifex) hummock grassland/shrub land
- *Zygochloa paradoxa* (sandhill cane grass) hummock grassland/shrub land
- *Eragrostis eriopoda* (woolly butt) tussock grassland
- *Aristida holathera* (kerosene grass) tussock grassland

These vegetation units are widespread and undisturbed in the surrounding area and are not mapped as Critical Habitats according to the EPBC PMST (DCCEEW, 2022). Table 4-6 provides description of vegetation communities as mapped by Wilson *et al.* (1991) and shown in Figure 4-12.

Table 4-6 Description of vegetation units

Broad vegetation class	Fine vegetation class	Fine vegetation class description	Structural formation
Low open woodlands	93	*Triodia basedowii* (hard spinifex) hummock grassland with *Allocasuarina decaisneana* (desert oak) open-woodland overstorey between dunes	L1H3 Mixed species low open wood lands
Sparse shrublands	73	*A. tetragonophylla* (dead finish), *A. kempeana* (witchetty bush) sparse-shrubland with herb/grassland understorey	Z1F3 Shrubs < 3m, 1-9%; Forbs 30-69%
Sparse shrublands	71	*A. aneura* (Mulga) tall sparse-shrubland with grassland understory	S1G3: Shrubs >2m tall less than 9% and tussock grass 30-69%
Tall shrubland	87	*Triodia* (Spinifex) open-hummock grassland with *A. aneura* tall sparse-shrubland over-story	S1H2: Shrubs >2m tall less than 9% and hummock grass 10-29%
Open woodlands	30	*E. gongylocarpa* (Marble Gum) open-woodland with open-hummock grassland understory	M1H2: Trees >10m tall <9% and hummock grass 10-29%

MASP and Brewer Estate Oil Yard

Only one of the species is listed as being near threatened (*TPWC Act*), the grass tree (*Xanthorrhoea thorntonii)* and was found during a site survey along the MASP route during previous surveys. There are a few small, disjunct populations of this species in the western section of the pipeline corridor on either side of Deering Creek. A few plants of the *X. thorntonii* grow at the edge of a seismic line that is now the pipeline route.

Within the Brewer Estate Oil Yard, the vegetation consists of ironwood (*A. estrophiolata*) open woodland and mulga tall open shrub land with a variety of other, smaller acacias, lower shrubs and grasses. The area is interspersed with highly disturbed and cleared areas (e.g. firebreaks) and some retention of vegetation.

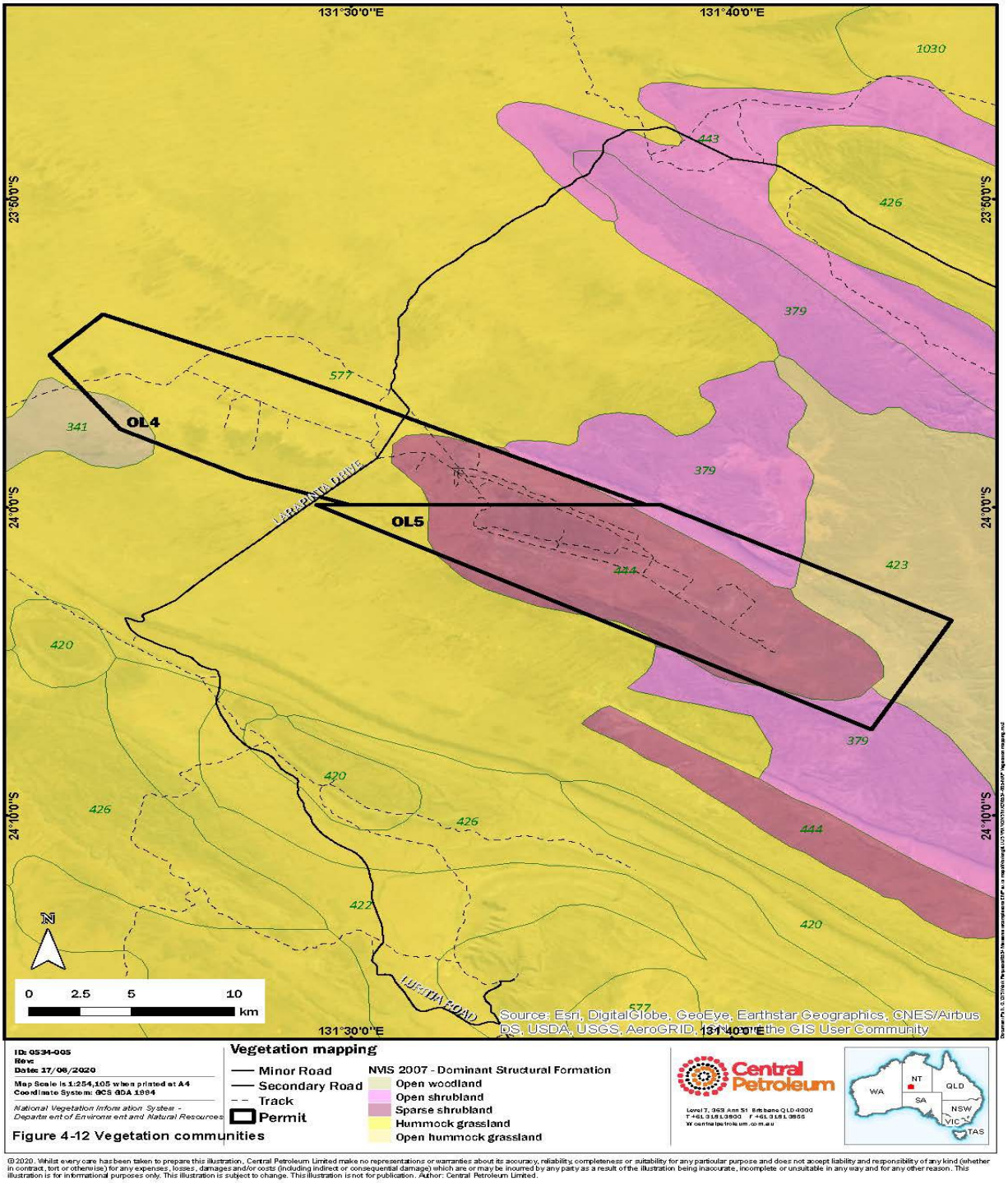


Figure 4-12 Vegetation communities

4.2.6 Conservation significant flora

A flora species is considered in this EMP to be of conservation significance if it is:

- Listed as threatened species[3] under the *TPWC Act* and is either:
  - recorded in the NT Flora Atlas as being within Mereenie or within 25km of the site boundary, or
  - recorded during field surveys of the NRM.
- Listed as threatened species[4] under the *EPBC Act* and is either:
  - identified by a PMST report within Mereenie or within 25km of the site boundary, or
  - recorded during field surveys of Mereenie.

There have been several flora field surveys of Mereenie, including:

- Flora and Fauna Assessment, Stage 2 Field Survey by Parks and Wildlife Commission of the Northern Territory ((PWCNT), 2000):
  - Site-wide survey which assessed flora at 17 survey sites representative of the major habitats within Mereenie. The survey found a total of 461 plant species including 13 conservation significant flora under the *TPWC Act* (none under the *EPBC Act*); one vulnerable species (Santalum acuminatum), two data deficient (DD) species (Acacia nyssophlyllai and Comesperma viscidulum), with the remaining of near threatened status.
  - The study notes that the development at Mereenie is having little impact on the flora of the area and that most habitats that have been affected by the development are relatively robust and well represented in the region.
- Flora and Fauna Assessment by Low Ecological Pty Ltd (2017): Survey conducted at WM25 and WM26 locations (noting that these were exploration wells and WM25 was never drilled). No conservation significant flora was identified in the project area.
- Ecological Assessment by EcOz Pty Ltd (2020): Survey conducted at the locations of WM27 and WM28 (wells developed in 2021). *Laxmannia arida* (NT under the *TPWC Act*) was found during the survey, along with 74 species of Least Concern under the *TPWC Act*.

Based on results of the EPBC PMST, a NT Flora Atlas desktop search and previous flora field surveys, Table 4-7 provides a summary of the conservation significant flora that may be present within MRN. Figure 4-12 Vegetation communities shows the locations of conservation significant flora within and around Mereenie as recorded on the NT Flora Atlas and identified during the 2000 site survey by Parks and Wildlife Commission of the Northern Territory. No conservation significant flora was recorded on or directly adjacent (within 50m) of MRN well pads, although a brilliant hopbush population is located along the access road to EM03 (refer environmental sensitivity maps, Appendix 4).

There are no state or territory recovery plans for any of the conservation significant species identified on-site.

Table 4-7 Conservation significant flora of Mereenie Field

Scientific name	Common name	TPWC status[1]	EPBC status[2]	EPBC presence[3]	Flora Atlas Records	Ecological survey result
Acacia incurvaneura	Mulga	DD	-	-	11	No
Accacia mconochieana	Salt Wattle	DD	-	-	2	No
Acacia nyssophylla	Wattle	DD	-	-	-	Yes
Acacia so. Blue mulga	Wattle	DD	-	-	1	Yes
Amyema miraculosa subsp. Boormanii	Amyema, Fleshy Mistletoe	DD	-	-	5	No

[3] Species classified as extinct in the wild (EW), critically endangered (CE), endangered (E) or vulnerable (Vu), near threatened (NTD) or data deficient (DD) under the TPWC Act

[4] Species classified as extinct, extinct in the wild, critically endangered, endangered, vulnerable and conservation dependent under the EPBC Act.

Scientific name	Common name	TPWC status[1]	EPBC status[2]	EPBC presence[3]	Flora Atlas Records	Ecological survey result
Aristida strigosa	Rough Wiregrass	DD	-	-	6	No
Atriplex vesicaria subs. Calcicola	Bladder Saltbush	DD	-	-	1	No
Austrostipa centralis	Austrostipa	NTD	-	-	1	No
Austrostipa trichophylla	Austrostipa	DD	-	-	2	No
Brachyscome ciliaris	Variable Daisy	DD	-	-	63	No
Bulbostylis pyriformis	Bulbostylis	NTD	-	-	2	No
Calotis cuneifolia	Blue Burr-daisy, Purple Burr-daisy	DD	-	-	1	No
Chthonocephalus pseudevax	Ground-heads	NTD	-	-	1	No
Comesperma viscidulum	Comesperma	DD	-	-	10	Yes
Commicarpus australis	Commicarpus	NTD	-	-	-	Yes
Corynotheca licrota	Club-fruit Lilly	NTD	-	-	1	Yes
Cuphonotus andraeanus	Downy Mother-of-Misery	NTD	-	-	1	No
Dodonaea microzyga var. microzyga	Brilliant Hopbush	NTD	-	-	5	Yes
Dysphania rhadinostachya subsp. Inflata	Dysphania, Rats Tail	DD	-	-	2	Yes
Einadia nutans subsp. Nutans	Einadia	NTD	-	-	1	Yes
Eragrostis sterilis	Lovegrass	NTD	-	-	1	No
Euphorbia sarcostemmoides	False Caustic Bush	NTD	-	-	20	Yes
Glischrocaryon aureum	Yellow Popflower	NTD	-	-	-	Yes
Glischrocaryon aureum var. angustifolium	-	NTD	-	-	5	No
Goodenia occidentalis	Goodenia	NTD	-	-	1	Yes
Grevillea pterosperma	Desert Grevillea	NTD	-	-	11	Yes
Gunniopsis septifraga	Gunniopsis	NTD	-	-	1	No
Hakea grammatophylla	Hakea	NTD	-	-	3	No
Haloragis odontocarpa f. octoforma	-	DD	-	-	12	No
Haloragis odontocarpa f. rugosa	-	DD	-	-	2	No
Histiopteris incisa	Bats Wing Fern, Oak Fern	NTD	-	-	1	No
Hydrocotyle sp. Watarrka	Hydrocotyle	NTD	-	-	1	No

Scientific name	Common name	TPWC status[1]	EPBC status[2]	EPBC presence[3]	Flora Atlas Records	Ecological survey result
Juncus continuus	Juncus	NTD	-	-	9	No
Laxmannia arida	Laxmannia	NTD	-	-	-	Yes
Macrozamia macdonnellii	MacDonnell Ranges Cycad	NTD	VU	Known to occur	10	No
Melaleuca faucicola	Desert Bottlebrush	NTD	-	-	7	No
Ophioglossum lusitanicum	Austral Adders Tongue	NTD	-	-	1	No
Persicaria decipiens	Slender Knotweed	NTD	-	-	1	No
Phyllanthus lacunellus	Lagoon Spurge, Caraweena Clover	DD	-	-	4	No
Santalum acuminatum	Desert Quandong	VU	-	-	9	Yes
Sclerolaena parallelicuspis	Western Copper Burr	NTD	-	-	6	No
Senna artemisioides subsp. Kuyunba	Cassia	DD	-	-	13	No
Stenanthemum petraeum	Stenanthemum	NTD	-	-	11	No
Vittadinia pterochaeta	Rough Fuzzweed	NTD	-	-	-	Yes
Xanthorrhoea thorntonii	Desert Grass Tree	NTD	-	-	1	No

[1] TPWC Status: CR, Critical Endangered; EN, Endangered; VU, Vulnerable; NTD, Near Threatened; DD, Data Deficient as listed under the TPWC Act.

[2] EPBC Status: CR, Critical Endangered; EN, Endangered; VU, Vulnerable as listed under the EPBC Act

[3] Listed on the EPBC PMSR report retrieved for the field and 25km buffer

[4]Number of records on the NT Flora Atlas for the field and 25km buffer

- indicates no record

4.2.7 Conservation significant fauna

A fauna species is considered in this EMP to be of conservation significance if it is:

- Listed as a threatened species under the *EPBC Act* and is either:
  - identified by a PMST report within Mereenie or within 25km of the site boundary, or
  - recorded during an ecological assessment of Mereenie.
- Listed as a threatened spec under the *TPWC Act* and has been either:
  - recorded in the NT Fauna Atlas as being within Mereenie or within 25km of the site boundary
  - recorded during an ecological assessment of MRN.

There have been several fauna field surveys of Mereenie, including:

- Flora and Fauna Assessment, Stage 2 Field Survey by Parks and Wildlife Commission of the Northern Territory (2000):
  - Site-wide survey which assessed fauna at 12 survey sites representative of the major habitats within Mereenie. The survey recorded seven frogs, 15 mammals, 53 reptile species and 96 birds.
  - The only threatened fauna species recorded was the black-footed rock wallaby, classed as NT under the *TPWC Act* and VU under the *EPBC Act*. The extent of the population in Mereenie was not determined as most of the suitable habitat fell within the cultural heritage exclusion zone. The exclusion zone is also noted to be preferred habitat for the Centralian rockrat (*Zyzomys pendunculatus*), long-tailed dunnart (*Sminthopsis longicaudata*) and common brushtail possum (*Trichosurus vulpecula vulpecula*) which were suggested as possibly occurring within Mereenie.
  - Four NT species under the *TPWC Act* as well as two MIG/MAR species were noted as being found at Mereenie during previous surveys.

- The study notes that the development at Mereenie is having little impact on the fauna of the area and that most habitats that have been affected by the development are relatively robust and well represented in the region.

- Mereenie Expansion Fauna Management Report by Resource Environment Strategies (2014):
  - Report from fauna spotter/catchers during installation of new flow lines for Mereenie expansion project. A total of 98 species encountered and relocated including EPBC listed black-footed rock wallaby (vulnerable; NT: near threatened) and TPWC listed crest-tailed mulgara *(Dasycercus cristicauda))* (vulnerable).
- Ecological Assessment by EcOz Pty Ltd (2020):
  - Survey conducted at the proposed locations of WM27 and WM28 (recently developed wells now covered under this EMP). No conservation significant fauna was detected during the survey.

Based on results of the EPBC PMST, a NR Fauna Map search and previous flora fauna surveys, Table 4-8 provides a summary of the conservation significant fauna that may be present in Mereenie. Figure 4-11 shows the locations of conservation significant fauna within and around Mereenie as recorded on the NT Fauna Atlas and identified during the 2000 site survey by Parks and Wildlife Commission of the Northern Territory. No conservation significant fauna was recorded on or directly adjacent (within 50m) of Mereenie well pads (refer environmental sensitivity maps, Appendix 4).

The black-footed rock wallaby is covered by the national "Recovery plan for five species of rock wallabies: Black-footed rock wallaby (Petrogale lateralis), Rothschild rock wallaby (Petrogale rothschildi), Short-eared rock wallaby (Petrogale brachyotis), Monjon (Petrogale burbidgei) and Nabarlek (Petrogale concinna) 2012-2022".

Table 4-8 Conservation significant fauna of Mereenie Field

Scientific name	Common name	TPWC status[1]	EPBC status[2]	EPBC presence[3]	Flora Atlas Records	Ecological survey result
Actitis hypoleucos	Common Sandpiper	-	MIG MAR	May occur	-	No
Amytornis modestus	Thick-billed Grasswren	-	VU	-	1	No
Amytornis modestus modestus	Thick-billed Grasswren (MacDonnell Ranges)	EX	VU	-	1	No
Amytornis striatus	Striated Grasswren	NTD	-	-	6	No
Apus pacificus	Fork-tailed Swift	-	MIG MAR	Likely to occur	-	No
Ardeotis australis	Australian Bustard	NTD	-	-	28	Yes
Ardea alba	Great Egret	-	MIG MAR	Likely to occur	-	No
Ardea ibis	Cattle Egret	-	MIG MAR	May occur	-	No
Burhinus grallarius	Bush Stone-curlew	NTD	-	-	5	No
Calyptorhy nchus banksii samueli	Red-tailed Black-cockatoo (central Australia)	NTD	-	-	76	Yes
Calidris acuminata	Sharp-tailed Sandpiper	-	MIG MAR	May occur	-	Yes
Celidris melanotos	Pectoral Sandpiper	-	MIG MAR	May occur	-	No
Charadrius veredus	Oriental Plover	-	MIG MAR	May occur	-	No
Chrysococc yx osculans	Black-eared Cuckoo	-	MAR	Known to occur	-	No
Calidris ferruginea	Curlew Sandpiper	-	CE	May occur	-	No
Conopophi la	Grey Honeyeater	DD	-	-	6	No

Scientific name	Common name	TPWC status[1]	EPBC status[2]	EPBC presence[3]	Flora Atlas Records	Ecological survey result
whitei						
Croitana aestiva	Desert Sand- skipper	EN	EN	-	-	No
Dasycercus cristicauda	Crest-tailed mulgara	VU	-	-	-	Yes
Dromaius novaeholla ndiae	Emu	NTD	-	-	31	Yes
Erythrotrio rchis radiatus	Red Goshawk	VU	VU	May occur		No
Falco hypoleucos	Grey Falcon	VU	-	-	5	No
Glareola maldivaru m	Oriental Pratincole	-	MIG MAR	May occur		No
Haploscap anes barbarossa	Spectacular Elephant Beetle	DD	-	-	2	No
Lagorchest es conspicillat us	Spectacled Hare-wallaby	NTD	-	-	1	No
Lagorchest es hirsutus	Mala	EW	EN	Likely to occur	2	No
Liopholis kintorei	Great Desert Skink	VU	VU	May occur	2	No
Liopholis slateri slateri	Slater's Skink	EN	EN	May occur		No
Lophoictinia isura	Square-tailed Kite	NTD	-	-	1	No
Macrotis lagotis	Greater Bilby	VU	VU	-	2	No
Motacilla cinerea	Grey Wagtail	-	MIG MAR	May occur		No
Motacilla flava	Yellow Wagtail	-	MIG MAR	May occur		No
Merops ornatus	Rainbow Bee- eater	LC	MIG MAR	May occur	169	Yes
Notoryctes typhlops	Itjaritjari	VU	-	-	6	No
Pseudechis australis	King Brown Snake	NTD	-	-		Yes
Petrogale lateralis	Black-footed Rock-wallaby	NTD	VU	Known to occur	109	Yes
Polytelis alexandrae	Princess Parrot	VU	VU	Known to occur	31	No
Porzana fluminea	Australian Spotted Crake	DD	-	-	1	No
Pseudechis australis	King Brown Snake	NTD	-	-	11	No
Pyrrholaemus brunneus	Redthroat	NTD	-	-	6	No
Pezoporus occidentalis	Night Parrot	CR	EN	May Occur	-	No
Rostratula australis	Australian Painted Snipe	VU	EN	May Occur	-	No
Semotrachia euzyga	-	EN	-	-	2	No
Sinumelon bednalli	Bednall's Land Snail	NTD	-	-	2	No
Tateropa aemula	-	VU		-	9	No

Scientific name	Common name	TPWC status[1]	EPBC status[2]	EPBC presence[3]	Flora Atlas Records	Ecological survey result
Trichosurus vulpecula vulpecula	Common Brushtail Possum (Southern N.T.)	EN	-	-	2	No
Zyzomys pedunculatus	Central Rock- rat	EN	EN	May occur	0	No

1 TPWC Status: CR, Critical Endangered; EN, Endangered; EX, Extinct; VU, Vulnerable; NTD, Near Threatened; DD, Data Deficient; LC, Least Concern as listed under the Territory Parks and Wildlife Conservation Act (TPWC).

2 EPBC Status: CR, Critical Endangered; EN, Endangered; VU, Vulnerable; MIG, Migratory; MAR, Marine; as listed under the Environmental Protection and Biodiversity Act (EPBC).

3 Listed on the EPBC PMSR report retrieved for the area for the MRN and 25km buffer

4Number of records on the NT Flora Atlas for the MRN and 25km buffer

- indicates no record

4.2.8 Introduced flora (weeds)

Weeds are an ongoing threatening process to the natural environment and operations at the Mereenie Field. Weeds managed under this EMP can be categorised via the following:

- Weeds of National Significance (WoNS) – nationally agreed priority flora species for control and management. Weed species are determined based on rankings for invasiveness, potential to spread, and impact on socio-economic and environmental assets.
- Declared Weeds – species which have been identified for control, eradication, or prevention of entry in all or part of the Northern Territory under the *Weeds Management Act 2001*. Declared weeds can be of the following classes:
  - Class A – to be eradicated
  - Class B – growth and spread to be controlled
  - Class C – not to be introduced into the Northern Territory
- Priority weeds – species which have been identified as a priority or alert weed species within the Alice Springs Regional Weed Strategy 2021-2026 (DEPWS, 2021) as follows:
  - Category 1 – priority weeds for eradication: Mesquite (Prosopis spp.), Rope Cactus (Cylindropuntia spp) and Prickly pears (Opuntia spp.)
  - Category 2 – priority weeds for strategic control: Athel pine (Tamarix aphylla), Parkinsonia (Parkinsonia *aculeata),* Rubber bush (*Calotropis procera),* and Buffel Grass (*Cenchrus cillaris*)

No declared weeds or WoNS were reported in the EPBC PMST in and around (25km radius) Mereenie, nor have they been identified during annual weed surveys. There were no NT Declared Weeds or Priority or Alert weeds under the *Alice Springs Regional Weed Strategy* identified in the NT Flora Atlas as being in or within 25km buffer of Mereenie.

Site wide weed monitoring occurs on an annual basis under the Mereenie Weed Management Plan (Low Ecological Services Pty Ltd, 2019) as per the Code, and the survey provides the basis for weed control, which aims to occur during periods of active weed growth (i.e. usually after the wet season/large rain events). The most recent survey was conducted in 2021 (2022 survey was not complete for inclusion here) by the dedicated weeds officer for Mereenie (Low Ecological Services, 2020). Environmentally invasive weeds (but not of Declared/listed status) found on-site include Paddy melon (*Citrullus lanatus*), Feathertop rhodes grass (*Chloris virgata*) and Spiked Malvastrum (*Malvastrum americanum*). These environmental weeds were found in disturbed soils such as roadsides, building and around operational infrastructure such as Mereenie camp.

Buffel grass

The previous surveys have confirmed the presence of Buffel grass throughout the Mereenie Field, which, while not declared under state or federal legislation, is covered by an EPBC Threat Abatement Advice (DoE, 2015) and as Category 2 Priority Weed under the *Alice Springs Regional Weed Strategy 2021-2026*.

Surveys are conducted on an annual basis at Mereenie to monitor the presence of Buffel grass and other weed species. In addition, the operator has sought the advice of DPEWS Officers in Alice Springs to review the presence of this invasive species across field operations. Advice from officers (pers comm, Chris Brown DEPWS) was that future eradication and control should focus on no new outbreaks in newer developed area

(particularly OL4/western field) whilst conducting limited control of wider areas to direct operational areas where the Buffel grass appears to have naturalised.

Weed mapping

The location of the environmental weeds found during the 2021 survey as well as environmental weeds recorded on the NT Flora Atlas is shown in Figure 4-11. Environmental weeds have been recorded in and around well pads and infrastructure across the eastern (OL5) and western sections (OL4) of the Mereenie Field (refer environmental sensitivity maps, Appendix 4). An ongoing eradication and control program is in place, particularly following rainfall events, when buffel grass and other environmental weeds have a flourish of growth. In addition, discussions are maintained with DEPWS Officers to identify new methods for the treatment and control of buffel grass in the Alice Springs region.

Regular lease inspections are conducted to monitor spread of weeds after rainfall events and to target physical and chemical weed control activities.

MASP and Brewer Estate Oil Yard

Regular weed eradication and control is conducted along the MASP and within the Brewer Estate Oil Yard. As with the Mereenie Field, Buffel grass is prevalent along the MASP and also within Brewer Estate. Regular ROW inspections monitor and control weed and vegetation growth the ensure pipeline standards are maintained.

4.2.9 Introduced fauna (pests)

Introduced pest species are a threatening process to the natural environment and the rehabilitation efforts implemented at the Mereenie Field. In addition, they can cause damage to infrastructure and the safety of personnel. An introduced fauna species is considered in this EMP to be of management concern if it is:

- listed in the NT Fauna Atlas as “Introduced” and has been recorded at or within a 25km buffer of Mereenie or;
- identified as an invasive species/threatening process by under the *EPBC Act*, or;
- has been recorded during ecological surveys of the area.

Based on results of previous EPBC PMST records, a NT Fauna Atlas desktop search and previous fauna surveys (Low Ecological, EcOz) or by Parks and Wildlife Commission of the Northern Territory (2000), Table 4-9 provides an overview of the introduced fauna located at or within 25km of the field.

Table 4-9 Introduced fauna

Common name	Scientific name	Common name	Scientific name
Camel	*Camelus dromedarius*	Fox	*Vulpes*
Cat	*Felis catus*	Horse	*Equus caballus*
Cattle	*Bos taurus*	House Mouse	*Mus musculus*
Donkey	*Equus asinus*	Rabbit	*Oryctolagus cuniculus*
Dog	*Canis lupus familiaris*		

4.2.10 Fire history

The North Australia and Rangelands Fire Information (NAFI, 2022) data base shows that a large part of OL4 was affected by a large-scale fire in 2002 and then again in 2011. Both fire events followed several years of above average rainfall. Since then, there have been no major fire events although a small section of OL5 was affected in 2019. Figure 4-13 shows the fire frequency at Mereenie.

Recent fire activity in September and October 2022 (and not yet recorded on long term mapping, NAFI, 2022) has occurred in areas to the north and south of the Mereenie Field. These fires did not cross into the Operating Licence areas but were monitored.

Fire breaks are maintained around infrastructure to assist in the management of fires that may occur within the Mereenie Field. In addition, vegetation is managed around wells, flowlines and processing plants to reduce fuel loads should fire occur in the Mereenie Field.

The MASP ROW is maintained to ensure no large vegetation provides a fuel load for bushfires. The MASP ROW is cleared and acts as a firebreak. No bushfires have been recorded at the Brewer Estate Oil Yard. Extensive fire breaks are maintained along the fence line boundary of the yard.

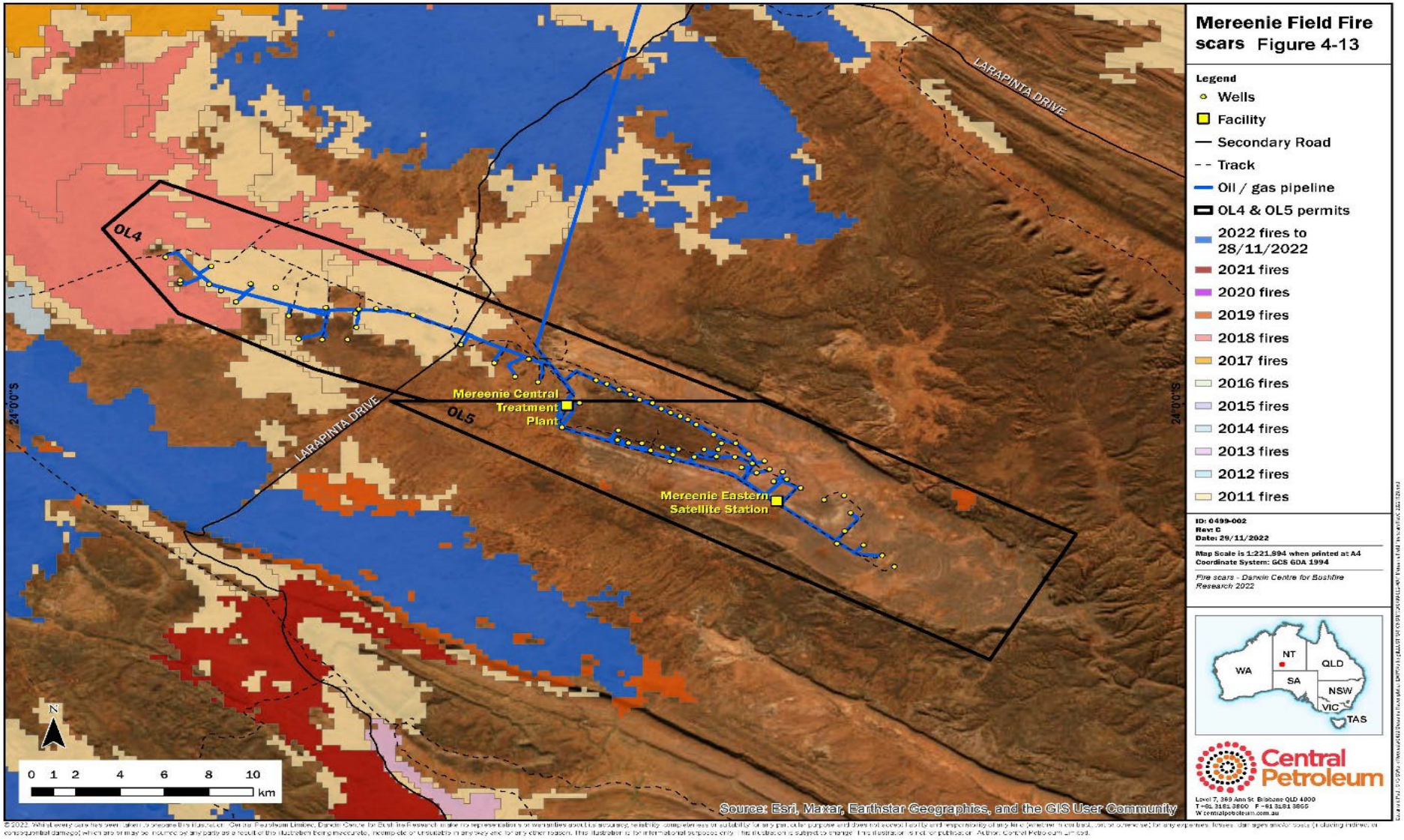


Figure 4-13 Mereenie fire history

4.3 Socio-economic Environment

4.3.1 Land tenure and use

Land on which Mereenie operates is Aboriginal freehold land belonging to the Haasts Bluff Aboriginal Land Trust. Undertakings have been given in the Mereenie Land Use Agreement to maintain the right of the Traditional Owners to move freely throughout Mereenie and use non-operational land within Mereenie for pastoral grazing activities and conservation purposes.

There are a number of national parks and reserves in the wider Alice Springs/Central Australia region including Finke Gorge National Park, Owen Springs Reserve, Watarrka National Park and the West MacDonnell National Park (Figure 4-14). Mereenie is not within or directly adjacent to any Indigenous Protected Areas which form part of the Australian Reserve System (Figure 4-14) Tourism is notable in the surrounding areas however, Mereenie operations do not directly overlap with tourist areas.

Mereenie is not within any NT petroleum reserved blocks, which are areas designated free of petroleum exploration.

MASP and Brewer Estate Oil Yard

The MASP route passes through the Haasts Bluff Aboriginal Land Trust, the Hermannsburg Special Purpose Lease (which has been divided into five Land Trusts), through the Owen Springs Reserve, and into Brewer Estate Crude Oil Terminal. The pastoral grazing activities (cattle and horses) on the MASP are managed by Aboriginal interests and undertaken by outstation communities.

Land use along the MASP is predominantly pastoral. Since the original approval of the MASP in the mid-1980s, an area of the alignment is now within the Owen Springs Reserve (acquired by NT Government in 2000).

The Brewer Estate Oil Yard is located in an industrial zoned area and use of this land is consistent with that zoning.

