

ENVIRONMENT MANAGEMENT PLAN

Mereenie Field Workover and Wellhead Equipment, Safety Systems and Gathering Line Activities

September 2020

Review record

Date	Reason for issue	Version	Author	Approver
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17 September 2020	Updated and resubmitted to DENR	CTP4-3	C. Lambert	J. van Rooyen

DISCLAIMER

This is a Central Petroleum Limited (CP) document and it has been prepared using the skill and care expected from professional scientists to provide factual and technical information and reasonable solutions to identified risks.

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- When there is a significant change to the activities not covered by this EMP
- When there is a significant change to the regulatory framework within which the activities are carried out
- When recommendations or comments from the government approval process are made
- If there is a change in circumstances (e.g. a new or increase in environmental impact or risk) which is not provided for in this EMP
- In the event an incident causing significant environmental harm or loss occurs
- Five yearly after acceptance, unless superseded by another plan.

This document shall not be issued and/or revised without the express approval of the CP General Manager of Operations. Likewise, any amendments to this document shall be checked and approved by the CP General Manager of Operations.

DOCUMENT DETAILS

Document Number:	9900-630-PLN-0001 – CTP4-3
Name of Document:	Mereenie Field Workover and Wellhead Equipment, Safety Systems and Gathering Line Activities: Environment Management Plan
Authors:	Enviro-Value Pty. Ltd.
Client:	Central Petroleum
Name of Project:	Mereenie Workover and Wellhead Equipment, Safety Systems and Gathering Line Project

Glossary	
Abbreviation / Term	Definition
AADT	Annual Average Daily Traffic
AAPA	Aboriginal Areas Protection Authority
ALARP	As Low As Reasonably Practicable
APPEA	Australia Petroleum Production and Exploration Association
Aquifer	A body of rock that is sufficiently permeable to conduct groundwater and currently supplying, or potentially being able to supply, water for environmental, cultural or consumptive (stock or domestic) uses, as determined by the Northern Territory Government.
bbl	Barrel
BTEX	Benzene, Toluene, Ethylbenzene and Xylene
CLC	Central Land Council
CP	Central Petroleum Limited
DENR	Department of Environment and Natural Resources (NT)
DAWE	Department of Agriculture, Water and Environment (Cth)
DPIR	Department of Primary Industry and Resources (NT)
EMP	Environmental Management Plan
EPA	Environment Protection Authority
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999 (Cth)
ESD	Ecologically Sustainable Development
FEMP	Field Environment Management Plan
HS&E	Health, Safety and Environment
HS&E MS	Health, Safety and Environmental Management System
IBRA	Interim Biogeographical Regionalisation for Australia
IECA	International Erosion Control Association
ISO	International Standards Organisation
KCl	Potassium Chloride
m	Meter
MNES	Matters of National Environmental Significance
MRN	Mereenie Field
NEPM	National Environment Protection Measure
NORMS	Naturally Occurring Radioactive Materials
NT	Northern Territory
O&G	Oil and Gas
P&A	Plugged and Abandoned
PAH	Polynuclear Aromatic Hydrocarbons
PMST	Protected Matters Search Tool
PJ	Peta-Joule
RCCA	Register and Closeout of Correcting Actions
SDS	Safety Data Sheet
SS	Suspended
SSCC	Sacred Sites Clearance Certificate
Significant Rainfall	Any rainfall event over 10mm in 24 hours
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

Glossary	
Abbreviation / Term	Definition
	assessment, advice and analysis about performance relevant to the subject matter using relevant protocols, standards, methods, literature or conduct tasks in accordance with requirements
TCP	Tubing-conveyed perforating
TJ	Tera-joule
TO	Traditional Owner
TPH	Total Petroleum Hydrocarbons
TRH	Total Recoverable Hydrocarbons
TPWC Act	Territory Parks and Wildlife Conservation Act 1976 (NT)
WMPC Act	Waste Management and Pollution Control Act 1998 (NT)
WIMP	Well Integrity Management Plan
WMP	Weed Management Plan
WOMP	Well Operations Management Plan
WoNS	Weeds of National Significance

Executive Summary

Operated by Central Petroleum Limited 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 0-1). The field commenced production in the 1980's and contains 71 wells, though only 43 wells are currently active. To meet supply demands, improve well production and maintain well barriers, Central Petroleum Limited propose to workover up to 25 of the existing 71 wells within the field over the next five years. Above-ground infrastructure will also be upgraded across the field, with new wellhead equipment, safety systems and gathering lines to be replaced and/or installed.

Five existing wells have been chosen for the 2020-2021 workover program, however wells for future workover programs will be decided based on production operation and maintenance requirements at the time. Workovers will target the gas producing zones of the Pacoota Sandstone and Stairway Sandstone. All zones have been previously accessed by wells in the Mereenie Field. Workovers are expected to increase production by around 2 terajoules (TJs) per well per year.

This plan seeks approval for Central Petroleum Limited to workover any 25 of the existing 71 wells and install wellhead equipment, safety systems and gathering lines (tie-in to existing or install where there is no existing) at any of the 71 existing wells as required.

This environment management plan relates to activities at existing wells using the existing disturbance footprint. No drilling, hydraulic fracturing/stimulation or clearing of native vegetation outside of the existing disturbance footprint is to occur.

The purpose of this environment management plan is to provide a generic environment management framework for workover and wellhead equipment, safety systems and gathering line works in the Mereenie Field, and address how Central Petroleum Limited will conduct its scope of activities in a manner that:

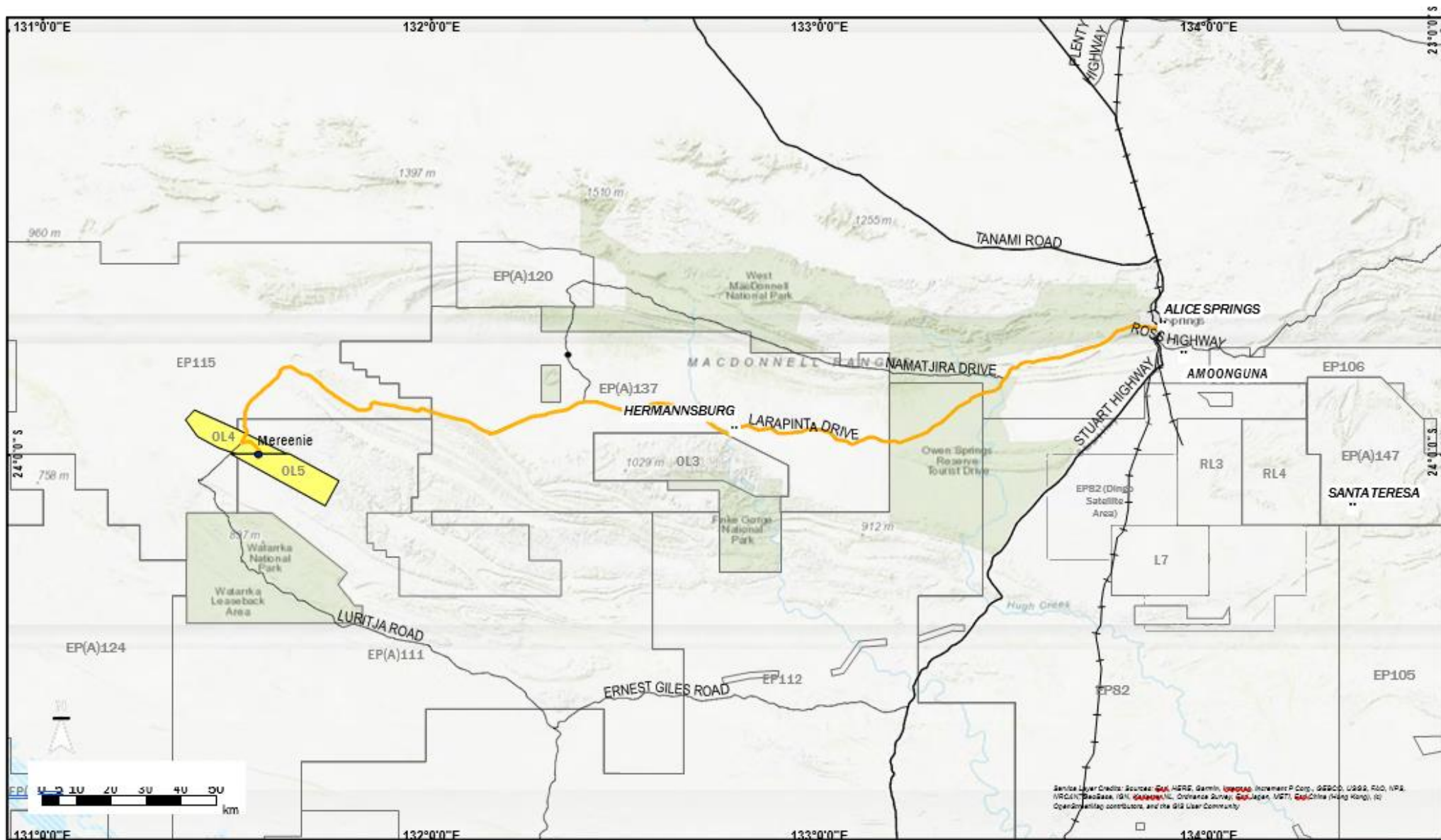
- is consistent with the principles of ecologically sustainable development
- complies with regulatory obligations including requirements of the Code of Practice for Petroleum Activities in the Northern Territory (the Code)
- reduces impacts and risks are reduced to as low as reasonably practicable and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

Nominated Liaison

Details for Central Petroleum Limited's nominated liaison for this environmental management plan are contained in Table 0-1.

Table 0-1 Nominated Person Details

Attribute	Details
Name	James Van Rooyen
Position	Drilling and Completions Manager
Company	Central Petroleum Limited
Address	7/369 Ann Street, Brisbane QLD 4000
Contact Details	Phone: +61 (0) 7 3181 3800 Email: info@centralpetroleum.com.au



ID: 0525-000
Rev:
Date: 21/08/2020
 Map Scale to 1:3,494,355 when printed at A4
 Coordinate System: WGS 1984 Web Mercator Auxiliary
 A

Mereenie Access

- Mereenie
- Towns
- Access Road
- Principal Road
- Secondary Road
- + Railways
- Mereenie field
- CTP Permits

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Figure 0-1 Location of the Mereenie oil and gas field (OL4 and OL5) relative to Alice Springs, other Central Petroleum Permits, and National Parks

Description of Activity

The environment management plan covers the activities required to workover and install wellhead equipment, safety systems and gathering lines as per Table 0-2.

Table 0-2 Description of the workover and wellhead equipment, safety systems and gathering line activities

Activity	Description
In-scope	
Workover and well intervention activities at existing oil and gas wells	<ul style="list-style-type: none"> ▪ Remove and replace production tubing ▪ Milling and un-setting of packers ▪ Milling and casing around obstructions in the well in compliance with the Code ▪ Well clean out including removing sand out of the well ▪ Recovery/ removal via milling and/or fishing and replacement of down hole equipment ▪ Remedial cementing ▪ Perforating the well in the gas zones of producing formations ▪ Plugging the well in compliance with the Code ▪ Installing equipment to prevent sand from entering the well ▪ Repairing casing via squeeze cementing ▪ Installing or replacing liners ▪ Remedial cementing ▪ Completion brine left in annulus above the top set packer to surface ▪ Plugging the well in compliance with the Code
Site set-up and de-mobilisation for workover activities at existing oil and gas wells	<ul style="list-style-type: none"> ▪ Onsite fuel and chemical handling storage measures ▪ Storage (e.g. pipe racks) and containment (e.g. skip bins) facilities for replaced production tubing, well liners and waste from activity ▪ Workover fluid handling system which includes a degasser operated in compliance with the Code ▪ Underbalanced workover system operations in compliance with the Code ▪ Pressure lines and manifolds in compliance with the Code ▪ Re-instatement of flare pit if required ▪ Respective on-site containment systems (flare pit) for material from the well which may include debris, reservoir sand and fines, well fluids, kill fluid, workover fluid and fugitive gas ▪ Installation of blooie, diverter or bleed off lines to a flare / debris containment system ▪ Gas flaring at the wellsite during the workover activities at a rate of approximately 5 TJs (~300 tons CO₂eq) per well per day over a three-day period ▪ No planned venting to be conducted, all gas to be flared in accordance with Code requirements ▪ Set-up to mitigate overland flow across work site in event of rain and/or 100kL spill at site ▪ Set-up on existing disturbance footprint with light grading to level the existing well pad. ▪ Set-up and demobilisation of workover rig and associated equipment including offices. Minimum area for workover rig set-up on the well lease pad is 60m x 60m

Activity	Description
	<ul style="list-style-type: none"> ▪ Traffic movements associated with workover rig and mobile equipment entering and leaving site for the campaign each year, with additional return trips for maintenance, as required, plus light vehicle movements associated with 4-10 contract personnel. Return trips during each campaign to depend on rig contractor roster ▪ Water sourced from onsite bores provided water extraction licence in place prior to extraction
Replacement/installation of wellhead equipment, safety systems and gathering lines at an existing oil and gas production well	<ul style="list-style-type: none"> ▪ Installation of well site metering, control and shut down skids ▪ On-site wellhead equipment, safety systems and gathering line pipe-works to connect the wellhead to existing field gathering line ▪ Hot works/welding ▪ Hydrostatic testing (using freshwater from commercial supplier) for integrity and leak detection during commissioning ▪ Leak detection monitoring in accordance with Code on recommissioning of the well and in follow-up routine well site inspections in accordance with the Mereenie Field Environmental Management Plan ▪ Loading and unloading of wellhead equipment, safety systems and gathering lines using a crane truck ▪ No freight, trucking or vehicle movements beyond what is experienced under normal production operations
All activities	<ul style="list-style-type: none"> ▪ Use of areas within the existing disturbance footprint only including existing roads, access tracks, laydown areas, well lease pads ▪ Personnel to use the existing Mereenie Camp (85 person camp) ▪ Use of a mixture of commercially supplied and existing groundwater bores for water requirements ▪ Management of Naturally Occurring Radioactive Materials (NORMs) as per the CP NORMs (Radiation) Management Plan and the Code ▪ Ongoing production operation and maintenance, decommissioning and final rehabilitation of the wells to occur under the Mereenie Oil and Gas Field Environmental Management Plan 2017 upon completion of the works
Out of Scope	
Activities that are not part of the workover and wellhead equipment, safety systems and gathering line activities:	<ul style="list-style-type: none"> ▪ Drilling ▪ Hydraulic fracturing/stimulation ▪ Planned venting ▪ Native vegetation clearing and use of areas outside the existing disturbance footprint

All activities proposed under this environment management plan are conducted in accordance with the accepted Well Integrity Management Plan and Well Operations Management Plan as per the Code.

Description of the Environment

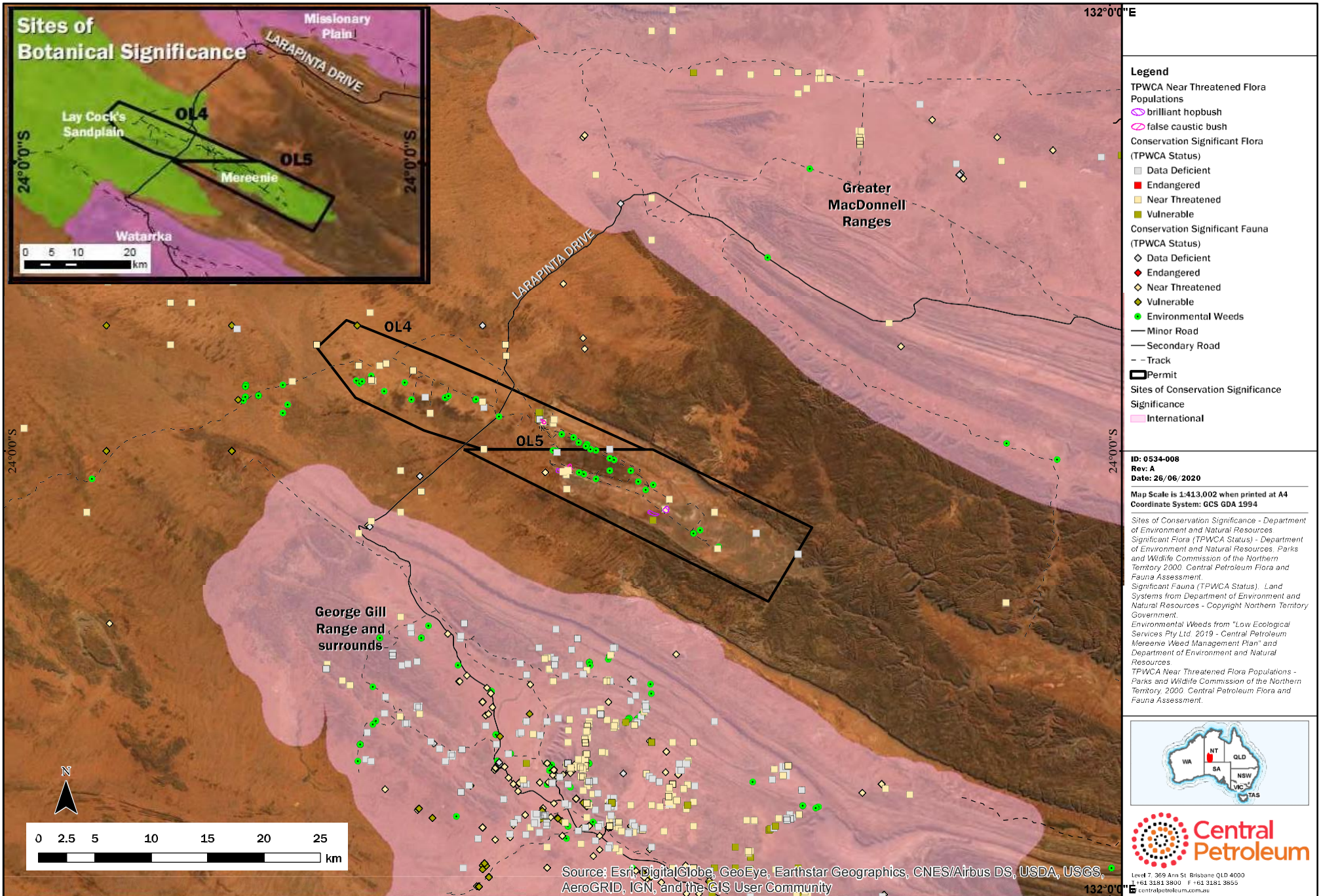
A summary of the physical and social environment for the field is provided in Table 0-3.

Table 0-3 Summary of the environment

Attribute	Description
Existing Mereenie Field operations	71 existing Mereenie oil and gas wells located on existing well lease pads of varying size which have been historically cleared and graded. Wells connect to existing 178 km of gathering lines, which transports gas, oil, water to existing processing facilities. Access to wells is via established tracks and roads, used daily by operations personnel. Existing camp accommodates 100+ personnel. Construction and operation of the field pre-dates the establishment of the Code in 2019. Production operations and maintenance activities including camp operation is conducted under the approved 2017 DENR/DPIR Mereenie Oil and Gas Field Environmental Management Plan 2017.
Climate	Semi-arid, monsoonal wet season occurring November to March with highest mean rainfall occurring in January (45.7mm).
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 170,000km ² and a maximum sediment thickness of 14,000m. Workovers to target the Pacoota Sandstone and Stairway Sandstone formations which have already been accessed by wells throughout the field.
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	<ul style="list-style-type: none"> ▪ 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 Mereenie 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 workovers is to be sourced from RN017898, RN017657, RN004620, RN013861, and/or RN018955, all of which access the Mereenie Sandstone. The estimated volume of groundwater required is 0.32ML/year. A groundwater

Attribute	Description
	<p>extraction licence application is in progress (application reference number AG09209; total volume of water extraction licence application is 52.8ML per annum for use throughout the field which includes groundwater for workovers). No groundwater will be taken for the EMP activities until the water extraction licence has been approved.</p> <p>Baseline assessments conducted and results were below drinking water and stock watering guidelines with no detection of hydrocarbon gases or products.</p> <p>No groundwater is required for wellhead equipment, safety systems and gathering line installation.</p>
Surface water	<p>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.</p>
Bioregion	<p>OL4 is located within the MacDonnell Ranges and Great Sandy Desert Interim Biogeographical Regionalisation for Australia, while OL5 is within the MacDonnell Ranges bioregion.</p>
Sites of Conservation Significance / Sites of Botanical Significance	<p>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 points (Figure 0-2). Field located within the Laycock Sandplain and Mereenie Site of Botanical Significance (Figure 0-2).</p>
Conservation Significant Fauna	<p>46 conservation significant fauna species identified as potentially occurring within the Mereenie Field, 8 of which have been confirmed during site surveys. Figure 0-2 shows the location of conservation significant fauna recorded on site.</p>
Conservation Significant Flora	<p>45 conservation significant flora species identified as potentially occurring within the Mereenie field, 15 of which have been confirmed during site surveys. Figure 0-2 shows the location of conservation significant flora recorded on site.</p>
Weeds / Pests	<p>No declared or Weeds of National Significance found within the Mereenie Field. Buffel grass, a significant threat under the Alice Springs Regional Weed Management Plan 2013-2018 detected during 2019 site survey, along with three other environmental weeds. Environmental weed locations are shown in Figure 0-2.</p>
National Parks and Reserves	<p>No National Parks (Figure 0-1) or Indigenous Protected Areas within or immediately adjacent to the Mereenie Field</p>
Fire History	<p>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 Mereenie Field is not within a declared fire protection zone but is within the Alice Springs Fire Management Zone.</p>
Surrounding Land Tenure / Use	<p>Haasts Bluff Aboriginal Land Trust / Aboriginal land and petroleum activities. CP 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 CP's activities are outlined in the Agreement and the Mereenie Sacred Sites Clearance Certificate (SSCC) (SSCC C2013-046, renewed July 2017). 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.</p>

Attribute	Description
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 (Figure 0-1). 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 (Figure 0-1).
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 July 2017) obtained under the <i>Mereenie Agreement, 2003</i> . 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	CP operates the Mereenie Field under SSCC C2013-046. Activities in this plan do not trigger additional assessments as the SSCC permits construction of pipelines, flowlines and connections, use of existing laydown areas, construction 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	CP has obtained an AAPA Authority Certificate for the works described in this EMP (certificate number C2020/023). Activities will comply with conditions of the approved certificate.



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Figure 0-2 Sites of Conservation Significance, Sites of Botanical Significance and locations of conservation significant flora and fauna, and environmental weeds, in and around the Mereenie Field

Risk Assessment Summary

Central Petroleum Limited has undertaken a risk assessment that is consistent with the requirements of International Standards Organisation 31000 for the activities under this environment management plan. The risk assessment has considered the inherent risk of an activity (i.e. without controls in place) and the residual risk (i.e. after mitigation measures have been applied). 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 0-4 provides a summary of the residual risks for activities under the environmental management plan. All risks are considered by Central Petroleum Limited to be as low as reasonably practicable and are accepted.

Table 0-4 Count of residual risks

Count	Residual Risk			
	Low	Medium	High	Very High
	34	4	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 rig mobilisation
- Increased occurrence of weeds (including invasive species) from civil works, vehicle movements and rig mobilisation
- Disturbance to cultural heritage sites as a result of fire from the activities
- Contamination of ground water, surface water and reduced groundwater pressure from subsurface loss of containment

Management Plans

Management Plans have been developed for the following:

- Erosion and Sediment Control
- Weed Management
- Bushfire Management
- Wastewater Management
- Spill Management
- Methane Emission Management
- Rehabilitation Management

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 workover and wellhead equipment, safety systems and gathering line EMP was undertaken by Central Petroleum in November 2019.

Under the SSCC and Mereenie Agreement, Formal Liaison Committee Meetings are the formal method by which the Central Land Council is to be engaged. Formal Liaison Committee Meetings were scheduled for March 2020, however to date, the meetings have been postponed on multiple occasions due to the covid-19 pandemic. Central Petroleum Limited will be attending the next Liaison Committee Meeting (organised by the Central Land Council) which is due to be held in September 2020 to provide a further information to the Central Land Council on the program including the information required under the Petroleum (Environment) Regulations 2016.

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1.0 Introduction

Operated by Central Petroleum Limited 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 0-1). The field commenced production in the 1980's and contains 71 wells, though only 43 wells are currently active. To meet supply demands, improve well production and maintain well barriers, Central Petroleum Limited propose to workover up to 25 of the existing 71 wells within the field over the next five years. Above-ground infrastructure will also be upgraded across the field, with new wellhead equipment, safety systems and gathering lines to be replaced or installed where none currently exist.

Five existing wells have been chosen for the 2020-2021 workover program, however wells for future workover programs will be decided based on production operation and maintenance requirements at the time. Workovers will target the gas producing zones of the Pacoota Sandstone and Stairway Sandstone. All zones have been previously accessed by wells in the Mereenie Field.

This plan seeks approval for Central Petroleum Limited to workover any 25 of the existing 71 wells and install wellhead equipment, safety systems and gathering lines (tie-in to existing or install where there is no existing) at any of the 71 existing wells as required.

This environment management plan relates to activities at existing wells using the existing disturbance footprint. No drilling, hydraulic fracturing/stimulation or clearing of native vegetation outside of the existing disturbance footprint is to occur.

This EMP provides a detailed description of how CP 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 (herein referred to as the Code).

1.1 Mereenie Oil and Gas Field

1.1.1 Location

The MRN is located approximately 280 km west of Alice Springs in a remote part of the Northern Territory and is one of a number of CP operated petroleum fields in the area (Figure 1-1).

Any visitors or contractors accessing the MRN must first report to the CP MRN Offices. Access to the field from Alice Springs is via a network of sealed and unsealed public and private roads, heading west from Alice Springs along Larapinta Drive/Red Centre Way to Hermannsburg, and then continuing towards Kings Canyon. The turn off to the MRN is left off the Red Centre Way; approximately 175 km past Hermannsburg.

1.1.2 Field History and Existing Operations

The MRN was discovered in 1963 and commenced production in 1984. The field produces oil, condensate, and gas, with oil and condensate processed onsite and trucked to Port Bonython for storage prior to export, typically to refineries in Singapore. Gas is processed onsite for supply to domestic markets.

In 2019, the commissioning of the Northern Gas Pipeline provided access to domestic east coast gas markets resulted in a significant increase to gas production at the MRN (16 PJ in 2019, triple 2018 production rates). As at the end of 2019, the field has delivered 17 million barrels (bbls) of oil and condensate and over 280 Petajoules (PJ) of natural gas.

The proposed workover activities are estimated to initially increase gas production by around 2 terajoules (TJs) per well per day, noting the decline in performance over time as gas is withdrawn from the reservoir.