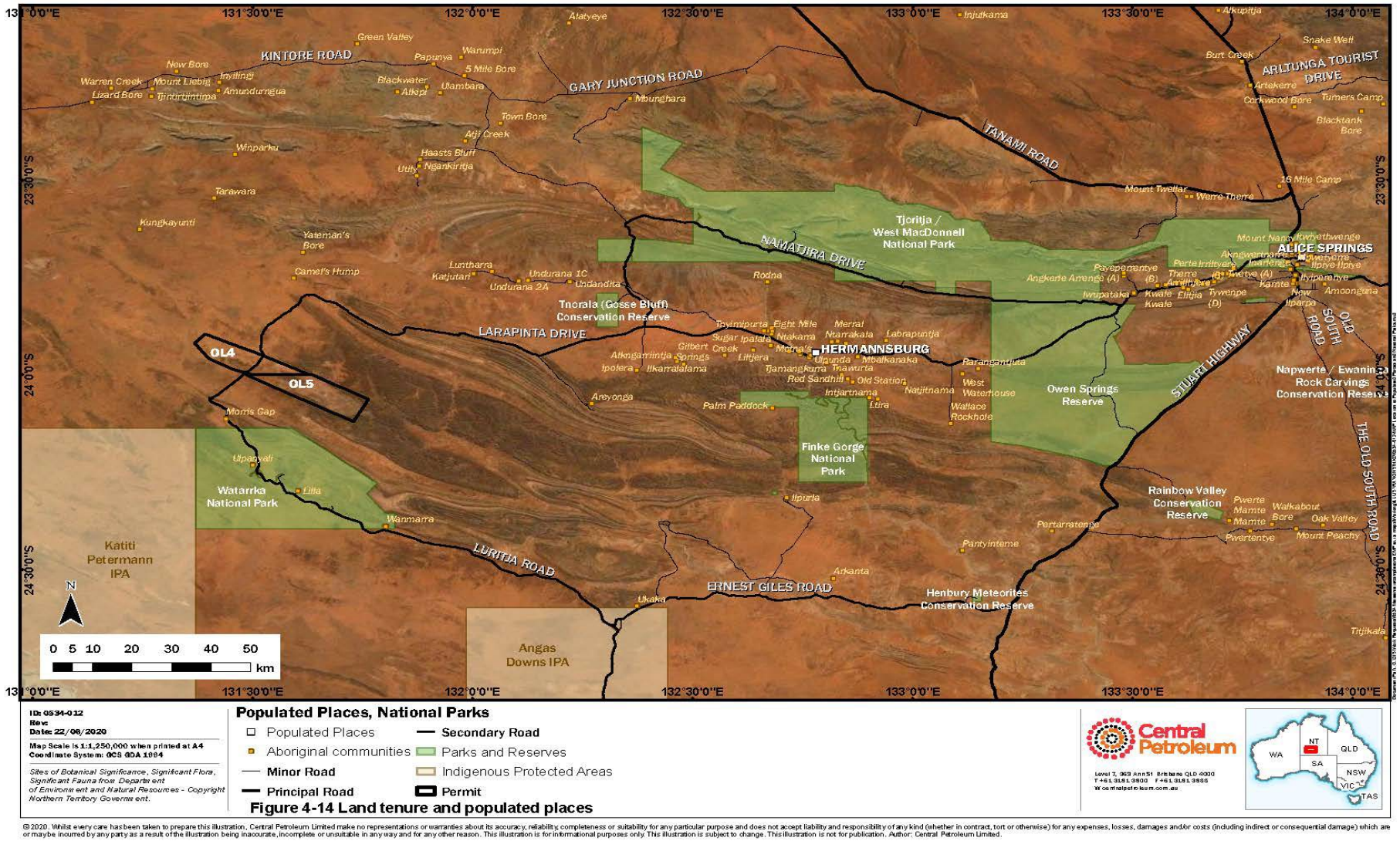


Figure 4-14 Land tenure and populated places

Figure 4-14 National Parks and Reserves

4.3.2 Surrounding populated places

Mereenie is located in a remote and sparsely populated region, though there are several small Aboriginal communities within proximity, or that have strong traditional ties with the surrounding land, including Kulpidjara, Areyonga, Underana, Undandita, Haasts Bluff, Papunya, and Ipolera.

There is also a community of 600-800 people at Hermannsburg, located 110km east of Mereenie. The nearest major centre is Alice Springs, with a population of approximately 26,000, located 250km by road from Mereenie. The locations of the surrounding communities are shown in Figure 4-14.

As part of stakeholder consultation and requirements under the Mereenie Agreement and Central Land Council (CLC) Sacred Sites Clearance Certificate (SSCC), the operator has and will continue to engage with surrounding stakeholders regarding the workover and wellhead equipment, safety systems and gathering line works.

The Mereenie Field has a positive impact on the social and economic values of these communities through increased workforce participation opportunities and development of infrastructure such as water supply and roads/tracks to support Traditional Owners pastoral land use activities.

4.3.3 Noise

As noted in Section 4.3.2 above, Mereenie is located within a sparsely populated region. There are no communities within the area bounded by OL4/OL5 and the nearest sensitive receptor is located approximately 25km from the noise sources located across the field.

Northern Territory Noise Management Framework Guideline 2018 refers to offensive noise that may cause an environmental nuisance. The offensive noise test described in the NT framework is not relevant given the nearest sensitive receptors for noise to the Mereenie Field are at Watarrka (Kings Canyon) National Park, approximately 25km south of the CTP at Mereenie. This is a conservation area with tourist traffic peaking from April to October. No impacts on sensitive receptors are considered likely given the remote and isolated location of the field. Noise sources at the Mereenie Field are centred on the CTP and ESS processing facilities. The operation of compressors and power generation units at these industrial facilities occurs 24-hours/day. In the first instance, these facilities must comply with exposure standards for noise defined in the *Work Health and Safety Regulation 2011* which provide a much stricter threshold for noise sources, thereby mitigating any potential off-site nuisance noise. The facilities have been in operation for 40 years, as such impacts on the natural environment would be minimal as fauna has avoided or adapted. The operator will monitor any complaints regarding noise as part of its stakeholder engagement process.

Given the distance to the nearest receptor and that noise generated within the Operating Licence area does not plausibly exceed “nuisance noise tests”, an assessment described under Section 3.2 of the *Northern Territory Noise Management Framework Guideline 2018* has not been conducted.

4.3.4 Cultural heritage

4.3.4.1 Historic and natural heritage

Mereenie is located within the MacDonnell Shire. An online search of the Northern Territory heritage register showed 18 publicly listed heritage sites in the MacDonnell Shire, none of which are within nor adjacent to Mereenie. No non-public sites were found by the online search.

Advice provided by the Heritage Branch (Ref No.: HCD2022/0038, dated April 11, 2023) indicate that the [redacted]

EPBC PMST for Mereenie and 25km buffer wells did not identify any World Heritage Properties, National Heritage Places, Commonwealth Heritage Places or Places on the Register of National Estate.

4.3.4.2 Aboriginal archaeological assessment

No new areas of disturbance are proposed for consideration with this EMP as no new archaeological assessment has been conducted.

Known Aboriginal areas of value have been identified and are protected under provisions contained in approved sacred sites certificates and the *Heritage Act 2011*. These areas are identified via mapping and where practicable signage across the Mereenie Field, and all personnel and contractors are made aware as part of site inductions.

4.3.5 Sacred Sites

Due to the duplicative nature of sacred site clearances process in the NT, The operator has the follow clearances:

Central Land Council

A current SSCC for operations at Mereenie (SSCC C2013-046, renewed April 2022). All regulated activities in this plan are covered under this clearance. All activities are to be conducted within SSCC assessed areas and in accordance with the SSCC conditions.

Aboriginal Areas Protection Authority

A new AAPA Authority Certificate for the works described in this EMP has been applied for. The operator commits to complying with the requirement of the Authority once approved.

5 Engagement and Consultation

5.1 Stakeholder engagement

The operator is committed to proactively engaging with a range of stakeholders and other interested parties. We aim to establish and maintain enduring and mutually beneficial relationships with the communities of which we operate; ensuring that our activities generate positive economic and social benefits for and in partnership with these communities.

The stakeholders in relation to this EMP are the Indigenous Traditional Owners represented by the CLC as per the Mereenie Agreement 2003. All of the EMP activities are defined as ongoing production enhancement activities and included under the existing CLC agreements.

No consultation with the Commonwealth Government was required as it has been determined that the works are unlikely to cause a significant impact on MNES. Therefore, the *EPBC Act* will not be triggered.

A record of all engagements undertaken with stakeholders is captured in a stakeholder engagement register (outlined in 0).

5.1.1 Traditional Owner(s) engagement

The operator undertakes regular consultation with Traditional Owners primarily through annual community liaison meetings. As outlined in the Mereenie agreement, these liaison committee meetings will take place annually into the future. At these meetings the operator provides an overview of its ongoing production operations, anticipated field workover programs and other development activities. At these meetings we discuss:

- The activities to be undertaken on country and proposed locations.
- The understanding of the nature and purpose of activities, which is to be executed by the CLC in accordance with the *Land Rights Act.*
- The planned Aboriginal sacred site surveys to be completed as part of this EMP and future planning.
- Planning and execution of on country meetings to discuss the exploration and drilling program also occurring and complete the Sacred Site Clearance and avoidance surveys of land with the CLC.

5.2 Assessment of merit of stakeholder objection or claim

The process that the operator will undertake in assessing any stakeholder objection/claim that it receives includes:

- All stakeholder objections/claims are to be provided to the Chief Operating Officer (COO) who will appoint a person to confirm that the objection/claim relates to the activities under this EMP.
- The COO to notify the stakeholder:
  - If the objection/claim is not related to the operator and that no additional action is required; or
  - If the results confirm that the objection/claim is related to the operator an investigation will commence.
- In relation to the investigation:
  - The COO will appoint a person to investigate the objection/claim
  - The appointed person is to investigate and provide a written report of their findings to the COO
  - Once the report is accepted, a discussion with the stakeholder will take place to communicate the outcomes of the investigation including any actions that the operator has/will undertake to address the objection/claim – if required. Following the discussion, a written response will be provided.

5.3 Details of changes due to engagement

Any proposed changes in operations, policy or procedures because of stakeholder consultation or other engagement will be considered by operational Management. If any changes for merit are deemed necessary, these changes will follow the approved the operator's management of change process and captured in a register.

6 Environmental Impacts, Risks and Mitigation

6.1 Approach

6.1.1 Risk assessment methodology

The operator's risk management approach is aligned with all material aspects of ISO 31000 and all environmental risks associated with operations have been:

- Identified, analysed and evaluated including the assessment of critical controls and their effectiveness (Table 6-1)
- Recorded in a risk register
- Treated in a manner commensurate with the level of risk
- Communicated to key stakeholders
- Monitored and reviewed in a manner commensurate with the level of risk.

Assessment of risk is completed using the operator's Risk Matrix (section 6.1.5) to assess and rate risks by assessing the combination of likelihood of occurrence and the severity of the impact/outcome of an event. This allows quantification of the risk and determination can then be made about whether the risk is ALARP and acceptable or whether further mitigation is required.

Table 6-1 Control effectiveness

Assessment	Description
Effective	Controls are well designed and are operating effectively, and management monitoring and review of controls are established.
Satisfactory	Controls are reasonably well designed, and most aspects are operating effectively with some minor areas for improvement.
Needs Attention	Certain control/s are not well designed and/or are systematically not operating effectively.
Ineffective	Significant gaps in the design and operation of controls. No confidence that any degree of control is being achieved.

6.1.2 ALARP and acceptability

As part of the operator's risk assessment process, each risk is mitigated to ALARP. The operator considerers risks having been reduced to ALARP when all reasonably practicable control measures have been identified and implemented. ALARP involves making a judgement about whether all reasonably practicable measures are in place to control a potential risk or impact considering the level of consequence and cost, time and resources involved to mitigate it.

To determine whether potential environmental risks and inputs are 'acceptable' is a matter of judgement that depends on issues such as the nature and scale of impacts and the social or economic benefits. The operator's risk tolerance/acceptance process (Table 6-2) is utilised to determine whether to accept the assessed residual risk or implement improvement actions.

Table 6-2 Risk Acceptance/Action Criteria

	Low	Medium	High	Very High
Risk owner/ acceptance	Activity owner	Direct reports to Managers	Managers	CEO/ExCo
Improvement actions identified	Within a reasonable timeframe	3 months	1 month	As soon as practicable

In addition to the requirements detailed above, for the purposes of petroleum activities, impacts and risk to the environment are considered broadly acceptable if:

- The residual risk is determined to be 'Low' the controls are determined to be effective, and the scientific uncertainty score is A (low) or
- The residual risk is determined to be either 'High' or 'Medium', the controls are determined to be effective, and the scientific uncertainty score is A (low) as well as ALARP being demonstrated through:
  - Alignment with legislative requirements, regulator guidance, stakeholder expectations
  - Adoption of regional strategies and plans
  - Not compromising ESD Principles, and

- Limiting the nature and scale of the effect on the environment.

6.1.3 Uncertainty

To enable an accurate assessment of the potential impact and risk of the activities, the risk assessment process considers scientific uncertainty regarding the information available to assess the risk. Uncertainty is high where confidence in the available information is low in identifying risk or the effectiveness of a management control. Additional baseline studies or other safeguards may be required to increase the accuracy of an assessment to determine the acceptability of a risk.

Scientific uncertainty is qualitatively assessed using a generic means of ranking the data available in accordance with the criteria assigned in Table 6-3. Considerations of scientific uncertainty have been included in the risk assessment.

Table 6-3 Scientific uncertainty scoring

Category	Description	Decision Making Tools
A (low)	Control/mitigation measures are well understood and established within the industry to ensure the risk is effectively controlled Information available to assess the risk is current	Legislation, codes and standards exist to regulate the activity Good industry practice includes additional controls beyond legislation, codes and standards
B (moderate)	Control/mitigation measures exist and have been demonstrated as effective in other industries Information used to assess the risk is still valid but is either starting to date or there are information gaps	Risk based assessment tools are available for use (e.g. modelling, quantitative risk assessment, cost benefit analysis etc)
C (high)	Scarce or no data available to support the assessment of the risk	No guidance material available. The precautionary approach to management of the risk is required.

6.1.4 Risk assessment summary

The outcomes of the environmental risk assessment are presented in Appendix 1. Table 0-3 provides a summary of the residual risks for activities under the environmental management plan. All risks are considered by the operator to be as low as reasonably practicable and are accepted.

Table 6-4 Risk assessment summary

	Residual Risk			
	Low	Medium	High	Very High
Count	35	5	0	0

The ‘Medium’ residual risks for activities under this environment management plan are:

- Injury or death of conservation significant fauna from civil works, vehicle movements and earthworks
- Increased occurrence of weeds (including weeds of national significance)
- Contamination of soil from release of hydrocarbons and formation water, including wastewater to ground
- Loss of places or items of cultural significance from fire as a result of activities under this EMP

Subsurface loss of contaminants during workovers contaminating surface water and/or groundwater and reducing groundwater pressure

6.1.5 Environmental management strategy

Based on the results of the risk assessments conducted and the identification of critical controls as detailed in Appendix 1. The operator has categorised the environmental outcomes and developed performance standards and measurement criteria aligned with the identified critical controls. The environmental outcomes, performance standards and measurement criteria are outlined in Sections 6.2 to 6.10.

6.1.6 Risk Matrix

Impact Type / Impact Level	Health and Safety	Environment	Community	Legal	Reputation	Financial AUD$	Remote	Unlikely	Possible	Likely	Frequent
							Conceivable, but only in extreme circumstances	Event is unlikely to occur during the life-span of a project	Event may occur during the life-span of a project	Event likely to occur during the life-span of a project	Recurring event during the life-span of a project
							<1% chance of occurring within the next year.	>1% chance of occurring within the next year	>10% chance of occurring within the next year	>30% chance of occurring within the next year	>60% chance of occurring within the next year
Extreme	5 or more fatalities or life-threatening injury / illness or total permanent disability.	Extensive permanent impact on / off site or damage to critically endangered species, habitats, ecosystems.	Extensive irreversible impacts to the community or social wellbeing. Long term social unrest. Permanent damage to area/s of cultural significance.	Charges against any director or senior executive involving jail, substantial fine or loss of right to manage the company. Public inquiry – requiring considerable resources and senior executive time. Loss of an asset or loss of licence to operate an asset. Permanent non-voluntary suspension of trading CTP securities on the ASX.	Multiple stakeholder groups confirming coordinated action, as reflected in media channels with significant reach and influence. Negative international or prolonged national media (e.g. 2 weeks).	Loss of value in excess of $20m Cashflow impact in excess of $5m	High	Very High	Very High	Very High	Very High
Critical	1-4 fatalities or life-threatening injury / illness or total permanent or partial disability.	Extensive long term partially reversible impact on / off site or damage to endangered species, habitats, ecosystems.	Extensive reversible impacts to the community or social wellbeing. Prolonged community outrage. Extensive long term partially reversible damage to area/s of cultural significance.	Charges against any director, senior executive or senior manager involving fines, jail or the loss of right to manage the company. Prolonged major litigation – exposure to significant damages, fines or costs. Suspension or restrictions to the benefit of an asset or operate an asset. Prolonged non-voluntary suspension of trading CTP securities on the ASX.	Multiple stakeholder groups mobilising and encouraging other to act, as reflected in media channels with significant reach and influence. Negative media national for 2 days or more.	Loss of value >$10m to $20m Cashflow impact >$1m to $5m	High	High	High	Very High	Very High
Serious	Injury or illness resulting in partial disability, lost time or alternative / restricted duties.	Long term reversible impacts on / off site or to vulnerable or near threatened species, habitats, ecosystems.	Impacts to the community or social wellbeing. High levels of community tension. Long / medium term partially reversible damage to area/s of cultural significance.	Charges against any employee (not described above). Non-compliance with conditions of licence to own or operate an asset or to conduct an activity. Litigation - exposure to damages, fines or costs. Short-term non-voluntary suspension of trading CTP securities on the ASX.	More than one stakeholder group's opinion or view influencing other stakeholders, reported through media channels with some reach and influence. Negative national / state media for 1 day.	Loss of value >$2.5m to $10m Cashflow impact >$500k to $1m	Medium	Medium	High	High	High
Moderate	Injury or illness to 1 or more people resulting in medical treatment.	Medium / short-term impact on / off site or to low risk / least concern / common regional species, habitats, ecosystems.	Small scale impacts to the community or social wellbeing. Isolated examples of community tension. Moderate short-term impact to areas of cultural significance.	Moderate non-compliance with external mandatory obligations or breach of contractual or other legal obligations (not described above). Litigation possible. Non-compliance with internal controls with a moderate impact	A single stakeholder group drawing attention to an incident, issue, or approach conveyed through local media channels.	Loss of value >$500k to $2.5m Cashflow impact >$250k to $500k	Low	Medium	Medium	Medium	Medium
Minor	Injury or illness requiring first aid to 1 or more people, or no treatment recorded.	Minor near source impact on / off site – readily dealt with.	Minor community impact / short-term impact to areas of cultural significance – readily dealt with.	Minor non-compliance with external mandatory obligations or breach of contractual or other legal obligations. Non-compliance with internal controls with a minor impact.	A person or organisation within a stakeholder group signalling an interest in an incident, event or approach, using channels with limited reach or influence. Public concern restricted to local complaints.	Loss of value >$250 to $500K Cashflow impact >$50 to $250k	Low	Low	Low	Medium	Medium

6.2 Biodiversity

<table>
<tr><th colspan="6">Environmental performance measures: Biodiversity</th></tr>
<tr><td>Activities</td><td colspan="5">▪ Civil and project activities – earthworks, land and vegetation management
▪ Well operations – surface infrastructure
▪ Production facilities – gathering and boosting, oil and gas processing,
▪ Well workover – fluid systems
▪ Rehabilitation
▪ Support activities – chemical storage, workover fluids, waste and wastewater management</td></tr>
<tr><td>Residual risk</td><td>Medium</td><td>Code of Practice</td><td>A.3.1; A.3.5; A.3.6; A.3.7, A.3.9</td><td>Uncertainty</td><td>A (Low)</td></tr>
<tr><td rowspan="2">Risk</td><td colspan="3">Consequences</td><td colspan="2">Critical controls</td></tr>
<tr><td colspan="3">▪ Loss of vegetation / fauna habitat values from:
- loss of containment, including spills and leaks, of hydrocarbons, chemicals, workover fluids, wastewater, including in wet weather
- storage, handling, use and disposal of fuels, oils and chemicals
- uncontrolled fires from an ignition source
- movement of vehicles and heavy machinery outside of disturbance areas
- spread of weed species
▪ Encouragement of native and pest fauna from poor waste handling and storage
▪ Loss of fauna habitat from lack/failure of rehabilitation
▪ Loss of fauna from:
- vehicle movements and human interaction
- injury or death from access to ponds, pits, sumps or trenches or similar</td><td colspan="2">▪ Weed Management Plan
▪ Progressive Rehabilitation and Closure Plan
▪ Fire Management Plan
▪ Wastewater Management Plan
▪ Spill Management Plan
▪ Erosion and Sediment Control Plan</td></tr>
<tr><td>ALARP And Acceptability</td><td colspan="5">The residual risk remains medium based on moderate impacts of loss of conservation significant fauna. The operator considers that the risk has been reduced to APLARP and acceptable based on the following:
▪ Vehicle movements are a necessary part of operations controls are aligned with industry practice and consistent with ESD principles to co-exist without any long-term impacts to the local environment.
▪ No WoNS or declared weeds in Mereenie so risk of weed spread between well sites minimised. Best practice weed management in place and the operator seeks to achieve the requirements of key legislation and strategies as outlined in Section 2.</td></tr>
<tr><td>Environmental outcome</td><td>Environmental performance standard</td><td colspan="3">Measurement criteria</td><td>Records</td></tr>
<tr><td>No significant impact to threatened fauna,</td><td>No unauthorised clearing of vegetation or loss of</td><td colspan="3">▪ Area of known threatened fauna will be sign posted to avoid impacts to threatened fauna or their habitat</td><td>▪ Incident Records
▪ Environmental Sensitivity Maps</td></tr>
</table>

Environmental performance measures: Biodiversity			
their habitat and sites of conservation significance	fauna habitat	▪ Permit to work specifies area authorised cleared work areas ▪ The incident management system shows no incidents of unauthorised clearing ▪ The incident management system indicates no releases from the re-use, recycling, treatment, handling, storage and evaporation of wastewater	
	No introduction of new or spread of existing Weeds of National Significance, weed listed under NT legislation or locally significant weed species	▪ Annual weed survey ▪ No new WONS, NT listed weed species or locally significant weed species identified ▪ Weed certifications from vehicles, equipment and machinery entering from known weed infestation areas ▪ Weed hygiene training provided within field inductions	▪ Weed survey report ▪ Incident Records ▪ Weed declaration certificates ▪ Induction and register of participants
	Death or injury of conservation significant fauna will be minimised	▪ Inductions present requirements around protection of fauna, flora, their habitat and reporting fauna interactions ▪ No incidents recorded in incident management system of driving off designated roads, access tracks and well pads ▪ No incidents within incident management system involving vehicle related fauna strikes with speeds above 70km/hr	▪ Incident records ▪ Induction and register of participants
	No uncontrolled fires from the operator's activities	▪ The incident management system shows no recorded incidents of uncontrolled fires starting because of the operator's activities	▪ Incident records
	The operator's activities will not encourage pest species	▪ The incident management system shows no records of pest species interactions with waste or inappropriate waste storage and handling that encourages vermin access.	▪ Incident records ▪ Inspection records
Environmental monitoring and reporting		▪ Rehabilitation success monitoring as per Rehabilitation Plan, including visual inspection and photo point monitoring (Annual) ▪ Weed survey (annual) ▪ Lease area monitoring and inspections (fauna interactions/fencing) (various, based on activities) ▪ Fire break monitoring (annual) ▪ Fire fuel load review (annual) ▪ Fire mapping review (annual) ▪ Fauna interactions (as required)	
Corrective actions		▪ Reinstatement of firebreaks ▪ Reinstatement of fencing, fauna matting or escape points for protection of fauna ▪ Reinstatement of disturbed areas ▪ Removal of new weed infestations	

6.3 Land

<table>
<tr><th colspan="6">Environmental management strategy: Land</th></tr>
<tr><td>Activities</td><td colspan="5">▪ Civil and project activities – earthworks, land and vegetation management
▪ Well operations –surface infrastructure
▪ Production facilities – gathering and boosting, oil and gas processing,
▪ Well workover – fluid systems
▪ Wellhead equipment, safety systems and gathering network replacement
▪ Rehabilitation
▪ Support activities – services, chemical storage, workover fluids, waste and wastewater management
▪ Mereenie to Alice Springs Pipeline/Brewer Estate Oil Yard</td></tr>
<tr><td>Residual risk</td><td>Medium</td><td>Code of Practice</td><td>A.3.1, A.3.4, C.7.1, C.7.2</td><td>Uncertainty</td><td>A (Low)</td></tr>
<tr><td rowspan="2">Risk</td><td colspan="3">Consequences</td><td colspan="2">Critical controls</td></tr>
<tr><td colspan="3">▪ Soil/land contamination from:
- loss of containment, including spills and leaks, of hydrocarbons, chemicals, workover fluids, wastewater, including during wet weather
- storage, handling, use of fuels, oils and chemicals
- wastewater handling, storage and treatment/disposal
- waste generation, segregation and disposal
▪ Land disturbance and exposure of soils increasing erosion hazard from movement and use of heavy machinery/earthworks
- wet weather including flooding and high rainfall events resulting in erosion
- Loss of soil viability and productivity from soil stockpiling or compaction
- Failure of rehabilitation</td><td colspan="2">▪ Implementation of asset management system
▪ Spill Management Plan
▪ Wastewater Management Plan
▪ Wet Season Management Plan
▪ Erosion and Sediment Control Plan
▪ Rehabilitation Management Plan
▪ Waste segregation and implementation of waste management hierarchy
▪ Job Hazard Analysis/ Permit to work systems</td></tr>
<tr><td>ALARP and Acceptability</td><td colspan="5">The operator considers that the risks have been reduced to ALARP and no further risk reduction is warranted as:
▪ A strong historical knowledge of the field and the environmental response to land disturbance, erosion and contamination events presents a low level of uncertainty.
▪ Operation of flowlines in accordance with legislative and best practice guides/codes (refer Section 2)
▪ Operation of wastewater storage and disposal as per the Code. The ponds were developed prior to the implementation of the Code, no leak detection is in place but a program of regular inspections as part of the Asset Management System has been successfully implemented.
▪ Secondary containment (when in use) will be inspected weekly, unless being operated through the wet season during which period it will be monitored daily. Operation and maintenance of the gathering network and the MASP in accordance legislative and with best practice industry standards (refer Section 2).</td></tr>
</table>

Environmental management strategy: Land			
Environmental outcome	**Environmental performance standards**	**Measurement criteria**	**Records**
No significant long-term impacts on soil stability, soil quality and land formations from the operator's activities	Erosion and sediment controls in place, including wet weather response.	▪ Records show the erosion and sediment control measures are being implemented ▪ Records show inspections of erosion and sedimentation issues after significant rainfall events ▪ Records show all active work sites inspected for evidence of erosion and sedimentation, including after significant rain events, and that where erosion/sedimentation is identified, remedial actions are taken ▪ The incident management system shows no incidents relating to the failure of ESCP controls (within the design parameters) ▪ Records show restricted use of roads and tracks to operational safety activities across the field after significant rainfall event (>10mm in 24 hours)	▪ Inspection records ▪ Incident records ▪ Weather records
	Disturbance of land remains within existing cleared and operational areas.	▪ Records show that earthworks and upgrade/project activities remain within previously disturbed areas ▪ Records show vehicles and machinery remain within designated areas ▪ Records show that personnel, visitors and contractors are aware of designated work areas	▪ Incident records ▪ Induction records ▪ Permit to work records
	No releases of contaminants (including wastes, wastewater, chemicals, hydrocarbons or workover fluids) resulting in long-term contamination of the soil	▪ Records show all spills remediated immediately on discovery, and where necessary contamination assessment undertaken ▪ The incident management system indicates no releases of contaminants incidents related to wet weather operations ▪ The incident management system indicates no releases from the re-use, recycling, treatment, handling, storage of wastewater ▪ The incident management system indicates no release of contaminant incidents related to a control failure of the Wastewater Management Plan ▪ The incident management system indicates no Level 3 spills as per the Spill Management Plan ▪ Records show emergency response plan implemented in the event of a Level 3 spill or leak	▪ Incident records ▪ Soil monitoring results ▪ Inspection records ▪ Wet weather records
	Land no longer required for active operations is stabilised and progressively rehabilitated	▪ Records show full rehabilitation has been initiated for areas no longer required for the operator's activities ▪ Records show progressive rehabilitation has been initiated to reinstate/reduce areas no longer required	▪ Rehabilitation success monitoring ▪ Incident records

Environmental management strategy: Land	
Environmental monitoring and reporting	▪ Visual site inspection to ensure appropriate erosion and sediment control measures implemented (Civil activities and workovers: Daily; Operational areas: Monthly, Field: within five days of significant rainfall) ▪ Soil contamination assessment incorporating sampling following any Level 3 spills or spills outside of lease areas (as required) ▪ Rehabilitation success monitoring – land stabilisation (annual) ▪ Weather and road conditions (daily) ▪ Chemical and waste storage areas/tanks or similar (daily) ▪ Secondary containment (when in use) will be inspected weekly, unless being operated through the wet season during which period it will be monitored daily.
Corrective actions	▪ Revisit rehabilitation strategy where revegetation does not meet specified criteria ▪ Revegetate areas where natural revegetation is not occurring ▪ Reinstate eroded areas, particularly following wet weather events

6.4 Surface water

<table>
<tr><th colspan="6">Environmental performance measures: Surface water</th></tr>
<tr><td>Activities</td><td colspan="5">▪ Civil and project activities – earthworks, land and vegetation management, project, borrow pits, mobilisation/demobilisation
▪ Well operations – surface infrastructure, well maintenance and integrity
▪ Production facilities – gathering and boosting, oil and gas processing, condensate and oil storage and loadout
▪ Well workover – fluid systems
▪ Wellhead equipment, safety systems and gathering network replacement
▪ Rehabilitation
▪ Support activities – chemical storage, workover fluids, waste and wastewater management</td></tr>
<tr><td>Residual risk</td><td>Medium</td><td>Code of Practice</td><td>A.3.4, A.3.8, C.3, C.4.1, C.4.2, C.5, C.7.1, C.7.2</td><td>Uncertainty</td><td>A (Low)</td></tr>
<tr><td rowspan="2">Risk</td><td colspan="3">Consequences</td><td colspan="2">Critical controls</td></tr>
<tr><td colspan="3">▪ Surface water contamination from:
- loss of containment, including spills and leaks, of hydrocarbons, workover fluids, wastewater from assets, including during wet weather
- spill or leak from the storage, handling, use of fuels, oils and chemicals
- flooding from significant rainfall events
- earthworks/civil activities including heavy machinery use
- poor waste handling and disposal</td><td colspan="2">▪ Asset Management System
▪ Wastewater Management Plan
▪ Spill Management Plan
▪ Wet Season Management Plan</td></tr>
<tr><td>ALARP and Acceptability</td><td colspan="5">The operator considers that the risks have been reduced to ALRA and no further risk reduction is warranted as:
▪ Operation of flowlines in accordance with legislative and best practice guides/codes (refer Section 2)
▪ Operation of wastewater storage and disposal as per the Code. The ponds were developed prior to the implementation of the Code, no leak detection is in place but a program of regular inspections as part of the Asset Management System has been successfully implemented.
▪ Secondary containment (when in use) will be inspected weekly, unless being operated through the wet season during which period it will be monitored daily.
▪ Operation and maintenance of the gathering network and the MASP in accordance legislative and with best practice industry standards (refer Section 2).</td></tr>
<tr><td>Environmental outcome</td><td>Environmental performance standards</td><td colspan="2">Measurement criteria</td><td colspan="2">Records</td></tr>
<tr><td>No significant impact on surface water quality from the operator’s activities</td><td>No release of contaminants resulting in long term contamination of surface waters, including during wet</td><td colspan="2">▪ Records show all spills remediated immediately on discovery, and where necessary contamination assessment undertaken
▪ The incident management system indicates no release of contaminant incidents related to storage, handling, use or disposal of chemicals, fuels, wastes</td><td colspan="2">▪ Inspection records
▪ Incident Records
▪ Chemical Register</td></tr>
</table>