The field is comprised of OL4 and OL5 tenement areas (123km² and 158km² respectively) and contains 71 wells, though only 43 wells are currently active. Of the active wells, 43 produce both oil and gas and four wells are used for gas re-injection (three of which are also producing wells). The remaining wells are observation wells (suspended production wells now used for monitoring pressure and gas leaks etc.), suspended production wells (suspended mainly due to poor performance) or wells that have been plugged and abandoned (P&A). The MRN wells access the oil and gas producing zones of the Stairway Sandstone

(Upper and Lower), Horn Valley Siltstone and Pacoota Sandstone (P1, P2, P3, P4). The current status and target zone of each well at MRN is shown in Table 1-1.

Table 1-1 Status and target formation zones of the Mereenie wells

Well Name	Status	Current target formation zone	Well Name	Status	Current target formation zone
EM01	O&G	P1, P3	EM36	O&G	P3
EM02	O&G	P1, P3	EM37	O&G, GI	P3
EM03	P&A	N/A	EM38	O&G	P3, P4
EM04	P&A	N/A	EM39	O&G	P3, P4
EM05	P&A	N/A	EM40	O&G	P3, P4
EM06	P&A	N/A	EM41	O&G	P3, P4
EM07	O&G, GI	P3	EM42	O&G	P3
EM08	P&A	N/A	EM43	O&G	P1
EM09	P&A	N/A	EM44	SS	N/A*
EM10	P&A	N/A	EM45	SS	N/A*
EM11	P&A	N/A	WM01	O&G	P1, P3
EM12	O&G	P1, P3	WM02	OS	P1, P3
EM13	GI	P3	WM03	O&G	P1, P3
EM14	O&G	P3	WM04	OS	P3
EM15	O&G	P3	WM05	O&G	P3
EM16	O&G	P3	WM06	O&G	P1, P3
EM17	O&G	P3	WM07	SS	P3
EM18	OS	P3	WM08	OS	LSW, HV, P3
EM19	O&G	P3	WM09	O&G	P3
EM20	O&G	P3	WM10	OS	P3
EM21	O&G	P3	WM11	P&A	N/A
EM22	O&G	P3	WM12	O&G	P3
EM23	O&G, GI	P3	WM13	P&A	N/A
EM24	OS	P1	WM14	O&G	P1
EM25	OS	P1	WM15	O&G	USW, P1, P2
EM26	OS	HV, P1	WM16	O&G	USW, P1
EM27	OS	P1	WM17	O&G	P1
EM28	O&G	P3	WM18	O&G	P1, P2
EM29	O&G	P3	WM19	SS	P3
EM30	O&G	P3	WM20	O&G	P3, P4
EM31	O&G	P1, P3	WM21	SS	N/A*
EM32	O&G	P3	WM22	SS	N/A*
EM33	O&G	P3	WM23	O&G	P3
EM34	O&G, GI	P3	WM24	O&G	P3
EM35	O&G	P3	WM26	SS	N/A
			M01	P&A	N/A

O&G: Oil and gas
 GI: Gas injection
 OS: Observation, currently suspended
 SS: Suspended
 P&A: Plugged and abandoned.

P1: Pacoota P1
 P2: Pacoota P2
 P3: Pacoota P3
 P4: Pacoota P4
 USW: Upper Stairway
 LSW: Lower Stairway
 HV: Horn Valley

N/A: Not applicable, cement plugs in place
 N/A*: Not applicable, not drilled to formation depth

The MRN wells are located on well lease pads of varying size that were historically cleared and graded when the field was being developed. The lease pad houses the existing well bore hole, well head, above-ground facilities and flare pit if it hasn't been backfilled previously.

The well is connected by on-lease pipework to the existing gathering system (approximately 178 km), which runs throughout the field to collect gas, oil and water and direct it to the eastern satellite station for separation (though sometimes gas is re-directed to the gas re-injection wells depending on supply requirements).

Water from the production wells is directed to the evaporation ponds, and oil and gas goes to the central treatment plant for processing. Oil and condensate transported offsite via tankers while sales gas is delivered via pipeline.

Access to the well lease pads and other areas/infrastructure of the MRN is via existing roads and tracks. CP operations personnel use these roads and tracks to conduct routine operations and maintenance activities at the MRN. There is one existing permanent camp which houses 100+ employees and contractors working at the MRN.

The guiding document for environment management at the MRN on a day-to day basis is the CP 2017Mereenie Field – Field Environmental Management Plan (MRN FEMP). The MRN FEMP addresses the construction, operation, maintenance and associated decommissioning and rehabilitation activities that are conducted at the MRN including:

- Road, track and well lease pad construction, maintenance and access
- Well operation, management, and maintenance
- Gas and oil systems
- Pipeline and flow line operations
- Processing facilities
- Equipment failure
- Camp operation and associated activities
- Travel, transport and vehicles
- Fuel and chemical storage, handling and transportation
- Waste management
- Rehabilitation
- Decommissioning.

The construction of the MRN field and operation and maintenance activities as approved under the MRN FEMP pre-dates the implementation of the Code in 2019.

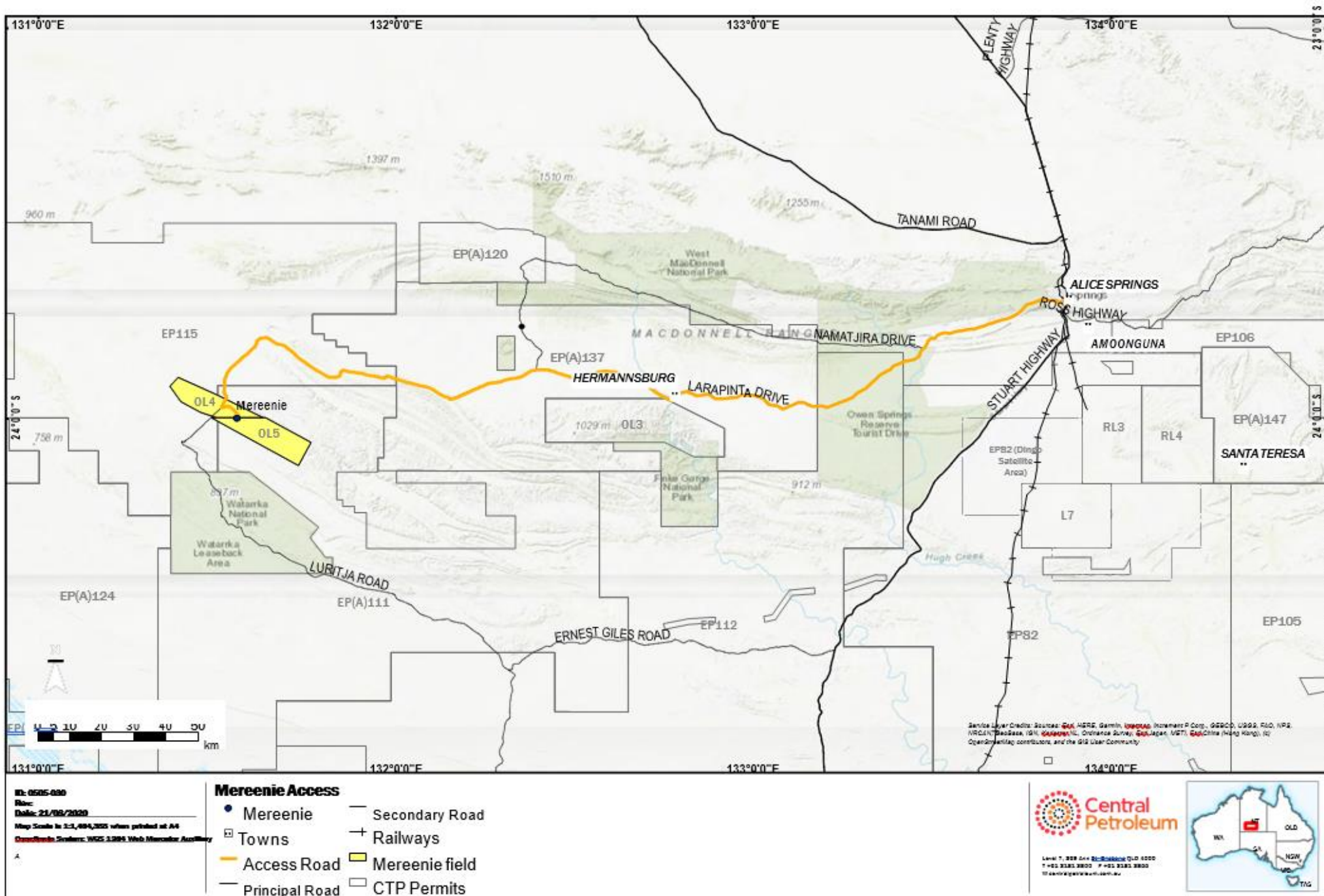


Figure 1-1 Location of the Mereenie oil and gas field (OL4 and OL5) relative to Alice Springs, other Central Petroleum Permits, and National Parks

1.2 Title Holder

Table 1-2 provides details of the registered OL4 and OL5 titleholder, and the titleholder's nominated liaison person. Central Petroleum Mereenie Pty Ltd is a subsidiary company of CP and shares a 50% interested in OL4 and OL5 with Santos Limited and its subsidiary company. Santos Limited and Santos QNT Pty Ltd have recently sold their share to Macquarie Mereenie Pty Ltd and are in the process of transferring their registered interests. CP is the operator of the MRN.

Table 1-2 Details registered titleholder and nominated liaison

OL4 and OL5 Title Holders	Nominated Liaison for MRN
<p>Name: Central Petroleum Mereenie Pty Ltd Address: Level 7/369 Ann Street, Brisbane QLD 4000 Postal Address: PO Box 292 Brisbane, QLD, 4001 ABN: 95 009 718 183 Website: www.centralpetroleum.com.au Percentage ownership: 50 (OL4), 50 (OL5)</p> <p>Name: Santos QNT Pty Ltd Address: Level G Santos Centre 60 Flinders Street Adelaide, SA 5000 ABN: 33 083 077 196 Website: https://www.santos.com/ Percentage ownership: 43.75 (OL4), 43.75 (OL5)</p> <p>Name: Santos Limited Address: Level G Santos Centre 60 Flinders Street Adelaide, SA 5000 ABN: 800007550923 Website: https://www.santos.com/ Percentage ownership: 6.25(OL4), 6.25 (OL5)</p>	<p>Name: Ben Visser Position – General Manager Operations Company – Central Petroleum Limited Address: 7/369 Ann Street, Brisbane QLD 4000 Phone: +61 (0)7 3181 3800 E-mail: info@centralpetroleum.com.au</p>

1.3 Purpose

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

More specifically, this EMP aims to:

- Provide a generic framework for gas well workovers and wellhead equipment, safety systems and gathering line activities at existing production well site
- Address regulatory requirements
- Provide impact management strategies to assist SP 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 the activities listed in Table 1-3 with a detailed description the activities provided in Section 4.0, noting that the EMP covers only those aspects directly associated with the workover and wellhead equipment, safety systems and gathering line activities. The day-to-day operation of the MRN is managed under the MRN FEMP.

If activities that are not listed in either this EMP or in the FEMP and are required to be undertaken, CP will liaise with Department of Environment and Natural Resources (DENR) to determine whether an amendment to this EMP is appropriate or whether a new EMP is required.

Table 1-3 Scope of the workover and wellhead equipment, safety systems and gathering line activities

Activity	Description
In-scope	
Workover and well intervention activities at existing oil and gas wells	<ul style="list-style-type: none"> ▪ Remove and replace production tubing ▪ Milling and un-setting of packers ▪ Milling and casing around obstructions in the well in compliance with the Code ▪ Well clean out including removing sand out of the well ▪ Recovery/ removal via milling and/or fishing and replacement of down hole equipment ▪ Remedial cementing ▪ Perforating the well in the gas zones of producing formations ▪ Plugging the well in compliance with the Code ▪ Installing equipment to prevent sand from entering the well ▪ Repairing casing via squeeze cementing ▪ Installing or replacing liners ▪ Remedial cementing ▪ Completion brine left in annulus above the top set packer to surface ▪ Plugging the well in compliance with the Code
Site set-up and de-mobilisation for workover activities at existing oil and gas wells	<ul style="list-style-type: none"> ▪ Onsite fuel and chemical handling storage measures ▪ Storage (e.g. pipe racks) and containment (e.g. skip bins) facilities for replaced production tubing, well liners and waste from activity ▪ Workover fluid handling system which includes a degasser operated in compliance with the Code ▪ Underbalanced workover system operations in compliance with the Code ▪ Pressure lines and manifolds in compliance with the Code ▪ Re-instatement of flare pit if required ▪ Respective on-site containment systems (flare pit) for material from the well which may include debris, reservoir sand and fines, well fluids, kill fluid, workover fluid and fugitive gas ▪ Installation of blooie, diverter or bleed off lines to a flare / debris containment system ▪ All activities conducted in accordance with the accepted Well Integrity Management Plan and Well Operations Management Plan as per the Code ▪ Gas flaring at the wellsite during the workover activities at a rate of approximately 5 TJs (~300 tons CO₂eq) per well per day over a three-day period ▪ No planned venting to be conducted, all gas to be flared in accordance with Code requirements ▪ Set-up to mitigate overland flow across work site in event of rain and/or 100kL spill at site ▪ Set-up on existing disturbance footprint with light grading to level the existing well pad. ▪ Set-up and demobilisation of workover rig and associated equipment including offices. Minimum area for workover rig set-up on the well lease pad is 60m x 60m ▪ Traffic movements associated with workover rig and mobile equipment entering and leaving site for the campaign each year, with additional return trips for maintenance, as required, plus light vehicle movements associated with 4-10 contract personnel. Return trips during each campaign to depend on rig contractor roster ▪ Water sourced from onsite bores provided water extraction licence in place prior to extraction

Activity	Description
Installation / replacement of wellhead equipment, safety systems and gathering line at an existing oil and gas production well	<ul style="list-style-type: none"> ▪ Installation of well site metering, control and shut down skids ▪ On-site wellhead equipment, safety systems and gathering line works to connect the wellhead to existing field gathering line ▪ Hot works/welding ▪ Hydrostatic testing (using freshwater from commercial supplier) for integrity and leak detection during commissioning ▪ Leak detection monitoring in accordance with Code on recommissioning of the well and in follow-up routine well site inspections in accordance with the Mereenie Field Environmental Management Plan ▪ Loading and unloading of wellhead equipment, safety systems and gathering lines using a crane truck ▪ No freight, trucking or vehicle movements beyond what is experienced under normal production operations
All activities	<ul style="list-style-type: none"> ▪ Use of areas within the existing disturbance footprint only including existing roads, access tracks, laydown areas, well lease pads ▪ Personnel to use the existing Mereenie Camp (100+ person camp) ▪ Use of a mixture of commercially supplied and existing groundwater bores for water requirements ▪ Management of Naturally Occurring Radioactive Materials (NORMs) as per the CP NORMs (Radiation) Management Plan and the Code ▪ Ongoing production operation and maintenance, decommissioning and final rehabilitation of the wells to occur under the Mereenie Field Environmental Management Plan upon completion of the works
Out of Scope	
Activities are not part of the workover and wellhead equipment, safety systems and gathering line activities:	<ul style="list-style-type: none"> ▪ Drilling ▪ Hydraulic fracturing/stimulation ▪ Planned venting ▪ Native vegetation clearing and use of areas outside the existing disturbance footprint

2.0 Commitment to the Environment

2.1 Environmental Policy

CP has a high standard of environmental responsibility implemented through operational quality and integrity measures above and beyond industry standards. CP has a strong environmental commitment focus through all its facilities and operations, being at the forefront of policy and management strategy developments. CP has compiled this EMP and developed mitigation and preventative measures and standards to ensure the workover and wellhead equipment, safety systems and gathering line activities have the smallest ecological footprint as possible. Also, to ensure that any impacts or incidents that have the potential to result in environmental degradation are identified and remediated as soon as possible. The employees and contractors of CP, both office and field, have been briefed on the company's policy, standards and expectations.

CP corporate environmental policy is provided in Plate 3.1 and the corporate Health, Safety and Environment (HS&E) policy is provided in Plate 3.2.



ENVIRONMENTAL PROTECTION POLICY

Central Petroleum Limited considers protection of the natural and social environment to be of the highest priority in all its activities, both domestic and international, and conducting its operations in an environmentally responsible manner.

It is Central Petroleum's policy to:

- Comply, at a minimum, with applicable laws, regulations, standards, codes and guidelines for the protection of the environment and cultural heritage, and in their absence, adopt the best practicable means to prevent or minimise adverse environmental and cultural heritage impacts;
- Cooperate with governments and industry in the formulation of rational and practical environmental and cultural heritage guidelines and legislation;
- Continuously develop the company's environmental management system and cultural heritage management plans to identify, control and monitor risks and compliance with government regulations and industry guidelines, utilising the most appropriate technology available;
- Commit all levels of management to accept responsibility for environmental and cultural heritage management in all Central Petroleum activities;
- Promote environmental and cultural heritage awareness in all Central Petroleum employees and contractors through induction and training programs;
- Maintain cooperative and positive relationships with indigenous people with custodial responsibility for the land where Central Petroleum operates to minimise the impact of those operations on the cultural heritage of the indigenous people, and cooperate with other legitimate land users so that, where appropriate, multiple land use is possible;
- Conduct all Company operations in such a way as to minimise disturbance to the environment, protect native flora and fauna, avoid the pollution of land, water and air, and avoid disturbance of known sites of archaeological, cultural heritage, historical, natural or scientific significance; and
- Maintain an active rehabilitation program that will restore operational areas to a condition which is compatible with the prior land use.



Leon Devaney
Managing Director
5 September 2019



HEALTH, SAFETY, SECURITY & ENVIRONMENT POLICY

Central Petroleum Limited believes that effective management of Health, Safety, Security and the Environment (HSSE) to be of the highest priority in all its activities and it is essential for success in its business, by:

- Providing leadership and commitment to HSSE issues and communicating our expectations to employees, contractors and other stakeholders;
- Providing clear direction and monitoring of a zero drug and alcohol tolerance to all contractors and employees at all Central Petroleum managed work sites, offices and operations.
- Zero tolerance to smoking in any workplace, except designated areas;
- Complying with national, state and local legislation;
- Providing a safe working environment for all employees, contractors and third-party personnel;
- Minimising the impact of our activities on the environment;
- Selecting and managing contractors to ensure their HSSE performance meets the statutory and Company requirements;
- Carrying out risk assessments and taking effective measures to reduce risks to as low as reasonably practicable on all our operations;
- Providing sufficient training, resources, equipment and personnel to achieve our HSSE objectives;
- Maintaining appropriate HSSE documentation;
- Monitoring HSSE performance-investigating and reporting all incidents and accidents regularly to the Board of Directors as well as relevant authorities;
- Striving for continuous improvement;
- Ensuring effective emergency response procedures are in place;
- Supporting wherever possible the advancement of local communities in areas where we operate;
- Conducting audits and reviews to assess compliance with this policy; and
- Implementing and using management systems for integrity management of plant, pipelines and equipment.

It is the responsibility of all employees and contractors to comply with this policy and to assist Central Petroleum Limited in its implementation.



Leon Devaney
Managing Director
5 September 2019

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Plate 2.2 CP's Corporate HSSE Policy

3.0 Environmental Legislation and Other Requirements

3.1 Key Legislation

The key NT and Commonwealth legislation relevant to the workovers and wellhead equipment, safety systems and gathering line activities is provided in Table 3-1.

Table 3-1 Summary of legislative requirements

Relevant Legislation	Legislative Requirement	Responsible Agency	Actions
Commonwealth			
<i>EPBC Act</i>	Referral of proposed action / ministerial approval	Department of Agriculture, Water and Environment	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 as a result of the MRN workover and wellhead equipment, safety systems and gathering line activities and a referral is not required at this stage.
<i>National Greenhouse and Energy Reporting Act 2007</i>	Reporting under National Greenhouse and Energy Reporting Scheme	Australian Government – Clean Energy Regulator	CP's activities within the MRN, including the workover and wellhead equipment, safety systems and gathering line works contribute to triggering the threshold for reporting and CP must report greenhouse gas emissions, energy production and energy consumption data to the Australian Government annually.
<i>National Environment (National Pollution Inventory Protection) Measure 1998</i>	Reporting under the National Pollution Inventory (NPI)	Department of Agriculture, Water and the Environment – NPI	CP's activities at MRN, including the workover and wellhead equipment, safety systems and gathering line works, may contribute to triggering the threshold for NPI reporting and CP must report pollution data to the NPI annually if any of the NPI thresholds are triggered.
NT			
<i>Petroleum Act 1984</i>	Petroleum titles	Department of Primary Industries and Resources (DPIR)	CP has obtained the necessary petroleum titles to undertake the activities listed in this EMP
<i>Bushfire Management Act 2016 / Bushfire Management Planning Guideline: Onshore Petroleum Projects</i>	Bushfire Management Plan / Permit to burn	Bushfires NT	CP has included a bushfire management plan consistent with the requirements of the Act and guideline. The MRN 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 MRN.
<i>Petroleum (Environment) Regulations 2016</i>	Approved FEMP	DENR	The construction, operation, maintenance and decommissioning of the existing MRN oil and gas infrastructure is currently approved under the 2017 MRN FEMP, which was approved prior to the implementation of the Code in 2019. CP will have an approved EMP in place for the workovers and wellhead equipment, safety systems and gathering

Relevant Legislation	Legislative Requirement	Responsible Agency	Actions
			line works prior to commencement of the activities. EMP activities are to comply with requirements of the Code and Schedule 1 of the regulations. The EMP stipulates incident and reporting requirements.
<i>Code of Practice: Onshore Petroleum Activities in the Northern Territory 2019</i>	Activities to be performed under an approved EMP are to be consistent with the Code	DENR	The construction, operation and maintenance of the existing MRN (including activities within scope of the MRN FEMP) are not subject to the Code as approval for these activities was obtained prior to 2019 when the Code was implemented. As the EMP activities described herein are beyond the scope of the MRN FEMP, the activities are subject to Code compliance and this EMP to be submitted for approval is to be consistent with the Code.
<i>Environmental Protection Act 2019 and associated Environment Protection Regulations 2020</i>	Referral of proposed action / environmental approval	NT EPA	The activities within the scope of EMP do not constitute any material change of use. CP is of the view that the workover and wellhead equipment, safety systems and gathering line activities covered by this EMP do not have a significant effect on the environment and that assessment under the <i>Environment Protection Act 2019</i> .
<i>Northern Territory Aboriginal Sacred Sites Act 1989</i>	Must not enter, damage or interfere with a Sacred Site (even if not registered) / Authority Certificate	AAPA	CP has an approved AAPA Authority Certificate for the works described in this EMP (C2020/023). The EMP works are to be conducted in the area approved under C2020/023 only. Any incident involving sacred sites is to be reported to AAPA.
<i>Water Act 1992</i>	Groundwater extraction licence	DENR	Existing groundwater bores within the MRN will be used to source groundwater. CP has an application for a groundwater extraction licence for five bores in the MRN currently in progress (application reference number AG09209). Groundwater will not be taken for the workover and wellhead equipment, safety systems and gathering line activities. until the water extraction licences is approved.
<i>Heritage Act 2011</i>	Work approval (for removal or damage of archaeological sites)	DENR	All activities outlined in this EMP will be conducted within the exiting operational footprint of the MRN, therefore CP do not anticipate a work approval will be required.
<i>Radiation Protection Act 2004</i>	Disposal of radiation sources (NORM)	Department of Health	CP to undertake NORM testing as outlined in the EMP. If limits specified in the act are exceeded, disposal of the material to be in accordance with the Act.
<i>Public Health and Environmental Act 2011</i>	Wastewater management	Department of Health	CP to abide by the Code of Practice for Onsite Wastewater Management.
<i>Territory Parks and Wildlife Conservation Act 1976</i>	Protects wildlife and listed threatened species in the NT	DENR	EMP activities to be conducted within existing MRN operational footprint and on existing MRN wells so significant impacts to wildlife and listed threatened species are unlikely.

Relevant Legislation	Legislative Requirement	Responsible Agency	Actions
<i>Work Health and Safety (National Uniform Legislation) Act 2011</i>	Provides for occupational health and safety measures associated with petroleum activities	NT Worksafe	CP to undertake activities in accordance with the Act, including reporting of incidents
<i>Transport of Dangerous Goods by Road and Rail (National Uniform Legislation) Regulations 2011</i>	Dangerous goods can only be transported by appropriately licenced personnel and within licenced vehicles	NT Worksafe	CP to ensure that any dangerous goods transportation that occurs above the trigger levels are done so by appropriately licensed transportation personnel (including vehicles)
<i>Petroleum Act 1984</i>	Land Access and Compensation Agreements	Not Applicable	Land access agreements are in place with the Central Land Council for the MRN as per the <i>Mereenie Agreement, 2013</i> . No other agreements are required for activities under this EMP.
<i>Waste Management and Pollution Control Act 1998</i>	General environmental duty	EPA	Where activities occur outside of OL4 and OL5 (e.g. during transportation), CP 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.
<i>Waste Management and Pollution Control Act 1998</i>	Licensed waste transporters	EPA	CP will ensure that any listed waste generated during the workovers and wellhead equipment, safety systems and gathering line works is removed from the MRN by an appropriately licensed transporter.
<i>Weeds Management Act 2001</i>	Defines weed declaration classes and statutory weed management plans	DENR	CP to ensure its activities are consistent with statutory weed management plans and undertakes weeds management activities consistent with weed declaration classes

3.2 Key Codes of Practice and Guidelines

The key codes of practice and guidelines relevant to the activities described in this EMP are summarised in Table 3-2.