Environmental performance measures: Surface water			
	weather operations	▪ The incident management system indicates no release of contaminant incidents related to wet weather operations ▪ The incident management system indicates no releases from the re-use, recycling, treatment, handling, storage of wastewater ▪ The incident management system indicates no release of contaminant incidents related to a control failure of the Wastewater Management Plan ▪ The incident management system indicates no Level 3 spills as per the Spill Management Plan ▪ Records show emergency response plan implemented in the event of a Level 3 spill or leak	
	Erosion and sediment controls in place	▪ Records show the erosion and sediment control plan is implemented ▪ Records show all active work site inspected for evidence of erosion and sedimentation, including after significant rain events, and that where erosion/sedimentation is identified, remedial actions are taken ▪ The incident management system shows no incidents relating to the failure of ESCP controls (within the design parameters)	▪ Inspection records ▪ Incident records ▪ Job hazard analysis
	No long-term impacts on surface water from operation of evaporation ponds	▪ Records show freeboard is maintained ▪ No incidents of overtopping from evaporation ponds recorded within the incident management system ▪ Records show inspections of integrity are maintained ▪ Records show production needs consider available holding capacity within evaporation ponds, particularly during wet weather	▪ Inspection records ▪ Daily production reports ▪ Incident records
Environmental monitoring	▪ Water sampling, where available following a Level 3 spill, to determine extent of contamination of surface water and following removal of contamination source (as required as part of Level 3 spill response) ▪ Secondary containment (when in use) will be inspected weekly, unless being operated through the wet season during which period it will be monitored daily. ▪ Evaporation ponds: freeboard levels and fauna interactions (daily) ▪ Visual monitoring of erosion and sediment controls: - Civil activities and workovers: Daily - Operational areas: Monthly - Field: within 5 days of significant rainfall		
Corrective actions	▪ Soil remediation where spills occur to reduce impact to nearby surface water ▪ Review of wet weather procedures and response ▪ Review of storage and handling practices of contaminants ▪ Increased awareness and training		

6.5 Groundwater

<table>
<tr><th colspan="6">Environmental performance measures: Groundwater</th></tr>
<tr><td>Activities</td><td colspan="5">▪ Well operations – well barriers, maintenance and integrity
▪ Production facilities – gathering and boosting, oil and gas processing
▪ Well workover – barrier protection, fluid systems, suspension, decommissioning
▪ Support activities – services, chemical storage, workover fluids, waste and wastewater management</td></tr>
<tr><td>Residual Risk</td><td>Medium</td><td>Code of Practice</td><td>B.4.1, B.4.2, B.4.17</td><td>Uncertainty</td><td>A (Low)</td></tr>
<tr><td rowspan="2">Risk</td><td colspan="3">Consequences</td><td colspan="2">Critical controls</td></tr>
<tr><td colspan="3">▪ Contamination of groundwater resources from:
- Subsurface loss of contaminants during workovers
- Groundwater inflow from workover activities
- Well integrity
- Spill or leak from the use, transportation, treatment, handling and storage of, workover fluids, wastewater, and, diesel, fuel, oils and chemicals, including during wet season
- Loss of containment from wastewater ponds
▪ Reduced groundwater availability for wider community from use of groundwater resources to support the operator’s activities</td><td colspan="2">▪ Groundwater extraction licence (M10001)
▪ Asset Management System
▪ Wells managed in accordance with DITT approved WOMPs
▪ Implement Emergency Response Plan
▪ Wastewater Management Plan
▪ Spill Management Plan
▪ Groundwater Management Plan</td></tr>
<tr><td>ALARP and Acceptability</td><td colspan="5">▪ The operator considers that this risk has been reduced to ALARP and no further risk reduction is warranted based on:
▪ Well operations and workovers will be conducted using extensive best practice controls as outlined in the DITT approved WOMPs for each well. The subsurface loss of containment risks of operations and workovers are generally lower than drilling a new well because cement casing is already in place and there are no open zones, which provides some protection against hydrocarbon migration. Multiple well barriers are used across aquifers to minimise interaction.
▪ The residual risk has been reduced to the greatest extent possible due to the consequence of impacts on groundwater from subsurface losses remaining as serious if an event did occur. We consider that this risk has been reduced to ALARP and no further risk reduction is warranted.
▪ We also note that part of the rationale for conducting the workover activities is to improve well integrity in an aging field. Workovers will ensure well barriers are in-tact so that subsurface loss of containment risks are reduced during the operation of the well.</td></tr>
</table>

Environmental performance measures: Groundwater			
Environmental outcome	**Environmental performance standards**	**Measurement criteria**	**Records**
No significant impact on groundwater quality, levels and availability as a result of activities	No releases of contaminants (wastewater, wastes, chemicals, hydrocarbons or workover fluids) resulting in long-term contamination of groundwater resources	▪ Records show all spills remediated immediately on discovery, and where necessary contamination assessment undertaken ▪ The incident management system indicates no releases of contaminants incidents related to wet weather operations ▪ The incident management system indicates no releases from the re-use, recycling, treatment, handling, storage of wastewater ▪ The incident management system indicates no releases of contaminant incidents related to a control failure of the Wastewater Management Plan ▪ The incident management system indicates no Level 3 spills as per the Spill Management Plan ▪ Records show Emergency Response Plan implemented in the event of a Level 3 spill or leak ▪ Groundwater Management Plan will be implemented	▪ Groundwater monitoring results ▪ Incident records
	Groundwater extraction does not reduce groundwater availability to surrounding users	▪ Records indicate only existing operator bores used to extract groundwater as per the approved groundwater extraction licence (M10001) ▪ Records indicate the operator does not exceed the groundwater extraction volume approved in the groundwater extraction licence	▪ Water extraction records
	Wells are managed under a Well Operations Management Plan to monitor integrity and potential for impact on groundwater	▪ Records show that a DITT approved WOMP is implemented for each well ▪ Records indicate that BOPs and well control equipment is installed, maintained and routinely tested on workover rigs ▪ Records of ongoing maintenance, monitoring and testing processes as specified in WOMPs	▪ Well Barrier Integrity Verification reports ▪ Inspection records ▪ Incident records
Environmental monitoring and reporting	▪ Groundwater monitoring program (baseline bi-annual, wet/dry season transition)* with results reported annually. ▪ Groundwater extraction volumes as per extraction licence M10001 (quarterly) ▪ Well monitoring, surveillance and reporting as per DITT approved WOMPs ▪ Calibration of in-situ water meter at least once prior to use within the Mereenie field as per the operator's Standard Operating Procedures		
Corrective actions	▪ Remediate spills and leaks where possible to reduce groundwater impact ▪ Conduct workover to improve integrity of wells, thereby reducing potential for groundwater interaction ▪ Review opportunities for water reduction across field operations and subsequent groundwater extraction reduction.		

** Monitoring undertaken every six months until a baseline dataset of six samples is established. Thereafter, the monitoring frequency will be reviewed with reference to those included in the Groundwater Sampling and Analysis – Field Guide by Geoscience Australia, Sundaram et al.*

6.6 Air and noise

<table>
<tr><th colspan="6">Environmental performance measures: Air and noise</th></tr>
<tr><td>Activities</td><td colspan="5">▪ Civil and project activities – earthworks, land and vegetation management, borrow pits, wastewater evaporation systems
▪ Well operations – operations, maintenance and integrity
▪ Workovers – well interaction, suspension, decommissioning
▪ Wellhead equipment, safety systems and gathering network replacement
▪ Production facilities –, gathering and boosting, oil and gas processing, venting and flaring, maintenance
▪ Support activities – waste, chemical storage, greenhouse gas emissions</td></tr>
<tr><td>Residual risk</td><td>Medium</td><td>Code of Practice</td><td>A.3.3, B.4.8, B.4.9, B.4.14 D.5*</td><td>Uncertainty</td><td>A (Low)</td></tr>
<tr><td rowspan="2">Risks</td><td colspan="3">Consequences</td><td colspan="2">Critical controls</td></tr>
<tr><td colspan="3">▪ Release of contaminants to air environment through:
- loss of containment (gas)
- fugitive emissions/leaks from wells, flowlines and processing equipment
- air emissions from combustion of fuel/gas
- flaring and venting of gas and processing by-products
- emission from release of chemicals, hazardous substances to atmosphere
- vehicle and heavy machinery movements
- explosion or fire from the operator’s activities</td><td colspan="2">▪ Asset integrity and maintenance systems
▪ Emergency Response Plan
▪ Methane Emissions Plan/leak detection program
▪ Well Operation Management Plan
▪ Job Hazard Analysis and Permit to Work systems
▪ Flaring in designated and restricted areas</td></tr>
<tr><td>ALARP and Acceptability</td><td colspan="5">The Code dictates methane emissions for onshore shale gas fields (Clause D.2). Mereenie is a conventional gas operation but adheres to these requirements as far as practical as outlined in the Methane Emissions Management Plan. The residual risk has been reduced to the greatest extent possible therefore, we consider this risk ALARP and acceptable.</td></tr>
<tr><td>Environmental outcome</td><td colspan="2">Environmental performance standards</td><td colspan="2">Measurement criteria</td><td>Records</td></tr>
<tr><td>The operator’s activities do not create a measurable decrease in air quality at sensitive receptors</td><td colspan="2">No release of air contaminants resulting in long term impact to sensitive receptors</td><td colspan="2">▪ Records indicate regular inspections are conducted in line with Well Operations Management Plan and asset maintenance systems
▪ Records of inspection identify asset integrity system and processes are being implemented
▪ Records show that safety critical processes and procedures are in place</td><td>▪ Inspection records
▪ Process/metering records
▪ Incident records
▪ Calibration records</td></tr>
</table>

Environmental performance measures: Air and noise			
	No uncontrolled fire or explosion from the operator's activities	▪ Records show that safety critical processes and procedures are in place as per Integrity Management System ▪ Incident management system shows that emergency response plan is implemented	▪ Inspection records ▪ Incident records
Greenhouse gas emissions are minimised	Venting to be eliminated as far as reasonably practicable.	▪ Incident management system records unplanned venting of gas not related to safety or emergency situations. ▪ Daily reports confirm all technically recovered hydrocarbons sent to the flare is metered and recorded ▪ Calculation of greenhouse gas emissions in accordance with the NGER Measurement Determination	▪ Incident records ▪ NGER Report ▪ Venting and flaring records
	All leaks detected and repaired as per the Code	▪ Records show methane emissions management plan implemented ▪ The incident management system shows a log of all reported leaks ▪ Fugitive emissions are accounted for in NGER calculations and reporting	▪ Incident records ▪ Leak detection records ▪ NGER Report
Environmental monitoring and reporting	▪ Routine testing, inspection and maintenance for assets including wells, flowlines, processing plant equipment (as per Asset Management System) ▪ Leak detection monitoring program (annual) ▪ Recording of unplanned venting events (as required) ▪ Pressure monitoring of flowlines and MASP (continuous) ▪ Hydrotest monitoring of assets prior to re-commissioning (as required) ▪ Well head pressure (monthly) ▪ Flaring volumes: - Workovers (wells): daily - Production facilities (CTP/ESS): continuous ▪ Calibration records for plant/well metering and measurement as per Asset Management System/Measurement Scheme ▪ Calibration of meters used for leak detection prior to use within Mereenie field as per the operator's Standard Operating Procedures ▪ Clean Energy Regulator – National Greenhouse and Energy Reporting scheme (NGERs) ▪ Supply of NGERs outcomes to the Northern Territory Government		
Corrective actions	▪ Repair of leaks ▪ Implement corrective maintenance via incident and maintenance systems where regular inspections identify potential asset failure		

** The scope of Section D applies only to "onshore shale gasfields" as specified in Clause D.2 of the Code, the operator is working to meet the requirements of Section D of the Code where relevant to our operations*

6.7 Hazards

<table>
<tr><th colspan="6">Environmental performance measures: Hazards</th></tr>
<tr><td>Activities</td><td colspan="5">▪ Civil and project activities – earthworks, land and vegetation management, site mobilisation/demobilisation
▪ Well operations -surface infrastructure
▪ Production facilities – gathering and boosting, oil and gas processing, venting and flaring, oil loadout
▪ Well workover – fluid systems
▪ Wellhead equipment, safety systems and gathering network replacement
▪ Rehabilitation
▪ Support activities –chemical storage, workover fluids, waste and wastewater management
▪ Mereenie to Alice Springs Pipeline/Brewer Estate Oil Yard</td></tr>
<tr><td>Residual Risk</td><td>Low</td><td>Code of Practice</td><td>B.4.16</td><td>Uncertainty</td><td>A (Low)</td></tr>
<tr><td rowspan="2">Risk</td><td colspan="2">Consequences</td><td colspan="3">Critical controls</td></tr>
<tr><td colspan="2">▪ Ignition sources present from the operator’s activities causing fire and loss of areas/items of cultural significance
▪ Daily operations activities during or following intense weather events (flooding, wind, lightning)
▪ Naturally Occurring Radioactive Materials (NORMS)</td><td colspan="3">▪ Wastewater Management Plan
▪ Spill Management Plan
▪ Erosion and Sediment Control Plan
▪ Bushfire Management Plan
▪ Methane Emissions Management Plan
▪ Wet Season Management Plan
▪ Asset Management System
▪ Waste management hierarchy implementation</td></tr>
<tr><td>ALARP and Acceptability</td><td colspan="5">Based upon the risk being ranked as a low, the controls being assessed as effective and a scientific uncertainty score outcome of low, the risk is determined to be ALARP and ‘acceptable’
The activities under this EMP have been occurring for over 40 years and the operator is experienced with operating in the climatic and environmental conditions. Systems and controls are in place to effectively manage operations in the event of natural hazards such as bushfire, wet weather and the occurrence of NORMS.</td></tr>
<tr><td>Environmental outcome</td><td>Environmental performance standard</td><td colspan="2">Measurement criteria</td><td colspan="2">Records</td></tr>
<tr><td>Bushfires are not started from conduct of the regulated activity and infrastructure is protected from fires started outside of the OL areas</td><td>No uncontrolled bushfires caused by the operator’s activities</td><td colspan="2">▪ The Incident Management System shows no fires resulting from the operator’s activities
▪ Records show annual fire scar mapping, annual fire load estimates and maintenance of firebreaks are undertaken
▪ Records show emergency response plan implemented in the event of a fire
▪ Records show weather conditions, including current fire danger are reviewed as part of pre-start/toolbox/Job Hazard Analysis/Permit to Work processes
▪ Records show NAFI fire tracking maps are reviewed daily as part of operations where a high fire danger is present
▪ Records show emergency response drills are conducted</td><td colspan="2">▪ Incident records
▪ JHA records
▪ Daily reports</td></tr>
</table>

Environmental performance measures: Hazards			
No significant impact on the natural environment from the operator's activities in association with weather events	No releases of contaminants resulting in long-term contamination of surface waters	▪ The incident management system indicates no releases of contaminant incidents related to wet weather operations ▪ Incident management system indicates no incidents relating to the failure of ESCP controls (within design parameters)	▪ Incident records ▪ Post wet weather inspection records ▪ Daily reports ▪ Inspection records
	Erosion and sediment controls in place where required and working as designed	▪ Records show Erosion and Sediment Control Plan is being implemented. ▪ Incident management system indicates no incidents relating to the failure of ESCP controls (within design parameters) ▪ Weather conditions, including current fire danger are reviewed as part of pre-start/toolbox/Job Hazard Analysis/Permit to Work processes	▪ Incident records ▪ Post wet weather inspection records ▪ Inspection records
The extraction of subsurface equipment, hydrocarbons and water does not result in human health impacts	No impacts from presence of NORMs on environment or human health	▪ Records indicate that NORMS levels are within acceptable limits prior to handling and disposal ▪ Records show licenced waste contractors are used for movement of waste materials.	▪ NORMS testing records ▪ Incident records ▪ Waste tracking records
Environmental monitoring and reporting		▪ Monitor long-term and short-term weather forecast (daily) ▪ Measure rainfall (daily) ▪ Inspect firebreaks (annual) ▪ Inspect fire equipment functionality (bi-annual, prior to high fire danger season) ▪ Monitor freeboard on evaporation ponds (daily) ▪ Secondary containment (when in use) inspected weekly, unless being operated through the wet season during which period it will be monitored daily. ▪ Monitor water volumes entering evaporation ponds from CTP/ESS processes (daily) ▪ Testing of NORMs (as required during workovers; as per the operator's NORMs plan during operations) ▪ Inspect chemical, fuel and oil storage areas (monthly) ▪ Emergency Response Drills (monthly) ▪ Waste tracking (monthly)	
Corrective actions		▪ Maintain capacity in bunds/secondary containment devices ▪ Manage freeboard within wastewater storage ▪ Replace defective fire equipment ▪ Reinstate fire breaks ▪ Reinstate/repair erosion and sediment control devices	

6.8 Heritage

<table>
<tr><th colspan="6">Environmental performance measures: Heritage</th></tr>
<tr><td>Activities</td><td colspan="5">▪ Civil and project activities – earthworks, land and vegetation management, site mobilisation/demobilisation, borrow pits
▪ Rehabilitation</td></tr>
<tr><td>Residual risk</td><td>Medium</td><td>Code of Practice</td><td>A.3.1, A.3.7, A.3.5, A.3.8</td><td>Uncertainty</td><td>A (Low)</td></tr>
<tr><td rowspan="2">Risk</td><td colspan="3">Consequences</td><td colspan="2">Critical controls</td></tr>
<tr><td colspan="3">▪ Loss of heritage values or items of significance from:
- Disturbance/exposure of heritage sites/artefacts of cultural significance
- Ignition sources present from the operator’s activities causing fire and loss of areas/items of cultural significance
- Unauthorised access to the field by public
- Unauthorised access to restricted work areas/no-go zones</td><td colspan="2">▪ SSCC Certificates/CLC permits in place
▪ Site inductions (cultural awareness)
▪ Access to site pre-approved under CLC permit
▪ Activities remain within previously disturbed areas
▪ Implement Bushfire Management Plan
▪ Implement Emergency Response Plan/actions</td></tr>
<tr><td>ALARP and Acceptability</td><td colspan="5">▪ Activities are not being conducted in the cultural heritage sensitive areas (exclusion zones), though there is a remote likelihood of disturbance to items or places of significance from operational activities ranking this as a low risk. Works are remaining within previously disturbed areas and under permits from CLC (SSCC C2013-046) and A new AAPA Certificate, covering the entire field and all the works described in this EMP has been applied for. Activities will comply with conditions of the approved certificate..
▪ Fire could spread to culturally significant areas if started by the operator’s activities. This presents a risk of a serious nature for the loss of culturally significant areas, but through the implementation of control measures outlined within the Bushfire Management Plan the operator considers that this risk has been reduced to lowest possible and is ALARP and acceptable.</td></tr>
<tr><td>Environmental outcome</td><td colspan="2">Environmental performance standard</td><td colspan="2">Measurement criteria/monitoring</td><td>Records</td></tr>
<tr><td>No significant impact to indigenous and non-indigenous artefacts, Aboriginal Sacred Sites, and non-indigenous</td><td colspan="2">No non-compliance with AAPA Sacred Site Certificates or CLC permits</td><td colspan="2">▪ The Incident Management System shows no recorded incidents involving non-compliance with AAPA and CLC permits.
▪ Personnel inductions include cultural and heritage awareness including exclusion zones and unexpected finds procedures.</td><td>▪ Incident Records
▪ Induction (Heritage and Cultural Awareness)</td></tr>
</table>

Environmental performance measures: Heritage			
heritage sites	No unauthorised disturbance of Aboriginal archaeological places/objects and/or Aboriginal Sacred Sites	▪ Incident Management System show no recorded incidents involving damage to Aboriginal archaeological places/objects and/or Aboriginal Sacred Sites ▪ No removal of artefacts in situ without prior approval from Heritage Branch NT	▪ Incident Records ▪ Communication with CLC
Bushfires are not started from conduct of the regulated activity and infrastructure is protected from fires started outside of the OL areas	No uncontrolled bushfires caused by the operator's activities	▪ The Incident Management System shows no fires resulting from the operator's activities ▪ Records show annual fire scar mapping, annual fire load estimates and maintenance of firebreaks are undertaken ▪ Records show emergency response plan implemented in the event of a fire ▪ Records show weather conditions, including current fire danger are reviewed as part of pre-start/toolbox/Job Hazard Analysis/Permit to Work processes ▪ Records show NAFI fire tracking maps are reviewed daily as part of operations where a high fire danger is present ▪ Records show emergency response drills are conducted	▪ Incident records ▪ JHA records ▪ Daily reports
Environmental monitoring and reporting		▪ Notify AAPA. / CLC of approval and permit breaches as per conditions (as required) ▪ Review of registers and records (annual)	
Corrective actions		▪ Consult with Traditional Owners / CLC ▪ Investigate incidents and review and revise procedures	

6.9 Community

Environmental performance measures: Community values					
Activities	▪ Civil and project activities – site mobilisation/demobilisation ▪ Well operations -surface infrastructure ▪ Production facilities – gathering and boosting, oil and gas processing, venting and flaring, oil loadout ▪ Well workover – fluid systems ▪ Mereenie to Alice Springs Pipeline/Brewer Estate Oil Yard				
Residual risk	Low	**Code of Practice**		**Uncertainty**	Low
Risk	**Consequences**		**Critical controls**		
	▪ Ignition sources present from the operator's activities causing fire and loss of areas/items of cultural significance ▪ Increased traffic during works programs ▪ Increased waste generation impacts regional landfill capacity and disposal of listed wastes		▪ All activities remain within approved SSCC and APPA areas ▪ Site Induction ▪ Bushfire Management Plan ▪ Methane Emissions Management Plan ▪ Emergency Response Plan ▪ Traffic management plan and logistics coordination ▪ Implementation of waste hierarchy in operations and program planning		
ALARP and Acceptability	Based upon the risk being ranked as a low, the controls being assessed as effective and a scientific uncertainty score outcome of low, the risk is determined to be ALARP and 'acceptable' The activities under this EMP have been occurring alongside the owners of the land under agreement for over 40 years. The operator is maintaining relationships with the community to ensure that the risk of operations remains low and that the protection of social and economic sustainability values remains.				
Environmental outcome	**Environmental performance standard**	**Measurement criteria**		**Records**	
The operator's activities minimise the following: ▪ Reduction in capacity of road infrastructure up to and within Mereenie	No complaints from stakeholders	▪ Records of the operator's approved journey management plans ▪ Records show Traditional Owners able to access field in liaison with Production Supervisor/Person in Charge ▪ Contact information provided to local communities and stakeholder to facilitate communication ▪ No recorded incidents of work being conducted beyond approved operational areas		▪ Stakeholder Communication Log ▪ Journey Management System ▪ Incident records	

Environmental performance measures: Community values			
▪ Maintain and enhance community relationships ▪ Safety risks to the community	No disturbance to surrounding land uses/access from the operator's activities	▪ The incident management system shows no record of complaints regarding surrounding land use, access, amenity, noise or nuisance ▪ No recorded incidents against traffic management plans for the operator's activities ▪ Records of journey management system implementation	▪ Stakeholder Communication Log ▪ Journey Management System ▪ Incident records
	No impact on regional waste resources and services	▪ Records show only licensed waste contractors are used for waste handling, treatment and/or disposal	▪ Waste tracking register
	Visitors and contractors are aware of environmental requirements	▪ All visitors and contractors are approved for access and inducted according to their visit requirements.	▪ Induction records ▪ Incident records
	No significant impacts to the wider community from the operation of the field, the MASP or Brewer Estate Oil Yard	▪ Record indicate that the Pipeline Management Plan is implemented for the MASP ▪ Incident management system does not indicate a breach of access to the Brewer Estate Oil Yard	▪ Incident Records ▪ Inspection records.
Environmental monitoring and reporting		▪ Waste tracking (monthly) ▪ Waste storage (weekly) ▪ Community complaints (as required) ▪ Traffic changes (weekly during workovers)	
Corrective actions		▪ Drive to conditions on unsealed private and public roads to minimise nuisance and safety risks ▪ Communicate with Traditional Owners/CLC where incidents occur beyond operational areas. ▪ Investigate incidents and review and revise procedures ▪ Re-instate areas disturbed beyond approved boundaries	

6.10 Cumulative impacts

The cumulative impacts associated with the ongoing operation and well integrity and intervention campaigns have been assessed as low. The Mereenie Field has been part of the local community since the mid-1980s and has supported the Traditional Owners through the provision of infrastructure to support their pastoralist activities.

Aspect	Risk rating	Summary
Water (groundwater)	Low	No impacts identified on surrounding users. Traditional Owners have full access to water supplies via stock dams and water storage across Mereenie Field. Water managed under licence M100001.
Surface water	Low	No surface water will be taken and no surface water extraction licences exist for the area. No release to surface water proposed.
Greenhouse Gas Emissions	Low	No emissions from land clearing activities. For the 2022 NGER reporting period, greenhouse gas emissions were 56,743 tCO_2e. This included a two well drilling program that occurred under the NT Drilling Program EMP (EMP CTP3-4). Production and metering improvements in addition to leak detection and repair programs are showing an improvement in emissions. Planned projects including the installation of a flare gas compressor will see continued reductions in emissions. Current emissions levels do not trigger the *Northern Territory Governments Large Emitters Policy 2021*.
Community – traffic	Low	An additional 20 vehicles per day accessing Mereenie are anticipated during specific work programs such as the well integrity and intervention programs. This is above the current traffic volumes that have been ongoing accessing the Mereenie Field for the last 40 years. Journey Management Planning and personnel awareness through daily pre-start meetings of increased traffic during peak tourist periods and maintaining safety for the operational crews and tourists alike is a priority.
Community – tourism	Low	Tourism activities have worked nearby to Mereenie for the life of the field. With the isolated location of the wells and supporting infrastructure and no other resource or industrial projects in the area the operator considers the impacts of ongoing activities to be low.
Community – amenity/visual impact	Low	The majority of infrastructure for Mereenie is not visible or accessible. The MASP ROW is evident along sections of Larapinta Drive through cleared areas and signage. Limited visual impact exists from the flare facility due to the open terrain.
Rehabilitation – final land use	Low	Successful rehabilitation is dependent on the vegetation type, soil type and moisture content in the soil which, in turn, is dependent on the timing and amount of rainfall in the region after earth work restoration commences.

7 Management Plans

7.1 Wet Season Management Plan

All activities conducted at the Mereenie Field are conducted on a continuing daily basis, 365 days per year, 24 hours per day. This means that works occur during the wet season.

A Wet Season Management Plan has been developed and presented below in Table 7-1 to address the risks and management measures put in place to ensure operations can continue with little impact on gas production or impact on the environment.

7.2 Erosion and Sediment Control Plan

The Code requires an Erosion and Sediment Control Plan (ESCP) for the activities to be developed by a suitable qualified person in accordance with the relevant guidelines including IECA Best Practice Guidelines. Table 7-2 presents the ESCP for Mereenie.

7.3 Weed Management Plan

The Code requires a Weed Management Plan (WMP) that is developed in accordance with the requirements of the *NT Weed Management Planning Guide: Onshore Petroleum Projects.* The Weed Management Plan is provided below in Table 7-3.

7.4 Bushfire Management Plan

The Bushfire Management Plan for the Mereenie Field is provided in Table 7-4 and has been based on the *Bushfire Management Planning Guide: Onshore Petroleum Projects (*DENR, 2020) and the Code.

7.5 Rehabilitation Management Plan

The Rehabilitation Management Plan, Table 7-5 addresses both rehabilitation of decommissioned areas/wells and also the progressive rehabilitation of areas where the disturbance footprint can be reduced without impacting the daily operations of the area.

7.6 Wastewater Management Plan

The Wastewater Management Plan (WWMP) is provided in Table 7-6. The Wastewater Management Plan focuses only on wastewater as per the definition in the Code. The management of sewage and grey water from camp and administration facilities is not covered in the WWMP.

7.7 Spill Management Plan

The Code requires a Spill Management Plan (SMP) that assesses and manages the risks posed by potential spills of waste, wastewater, produced oil or condensate, fluids and any chemicals used or stored as part of petroleum activities and addresses the requirements of the Code is presented in Table 7-7.

7.8 Methane Emissions Management Plan

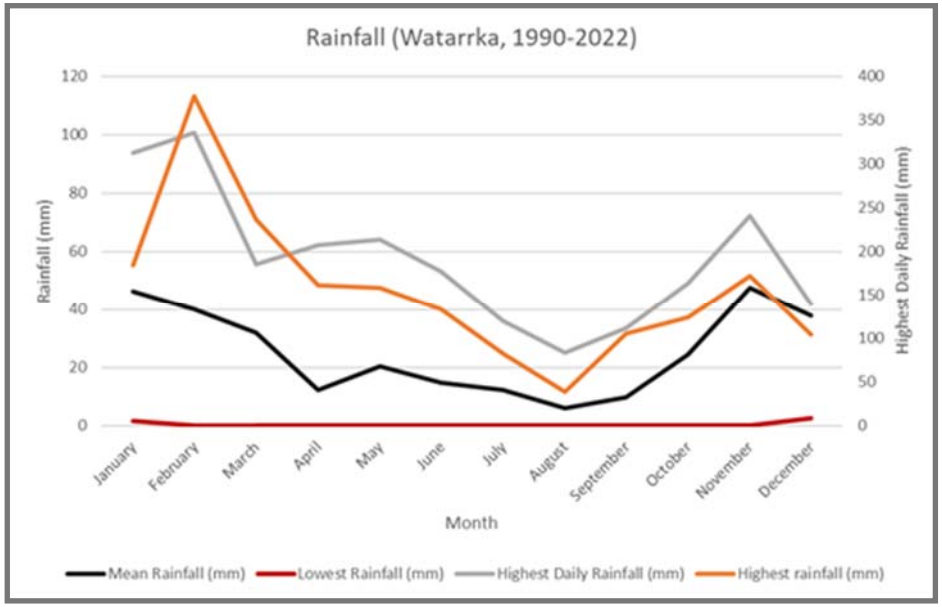
The Methane Emissions Management Plan (MEMP) aims to reduce emissions via emissions detection and management in the gas field. Monitoring and measurement is undertaken to quantify and reduce fugitive methane emissions from the activities. The Plan is presented in Table 7-8.

Mereenie OL4 and OL5— Field/CTP/ESS/Camp Wet Season Management Plan 2022

CENTRAL PETROLEUM MEREENIE FIELD	
Property land uses	CP operates the MRN under OL4 and OL5 issued under the *Petroleum Act 1984*
Site Description	The Mereenie field is an oil and gas field located west of Alice Springs in a remote part of the Northern Territory. The field commenced production in the 1980's and contains 73 wells, out of which only 43 are active.
Wet Season Management Plan	
Purpose	To respond to the risks associated with wet weather on daily operations.
Objectives	Ensure that all operational and workover activities can continue to be undertaken safely and with minimal risk to the environment during the wet season . Have the ability to main 365 day operational activities through provision of goods and services, including fuel, oil, chemicals and materials.

WET SEASON RISKS	
Key Risks	**Controls**
• Transport and storage of oil, fuels ,chemicals, wastewater and materials to support CP activities	• Sufficient materials required for ongoing operations will be stored onsite in the event of wet weather. This includes 10 days allowance of required fuel. • Access to field operations is limited to safety critical activities during significant wet weather or flooding • Systems and equipment will be reviewed following significant rainfall events to ensure safety and environmental risks are minimised • Chemical storage areas are bunded with covers, where possible, to prevent water ingress • Bunding and secondary containment is inspected and emptied to suitable location following rainfall events • During workovers, wastewater tanks at well sites have available freeboard to meet 1:1000y ARI • Evaporation ponds are maintained with available freeboard to contain a 1:1000y ARI event
• Flooding and erosion/damage to access tracks and roads	• Roads and access tracks are inspected following significant rainfall to identify and prevent further erosion and sedimentation • Civil equipment is available to assist with emergency response • Earthworks will be minimised during the wet season where possible. • Alternative access via predominantly sealed roads of Stuart and Lasseter Highways used during significant rainfall events.