Table 3-2 Key codes of practice and guidelines

Document	Summary
<i>Code of Practice: Onshore Petroleum Activities in the Northern Territory (2019)</i>	Mandatory Code of Practice for the petroleum industry to ensure that petroleum activities in the Northern Territory are managed according to minimum acceptable standards to ensure that risks to the environment can be managed to a level that is as low as reasonably practicable (ALARP) and acceptable.
<i>Schedule of Onshore Petroleum Exploration and Production Requirements (2019)</i>	Mandatory schedules for the exploration or development of petroleum for the petroleum industry to ensure that petroleum activities in the Northern Territory are managed according to minimum acceptable standards.
<i>Code of Practice for on-</i>	Stipulates the approved sewage and sillage treatment devices and practices within the

Document	Summary
<i>site Wastewater Management (2014)</i>	NT. Sewage and sullage produced and disposed of from the camps must be undertaken in accordance with the Code
<i>Australian Pipeline Industry Association Code of Environmental Practice – Onshore Pipelines (2017)</i>	Provides industry accepted guidance on environment management through the planning and asset acquisition, construction, operational and decommissioning phases of a pipelines' lifecycle
<i>APPEA Code of Environmental Practice (2008)</i>	Provides an outline of environmental objectives which represent guidance on key aspects of good environmental practice in the petroleum industry
<i>Best Practice Erosion and Sediment Control (2008)</i>	Facilitates the identification of those issues that should be considered when formulating and evaluating strategies for best practice erosion and sediment control. Facilitates best practice storm water management. Facilitates active avoidance or minimization of soil erosion resulting from construction activities. Facilitate best practice soil and sediment control management on sites. Erosion and sediment Control Plan covering petroleum exploration activities are
<i>Weed Management Planning Guide – Onshore Petroleum Projects (2019)</i>	Provides guidance to the industry about the weed management planning required to undertake onshore petroleum projects in the NT
<i>ISO 31000 Risk Management – Principles and guidelines</i>	Outlines the process to be followed to ensure the risk assessment process is undertaken in accordance with best practice requirements
<i>Australian and New Zealand Guidelines for Fresh and Marine Water Quality</i>	Provides best practice protocol for water quality monitoring and field sampling (including for ground water).

3.3 Central Land Council Agreement and Sacred Sites Certificate

CP has a contractual agreement with the Central Land Council (CLC) for lease of the OL4 and OL5 land for petroleum activities under the Mereenie Agreement 2003. The CLC act as a representative of the Indigenous Traditional Owners of the MRN. The Mereenie Agreement 2003 essentially forms CP's land access agreement, and also deals with matters such as royalties, administration and Sacred Sites protection.

Under the Mereenie Agreement 2003, the CP has obtained a Sacred Sites Clearance Certificate from the CLC (SSCC C2013-046), which was renewed in July 2017. This certificate was issued following an assessment of the current and future activities to be conducted by CP at the MRN, a cultural heritage assessment and survey, and delineation of cultural heritage restricted work and exclusion zones. The certificate outlines what CP activities (including future activities) are permitted to occur without further assessment and the locations where the activities are approved to occur.

CP, in consultation with the CLC, has assessed the EMP activities against the SSCC and determined that the activities are approved under the existing SSCC (C2013-046). The SSCC permits (among other activities) 'construction of pipelines, flowlines and connections, use of existing laydown areas, construction and maintenance of leases, and drilling and petroleum engineering operations'. All EMP activities are to be conducted within SSCC assessed area and all works are to be conducted in accordance with the SSCC conditions, including the restricted work and exclusion zone areas, and liaison meetings and CLC engagement requirements.

4.0 Description of Activity

4.1 Criteria for Well Selection

CP propose to workover up to five existing wells per year and install additional wellhead equipment, safety systems and gathering lines at any of the 71 existing MRN wells as required over the 5-year validity period of this EMP. Five existing wells have been nominated for the 2020-2021 workover program (WM19, WM20, WM14, WM15 and EM39). Wells to be selected for future workover programs will be nominated based on factors including:

- Results of corrosion testing conducted as part of CPs asset integrity management system, which may indicate that the completions or down-hole equipment needs to be replaced
- Predicted gas yield.

Wellhead equipment, safety systems and gathering lines will be installed at existing wells as required considering operational need.

Physical and environmental factors at the well site will be taken into consideration when planning the activities, noting that all wells are existing, and activities are to be conducted within the existing disturbance footprint. Environmental sensitivity maps (Appendix 7) provide recent aerial imagery of the well site and display the topography, creeks /drainage lines downslope of the well and locations of flora, fauna and weed records. These maps can be used to determine, for example:

- Workover rig layout and flare pit location (if required) within the existing disturbance footprint
- Proximity of activities to drainage lines and streams with respect to topography and potential erosion hazard so that site-specific erosion and sediment controls can be implemented to prevent discharge of overland flow following rainfall and the migration of potential spills to environmentally sensitive areas
- Proximity of activities to known protected flora and fauna habitat so that areas can be specifically avoided, and potential offsite discharges diverted using erosion and sediment control measures.
- Proximity of activities to known weed locations so that weed control can be taken prior to mobilisation to site.

The environmental sensitivity maps will be updated as contemporary information becomes available (e.g. from the annual weed survey at the MRN).

4.2 Proposed Timetable

The workover program is estimated to take around three consecutive months on an annual basis. Wellhead equipment, safety systems and gathering line activities are likely to take around 2 months to complete each year. The approximate duration of each activity is provided in Table 4-1. Activities are based on a 12-hour shift however 24-hour operations may be required for workovers.

Table 4-1 Approximate activity duration

Activity	Approximate Duration
Workover	
Civil works	1.5 days per well
Workover	Averaging 10 days per well, but up to 20 days
Site set-up and demobilisation	2 days per well
Rehabilitation	1.5 days per well plus ongoing monitoring as per the Rehabilitation Plan

Activity	Approximate Duration
Wellhead equipment, safety systems and gathering line replacement	
Removal and replacement of existing wellhead equipment, safety systems and gathering lines	Allow 3 days per well

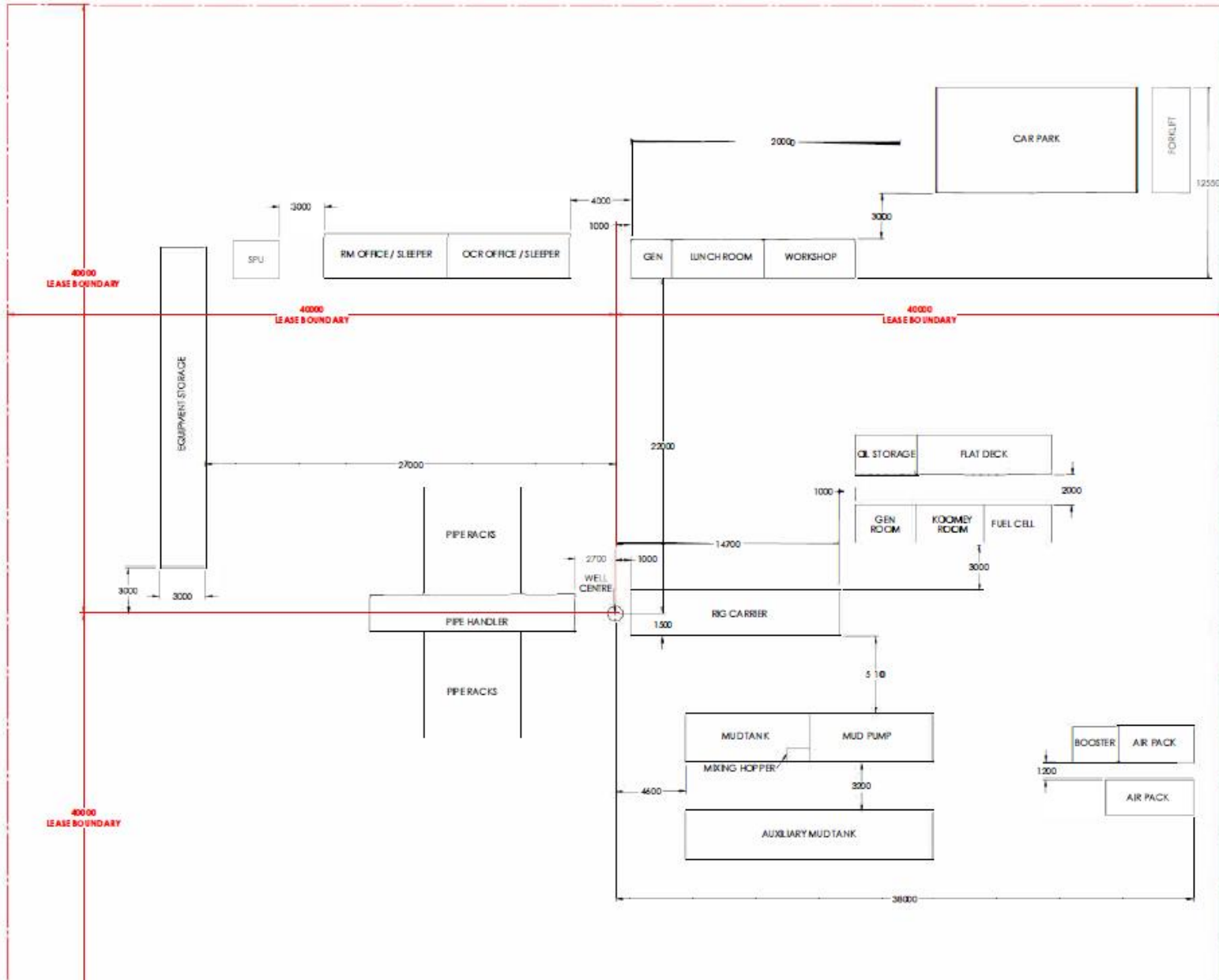
4.3 Workovers

4.3.1 Civil Works

The civil works required to support the workover campaign includes:

- Regrading of existing well lease pads and, if required, surrounding operational areas that have been previously cleared (i.e. hardstand areas) to level the work area for the workover equipment.
- Ideally, the workover rig needs 80m x 80m (0.64ha) on the well lease pad though the equipment can be reconfigured to fit on a 60m x 60m (0.36ha) area if required.
- A typical rig layout on a 80m x 80m well lease pad is shown in Figure 4-1 and an example of the layout on WM20 with flare pit shown in Figure 4-2. The environmental sensitivity maps (Appendix 7) generated for the 71 MRN wells can be used by CP and the rig contractor to plan the site-specific rig layout at a wells nominated for workovers. Site verification will be required, and consideration will be given to weed management, erosion and sediment control and the preservation of regrowth vegetation that may be present on the well lease pad.
- In accordance with section A.3.7 (b) of the CoP, infrastructure (including flare pits) will be designed, constructed, operated and maintained to mitigate risks of ignition.
- Re-instatement of flare pit if the existing flare pit has been previously backfilled. Flare-pits are typically located on or adjacent to the well lease pad. All new flare pits will be located in the existing disturbance footprint.
- Flare pit dimensions are approximately 12m length x 10m width x 1.5m depth (0.18ML volume) with a horizontal inground flare system to mitigate risk of ignition.
- For the flare pits, material excavated from the flare pit will be used to create an embankment at the back of the pit to divert heat to mitigate risk of ignition. If there is not a suitable location for the flare pit, the flare tank will be used.
- Set-up of rig equipment, tanks, storage units and office facility within the work area as per Figure 4-1.
- Construction of drain/trench around mud tanks (filled with water or workover fluid) to direct potential tank overflow to the flare pit where it will evaporate during flaring. The approximate dimensions of the drain/trench are 300m width x 300mm depth (around the tanks).
- Installation of sediment and erosion controls.
- As per B.4.16.2 (e) of the CoP,. temporary fencing will be installed around the flare pits and wells to prevent fauna entry. Upon completion of the work, a fauna ramp will be installed, and the wellsite managed from there on in under the MRN FEMP.
- If not already present, wells signed with well name, well number, major hazards and CP contact name and contact details of the person in charge of the workover operations.

RIG LAYOUT DIMENSIONS



- ALL EQUIPMENT MAY BE MOVED TO SUIT ADDITIONAL ITEMS LOCATED ON THE WORKING LEASE, SUCH AS PRODUCTION EQUIPMENT. A RISK ASSESSMENT IS TO BE CONDUCTED TO DETERMINE THE NEW POSITION FOR THE EQUIPMENT TO BE SPOTTED.
- BLOOIE LINE ORIENTATION AND SCUFF TANK POSITION MAY BE MOVED TO SUIT LEASE SIZES AND SURFACE EQUIPMENT. API RP 54 RECOMMENDS BLOOIE LINE LENGTH TO BE 150M (45.8m) AND AIR COMPRESSORS TO BE 100M (30.5m) FROM WELL CENTRE WHERE TERRAIN PERMITS. A RISK ASSESSMENT IS TO BE CONDUCTED TO DETERMINE THE NEW POSITION FOR THE EQUIPMENT TO BE SPOTTED WITHIN THE ORIENTATION AND DISTANCE REQUIRED.



APPROX. MASS: 0.00kg

PREPARED BY: N.Z. CHECKED BY: AMC DATE: 19/12/17	DRAWN BY: DW DATE: 21/12/17
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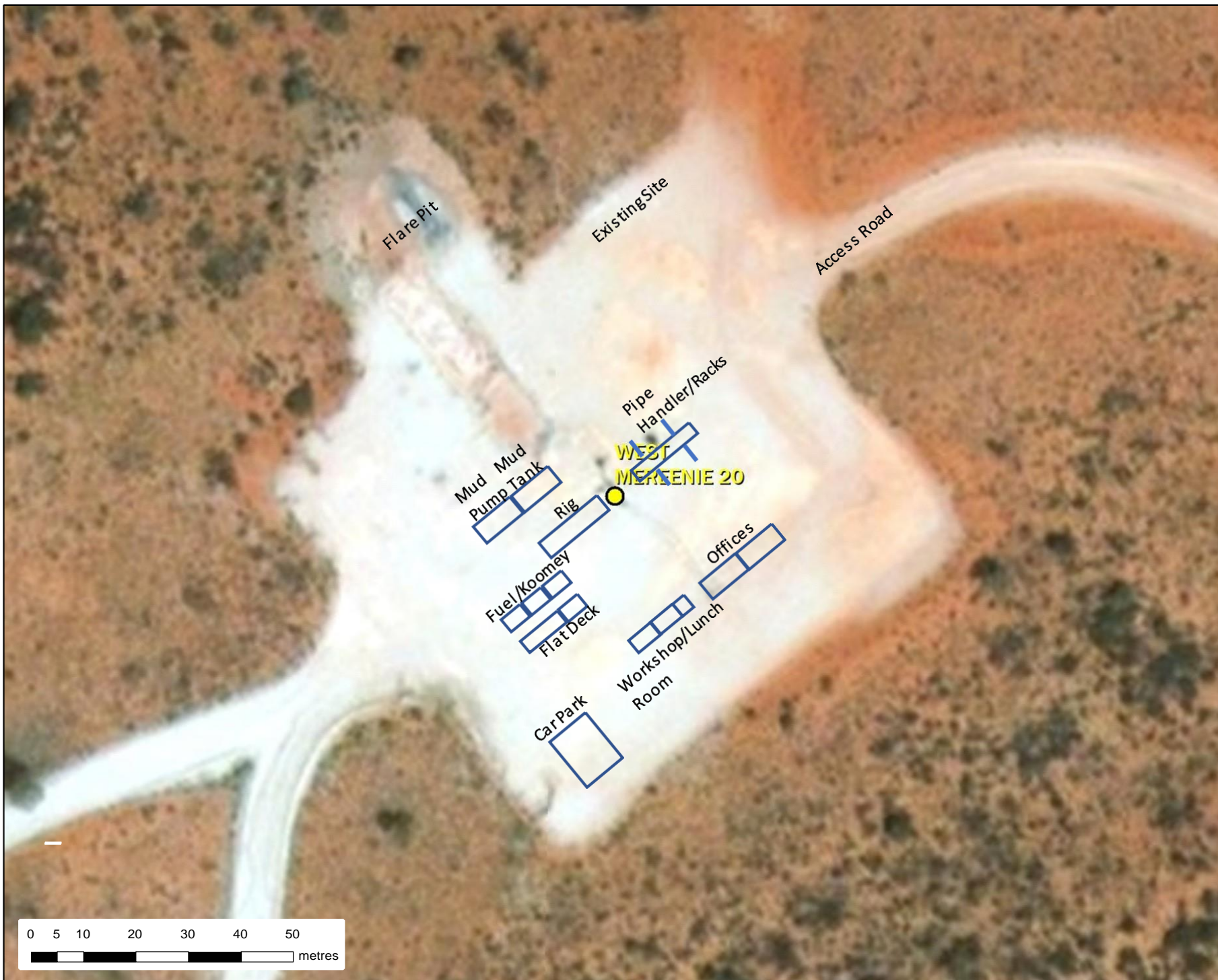


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TITLE: Wild Desert Rig #18 Layout	REV: A2
NO: PT03928	REV: B0

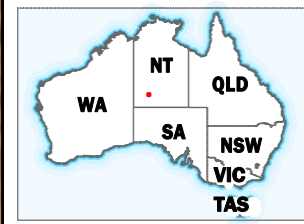
Figure 4-1 Typical workover rig layout



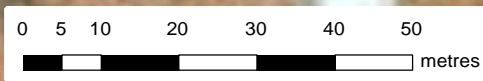
RIG SITE LAYOUT

Legend

ID: 0400-001
Rev:
Date: 10/06/2020
Map Scale is 1:664 when printed at A4
Coordinate System: GDA 1994 MGA Zone 52



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Figure 4-2 Example rig and equipment layout on W20 with flare pit

4.3.2 Workovers

The following section describes the typical workover activities that may occur at the MRN wells, noting that not all of the activities need to occur and the type of activities conducted will depend on the condition of the well's downhole equipment / infrastructure and CP's operational requirements. Integrity verification tests will be conducted prior to, during and following the workover as per the Well Operations Management Plan (WOMP) and Well Integrity Management Plan (WIMP).

Workover activities will use either service rig (Figure 4-3) with optional primary jet pump system, or a snubbing unit (hydraulic rig) (Figure 4-4), depending on the type of workover activity required and availability of equipment from the workover contractor.

A workover begins by shutting in the well with the existing Christmas tree valves. The lead rig contractor then positions the workover rig over the well then installs certified blow out preventors (BOPs). The BOP is function/pressure tested. The well is now secure and under control and any pressures or residual gas from the well bled to be flared in the flare pit via the blooie line or dedicated bleed lines.

The existing completion will be removed using the rig to pull the down hole completion including the seal assembly, packers and other existing completion assemblies along with the removal of the tubing string. A packer retrieval tool may need to be used and run in hole to retrieve the existing packer and remaining tubing string or debris in the hole if they do not come out in the initial retrieval process.

The retrieved tubing and other metals will be tested for naturally occurring radioactive materials (NORMs) as per Section 4.6.3 and recycled as scrap metal at an approved facility provided no NORMs present.

Once the current tubing string is removed from the well, fishing gear may be run in the hole to retrieve any other completions gear. If the gear cannot be retrieved via fishing, it may need to be milled. This is considered routine workover operations.

Following fishing/milling operations, a swivel may be made up with a clean out bit and run in the hole to clean out fill (sand) with an air/mist fluid system. If required, plugs and packers may be run in the well to isolate formation zones no longer required. Plugs and packers that currently isolate producing formations may be retrieved or milled out to reopen the formation zones. Other obstructions in the well may need to be milled out or cased in accordance with the Code. Fishing and milling activities can often require the use of workover fluid to bring the milled/fished materials/equipment back to the surface.

The well will then be perforated with wireline perforating guns. Perforation will target the formation zone already accessed by the well, and/or other gas zones of the Pacoota Sandstone and/or Stairway Sandstone formations. All zones have been previously accessed by wells in the MRN. A well may have up to 3-4 perforations in the casing, allowing it to produce from multiple zones.

A new tubing string will then be run in the well. The perforations will be isolated by packers so that the well can selectively produce from up to 3-4 zones independently by opening/closing sliding sleeves. Other down-hole equipment such as gauges and valves may be installed/replaced. A completion brine will be left in the annulus above the top set packer to surface.

Other down-hole activities that may be undertaken as part of the workover works includes:

- Installing equipment to prevent sand from entering the well
- Repairing casing via squeeze cementing
- Installing or replacing liners
- Remedial cementing
- Completion brine left in annulus above the top set packer to surface
- Plugging the well in compliance with the Code

Note that only the gas caps are to be accessed during the workover. Any gas or retrieved fill or materials is expected to be dry gas for which condensate separation is not required.



Figure 4-3 Example of a typical workover rig

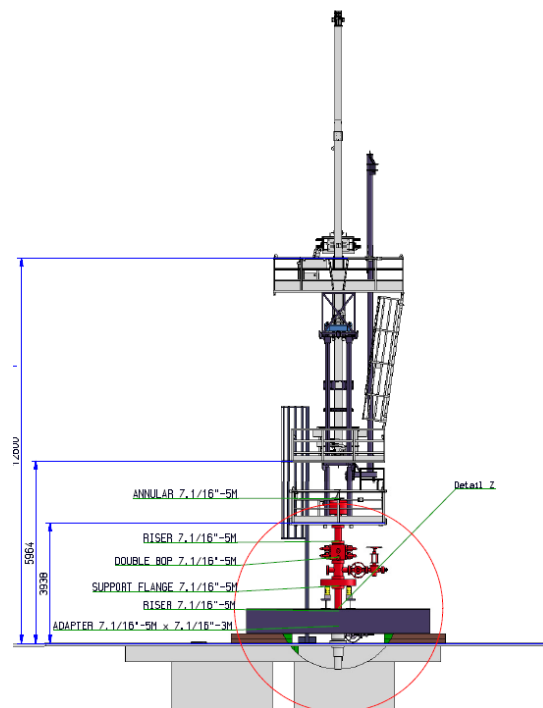


Figure 4-4 Example of a typical snubbing unit (picture, left and schematic, right)

4.3.2.1 Barrier Protection

An example of the typical well barriers that currently exist in the MRN relative to stratigraphy is provided in Figure 4-5. 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.

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

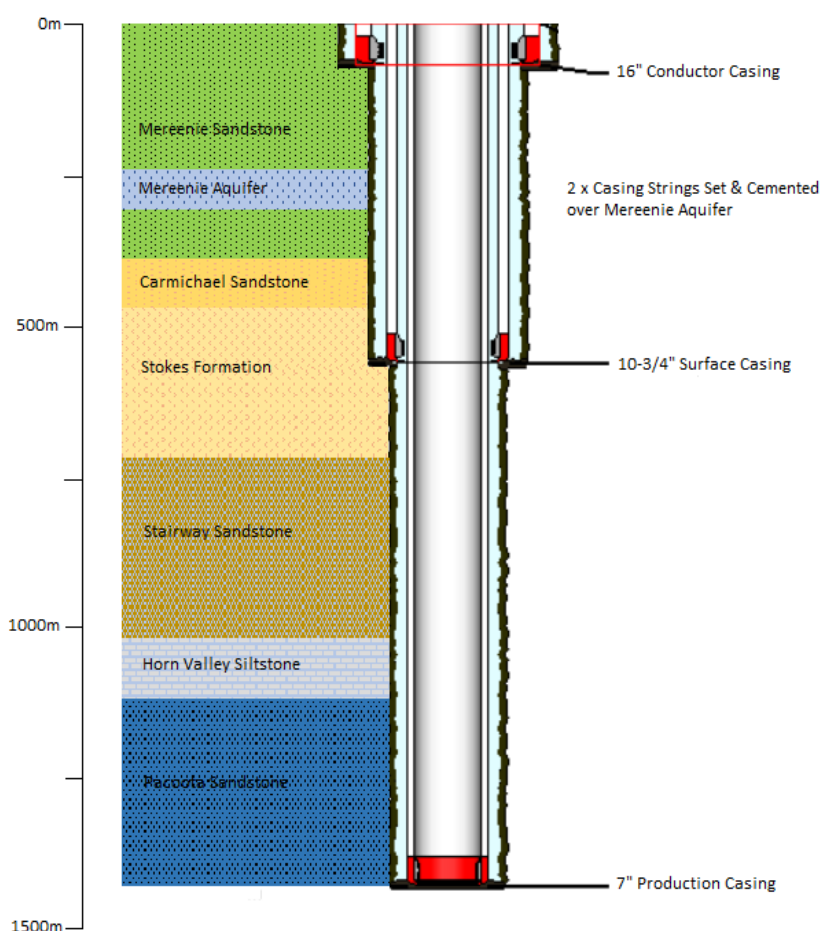


Figure 4-5 Typical Mereenie well barriers relative to stratigraphy

The use and verification of well barriers that will be used and installed during workovers is prescribed by the Code. At this point in time, CP is working with various suppliers and contractors in the final stage of workover design. The well barrier schematics are not yet developed, however CP will fully comply 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.

CP will ensure that well integrity is maintained, as set out in section B.4.1 of the Code. More specifically as stipulated in the Code, CP will ensure the following mandatory requirements are met:

B.4.14.2 Mandatory requirements (a) Well barrier elements must be in place to intervene on the well during workover and intervention activities. as specified in section B.4.3 of this Code. (b) Fit for purpose well design and construction materials must be used workover and intervention activities as specified in this Code (sections B.4.6, B.4.7, and B.4.8). (c) All new barriers or new well operating envelopes must be verified and clearly documented and reported by submission of an updated well barrier integrity validation (WBIV) report to DPIR.

These mandatory requirements will be submitted to the DPIR and approved prior to any works being undertaken in the field. If requested, CP can provide the “approved” well barrier diagrams when approved by the DPIR.

4.3.2.2 Fluid System

In accordance with the code, CP 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:

- Well cleaning – During production operations there is often debris from the formation that settles either in the tubing or at the bottom of the hole. Workover fluid may be required if the debris cannot be brought to the surface with air/mist.
- Fishing and milling – During the removal of old completion equipment, milling or fishing operations are often required. This process involves using specialised mills or fishing equipment designed to latch on to or cut up the old equipment. During this process there is a need to remove this back to surface and the fluid enables the milled / fished debris to be carried back to surface.
- Well control - The best method of keeping formation fluid (water, oil or gas) contained within the reservoir is to ensure that the pressure in the well bore is equal to or greater than the reservoir pressure. The simplest way to achieve this is through the use of workover fluid, which may be used in the event of a kick or blow-out where the well needs to be killed.

CP will use a water-based workover fluid during workover. Where workover fluid is used, 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.

Installed 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 as per Section 4.6.3 and recycled at an approved facility as scrap metal provided no NORMs present.

4.3.3 Wellhead Equipment, Safety Systems and Gathering Line Works

Wellhead equipment, safety systems and gathering lines works will 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.

Loading and unloading of wellhead equipment, safety systems and gathering lines will be conducted using a crane truck. Where possible, instruments and pipes will be prefabricated and connected using flanges to avoid fabrication and welding (hot work) on site. If this is not achievable, welding will be required to complete the installation.

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.

As per Section 7.5 Methane Emissions Monitoring Plan, leak detection monitoring will occur in accordance with Code on recommissioning of the well and in follow-up routine well site inspections in accordance with the MRN EMP. Removed pipework will be tested for NORMs as per Section 4.6.3 and recycled at an approved facility provided no NORMs present.



Figure 4-6 Example of typical metering instrument, skid



Figure 4-7 Example of typical control valves

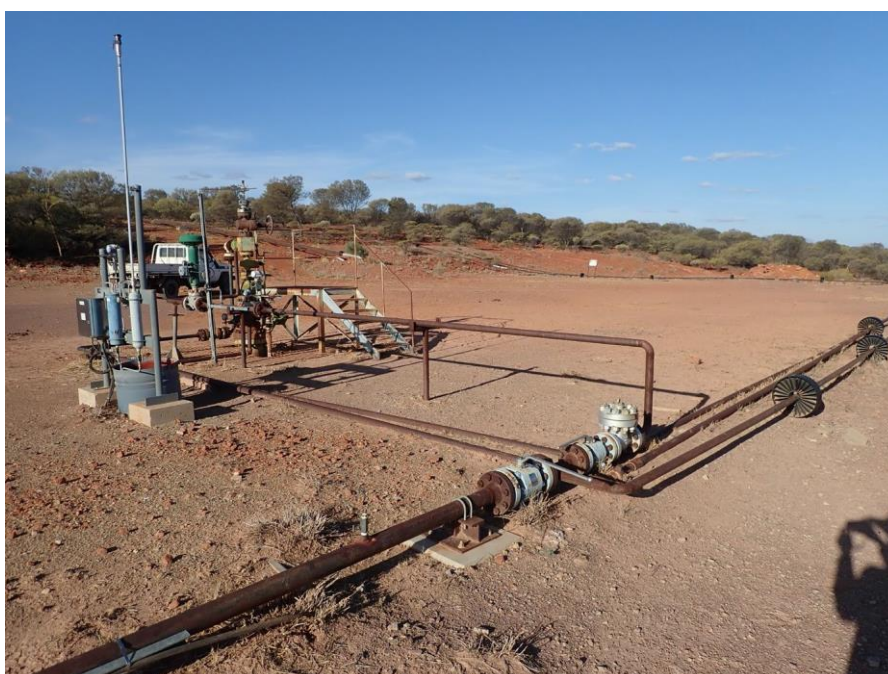


Figure 4-8 Typical well lease layout and above ground pipeline

4.4 Decommissioning

Decommissioning of a well is not a planned activity under this EMP. However, this section is included to account for any emergency decommissioning 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 compliant and accepted WIMP and WOMPs including:

- 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. The cement plugs will be permanently placed in the well and verified as follows;
- Off bottom open hole cement plugs will be verified by tagging the plug with a minimum 2270 kg (5000 lb) drill string weight,

- For consecutive stacked cement plugs with the first plug set on bottom or solid base (e.g. mechanical packer, other verified cement plug) validation of the top of good quality cement will be carried out by tagging the top plug with a minimum 2270 kg (5000 lb) drill string weight. If using a sacrificial stinger to set open hole plugs, no tag is necessary where no losses are observed during cement placement.
- For a cased hole cement plug with the bottom of the plug exposed to open hole validation will be done by tagging the top plug with a minimum 2270 kg (5000 lb) drill string weight and by pressure testing to 3.5 MPa (500 psi) above the estimated (or previously recorded) leak-off pressure (within the limits of the casing and wellhead pressure ratings).
- For a cased hole cement plug supported by a pressure tested bridge plug, validation may be by post cement job report and calculations, or by tagging the plug with a minimum 2270 kg (5000 lb) drill string weight.
- For an unsupported cased hole cement plug barrier not exposed to open hole below, validation will be done by tagging the plug with a minimum 2270 kg (5000 lb) drill string weight.
- When a sacrificial string is used to place a cement plug, validation may be via a combination of pressure testing to confirm isolation and validation of the conduct of the cement job.

Before the wellhead is removed zero pressure on any casing or annulus will be confirmed. Wellheads will be removed, and the casing will be cut.

A steel marker plate cut from corrosion resistant alloy or similar grade steel for corrosive environments will be installed after the wellhead has been cut off detailing the following:

- the identifying name of the well;
- the total depth in metres of the well;
- the date the well was decommissioned; and
- the marker plate shall be covered with soil to ground level.

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 NORM 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.

Leases and roads will be rehabilitated or left in place subject to an agreement with landholders.

4.5 Rehabilitation

Rehabilitation of at the workover and wellhead equipment, safety systems and gathering line well sites will be undertaken in accordance with the rehabilitation management plan in Section 7.7.

For wells that that undergo activities under this EMP, the ongoing production operation of the wells will be undertaken under the MRN FEMP with final rehabilitation of the operational well undertaken in accordance with that plan. Once the well has been transferred to operation under MRN FEMP, all obligations for the well will also be transferred and this workover and wellhead equipment, safety systems and gathering line EMP will be closed out.

4.6 Support Activities

4.6.1 Flaring

During the workover at each well, production gas will be flared to remove residual gas from the well once the well has been shut in. Gas will be flared in flare pits (existing or newly constructed) or else flared in the stack/tank system. The estimated maximum flow rate is 5 TJ (~300 tons CO₂eq) per well per day for a period of three days. There is no planned venting. Central Petroleum and the company providing the services have determined a combustion efficiency of 98% for the blooey line flare in an open-air environment.

The efficiency of the open-ended flare is modelled on the Flare Efficiency study by McDaniel (1983) commissioned by the US EPA to study the efficiencies of flares as devices for the disposal of hydrocarbon emissions. This study determined the combustion efficiencies in the flare plume are greater than 98%.

There is no planned flaring or venting associated with the wellhead equipment, safety systems and gathering line installation activities. The well will be isolated prior to commencing the activities and gas bleed into the existing field gathering network.

All workover flaring and any emergency venting and will be in accordance with the requirements of the Code. Emissions from any flaring and/or emergency venting events will be estimated and recorded for reporting to state and federal governments.

4.6.2 Water Usage

Water used during activities under this EMP may be sourced from the onsite bores and/or from commercial water suppliers.

Groundwater is proposed to be extracted from five pre-existing onsite bores (RN017898, RN017657, RN004620, RN013861 and RN018955), all of which access the Mereenie Sandstone. Due to the arid location of the MRN, there is very little available surface water in the area, thus groundwater is relied on for use.

CP propose to extract groundwater for the workover activities, noting that no groundwater is required for the wellhead equipment, safety systems and gathering line activities. A water extraction licence application is in progress for the whole MRN for a total volume of 52.8ML per year, which includes groundwater for the proposed EMP activities, and will be in place prior to groundwater extraction for workover activities (application reference number AG09209).

The main use of water during the workover activities is for workover fluid. Around 400 bbls (63.6m³) of groundwater will be required per well. On average this equates to approximately 0.32ML per year if five wells are worked over per year.

Wellhead equipment, safety systems and gathering line activities will source approximately 2000L per well of commercial freshwater to be used during hydrostatic testing. The total volume of water used per year will depend on the number of wells which undergo wellhead equipment, safety systems and gathering line activities. If a maximum of 14 wells are refurbished per year over the five-year validity period of this EMP, a total of approximately 0.028ML/year may be used. CP anticipate the actual figure is likely to be less as it is unlikely all 71 wells will be refurbished over the course of five years. No other water is required specifically for these works.

The actual volumes of all water used at each of the workover and wellhead equipment, safety systems and gathering line activity locations will be recorded and tracked, including volumes of water transferred to each tank. CP will also record daily estimates of volumes of water that evaporate from any tanks.

Water usage for dust suppression, camp operation, firefighting (if required) and potable water is covered under the MRN FEMP and are therefore not within the scope of this EMP.

4.6.3 Naturally Occurring Radioactive Materials

CP holds a radiation licence for dealing with a radiation source (permit number 1902650L) as NORMs are typically found alongside oil and gas deposits. CP performed a complete site NORMS surveys in September 2019. The survey indicated that the site emitted a Very, Very Low level (VVL) radiation hazard with an average of 0.2 and 1.0 µSv, and that the worker radiation dose was well below (1000x) the member of public recommended exposure limit, which is 1 mSv per year. This survey was performed extensively across the entire Mereenie field and processing plant.

As the survey results were consistent across the field, Central Petroleum is expecting similar levels of NORMS during the workover activities and is not expected to present a radiation exposure hazard.

As a precaution in the event that results are not in line with expectations, any activity surrounding well works requires CP to utilise safe risk management and handling methods for NORM materials. Prior to the removal of any tubing from the well, the NORMS (Radiation) Management Plan alongside a Job Hazard Analysis or procedure is readied and a worker safety briefing on NORM and the materials to be handled is performed.

Personnel performing well related activities must wear the appropriate PPE:

- Long leg and arm cotton clothing
- Safety Eye wear
- Hard hat for head protection
- Suitable gloves for the task. (Standard well workers gloves are considered a suitable level of protection against standard hazards including NORM in onshore well activities)

Whilst CP is confident that there is VVL radiation hazard some precautions will be undertaken to verify this. The following broad steps will be followed:

- A qualified radiation sampler and person competent in our NORMS procedure will be present on site.
- As the first joint of tubing is pulled from the well, a radiation reading shall be taken using a gamma-beta probe – Ludlum Survey meter
- As the tubing will be moist, the immediate risk of inhalation will not be a concern
- Gloved hands will protect the workers from loose norm materials
- As the tubing is lowered on to the racks another reading, and inspection will be performed
- The tubing radioactivity readings are anticipated be in the VV Low level regions and not considered harmful
- If the two readings confirm this, then there is no requirement for special treatment as the tubing is retrieved from the well
- Tubing will be stored in a suitable environment away from workers and covered if potential for drying and dust release is considered a risk
- Once dry a third reading will be taken and there will be no requirement for the isolation of the tubing and normal handling, storage and removal from site procedures can be followed

If the results are higher than expected at any stage, the competent person will ensure that the tubing is handled in accordance with the approved NORMS procedure and appropriately treated, stored, transported by an approved waste transport company and disposed of appropriately at an approved facility.

4.6.4 Waste Management

At each well site, waste is initially separated into listed and non-listed wastes. Listed waste is any waste prescribed under the *Waste Management and Pollution Control (Administration) Regulations 1998* as a listed waste (refer <https://ntepa.nt.gov.au/waste-pollution/approvals-licences/listed-waste>), with non-listed waste being waste that is not prescribed under the legislation. Listed and non-listed wastes are stored in vermin proof containers at each well lease until it is collected and transported off site by a licensed contractor and disposed of at an appropriately licensed facility.

As part of the removal of any wastewater from each location (in addition to those requirements for a licensed waste transporter) the following matters are to be recorded:

- Volume removed
- Destination
- Licence number of the waste transporter

The tracking of wastewater must be done in an auditable chain of custody system and be in accordance with requirements imposed under the *Waste Management and Pollution Control Act 1998* and the *Radiation Protection Act 2004* (if applicable).

The typical wastes that may generated at each well lease is listed in Table 4-2.

Table 4-2 Potential waste types and disposal method

Typical waste	Disposal method
Sewage, grey water	Treatment Greywater and sewage treatment and management at the camp previously approved under the MRN FEMP. Any portable greywater and sewage treatment systems will be operated as per the Department of Health's Code of Practice for onsite wastewater management.
Food, paper, plastics	Disposal Stored in waste bins for transport and disposal at an approved disposal facility
Glass, cans, scrap metals	Recycling Stored in recycling bins for collection and transport to an approved recycling facility
Empty chemical, dangerous goods containers	Recycled / Disposed 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
Timber pallets	Recycled / Disposed 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
Batteries	Recycled Stored in a secure area for collection and transport to an approved recycling facility
Oily rags, oil-contaminated material, filters, greases and any other hydrocarbon containing material	Recycled / Disposed Stored in a secure area for collection and transport to an approved recycling facility or disposal facility
Used spill kit materials	Disposal Stored in a secure area for collection and transport to an approved disposal facility
Workover fill / cuttings	Recycled / Treatment / Disposal Remaining fluids stored in lined sump / flare pit and evaporated. Solids disposed either off site at an approved facility.
Spill contaminated soil	Disposal Stored in waste bins for transport and disposal at an approved disposal facility
Raw water	Reuse Excess water at conclusion of the activities will be used
Used production tubing, well lines, pipes, wellhead equipment, safety systems	Disposal Storage (e.g. pipe racks) and containment (e.g. skip bins) facilities for replaced production tubing, well liners and other wastes from the activity

4.6.5 Chemical Storage, Use and Transport

All chemicals used in Australia must be approved for use by the Commonwealth Government's Department of Health and be listed on the Australia Inventory of Chemical Substances which is maintained under the National Industrial Chemicals Notification and Assessment Scheme. The safety data sheets (SDS) for all chemicals to be used as part of the workover campaign will comply with the standards set by NT WorkSafe and be provided to DPIR as part of the workover applications.

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, Code clause A.3.8 and the SDS for each chemical.

With regards to secondary containment and the requirements of A 3.8.(g) of the Code, areas of chemical use and storage on the well lease will be managed as follows:

- The chemical store is a compacted hardstand chemical storage area within the well lease. The chemical storage area will meet the requirement of the Code A 3.8(g) including bunding that

- will contain 100% of the largest containers stored in the area plus 10%. The bunded area is compacted to reduce the permeability to be able to recover materials if a spill occurs. In addition, the bunded area will be designed to manage clean and dirty water, be compatible with the stored materials and designed to avoid failure.
- The portable storage trailer is fully enclosed and is stored in the bunded chemical storage area within the well lease. The portable storage trailer will contain workover fluid chemicals and other chemicals as per Section 4.6.7. The portable trailer can be moved around the well lease to the location the chemicals are needed. Absorbent spill mats will be used during the use of the chemicals. As the portable storage trailer is fully enclosed, it does not need to provide for separation of clean and dirty water.
- The workshop area is fully enclosed and will contain chemicals for incidental use such as those listed in Section 4.6.7. The enclosed workshop will meet the requirement of the Code A 3.8(g) including capacity be able to contain 100% of the volume of the largest container stored in the workshop plus 10%. As the workshop is fully enclosed, it does not need to provide for the separation of clean and dirty water.

In terms of chemical transport, 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. As per Section 7.8, additional management measures are required for chemical transport during the wet season and on unsealed roads.

4.6.6 Workover Fluid

The proposed workover fluid is comprised predominately of water (extracted groundwater) with the remaining made up of salts and fluid additives. Water for workover fluid will be stored at the well site in the engineered mud tank system. There may be two to three mud tanks on site with a total volume of up to 650 bbls, but only approximately 400 bbls (0.063 ML) 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)
 - is 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
 - This is added to the workover fluid to act like a skin on the wellbore to help minimise the fluid invasion into the surrounding formations. As per KCl above, this product tries to reduce the invasion of fluid into the formation and KCl is added in the event that some fluid passes through the Resi Drill barrier.
 - It designed to give any drilling fluid non-invasive properties. 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. The product also has a high degree of environmental acceptability
- AMC Biocide G
 - is a specifically designed low toxicity, broad spectrum biocide designed to reduce and prevent bacterial and fungal activity in water-based fluids. AMC Biocide G is a more environmentally acceptable alternative to glutaraldehyde and does not cause skin

sensitisation and dermatitis that can occur through the handling of glutaraldehyde making it safer to handle.

- This is added to ensure that any surface bacteria is 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
 - Caustic soda or acid used to alter the pH of the workover fluid

The predicted quantities of chemicals used is provided in Table 4-3, with the SDS provided in Appendix 1. The workover fluid chemicals are stored in an enclosed purpose built portable trailer, which keeps chemicals 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%.

Mixing of the fluid chemicals occur within 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 made-up workover fluid (water plus additives) returned to the mud tanks. As per Section 4.3.1, a drain/trench will be constructed around the mud tanks to direct potential overflow to the flare pit, which has capacity of 0.18ML, which is enough to contain 180% of volume of the mud tanks.

The mud tanks are not directly located within a lined bunded area as this would require additional earth works and ground disturbance at the well lease, resulting in increased potential erosion and weed establishment. Use of the flare pit, with >120% capacity of the mud tanks, and construction of a drain around the tanks provides an effective but low disturbance solution to the management of potential spills and leaks from the mud tanks. The flare pit cannot be lined as lining would present a fire risk.

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 spills/leaks away from water courses, drainage lines or vegetation.

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. 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 (NEMP) 2013 contaminated soil guidelines.

No drilling fluid chemicals that are used in the process contain benzene, toluene, ethylbenzene and xylene (BTEX).

Table 4-3 Workover fluid additives per well

Product Name	Dangerous Good	Hazardous Substance	Estimated Quantity / well	Concentration (parts per billion)	Container Size	Storage Location
AMC BIOCID E G	No	Yes	35 L	0.02	20 L / Package	Portable storage trailer in the chemical storage area
AMC RESI DRILL	No	No	0-710 kg	0-15 kg/m ³	25 kg / Package	Portable storage trailer in the

Product Name	Dangerous Good	Hazardous Substance	Estimated Quantity / well	Concentration (parts per billion)	Container Size	Storage Location
						chemical storage area
AMC XAN BORE (Guar Gum)	No	No	142 kg	1-3 kg/m ³	25 kg / Package	Portable storage trailer in the chemical storage area
Potassium Chloride	No	No	2,066 kg	7.1	25 kg / Package	Portable storage trailer in the chemical storage area
Caustic Soda	Yes	No	200 – 1000 kg	pH adjustment	25 kg	Portable storage trailer in the chemical storage area
Acid (Hydrochloric or Citric Acid)	Yes	No	50 – 500 kg	pH adjustment	25 kg	Portable storage trailer in the chemical storage area

At each workover, a small volume (80-150 bbls) 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 banded mixing hopper before use.

4.6.7 Other Chemicals

Table 4-4 provides a summary of the other chemicals that will be stored at each of the well leases during the drilling campaign. Diesel will be stored in a double lined tank, whilst the other chemicals will either be stored in the workshop or in a portable storage trailer located within the chemical storage area. The portable storage trailer can be moved around the well lease to areas where the chemicals are required.

Table 4-4 Other chemicals

Product Name	Dangerous Good	Hazardous Substance	Estimated Quantity	Container Size / Type	Storage Location
Hydraulic oil	No	Yes	200 L	5 -20 L / Package	Portable storage trailer in the chemical storage area
Engine oil	No	No	200 L	5 - 20 L / Package	Portable storage trailer in the chemical storage area
Transmission oil	No	No	200 L	5 – 20 L / Package	Portable storage trailer in the chemical storage area
Coolant	No	No	200 L	5 – 20 L / Package	Portable storage trailer in the chemical storage area
Degreasers	No	No	100 L	5 – 20 L / Package	Portable storage trailer in the chemical storage area
Diesel	Yes	Yes	5 – 30 KL	100 KL / Tank	Well lease – double lined tank / fuel cell
Pipe Dope	No	Yes	20 L	20 L / Package	Workshop

Product Name	Dangerous Good	Hazardous Substance	Estimated Quantity	Container Size / Type	Storage Location
Brake cleaner	No	Yes	20 L	20 L / Package	Workshop
WD-40	No	Yes	20 L	1 L / Package	Workshop
Various spray paints	No	Yes	10 L	1 L / Package	Workshop

4.6.8 Personnel and Camp Requirements

CP will engage a rig contractor to conduct the workover work, using existing CP personnel to support the activities. Up to 15 contract staff may be on site during the workover activities. Existing CP personnel will be used to complete the wellhead equipment, safety systems and gathering line work.

All personnel for the activities will be housed in the existing onsite camp, which accommodates 85 personnel and which is operated and managed under the MRN FEMP Section 6.5. Activities will be conducted during 12-hour daytime shifts with the option of conducting workover activities on a 24-hour basis. In this case, 2-4 beds may be set-up in office facilities at the wellsite. 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.

4.6.9 Traffic and Access

For the wellhead equipment, safety systems and gathering line installation, there are not expected to be any traffic movements above and beyond normal operations under the MRN FEMP (existing onsite equipment used and CP personnel used). Where possible, deliveries of any prefabricated equipment/materials required for this task will be combined with other freight required under the MRN FEMP.

For workover activities, rig contractors and personnel will require access to existing Mereenie Field within the Amadeus Basin, approximately 280 km west of Alice Springs. Access to the field from Alice Springs is via a network of sealed and unsealed public and private roads, heading west from Alice Springs along Larapinta Drive/Red Centre Way to Hermannsburg, and then continuing towards Kings Canyon. The turn off to the Mereenie is left off the Red Centre Way; approximately 175 km past Hermannsburg. At which point the wells are accessed via CP’s access tracks.

Larapinta Drive is the main highway to access to the Palm Valley, Mereenie and Surprise Fields. Larapinta Drive is a sealed single carriage road from Alice Springs to Hermannsburg, the road is unsealed west of Hermannsburg. The speed limit on the Larapinta Drive is 110 km/h unless otherwise sign posted. Larapinta drive is utilised by the local community, as well as, providing access to a number of tourist attractions.

Existing traffic figures were obtained from the DIPL Annual Traffic Report 2018 for the Larapinta Drive 1km east of Larapinta / Namatjira intersection. This location can be assumed that the traffic figures at the Mereenie, Palm Valley and site will be similar. The peak dry season traffic volume is 731 vehicles with the annual average daily traffic (AADT) volume of 447 vehicles (refer Figure 4-9).

Rural Primary Count Stations

Key: Adjusted Data

Year: 2019

Table: 2.2 Calculated AADT and Monthly ADT for Primary Stations

Region: Alice Springs

Road Name / Location	Station No	Direction	Units	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	AADT
Larapinta Drive 1km East of Larapinta/Namatjira Intersection	RAVDP002	Inbound	Veh	131	142	151	258	256	307	375	296	284	224	164	138	228
		Outbound	Veh	131	139	147	244	246	289	356	285	269	216	162	133	219
		Both	Veh	262	281	298	502	502	596	731	581	553	440	326	271	447
Larapinta Drive 30km North of Kings Canyon (at jump up)	RAVDP013	Inbound	Veh	11	11	14	43	36	52	76	49	51	32	14	10	33
		Outbound	Veh	14	15	16	34	28	35	48	38	33	27	16	11	26
		Both	Veh	25	26	30	77	64	87	124	87	84	59	30	21	59
Lasseter Highway 500m West of Stuart Highway	RAVDP007	Inbound	Veh	92	89	104	205	193	231	333	240	247	223	530	87	214
		Outbound	Veh	104	104	128	251	220	307	382	272	296	222	541	98	244
		Both	Veh	196	193	232	456	413	538	715	512	543	445	1071	185	458
Lasseter Highway 500m East of Yulara/Airport Intersection	RAVDP008	Inbound	Veh	147	132	158	319	296	379	547	376	390	327	158	120	280
		Outbound	Veh	133	128	154	318	282	382	533	366	392	305	153	120	273
		Both	Veh	280	260	312	637	578	761	1080	742	782	632	311	240	553

Figure 4-9 Traffic flows on Larapinta Drive

The anticipated peak project vehicle movement level is <10 vehicles/day in addition to the existing peak dry season traffic volumes. Traffic movements will be associated with heavy vehicles including the workover rig and other workover plant entering and leaving site for the campaign each year (with additional return trips e.g. for maintenance as required) plus light vehicle movements associated with up to 15 contract personnel. Return trips during each campaign to depend on workover rig contractor roster.

Movements of civil related infrastructure are anticipated to be minor and will be sourced locally, with a peak of 2 vehicle movements (<20% heavy vehicles) for several days during equipment mobilisation and demobilisation (prior to the workover rig mobilisation). Average daily traffic additions during the remainder of the project period are likely to be 5-8 movements per day for the first week, reducing down to 2-5 movements for the remainder of the period and increasing again as the rig demobilises to the next location. It is expected that 1 fuel delivery will occur every 10 days and 1 water truck delivery every three days.

There will be no dominant traffic flow direction for the program, with traffic likely to be roughly split between traffic from Alice Springs and each program. The total volume of traffic is considerably lower than the capacity of the Stuart Highway and Larapinta Drive, with any reduction in LOS from the volume of project traffic considered unlikely.

There are no upgrades required to the State roads for the loads. Movement of heavy loads (i.e. drilling rig mobilisation and demobilisations) through regional centres will be avoided. All access tracks associated with the MRN are cleared signed for authorised vehicles only. The turn in and turn offs of NT controlled roads are currently being used by CP operations and no further upgrades are required. Where vehicles associated with the EMP activities are causing significant dust on NT controlled roads, vehicle speeds will be reduced. Any oversized loads will be accompanied by an accredited pilot.

Once the workover rig contractor is confirmed and prior to the project commencing, a Traffic Management Plan will be prepared, and approval gained from DIPL.

5.0 Description of Environment

5.1 Physical Environment

5.1.1 Climate

The MRN experiences an arid to semi-arid climate which is characterised by hot dry summers and cool dry winters with low average 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.

Climate data has been summarised using all available data from the nearest Bureau of Meteorology weather station (015652, Watarrka) and Table 5-1 shows the mean maximum and minimum temperature, mean rainfall, highest rainfall, lowest rainfall, mean days of rain and mean evaporation for each month.

Table 5-1 Climate data for the Mereenie Field

Parameter	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean maximum temperature (°C)	38.4	36.9	35.1	30.7	24.9	21.3	21.9	24.4	29.4	33.2	35.1	36.7
Mean minimum temperature (°C)	23.5	23.0	20.8	16.7	10.8	6.4	6.1	8.1	13.1	17.5	19.7	22.1
Mean rainfall (mm)	45.7	39.8	29.2	13.3	22.1	14.7	13.4	6.0	10.0	24.6	45.0	37.3
Highest rainfall (mm)	185.0	377.8	237.2	161.6	158.1	133.5	82.5	38.9	104.9	123.7	168.5	103.9
Lowest rainfall (mm)	1.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.5
Mean days of rain	5.6	4.9	3.0	2.6	3.3	2.5	2.5	1.6	2.7	4.0	6.5	7.3
Mean evaporation (mm)	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR

5.1.2 Geology

The MRN 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. The basin covers approximately 170,000 km³ 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 Seqymour Sub-basins in the south (Geoscience Australia, 2020). It is bound in the north by the Arunta complex and in the south by the MusgraveMann complex, both containing granite, gneiss and schists, with amphibolite and quartzite.

The general stratigraphy of the Amadeus Basin is shown Figure 5-1.