	Plan Owner	Implementation
Groundwater contact	Risk and HSE Manager	Production Supervisor



WET SEASON MONITORING		
Monitoring	**Information location/Action**	**Frequency**
Weather forecast	http://www.bom.gov.au/nt/	Daily
Road conditions	https://roadreport.nt.gov.au/home	After significant rainfall event
Containment areas and sumps, evaporation	Visual monitoring for overflows	After rainfall event
Internal roads and access tracks	Visual monitoring for erosion	After significant rainfall event
Evaporation Ponds	Freeboard levels	Daily

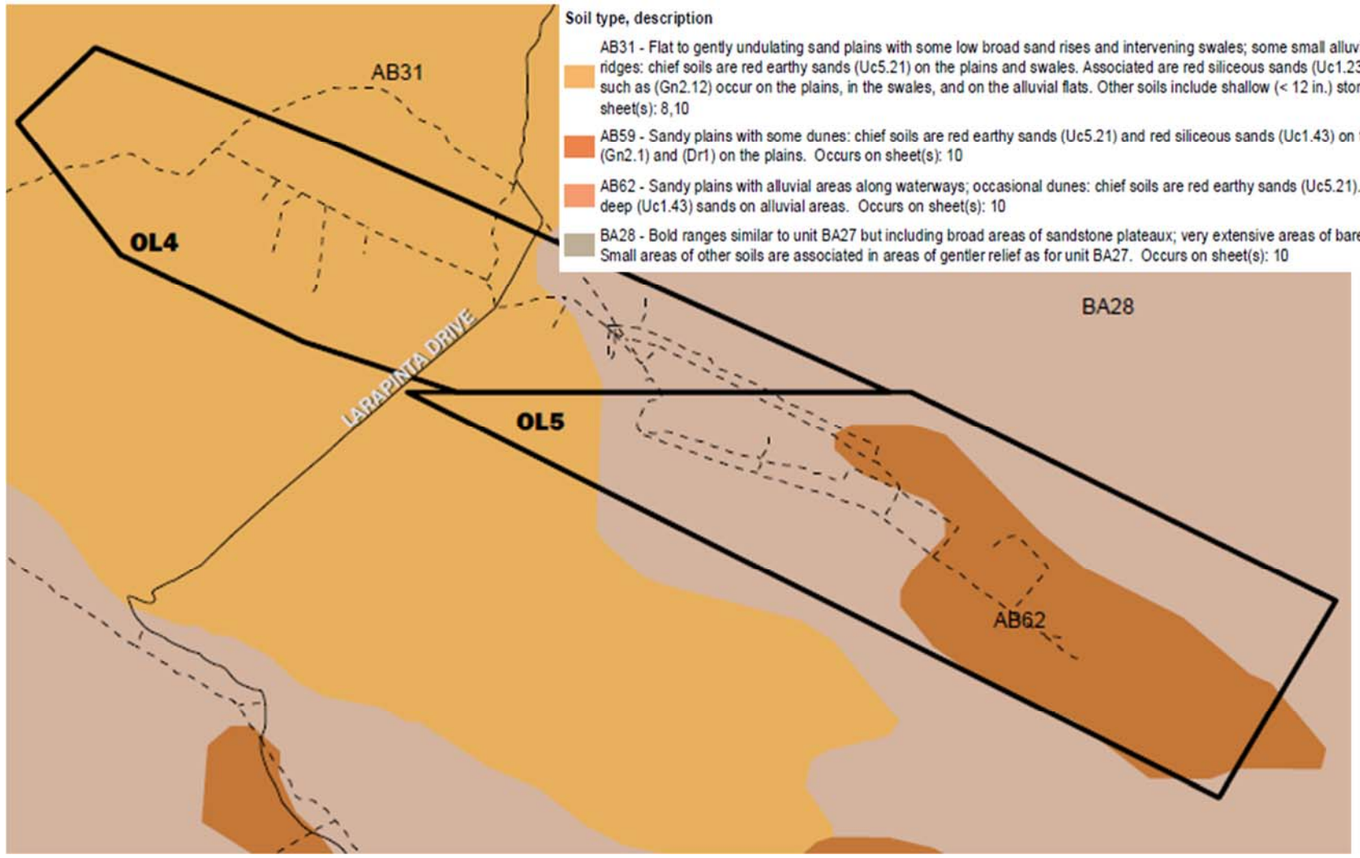
Mereenie
Erosion and Sedimentation Control Plan 2022

	Owner	Field Implementation
ESCP	Risk and HSE Manager	Production Supervisor

Central Petroleum Mereenie Field	
Property land uses	CP operates the MRN under OL4 and OL5 issued under the *Petroleum Act 1984*
Objectives	To reduce the risks of erosion and sedimentation on the land, soil and surface waters in the OL area

EROSION AND SEDIMENTATION RISKS	
Key Risks	**Controls**
Annual estimated soil loss is considered very low. Average monthly rainfall risk ranges from very low (April—October) to moderate (December).	
Earthworks in relation to operational maintenance and minor earthworks for workovers and pipeline connections	• Install erosion and sediment control structures (e.g. berms, sediment fences) using best practice guidelines by DEPWS and IECA where required • Clear vegetation only within approved and existing disturbance areas • Stockpile top soil separately in low profile mounds • Conduct Job Hazard Analysis for any new task or new use of equipment to identify correct control measures • Encourage surface vegetation where possible • Avoid driving after significant rainfall events • Conduct works during daylight hours • Keep construction operation and level of final constructed surface above 1 in 100 year flooding events • Inspect flowline/pipeline easements regularly for erosion and repair where detected • Plan operational activities to minimise new land disturbance • Carry out earthworks in accordance with CP standards and procedures • Monitor integrity of installed control devices after every significant rainfall events
Movement of heavy machinery and vehicles	• Avoid driving after significant rainfall events • No driving beyond access tracks/well pads • Personnel access to the facility and any site/area by permit approved by the CLC
Flooding and rainfall erosivity	• Install erosion and sediment control structures (e.g. berms, sediment fences) using best practice guidelines by DEPWS and IECA • Inspect integrity of installed control devices after every significant rainfall event • Remediate in accordance with IECA and DEPWS best practice principles

LIKELY IMPACTED AREAS	
Disturbance areas	• Pads • Roads • Plant • Flowlines/pipelines • MASP
Watercourse crossings	• Strutt Creek (tributary of Parke Creek)



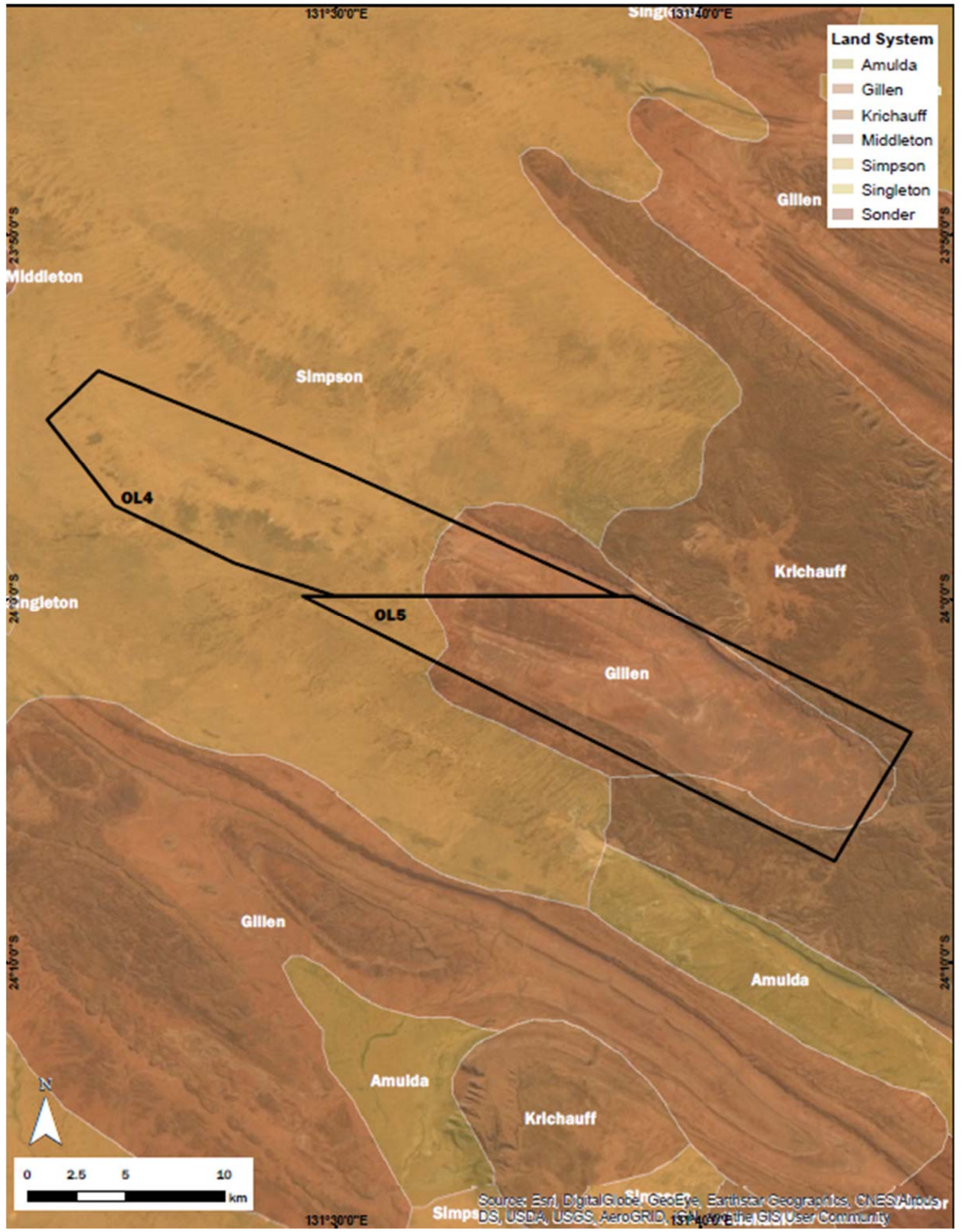
EROSION AND SEDIMENTATION MONITORING PROGRAM			
Mitigation Measure	**Measurement Criteria**	**Monitoring frequency**	**Record**
No unauthorised clearing	• Clearance from DPIR, CLC and/or AAPA before any new clearing works undertaken.	Prior to any new works	Job hazard analysis
No unauthorised third-party access	• Travel to Mereenie requires pre-approval for all visitors • Visitor to report to camp on arrival	As required	Journey Management Plan Visitor and staff inductions
Limit vehicle access	• Any off-road driving to be reported to the supervisor and investigated • No vehicle access to rehabilitated areas • Avoid driving where possible after significant rainfall	As required	Visitor and staff inductions
All erosion and sedimentation control devices compliant with DEPWS and IECA best practise guidelines	• Install erosion and sediment control devices in accordance with DEPWS and IECA guidelines to: – Slow surface water on slopes greater than 3%; • Divert water into the surrounding environment to encourage natural sheet flow: – Sediment catch drains installed (to stop sediment flowing into water courses) – Reference the DEPWS or IECA guidelines for a full list or control devices and how to install	Annual or after a significant rainfall (>10mm in 24 hours)	Site inspection form
No windrows or concentration points	• Inspect all access tracks, roads and cleared areas within the OL area to ensure no windrows or concentration points • All erosion gully heads removed and flattened to encourage laminar flow and reduce further development of erosion.	Post earthworks	Site inspection form
Rehabilitation	• Progressively rehabilitate non-operational areas to encourage vegetation growth for stabilisation • Install erosion and sediment control structures (e.g. berms, sediment fences) using best practice guidelines by DEPWS and IECA until rehabilitation is stabilised	As per Rehabilitation Management Plan	Refer to the Rehabilitation Management Plan

TYPICAL EROSION AND SEDIMENTATION CONTROL DEVICES*		
Type	**Use**	**Example**
Fibre rolls	• Fibre rolls consist of small-diameter, biodegradable straw/ coir-filled logs. • Can be used as check dams in wide, shallow drains so long as the logs can be anchored to prevent movement. • Best used in locations where it is desirable to allow the log to integrate into the vegetation, such as in vegetated channels.	
Check dams	• Sandbag check dams are typically used in drains less than 500 mm deep, with a gradient less than 10%. • These check dams are typically small (in height) and therefore less likely to divert water out of the drain compared to rock check dams. • Can also be used as a temporary (supplementary) sediment trap. • Can be used for velocity control	
Cross ban (whoa boy) drainage	• Divert water off tracks • Collect and divert sheet flow off roads and tracks	
Sediment fence	• Sediment fences formed from a composite (non-woven) fabric are generally preferred down-slope of stockpiles containing clayey material instead of the traditional, woven sediment fence fabric. • Woven fabric sediment fences (left) are best used for sandy soils and stockpiles located up-slope of a suitably grassed buffer zone that will allow for the infiltration of stormwater runoff from the stockpile.	

Devices will be as per the design standards of *IECA Best Practice Erosion and Sediment Control Guidelines

Source: *Erosion and Sediment Control- A Field Guide for Construction Site Managers, Version 5, 2012, Catchments & Creeks Pty Ltd*

Land Systems						
Extent	**Land System**	**Description**	**Geology**	**Topography**	**Soils**	**Erosion Hazard**
10%	Krichauff	Sand plains with dunes, occupying the northwest part of the Mereenie Field	Flat lying sandstone, siltstone and conglomerate. Upper Proterozoic age, Amadeus trough (Heavitree quartzite)	Partially dissected erosional weathered land surface; relief up to 500 ft	Shallow stony or gravelly soils and some red sands or red clayey sands	Moderate erosion hazard
45%	Simpson	Sandstone plateaus, eroded and dissected, forming margins to the southeast part of the Mereenie Field	Extensive dune fields with hard spinifex pastures	Sand dunes of varying height and alignment, up to a maximum of 70ft in the Simpson Desert section	Red sands to red clayey sands and locally red earths	Low erosion hazard
45%	Gillen	Sandstone strike ridges and intervening valleys in the southern part of the Mereenie Field	Sandstone mountains with mulga or witchetty bush country	Partially dissected erosional weathered land surface; relief up to 500 ft	Shallow stony or gravelly soils and some red sands or red clayey sands	Moderate erosion hazard



Mereenie (MRN) OL4 & OL5— Field/CTP/ESS/Camp Weed Management Plan 2022

	Contact Details	Name
Weeds Officer	[redacted]	[redacted]

CENTRAL PETROLEUM MEREENIE FIELD	
Property land uses	CP operates the MRN under OL4 and OL5 issued under the *Petroleum Act 1984*
Site Description	The Mereenie field is an oil and gas field located west of Alice Springs in a remote part of the Northern Territory. The field commenced production in the 1980's and contains 73 wells, out of which only 43 are active.
Weeds Management Plan	
Purpose	To prevent and control new and existing weed species within the operating licence areas.
Objectives	To prevent weeds through the following process steps: 1. Identification 2. Prevention 3. Control 4. Disposal

MEASUREMENT CRITERIA		
Performance Standard	Measurement Criteria	Records
No weeds in areas where fill has been used	All fill sourced from approved borrow pits on site; weed free. Routine site inspection to look for emergence of weeds and remove or spray accordingly.	Weed free certificate
No new infestations of weeds	Disturbed areas checked for emergence of weeds, and removed or dealt with in accordance with DENR and WoNS guidelines	Six-month inspection report

RISKS AND MANAGEMENT CONTROLS		
Project Stage	Key Risks	Management Controls
Exploration	• Machinery and equipment sourced from weed-infested locations – potential for introduction and spread of weeds not currently existing on-site.	• Machinery wash down plans agreed with Production Supervisor/ Project Manager prior to entering site • If coming from known weed-infested areas or interstate, vehicles should have a weed-free certificate, issued by appropriately qualified personnel before entering the site. • Compulsory site inductions provided to all personnel, contractors, and visitors prior to entering the site
Ongoing activities on-site	• Spread of weeds due to driving on tracks or well-pads. • Spread of weeds from areas of high infestation (e.g. east field to low infestation west field)	• Use wash-down bay • If coming from known weed-infested areas or interstate, vehicles should have a weed-free certificate, issued by appropriately qualified personnel before entering the site • Photos and/or GPS locations of Declared Weeds reported to Weeds Officer when observed by on-site staff • Avoid driving between areas of high infestation to areas of low infestation whenever possible • If sand, soil or gravel is brought on site such as for hardstand areas and pipe bedding, is to be sourced from material that does not contain declared weed seeds or plants
Well abandonment	• Well pads not frequented by CP staff allowing existing weeds to spread without being noticed.	• Staff to be made aware of risks of weed spread • Abandoned/suspended wells to be included in weed surveys and annual audits
Weed control	• Weeds not adequately controlled/ insufficient effort or poor timing of weed control. • Weeds not removed/stacked during weed control efforts, resulting in further spread.	• Monitor areas that have been treated annually. Seeds can remain viable for more than five years. • Remove weed seedlings before they flower and produce seed. Use weed attribute table to record activities, progress, and observations
Weed survey	• Insufficient survey effort • Weeds present on site not identified during survey	• Submit weed survey results to DEPWS annually • Use of NTG spatial data sets to find areas of weed infestations within close proximity to the site

WEED CONTROL METHODS	
Method	Description
Physical/manual control	• Hand-pulling: Labour intensive for large outbreaks but effective method for controlling weed seedlings prior to seed set. Useful method for hard to reach areas e.g. around the pipes at CTP- Fresh water tank • Use of tools and equipment such as shovels, brush cutters, slashers and axes to physically remove the species: effective for larger areas of infestation • To prevent further infestations or spread: – Use this method before weeds begin seeding. If weeds have begun seeding, it needs to be buried, burnt or stacked in a pile to ensure seed material do not result in reinfestation – Alternatively transport weeds off-site via a waste contractor. For any Declared Weeds that may occur in the future, transport restrictions may apply – After weed removal, monitor the site for any new infestation
Chemical control	• Foliar spraying: Spray diluted herbicide over the foliage of the plant until it is wet (but not dripping). Use spray dye as a visual cue to ensure evenness of coverage. Should only be used when plants are actively growing so the chemical is circulated through the plant down to the roots. It is most effective on new growth a few days to weeks after a rain event. Best undertaken in the early morning and late evening when the Delta T (the relationship between temperature and humidity) is within the range of 2-10 • Foliar spraying with Glyphosate: Glyphosate is a common broad-spectrum herbicide that can be sprayed on both broad leaf plants and grasses. It must be applied to a plant while it is actively growing to be effective. Depending on geographical location, the periods of effective Glyphosate use can be restricted. For higher effectiveness first slash the invasive grasses then spray the regrowth. Combine with Flupropanate, a residual herbicide, which will control both mature tussocks and the germination of residual seed banks for up to two years • Adjusting water quality: Hard water (water with 150-300 mg/L $CaCO^3$) reduces the effectiveness of herbicides such as glyphosate, 2,4-D amine, MPA amine and Dicamba. Where necessary, add softening agents and adjust the pH of the water in spray applicators • Residual herbicides: Residual (long-acting) herbicide pellets e.g. Flupropanate and Graslan remains effective in the ground for a period of up to two years but is only activated after rainfall. When using residual herbicides, it is important to ensure all pellets are raked just into the surface to avoid off-site migration. Residual

MANAGEMENT PROCESS			
Process Step	**Objective**	**Actions**	**Frequency**
Weed Identification	Weed species and area of infestation are identified and monitored	• Weed surveys undertaken annually by dedicated weeds officer • Photograph weed species identified (and/or areas of infestation recorded with GIS and mapped) • Report to the CP HSE Team and included within weed survey report • Weed survey findings used to determine control programs in consultation with CP or suitable contractors • CP site staff to be trained in identification of weeds, particularly Declared Weeds and WoNS. CP staff should familiarise themselves with declared weeds that have potential to enter the site (e.g. Athel pine)	• Annual external annual audit • For ongoing operations – e.g quarterly internal and annual external audits
Weed prevention	No new declared weeds, WoNS or environmental weed individuals or infestations.	• Vehicles and/or equipment coming from an area with Declared Weeds should be cleaned and obtain a weed free certificate before entry • Vehicles entering from outside the MRN must be weed free. If coming from known weed-infested areas or interstate, vehicles should have a weed-free certificate, issued by appropriately qualified personnel before entering the site • If areas containing weeds are accessed, clean all equipment and machinery. Wash or blow down vehicles to prevent transfer of weeds to uncontaminated areas • Source fill brought onto site from weed free area • No unnecessary clearing to minimise ground disturbance • Road grading in areas of weeds should start from the outside of the infestation towards the centre of the infestation • No off-road driving • Monitor operational areas and 'hotspots' continually • Report weed sightings to the Weeds Officer	Ongoing as part of operational procedures
Weed Control	Existing weeds are controlled using effective methods Personnel and infrastructure are protected from increased fire risk due to weed infestations No spread of weeds No new weed species present	• Use the correct control and/or removal method selected by trained personnel/contractor based on species present and extent of infestation • Maintain a 4m fire break around infrastructure • Plan a rapid response to seasonal changes to maximise the effectiveness of control activities • Engage local traditional owners, rangers or contractors to assist with mechanical and chemical control of weed species at the site • CP staff will also undertake weed control when they are available during normal operations • Shapefiles/maps from previous weed surveys inform the weed control activities and control activities are mapped using the same methods. This will enable the Weeds Officer to be more aware of the spread or containment of existing weeds and the effectiveness of weed control.	Control/removal scheduled to occur prior to weed seeding where practicable - timing with seasons and predicted rainfall (Usually Nov-March)
	Weed control methods result in no environmental harm	• Only suitably trained personnel will use chemicals and herbicides, in accordance with CP's chemical handling and storage procedures • Relevant stakeholders will be consulted prior to chemical herbicide being used • Assess areas outside of operational areas prior to weed control to identify conservation-listed flora. • Ensure non-target conservation-listed species are not impacted by weed control • Minimise drift by spraying on low-wind days • No use of residual herbicide pellets within 2-3 canopy diameters of trees or shrubs • Follow-up surveys will refine the impacts of weed removal of the potential for future vegetation re-growth	During weed control activities as part of operational procedures Prior to weed control in areas outside of operational area.
Disposal of weeds and chemicals	Weeds disposed of in environmentally friendly manner No further weed spread from disposal Correct disposal of chemical containers	• Weed plant material (leaves, seeds, flowers, branches etc.) that are physically removed will be burnt in a burn pit or removed from site (e.g. via waste bins) • It is illegal to transport declared weeds. If declared weeds enter the site, these should be burnt and then buried on site at a depth sufficient to prevent emergence of seeds or seedlings • Chemical containers disposed of correctly	On completion of weed control activities
Reporting	Compliance with NTG requirements	• Annual update provided to DEPWS to include weed control activities, updated locations of weed spread.	Annual survey report provided to DEPWS

IDENTIFIED WEEDS SPECIES			
Common Name	**Scientific Name**	**Image**	**Control Method**
Buffel grass	*Cenchrus ciliaris*		• November—December • Foliar spray with Glyphosate (360g/L) Roundup Biactive® or other aquatic-sensitive Glyphosate product. At least two treatments within a growing season • Residual herbicide: Foliar spraying with Flupropanate at an application rate of 1000L/ha or 1L/10m².
Feathertop rhodes grass	*Chloris virgata*		• August—October • Physical/manual control • Foliar spray with Glyphosate (360g/L). Seed set must be stopped or minimised to break the life cycle. Spray small seedlings as soon as possible after rain for best control. A double-knock tactic using two different control means within a short amount duration (7 to 10 days) is most effective.
Paddy melon	*Cucumis myriocarpus*		• September—November • Physical/manual control • Foliar spray : Garlon + Antievap spray adjuvant 1% or mixture of triclopyr, 2,4-D and metsulfuron • Paddy melons have hairy and waxy leaf surfaces that are hard to wet and penetrate when applying herbicide
Mimosa bush	*Vachellia farnesiana*		• March—May • Basal spray – spray around base of plant to 30cm with Triclopyr 240 g/L + Picloram 120 g/L (Access™). Rate: 1.0 L per 60 L of diesel • Residual herbicide: Graslan granules: (7 g) for every 1 m height of plant applied at the base
Spiked Malvastrum	*Malvastrum americanum*		• Physical/manual control • Foliar spray with Glyphosate (360g/L)
Wild lettuce	*Lactuca seriola*		• June—August • Foliar spray with Glyphosate at early growth or rosette stages in spring, summer or autumn

Mereenie (MRN) OL4—Field/CTP/ESS/Camp Bushfire Management Plan 2022

This Plan operates in conjunction with the *Mereenie Emergency Response Plan*

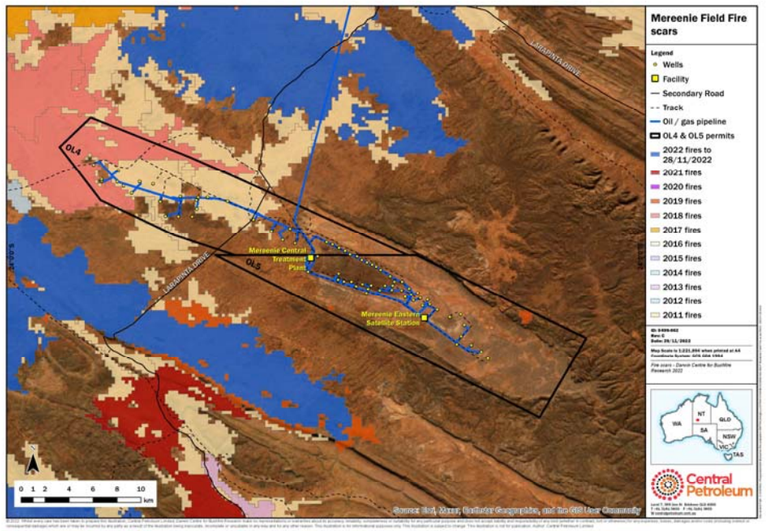
Central Petroleum Mereenie Field	
Property land uses	CP operates the Mereenie under OL4 and OL5 issued under the *Petroleum Act 1984*
NT Fire Management Zone	Alice Springs
NT Fire Protection Zone	The MRN is not located within a NT Fire Protection Zone
Aim	To minimise the potential and impact of fires from CPs activities to people, environment, culturally significant sites, public infrastructure and community lands.
Objectives	Minimise the risk of causing bushfires from CP's activities and to prevent accidental fire risk and ensure safe storage of chemicals
Plan Owner	Risk and HSE Manager

	Contact Details	Name
Bushfire Officer	Mereenie Production Supervisor	

Stakeholders	Contact Details
Emergency	000
Bushfire NT	08 8973 8876 (Katherine) 088952 3066 (Alice Spring)
NAFI	www.firenorth.org.au/nafi3/
Bureau of Meteorology	www.bom.gov.au
NT Fire Incident Map	www.pfes.nt.gov.au/incidentmap/
Secure NT	securent.nt.gov.au/alerts
Central Land Council	08 8951 6211
Watarkka NP Ranger Station	08 8956 7460

SEASONAL BUSHFIRE WORKS CALENDAR

Month	Bushfire risk	Activities	Month	Bushfire risk	Activities
Jan	High	• Monitor conditions • Fire Danger Period actions • Fire Ban Day actions	Jul	Low	• Map critical functions • Identify threats • Assess risks
Feb	High	• Monitor conditions • Fire Danger Period actions • Fire Ban Day actions	Aug	Low	• Update plans • Check fire fighting capabilities • Reduce hazard—start
Mar	Medium	• Monitor conditions • Fire Danger Period actions • Fire Ban Day actions	Sep	Medium	• Reduce hazard—end • Test emergency plans
Apr	Medium	• Monitor conditions • Fire Danger Period actions • Fire Ban Day actions	Oct	High	• Monitor conditions • Fire Danger Period actions • Fire Ban Day actions
May	Low	• Repair and replace assets	Nov	High	• Monitor conditions • Fire Danger Period actions • Fire Ban Day actions
June	Low	• Improve resilience	Dec	High	• Monitor conditions • Fire Danger Period actions • Fire Ban Day actions



FIRE MANAGEMENT ZONES Actions	
Low Fuel Zone (4m)	• Remove fire fuel load if bushfire risk is high • Use manual/mechanical removal, burns are not the preferred option
Fire Break Zone (4m)	• Only diesel vehicles to be used • Store chemicals in designated areas • Sufficient fire fighting water is available during projects activities • No open flames or fires outside of designated areas (inclusive of flare pits) • Remove vegetation from bare earth fire break area • Use manual/mechanical removal, burns are not the preferred option
Cleared Access Track	• Remove vegetation from bare earth tracks • Maintain 4m exclusion zone
Flare (CTP/ESS/wells)	• Flare is operational 24hrs

BUSHFIRE MANAGEMENT

Plan

Map Critical Functions	• Review emergency management structure • Contact and collaborate with neighbours
Identify Threats	• Identify local site conditions and fuel loads • Identify bushfire threats to operations and assets
Assess Risk	• Conduct fire mapping (annual) • Develop fire fuel load reduction program • Proper storage of flammable chemicals • Vegetation stockpiles are placed at safe distances from potential ignition sources • Update risk assessment
Update Plans	• Update Bushfire Management Plan and Emergency Response Plan

Prepare

Check Fire Fighting Capability	• Inspect and test critical equipment • Identify staging areas for emergency equipment • Fire fighting equipment located in every vehicle. • Train staff
Reduce Hazard	• Fire fuel load reduction manual/mechanical removal • Controlled burns is not the preferred option • Maintenance of fire breaks and fire access tracks (as required)
Test Emergency Plans	• Conduct fire drills (desktop/physical) • Conduct incident and emergency training with partners

Respond

Monitor Conditions	• Check NAFI (daily) • Monitor sources of ignition (daily)
Fire Danger Period	• Permit to burn required • Check fire danger status (daily)
Fire Ban Day	• No burns • Flare is operational 24hrs for process safety events (increase monitoring)

Recovery

Repair and Replace Assets	• Repair and replace damaged assets
Improve Resilience	• Review and improve asset standards for buildings and infrastructure • Review incident responses

BUSHFIRE RESPONSE—ERP

Actions

Move Away	• Move yourself and others away from danger
Raise Alarm	• Raise alarm on field radio *UHF Channel 1* /SOS alarm on tracker/ phone • Notify emergency services • Activate alarms and muster, as required
Gather Information	• Fire location • Wind direction • Wind strength • Size of fire • Type of fire • Any injured/missing personnel
Mobilise SERT	• Mobilise Site Emergency Response Team (SERT) if additional resources are needed • The control of a bushfire rests with the Rural Fire Brigade until the fire reaches the site boundaries • If fire breaks are crossed, the SERT leader shall review what plant must be shut down or additional fire breaks be prepared
Notify	• Neighbours in surrounding properties
Monitor	• Weather information • Wind direction • Local fire information/NAFI • Road condition reports

BUSHFIRE MANAGEMENT CONTROLS		
Site Activity	**Key Risks**	**Management Controls**
Civil activities/earthworks Vehicle and equipment movement	• Ignition sources	• Conduct bushfire related risk assessment before flaring and on each day during a flaring event. • Store flammable and combustible liquids according to the relevant Australian Standards • All infrastructure, plant and equipment designed, constructed and operated and maintained to minimise risks of ignition • Appropriate fire management and control equipment available in every vehicle and at each facility (e.g. fire extinguishers, water supply etc) • Train onsite personnel in use of fire control equipment • Conduct Job Hazard Analysis for any new task or new use of equipment to ensure appropriate control measures are identified and to take account of variation in fire danger ratings • Prior to attending site, each day obtain information on current fire danger, presence of fire in the area and current weather condition from the North Australia & Rangelands Fire Information (NAFI) and bureau of meteorology websites • Flammable material to be stored on the well lease according to SDS and Code requirements. 4m clearance area between flammable material storage and well lease boundary. • Bare earth roads and laydown areas • Only diesel vehicles to be used • No open flames or fires outside of designated areas • Place stockpiles away from ignition sources and in low profile mounds • Maintain fire access trails • Sufficient water to be available on site to enable CP to provide an initial response to an accidental fire at the well lease • Inductions to include fire risks, hazardous zones, controls and emergency response procedures • If fire detected, implement emergency response plan • Follow directions given by Operations under the Emergency Response Plan • Fire breaks are maintained across the field to prevent fire spread to other land and to protect key infrastructure. • Roads and access tracks also act as fire breaks as most are more than 4m wide • The well leases at Mereenie are large and will not be fully occupied by equipment. The well lease itself therefore forms a fire break.
Flaring and emergency venting	• Ignition sources	• Permit to burn is required during the Fire Danger Period (generally November to March for Southern NT). Obtain permit from Bushfires NT. • Conduct bushfire related risk assessment before flaring and on each day during a flaring event. • Sufficient water to be available on site to enable CP to provide an initial response to an accidental fire at the well lease
Land management	• Fuel load management • Unpredictable rainfall	• Conduct Job Hazard Analysis / obtain Permit to Work for any new task or new use of equipment to ensure appropriate control measures are identified and to take account of variation in fire danger ratings • Permit to burn is required during the Fire Danger Period (generally November to March for Southern NT). Obtain permit from Bushfires NT. • Conduct bushfire related risk assessment before flaring and on each day during a flaring event at well sites • Maintain a fenced and cleared area around the CTP flare pit • Assess fire fuel load and local site conditions (e.g. seasonal rainfall, fuel load, grazing, high fuel exotic grasses (e.g. buffel) at each wellsite nominated for EMP activities and remove fire fuel load if bushfire risk exists. • Place stockpiles away from ignition sources and in low profile mounds • Maintain fire access trails using previously cleared and disturbed areas • Annual fire mapping to monitor changes to fire frequency in the MRN • Fire breaks are maintained to a distance of 4m to prevent fire spread to other land and to protect key infrastructure. • Roads and access tracks also act as fire breaks as most are more than 4m wide • Burns are not the preferred method of fuel load reduction at an oil and gas site.
Personnel Smoking	• Ignition sources	• Designated smoking areas with appropriate waste receptacles • Appropriate fire management and control equipment available in every vehicle and at each facility (e.g. fire extinguishers, water supply etc) • Train onsite personnel in use of fire control equipment

Mereenie Field—Rehabilitation Management Plan

CP Rehabilitation Officer	Position
	Environmental Specialist

Location of the Mereenie Field

Property land uses	Gas exploration , production and pastoral activities
Climate	In general, Mereenie OL4 experience an arid to semi-arid climate, which is characterised by hot dry summers and cool dry winters with a low average annual rainfall. Typically, more rainfall occurs in the summer months associated with monsoonal influences; however, the amount of rainfall in the arid zone has a history of being highly variable.
Site Description (pre-disturbance)	The Mereenie Field has the following three land systems: • Simpson (covers 45% of Mereenie Field)–. Extensive dune fields with hard spinifex pastures. Red sands to red clayey sands and locally red earths. Low erosion hazard. • Gillen (covers 45% of Mereenie Field) – Sandstone mountains with mulga or witchetty bush country. Shallow stony or gravelly soils and some red sands or red clayey sands. Moderate erosion hazard. • Krichauff (covers 10% Mereenie Field) - Flat lying sandstone, silt-stone, and conglomerate. Shallow stony or gravelly soils and some red sands or red clayey sands. Moderate erosion hazard.