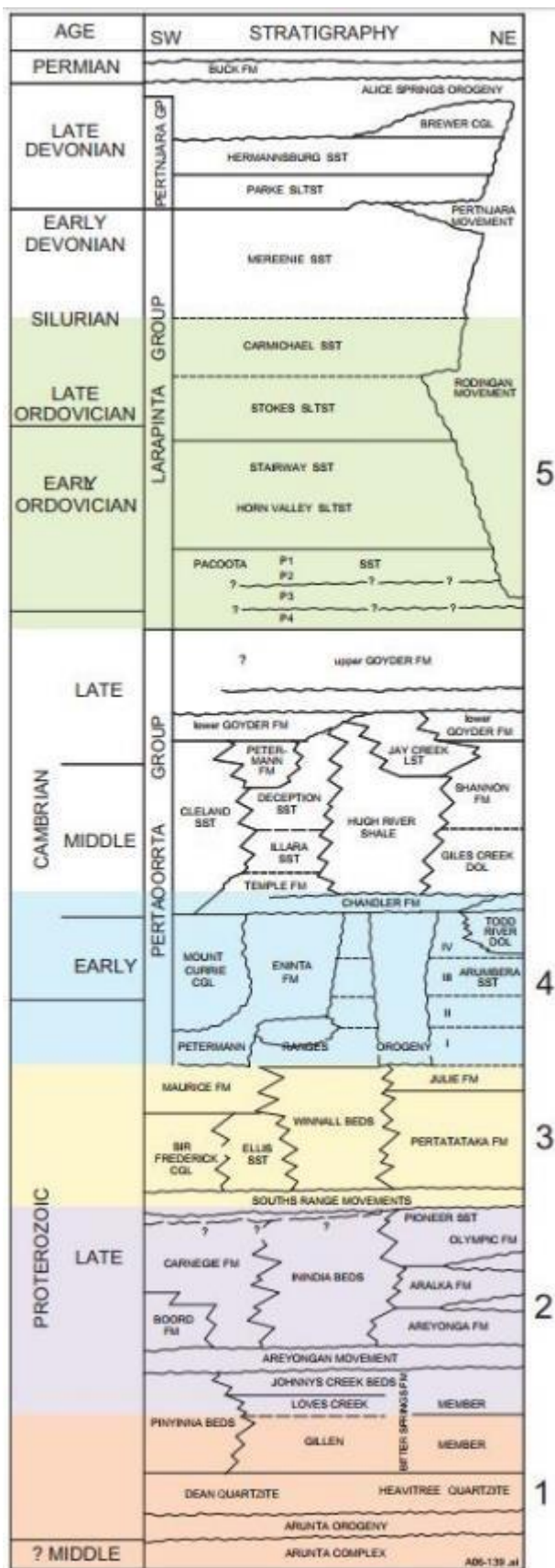


Figure 5-1 Stratigraphy of the Amadeus Basin

5.1.3 Soils

Three soil types, as mapped using data from the Digital Atlas of Australian Soils (based on Northcote, et al. 1960-1968) are present within the MRN. Table 5-2 provides a description of these soil types with Figure 5-2 showing the location of MRN relative to soil types.

Table 5-2 Description of the Mereenie Field 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, cuervas and hills on sandstones and quartzites	Chief soils are shallow stony sands

5.1.4 Land Systems

A land system is an area or group of areas throughout which there is a recurring pattern of topography, soil and vegetation (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 land systems within the MRN include the Simpson, Krichauff and Gillen as shown in Figure 5-3 and described in Table 5-3.

Table 5-3 Description of land systems mapped in the Mereenie Field (Perry, et al. 1962)

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

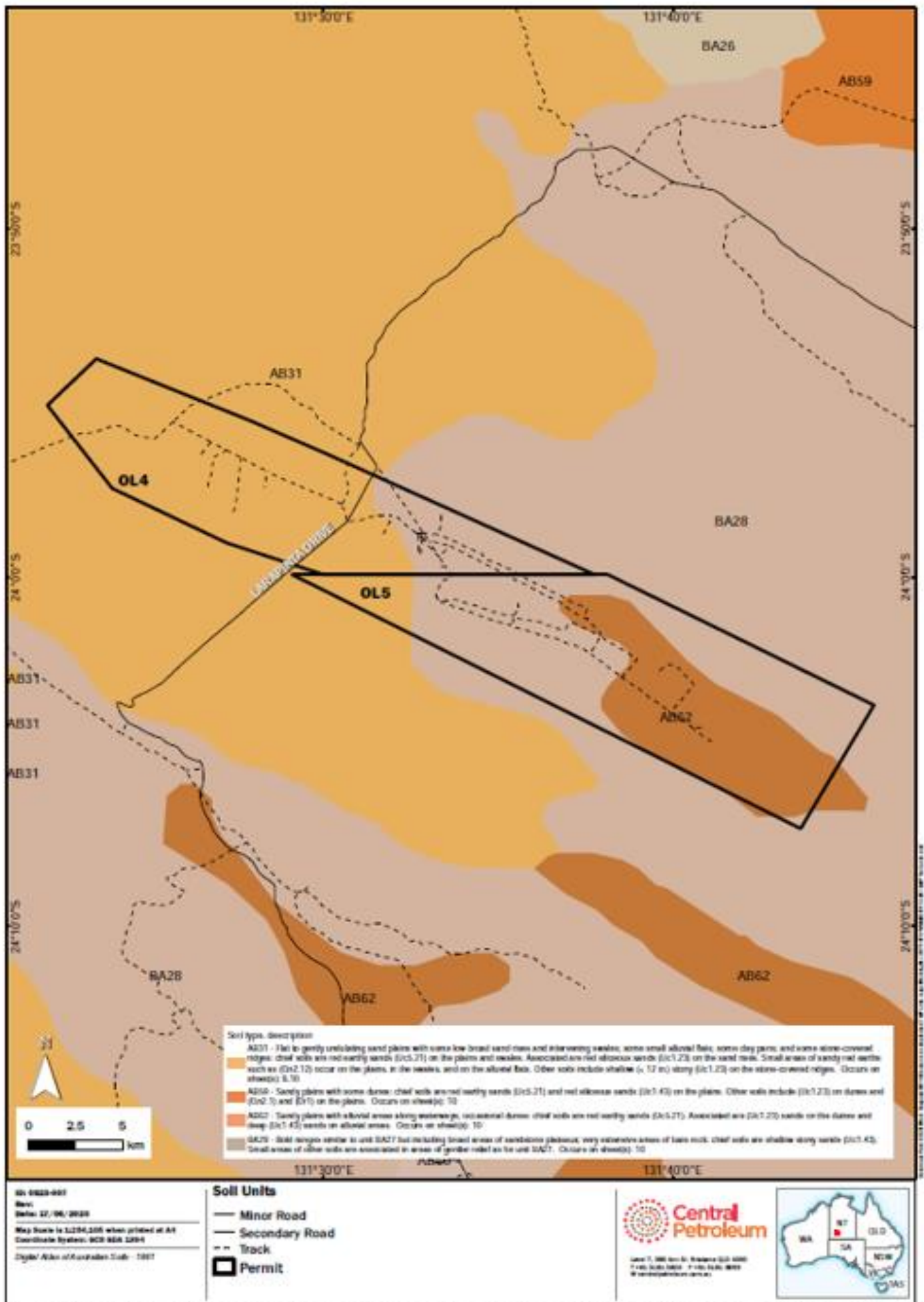


Figure 5-2 Soil types in the Mereenie Field

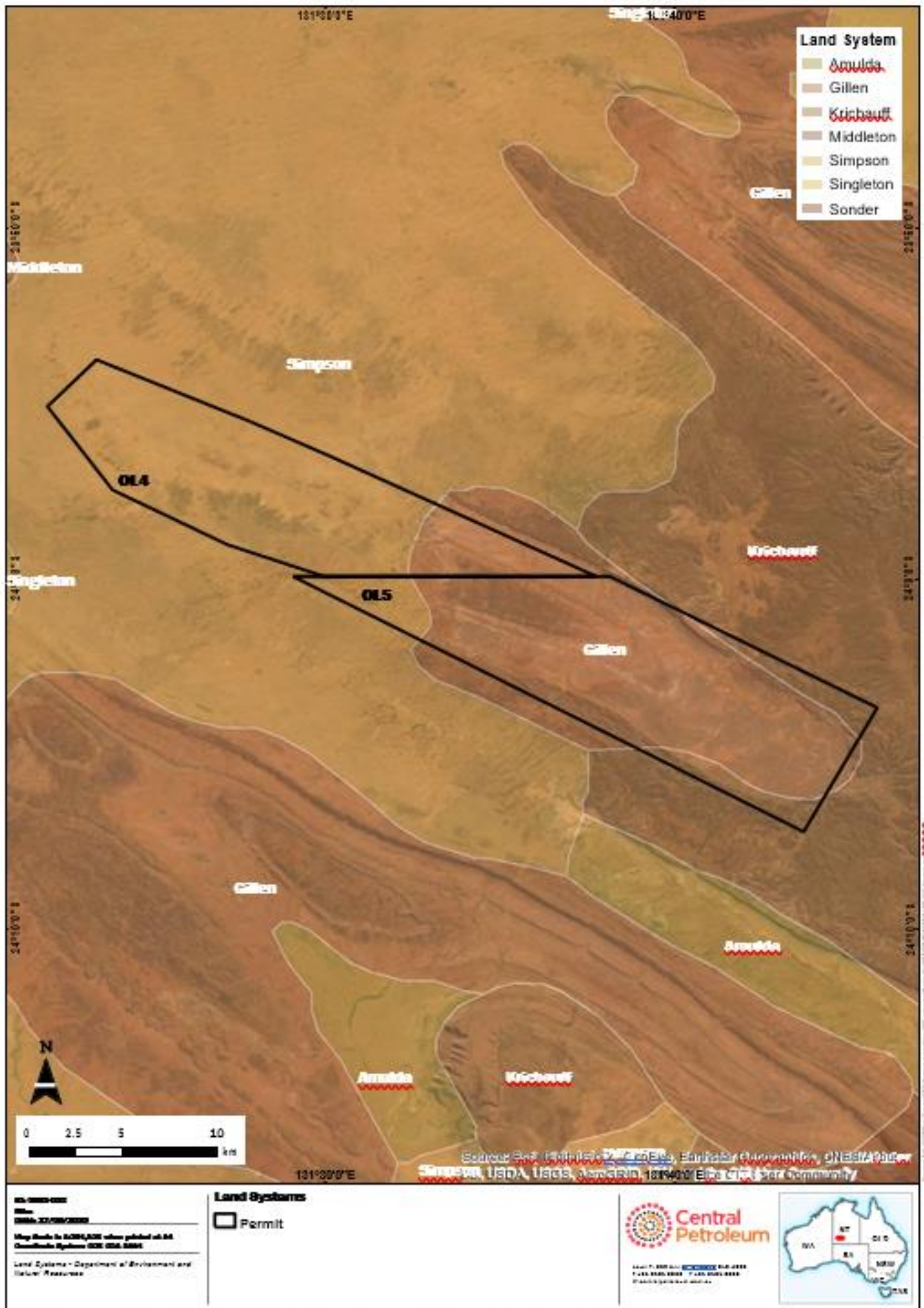


Figure 5-3 Land systems of the Mereenie Field

5.1.5 Hydrogeology / Groundwater

The MRN is within the Amadeus Basin, an elongated east-west aligned sedimentary basin that covers an area of approximately 170 000 km² in central Australia. Lloyd and Jacobson (1987) define two main hydrogeological domains within the Amadeus Basin: the north-central area has broad folding associated with extensive and mappable sandstone aquifers, elsewhere in the basin greater deformation has resulted in the development of a regional fractured rock groundwater systems.

The MRN 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 Hermansburg Sandstone, Mereenie Sandstone and the Pacoota Sandstone, which are shown in the context of the Amadeus Basin stratigraphy in Figure 5-1.

The local surface geology of the MRN is shown in Figure 5-4. The Hermansburg Sandstone has been eroded at the MRN 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 the MRN, the Hermansburg Sandstone is approximately 120m thick.

The Parke Siltstone, which underlies the Hermansburg 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 Pty Ltd, 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 649 m in the MRN 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 the MRN wells (see Figure 5-5, 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 Pty Ltd, 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 the MRN as defined by the Code. Bore yields of up to 100 L/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 – 5 L/s) while Read (2007) reports on range of 1.5 – 10 L/s from 15 bores. Water quality of the Mereenie Sandstone is variable but in the MRN is generally of good potable drinking water quality¹. 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 4,000 m²/day have been observed in the Mereenie Sandstone though 600 m²/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 300 m 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.

¹ Good palatability in drinking water has a TDS of <600 mg/L (NHMRC, NRMCC 2011), test results from 2020 of two MRN bores accessing the Mereenie Sandstone groundwater showed average 400mg/L TDS (Appendix 2)

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 the MRN. 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 the MRN 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 Pty Ltd, 2001).

Table 5-4 provides a summary of the formation depth, thickness and groundwater potential of formations beneath the MRN wells from the Parke Siltstone to the Pacoota Sandstone.

Table 5-4 Summary of stratigraphy and groundwater occurrence in wells the Mereenie Field

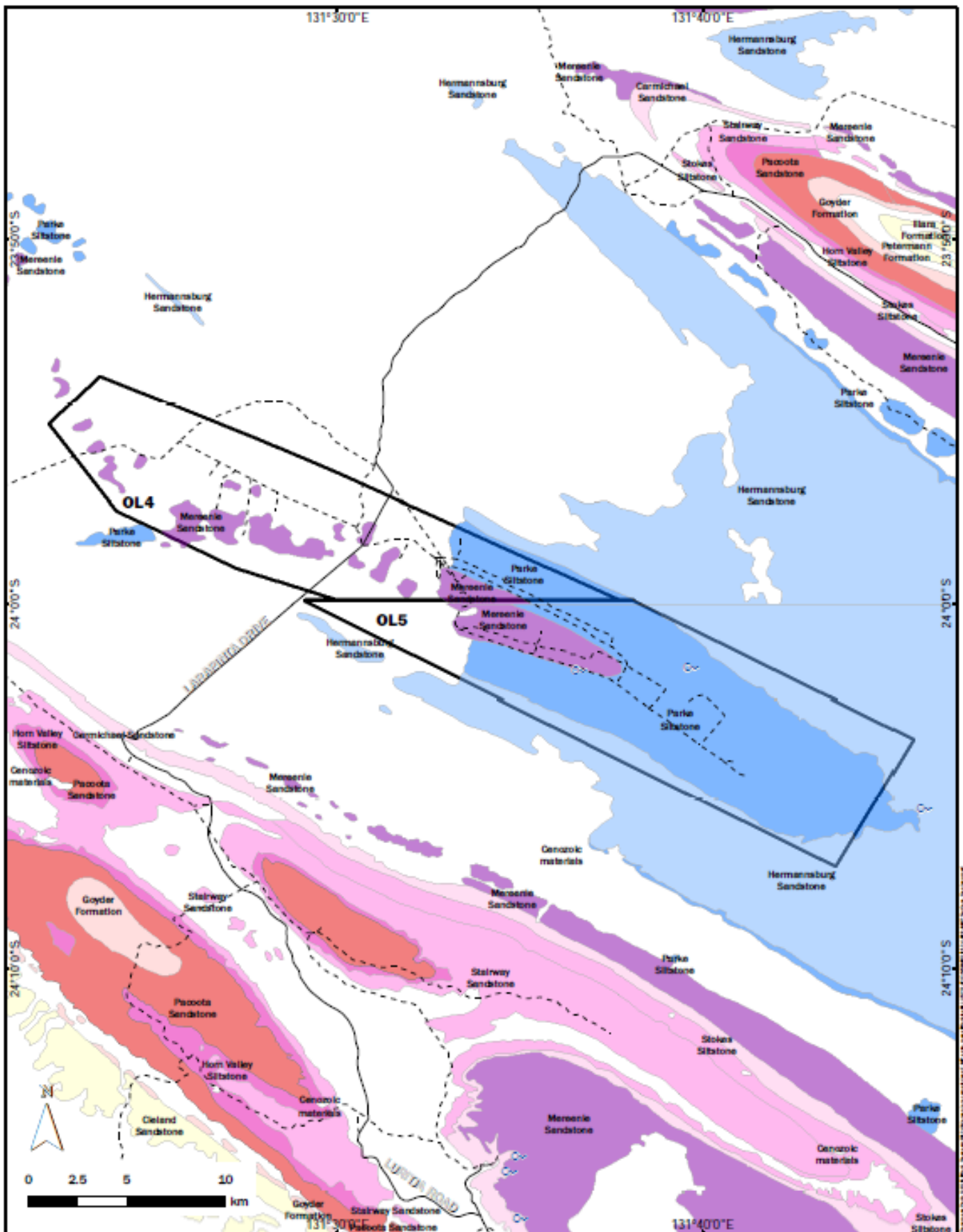
Formation	Depth min / max (mTVD)**	Thickness min – max (m) +	Lithology	Groundwater Availability	Water Quality^
Parke Siltstone	0	5 / 285	Micaceous siltstone with minor thin interbeds of litho-feldspathic quartz sandstone	Poor	Not known
Mereenie Sandstone	0 / 285	320 / 649	Porous quartz sandstone	Regional 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 / 11184	211 / 286	Silty sandstone with interbedded siltstone	Gas Reservoir	Not known
Horn Valley Siltstone	1001 / 1426	58 / 89	Claystone with interbedded marl and limestone	Poor (Aquitard)#	Not known
Pacoota Sandstone	1076 / 1489	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



ID: 0034-009
 Rev: 01
 Date: 24/04/2020
 Map Scale is 1:254,100 when printed at A4
 Coordinate System: GCS_BDA_1994
 250k Surface Geology - Northern Territory
 Geological Survey
 Mapped Springs - Springs of the Northern Territory
 Department of Environment and Natural Resources

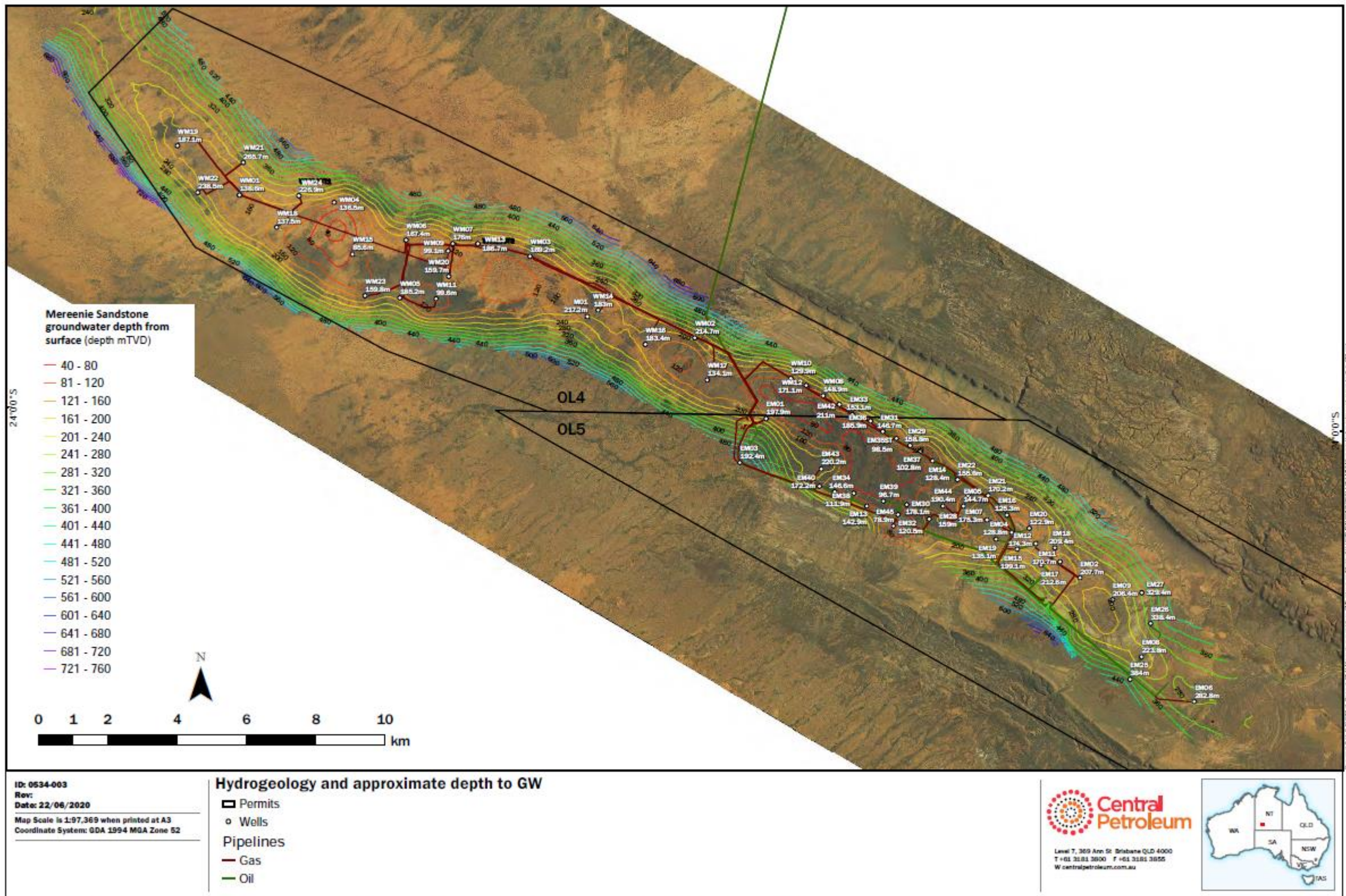
Outcrop Geology			
○ Mapped spring	■ Carmichael Sandstone	■ Hermannsburg Sandstone	■ Horn Valley Siltstone
— Minor Road	■ Stokes Siltstone	■ Parkie Siltstone	■ Peacocks Sandstone
— Secondary Road	■ Stairway Sandstone	■ Merensie Sandstone	■ Goyder Formation
— Track	■ Horn Valley Siltstone	■ Carmichael Sandstone	■ Deception Formation
	■ Peacocks Sandstone	■ Stokes Siltstone	■ Temple Formation
■ Hermannsburg Sandstone	■ Goyder Formation	■ Stairway Sandstone	■ Wreath
■ Parkie Siltstone	■ Orlend Sandstone		
■ Merensie Sandstone			

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Figure 5-4 Surface geology and spring locations in the Mereenie Field



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Figure 5-5 Merenie wells which intersected the Merenie Sandstone groundwater during drilling, and the depth that groundwater was encountered. Wells not shown indicates that no groundwater was identified at that well.

5.1.6 Groundwater Bores

A search of water bore data from DENR identified 24 registered existing groundwater bores within the MRN and six groundwater bores within a 10 km radius of the MRN. Figure 5-6 shows the locations of the identified bores.

Table 5-5 provides an overview of each of the existing registered groundwater bores using information taken from the DENR water bore data set and associated water bore drilling logs. The current status of the six bores identified within 10km of the MRN has been taken from the DENR water bore dataset and CP has provided the current status of the water bores located within the MRN. CP is not proposing any changes to the status of the bores identified in Table 5-5. The only activities under this EMP relating to groundwater bores is the proposed groundwater extraction from RN017898, RN017657, RN004620, RN013861 and RN018955 as outlined in section 4.6.2 Water Usage.

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 10 km of the MRN boundary have either been backfilled, abandoned or there was no water interaction was detected during drilling and so CP considers that they are unlikely to be in use.

There are no water extraction licences within the immediate surrounding the MRN.

Table 5-5 Summary of registered bores within the Mereenie Field and 10 km radius

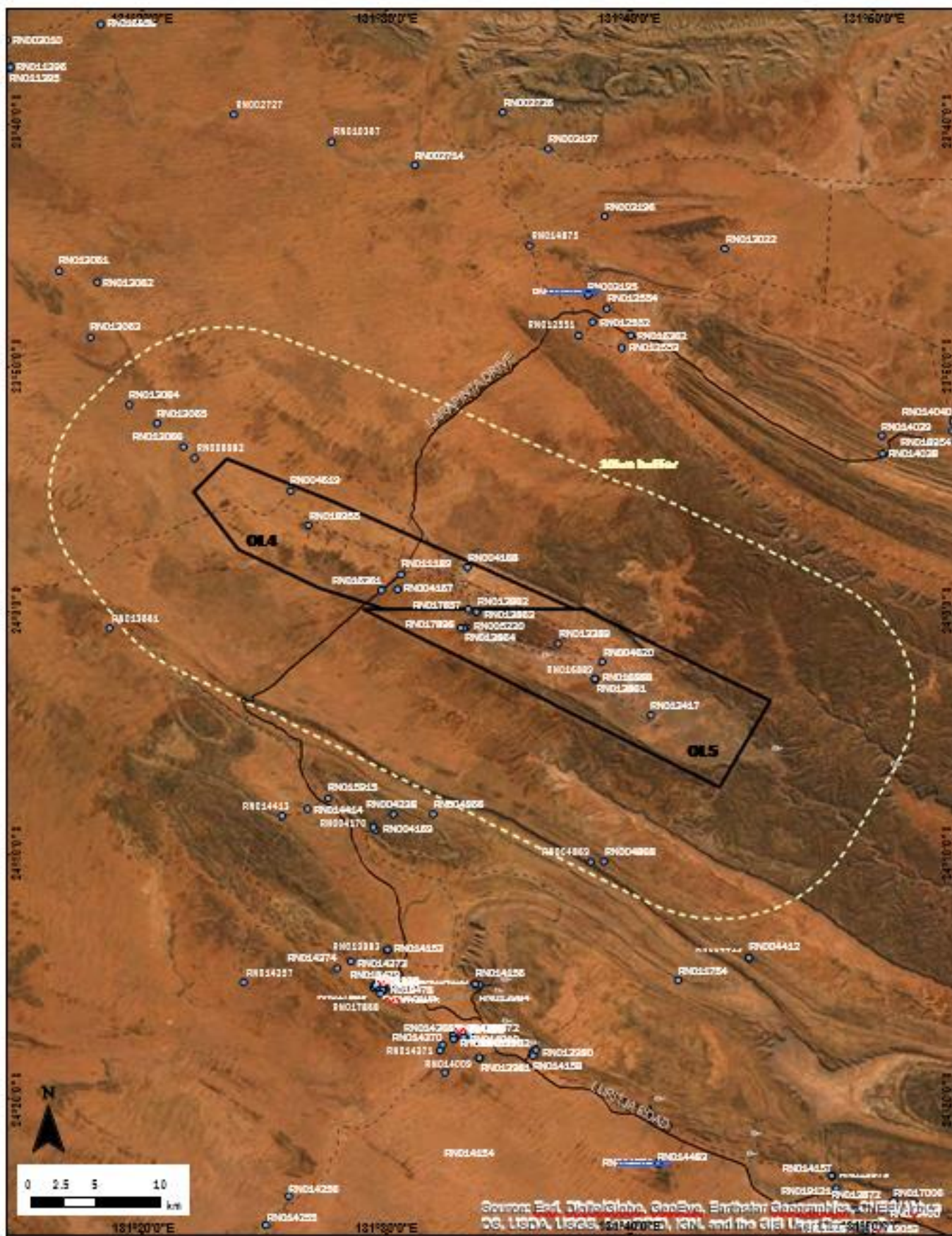
Bore ID	Location	Registered to CP	Formation Screened	Drilled depth (mBGL)	Groundwater		Current Status
					EC (mS /cm)	Depth to water (mBGL)	
RN004868	Within 10km	No	No water interaction	107	-	-	Records state the status of the bore is not known, though unlikely to be in use as water was not encountered 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

Bore ID	Location	Registered to CP	Formation Screened	Drilled depth (mBGL)	Groundwater		Current Status
					EC (mS /cm)	Depth to water (mBGL)	
RN018955	OL4	Yes	Mereenie Sandstone	192	360^	159	CP has applied for a groundwater extraction licence for this bore.
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	CP has applied for a groundwater extraction licence for this bore.
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	CP has applied for a groundwater extraction licence for this bore.
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	-	CP has applied for a groundwater extraction licence for this bore.
RN013861	OL5	Yes	Mereenie Sandstone	277	445	-	CP has applied for a groundwater extraction licence for this bore.