Environmental Strategies and timing

Activity	Strategies	Timing
Analogue sites	Identify appropriate analogue sites for each of the disturbance areas	After the first wet season in conjunction with the first monitoring event
Post Decommissioning	• Remove above ground infrastructure • Remove rubbish • Backfill sumps / pits to ground level • Re-spread vegetation previously cleared	Commence within 12 months of well being decommissioned
Land use	The final land use options will be determined in consultation with the landowners and other relevant stakeholders and may include: • Pre-disturbance land use • Pastoral activities • Tourism related activities • Conservation (reserve or park)	Commence within 12 months of well being decommissioned
Soil Stability	Remove any flow concentration points that may block overland sheet flow Re-instate natural drainage channels (i.e. removal of bunds and structures that temporarily altered flow paths) Return soil profile with topsoil replaced as final layer where possible Deep ripping and contouring of access roads, well leases and camps to as close to natural landform as possible Ensure all cleared areas have a rough surface to aid in water, seed and litter catchment Erosion and sedimentation devices installed and maintained as per the ESC Plan	Commence within 12 months of well being decommissioned
Contaminated soil	Undertake remediation of contaminated soil in accordance with spill management plan / emergency response plan	Remediation of contamination to be undertaken immediately.
Revegetation	Revegetation of decommissioned areas is undertaken post soil stability. Where possible natural regeneration of areas will be promoted. If there is limited materials to promote regeneration then seeding a cover crop may be used to assist in soil stability until pioneer species emerge. Where natural regeneration requires assistance seeding of native plants will be undertaken.	Leases commence within 12 months of case / suspend or decommissioned Facilities commence within 12 month of the equipment being decommissioned Camps / access tracks commence within 12 months of infrastructure no longer being required
Monitoring	All monitoring to be undertaken by a suitably qualified person and in accordance with this Plan	Refer to the rehabilitation measurement criteria and monitoring program

Rehabilitation Objectives

The objectives of this rehabilitation management plan are to:

- Minimise disturbance as far as reasonable practicable
- Progressively rehabilitate significantly disturbed land which is not required for ongoing activities
- Return all disturbed areas to a safe and stable landform as close as possible to the surrounding environment
- Ensure significantly disturbed land is re-established to its pre-disturbed condition and land use
- No residual contamination
- No land management issues for future land managers.

Actions for successful Rehabilitation

Prior to and during operations, activities are undertaken to improve the success of rehabilitation these include:

- Utilisation of a multi-criteria assessment (inclusive of rehabilitation objectives) to select a preferred location
- Completion of pre-disturbance surveys
- Preparation of maps defining boundaries of different rehabilitation manage-ment areas or zones and infrastructure
- Topsoil is stockpiled onsite around the edges of the lease in low profile mounds (<2m) to preserve the biological activity
- Vegetation stockpiled separately on the edge of the lease preserved for seed bank, habitat and erosion protection
- Erosion and sediment devices are put in place as per the ESCP
- All wastes managed per the EMP
- Weed management plan implemented.

Rehabilitation Risks

Key Risks	Controls
Drought — impacting the establishment of rehabilitated vegetation	• Time rehabilitation actions to coincide with the beginning of the wet season, to ensure access to the site and maximise the establishment period of vegetation over the wet season • Re-spread topsoil across the site to utilise the local seed bank • Ongoing monitoring to identify if further seed inputs are required • Collection of seed from the local area to ensure seed stock is suited to the climatic conditions of the site.
Fire—impacting revegetation	• Establish a mix of perennial and annual grass species • Ongoing monitoring to determine fire impacts on revegetation. • Ongoing monitoring to determine if further seed inputs are required
Grazing —impacting revegetation	• Establish a mix of perennial and annual grass species • Re-spread timber with top soil • Ongoing monitoring to determine pest species grazing impacts on revegetation. • Ongoing monitoring to determine if further seed inputs are required • Ongoing monitoring to determine if fencing is required
Lack of topsoil and soil inversion—impacting rehabilitation success	• Soils are to be returned to pre-disturbance soil profiles • Topsoil spread over the entire lease evenly. • Topsoil may need to be made or brought in if there is a lack of topsoil
Exposed Ground — leading to an increase in weed establishment and/or erosion	• Remove windrows and topsoils • Respread of topsoil and vegetated matter across the site • Annual weed surveys of rehabilitated area once rehabilitation is established • Control of any weed incursions

Seasonal Rehabilitation Calendar

Mo	Season	Activities	Mo	Season	Activities
Jan	**Wet**	• Revegetation • Broadcasting seeds • Collection of seeds	**Jul**	**Dry**	• Decommission and remove non-essential infrastructure • Install ESC for new infrastructure • Establish analogue sites for new infrastructure
Feb	**Wet**	• Revegetation • Broadcasting seeds • Collection of seeds	**Aug**	**Dry**	• Decommission and remove non-essential infrastructure • Install ESC for new infrastructure • Establish analogue sites for new infrastructure
Mar	**Wet**	• Revegetation • Broadcasting seeds • Collection of seeds	**Sep**	**Dry**	• Decommission and remove non-essential infrastructure • Install ESC for new infrastructure • Establish analogue sites for new infrastructure
Apr	**Wet**	• Repair ESC controls • Weeds survey and management • Collection of seeds	**Oct**	**Transition**	• Decommission and remove non-essential infrastructure • Install ESC for new infrastructure • Establish analogue sites for new infrastructure • Prepare rehabilitation areas for wet season
May	**Transition**	• Repair ESC controls • Weeds survey and management • Collection of seeds • Complete rehabilitation annual monitoring	**Nov**	**Wet**	• Check ESC controls • Prepare rehabilitation areas for wet season
June	**Transition**	• Repair ESC controls • Monitor and prepare for bushfires	**Dec**	**Wet**	• Revegetation • Broadcasting seeds • Collection of seeds

Decommissioning and Rehabilitation Process

Asset	Specific activities to the asset	General activities across all assets
Lease pad and wellhead	• All decommissioning activities will be conducted in accordance with the Code compliant and accepted WIMP and WOMPs for each well. • The wellhead is removed, the casing cut per the Code of Practice: Surface cement plug detailed in B.4.15.3: Cement plug requirements and validation methods. A steel marker plate installed to identify the well and details per the Code of Practice.	• Any imported gravel material is removed and returned to the source quarry or utilised elsewhere on CP operational sites • The site is re-contoured as close as possible to the pre-existing natural landscape • Hardstand is deep ripped to relieve compaction, encourage infiltration and water retention • Topsoil is respread evenly over the lease area and lightly scarified to encourage moisture retention and seed capture • Vegetation is respread over the lease, this acts as erosion control, provides habitat and promotes natural revegetation • Any weeds or invasive species are managed per the weed management plan during the rehabilitation process • Temporary erosion and sediment controls to support the rehabilitation designed and installed where required • All waste removed from site • If natural revegetation success is low, seeding may be required, this will be assessed through the monitoring program.
Ponds and dams	• Remove the contents of the dam to a licenced facility (on-site or offsite) • Remove the liners from the Dam and dispose of appropriately • Test for any contamination of soils beneath the liner systems (remove any contaminated material) • Fill in the void utilising stockpiled materials	
Facilities (compressors, inlet facilities, metering facilities, warehouses and offices)	• Recycle building materials where possible • Look for re-use options or sale option for equipment • Cement foundations are beneficially re-used or disposed of properly • All services are blinded and left safe or removed	
Pipelines (aboveground)	• Aboveground steel pipelines are recycled • Cement pilings for aboveground pipelines are recycled or disposed of properly	
Camp	• All services are blinded and left safe or removed • Sewage treatment facility is removed for re-use or sold on • Camp units are removed re-used or sold on.	

Mereenie OL4 Rehabilitation Management Plan—Rehabilitation measurement criteria and monitoring Program

CP Rehabilitation Officer	Contact Details	Name

	Acceptability Criteria			Annual Monitoring Program				
Rehabilitation Outcome	**Endpoint(s)/Performance Standards**	**Measurement Criteria**	**Rational**	**Frequency**	**Proposed Methodology (adaptive depending on seasonal conditions)**	**Rational**	**Corrective Actions**
• The vegetation composition (e.g. type, density and maturity) of the rehabilitation is recognisable as the target vegetation community and indistinguishable from the surroundings. • The vegetation structure of the rehabilitation is recognisable as, or is trending towards the target plant community. • No adverse erosion	• Dominant species in analogue sites are represented in rehabilitated areas • Community structure is substantially the same as the analogue site/s groundcover, shrubs and trees • Perennials have established, stabilising soils and reducing erosion potential • Habitat structures and habitat quality are substantially similar to analogue sites, creating connection to the adjacent landform and vegetation allowing for fauna re-use of the site • Completely stable (or in dynamic systems such as dunal landforms, same degree of stability as surrounding terrain)	• Ground cover - 75% foliage cover and density of the analogue site • Perennial Cover- recruitment of woody perennial species achieves 75% of the analogue site • Plant species richness and abundance achieves 75% of the analogue site • No declared weed species under the Northern Territory Weeds Management Act • No weed species • 50% of the organic litter and coarse woody debris of the analogue site • No evidence of soil subsidence and <2% erosion across the site (qualitative – photo evidence of scarring, rill/sheet erosion)	• Cover equivalent to 75% of the analogue site/s is likely to self-sustain over time and rehabilitated areas become ecologically integrated with surrounding areas • Species richness shows the rehabilitation site is able to support the full complement of species from analogue sites, even if not all species are yet at the same abundance, noting that in an arid environment, species such as spinifex grow extremely slowly • In arid regions soil stability is critical for the success of rehabilitation	• Annually, commencing after the first wet season, and noting the following: • The Amadeus Basin is located in an arid region and establishment of vegetation generally is slower than areas with higher rainfall. Therefore, it is unlikely that quantitative assessments will provide meaningful data to determine rehabilitation success in years 1, 2 and 3 • In year 1 the analogue sites will be set up, the photo monitoring points will be established and the permanent woody species transect will be established. The site will be assessed for stability and any weed issues. • 2 and 3, if there is no evidence of vegetation regeneration but the sites appear to be stable, and free from erosive forces or fire effects, a visual assessment only of cover and structure will be made. • In year 4, and year 5 monitoring against endpoints will be undertaken. An adaptive approach will be taken year on year for the monitoring. A suitably qualified person may adapt the monitoring based on the seasonal conditions (i.e the wet season). This will be documented in the annual rehabilitation report. • Post 5 years the EMP will need to be updated and the data collected will be used to update the new rehabilitation plan.	**Year 1** • 2 or more analogue sites in nearby undisturbed vegetation community and landforms as per the analogue definition and selected by a suitably qualified person • Establish permanent 100x4m woody species transects • Establish photo monitoring and collect photos • Record any weather events during the period • Check for subsidence across the rehabilitated area • Assess the % of erosion across the rehabilitated area. • Check for any loss of topsoil through erosion and map areas of concern • Check for soil inversion issues and map areas of concern • Weed Survey **Year 2 and Year 3** • Check for integrity of works and ability for future rehabilitation success • Record any weather events during the period • photo monitoring • Check for subsidence across the rehabilitated area • Assess the % of erosion across the rehabilitated area. • Check for any loss of topsoil through erosion and map areas of concern • Check for soil inversion issues and map areas of concern • Weed survey **Year 4** • Woody species transects from the permanent 100x4m • Collect 1x1 m ground cover quadrants every 10m along a transect. Transect to be randomly selected • Photo monitoring collected • Record any weather events during the period • Check for subsidence across the rehabilitated area • Assess the % of erosion across the rehabilitated area. • Check for any loss of topsoil through erosion and map areas of concern • Check for soil inversion issues and map areas of concern • Weed survey **Year 5** • Woody species transects from the permanent 100x4m • Collect 1x1 m ground cover quadrants every 10m along a transect. Transect to be randomly selected • Photo monitoring collected • Record any weather events during the period • Check for subsidence across the rehabilitated area • Assess the % of erosion across the rehabilitated area. • Check for any loss of topsoil through erosion and map areas of concern • Check for soil inversion issues and map areas of concern • Weed survey	• As per the Code of Practice A3.9 (b) the rehabilitation plan should be appropriate to the scale and nature of the activity. In CPs experience operating in the Amadeus Basin, which is an arid region the establishment of vegetation takes time. In CP experience it takes 10+ years for sites to reach the rehabilitation outcomes. The rehabilitation plan has been developed to meet the scale and nature of the rehabilitation (i.e. size of the disturbance and the time to rehabilitation) • As per the Code of Practice A3.9 (e) Regular maintenance and at least yearly monitoring of rehabilitated areas must take place to measure compliance with the Rehabilitation Plan. Rehabilitation success relies on good site preparation and rainfall and an adaptive approach for monitoring is required to take in the seasonal conditions. This will rely on a suitably qualified person to assess the seasonal variations and match the appropriate monitoring to undertake each year. This could include the use of technical advances like drones, satellites, remote sensing and lidar to assess the site stability and vegetation cover. • The quantitative data is of significant value as the rehabilitation matures and reaches the acceptability criteria. In addition, the year on year growth in an arid environment is slow and therefore yearly monitoring of all parameters is not necessary. The key is to assess if the site is on the right trajectory to achieve the acceptability criteria, which aligns with the adaptive management approach.	• Weeds impacting revegetation success – implement the weed management plan • Pest species impacting the rehabilitation success – Identify the pest species and put in place measures to protect the rehabilitated areas (e.g. fencing) • Poor vegetation germination/re-growth is limited in richness/ or community structure inconsistent with the analogue site – Infill seeding and/or top dress with a soil additive/topsoil or fertilise • Erosion and sediment control remediation of failed erosion and sediment controls • Review the re-profiling of the site to address any stabilisation issues. Undertake earthworks for re-profiling as necessary

Mereenie Field—Wastewater Management Plan

WWMP Owner	Operations Manager

CENTRAL PETROLEUM MEREENIE FIELD	
Property land uses	CP operates the MRN under OL4 and OL5 issued under the *Petroleum Act 1984*
Site Description	The Mereenie field is an oil and gas field located west of Alice Springs in a remote part of the Northern Territory. The field commenced production in the 1980's and contains 73 wells, out of which only 43 are active.
Wastewater Management Plan	
Purpose	To manage the wastewater to minimise environmental risks and impacts
Objectives	To manage wastewater in the following hierarchy: 1. Avoid: Eliminate or substitute an activity that results in wastewater 2. Reduce: lower the generation of wastewater as part of a process or activity 3. Reuse: beneficial re-use of wastewater for another purpose without treatment, or with minimal treatment 4. Treat: bring wastewater back into use through treatment to improve water quality or to make quality suitable for disposal 5. Dispose

WASTEWATER STORAGE/TRANSFER/TREATMENT	
Facility	**Contents**
Transfer lines	• Oily water • Oil
CTP evaporation pond	• Production water • Process water • Interceptor pond
ESS evaporation pond	• Production water from plant • Process water
Grizzly pond	• Production water from CTP pond
Workover tanks (wells)	• Flare pit

WASTEWATER SOURCES				
Activity	**Type**	**Quantity**	**Target Quality**	**Management Method**
Workover fluid (Groundwater mixed with KCl and biocide)	Workover fluid	0.1 ML/well	• pH: 6-10.5 • KCl: 2-5% • Biocide: 0.02% • Conductivity: 8-30 mS/cm	During workover program: • Store onsite in tanks • Re-use After workover program: • Dispose in evaporation pond or offsite facility
Pigging/ flowline maintenance	Produced water Oily water/oil/ condensate	20kL/event	N/A	Dispose in ESS/CTP evaporation pond via ESS/CTP separation systems
Hydrostatic test water	Hydrostatic test water	2,000 L	As per source water quality (commercially supplied freshwater)	Dispose in ESS/CTP evaporation pond
Processing plant	• Oily water • Produced water	• CTP: ~8-12ML/yr • ESS: ~0.4-1 ML/yr	N/A	Dispose in ESS/CTP evaporation pond , via interceptor systems
Vehicle washdown	• Oily water • Silt	Est. 100 kL/year	N/A	Dispose in CTP evaporation pond via interceptor systems for evaporation

WASTEWATER RISKS	
Key Risks	**Controls**
Subsurface loss of contaminants during workovers	• Wells are designed with multiple barriers in place • Groundwater monitoring program to detect potential loss of containment
Spill or leak from the use, transportation, treatment, handling and storage of, workover fluids and wastewater	• Store liquid wastes (other than workover fluid) in a secured container within a bunded area • Monitor workover tanks daily or once per 12 hour shift • Promptly repair drips and leaks • Transport hazardous material within the NT by a licensed NT EPA contractor • Where applicable, place pumps, tanks and transfer lines within suitably bunded areas
Loss of containment (including spills, leaks or seepage), including during wet season	• Maintain freeboard of 500mm • Asset integrity management system which includes: – Leaks/spills inspections and repairs when detected – Check and maintain fittings and equipment – Report spills, leaks or points of excessive wear, for maintenance and repairs • Provide portable spill containment equipment and response (e.g. spill trays) where appropriate
Loss of containment from evaporation pond	• Lined pond • Asset integrity assessment • Daily monitoring of minimum freeboard—500mm • Daily monitoring of inflows from processing plants
Fauna death or injury	• Limit fauna interaction through installation of fencing to prevent large fauna access • Fauna egress matting provided for each pond • Visual monitoring for evidence of fauna access

WASTEWATER MONITORING PROGRAM AND RECORDS				
Type	**Requirements**	**Frequency**	**Parameters**	**Records**
Baseline soils	0.6m deep soil cores from 2 locations across the well site, adjacent to: • Storage / mixing tanks • Flare pit	Prior to civil works for the well lease occurring	• Permeability • Particle size • Total chlorides • Exchangeable sodium • Emmerson aggregate test	• Soil analysis data
Stored water	• Measure groundwater volume extracted from bores via flowmeter • Measure groundwater quality from bores • Third party supplied water – volume and quality to be supplied by provider	**From Bore** • Volume – as extracted • Quality – minimum one sample prior to use **Third party supplied** • Prior to delivery	**From Bore** • Volume • Quality – as per Table 6 of the Code **Third party supplied** • As required by supplier	• Groundwater volume extracted • Groundwater quality analysis data • Third party supplied water – volume and quality
Workover formation water	• Measure quantity (estimate based on actual workover data) • Measure quality	• Every time wastewater is treated and used • Prior to disposal	• Volume	• Wastewater volumes treated for re-use (equivalent to 'water usage tracking – produced water') • Wastewater volumes generated during workovers If wastewater to be transported and disposed of offsite • Wastewater volume spilled
Rig tanks capacity / integrity	• Analysis of available freeboard within the tank • Visual inspection of integrity of tank	• Every time wastewater is transferred • Daily during workovers • Monthly or after significant rainfall event until rehabilitated • Weekly inspections when in use unless during wet season whereby the frequency is daily	• Volume	• Wastewater volumes transferred to tanks • Tank integrity visual inspections including freeboard availability
Production* evaporation ponds	• Analysis of available freeboard • Integrity inspections • Volume of produced water entering ponds	• Freeboard of production pond inspected daily • Pond integrity monthly • Daily for volume	• Volume • Potential leakage	• Produced water volume entering the evaporations ponds • Wastewater volume spilled
Wildlife / stock / human interactions	• Inspect control measures at tanks and evaporation ponds	• Workovers daily • Other times - Monthly	• Evaporation ponds have fauna egress escapes • Flare pit – temporary fencing intact or fauna egress escapes	• Number of wildlife/stock interactions

* produced water from field is mixed with process water CTP/ESS and from washdown bay etc.

Mereenie (MRN) OL4— Field/CTP/ESS/Camp Spill Management Plan 2022

CENTRAL PETROLEUM MEREENIE FIELD	
Property land uses	CP operates the MRN under OL4 and OL5 issued under the *Petroleum Act 1984*
Aim	To minimise the potential impact of spills from CPs activities to people, environment, culturally significant sites, public infrastructure and community lands.
Objectives	Operate with due care to prevent loss of containment, ensure safe storage and handling of potentially contaminating substances and undertaking effective spill clean- up
Communications	Operations Manager

SPILL SCENARIOS AND MANAGEMENT

Type	Activity	Activity duration	Mechanism	Location	Quality	Approximate Quantity	Key Management Control
Operations	Storage of chemicals in the chemical storage areas (e.g. at the CTP/ESS, workshop, waste storage areas, well sites)	Operations: ongoing	Container rupture Lids / taps not fitted Spill during chemical handling and mixing	Chemical storage Area Portable chemical storage trailer Temporary storage	General use chemicals (e.g. oil, diesel, hydraulic oils degreasers) as per SDS Workover and well suspension fluids	IBCs: 1,000L	• Daily visual checks of the chemical storage area • Secondary containment / bunding • Spill kits available • Minimise quantity of chemicals at well site / temporary locations
	Handling / mixing of chemicals Pigging	Operations: ongoing	Poor handling / mixing practices Poor transfer into tanks Overtopping of tanks	Chemical storage area Chemical loading areas (wells, CTP/ESS, camp)	General use chemicals (e.g. oil, diesel, hydraulic oils degreasers, pesticides, biocide and corrosion inhibitors) as per SDS Workover and well suspension fluids	IBCs: 1,000L	• Handling / mixing performed by a competent person • Visual assessment during mixing / transfers • Daily visual checks of the chemical storage, mixing and loading areas • Mixing within bunded areas • Compacted lease and work areas • Temporary absorbent mats used, where possible • Spill kits available
	Truck/rig/vehicle refuelling	Operations: ongoing	Incorrect refuelling set-up Poor refuelling practices	Operations equipment	As per fuel SDS	100L	• Operators maintain visual contact whilst re-fueling • Spill kits available
	Oil loadout/ Diesel delivery	Operations: ongoing (up to 5x/week)	Fittings failure	Oil loadout	Crude oil and condensate	30,000L	• Operators maintain visual contact whilst re-fuelling. • Spill kits available
	Chemical transportation to / from location outside of OL4 and OL5	Operations: ongoing	Incorrect storage Incorrect loading / unloading technique Traffic incident	Vehicle	As per SDS	200-100L Traffic incident—up to 20,000kg	• Visual assessment during loading and unloading • Spill kits available • Emergency response in the event of a traffic incident
	Operation of flowlines and gathering network across field	Operations: ongoing	Flowline failure	All of field flowlines	Oil, oily water, process and produced water	>1,000L	• Visual assessment of flowlines • Integrity checks as per Asset Management Systems and pipeline integrity programs
	Transfer of waste fluids via truck	Operations: ongoing as required	Traffic incident Fitting failure Tank failure	Vehicle	Oily water, process water, grey water/sewage	300L	• Handling by a competent person • Visual inspections of equipment and fittings • Operators maintain visual contact
Workover	Chemical transfers between tanks and rigs on the well lease	Workovers 10-20 days	Coupling, hosing and pipe failures	Chemical loading area Pipework	General use chemicals (e.g. oil, diesel, hydraulic oils degreasers) as per SDS Workover and well suspension fluids	100L	• Real time monitoring of tank volumes • Daily visual checks during workovers • Well lease compacted • Spill kits available
	Storage of workover fluid in tanks on the well lease	Workovers 10—20 days	Container rupture Lids / taps not fitted correctly	Workover fluid tanks Flare tank / pit[1] Lined pits	Workover and well suspension fluids	Up to 0.10 ML	• Flare pit / tank to have volume markers included to allow quick identification of spills / loss of containment as small as 500L. • Daily visual checks of storage tanks and flare tank / pit during workovers. • Spill kits available • Compacted well lease • Flare pit to be hydro tested before works commence (if required).
	Handling / mixing of chemicals (biocides at wells)	Workovers 10—20 days	Poor handling / mixing practices Poor transfer into tanks Overtopping of tanks	Chemical storage area Chemical loading areas	General use chemicals (e.g. oil, diesel, hydraulic oils degreasers, pesticides) as per SDS Workover and well suspension fluids	100L	• Handling / mixing performed by a competent person • Visual assessment during mixing / transfers • Minimum daily visual checks of the chemical storage and loading areas • Compacted lease and work areas • Temporary absorbent mats used • Spill kits available
	Storage of chemicals in the chemical storage areas (e.g. well sites)	Workovers 10—20 days	Container rupture Lids/taps not fitted Spill during chemical handling and mixing	Chemical storage area Portable chemical storage trailer	General use chemicals (e.g. oil, diesel, hydraulic oils degreasers) as per SDS Workover and well suspension fluids	25L	• Daily visual checks of the chemical storage area • Secondary containment / bunding • Spill kits available • Minimise quantity of chemicals at well site / temporary locations
	Transfer of produced formation water from the wellhead to evaporation ponds via CTP	Workovers 10—20 days	Coupling, hosing and pipe failures	Truck	Produced formation water	10,000L	• Operator monitor transfer from tank to truck • Spill kits available • Compacted well lease

[1] Flare tank to be utilised for routine workovers (ie. < 5TJ/day) and hydrotested flare pit to be utilised for any workovers on wells with over 5TJ/day flow rate

SPILL TIER LEVELS		Spill (L)		
		20-200L	200-2,500 L	>2,500 L
Receiving environment	Bund or contained impervious area	**Internal report**	**Level 1**	**Level 1**
	Onsite lease pad, camp pad, hardstand, plant operating areas (CTP/ESS), road or work area compacted or sealed surface	**Internal report**	**Level 1**	**Level 2**
	Undisturbed permeable surfaces/areas adjacent to lease pads, camp pads, onsite roads where spills have moved beyond the approved activity area	**Level 1**	**Level 2**	**Level 3**
	Sensitive environmental or cultural feature (waterway, drainage lines, wetland, high valued habitat and sacred site) or where the spill has, or has the potential to, cause material or serious environmental harm	**Level 2**	**Level 2**	**Level 3**

LEVEL 1	• Spills can be contained within the disturbance foot print & cleaned up by site personnel with no external involvement • Spills < 200L • Clean-up time generally < 1 day • Examples: diesel spills during fuel transfer, oil spillage during routine maintenance, chemical spills during mixing, and storage, small wastewater spills • ERP not triggered • **Recordable incident**—record internally and notify DEPWS as per *Petroleum (Environment) Regulations 2016*
LEVEL 2	• Spill that may not be completely contained within the site boundary and/or may require additional resources to clean-up • Has not entered sensitive environment or cultural feature • ERP not triggered • Clean-up time <1 week • ERP not triggered • **Reportable incident**—notify DEPWS ASAP but no later than 2 hours after the first occurrence of the incident or after the time the interest holder becomes aware of the incident. DEPWS can be noted via 1800 413 567. Any verbal report to DEPWS must be followed up by a written report from the Project Manager within three days
LEVEL 3	• Spills cannot be contained and require substantial additional resources to clean up or the spill has entered a sensitive environment or cultural feature • Clean-up time > 1 week • ERP triggered • **Reportable incident**—notify DEPWS ASAP but no later than 2 hours after the first occurrence of the incident or after the time the interest holder becomes aware of the incident. DEPWS can be notified via 1800 413 567. Any verbal report to DEPWS must be followed up by a written report from the Project Manager within three days • **Offsite incident—**EPA must be notified of any incident outside of the OL that is causing or threatening to cause pollution as soon as practicable, but no less than 24 hours after becoming aware of the incident. NT EPA Pollution Hotline 1800 064 567.

SPILL RESPONSE		
Actions		
Stop		• Notify the onsite supervisor and request assistance if needed • Ensure all personnel are safe and clear of area -Stay clear of vapour, fumes, smoke and spills • Evacuate and muster (if necessary) • If safe to do so: – Remove any potential escalation factors (e.g. ignition sources etc) – Isolate the spill source • Stop unauthorised access • For larger incidents, emergency services may be mobilised to assist under the Emergency Response Plan (ERP)
Contain		• Review SDS • If safe to do so, contain the spill using onsite containment resources • Distribute spill control and absorbent material around and over the entre spill area, working from the outside to inside
Report		• Report the spill and notify as per spill incident reporting requirements • Gather as much information about the spill as you can including spill source and location, type of waste/chemical, spill area, volume released • Notify neighbours in surrounding properties if required under the ERP
Clean-up		• Clean-up the spill using onsite clean-up equipment (e.g. spill kit materials etc) by: – Recover free liquid – Remove contaminated material and store in the waste storage area • Dispose clean-up materials at licensed waste disposal facility • If clean-up takes longer than one day, use fencing to prevent access by personnel, livestock, and terrestrial fauna • Develop a remediation management plan for contaminated sites
Manage/ Improve		• Investigate the root cause of the spill and implement management actions

Mereenie (MRN) OL4 & OL5

Methane Management Plan 2022

This Plan operates in conjunction with the *Mereenie Emergency Response Plan*

MEMP Owner	Operations Manager

MEREENIE FIELD	
Property land uses	CP operates the MRN under OL4 and OL5 issued under the *Petroleum Act 1984*
Site Description	The Mereenie field is an oil and gas field located west of Alice Springs in a remote part of the Northern Territory. The field commenced production in the 1980's and contains 73 wells, out of which only 43 are active.
Methane Management Plan	
Purpose	To monitor and reduce fugitive methane emissions from oil and gas activities.
Objectives	To reduce fugitive methane emissions through effective detection and management practices across operations activities.

LEAK MONITORING

Inspection Frequency	Leak Detection Instruments
• If a leak is detected at a particular asset the frequency of inspections for the asset will be re-assessed and may be increased based on a risk assessment • Field Operator leak detection: as required as per Asset Management System and Permit to Work requirements (varies from daily to monthly) • Specialist technician inspection of systems for leaks as follows: – Well pad equipment: annually – Low pressure pipelines and fittings: annually – Plant including compressors: annually • Leak detection is only undertaken by appropriately trained and competent personnel • All gas containing equipment will be inspected for leaks within 48 hours of recommissioning / commissioning	Field: Dräger X - am 2500 detector, which features: • Detection of flammable gases and vapours, as well as O2, CO, NO2, SO2 and H2S; and • Detection of methane as low as 500ppm (1% of the lower explosive limit (LEL)). • Calibration as per CP Standard Operating Procedure (bump test prior to use (daily)) Specialist Technician: • Monitored following USEPA Method 21. Monitoring and analysis of leaks conducted using flame ionization (FID) technology and where possible Optical Gas Image (OGI) • Calibration annually by manufacturer and daily by specialist technician

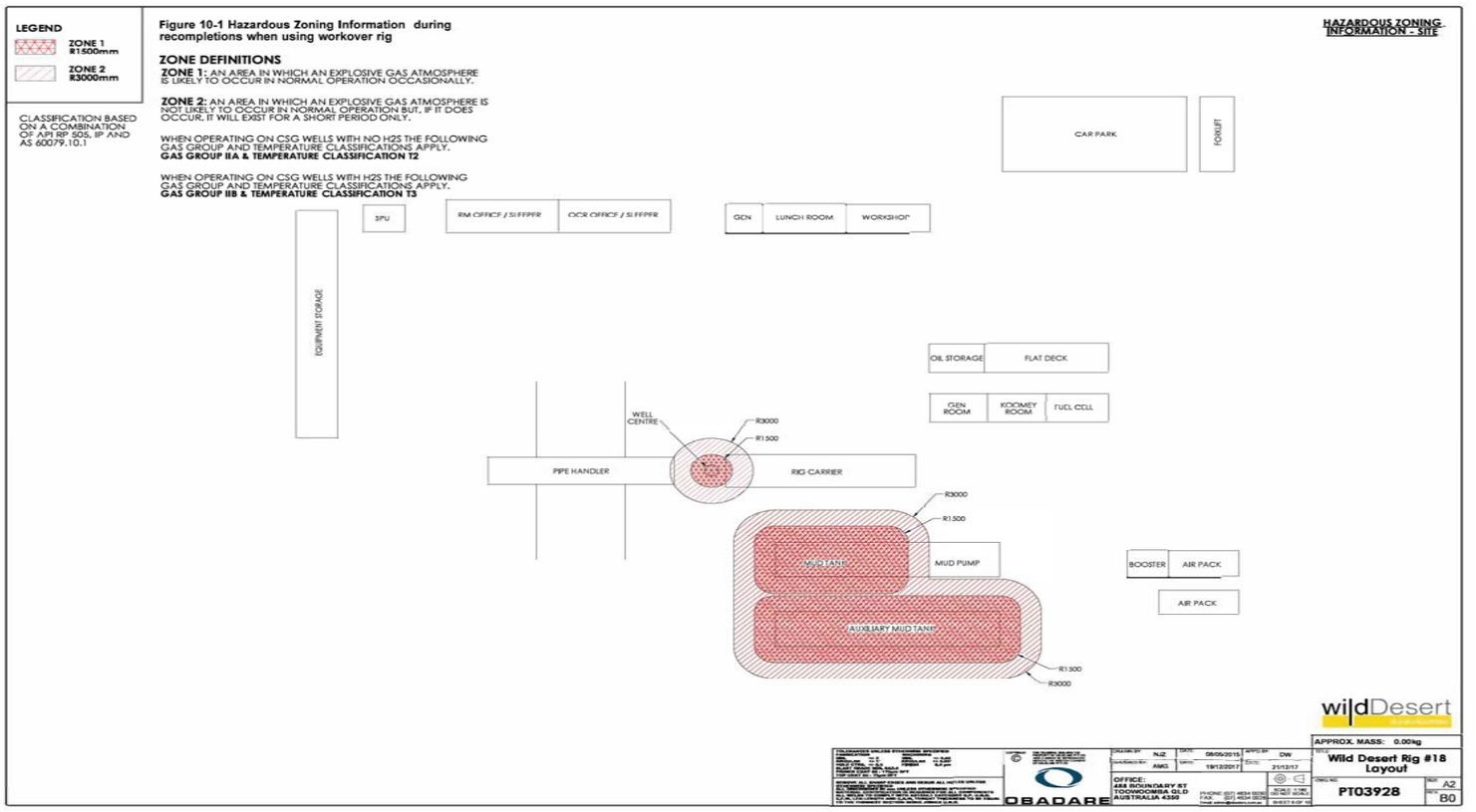
Leak Detection Procedure

Leak detection is undertaken in accordance with the USEPA Method 21. The procedure is as follows:

- Prior to commencing monitoring, calibrate and bump test the gas detector according to manufacturer's recommendation
- Monitoring is carried out at each well site, along the gathering system (vents, drains, metering instruments, manifolds) and within CTP/ESS:
  - Place the probe at the surface of the component interface where leakage could occur
  - Move the probe along the interface periphery while observing the instrument readout
  - Locate the maximum reading by moving the probe around the interface (note that where a leak is detected the operator is to make a determination as to whether it is safe to remain in the area to continue monitoring
  - Keep the probe at the location of the maximum reading for 2 times the response factor
  - Record the reading and source of the leak (if a leak is detected)
- If a leak is detected also record whether it is a minor or significant leak and implement corrective actions
- If a liquid petroleum leak is detected and it is safe to do so, record the estimated volume of leaked liquid and the source of the leak.