Bore ID	Location	Registered to CP	Formation Screened	Drilled depth (mBGL)	Groundwater		Current Status
					EC (mS /cm)	Depth to water (mBGL)	
RN016888	OL5	Yes	-	72	-	-	CP observation bore
RN016889	OL5	Yes	-	72	-	-	CP observation bore
RN013417	OL5	Yes	Mereenie Sandstone	691	126	-	Not in use

^ EC based on TDS using a conversion factor of 0.65

- indicates no data



<p>NSW 0000-0000 NT 0000-0000 0000-0000-0000</p> <p>They trade to 2000,000 when priced at 04 0000-0000-0000</p> <p>Water users - Department of Environment and Natural Resources</p>	<p>Groundwater bores</p> <ul style="list-style-type: none"> ● Registered water bores ○ NT Springs — Minor Road — Secondary Road — Track □ Permit ○ OL4 and OL5 - 10km buffer 	<p>Central Petroleum</p> <p>0000 0000 0000 0000 0000 0000 0000 0000 0000</p>	
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Figure 5-6 Groundwater bores in and around the Mereenie Field

5.1.7 Groundwater Quality

Contemporary groundwater quality assessments have been conducted by Golder Associates (2013, 2014 and 2015). Groundwater quality samples were also collected from RN018955 and RN016361 in March 2020 and analysed for 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.

A summary of water level, field parameters and laboratory results are presented in Appendix 2 alongside Australian drinking water guidelines (NHMRC, NRMCC 2011) and stock watering guidelines (ANZECC 2000), where applicable. All analytes are below drinking water health related guidelines and stock watering guidelines. No detections of hydrocarbon gases or products were recorded.

5.1.8 Wetlands, Springs, and Groundwater Dependant Ecosystems

Two springs are recorded on the DENR Springs data in the general vicinity of the MRN. The springs are located on OL5 on the south-eastern and north-eastern margin of the MRN and are positioned on drainage lines that feed into Parke Creek.

DENR 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 the MRN groundwater extraction bores access the Mereenie Sandstone and the closest groundwater bore is approximately 2 km or more from Parke Creek, groundwater extraction for workovers (none required to install wellhead equipment, safety systems and gathering lines) 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 the MRN there is limited potential for surface water-groundwater interaction and GDEs.

The MRN 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 (PMSR) (Appendix 3).

5.1.9 Surface Water

The MRN surface water hydrology is defined by the 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 5-7). 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 area eventually drain into Parke Creek, a major drainage line located in OL5 draining to the south east of the MRN (Figure 5-8). Approximately 40 km downstream is the confluence of Parke Creek and Walker Creek. 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 16 wells within approximately 50m to 150m of a creek/drainage line (EM11, EM12, EM13, EM14, EM15, EM18, EM19, EM21, EM23, EM26, EM28, EM31, EM36, EM43, EM44, EM45) (refer environmental sensitivity maps, Appendix 7).

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

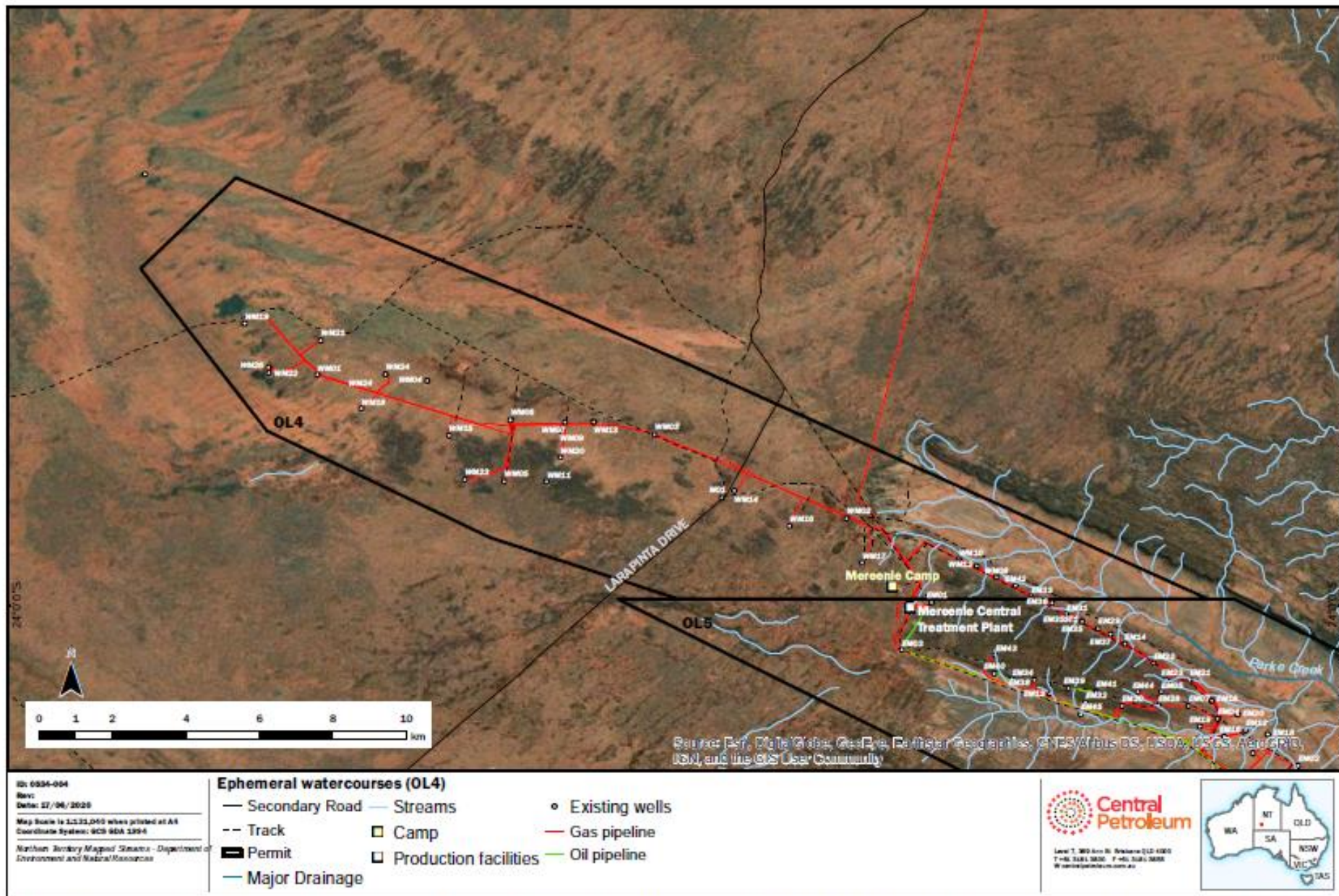


Figure 5-7 Hydrology of OL4

5.2 Natural Environment

5.2.1 Bioregions

The OL area is in two Interim Biogeographical Regionalisation for Australia (IBRA), split by the OL 4 and OL 5 boundary. OL 5 is located entirely within the MacDonnell Ranges Bioregion, as classified by Baker, et al., 2005 and described in Table 5-6. 10-15% of the bioregion is protected within Reserves, none of which occur within the MRN.

A proportion of OL 4 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 5-6. The locations of the bioregions relative to the MRN are shown in Figure 5-9.

Table 5-6 Bioregions of the 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

5.2.2 Sites of Conservation Significance

There are currently 67 sites of conservation significance (SOCS) identified by the Northern Territory government. SOCS 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 is located approximately 6 km to the south and the Greater MacDonnell Ranges are approximately 14 km north at their closest points (Figure 5-10). No impacts are expected given the distance between the MRN and the SOCS.

5.2.3 Sites of Botanical Significance

A Site of Botanical Significance (SOBS) is an area that has been defined by White et al. 2000 to hold important and / or unique botanical assemblages that require protection. SOBS are designated as either nationally significant (41 sites), bioregionally significant (79 sites) or of undetermined significance (33 sites). 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 etc).

The MRN is located within the Laycock Sandplain SOBS and the Mereenie SOBS (Figure 5-10). Both SOBS are designated as bioregionally significant.



Source: EPA, [Murrumbidgee Catchment](#), [Environmental Catchment No. 2](#), [NSW/ACT/NT/QLD](#), [USDA](#), [USGS](#), [Australia 1:50,000](#), [GIS User Community](#)

OL4-0000-0000
OL5-0000-0000
 May 2016 to 31/03/2026 when published as an
 Queensland System (QCS) OL4-0000-0000
 Interim Ecogeographic [Scoping Study](#) for Australia
 (ERA) version 7.2 - Australian Government
 Department of Sustainability, Environment, Water,
 Population and Communities

Bioregions

IBRA region

- Great Sandy Desert
- MacDonnell Ranges
- Permit



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Figure 5-9 Bioregions of the Mereenie Field

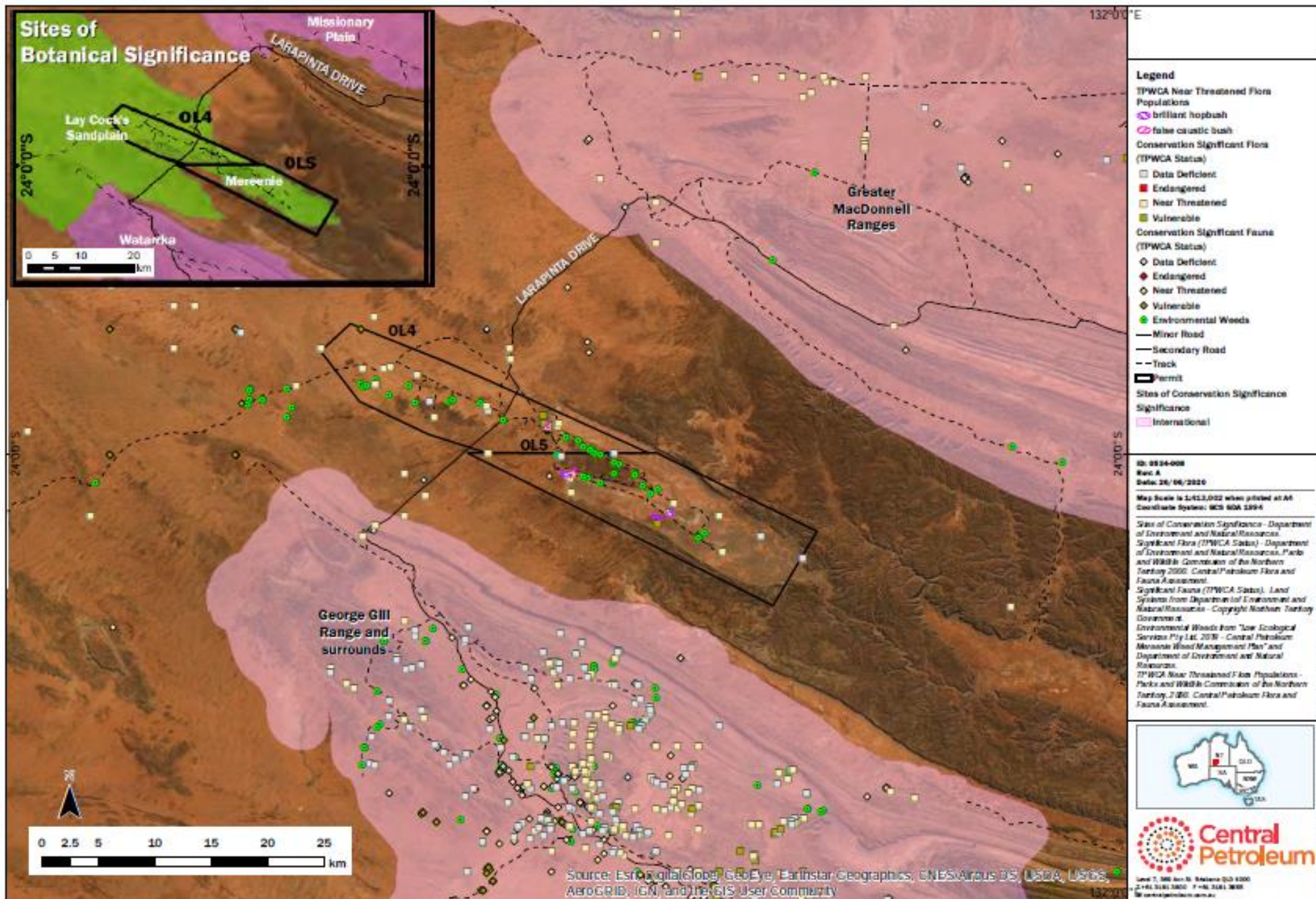


Figure 5-10 Sites of Conservation Significance, Sites of Botanical Significance and locations of conservation significant flora and fauna, and environmental weeds, in and around the Mereenie Field

5.2.4 Threatened Ecological Communities

No threatened ecological communities were identified in the PMSR as being within the MRN.

5.2.5 Vegetation Communities

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

- Simpson land system supports 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 supports a variable assemblage of plants with relatively few species. Two species of mulga occur among the shrubs.
- Gillen land system supports a mosaic of short bunch grass savannah and spinifex steppe with few trees or shrubs; this system also contains extensive bare areas.

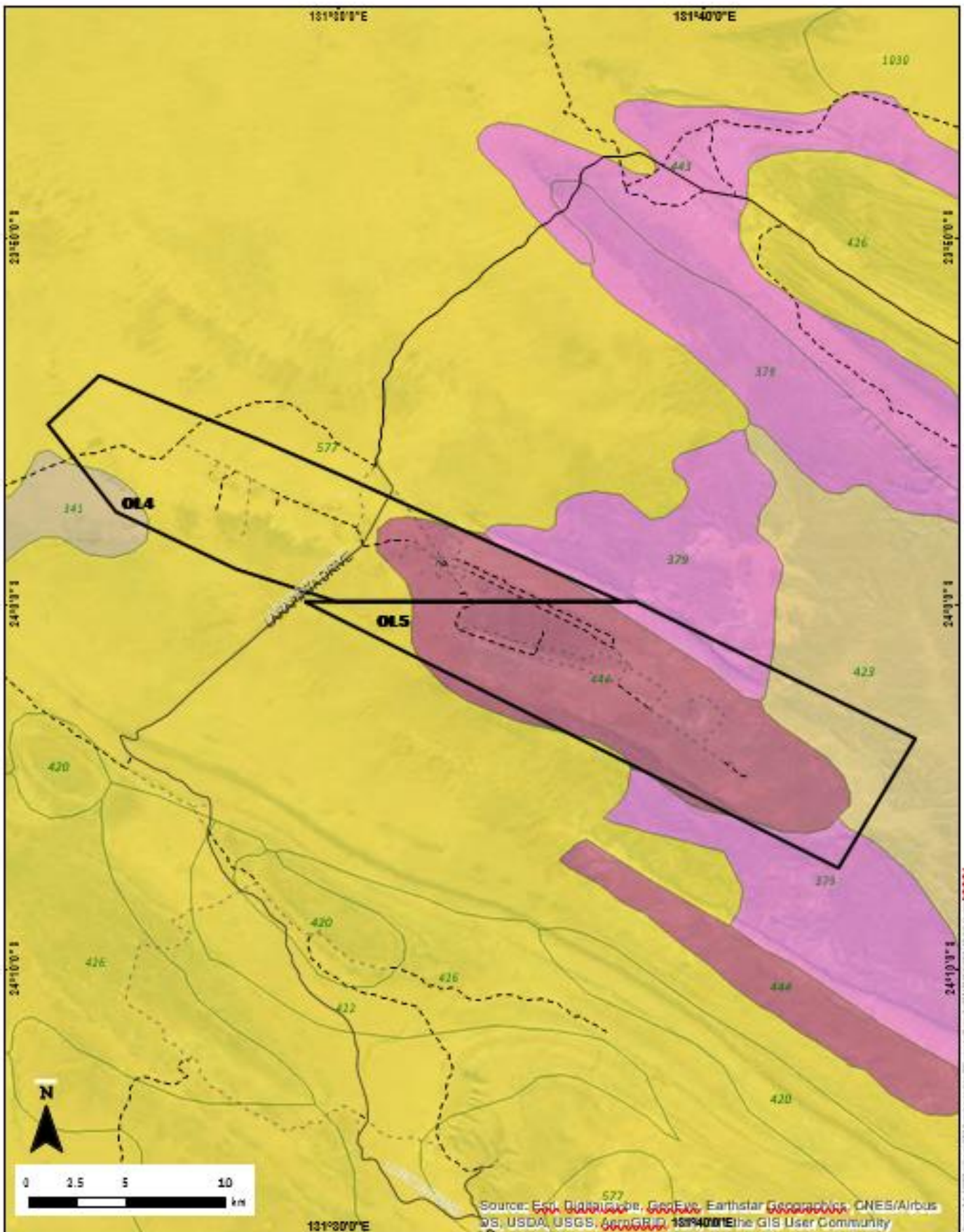
The following vegetation communities have been identified within the MRN:

- *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 PMSR. Table 5-7 provides description of vegetation communities as mapped by Wilson et al (1991) and shown in Figure 5-11.

Table 5-7 Description of vegetation units mapped in the Mereenie Field (Wilson, Brocklehurst, Clark, & Dickinson, 1991)

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



<p>Scale: 1:50,000 Date: 22/04/2008 Map Scale to 1:500,000 unless published with the Geospatial System (GIS) Data Model National Vegetation Information System - Vegetation Communities and Structural Formations</p>	<p>Vegetation mapping</p> <ul style="list-style-type: none"> — Minor Road — Secondary Road - - Track □ Permit <p>NVIS 2007 - Dominant Structural Formation</p> <ul style="list-style-type: none"> Open woodland Open shrubland Sparse shrubland Hummock grassland Open hummock grassland 	 <p>Central Petroleum</p> <p>Level 7, 200 City Boulevard, St. Leonards NSW 1585, Australia Tel: +61 2 955 0000 Fax: +61 2 955 0000 Email: info@centralpetroleum.com.au</p>	
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Figure 5-11 Vegetation Communities in the Mereenie Field

5.2.6 Conservation Significant Flora

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

- Listed as EW, CE, EN, VU, NT or DD under the TPWC Act and is either:
 - recorded in the NT Flora Atlas as being within the MRN or within 25km of the site boundary, or
 - recorded during field surveys of the NRM.
- Listed as CE, EN, VU or CD under the EPBC Act and is either:
 - identified by a PMST report within the MRN or within 25km of the site boundary, or
 - recorded during field surveys of the MRN.

There have been several flora field surveys of the MRN, including:

- Flora and Fauna Assessment, Stage 2 Field Survey by Parks and Wildlife Commission of the Northern Territory (2000):
 - Site-wide survey which assessed flora at 17 survey sites representative of the major habitats within the MRN. The survey found a total of 461 plant species including 13 conservation significant flora under the TPWC Act (none under the EPBC Act); one VU species (*Santalum acuminatum*), two DD species (*Acacia nyssophyllai* and *Comesperma viscidulum*), with the remaining of NT status.
 - The study notes that the development at the MRN 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 proposed locations of WM28 and WM29 (new exploration wells currently being assessed for approval by DENR). *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 PMSR, a NT Flora Atlas desktop search and previous flora field surveys, Table 5-8 provides a summary of the conservation significant flora that may be present within the MRN. Figure 5-10 shows the locations of conservation significant flora within and around the MRN 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 the MRN well pads, although a brilliant hopbush population is located along the access road to EM03 (refer environmental sensitivity maps, Appendix 7).

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

Table 5-8 Conservation significant flora of the Mereenie Field

Scientific Name	Common Name	TPWC Status ¹	EPBC Status ²	EPBC Presence ³	Flora Atlas Records	Ecological Survey Result
<i>Acacia incurvaneura</i>	Mulga	DD	-	-	11	No
<i>Accacia mconochieana</i>	Salt Wattle	DD	-	-	2	No
<i>Acacia nyssophylla</i>	Wattle	DD	-	-	-	Yes
<i>Acacia so. Blue mulga</i>	Wattle	DD	-	-	1	Yes
<i>Amyema miraculosa subsp. Boormanii</i>	Amyema, Fleshy Mistletoe	DD	-	-	5	No
<i>Aristida strigosa</i>	Rough Wiregrass	DD	-	-	6	No

Scientific Name	Common Name	TPWC Status ¹	EPBC Status ²	EPBC Presence ³	Flora Atlas Records	Ecological Survey Result
<i>Atriplex vesicaria</i> subs. <i>Calvicola</i>	Bladder Saltbush	DD	-	-	1	No
<i>Austrostipa centralis</i>	Austrostipa	NT	-	-	1	No
<i>Austrostipa trichophylla</i>	Austrostipa	DD	-	-	2	No
<i>Brachyscome ciliaris</i>	Variable Daisy	DD	-	-	63	No
<i>Bulbostylis pyriformis</i>	Bulbostylis	NT	-	-	2	No
<i>Calotis cuneifolia</i>	Blue Burr-daisy, Purple Burr-daisy	DD	-	-	1	No
<i>Chthonocephalus pseudevax</i>	Ground-heads	NT	-	-	1	No
<i>Comesperma viscidulum</i>	Comesperma	DD	-	-	10	Yes
<i>Commicarpus australis</i>	Commicarpus	NT	-	-	-	Yes
<i>Corynotheca licrota</i>	Club-fruit Lilly	NT	-	-	1	Yes
<i>Cuphonotus andraeanus</i>	Downy Mother-of-Misery	NT	-	-	1	No
<i>Dodonaea microzyga</i> var. <i>microzyga</i>	Brilliant Hopbush	NT	-	-	5	Yes
<i>Dysphania rhadinostachya</i> subsp. <i>Inflata</i>	Dysphania, Rats Tail	DD	-	-	2	Yes
<i>Einadia nutans</i> subsp. <i>Nutans</i>	Einadia	NT	-	-	1	Yes
<i>Eragrostis sterilis</i>	Lovegrass	NT	-	-	1	No
<i>Euphorbia sarcostemmoides</i>	False Caustic Bush	NT	-	-	20	Yes
<i>Glischrocaryon aureum</i>	Yellow Popflower	NT	-	-	-	Yes
<i>Glischrocaryon aureum</i> var. <i>angustifolium</i>	-	NT	-	-	5	No
<i>Goodenia occidentalis</i>	Goodenia	NT	-	-	1	Yes
<i>Grevillea pterosperma</i>	Desert Grevillea	NT	-	-	11	Yes
<i>Gunniopsis septifraga</i>	Gunniopsis	NT	-	-	1	No
<i>Hakea grammatophylla</i>	Hakea	NT	-	-	3	No
<i>Haloragis odontocarpa</i> f. <i>octoforma</i>	-	DD	-	-	12	No
<i>Haloragis odontocarpa</i> f. <i>rugosa</i>	-	DD	-	-	2	No
<i>Histiopteris incisa</i>	Bats Wing Fern, Oak Fern	NT	-	-	1	No

Scientific Name	Common Name	TPWC Status ¹	EPBC Status ²	EPBC Presence ³	Flora Atlas Records	Ecological Survey Result
<i>Hydrocotyle sp. Watarrka</i>	Hydrocotyle	NT	-	-	1	No
<i>Juncus continuus</i>	Juncus	NT	-	-	9	No
<i>Laxmannia arida</i>	Laxmannia	NT-	-	-	-	Yes
<i>Macrozamia macdonnellii</i>	MacDonnell Ranges Cycad	NT	VU	Known to occur	10	No
<i>Melaleuca faucicola</i>	Desert Bottlebrush	NT	-	-	7	No
<i>Ophioglossum lusitanicum</i>	Austral Adders Tongue	NT	-	-	1	No
<i>Persicaria decipiens</i>	Slender Knotweed	NT	-	-	1	No
<i>Phyllanthus lacunellus</i>	Lagoon Spurge, Caraweena Clover	DD	-	-	4	No
<i>Santalum acuminatum</i>	Desert Quandong	VU	-	-	9	Yes
<i>Sclerolaena parallelispis</i>	Western Copper Burr	NT	-	-	6	No
<i>Senna artemisioides subsp. Kuyunba</i>	Cassia	DD	-	-	13	No
<i>Stenanthemum petraeum</i>	Stenanthemum	NT	-	-	11	No
<i>Vittadinia pterochaeta</i>	Rough Fuzzweed	NT	-	-	-	Yes
<i>Xanthorrhoea thorntonii</i>	Desert Grass Tree	NT	-	-	1	No

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

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

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

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

- indicates no record

5.2.7 Conservation Significant Fauna

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

- Listed as CE, EN, VU, CD, MIG or MAR under the EPBC Act and is either:
 - identified by a PMST report within the MRN or within 25 km of the site boundary, or
 - recorded during an ecological assessment of the MRN.
- Listed as EW, CE, EN, VU, NT or DD under the TPWC Act and has been either:
 - recorded in the NT Fauna Atlas as being within the MRN or within 25 km of the site boundary
 - recorded during an ecological assessment of MRN.

There have been several fauna field surveys of the MRN, 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 the MRN. 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 the MRN 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 rock rat (*Zyomys pendunculatus*), long-tailed dunnart (*Sminthopsis longicaudata*) and common brushtail possum (*Trichosurus vulpecula vulpecula*) which were suggested as possibly occurring within the MRN.

- Four NT species under the TPWC Act as well as two MIG/MAR species were noted as being found at the MRN during previous surveys.
- The study notes that the development at the MRN 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 construction of new flow lines for the MRN expansion project. A total of 98 species encountered and relocated including EPBC listed black-footed rock wallaby and VU TPWC listed crest-tailed mulgara (*Dasycercus cristicauda*)).
- Ecological Assessment by EcOz Pty Ltd (2020):
 - Survey conducted at the proposed locations of WM28 and WM29 (new exploration wells currently being assessed for approval by DENR). No conservation significant fauna were detected during the survey.

Based on results of the EPBC PMSR, a NT Flora Atlas desktop search and previous flora field surveys, Table 5-9 provides a summary of the conservation significant fauna that may be present in the MRN. Figure 5-10 shows the locations of conservation significant fauna within and around the MRN 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 the MRN well pads (refer environmental sensitivity maps, Appendix 7).