RISKS AND MANAGEMENT CONTROLS

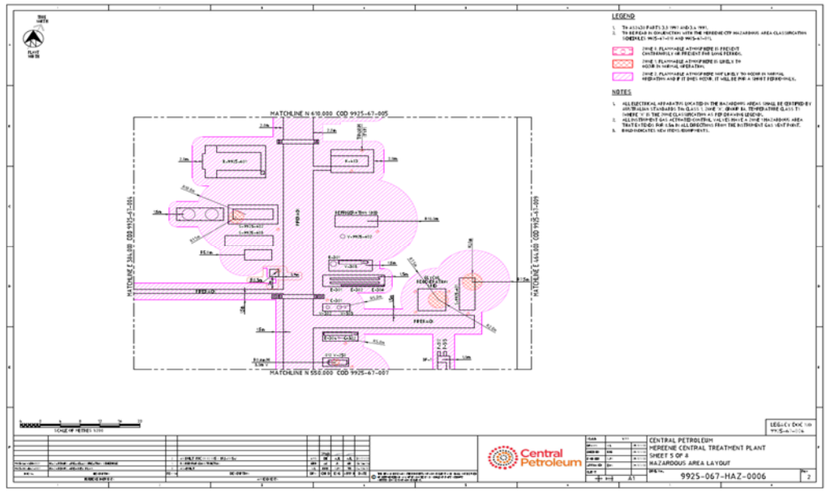
Key Risks	Management Controls	Actions
Fugitive methane emissions during workovers leading to health and safety hazard including adverse environmental impacts	• Wells and associated surface infrastructure is designed to mitigate leaks in accordance with the following standards: – ISO 16530-1-2017 Petroleum and natural gas industries - Well Integrity - Life cycle governance – API SPEC 5CT 2016 Casing and Tubing – API RP 59 2012 Well control operations – API SPEC 6A 2016 Wellhead and Christmas Tree equipment – NORSOK Standard D-010, Well integrity in drilling and well operations – Leak detection implemented consistent with the Code of Practice. – Ongoing well maintenance as per the Well Operations Management Plan.	During workovers, gas will be flared at the wellsite at a maximum rate of approximately 5 TJ per well per day over three days. All residual gas is to be flared and no planned venting is to occur during workovers. There is no planned flaring or venting needed during surface facility activities as gas will bleed to into the gathering lines. Planned and emergency flaring and emergency venting is recorded in the Daily Production Report, which is then included in the Monthly Production report submitted to DPIR .
Fugitive methane emissions during operations leading to health and safety hazard including adverse environmental impacts	• All assets to be managed in accordance with the following to mitigate and response to fugitive emissions and leaks: – Permit to work procedure – Asset maintenance system – Pipeline Integrity System – Standard Operating Procedure (Isolations) – Monitoring as per Code of Practice	No entry to hazardous areas without portable gas detector Specialist monitoring of assets on annual basis including: • Valves, flanges and connectors >10mm ND • Pumps, pressure safety valve (PSV) • Except where inaccessible due to work safety



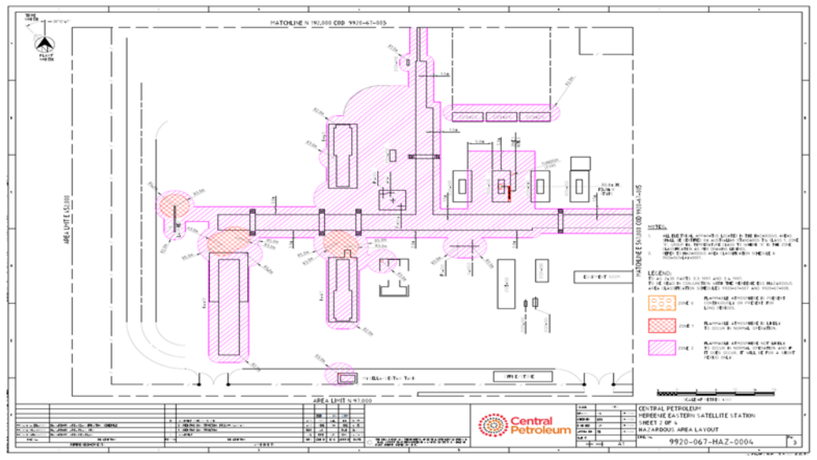
EMERGENCY RESPONSE		
Actions	**Gas Leak (Minor)**	**Gas Leak (Major)**
Move Away	• Move yourself and others away from danger • Establish a perimeter around the affected area, evacuate or restrict access • Arrange for the safe shutdown of plant, equipment, vehicles in the affected area	• Move yourself and others away from danger • Establish a perimeter around the affected area, evacuate or restrict access • Arrange for the safe shutdown of plant, equipment, vehicles in the affected area • The ESD systems provide the main control mechanism for all gas escapes. Do not attempt to disperse or extinguish a gas cloud or fire
Raise Alarm	• Raise alarm on via radio, SOS tracker, phone or in person • Activate alarms and muster, as required	• Raise alarm on via radio, SOS tracker, phone or in person • Activate alarms and muster, as required
Gather Information	• Identify the location of the leak and isolate the affected section of the pipeline, suspend operations if necessary • If a liquid petroleum leak is detected and it is safe to do so, record the estimated volume of leaked liquid and the source of the leak • Establish gas or other testing protocols prior to entering the area or introducing any potential ignition sources e.g. equipment	• Identify the location of the failure and isolate the affected section of the leak, suspend operations if necessary • If a liquid petroleum leak is detected and it is safe to do so, record the estimated volume of leaked liquid and the source of the leak
Mobilise Site Emergency Response Team (SERT)	• Mobilise SERT if additional resources are needed • Determine if any outside assistance is required	• Mobilise SERT if additional resources are needed • Determine if any outside assistance is required
Notify	• Land owner or occupier of the property must be notified if the leak cannot be repaired immediately (from CoP)	• Department of Primary Industry and Resources' emergency hotline number 1 300 935 250 within 24 hours (from COP) • Land owner or occupier of the property must be notified if the leak cannot be repaired immediately (from COP)
Monitor	• Weather information • Wind direction • If safe to do so, monitor the concentration of methane at the surface of the component for a sustained period of approximately twice the response time of the instrument in accordance with USEPA Method 21 (from CoP)	• Weather information • Wind direction • If safe to do so, monitor the concentration of methane at the surface of the component for a sustained period of approximately twice the response time of the instrument in accordance with USEPA Method 21 (from COP)
Repair leak	• Make emergency repairs to eliminate gas escaping from the affected area • Prepare a Permit and work order to finalise after immediate repairs undertaken • All minor leaks must be documented and repaired as soon as practicable, but in any event within 30 days of identification. (CoP)	• If repairs are possible – undertake using caution • The gas leak must be isolated, repaired if possible, contained or otherwise made safe within 72 hours of detection of the leak (from COP) • if the risks of immediately repairing a leak exceed the risk posed by the leak, an extension of the 72-hour deadline may be sought if provided that other measures to mitigate the risk are undertaken (from CoP) • If finalising the remediation is delayed more than 7 business days from the identification of the leak an update must be submitted on that day. The final close out report shall be provided when all work is completed (from CoP)
Incident report	• Prepare and enter information to Incident Management System • Estimate the likely amount of release • If the 30 day deadline being unachievable, the Minister must be notified within the 30 days and provided with the reason for the delay and a target date for completion of the work (from CoP)	• Assign a team member to gather and record information about the leak and the incident timeline • Determine the likely leak volume • A written close-out report must be submitted within 5 business days of the remediation of the leak, specifying the date of identification, nature and level of leak, location and name of the operating plant, and the rectification actions taken (from COP) • CP will cooperate fully with the relevant regulators (from CoP)

EXAMPLES OF HAZARDOUS AREAS FOR OPERATOR LEAK DETECTION

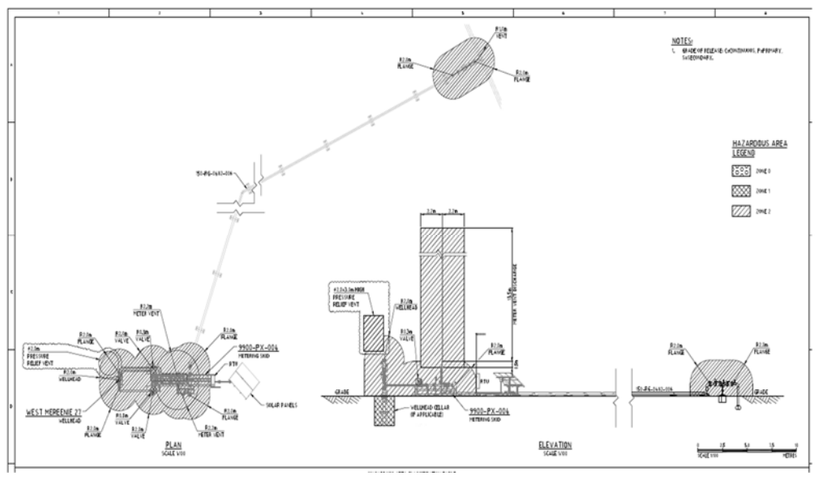
Central Treatment Plant



Eastern Satellite Station



Well



8 Implementation Strategy

This section covers the wider context of the EMP implementation and the requirements common across all environmental and operational aspects of the Mereenie Field. Consistent with our values, The operator is committed to conducting its operations in an environmentally responsible and sustainable manner aligned with community/social expectations. We believe that achieving and maintaining good environmental outcomes is critical to the success of our business.

Details regarding the implementation of environmental management aspects, including specific monitoring and records management are provided in Section 6.2 to 6.9.

8.1 Management system

The operator works under a HSE Management System which contains the policies, procedures, standards and plans which are in place to manage and minimise the impact from its activities. In addition to meeting legal requirements, The operator's activities are also governed by several additional risk focused policies and procedures designed to ensure appropriate industry standards are in place.

8.2 Roles and responsibilities

The Mereenie Field is operated utilising the following management structure, with responsibilities aligned with specific roles detailed in Table 8-1. However, all personnel have a responsibility to operate in a safe and environmentally responsible manner.

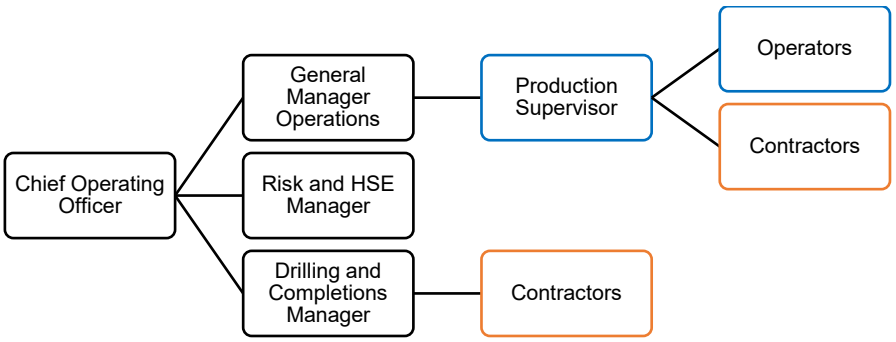


Figure 8-1 Management structure

Table 8-1 Roles and responsibilities

Role	Responsibilities	Activities
Chief Operating Officer	Overall operation of the operator's activities	All
General Manager Operations	Nominated Liaison Officer	Production operations, civil and project activities, support, workovers
Drilling and Completions Manager	Project managing workovers activities	Workovers/Civil and project activities
Risk and HSE Manager	Providing systems, processes and advice to site personnel on the management of risk and the environment.	All
Production Supervisor	Person in charge on-site to operate facilities in a safe responsible manner	All
Operators	Safe operating of the field and infrastructure	Production operations
Contractors	Deliver projects in line with scope and requirements.	Production operations, civil and project, support, workovers

8.3 Training and awareness

The operator's policies and procedures outlines the training and competency requirements of all personnel (staff, contractors and visitors) to ensure they can fulfil their obligations under this EMP. This enables the operator to work effectively in developing and promoting measures to ensure a high level of HSE knowledge and compliance. The key systems and processes to manage compliance with our standards are:

- Compulsory site and HSE inductions

- Contractor pre-qualification processes
- Contractor management system and processes
- Task specific work instructions and competency requirements

A register of training and competencies for the operator personnel, contractors and visitors is maintained for compliance with the operator's management system.

Key requirements of the EMP are included in the training and induction materials. A copy of the EMP is available on site and online to all employees, contractors, and visitors.

A toolbox meeting will be held daily, these are designed for the operator's personnel and contractors to discuss tasks the HSE controls and specific requirements for the day's operations. In addition, given ongoing operations, the operator has implemented a suitable handover procedure for shift changes and crew changes to ensure that relieving personnel are fully aware of their responsibilities and work status. Shift change handovers include the completion of checklists and other specified documentation.

8.4 Emergency preparedness and response

An Emergency Response Plan (ERP) is in place covering the proposed activities within the EMP. The ERP provides a broad framework for managing potential emergency incidents to minimise the potential risk to human safety and the environment, and includes:

- Decision trees and escalation points
- Emergency contacts
- Emergency action guides
- Details of emergency response personnel, equipment and facilities

When conducting workovers, the development of a program specific ERP is completed in conjunction with the workover contractor, however all minimum standards from the field ERP are carried over.

The operator will ensure all personnel, contractors and visitors are aware of the emergency response framework and are trained in emergency response procedures relevant to their role/position.

The operator's emergency management framework is reviewed and updated as part of continuous improvements processes to incorporate the latest information arising from incidents, near misses and emergency simulation training sessions.

8.5 Contractor management

Most of the work undertaken under this EMP will be performed by the operator's personnel using standard work instructions. However, some scopes of work will be undertaken by contractors. Efforts are therefore focused on effective contractor management, to ensure third parties are compliant with the relevant EMP commitment and contractual requirements.

The contract and scope of work are the key mechanisms the operator uses to manage contractors and outline compliance requirements for the contracted activity. Contractors are also provided with:

- Key compliance and system documents
- A list of compliance commitments and responsible person for a specific activity
- A list of inspections, procedures and other tools required to implement the content of the EMP
- Monitoring and reporting requirements
- Hold Points which require a deliverable to be completed prior to entry into a new activity phase (i.e. prior to mobilisation, operation and demobilisation)
- Maps illustrating the approved work zones and any restricted areas

Assurance over contractor performance is undertaken prior to, during and post the scope or activities.

8.6 Monitoring and reporting

8.6.1 Monitoring

Environmental monitoring conducted specific to each environmental aspect is outlined in Sections 6.2 to 6.9.

Any incident identified from our monitoring activities will be captured in incident reporting system and actions will be taken to rectify the incident and prevent its reoccurrence. If incident thresholds are reached a more formal investigation will be undertaken. All personnel are required to proactively report all incidents, and identification of potential hazards not matter how minor to act as an alert and to maintain a program of continual improvement.

All sampling and analyses carried out to meet the requirements of the EMP and the Code will be conducted by suitably qualified and competent persons. Instruments and measuring and metering devices will be maintained and calibrated in accordance with manufacturer's specifications in readiness for use. Calibration of equipment will be prompted and managed via our asset management system with records and evidence, or currency maintained. In addition, and as per the Code, laboratory analyses will be conducted by a laboratory that has National Association of Testing Authorities (NATA) accreditation for such analyses and tests where available or using duplicate samples across independent laboratories where not available and in accordance with Code.

8.6.2 Reporting

All reporting under the *CoP, Petroleum (Environment) Regulations, NT Waste Management and Pollution Control (WMPC) Act 1998, the schedule* and other relevant legislation as they relate to this EMP will be provided as per requirements. Any ad hoc reporting such as reportable incidents, and requests for prescribed documents will be provide as per *Petroleum (Environment) Regulations 2016*.

In addition, reporting is prepared to support national reporting requirements that also support the EMP and the Code requirements, including *National Greenhouse and Energy Reporting Act* and the *National Environmental Protection Measure (National Pollutant Inventory).*

MASP and Brewer Estate

In additional to reporting under the above requirements, reporting of incidents associated with the operation of the MASP will also be accordance with the requirements of the:

- *Energy Pipelines Act 2015*, and
- *Energy Pipelines Regulations 2015*.

8.7 Records management

As per the operator's standard practice, all prescribed environmental records required under this EMP will be maintained in accordance with the *Petroleum (Environment) Regulations 2016* and other relevant legislation. Details of specific records captured to address environmental risks and performance standards are presented in Sections 6.2 to 6.9.

8.8 Management of change

A Management of Change (MoC) process is in place to ensure any changes to activities are appropriately accessed and communicated to ensure no additional unintended risks or impacts are introduced.

The MoC process will only be used when optimising environmental outcomes or to improve operational efficiency where no new regulated activity, risk (including risk level) or impact is introduced. Where a new regulated activity, risk (including risk level) or impact is introduced, then a modification revision of the EMP is required under the Regulations.

8.9 Auditing and assurance

In addition to regular monitoring as set out in this document, audits assessing compliance with this EMP will be undertaken by the operator or third parties prior to, during and upon completion of the activity and at least annually. Any non-compliances arising from regulated activities will be recorded and corrective actions undertaken to address the gaps. These non-conformances and corrective actions will be recorded, tracked, and reported. Any non-compliance with approved conditions will be reported in the AEPR.

8.10 Corrective action, review and continuous improvement

Corrective Actions

The operator's incident management procedures and systems are part of our HSE management systems and are designed to:

- Ensure all incidents and hazards are reported in a standard format so that consistency and accuracy of the process is maintained
- Identify the underlying and basic causes of all incidents and hazards
- Implement corrective/improvement actions to prevent the recurrence of similar incidents and hazards
- Provide information to prepare the incidents and hazards statistics and identify potential trends
- Identify potential suitable corrective actions.

All corrective/improvement associated with incident, hazards, and assurance activities are recorded, tracked and reported. Any overdue actions are followed up and escalated as required.

Review and Continuous Improvement

Implementation of this EMP will be continually assessed and revised as required based on monitoring and assurance results, feedback, change to the proposed work program or a material increase in risk level.

A formal review and resubmission of this EMP will be undertaken every five years.

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10 Glossary and Abbreviations

Abbreviation	Details
2D	2 Dimensional (Seismic Survey)
AAPA	Aboriginal Areas Protection Authority
ALARP	As Low As Reasonably Practicable
APPEA	Australia Petroleum Production and Exploration Association
CD	Conservation Dependent
CE	Critically Endangered
CLC	Central Land Council
Competent person	Means a person who has the necessary ability, knowledge, and the relevant experience to conduct the task or activity
The Operator	Central Petroleum Limited
CSA	Chemical Storage Area
DAWE	Department of Agriculture, Water, and the Environment (Federal), now DCCEEW
DCCEEW	Department of Climate Change, Energy, the Environment and Water
DD	Data Deficient
DEPWS	Department of Environment, Parks and Water Security
DITT	Department of Industry, Tourism and Trade
DotE	Department of the Environment (Federal), now DCCEEW
ESCP	Erosion and Sediment Control Plan
EMP	Environment Management Plan
EMS	Environmental Management System
EN	Endangered
EOPSMC	Environmental Outcome, Performance Standard, Measurement Criteria
EP 115	Exploration Permit 115
EPA	NT Environment Protection Authority
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999
ESD	Ecologically Sustainable Development
GIS	Geographic Information System
Ha	Hectare
HSE	Health, Safety and Environment
HSE MS	Health, Safety and Environmental Management System
ISO	International Standards Organisation
Kg	Kilogram
m	Metre
mm	Millimetre
MCA	Multi Criteria Analysis
MNES	Matters of National Environmental Significance
NAFI	Northern Australia Fire Information
NTD	Near Threatened
NT	Northern Territory
OL3	Operating Licence 3
OL4	Operating Licence 4
OL5	Operating Licence 5
PMST	Protected Matters Search Tool
PPE	Personal Protective Equipment
PSV	Pressure Safety Valve

Abbreviation	Details
SDS	Safety Data Sheet
Significant Rainfall	Any rainfall event over 15 mm in 24 hours
SIMOPS	Simultaneous Operations
SOBS	Site of Botanical Significance
SOCS	Site of Conservation Significance
SSCC	Sacred Sites Clearance Certificate
Suitably Qualified Person	A person who has the professional qualifications, training or skills or experience relevant to the nominated subject matter or task and can give authoritative assessment, advice, and analysis about performance relevant to the subject matter using relevant protocols, standards, methods, literature or conduct tasks in accordance with requirements
TPWC Act	Territory Parks and Wildlife Conservation Act
Vu	Vulnerable
WoNS	Weeds of National Significance

Appendix 1. Environmental Risk Assessment

Table A.1 Risk Assessment

Potential Impact	Causes	Consequence	Inherent Risk			Existing Control Measures (Control Type)	Controls Rating	Residual Risk			Uncertainty Level	Code of Practice	ALARP / Acceptability Rationale
			I	L	R			I	L	R			
Flora and Fauna													
Activities adversely affect Conservation Significant flora and fauna	Civil works, vehicle movements and heavy equipment / rig mobilisation including: Earthworks to re-establish flare pit and construct tank trench/drain Rehabilitation (as it applies to this EMP scope) Unintended introduction and / or spread of weeds and invasive species	Injury or death of conservation significant fauna	Moderate	Possible	Medium	▪ Limit speed on unsealed access roads (administrative) ▪ All personnel attending MRN for operations or workovers will be inducted on speed limits and times to avoid driving (administrative) ▪ Vehicle movements will be planned to minimise the number of trips undertaken e.g., car-pooling for personnel movements (administrative) ▪ Any oversized loads will be accompanied by an accredited pilot (administrative)	Effective	Moderate	Unlikely	Medium	A	Clause A.3.5	Movements take place on in field access tracks, with controls established and operating successfully under a site-based traffic management plan. Consideration was given to reducing the speed limit however the site has been operating with the current limits without any adverse effect recorded. There will only be a small increase in vehicle movements for a short period on-site during work over activities on top of additional operations activities. The controls implemented are aligned with industry practice and are consistent with the Code and ESD principles with activities able to co-exist without any long-term impacts to the local environment. The residual risk has been reduced to the greatest extent possible due to the consequence remaining as moderate if an event did occur. Therefore, we consider this risk ALARP and acceptable in accordance with the rationale provided in Section 6, with no further risk reduction warranted.
		Loss of conservation significant vegetation and fauna habitat	Moderate	Unlikely	Medium	▪ Work conducted in pre-disturbed operational areas only ▪ Permit to work to specify that no clearing of previously undisturbed vegetation to occur (elimination) ▪ Conduct earthworks in accordance with the permit to work (administrative) ▪ Drive on designated vehicle access tracks only (administrative)	Effective	Moderate	Remote	Low	A	Clause A.3.1 A.3.5	Based upon the risk being ranked as a low, the controls being assessed as effective and a scientific uncertainty score outcome of low, the risk is determined to be ALARP and acceptable in accordance with the rationale provided in Section 6, with no further risk reduction possible.
		Increased occurrence of weeds (including WoNs	Serious	Possible	Medium	▪ All vehicles, equipment and machinery from known weed infested areas are to be cleaned and inspected for weeds prior to attending either the MRN (engineering) ▪ Bulk materials imported to site to be declared weed seed free (engineering, administrative) ▪ Implement the Weed Management Plan (elimination, engineering, administrative)	Effective	Serious	Unlikely	Medium	A	Clause A.3.1 A.3.6	No WoNS or declared weeds in MRN so risk of weed spread between well sites minimised. Operational vehicles not exposed to weed zones as most remain on site or southern NT. All vehicles from known weed zones are cleaned prior to site entry and materials inspected & declared weed seed free. Field-wide weed management occurs regularly as part of ongoing operations. The residual risk has been reduced to the greatest extent possible due to the consequence remaining as serious if an event did occur. Therefore, we consider this risk ALARP and acceptable in accordance with the rationale provided in Section 6, with no further risk reduction warranted.

Potential Impact	Causes	Consequence	Inherent Risk			Existing Control Measures (Control Type)	Controls Rating	Residual Risk			Uncertainty Level	Code of Practice	ALARP / Acceptability Rationale
			I	L	R			I	L	R			
	Uncontrolled fires as a result of CTP's activities via: Spill and ignition of flammable substances Loss of containment from the well Uncontrolled ignition source	▪ Injury or death of conservation significant fauna ▪ Loss of conservation significant vegetation and fauna habitat	Serious	Likely	High	▪ Fire breaks around well lease and infrastructure (engineering) ▪ Smoking is only permitted in designated smoking areas (engineering) ▪ Implement methane emission management plan (administrative) ▪ Implement emergency response plan (administrative) ▪ Conduct Job Hazard Analysis for any new task or new use of equipment to ensure appropriate control measures are identified and to take account of variation in fire danger ratings (administrative) ▪ When attending a site conduct daily toolbox meetings to advise on current fire danger, presence of fire in the area and current vegetation condition (administrative) ▪ Inductions to include information on the emergency response plan, designated smoking areas fire extinguisher locations (administrative) ▪ Fire extinguishers available in all MRN vehicles (PPE)	Effective	Minor	Unlikely	Low	A	Clause A.3.5 A.3.7 D.5.1	Based upon the risk being ranked as a low, the controls being assessed as effective and a scientific uncertainty score outcome of low, the risk is determined to be ALARP and 'acceptable' in accordance with the rationale provided in Section 6, with no further risk reduction possible.
	Storage and transportation of domestic wastes	Scavenging by native and pest species Pest outbreaks	Moderate	Unlikely	Medium	▪ Suitable waste containers for waste storage are to be available (engineering) ▪ Waste containers to be fauna and vermin proof (engineering) ▪ Waste storage areas are inside fenced areas to minimise fauna access (engineering) ▪ Each facility is maintained free of rubbish outside waste disposal receptacles (administrative) ▪ All waste is to be stored in waste containers (administrative)	Effective	Minor	Unlikely	Low	A		Based upon the risk being ranked as a low, the controls being assessed as effective and a scientific uncertainty score outcome of low, the risk is determined to be ALARP and 'acceptable' in accordance with the rationale provided in Section 6, with no further risk reduction possible.
	Storage of wastewater at evaporation ponds	Fauna entrapment	Moderate	Possible	Medium	▪ All lined water storages are within a fenced compound (engineering) ▪ Water storages outside the fenced compound are shallow with low gradient bunds (engineering) ▪ Fauna egress matting provided in lined ponds	Effective	Moderate	Remote	Low	A		Based upon the risk being ranked as a low, the controls being assessed as effective and a scientific uncertainty score outcome of low, the risk is determined to be ALARP and 'acceptable' in accordance with the rationale provided in Section 6, with no further risk reduction possible.

Potential Impact	Causes	Consequence	Inherent Risk			Existing Control Measures (Control Type)	Controls Rating	Residual Risk			Uncertainty Level	Code of Practice	ALARP / Acceptability Rationale
			I	L	R			I	L	R			
Land													
Activities adversely affect soils and topography	Movement and use of heavy machinery and vehicles, including during wet season Earthworks for re-establishment of flare pit and workover fluid tank drain/trench, including during wet season Earthworks in relation to civil maintenance activities including during the wet season	▪ Inversion of soil profile ▪ Soil erosion and siltation of watercourses ▪ Soil compaction	Moderate	Unlikely	Medium	▪ Implement erosion and sediment control plan (administrative) ▪ Requirement for erosion and sediment control structures (e.g. berms, sediment fences) is determined during site audits. Where determined from the audit that they are necessary they will be in line with best practice guidelines by DENR and IECA (engineering) ▪ Conduct Job Hazard Analysis for any new task or new use of equipment to ensure appropriate control measures are identified (administrative) ▪ Avoid driving on access tracks for 24 hours following significant rainfall events (i.e. >10mm in 24 hours) (administration) ▪ Site inspections to be undertaken within 5 business days of a significant rainfall event to assess erosion issues (administrative) ▪ Drive on designated vehicle access tracks only (administrative) ▪ Implement Rehabilitation Plan (administrative) ▪ Implement Wet Season Management Plan (administrative)	Effective	Minor	Unlikely	Low	A	Clause A.3.4 A.3.9	Based upon the risk being ranked as a low, the controls being assessed as effective and a scientific uncertainty score outcome of low, the risk is determined to be ALARP and 'acceptable' in accordance with the rationale provided in Section 6, with no further risk reduction possible.
	Loss of containment (including spills or leaks), including during wet season	Contamination of soils	Moderate	Likely	Medium	▪ Asset integrity management system which includes: - Undertake inspection for leaks/spills and rectify where detected (administrative, engineering) - Ensure all fittings and equipment are checked and maintained (administrative, engineering) - Ensure that any spills, leaks or points of excessive wear are appropriately reported, and the necessary maintenance work and control measures undertaken (administrative, engineering) ▪ Provide portable spill containment equipment (e.g. spill trays) at each wellsite (engineering) ▪ Provide spill response kits appropriate for the types of spills possible (engineering) ▪ Implement Spill Management Plan (administrative) ▪ Implement Wastewater Management Plan (administrative) ▪ Implement Wet Season Management Plan (administrative)	Effective	Moderate	Remote	Low	A	Clause A.3.8 C.7.1 C.7.2	Based upon the risk being ranked as a low, the controls being assessed as effective and a scientific uncertainty score outcome of low, the risk is determined to be ALARP and 'acceptable' in accordance with the rationale provided in Section 6, with no further risk reduction possible.

Potential Impact	Causes	Consequence	Inherent Risk			Existing Control Measures (Control Type)	Controls Rating	Residual Risk			Uncertainty Level	Code of Practice	ALARP / Acceptability Rationale
			I	L	R			I	L	R			
	Spill or leak from the use, transportation, treatment, handling and storage of diesel, fuel, oils, including during wet season	Contamination of soil	Moderate	Possible	Medium	▪ Asset integrity management system which includes: - Store minimal volumes of fuels, oils and other chemicals on site while the site is not operational (administrative) - Ensure appropriate measures are in place (e.g. lining, bunding) to prevent fluids or other waste chemical and/or hydrocarbon fluids from contaminating water or land not specifically designated for waste disposal (engineering) - Ensure that where drips and leaks occur, corrective actions are raised, and repairs are undertaken in a timeframe commensurate with the risk of environmental harm escalating if not repaired (administrative) ▪ Implement fuel and chemical handling and storage procedure (administrative) ▪ Site specific risk assessment of road conditions for heavy vehicle transport will be conducted prior to mobilisation on unsealed roads using detailed weather forecasting (administrative) ▪ Provide spill response kits appropriate for the types of spills possible at each facility (engineering) ▪ Follow the appropriate Australian Standards and Code for the fuel / chemical being stored and used at the facility (engineering, administrative) ▪ On-site SDS and handling procedures for fuel / chemicals to be available at each facility (administrative) ▪ Secondary containment of chemicals and hazardous materials as per Code ▪ The required volumes of chemicals plus contingency will be transported to site from offsite locations at the minimum frequency possible to minimise transportation risks while allowing the necessary quantities to be appropriately stored onsite for access as required ▪ Implement Spill Management Plan (administrative) ▪ Implement Wet Season Management Plan (administrative)	Effective	Minor	Unlikely	Low	A	Clause A.3.8 C7.1(b) C.7.2	Based upon the risk being ranked as a low, the controls being assessed as effective and a scientific uncertainty score outcome of low, the risk is determined to be ALARP and ‘acceptable’ in accordance with the rationale provided in Section 6, with no further risk reduction possible.

Potential Impact	Causes	Consequence	Inherent Risk			Existing Control Measures (Control Type)	Controls Rating	Residual Risk			Uncertainty Level	Code of Practice	ALARP / Acceptability Rationale
			I	L	R			I	L	R			
	Release of oily and or saline water, including waste water, to ground, including during wet season	Contamination of soil	Serious	Remote	Medium	**General** ▪ Liquid wastes (other than workover fluid) to be stored in a secured container in a bunded area (engineering) ▪ Ensure appropriate measures are in place (e.g. lining, bunding) to prevent fluids or other waste chemical and/or hydrocarbon fluids from contaminating water or land not specifically designated for waste disposal (engineering) ▪ Ensure that where drips and leaks occur, corrective actions are raised, and repairs are undertaken in a timeframe commensurate with the risk of environmental harm escalating if not repaired (administrative) ▪ Transport of hazardous material within the NT by a licensed NT EPA contractor (administrative) ▪ Any transport across State or Territory borders to abide by the NEPM 2013 guidelines (administrative) ▪ Handle, store and otherwise manage all hazardous goods in accordance with relevant Australian Standards and Codes of Practice (administrative) ▪ Where applicable, ensure pumps, tanks and transfer lines are located within suitably bunded areas (engineering) ▪ Implement Spill Management Plan (administrative) ▪ Implement Wet Season Management Plan (administrative) ▪ Implement Wastewater Management Plan (administrative) **Workovers** ▪ Workover fluid stored in steel tanks surrounded by trench/drain to flare pit. Spills of workover fluid contained to the disturbed operational areas using bunding and immediately managed (engineering). **Aboveground Flowlines** ▪ West Mereenie wells - the flowlines are not co-located with the access track to decrease likelihood of accidental vehicle damage (engineering) ▪ Flowlines have asset protection along the route (fencing, bollards and traffic controls) (engineering) ▪ Site inductions includes information on the location of aboveground flowlines and safe driving conditions to be applied (administrative) **All Flowlines** ▪ Flowline to be constructed in accordance with Australian Standard 2885 (engineering) ▪ Flowline to be pressure tested prior to becoming operational (engineering) ▪ Flowline pressure monitored continuously to detect any failures as they occur (administrative) ▪ Flowline integrity inspections to be undertaken (engineering) **Evaporation ponds** ▪ Minimum 500mm freeboard to be available (administrative) ▪ Pond level to be inspected each quarter and after a significant rainfall event. Where the freeboard is less than 500mm, it is to be reduced by offsite transportation and disposal by a licensed waste transporter (engineering) ▪ Evaporation ponds have a clay liner and a HDPE liner	Effective	Serious	Remote	Medium	A	Clause A.3.8 C.7.1 C.7.2	Based upon the risk being ranked as a low, the controls being assessed as effective and a scientific uncertainty score outcome of low, the risk is determined to be ALARP and 'acceptable' in accordance with the rationale provided in Section 6, with no further risk reduction possible.
	Incorrect waste segregation, storage, handling and disposal (including hazardous	Loss of recyclable resources adding to landfill	Minor	Likely	Medium	▪ Segregate waste to maximise recycling and ensure other wastes are appropriately disposed of (administrative) ▪ Site inductions to include information on correct waste segregation and disposal (administrative)	Effective	Minor	Unlikely	Low	A		Based upon the risk being ranked as a low, the controls being assessed as effective and a scientific uncertainty score outcome of low, the risk is determined to be ALARP and 'acceptable' in accordance with the rationale provided in Section 6, with no further risk reduction possible.

Potential Impact	Causes	Consequence	Inherent Risk			Existing Control Measures (Control Type)	Controls Rating	Residual Risk			Uncertainty Level	Code of Practice	ALARP / Acceptability Rationale
			I	L	R			I	L	R			
	waste), including during wet season					▪ Removal of listed wastes for off-site disposal to be checked and signed by NT EPA approved and licensed contractor (administrative)							
		Soil contamination				▪ Wastes stored in secured containers (engineering) ▪ Liquid wastes to be stored in a bunded area (aside from workover fluid waste which is to be returned to the storage tank) (engineering) ▪ Implement Spill Management Plan (administrative) ▪ Implement Wet Season Management Plan (administrative)	Effective				A	Clause C.7.2	Based upon the risk being ranked as a low, the controls being assessed as effective and a scientific uncertainty score outcome of low, the risk is determined to be ALARP and 'acceptable' in accordance with the rationale provided in Section 6, with no further risk reduction possible.
	Waste generation	Increase waste to landfill and other treatment and or disposal facilities	Minor	Likely	Medium	▪ Wastewater disposed in existing evaporation pond ▪ Segregate waste to maximise recycling and ensure other wastes are appropriately disposed of (administrative) ▪ Site inductions to include information on correct waste segregation and disposal (administrative) ▪ Removal of listed wastes for off-site disposal to be checked and signed by NT EPA approved and licensed contractor (administrative) ▪ Ensure disposal facilities have capacity to accept quantities of waste r	Effective	Minor	Unlikely	Low	A	Clause C7.1(b)	Based upon the risk being ranked as a low, the controls being assessed as effective and a scientific uncertainty score outcome of low, the risk is determined to be ALARP and 'acceptable' in accordance with the rationale provided in Section 6 with no further risk reduction possible.
Cultural Heritage													
Activities adversely affect cultural heritage sites	Earthworks required to re-established flare pit / tank trench/drain Movement of heavy machinery and vehicles within each site Earthworks in relation to civil maintenance activities	Disturbance to cultural heritage sites	Moderate	Unlikely	Medium	▪ SSCC certificates in place and cultural heritage survey of work area previously undertaken (administrative) ▪ Site inductions to include information on location of known cultural and heritage sites and protocol for unexpected finds (administrative) ▪ No earthworks to be conducted after sunset or before sunrise (administrative) ▪ Journey management plan filled in and approved by CP (administrative) ▪ Personnel access to the facility and any site/area by permit approved by the CLC and CP (administrative)	Effective	Moderate	Remote	Low	A	Clause A.3.1	Based upon the risk being ranked as a low, the controls being assessed as effective and a scientific uncertainty score outcome of low, the risk is determined to be ALARP and 'acceptable' in accordance with the rationale provided in Section 6, with no further risk reduction possible.
	Fire as a result of CP's activities	Disturbance to cultural heritage sites	Serious	Possible	High	▪ If fire detected, implement emergency response plan (administrative) ▪ Conduct Job Hazard Analysis for any new task or new use of equipment to ensure appropriate control measures are identified and to take account of variation in fire danger ratings (administrative) ▪ Prior to attending site, each day obtain information on current fire danger, presence of fire in the area and current weather condition from government websites (administrative) ▪ Implement fire management plan (administrative)	Effective	Serious	Remote	Medium	A	Clause A.3.7	Activities are not being conducted in the cultural heritage sensitive areas (exclusion zones), though fire could spread to these areas if fire is out of control. The control measures have reduced the likelihood of the hazard to the greatest extent possible. The residual risk has been reduced to the greatest extent possible due to the consequence remaining as serious if an event did occur. Therefore, we consider this risk ALARP and acceptable in accordance with the rationale provided in Section 6, with no further risk reduction warranted.

Potential Impact	Causes	Consequence	Inherent Risk			Existing Control Measures (Control Type)	Controls Rating	Residual Risk			Uncertainty Level	Code of Practice	ALARP / Acceptability Rationale
			I	L	R			I	L	R			
Water													
Activities adversely affect surface water and ground water	Earthworks required to re-establish flare pit and tank drain/trench, including during wet season Earthworks in relation to civil maintenance activities including during the wet season	Disturbance to natural drainage patterns	Minor	Unlikely	Low	▪ Activities are being performed within the existing footprint of established well leases with no changes to flow patterns ▪ Permit to work to restrict activities to existing well leases (administrative) ▪ Well leases are not located within watercourses or drainage lines ▪ Upon demobilisation from site, drain/trench to be backfilled to produce landform consistent with pre-disturbed state and surrounding environment (engineering) ▪ Implement erosion and sediment control plan (administrative) ▪ Implement wet season management plan (administrative)	Effective	Minor	Remote	Low	A	Clause A.3.1	Based upon the risk being ranked as a low, the controls being assessed as effective and a scientific uncertainty score outcome of low, the risk is determined to be ALARP and 'acceptable' in accordance with the rationale provided in Section 6, with no further risk reduction possible.
		Erosion and siltation of watercourses	Moderate	Unlikely	Medium	▪ Implement erosion and sediment control plan (administrative) ▪ Install erosion and sediment control structures (e.g. berms, sediment fences) where necessary in accordance with best practice principles and guidelines by DENR and IECA (engineering) ▪ Conduct Job Hazard Analysis for any new task or new use of equipment to ensure appropriate control measures are identified (administrative) ▪ Site inspections to be undertaken within 5 business days of a significant rainfall event to assess erosion issues (administrative)	Effective	Moderate	Remote	Low	A	Clause A.3.4	Based upon the risk being ranked as a low, the controls being assessed as effective and a scientific uncertainty score outcome of low, the risk is determined to be ALARP and 'acceptable' in accordance with the rationale provided in Section 6, with no further risk reduction possible.
	Use of groundwater resources	Depletion of groundwater resources	Moderate	Unlikely	Medium	▪ Groundwater use remains within the volume allocated to the site (58.2ML/year) under Groundwater Extraction Licence M10001	Effective	Moderate	Remote	Low	A	NA	Based upon the risk being ranked as a low, the controls being assessed as effective and a scientific uncertainty score outcome of low, the risk is determined to be ALARP and 'acceptable' in accordance with the rationale provided in Section 6, with no further risk reduction possible.
	Subsurface loss of contaminants during workovers	Contamination of watercourses Contamination of groundwater Reduction of groundwater pressure	Critical	Remote	High	▪ Wells have multiple barriers in place (e.g. cementing, minimum two casing strings) ▪ Well to be managed in accordance with a Code compliant and accepted Well Operation Management Plan (WOMP) and Well Barrier Integrity Verification (WBIV) Reports (engineering, administrative), which will include procedures for: - Ensuring wells are suitable for workover prior to workovers - Ensuring all fittings and equipment are checked and maintained - Monitoring facility pressure for quick identification of any source of leak or rupture (administrative) - Ensuring that any spills, leaks or points of excessive wear are reported, and the necessary maintenance work and control measures undertaken (administrative) - Install, maintaining and routinely test blow-out preventers (BOPs) and related well control equipment on all rigs (administrative) - Kill (workover) fluid to be on site to kill the well - If contamination detected, implement emergency response plan (administrative). ▪ Groundwater monitoring program implemented to detect potential loss of containment	Effective	Serious	Remote	Medium	A	Clause A.3.8 A.4.9 A.4.10 B.4.14 C.7.1 C.7.2	Workovers will be conducted using extensive best practice controls to be outlined in an accepted WOMP and WIMP. The subsurface loss of containment risks of workovers are generally lower than drilling a new well because cement casing is already in place and there are no open zones, which provides some protection against hydrocarbon migration. The residual risk has been reduced to the greatest extent possible due to the consequence remaining as serious if an event did occur. We consider that this risk has been reduced to ALARP and no further risk reduction is warranted. We also note that part of the rationale for conducting the workover activities is to improve well integrity in an aging field. Workovers will ensure well barriers are in-tact so that subsurface loss of containment risks are reduced during the operation of the well. Because the workover activity may reduce subsurface loss of containment risks during operations and because the risks during workover activities can be reduced to ALARP, we consider this risk 'acceptable' in accordance with the rationale provided in Section 6

	Spill or leak from the use, transportation, treatment, handling and storage of, workover fluids, wastewater, and, diesel, fuel, oils and chemicals, including during wet season	Contamination of surface water Contamination of groundwater	Moderate	Unlikely	Medium	**General** ▪ Liquid wastes (other than workover fluid) to be stored in a secured container in a bunded area (engineering) ▪ Ensure appropriate measures are in place (e.g. lining, bunding) to prevent fluids or other waste chemical and/or hydrocarbon fluids from contaminating water or land not specifically designated for waste disposal (engineering) ▪ Ensure that where drips and leaks occur, corrective actions are raised, and repairs are undertaken in a timeframe commensurate with the risk of environmental harm escalating if not repaired (administrative) ▪ Transport of hazardous material within the NT by a licensed NT EPA contractor (administrative) ▪ Any transport across State or Territory borders to abide by the NEPM 2013 guidelines (administrative) ▪ Handle, store and otherwise manage all hazardous goods in accordance with relevant Australian Standards and Codes of Practice (administrative) ▪ Where applicable, ensure pumps, tanks and transfer lines are located within suitably bunded areas (engineering) ▪ Implement Spill Management Plan (administrative) ▪ Implement Wet Season Management Plan (administrative) ▪ Implement Wastewater Management Plan (administrative) **Workovers** ▪ Trench/drain to be constructed around workover fluid tanks to direct overflow to flare pit (engineering) and tanks to be monitored hourly during shift (administrative) **Aboveground Flowlines** ▪ Flowlines are not co-located with the access track across majority of field to decrease likelihood of accidental vehicle damage (engineering) ▪ Flowlines have asset protection along the route (fencing, bollards and traffic controls) (engineering) ▪ Site inductions includes information on the location of aboveground flowlines and safe driving conditions to be applied (administrative) **All Flowlines** ▪ Flowline to be constructed in accordance with Australian Standard 2885 (engineering) ▪ Flowline to be pressure tested prior to becoming operational (engineering) ▪ Flowline pressure monitored continuously to detect any failures as they occur (administrative) ▪ Flowline integrity inspections to be undertaken (engineering) **Evaporation ponds** ▪ Minimum 500mm freeboard to be available (administrative) ▪ Pond level to be inspected each quarter and after a significant rainfall event. Where the freeboard is less than 500mm, it is to be reduced by offsite transportation and disposal by a licensed waste transporter (engineering) ▪ Evaporation ponds have a compacted clay base and a HDPE liner **Oil storage and loadout** ▪ Storage tanks sit within clay lined bund. Tanks are steel plate floors with an internal expoy layer (engineering) ▪ Non-destructive vessel integrity inspections (engineering) ▪ Loadout pumps within bunded area (engineering)	Effective	Moderate	Remote	Low	A	Clause A.3.8 C.7.1 C.7.2	Based upon the risk being ranked as a low, the controls being assessed as effective and a scientific uncertainty score outcome of low, the risk is determined to be ALARP and 'acceptable' in accordance with the rationale provided in Section 6, with no further risk reduction possible.

Potential Impact	Causes	Consequence	Inherent Risk			Existing Control Measures (Control Type)	Controls Rating	Residual Risk			Uncertainty Level	Code of Practice	ALARP / Acceptability Rationale
			I	L	R			I	L	R			
	Flooding, particularly during wet season	Sedimentation of watercourses	Minor	Unlikely	Low	▪ Implement erosion and sediment control plan (administrative) ▪ Separation distance from major watercourses (no major watercourses) (engineering) ▪ If flooding occurs, implement emergency response plan (administrative) ▪ Requirement for erosion and sediment control structures (e.g. berms, sediment fences) is determined during site audits. Where determined from the audit that they are necessary they will be in line with best practice guidelines by DENR and IECA ▪ Inspect job site areas following flood events to determine extent of sedimentation and remedial actions taken as required ▪ Implement wet season management plan (administrative)	Effective	Minor	Unlikely	Low	A	Clause A.3.1 A.3.4	Based upon the risk being ranked as a low, the controls being assessed as effective and a scientific uncertainty score outcome of low, the risk is determined to be ALARP and 'acceptable' in accordance with the rationale provided in Section 6, with no further risk reduction possible.
		Contamination of watercourses	Minor	Unlikely	Low	▪ Separation distance from major watercourses (no major watercourses in MRN) (engineering) ▪ Store minimal volumes of fuels, oils and other chemicals at the job site (administrative) ▪ When stored onsite, fuels, oils and other chemicals to be stored in a bunded area ▪ Bunded area to not be located in a flood prone area (engineering) ▪ If flooding occurs, implement emergency response plan (administrative) ▪ Implement wet season management plan (administrative)	Effective	Minor	Unlikely	Low	A	Clause A.3.1 A.3.4	Based upon the risk being ranked as a low, the controls being assessed as effective and a scientific uncertainty score outcome of low, the risk is determined to be ALARP and 'acceptable' in accordance with the rationale provided in Section 6, with no further risk reduction possible.
	Incorrect hazardous waste segregation and disposal, including during wet season	Contamination of surface watercourse Radiation	Minor	Likely	Med	▪ Separation distance from major watercourses (no major watercourses in MRN) (engineering) ▪ Liquid wastes to be stored in a secured container in a bunded area (engineering) ▪ Ensure appropriate measures are in place (e.g. lining, bunding) to prevent fluids or other waste chemical and/or hydrocarbon fluids from contaminating water or land not specifically designated for waste disposal (engineering) ▪ Workover fluid to be stored in tanks and recirculated and reused where possible (engineering) ▪ Ensure that where drips and leaks occur, corrective actions are raised, and repairs are undertaken in a timeframe commensurate with the risk of environmental harm escalating if not repaired (administrative) ▪ Transport of hazardous material within the NT by a licensed NT EPA contractor (administrative) ▪ Any transport across State or Territory borders to abide by the NEPM 2013 guidelines (administrative) ▪ Handle, store and otherwise manage all hazardous goods in accordance with relevant Australian Standards and Codes of Practice (administrative) ▪ Where applicable, ensure pumps, tanks and transfer lines are located within suitably bunded areas (engineering) ▪ NORMs (Radiation) Management Plan to be implemented (administrative) ▪ Implement Spill Management Plan (administrative) ▪ Implement Wet Season Management Plan (administrative)	Effective	Minor	Unlikely	Low	A	Clause A.3.1	Based upon the risk being ranked as a low, the controls being assessed as effective and a scientific uncertainty score outcome of low, the risk is determined to be ALARP and 'acceptable' in accordance with the rationale provided in Section 6, with no further risk reduction possible.

Potential Impact	Causes	Consequence	Inherent Risk			Existing Control Measures (Control Type)	Controls Rating	Residual Risk			Uncertainty Level	Code of Practice	ALARP / Acceptability Rationale
			I	L	R			I	L	R			
	General use of roads and access tracks, including during wet season	Sedimentation of surface watercourses	Moderate	Unlikely	Med	▪ Stick to designated speed limits (administrative) ▪ Monitor access tracks for signs of erosion or sedimentation occurring (administrative) ▪ Implement erosion and sediment control plan (administrative) ▪ Implement wet season management plan (administrative)	Effective	Moderate	Remote	Low	A	Clause A.3.1 A.3.4	Based upon the risk being ranked as a low, the controls being assessed as effective and a scientific uncertainty score outcome of low, the risk is determined to be ALARP and 'acceptable' in accordance with the rationale provided in Section 6, with no further risk reduction possible.
Community													
Activities adversely affect sensitive receptors	Bushfire as a result of EMP activities Bushfire spreads to the EMP activity locations as a result of accidental ignition either within the MRN or offsite	Danger to health and safety of employees, contractors and possibly the public	Serious	Unlikely	Med	▪ Implement methane emissions management plan (administrative) ▪ Fire extinguishers to be available (engineering) ▪ Use of non-intrinsically safe material only if accompanied by a gas detector and the appropriate permit (administrative) ▪ All staff and visitors accessing the MRN must be inducted into the emergency response plan (administrative) ▪ Implement fire management plan (administrative) ▪ Chemicals, dangerous goods etc stored in secured containers and bunded areas (engineering) ▪ Hazardous zones for each well determined in accordance with the relevant Australian Standard (administrative) ▪ Only authorised equipment is allowed to be used within the hazardous zone Ignition sources to be kept outside designated hazardous zones (administrative) ▪ If fire occurs, implement emergency response plan (administrative) ▪ Fire fuel loads cleared from well leases (engineering) ▪ Horizontal in-ground flare system used within flare pit which is designed to minimise risk of ignition (engineering) ▪ No flaring on designated fire ban days (administrative) ▪ Designated smoking areas (administrative)	Effective	Moderate	Remote	Low	A	Clause A.3.7	Based upon the risk being ranked as a low, the controls being assessed as effective and a scientific uncertainty score outcome of low, the risk is determined to be ALARP and 'acceptable' in accordance with the rationale provided in Section 6, with no further risk reduction possible.
	Lack of consultation with stakeholders Adverse Community perception to activities	Local community and landowners' discontent and activism Disturbance or impedance of surrounding stakeholder's regular activities.	Moderate	Unlikely	Med	▪ All activities to stay within the approved SSCC and AAPA area (administrative) ▪ A full stakeholder consultation log will be maintained by CP (administrative) ▪ Early and ongoing community consultation and engagement approach (administrative) ▪ Local communities and stakeholders advised of CP contact number through multiple channels (administrative) ▪ Where possible, local and/or Indigenous people employed (administrative) ▪ All personnel and site visitors to have appropriate CLC approval and complete the appropriate inductions (administrative)	Effective	Moderate	Remote	Low	A	Clause A.3.1	Based upon the risk being ranked as a low, the controls being assessed as effective and a scientific uncertainty score outcome of low, the risk is determined to be ALARP and 'acceptable' in accordance with the rationale provided in Section 6, with no further risk reduction possible.

Potential Impact	Causes	Consequence	Inherent Risk			Existing Control Measures (Control Type)	Controls Rating	Residual Risk			Uncertainty Level	Code of Practice	ALARP / Acceptability Rationale
			I	L	R			I	L	R			
	Traffic increase due to activities	▪ Local community and landowners' discontent and activism ▪ Increased potential for vehicle accidents and damage to infrastructure ▪ Increased occurrence and diversity of weed species ▪ Disturbance or impedance of surrounding stakeholder's regular activities	Moderate	Unlikely	Med	▪ Consult with surrounding stakeholders when major operations will occur (administrative) ▪ Approved Traffic Management Plan. Transportation of over-width or over-dimension loads under DPIL approved permit with pilot (administrative) ▪ No unauthorised third-party access to the site (administrative) ▪ Zero alcohol and/or drugs policy with routine testing (administrative) ▪ Ensure vehicles are inspected and maintained regularly and have working lights and/or spotlights ▪ No deviation from access tracks and roads (administrative) ▪ Well lease access track signed to prevent unauthorised access (administrative) ▪ All turnoffs and turn onto NT controlled roads are suitable for petroleum activities (engineering) ▪ On unsealed roads if dust is created, reduce speed (administrative) ▪ CP has paramedics and ambulance on site and field hospital facilities ▪ Staff and contractors are appropriately licensed and manage journeys in accordance with a Journey Management Plan. Journeys are planned to minimise number of vehicle movements where possible (administrative) ▪ Limited driving at dawn and dusk (administrative) ▪ Refer to "Chemical Management Procedure" for transport of chemicals ▪ Contractor vehicles to comply with local area weed control measures	Effective	Moderate	Remote	Low	A	Clause A.3.1 A.3.6	Based upon the risk being ranked as a low, the controls being assessed as effective and a scientific uncertainty score outcome of low, the risk is determined to be ALARP and 'acceptable' in accordance with the rationale provided in Section 6, with no further risk reduction possible.
	Noise from activities	Local community complaints	Minor	Possible	Low	▪ Distance to sensitive receptors is approximately 40km via road (elimination)	Effective	Minor	Unlikely	Low	A	Clause A.3.3	Based upon the risk being ranked as a low, the controls being assessed as effective and a scientific uncertainty score outcome of low, the risk is determined to be ALARP and 'acceptable' in accordance with the rationale provided in Section 6, with no further risk reduction possible.
Air													
Activities adversely affect air quality and climate	Movement of heavy machinery and vehicles	Dust generation	Minor	Likely	Med	▪ Implement dust control measures where appropriate including water trucks ▪ Remote location unlikely to impact on surrounding users ▪ Vegetation in no-use area to be left undisturbed ▪ Site activities restricted to specific times (refer fire management plan) ▪ Machinery and vehicles to stick to designated speed limits	Effective	Minor	Unlikely	Low	A	Clause A.3.1	Based upon the risk being ranked as a low, the controls being assessed as effective and a scientific uncertainty score outcome of low, the risk is determined to be ALARP and 'acceptable' in accordance with the rationale provided in Section 6, with no further risk reduction possible.

Potential Impact	Causes	Consequence	Inherent Risk			Existing Control Measures (Control Type)	Controls Rating	Residual Risk			Uncertainty Level	Code of Practice	ALARP / Acceptability Rationale
			I	L	R			I	L	R			
	Fire as a result of CP's activities	Release of particulate emissions to the atmosphere	Critical	Unlikely	High	▪ Implement methane emissions management plan (administrative) ▪ If fire / explosion detected, implement emergency response plan (administrative) ▪ Conduct Job Hazard Analysis for any new task or new use of equipment to ensure appropriate control measures are identified and to take account of variation in fire danger ratings (administrative) ▪ Prior to attending site, each day obtain information on current fire danger, presence of fire in the area and current weather condition from government websites (administrative) ▪ Implement fire management plan (administrative) ▪ Fire management and control equipment available at each site, with personnel trained in its use (administrative) ▪ Use of non-intrinsically safe material only allowed if accompanied by a gas detector and the appropriate permit (administrative) ▪ Chemicals, dangerous goods etc stored in secured containers and bunded areas (engineering) ▪ Hazardous zones for each well determined in accordance with the relevant Australian Standard (administrative) ▪ Only CP authorised equipment allowed within the hazardous zone	Effective	Moderate	Remote	Low	A	Clause A.3.7 D.5.1	Based upon the risk being ranked as a low, the controls being assessed as effective and a scientific uncertainty score outcome of low, the risk is determined to be ALARP and 'acceptable' in accordance with the rationale provided in Section 6, with no further risk reduction possible.
	Unplanned venting of gas	Contribution to greenhouse gas emissions	Minor	Frequent	Medium	▪ Flare will be used during workovers with no planned venting to be conducted ▪ No planned venting or flaring during wellhead equipment, safety systems and gathering line installation	Effective	Minor	Remote	Low	A	Clause D.5.9	Based upon the risk being ranked as a low, the controls being assessed as effective and a scientific uncertainty score outcome of low, the risk is determined to be ALARP and 'acceptable' in accordance with the rationale provided in Section 6, with no further risk reduction possible.
	Loss of containment of gas and / or oil	Atmospheric pollution	Serios	Remote	Medium	▪ Asset integrity management system which includes: - Install, maintain and test blow-out preventers (BOPs) and related well control equipment on all rigs (administrative) - Well inspections to include tubing and annulus pressures checks and evidence of communication (administrative) - Well will be managed in accordance with a Well Operation Management Plan and Well Integrity Management Plan, which includes annular pressure checks (administrative) ▪ Implement methane emissions management plan (administrative)	Effective	Moderate	Remote	Low	A	Clause D.5.1	Based upon the risk being ranked as a low, the controls being assessed as effective and a scientific uncertainty score outcome of low, the risk is determined to be ALARP and 'acceptable' in accordance with the rationale provided in Section 6, with no further risk reduction possible.
	Gas leaks from well infrastructure and gathering and processing equipment					▪ Asset integrity management system which includes: - Undertake inspection for leaks and rectify where detected (administrative) - Inspect fittings and equipment are routinely checked for excessive wear and the necessary maintenance work is undertaken (administrative) - Monitor facility pressure for quick identification of any source of leak or rupture (administrative) ▪ Implement methane emissions management plan (administrative) ▪ If gas leak detected, implement emergency response plan (administrative) ▪	Effective				A	Clause D.5.1	Based upon the risk being ranked as a low, the controls being assessed as effective and a scientific uncertainty score outcome of low, the risk is determined to be ALARP and 'acceptable' in accordance with the rationale provided in Section 6, with no further risk reduction possible.

Potential Impact	Causes	Consequence	Inherent Risk			Existing Control Measures (Control Type)	Controls Rating	Residual Risk			Uncertainty Level	Code of Practice	ALARP / Acceptability Rationale
			I	L	R			I	L	R			
Greenhouse Gas Emissions													
Greenhouse gas emission contribution	Combustion of fuel during activities	Contribution to greenhouse gas emissions	Minor	Frequent	Medium	▪ Diesel fuel is to be used for all vehicles and the rig ▪ All diesel used onsite is to be compliant with the Federal Government's Fuel Quality Standards (Automotive Diesel) Determination 2019 (administrative) ▪ All equipment / machinery to be maintained in accordance with manufacturer specifications ▪ Processing facilities and generation use fuel gas as the energy source, with diesel back up where required	Effective	Minor	Likely	Low	A	NA	Based upon the risk being ranked as a low, the controls being assessed as effective and a scientific uncertainty score outcome of low, the risk is determined to be ALARP and 'acceptable' in accordance with the rationale provided in Section 6, with no further risk reduction possible.
	Unplanned venting of gas		Minor	Frequent	Medium	▪ Flare will be used during workovers with no planned venting to be conducted ▪ No planned venting or flaring during wellhead equipment, safety systems and gathering line installation, all gas bled to existing network prior to works ▪ Flares are utilised at the CTP and ESS no unplanned venting to be conducted	Effective	Minor	Remote	Low	A	Clause D.5.9	Based upon the risk being ranked as a low, the controls being assessed as effective and a scientific uncertainty score outcome of low, the risk is determined to be ALARP and 'acceptable' in accordance with the rationale provided in Section 6, with no further risk reduction possible.
	Leakage of gas from wells		Minor	Likely	Medium	▪ Well design and barrier integrity validation reports submitted to DPIR as part of accepted WOMP ▪ Routine well integrity and well barrier verification processes in place for the entire life of the well ▪ As part of the accepted WOMP an inspection criterion will be defined ▪ Methane emission detection to be undertaken in accordance with the Methane Emission Management Plan ▪ Well decommissioning / case and suspended includes multiple steel casing and cement barriers between hydrocarbon bearing zone and surface	Effective	Minor	Remote	Low	A	Clause D.5.1 D.5.2 D.5.3 D.5.4 D.5.5 D.5.6	Based upon the risk being ranked as a low, the controls being assessed as effective and a scientific uncertainty score outcome of low, the risk is determined to be ALARP and 'acceptable' in accordance with the rationale provided in Section 6, with no further risk reduction possible.
Cumulative Impacts													
Cumulative impacts on groundwater	Groundwater taken for activities combined with other known groundwater extraction	Groundwater taken for the project results in the natural recharge rate of groundwater being exceeded	Minor	Unlikely	Low	▪ Groundwater extraction will not be occurring within a Water Control District ▪ Groundwater extraction licence in place (52.8ML/y limit)	Effective	Minor	Remote	Low	A	NA	There are no water extraction licences within the immediate surrounding area of the Mereenie Field. Water extraction licences for the Mereenie aquifer totalling over 11,400 ML/yr1F[1] have been granted by the NT Government. The 52.8ML is a small fraction of the total water approved for extraction in this aquifer Based upon the risk being ranked as a low, the controls being assessed as effective and a scientific uncertainty score outcome of low, the risk is determined to be ALARP and 'acceptable' in accordance with the rationale provided in Section 6, with no further risk reduction possible.
Cumulative impacts on surface water	Take of surface water for activities combined with other known surface water take Discharges to surface water	▪ Reduction in available surface water ▪ Contamination of surface water	Minor	Unlikely	Low	▪ No take of surface water proposed ▪ No NT government granted surface water take licences2F[2] in the area ▪ No surface water releases proposed ▪ Spills and leaks to be actioned in accordance with the Spill Management Plan	Effective	Minor	Remote	Low	A	NA	CP is not proposing to take surface water or undertake any releases to surface waters. Control measures are designed to reduce potential impacts to surface waters. Based upon the risk being ranked as a low, the controls being assessed as effective and a scientific uncertainty score outcome of low, the risk is determined to be ALARP and 'acceptable' in accordance with the rationale provided in Section 6, with no further risk reduction possible.