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 5-9 Conservation significant fauna of the Mereenie Field

Scientific Name	Common Name	TPWC Status ¹	EPBC Status ²	EPBC Presence ³	Flora Atlas Records ⁴	Ecological Survey Result
<i>Actitis hypoleucos</i>	Common Sandpiper	-	MIG MAR	May occur	-	No
<i>Amytornis modestus</i>	Thick-billed Grasswren	-	VU	-	1	No
<i>Amytornis modestus modestus</i>	Thick-billed Grasswren (MacDonnell Ranges)	EX	VU	-	1	No
<i>Amytornis striatus</i>	Striated Grasswren	NT	-	-	6	No
<i>Apus pacificus</i>	Fork-tailed Swift	-	MIG MAR	Likely to occur	-	No
<i>Ardeotis australis</i>	Australian Bustard	NT	-	-	28	Yes
<i>Ardea alba</i>	Great Egret	-	MIG MAR	Likely to occur	-	No
<i>Ardea ibis</i>	Cattle Egret	-	MIG MAR	May occur	-	No
<i>Burhinus grallarius</i>	Bush Stone-curler	NT	-	-	5	No

Scientific Name	Common Name	TPWC Status ¹	EPBC Status ²	EPBC Presence ³	Flora Atlas Records ⁴	Ecological Survey Result
<i>Calyptorhynchus banksii samueli</i>	Red-tailed Black-cockatoo (central Australia)	NT	-	-	76	Yes
<i>Calidris acuminata</i>	Sharp-tailed Sandpiper	-	MIG MAR	May occur	-	Yes
<i>Celidris melanotos</i>	Pectoral Sandpiper	-	MIG MAR	May occur	-	No
<i>Charadrius veredus</i>	Oriental Plover	-	MIG MAR	May occur	-	No
<i>Chrysococcyx osculans</i>	Black-eared Cuckoo	-	MAR	Known to occur	-	No
<i>Calidris ferruginea</i>	Curlew Sandpiper	-	CE	May occur	-	No
<i>Conopophila whitei</i>	Grey Honeyeater	DD	-	-	6	No
<i>Croitana aestiva</i>	Desert Sand-skipper	EN	EN	-	-	No
<i>Dasyercus cristicauda</i>	Crest-tailed mulgara	VU	-	-	-	Yes
<i>Dromaius novaehollandiae</i>	Emu	NT	-	-	31	Yes
<i>Erythrotriorchis radiatus</i>	Red Goshawk	VU	VU	May occur		No
<i>Falco hypoleucos</i>	Grey Falcon	VU	-	-	5	No
<i>Glareola maldivarum</i>	Oriental Pratincole	-	MIG MAR	May occur		No
<i>Haploscapanes barbarossa</i>	Spectacular Elephant Beetle	DD	-	-	2	No
<i>Lagorchestes conspicillatus</i>	Spectacled Hare-wallaby	NT	-	-	1	No
<i>Lagorchestes hirsutus</i>	Mala	EW	EN	Likely to occur	2	No
<i>Liopholis kintorei</i>	Great Desert Skink	VU	VU	May occur	2	No
<i>Liopholis slateri</i>	Slater's Skink	EN	EN	May occur		No
<i>Lophoictinia isura</i>	Square-tailed Kite	NT	-	-	1	No
<i>Macrotis lagotis</i>	Greater Bilby	VU	VU	-	2	No
<i>Motacilla cinerea</i>	Grey Wagtail	-	MIG MAR	May occur		No

Scientific Name	Common Name	TPWC Status ¹	EPBC Status ²	EPBC Presence ³	Flora Atlas Records ⁴	Ecological Survey Result
<i>Motacilla flava</i>	Yellow Wagtail	-	MIG MAR	May occur		No
<i>Merops ornatus</i>	Rainbow Bee-eater	LC	MIG MAR	May occur	169	Yes
<i>Notoryctes typhlops</i>	Itjaritjari	VU	-	-	6	No
<i>Pseudechis australis</i>	King Brown Snake	NT	-	-		Yes
<i>Petrogale lateralis</i>	Black-footed Rock-wallaby	NT	VU	Known to occur	109	Yes
<i>Polytelis alexandrae</i>	Princess Parrot	VU	VU	Known to occur	31	No
<i>Porzana fluminea</i>	Australian Spotted Crane	DD	-	-	1	No
<i>Pseudechis australis</i>	King Brown Snake	NT	-	-	11	No
<i>Pyrrholaemus brunneus</i>	Redthroat	NT	-	-	6	No
<i>Pezoporus occidentalis</i>	Night Parrot	CR	EN	May Occur	-	No
<i>Rostratula australis</i>	Australian Painted Snipe	VU	EN	May Occur	-	No
<i>Semotracia euzyga</i>	-	EN	-	-	2	No
<i>Sinumelon bednalli</i>	Bednall's Land Snail	NT	-	-	2	No
<i>Tateropa aemula</i>	-	VU		-	9	No
<i>Trichosurus vulpecula vulpecula</i>	Common Brushtail Possum (Southern N.T.)	EN	-	-	2	No
<i>Zyzomys pedunculatus</i>	Central Rock-rat	EN	EN	May occur	0	No

¹ TPWC Status: CR, Critical Endangered; EN, Endangered; EX, Extinct; VU, Vulnerable; NT, 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

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

- indicates no record

5.2.8 Weeds

Weeds managed under this EMP can be categorised via the following methods:

- 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. There are currently 32 WoNS with each having an endorsed strategic plan which outlines tactics and actions for control
- 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 Management Plan 2013-2018. There are currently four priority species; Athel pine (*Tamarix aphylla*), Cacti (*Opuntia* and *Cylindropuntia spp.*), Parkinsonia (*Parkinsonia aculeata*), Rubber bush (*Calotropis procera*), and three alert weed species; Mesquite (*Prosopis spp.*), Prickly acacia (*Acacia nilotica*) and Fountain grass (*Cenchrus setaceus*).

No Weed of National Significance (WoNS) were identified in the EPBC PMSR, though *Cenchrus ciliaris*, buffel-grass, was listed as ‘likely to occur’ in and around (25km radius) the MRN. Buffel-grass is a State/Territory weed of significance but is not listed as a WoNS.

There were no NT Declared Weeds or Priority or Alert weeds under the Alice Springs Regional Weed Management Plan identified in the NT Flora Atlas as being in or within 25km buffer of the MRN. The data showed Buffel-grass had been identified in and around the MRN, along with other environmental weeds.

Site wide weed monitoring occurs on an annual basis under the MRN 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).

A weed survey of the MRN was undertaken in 2019 by Low Ecological Services Pty Ltd, the dedicated weeds officer for the MRN. The survey confirmed the presence of Buffel-grass throughout the site, which while not declared under state or federal legislation, is covered by the EPBC Threat Abatement Advice “Ecosystem degradation, habitat loss and species decline in arid and semi-arid Australia due to the invasion of buffel grass (*Cenchrus ciliaris* and *C. pennisetiformis*)”.

Other environmentally invasive weeds (but not of Declared/listed status) found onsite include Paddy melon (*Citrullus lanatus*), Feathertop rhodes grass (*Chloris virgata*) and Spiked Malvastrum (*Malvastrum americanum*) (Figure 5-12). These environmental weeds were found in disturbed soils such as roadsides, building and around operational infrastructure such as the MRN camp.

The location of the environmental weeds found during the 2019 survey as well as environmental weeds recorded on the NT Flora Atlas is shown in Figure 5-10. Environmental weeds have been recorded in and around 17 well pads (EM10, EM13, EM20, EM33, EM34, EM36, EM37, EM40, EM 42, WM03, WM07, WM08, WM09, WM14, WM15, WM18, WM22) (refer environmental sensitivity maps, Appendix 7).

The 2020 MRN weed survey was conducted in late July 2020, with the data and report available in September 2020.





Weed name	Status	Description	Photograph
Buffel Grass (<i>Cenchrus ciliaris</i>)	Not declared	<p>Long lived dense tussock grass with deep tap-root system up to 1m tall.</p> <p>Flower- varies in colour from straw to purple. Long cylindrical, dense, spike-like, 2.5–15 cm long.</p> <p>Leaves- blueish-green, hairy with pointed tips, flat or folded.</p> <p>Seed heads- Dense, hairy, cylindrical spike up to 15 cm long and 2 cm wide. Seeds enclosed in a cluster of bristles, giving 'fluffy' appearance.</p> <p>Stalks are tough and branched with swollen bases. Leaves are produced at the basal and higher nodes. Rhizomes up to 0.5 m long.</p>	
Paddy melon (<i>Cucumis myriocarpus</i>)	Not declared	<p>Annual with prostrate or climbing habit</p> <p>Slender rough stems</p> <p>Leaves 60 to 200 mm long and 40 to 150 mm wide</p> <p>Leaves large, coarse, hairy, pinnately-lobed and alternate</p> <p>Fruit golf ball size, striped, soft prickly melons</p> <p>Summer flowers 5 lobed and yellow.</p>	
Feathertop rhodes grass (<i>Chloris virgata</i>)	Not declared	<p>Tufted annual grass up to 1m tall</p> <p>Leaf blades are bluish green, 5 to 25cm long and 3 to 6mm wide</p> <p>Seed heads or panicles have 7 to 19 feathery, white-silver spikes that are 3 to 9mm long</p> <p>Leaf blades have tufts of hairs along the margins and where the blade joins the sheath</p> <p>Stem joints are hairless and sometimes very dark.</p>	
Spiked Malvastrum (<i>Malvastrum americanum</i>)	Not declared	<p>Erect, annual or short-lived perennial herb to 1m tall</p> <p>Most parts with short, scattered, stellate hairs, dense on young growth</p> <p>Leaves ovate to lanceolate</p> <p>Flowers in a dense terminal spike, yellow to orangish yellow</p> <p>Can produce root suckers</p>	

Figure 5-12 Known environmental weed species in the Mereenie Field (Low Ecological, 2019)

5.2.9 Introduced Fauna (Pests)

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 25 km buffer of the MRN or has been recorded on ecological surveys of the area or
- Identified as an invasive species by an EPBC Protected Matters Search Tool report within a 25 km buffer of the MRN or has been recorded in ecological surveys of the area

Based on results of the EPBC PMSR, a NT Flora Atlas desktop search and previous fauna survey by Parks and Wildlife Commission of the Northern Territory (2000), Table 5-10 provides an overview of the introduced fauna located at or within 25 km of the MRN.

Pest management is undertaken on a site wide basis under the MRN FEMP. The workover and wellhead equipment, safety systems and gathering line works will implement management controls to deter pests from the site while works are underway.

Table 5-10 Introduced fauna in the Mereenie Field

Class	Common name	Scientific name	Fauna Atlas	PMST Report	Ecological Survey
Mammal	Camel	<i>Camelus dromedarius</i>	☑	☑	☑
Mammal	Cat	<i>Felis catus</i>	☑	☑	☑
Mammal	Cattle	<i>Bos taurus</i>	☑	☑	☑
Mammal	Donkey	<i>Equus asinus</i>	☑		
Mammal	Dog	<i>Canis lupus familiaris</i>		☑	
Mammal	Fox	<i>Vulpes</i>	☑	☑	☑
Mammal	Horse	<i>Equus caballus</i>	☑	☑	☑
Mammal	House Mouse	<i>Mus musculus</i>	☑	☑	
Mammal	Rabbit	<i>Oryctolagus cuniculus</i>	☑	☑	☑

5.2.10 Fire History

The Darwin Centre for Bushfire Research data shows that a large part of OL4 was affected by a large-scale fire in 2011. Since then, there have been no major fire events although a small section of OL5 was affected in 2019. Figure 5-13 shows the fire frequency at MRN.

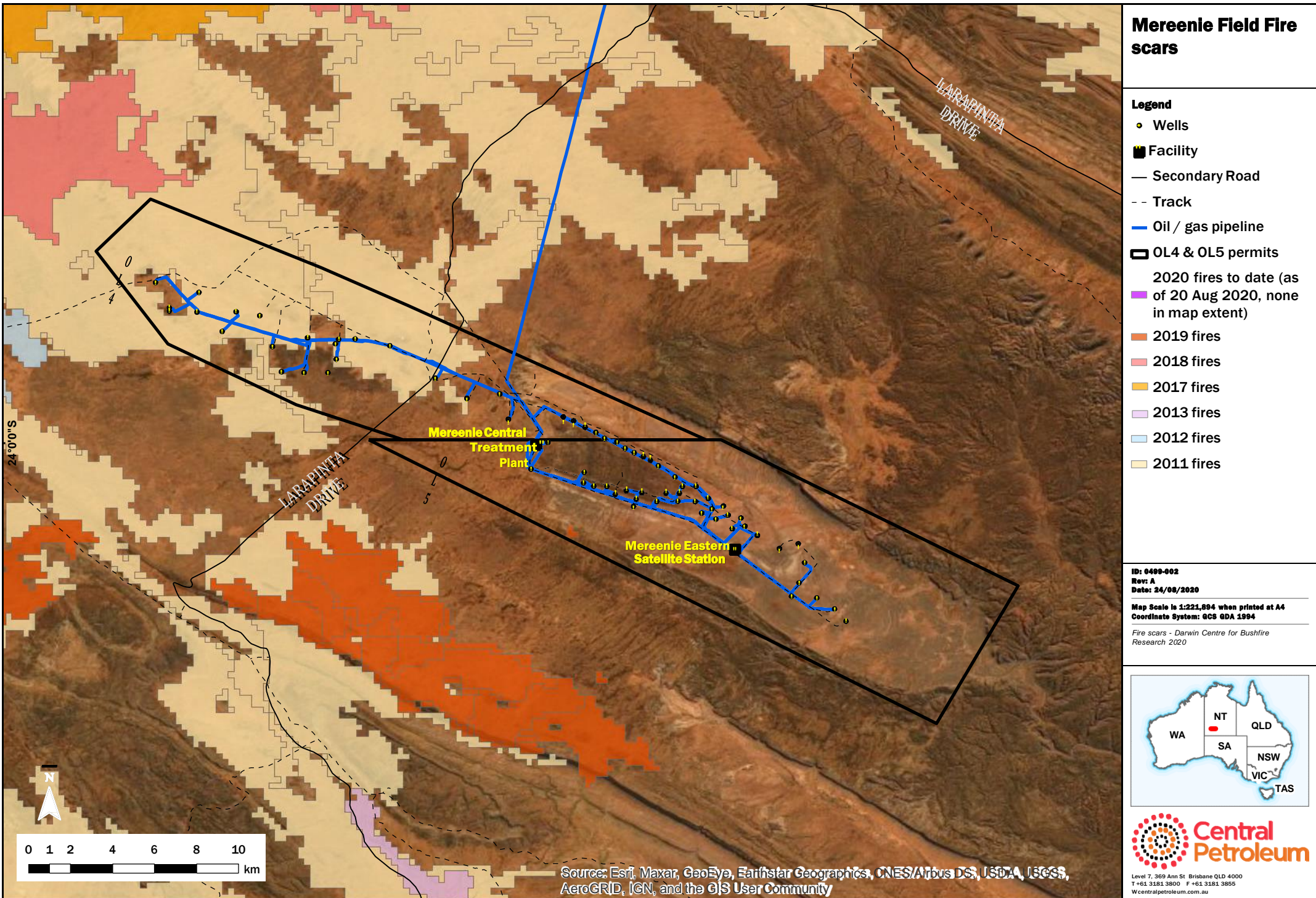


Figure 5-13 Mereenie Field fire scars

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5.3 Socio-Economic Environment

5.3.1 Land Tenure and Use

Land tenure of the MRN is Aboriginal land belonging to the Haasts Bluff Aboriginal Land Trust. Prior to the discovery of the oil and gas field, the area had been used by Aboriginal people. Undertakings have been given in the 2003 Mereenie Agreement to maintain the right of the Traditional Owners to move freely throughout the MRN and use non-operational land within MRN 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, Own Springs Reserve, Watarrka National Park and the West MacDonnell National Park (Figure 5-14). The MRN is not within or directly adjacent to any Indigenous Protected Areas which form part of the Australian Reserve System (Figure 5-14). Tourism is notable in the surrounding areas however, the MRN operations do not directly overlap with tourist routes or access.

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

5.3.2 Surrounding Populated Places

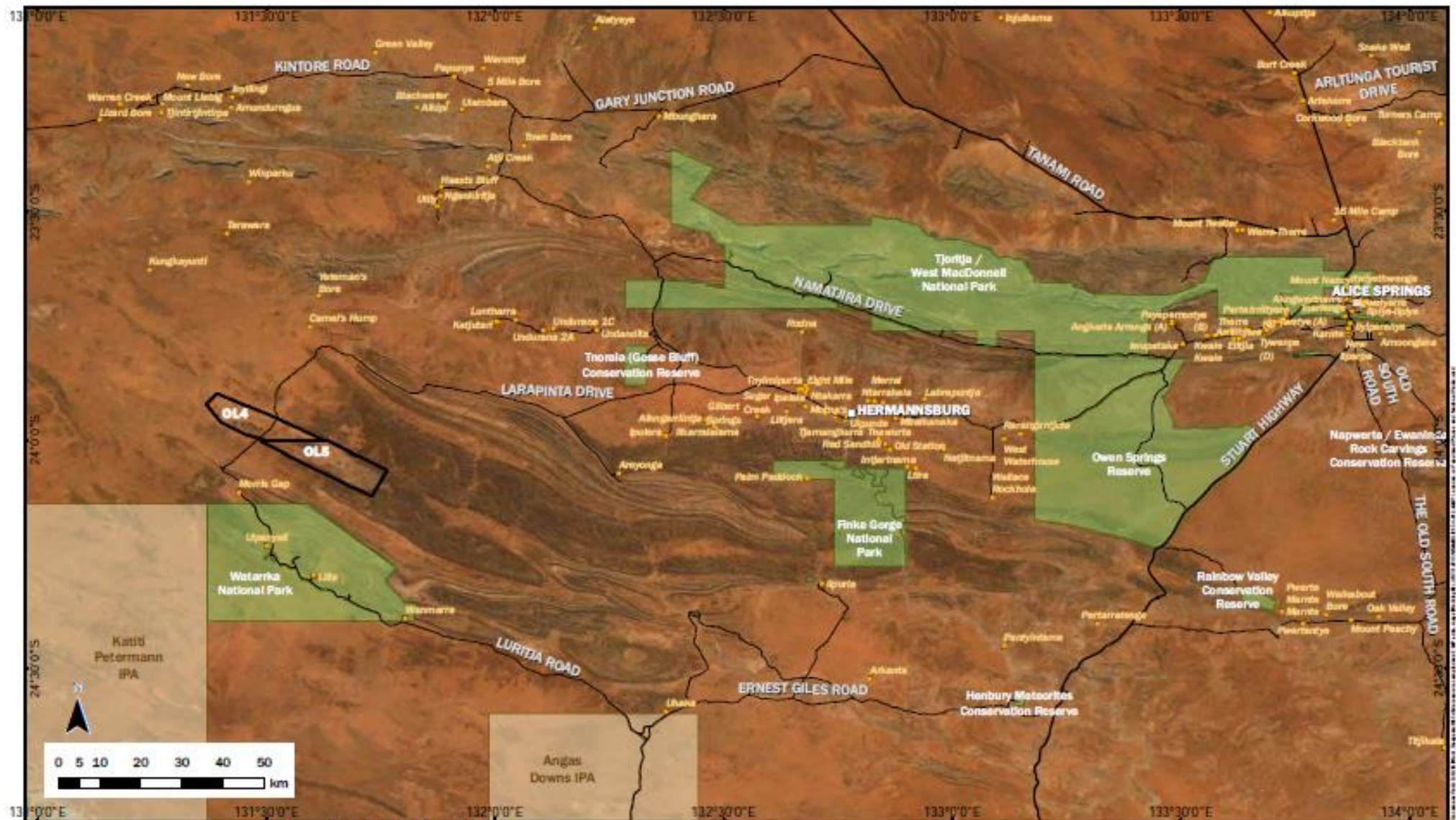
The MRN is located in a remote and sparsely populated region, though there are several small Aboriginal communities within proximity of the MRN, or have strong traditional ties with the surrounding land, including:

- Kulpidjara
- Areyonga
- Underana
- Undandita
- Haasts Bluff
- Papunya
- Ipolera

There is also a community of 600-800 people at Hermannsburg, located 110 km east of the MRN. The nearest major centre is Alice Springs, with a population of approximately 26,000, located 250 km by road from the MRN. The locations of the surrounding communities is shown in Figure 5-14.

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

CP will have a Traffic Management Plan approved by DPIL in place prior to commencement of the workover and wellhead equipment, safety systems and gathering line activities.



ID: 0594-012
 Rev: 22/06/2020
 Map Scale is 1:1,250,000 when printed at A4
 Coordinate System: GCS SDA 1994
 Sites of Botanical Significance, Significant Flora,
 Significant Fauna from Department
 of Environment and Natural Resources - Copyright
 Northern Territory Government

- Populated Places, National Parks**
- Populated Places
 - Aboriginal communities
 - Minor Road
 - Principal Road
 - Secondary Road
 - Parks and Reserves
 - Indigenous Protected Areas
 - Permit



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Figure 5-14 Merenie Field in relation to National Parks, Reserves and Populated Places

5.3.3 Cultural Heritage

5.3.3.1 Historic and National Heritage

The MRN 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 located in or within the MRN. No non-public sites were found by the online search.

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

5.3.3.2 Aboriginal Sacred Sites

CP has a current Central Land Council (CLC) Sacred Sites Clearance Certificate (SSCC) for operations at the MRN (SSCC C2013-046, renewed July 2017) obtained under the Mereenie Agreement, 2003. A cultural heritage survey was conducted as part of the SSCC approval. The SSCC maps the location of significant cultural heritage sites and includes restricted and exclusion zones within the MRN.

The workover and wellhead equipment, safety systems and gathering line works do not trigger additional sacred sites clearance as the SSCC C2013-046 permits (among other activities) “construction of pipelines, flowline and connections, use of existing laydown areas, construction and maintenance of leases and drilling and petroleum engineering operations”.

The workover and wellhead equipment, safety systems and gathering line activities are considered to fall within this scope. All conditions of the SSCC and Mereenie Agreement are to be followed during activities at the MRN. CP has and will continue to engage with the CLC and traditional owners regarding the workover and wellhead equipment, safety systems and gathering line works.

CP has obtained an AAPA Authority Certificate for the works described in this EMP (C2020/023). CP commits to complying with the requirement of the granted Authority Certificate.

6.0 Environmental Risk Assessment

CP acknowledges that environmental risks are inherent in some onshore oil and gas activities, and without control, environmental impacts may arise. As such, the Regulations require detailed assessment, reduction and control of these environmental risks and impacts through the development and implementation of the EMP for the project. This section provides an overview of the environmental risk assessment process.

6.1 Risk Management Approach

CP ensures that risks associated with this planned activity are systematically identified, assessed and managed to mitigate any potential impacts to the environment. CP’s risk management approach is aligned with all material aspects of ISO 31000 and all environmental risks associated with the project have been:

- Identified to determine the environmental values and / or sensitivities with the potential to occur as a result of the project
- Analysed and evaluated including the assessment of control effectiveness (refer Table 6-1)
- Recorded in a risk register
- Treated in a manner commensurate with the level of risk (formal risk management plans, detailed risk treatments, routine management)
- Communicated to key stakeholders
- Monitored and reviewed in a manner commensurate with the level of risk, and the retained consequences.

Assessment of risk is completed using CP’s Risk Matrix (Section 6.7) 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 (Section 6.3), or whether further mitigation is required.

CP’s risk management evaluates and reviews the inherent risk from an activity, the residual risk once controls are applied and the likelihood and consequence of a risk event. A key factor in determining the residual risk rating is the effectiveness of controls / mitigation measures. The review includes the effectiveness of the risk controls / mitigation measures to meet CP’s objective of ALARP and acceptability.

The results of CP’s risk management approach for activities under this EMP (including potential cumulative impacts) are contained in Table 6-5. The CP Operations Manager is the owner of the risks associated with activities under this EMP.


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.

6.2 Hierarchy of Controls

To mitigate a risk to ALARP, CP is required to demonstrate that all reasonably practicable control measures have been identified and implemented to reduce the risk of identified hazards. CP uses the hierarchy of controls listed in Table 6-2 to determine whether a risk has been mitigated to ALARP. In determining whether a risk is at ALARP, CP considers whether the introduction of additional controls to reduce the risk are possible and if they are, would they be considered reasonable or practicable (for example, if a residual risk of medium or higher, the highest existing controls relates to Engineering, is it reasonable or practicable to implement a Substitute or Eliminate control level).

Table 6-2 Hierarchy of controls

Hierarchy	Description	Effectiveness of Control
Eliminate	Hazard is physically removed	Highest  Lowest
Substitute	Hazard is replaced	
Engineering	The hazard remains but is isolated	
Administrative	People are required to change the way they work	
Personal Protective Equipment	Hazard remains but people are protected using equipment	

6.3 ALARP

As part of CTP’s risk assessment process, each risk is mitigated to ALARP. A risk can be considered to have been reduced to ALARP when all reasonably practicable control measures have been identified and implemented to reduce the risk of identified hazards. ALARP essentially 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.

6.4 Determination of Impact and Risk Acceptability

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. CP’s risk tolerance / acceptance process is utilised to determine whether to accept the assessed residual risk rating. In summary:

- ‘Very High’ residual risks are not tolerable / acceptable long term and must be supported by a comprehensive assessment and improvement plan to reach an acceptable level. ‘Very high’ residual risks must be approved by CP’s Chief Executive Officer
- ‘High’ and ‘Medium’ residual risks are acceptable provided that ALARP has been achieved and demonstrated
- ‘Low’ residual risks are acceptable, and it is assumed that ALARP has been achieved.

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.

6.5 Assessment of Uncertainty

To enable an accurate assessment of the potential impact and risk of the activities, the risk assessment process must include consideration of 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 system

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	Generally, no guidance material available. The precautionary approach to management of the risk is required.

6.6 Professional and Stakeholder Engagement

This risk assessment has been developed based on a collaborative and iterative approach. Specialists from respective fields and impacted stakeholders have been consulted throughout the risk assessment process to develop the most practical and realistic assessment of potential environmental risk for the MRN workover and wellhead equipment, safety systems and gathering line works and the relative impact of mitigation and preventative measures proposed.