[1] Based on available groundwater extraction licences on the Water Act Licensing and Permit portal at http://www.ntlis.nt.gov.au/walaps-portal/report/current/gwel

[2] Based on available surface water extraction licences on the Water Act Licensing and Permit portal at http://www.ntlis.nt.gov.au/walaps-portal/report/current/swel

Potential Impact	Causes	Consequence	Inherent Risk			Existing Control Measures (Control Type)	Controls Rating	Residual Risk			Uncertainty Level	Code of Practice	ALARP / Acceptability Rationale
			I	L	R			I	L	R			
Cumulative impacts on conservation significant flora and fauna	Clearing for activities combined with other known clearing activities in the area	Clearing results in unsustainable impacts to conservation significant flora and fauna	Minor	Unlikely	Low	▪ Activities restricted to previously disturbed locations ▪ No publicly known clearing activities within the local area	Effective	Minor	Remote	Low	A	NA	Activities under the EMP will not result in any cumulative impact on conservation significant flora and fauna. Based upon the risk being ranked as a low, the controls being assessed as effective and a scientific uncertainty score outcome of low, the risk is determined to be ALARP and 'acceptable' in accordance with the rationale provided in Section 6, with no further risk reduction possible.
Cumulative impacts on amenity	Traffic, visual, noise and lighting impacts from the activities combined with other developments in the area	Further reduction in the amenity of the local area	Minor	Unlikely	Low	▪ Activity is away from major transportation routes and is not visible from public roads ▪ All wells are existing wells – some wells will have new / replaced wellhead equipment, safety systems and gathering line, again this will not be visible from public roads ▪ Traffic to be managed under a DIPL approved traffic management plan	Effective	Minor	Remote	Low	A	NA	Based upon the risk being ranked as a low, the controls being assessed as effective and a scientific uncertainty score outcome of low, the risk is determined to be ALARP and 'acceptable' in accordance with the rationale provided in Section 6, with no further risk reduction possible.
Cumulative impacts on waste	Generation of waste during activities combined with other waste generating activities in the area	Reduction in capacity of waste disposal facilities to appropriately dispose of waste	Minor	Unlikely	Low	▪ Small volumes of general and listed waste to be generated ▪ The main waste will be steel pipe and tubing which can be recycled as scrap metal (provided no NORMs). Approximately 14 tonne steel to be recycled per well. ▪ Waste is managed by a nation-wide licenced waste contractor with access to various disposal facilities around the state ▪ Many destinations for scrap metal recycling	Effective	Minor	Remote	Low	A	NA	Based upon the risk being ranked as a low, the controls being assessed as effective and a scientific uncertainty score outcome of low, the risk is determined to be ALARP and 'acceptable' in accordance with the rationale provided in Section 6, with no further risk reduction possible.
Cumulative impacts on traffic	Increased traffic volume due to EMP activities	Pressure on the public road network and reduced availability for other road users	Minor	Unlikely	Low	▪ The field is located in a remote region. ▪ There will be no additional impact on traffic from wellhead equipment, safety systems and gathering line activities above and beyond the impacts of the MRN FEMP, with any additional potential impacts restricted to the workover activities. ▪ Anticipated peak project vehicle movement is <20 vehicles/day in addition the existing peak dry season traffic volumes ▪ Total volume of traffic is considerably lower than the capacity of Larapinta Drive ▪ Movement of heavy loads (e.g. workover rigs) through regional centres will be avoided ▪ Approved traffic management plan will be in place prior to commencement of activities ▪ Implement wet season management plan (administrative)		Minor	Remote	Low	A	NA	Based upon the risk being ranked as a low, the controls being assessed as effective and a scientific uncertainty score outcome of low, the risk is determined to be ALARP and 'acceptable' in accordance with the rationale provided in Section 6, with no further risk reduction possible.

Appendix 2. Stakeholder Engagement Register

Outlined below is a record of engagement undertaken in relation to the Mereenie Field operations and workovers activities over the past 12 months.

Date	Topics	Engagement	The Operator's Representative	Stakeholders	Information Provided	Outcome	Objections / Claims	Response to Objections / Claims
15 Sep 2022	Operations, future plans, Mereenie agreement.	Face to face on-site at the LCM	Chief Operations Officer, Drilling Manager	Traditional Owners, CLC representatives - see note 1	LCM presentation - see note 2	The T/O's and CLC were satisfied that sufficient information was provided. No additional clarifications were requested.	Nil	N/A

Note 1 –

Central Land Council

[redacted]

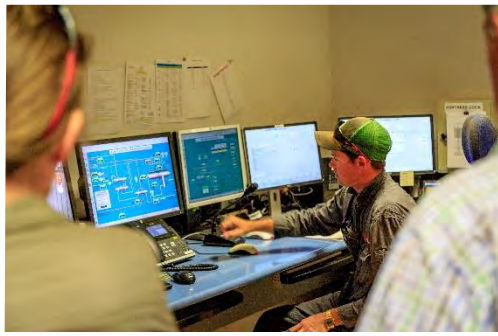
Traditional Owners -

Contact details: via Central Land Council

[redacted]

Note 2 –

See below an extract of the relevant pages from a presentation provided at the Mereenie LCM



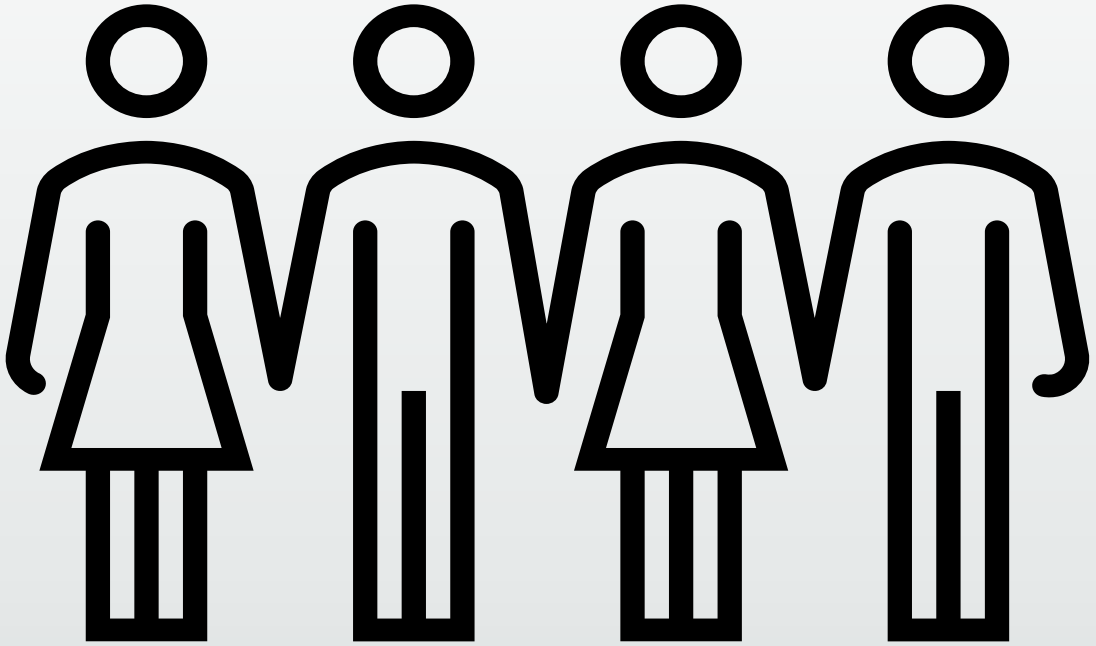
Mereenie LCM
15 September 2022

Central Petroleum

Agenda

1. Introductions / Welcome
2. CLC – LCM process and procedures
3. Central / Mereenie Performance
4. HSE Performance
5. Environmental Management
6. Social Management
7. Development Activities undertaken
8. Future Development Activities
9. Indigenous / Local Employment
10. Community Engagement / Sponsorships
11. Mereenie Agreement Negotiation
12. Any Other business / Close

Introduction / Welcome



FY22 Mereenie Operating Performance

- Strong demand for energy but limited by the capacity as the field continues its natural decline
- Implemented projects and monitoring to improve reliability of wells, pipelines and facilities
- Drilled 2 new wells WM 27 and WM 28
- Recompleted (changing the downhole set up) on 4 older wells. Results were encouraging
- We continue to upskill our TO's with more of our operator / maintainers completed their Certificate III in operations
- Signed up 2 of our TO's for mechanical apprenticeships (Barry Abbott and Jason Bloomfield)
- Potential vacancies for new recruits in 2023

Health, Safety & Environmental Performance

- Central has operated the Mereenie Field since September 2015 (over 7 years):
- Operated for over 2 years over 736 days, 220,000 hours worked across Mereenie without an injury requiring medical treatment or time off
  - This is a great record in the industry to operate without hurting anyone in the work place
  - Safety no.1 priority – making sure people go home safe
- Central have operated the field without a significant environmental incident which is an outstanding result.
  - Proven environmental performance
  - Implemented comprehensive groundwater monitoring program
  - Annual weed surveys
  - Developed and progressive rehabilitation and closure plans and commenced surface rehabilitation activities (reducing well pad size, closing non-operational areas)
  - Reducing greenhouse gas emissions – new equipment, etc.

Environmental Management

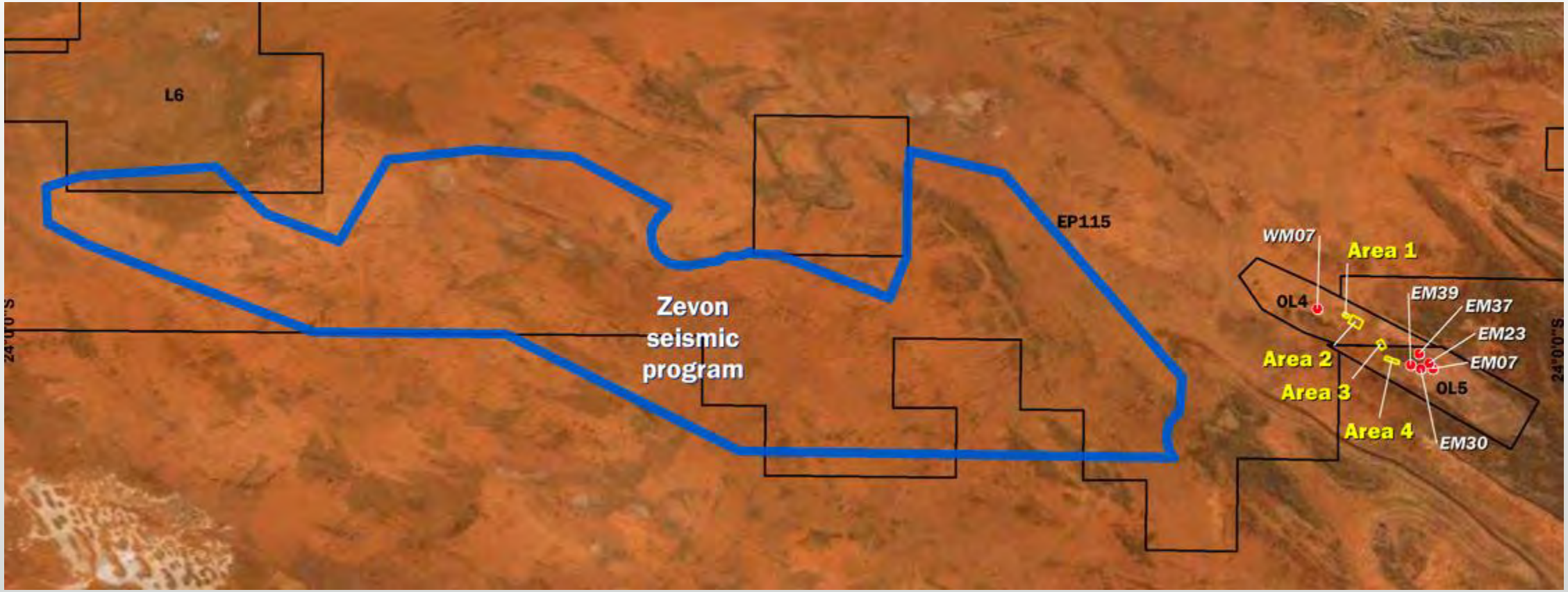
- Ongoing activities
  - Quarterly environmental inspections across all areas
  - Annual audits recently - 98% compliance with environmental outcomes and performance standards with only minor administrative opportunities identified
  - Only minor incidents
- Water management
  - Quarterly monitoring of water bores to ensure aquifer is protected including measuring usage rates, water quality, standing water levels
  - Water extraction licence granted caps water usage / no planned increase
- Environmental Management Plans (EMP)
  - All activities approved and conducted under an EMP which aims to protect and minimal impacts on ground water, flora and fauna, soils, weeds, etc. as well protect any sacred / historical sites.
  - All new activities require an EMP

Social Management

- COVID management
  - Continuing to operating under a COVID management plan e.g. negative test required prior to travel to site
  - Limiting face to face engagement to keep communities safe
- Providing safe working conditions and a positive inclusive culture
- Promote diversity
  - gender, ethnicity, background, etc
- Positive impact on communities
  - Job opportunities, supporting local business
- Ethical sourcing of equipment and supplies used across our business
- Working with CLC and AAPA to protection heritage and sacred sites
- Work with NT government to protect environment

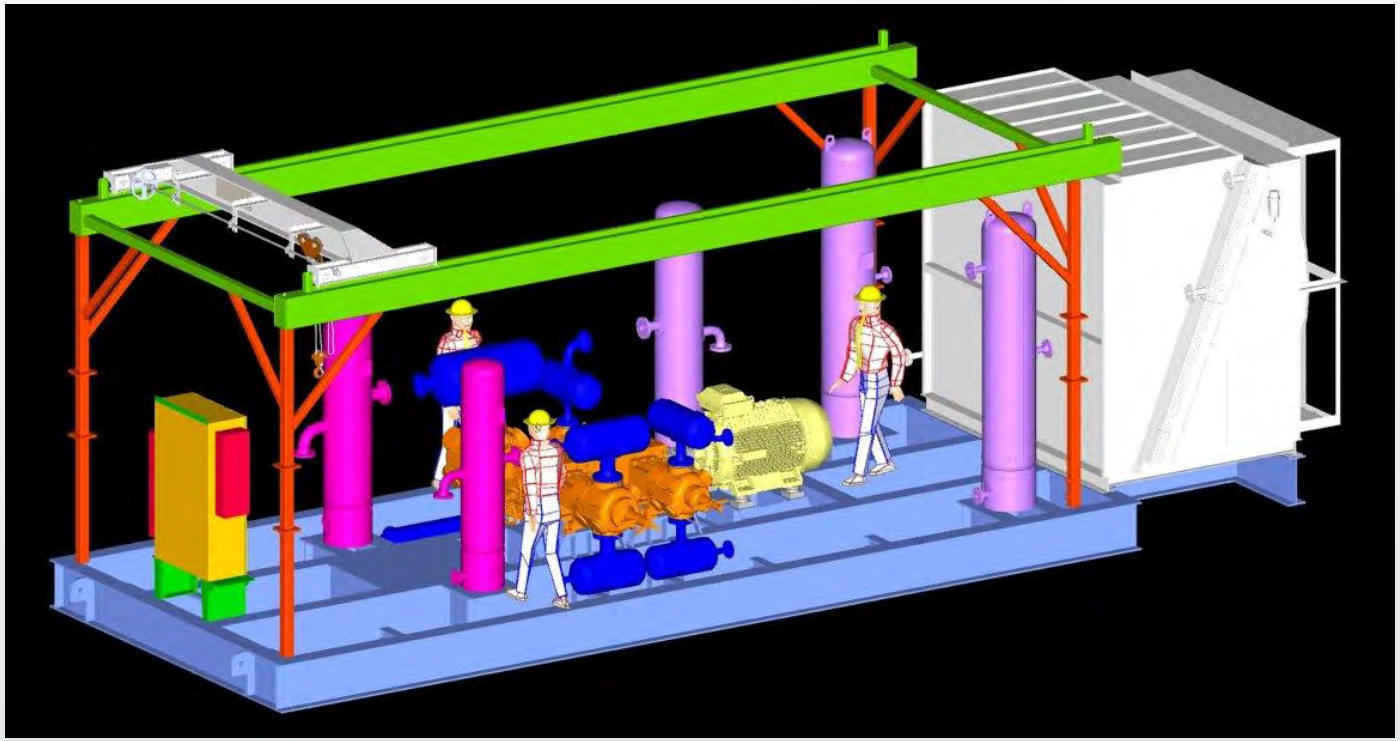
Future Development Activities

- Next 12 months – Flare Gas Compressor / Six recompletions / Two new wells / One seismic survey



Process Improvement - Flare Gas Compressor

- The flare gas compressor will sit within the existing Mereenie Central Treatment Plant
- Gas that is currently flared will be captured and re-processed – some of the gas will be re-blended back into our sales gas
- We expect that the installation of this compressor will reduce flared gas volumes by two-thirds
- The unit should be online in Q2-2023 after the plant maintenance shutdown



Recompletions

- Planned recompletion* of 6 wells – EM-7,23,30,37,39 and WM-7
- All re-completion work is done on existing cleared well pads. No additional land clearing required.
- Minimal additional environmental impacts.
- Recompletions involved:
  - Small rig is moved onto existing well pad and set up.
  - Safety and Environmental checks done
  - Tubing is removed and replaced
  - Well is modified with perforations into new zones and cleaned up
  - Well is commissioned and handed over to production operations.

*does not involve any fracking

Community Engagement / Sponsorships

- Central Petroleum continues to support communities with donations and sponsorships.
- Support provided in the past:
  - Brumby Week
  - PA system for community centres
  - Children's Charity Network
  - Literacy programs
  - Local sporting clubs – men's and women's teams (fees, jerseys, travel)
  - Diesel for remote communities
  - Christmas party food
  - Donations

Indigenous / Local Employment

- Focus on supporting local jobs and communities
- Central Petroleum works closely with the CLC to identify employment opportunities
- Maintained consistent levels of local and indigenous roles
- Offered indigenous trade apprenticeships
- There may be opportunities in the proposed works over the coming year.

Indigenous Employee Company Profile by Location				
	Indigenous		Total	Indigenous
Location	Female	Male	Employees	%
Mereenie	o	5	29	17%
Palm Valley	0	2	7	29%
BECGS	0	3	7	43%
Northern Territory	0	10	43	23%
Brisbane	0	0	48	0%
Total	0	10	91	11%

NT All Local Employee Company Profile by work site				
	Local		Total	
Location	Female	Male	Employees	Local %
Mereenie	1	11	29	41%
Palm Valley	1	4	7	71%
BECGS	1	5	7	86%
Northern Territory	3	20	43	54%

Community Engagement / Sponsorships

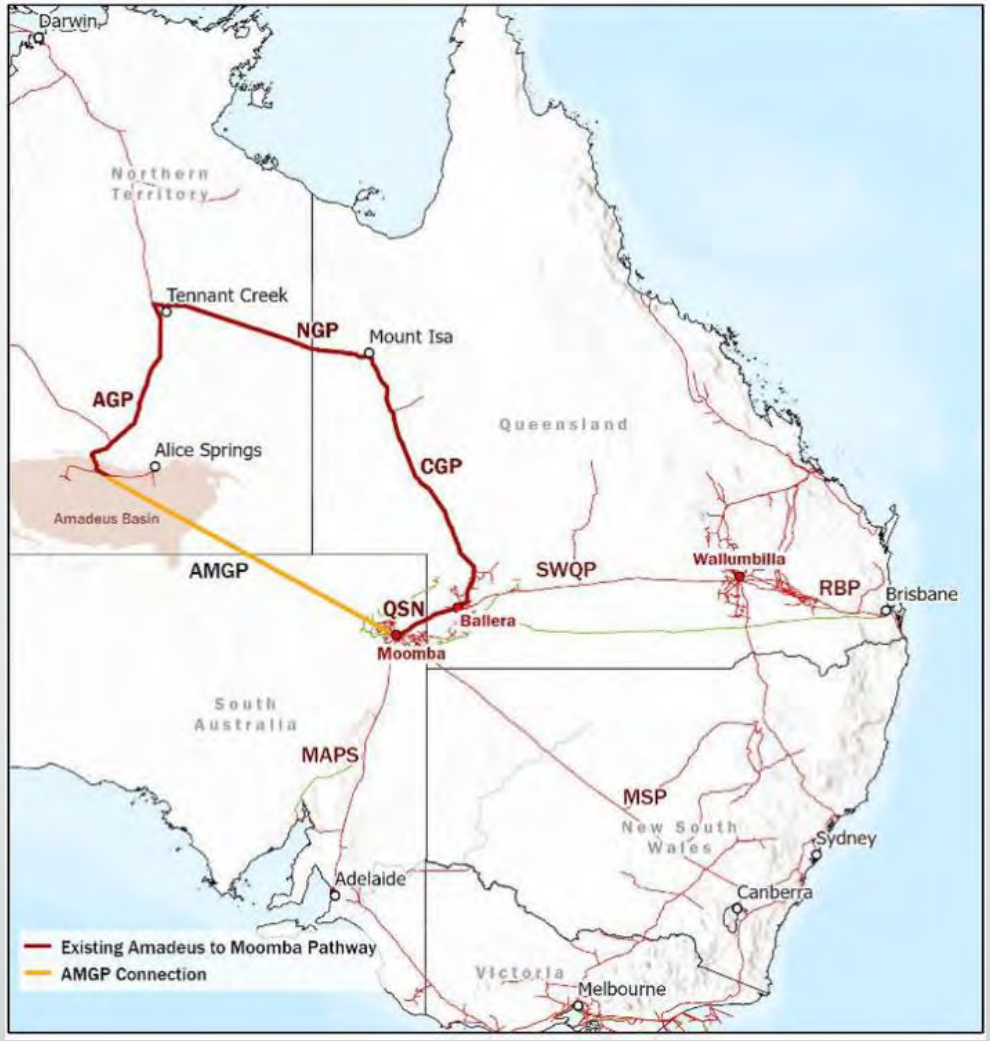
- All groups and community organisations can apply for support using the application forms.
- Central will consider the following types of support:
  - A financial contribution made to a non-profit organisation, charity or private foundation;
  - A financial contribution in support of an event, activity, or organisation. Central branding or verbal, written and visual acknowledgement may be required; or
  - A contribution by Central or Central personnel in the form of services or materials.
- Additional governance has been implemented. Applications will be considered on their merit and in the context of approved budgets. It is unlikely that there will be adequate budget for all requests, so unfortunately some applications will not be accepted. Priority will be given to activities or initiatives that are closely aligned with our operations.
- All applications can be emailed to: info@centralpetroleum.com.au / 07 31813800

Other Business / Questions

Supporting information on Environmental Outcomes, Risks and Controls

Pipeline Opportunities

- Potential new pipeline from Amadeus Basin NT to Moomba South Australia opening up the East Coast gas market.
  - Sell gas to new customers
  - Support further development of the field
  - Increased revenue and royalties
- Feasibility still being assessed



Environmental Outcomes, Risks and Controls

- Comprehensive risk assessments undertaken across all areas
- Multiple layers of controls implemented to mitigate the impacts as a result of the planned activities.
- EMPs detailing how impacts to the environmental will be avoided and minimized is in place

Outcomes / Objectives	Risks / Impacts	Controls
Minimise impacts on conservation areas and significant fauna / flora	Injury to fauna, loss of vegetation, increased weeds	- No additional clearing undertaken - Flora and fauna survey conducted - Regular inspections
Minimise and control soil erosion / sedimentation and maintain the viability of soil through preventing contamination	Erosion, sedimentation, contamination	- Erosion and sedimentation plans - Complete remediation of any spills or leaks / spill response kits - Minimal volumes of fuels, oils and other chemicals will be stored and used - Regular inspections
All heritage and culturally significant sites are identified and protected	Disturbance to heritage sites	- Heritage surveys conducted - CLC and Traditional owners consulted - Aboriginal Areas Protection Authority / CLC sacred sites clearance certificates in place

Environmental Outcomes, Risks and Controls

Outcomes / Objectives	Risks / Impacts	Controls
Avoid impacts to surface water and groundwater	Disturbance to drainage patterns, erosion and sedimentation, depletion of ground water, contamination	- Regular monitoring of ground and surface water conditions - Dual casing for all drilling to protect aquifers - Minimise groundwater usage - Regular inspections
Activities are not the cause of fires in the region	Fire, community	- Bushfire management plans in place include firefighting equipment, fire breaks
Mange capacity of road infrastructure up to and within the MRN Maintain and enhance community relationships	Traffic, noise, complaints	- Regular consultation with the community and stakeholders - Traffic management plans and community notification prior to commencing activities - All visitors to have appropriate CLC approval and be inducted on environmental issues prior to arrival at site
Activities do not negatively impact air quality	Dust generation, emissions, combustion	- Watering roads to minimise dust as required - Emissions management plan in place including restrictions on venting of gas and efforts to minimise flaring

- There may be unintended consequences as a result of an incident during the activities however comprehensive response plans and protocols are in place.
- There should be no impacts to stakeholder rights e.g. access to site during the planned activities, etc. however in order to manage safety on site we do ask that you inform the Site Supervisor.

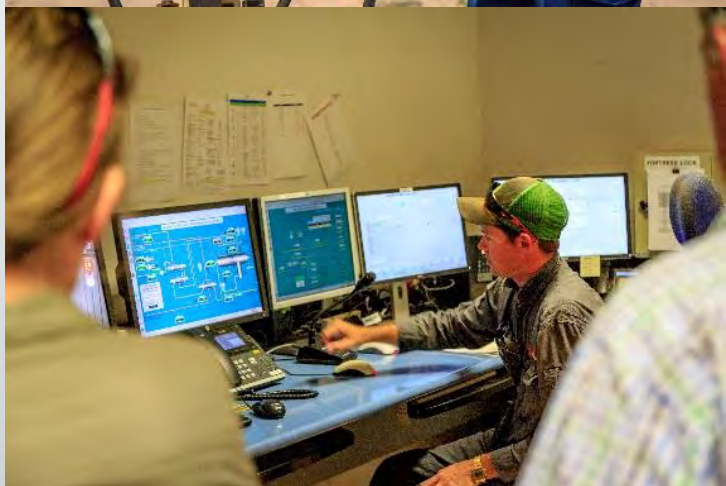
Contact and Further Information

Level 7, 369 Ann Street
Brisbane QLD 4000
Australia

+61 (0)7 3181 3800

info@centralpetroleum.com.au

www.centralpetroleum.com.au



Appendix 3. Protected Matters Search Tool Report

Australian Government
Department of Agriculture, Water and the Environment

EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected. Please see the caveat for interpretation of information provided here.

Report created: 21-Sep-2022

Summary

Matters of National Environment Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance (Ramsar	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	None
Listed Threatened Species:	12
Listed Migratory Species:	9

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at http://www.environment.gov.au/heritage

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Lands:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	13
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None
Habitat Critical to the Survival of Marine Turtles:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have

State and Territory Reserves:	2
Regional Forest Agreements:	None
Nationally Important Wetlands:	None
EPBC Act Referrals:	1
Key Ecological Features (Marine):	None
Biologically Important Areas:	None
Bioregional Assessments:	None
Geological and Bioregional Assessments:	None

Details

Matters of National Environmental Significance

Listed Threatened Species			[Resource Information]
Status of Conservation Dependent and Extinct are not MNES under the EPBC Act. Number is the current name ID.			
Scientific Name	Threatened Category	Presence Text	Buffer Status
BIRD			
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area	In feature area
Falco hypoleucos Grey Falcon [929]	Vulnerable	Species or species habitat known to occur within area	In feature area
Pezoporus occidentalis Night Parrot [59350]	Endangered	Species or species habitat may occur within area	In feature area
Polytelis alexandrae Princess Parrot, Alexandra's Parrot [758]	Vulnerable	Species or species habitat known to occur within area	In feature area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area	In feature area
MAMMAL			
Macroderma gigas Ghost Bat [174]	Vulnerable	Species or species habitat may occur within area	In feature area
Petrogale lateralis centralis Warru, Central Australian Rock-wallaby [90831]	Vulnerable	Species or species habitat known to occur within area	In feature area
Sminthopsis psammophila Sandhill Dunnart [291]	Endangered	Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Zyzomys pedunculatus			
Central Rock-rat, Antina [68]	Critically Endangered	Species or species habitat may occur within area	In feature area
PLANT			
Macrozamia macdonnellii			
MacDonnell Ranges Cycad [11843]	Vulnerable	Species or species habitat known to occur within area	In feature area
REPTILE			
Liopholis kintorei			
Great Desert Skink, Tjakura, Warrarna, Mulyamiji [83160]	Vulnerable	Species or species habitat known to occur within area	In feature area
Liopholis slateri slateri			
Slater's Skink, Floodplain Skink [83163]	Endangered	Species or species habitat may occur within area	In feature area

Listed Migratory Species			[Resource Information]
Scientific Name	Threatened Category	Presence Text	Buffer Status
Migratory Marine Birds			
Apus pacificus			
Fork-tailed Swift [678]		Species or species habitat likely to occur within area	In feature area
Migratory Terrestrial Species			
Motacilla cinerea			
Grey Wagtail [642]		Species or species habitat may occur within area	In feature area
Motacilla flava			
Yellow Wagtail [644]		Species or species habitat may occur within area	In feature area
Migratory Wetlands Species			
Actitis hypoleucos			
Common Sandpiper [59309]		Species or species habitat may occur within area	In feature area
Calidris acuminata			
Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area	In feature area
Calidris ferruginea			
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Calidris melanotos			
Pectoral Sandpiper [858]		Species or species habitat may occur within area	In feature area
Charadrius veredus			
Oriental Plover, Oriental Dotterel [882]		Species or species habitat may occur within area	In feature area
Glareola maldivarum			
Oriental Pratincole [840]		Species or species habitat may occur within area	In feature area

Other Matters Protected by the EPBC Act

Listed Marine Species			[Resource Information]
Scientific Name	Threatened Category	Presence Text	Buffer Status
Bird			
Actitis hypoleucos			
Common Sandpiper [59309]		Species or species habitat may occur within area	In feature area
Apus pacificus			
Fork-tailed Swift [678]		Species or species habitat likely to occur within area overfly marine area	In feature area
Bubulcus ibis as Ardea ibis			
Cattle Egret [66521]		Species or species habitat may occur within area overfly marine area	In feature area
Calidris acuminata			
Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area	In feature area
Calidris ferruginea			
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area overfly marine area	In feature area
Calidris melanotos			
Pectoral Sandpiper [858]		Species or species habitat may occur within area overfly marine area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Chalcites osculans as Chrysococcyx osculans			
Black-eared Cuckoo [83425]		Species or species habitat known to occur within area overfly marine area	In feature area
Charadrius veredus			
Oriental Plover, Oriental Dotterel [882]		Species or species habitat may occur within area overfly marine area	In feature area
Glareola maldivarum			
Oriental Pratincole [840]		Species or species habitat may occur within area overfly marine area	In feature area
Merops ornatus			
Rainbow Bee-eater [670]		Species or species habitat may occur within area overfly marine area	In feature area
Motacilla cinerea			
Grey Wagtail [642]		Species or species habitat may occur within area overfly marine area	In feature area
Motacilla flava			
Yellow Wagtail [644]		Species or species habitat may occur within area overfly marine area	In feature area
Rostratula australis as Rostratula benghalensis (sensu lato)			
Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area overfly marine area	In feature area

Extra Information

State and Territory Reserves			[Resource Information]
Protected Area Name	Reserve Type	State	Buffer Status
Katiti Petermann	Indigenous Protected Area	NT	In buffer area only
Watarrka	National Park	NT	In buffer area only

EPBC Act Referrals				[Resource Information]
Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status

Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Not controlled action				
Improving rabbit biocontrol: releasing another strain of RHDV, sthrn two thirds of Australia	2015/7522	Not Controlled Action	Completed	In feature area

Caveat

1 PURPOSE

This report is designed to assist in identifying the location of matters of national environmental significance (MNES) and other matters protected by the Environment Protection and Biodiversity Conservation Act 1999 (Cth) (EPBC Act) which may be relevant in determining obligations and requirements under the EPBC Act.

The report contains the mapped locations of:

- World and National Heritage properties;
- Wetlands of International and National Importance;
- Commonwealth and State/Territory reserves;
- distribution of listed threatened, migratory and marine species;
- listed threatened ecological communities; and
- other information that may be useful as an indicator of potential habitat value.

2 DISCLAIMER

This report is not intended to be exhaustive and should only be relied upon as a general guide as mapped data is not available for all species or ecological communities listed under the EPBC Act (see below). Persons seeking to use the information contained in this report to inform the referral of a proposed action under the EPBC Act should consider the limitations noted below and whether additional information is required to determine the existence and location of MNES and other protected matters.

Where data are available to inform the mapping of protected species, the presence type (e.g. known, likely or may occur) that can be determined from the data is indicated in general terms. It is the responsibility of any person using or relying on the information in this report to ensure that it is suitable for the circumstances of any proposed use. The Commonwealth cannot accept responsibility for the consequences of any use of the report or any part thereof. To the maximum extent allowed under governing law, the Commonwealth will not be liable for any loss or damage that may be occasioned directly or indirectly through the use of, or reliance

3 DATA SOURCES

Threatened ecological communities

For threatened ecological communities where the distribution is well known, maps are generated based on information contained in recovery plans, State vegetation maps and remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species

Threatened, migratory and marine species distributions have been discerned through a variety of methods. Where distributions are well known and if time permits, distributions are inferred from either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc.) together with point locations and described habitat; or modelled (MAXENT or BIOCLIM habitat modelling) using

Where little information is available for a species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc.).

In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More detailed distribution mapping methods are used to update these distributions

4 LIMITATIONS

The following species and ecological communities have not been mapped and do not appear in this report:

- threatened species listed as extinct or considered vagrants;
- some recently listed species and ecological communities;
- some listed migratory and listed marine species, which are not listed as threatened species; and
- migratory species that are very widespread, vagrant, or only occur in Australia in small numbers.

The following groups have been mapped, but may not cover the complete distribution of the species:

- listed migratory and/or listed marine seabirds, which are not listed as threatened, have only been mapped for recorded
- seals which have only been mapped for breeding sites near the Australian continent

The breeding sites may be important for the protection of the Commonwealth Marine environment.

Refer to the metadata for the feature group (using the Resource Information link) for the currency of the information.

Acknowledgements

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-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Department of Land and Resource Management, Northern Territory
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
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-CSIRO
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-eBird Australia
-Australian Government – Australian Antarctic Data Centre
-Museum and Art Gallery of the Northern Territory
-Australian Government National Environmental Science Program
-Australian Institute of Marine Science
-Reef Life Survey Australia
-American Museum of Natural History
-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
-Tasmanian Museum and Art Gallery, Hobart, Tasmania
-Other groups and individuals

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Please feel free to provide feedback via the Contact Us page.

Department of Agriculture Water and the Environment
GPO Box 858
Canberra City ACT 2601 Australia
+61 2 6274 1111