6.7 Central Petroleum Risk Matrix

Table 6-4 Central Petroleum risk management approach

Risk Matrix							Remote	Unlikely	Possible	Likely	Frequent	
							Conceivable, but only in extreme circumstances	Event is unlikely to occur during the lifespan of a project	Event may occur during the lifespan of a project	Event likely to occur during the lifespan of a project	Recurring event during the lifespan of a project	
Impact Type							<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	
Impact Level	Health and Safety		Environment	Community	Legal	Reputation	Financial AUD\$					
	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	

6.8 Risk Assessment Outcome

Table 6-5 Detailed environmental risk assessment

Potential Impact	Causes	Consequence	Inherent Risk			Existing Control Measures (Control Type)	Controls Rating	Mitigated Risk			Uncertainty Level	Code of Practice	ALARP / Acceptability Rationale
			C	L	R			C	L	R			
Flora and Fauna													
Activities adversely affect Conservation Significant flora and fauna	Civil works, vehicle movements and 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	<ul style="list-style-type: none"> Limit speed on unsealed access roads to 70km/hr (administrative) All personnel attending the MRN for the workover and wellhead equipment, safety systems and gathering line works will be inducted on speed limits and times to avoid driving Vehicle movements will be planned to minimise the number of trips undertaken e.g. utilisation of existing freight transport for combined deliveries under the MRN FEMP and car-pooling for personnel movements. Any oversized loads will be accompanied by an accredited pilot. 	Effective	Moderate	Unlikely	Medium	A	Clause A.3.5	<p>There will only be a small increase in vehicle movements for a short period on-site during activities. The movements take place on existing field access tracks and controls are already established and operating successfully under the Mereenie site traffic management plan and FEMP. Consideration was given to reducing the speed limit however the site has been operating with the current limits without any adverse effect recorded.</p> <p>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.</p> <p>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 6.4, with no further risk reduction warranted.</p>
		Loss of conservation significant vegetation and fauna habitat	Moderate	Unlikely	Medium	<ul style="list-style-type: none"> Work conducted in pre-disturbed operational areas 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 Clause A.3.5	<p>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 6.4, with no further risk reduction possible.</p>
		Increased occurrence of weeds (including invasive species)	Serious	Possible	Medium	<ul style="list-style-type: none"> 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 Clause A.3.6	<p>No WoNS or declared weeds in the MRN so risk of weed spread between well sites minimised if vehicles cleaned prior to site entry and materials inspected & declared weed seed free</p> <p>Field-wide weed management occurs concurrently under the MRN FEMP</p> <p>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 6.4, with no further risk reduction warranted.</p>

Potential Impact	Causes	Consequence	Inherent Risk			Existing Control Measures (Control Type)	Controls Rating	Mitigated Risk			Uncertainty Level	Code of Practice	ALARP / Acceptability Rationale
			C	L	R			C	L	R			
	<p>Uncontrolled fires as a result of CTP's activities via:</p> <p>Spill and ignition of flammable substances</p> <p>Loss of containment from the well</p> <p>Uncontrolled ignition source</p>	<ul style="list-style-type: none"> Injury or death of conservation significant fauna Loss of conservation significant vegetation and fauna habitat 	Serious	Likely	High	<ul style="list-style-type: none"> Fire break around well lease (engineering) Only fuel to be used on site is diesel (substitution) 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 extinguisher to be available in any vehicle which visits the MRN (PPE) 	Effective	Minor	Unlikely	Low	A	<p>Clause A.3.5</p> <p>Clause A.3.7</p> <p>Clause D.5.1</p>	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 6.4, with no further risk reduction possible.
	Storage and transportation of domestic wastes	<p>Scavenging by native and pest species</p> <p>Pest outbreaks</p>	Moderate	Unlikely	Medium	<ul style="list-style-type: none"> 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 6.4, with no further risk reduction possible.
Land													

Potential Impact	Causes	Consequence	Inherent Risk			Existing Control Measures (Control Type)	Controls Rating	Mitigated Risk			Uncertainty Level	Code of Practice	ALARP / Acceptability Rationale
			C	L	R			C	L	R			
Activities adversely affect soils and topography	<p>Movement and use of heavy machinery and vehicles, including during wet season</p> <p>Earthworks for re-establishment of flare pit and workover fluid tank drain/trench, including during wet season</p>	<ul style="list-style-type: none"> Inversion of soil profile Soil erosion and siltation of watercourses Soil compaction 	Moderate	Unlikely	Medium	<ul style="list-style-type: none"> 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	<p>Clause A.3.4</p> <p>Clause A.3.9</p>	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 6.4, with no further risk reduction possible.
	Loss of containment (including spills or leaks), including during wet season	Contamination of soils	Moderate	Likely	Medium	<ul style="list-style-type: none"> Asset integrity management system which includes: <ul style="list-style-type: none"> 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	<p>Clause A.3.8</p> <p>Clause C.7.1</p> <p>Clause C.7.2</p>	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 6.4, with no further risk reduction possible.

Potential Impact	Causes	Consequence	Inherent Risk			Existing Control Measures (Control Type)	Controls Rating	Mitigated Risk			Uncertainty Level	Code of Practice	ALARP / Acceptability Rationale
			C	L	R			C	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	<ul style="list-style-type: none"> Asset integrity management system which includes: <ul style="list-style-type: none"> 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 Clause C7.1(b) 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 6.4, with no further risk reduction possible.
	Release of oily and or saline water, including waste water, to ground, including during wet season	Contamination of soil	Serious	Remote	Medium	<ul style="list-style-type: none"> Ensure appropriate measures are in place (e.g. lining, bunding) to prevent fluids, waste chemicals and/or hydrocarbon fluids from contaminating water or land not approved for waste disposal (engineering) 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). 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 Clause C.7.1 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 6.4, with no further risk reduction possible.

Potential Impact	Causes	Consequence	Inherent Risk			Existing Control Measures (Control Type)	Controls Rating	Mitigated Risk			Uncertainty Level	Code of Practice	ALARP / Acceptability Rationale
			C	L	R			C	L	R			
	Incorrect waste segregation, storage, handling and disposal (including hazardous waste), including during wet season	Loss of recyclable resources adding to landfill	Minor	Likely	Medium	<ul style="list-style-type: none"> 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) 	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 6.4, with no further risk reduction possible.
		Soil contamination				<ul style="list-style-type: none"> 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 6.4, with no further risk reduction possible.
	Waste generation	Increase waste to landfill and other treatment and or disposal facilities	Minor	Likely	Medium	<ul style="list-style-type: none"> 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 6.4, 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	Disturbance to cultural heritage sites	Moderate	Unlikely	Medium	<ul style="list-style-type: none"> 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 6.4, with no further risk reduction possible.

Potential Impact	Causes	Consequence	Inherent Risk			Existing Control Measures (Control Type)	Controls Rating	Mitigated Risk			Uncertainty Level	Code of Practice	ALARP / Acceptability Rationale
			C	L	R			C	L	R			
	Fire as a result of CP's activities	Disturbance to cultural heritage sites	Serious	Possible	High	<ul style="list-style-type: none"> 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	<p>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.</p> <p>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 6.4, with no further risk reduction warranted.</p>
Water													
Activities adversely affect surface water and ground water	Earthworks required to re-establish flare pit and tank drain/trench, including during wet season	Disturbance to natural drainage patterns	Minor	Unlikely	Low	<ul style="list-style-type: none"> 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 6.4, with no further risk reduction possible.
		Erosion and siltation of watercourses	Moderate	Unlikely	Medium	<ul style="list-style-type: none"> 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 6.4, with no further risk reduction possible.
	Use of groundwater resources	Depletion of groundwater resources	Moderate	Unlikely	Medium	<ul style="list-style-type: none"> Groundwater use estimates for activities under the EMP are 0.32 ML/year and are to be taken from the existing bores within the field, which is a relatively small percent of the total volume allocated to the site (58.2ML/year under application). Water licence to be obtained 	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 6.4, with no further risk reduction possible.

Potential Impact	Causes	Consequence	Inherent Risk			Existing Control Measures (Control Type)	Controls Rating	Mitigated Risk			Uncertainty Level	Code of Practice	ALARP / Acceptability Rationale
			C	L	R			C	L	R			
	Subsurface loss of contaminants during workovers	Contamination of watercourses Contamination of groundwater Reduction of groundwater pressure	Critical	Remote	High	<ul style="list-style-type: none"> ▪ MRN wells have multiple barriers in place (e.g. cementing, minimum two casing strings) across as described in Section 4.2.3.1 ▪ Well to be managed in accordance with a Code compliant and accepted Well Operation Management Plan (WOMP) and Well Integrity Management Plan (WIMP) (engineering, administrative), which will include procedures for: <ul style="list-style-type: none"> - 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 Clause A.4.9 Clause A.4.10 Clause B.4.14 Clause C.7.1 Clause C.7.2	<p>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.</p> <p>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.</p> <p>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.</p> <p>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 6.4</p>

Potential Impact	Causes	Consequence	Inherent Risk			Existing Control Measures (Control Type)	Controls Rating	Mitigated Risk			Uncertainty Level	Code of Practice	ALARP / Acceptability Rationale
			C	L	R			C	L	R			
	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	<ul style="list-style-type: none"> Separation distance from surface water and groundwater resources (ephemeral water courses and average groundwater depth >200m) 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) 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) 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) 	Effective	Moderate	Remote	Low	A	Clause A.3.8 Clause C.7.1 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 6.4, with no further risk reduction possible.
	Flooding, particularly during wet season	Sedimentation of watercourses	Minor	Unlikely	Low	<ul style="list-style-type: none"> Implement erosion and sediment control plan (administrative) Separation distance from major watercourses (no major watercourses in MRN) (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 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 6.4, with no further risk reduction possible.

Potential Impact	Causes	Consequence	Inherent Risk			Existing Control Measures (Control Type)	Controls Rating	Mitigated Risk			Uncertainty Level	Code of Practice	ALARP / Acceptability Rationale
			C	L	R			C	L	R			
		Contamination of watercourses	Minor	Unlikely	Low	<ul style="list-style-type: none"> 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 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 6.4, with no further risk reduction possible.
	Incorrect hazardous waste segregation and disposal, including during wet season	Contamination of surface watercourse Radiation	Minor	Likely	Medium	<ul style="list-style-type: none"> 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 implement (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 6.4, with no further risk reduction possible.
	General use of roads and access tracks, including during wet season	Sedimentation of surface watercourses	Moderate	Unlikely	Medium	<ul style="list-style-type: none"> 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 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 6.4, with no further risk reduction possible.

Potential Impact	Causes	Consequence	Inherent Risk			Existing Control Measures (Control Type)	Controls Rating	Mitigated Risk			Uncertainty Level	Code of Practice	ALARP / Acceptability Rationale
			C	L	R			C	L	R			
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	Medium	<ul style="list-style-type: none"> 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 6.4, 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	Medium	<ul style="list-style-type: none"> 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 6.4, with no further risk reduction possible.

Potential Impact	Causes	Consequence	Inherent Risk			Existing Control Measures (Control Type)	Controls Rating	Mitigated Risk			Uncertainty Level	Code of Practice	ALARP / Acceptability Rationale
			C	L	R			C	L	R			
	Traffic increase due to activities	<ul style="list-style-type: none"> 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	Medium	<ul style="list-style-type: none"> Consult with surrounding stakeholders when major operations will occur Approved Traffic Management Plan. Transportation of over-width or over-dimension loads under DPIL approved permit with pilot No unauthorised third-party access to the site Zero alcohol and/or drugs policy with routine testing Ensure vehicles are inspected and maintained regularly and have working lights and/or spotlights. No deviation from access tracks and roads Well lease access track signed to prevent unauthorised access All turnoffs and turn onto NT controlled roads are suitable for petroleum activities On unsealed roads if dust is created, reduce speed 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. Limited driving at dawn and dusk 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 Clause 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 6.4, with no further risk reduction possible.
	Noise from activities	Local community complaints	Minor	Possible	Low	<ul style="list-style-type: none"> Distance to sensitive receptors is approximately 40km via road 	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 6.4, with no further risk reduction possible.
Air													
Activities adversely affect air quality and climate	Movement of heavy machinery and vehicles	Dust generation	Minor	Likely	Medium	<ul style="list-style-type: none"> 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 6.4, with no further risk reduction possible.

Potential Impact	Causes	Consequence	Inherent Risk			Existing Control Measures (Control Type)	Controls Rating	Mitigated Risk			Uncertainty Level	Code of Practice	ALARP / Acceptability Rationale
			C	L	R			C	L	R			
	Fire as a result of CP's activities	Release of particulate emissions to the atmosphere	Critical	Unlikely	High	<ul style="list-style-type: none"> 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 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 6.4, with no further risk reduction possible.
	Unplanned venting of gas	Contribution to greenhouse gas emissions	Minor	Frequent	Medium	<ul style="list-style-type: none"> 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 6.4, with no further risk reduction possible.
	Loss of containment of gas and / or oil	Atmospheric pollution	Serious	Remote	Medium	<ul style="list-style-type: none"> Asset integrity management system which includes: <ul style="list-style-type: none"> 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) 	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 6.4, with no further risk reduction possible.

Potential Impact	Causes	Consequence	Inherent Risk			Existing Control Measures (Control Type)	Controls Rating	Mitigated Risk			Uncertainty Level	Code of Practice	ALARP / Acceptability Rationale
			C	L	R			C	L	R			
					Medium	<ul style="list-style-type: none"> Implement methane emissions management plan (administrative) 							
	Gas leaks from well infrastructure				Medium	<ul style="list-style-type: none"> Asset integrity management system which includes: <ul style="list-style-type: none"> 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			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 6.4, with no further risk reduction possible.
Greenhouse Gas Emissions													
Greenhouse gas emission contribution	Combustion of fuel during activities	Contribution to greenhouse gas emissions	Minor	Frequent	Medium	<ul style="list-style-type: none"> 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 	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 6.4, with no further risk reduction possible.
	Unplanned venting of gas		Minor	Frequent	Medium	<ul style="list-style-type: none"> 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 6.4, with no further risk reduction possible.
	Leakage of gas from wells		Minor	Likely	Medium	<ul style="list-style-type: none"> 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 Clause D.5.2 Clause D.5.3 Clause D.5.4 Clause D.5.5 Clause 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 6.4, with no further risk reduction possible.
Cumulative Impacts													

Potential Impact	Causes	Consequence	Inherent Risk			Existing Control Measures (Control Type)	Controls Rating	Mitigated Risk			Uncertainty Level	Code of Practice	ALARP / Acceptability Rationale
			C	L	R			C	L	R			
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	<ul style="list-style-type: none"> Groundwater extraction will not be occurring within a Water Control District Groundwater requirement is approximately 0.32ML/yr Water licence to be obtained prior to use of water 	Effective	Minor	Remote	Low	A	NA	<p>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/yr² have been granted by the NT Government. A 0.32 ML/yr increase represents a very small increase.</p> <p>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 6.4, with no further risk reduction possible.</p>
Cumulative impacts on surface water	Take of surface water for activities combined with other known surface water take Discharges to surface water	<ul style="list-style-type: none"> Reduction in available surface water Contamination of surface water 	Minor	Unlikely	Low	<ul style="list-style-type: none"> No take of surface water proposed No NT government granted surface water take licences³ 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	<p>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 6.4, with no further risk reduction possible.</p>
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	<ul style="list-style-type: none"> Activities restricted to previously disturbed locations No publicly known clearing activities within the local area 	Effective	Minor	Remote	Low	A	NA	<p>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 6.4, with no further risk reduction possible.</p>
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	<ul style="list-style-type: none"> 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	<p>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 6.4, with no further risk reduction possible.</p>
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	<ul style="list-style-type: none"> 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	<p>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 6.4, with no further risk reduction possible.</p>

² 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>

³ 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	Mitigated Risk			Uncertainty Level	Code of Practice	ALARP / Acceptability Rationale
			C	L	R			C	L	R			
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	<ul style="list-style-type: none"> 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 6.4, with no further risk reduction possible.

6.9 Risk Summary

Table 6-6 shows the number of inherent risks identified to environmental aspects associated with the workover and wellhead equipment, safety systems and gathering line activities. Inherent risk refers to amount of risk associated with an event assuming the absence or failure of controls. The count of inherent risks is assessed with the assumption of no control measures are in place.

Table 6-7 provides a count of the residual risks associated with the workover and wellhead equipment, safety systems and gathering line works, with appropriate controls implemented. This summary indicates that the controls are effective, and risks have been successfully managed to ALARP and are acceptable.

Table 6-6 Count of inherent risks

	Inherent Risks			
	Low	Medium	High	Very High
Count	10	24	4	0

Table 6-7 Count of residual risks

	Residual Risk			
	Low	Medium	High	Very High
Count	34	4	0	0

7.0 Management Plans

7.1 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* and also provides for the following:

- Baseline weed assessments and prior to regulated activities being undertaken
- Ongoing weed monitoring
- Provision of a dedicated weeds officer
- Consistency with statutory requirements including any relevant threat abatement plans under the EPBC Act.

The MRN WMP is provided in Appendix 4 under which the workover and wellhead equipment, safety systems and gathering line activities will operate. The MRN WMP is the site-wide weed management plan that is implemented under the MRN FEMP for the operation of the MRN, noting that the MRN FEMP was approved prior to the code. The weed management requirements for this EMP are relative to the project scope, noting that the project activities will be conducted at specific locations within the MRN and at intermittent durations over the validity period of this EMP .

The EMP scope-specific weed management measures to be implemented during the activities are provided in Table 8-1. In addition, CP's activities are consistent with the EPBC Threat Abatement Advice "Ecosystem degradation, habitat loss and species decline in arid and semi-arid Australia due to the invasion of buffel grass (*Cenchrus ciliaris* and *C. pennisetiformis*)". CP's weed management measures for the EMP activities are in line with the relevant actions recommended in the buffel grass EPBC threat abatement plan as per Table 7-1.

Table 7-1 Demonstration of consistency with the buffel grass EPBC threat abatement plan

Relevant Recommended Actions for Land Managers under the Buffel Grass EPBC Threat Abatement Advice	Corresponding CP Weed Management Measures
<i>Implement the 2015 Australian Weed Strategy</i>	CP implements the National Weed Strategy through the MRN WMP.
<i>Establish, maintain and participate in national buffel grass taskforce to coordinate management at a national level</i>	CP is not currently involved in any state or national buffel grass taskforce.
<i>Identify and prioritise key assets and areas for strategic management</i>	<p>The MRN WMP notes that buffel grass is widespread throughout the MRN and total elimination of this species from the MRN leases is not practical.</p> <p>As per the MRN WMP, the key assets for protection on a site-wide basis include facilities (e.g. camp, central treatment plant), access roads and tracks. Known near threatened flora populations (brilliant hopbush and false caustic hopbush) and known conservation significant flora locations are also areas for protection and management.</p> <p>Measures to be implemented during the EMP activities such as weed free certificates and weed identification and treatment/removal (if feasible) of weeds from the wellsite prior to mobilisation aims to minimise the spread of buffel grass to key assets and areas for protection.</p>

Relevant Recommended Actions for Land Managers under the Buffel Grass EPBC Threat Abatement Advice	Corresponding CP Weed Management Measures
<i>Promote information on weed spread prevention</i>	Weed management, including management of buffel grass, forms part of the site inductions for the EMP activities
<i>Encourage / undertake early, persistent eradication where this is still feasible</i>	The MRN WMP notes that buffel grass is widespread throughout the MRN and total elimination of this species from the MRN leases is not practical. However, where feasible, CP will aim to remove buffel grass from the well sites occupied under this EMP in order to prevent further spread throughout the field.
<i>Minimise spread of buffel grass by natural means, especially water</i>	Not applicable to this EMP as site-wide weed management (i.e management of watercourses/drainage lines is undertaken as per the MRN FEMP.
<i>Keep buffel grass out of conservation reserves and Indigenous Protected Areas where it is absent or sparse, prioritizing areas where there is a significant risk of incursion and where important biodiversity or Indigenous cultural heritage assets are/would be threatened by buffel grass</i>	There are no conservation reserves and Indigenous Protected Areas within the EMP work area however weed management measures aim to reduce the spread of buffel grass throughout the MRN and greater region.
<i>Develop guidelines to minimise the inadvertent spread of buffel grass by human activity and stock movements. Implement recommended actions, particularly those in high conservation areas.</i>	The MRN WMP and this EMP are the relevant guidelines.
<i>Destroy and monitor outliers, new incursions and infestations threatening biodiversity and Indigenous cultural assets</i>	CP will aim treat/remove identified buffel grass from wellsites within the scope of the EMP when it is feasible to do so. As per the MRN WMP, weed monitoring is conducted on an annual basis for weeds including buffel grass.
<i>Contain populations of buffel grass that cannot be eradicated to protect biodiversity and Indigenous cultural heritage</i>	CP will aim treat/remove identified buffel grass from wellsites within the scope of the EMP when it is feasible to do so. No vegetation clearing is required under this EMP so the risk of contaminating plant and equipment with buffel grass reproductive material is reduced.
<i>Implement relevant actions in national and state/territory recovery plans</i>	The MRN WMP and this EMP are consistent with the “Recovery plan for five species of rock wallabies: Black-footed rock wallaby (<i>Petrogale lateralis</i>), Rothschild rock wallaby (<i>Petrogale rothschildi</i>), Short-eared rock wallaby (<i>Petrogale brachyotis</i>), Monjon (<i>Petrogale burbidgei</i>) and Nabarlek (<i>Petrogale concinna</i>) 2012-2022” , noting that the main habitat for the black-footed rock wallaby at the MRN is within the cultural heritage exclusion zone which will not be accessed during the EMP activities. -
<i>Implement relevant actions in conservation advices for ecological communities listed under the Environment Protection and Biodiversity Conservation Act 1999.</i>	No listed communities or ecological advices relevant to the EMP activities.

Relevant Recommended Actions for Land Managers under the Buffel Grass EPBC Threat Abatement Advice	Corresponding CP Weed Management Measures
<i>Conduct in-situ protection of threatened flora and fauna species through conservation agreements, bush regeneration and buffel grass control activities</i>	Where feasible, CP will conduct buffel grass control activities (conservation agreements and bush regeneration is beyond the scope of this EMP).
<i>Improve management of remnant vegetation to help relevant the establishment of buffel grass</i>	No applicable to this EMP as site-wide management is conducted under the MRN FEMP.
<i>Support Traditional Owners, community groups and others that are effectively controlling buffel grass to search for, document and manage existing and new infestations</i>	CP conducts annual weed surveys and will undertake control measures in accordance with the scope of this EMP. Liasion with Traditional Owners occurs under the MRN FEMP.
<i>Promote awareness of the impacts of buffel grass</i>	Weed management, including management of buffel grass, forms part of the site inductions for the EMP activities
<i>Monitor, evaluate and report of the efficacy of management programs</i>	Annual weed monitoring (including buffel grass) is conducted at the MRN under the MRN which informs effectiveness of management practices.

7.2 Bushfire Management Plan

The Code requires a fire management plan that demonstrates the following:

- Analysis of baseline fire information (minimum 10 years)
- Analysis of the impacts of the proposed activities on the existing fire management regime
- Coordination with the landholder and other land users and consistency with the landholder's fire management obligations and strategies
- Implementation of appropriate fire mitigation measures
- Appropriate fire control measures
- Annual fire mapping.

The bushfire management plan for the project is provided in Appendix 5 and has been based on the DENR's recently released *Bushfire Management Planning Guide: Onshore Petroleum Projects*. The site-specific fire management measures to be implemented during the activities are provided in Table 8-5.

7.3 Wastewater Management Plan

This plan is designed to provide the management strategy for how wastewater will be managed during the workover and wellhead equipment, safety systems and gathering line works.

Wastewater is defined in the Code as:

- Water that has been used in or produced from petroleum wells, whether it is being re-used, recycled, treated, or disposed of, and includes flowback fluid, produced water, drilling fluids, completion fluids, well suspension fluids and non-aqueous drilling fluids
- Waste material and material containing contaminants as defined in s 117AAB of the Act
- Wastewater meeting the definition of waste under the Waste Management and Pollution Control Act 1998 (NT)
- Water that has been acquired or used in petroleum activities that is being disposed of

- Residual drilling waste, e.g. muds and cuttings (which may be more or less in a solid state) in addition to the fluids mentioned above.

The wastewater management plan is required to include the following:

- Description of activities that will generate waste and wastewater
- Characteristics of the anticipated wastewater streams (including quantity and quality of each)
- Risk assessment in relation to the potential impact to the environment from water and wastewater
- Proposed method of water and wastewater storage, transportation, treatment, disposal, and reuse as part of the proposed activities
- Strategies to minimise or reduce the volume of wastewater that will be disposed offsite
- Expected quantity and quality of water and wastewater that will be treated and reused
- Estimates of the 1:1000 average rainfall interval (ARI) rainfall rate using the Australian Rainfall and Runoff methodologies for the critical period during which there would be the greatest risk of overtopping of any structures holding wastewater which are not enclosed.

7.3.1 Wastewater Management Framework

The Code establishes the following wastewater management framework, which CP has designed their wastewater management in accordance with:

- Estimate the quantities and qualities of water and wastewater from the petroleum activities
- Define the methods and approaches that are used to store, treat, reuse and dispose of wastewater
- Estimate the quantities and quality of wastewater (including derived solids) that will be removed from the site
- Based on the above include the environmental risks, impacts and mitigation in a wastewater management plan
- Monitor, manage and report on the above.

7.3.2 Wastewater Generated

Based on the activities proposed to be undertaken as part of this EMP, workover fluids are likely to be the only wastewater produced during workovers. Waste hydrostatic test water will be generated during wellhead equipment, safety systems and gathering line activities.

As described in Section 4.3, each of the wells will aim to be worked over without the use of workover fluid (using air/mist instead), however there may be instances where workover fluid is required. The DPIR requires CP to have enough workover fluid and a weighting agent at the wellsite at all times to kill the well in the event of an emergency / loss of containment during workovers.

CP will use water sourced from onsite bores for use in workover fluid. Workover fluid will not be mixed with any oil or BTEX based additives.

A small amount of biocide will need to be added to prevent bacterial activity and corrosion. Biocide comes in either a fluid state or water-soluble mix product (25kg sacks). Freshwater and additives (KCl and biocide) will be stored separately. If the work over fluid is not required, the water will be re-used or disposed of in an evaporation pond. In the event of an emergency or a workover fluid is needed, at this point it will be mixed on site in the mud mixing tank and stored in the engineered mud tanks (anticipated volume total volume workover fluid required is approximately 400 bbls (0.063ML)).

Whilst undertaking air/mist workovers, retrieved debris / fill / materials will be discharged into the flare pit (via the blooie line). Once flaring commences any small volumes of liquid within the flare pit is vaporised (not expecting water to be discharged as little water present in gas cap). Discharged materials can be removed and disposed or recycled at an approved facility.

Workover fluid will be separated from debris/fill/materials and returned to the workover fluid tank and reused for the other well workovers. Upon completion of the program, workover fluid will be returned to the evaporation ponds or tanks or disposed of at an approved facility.

The handling, use and storage of water and waste water is unlikely to result in interactions of wildlife, stock and human receptors as it will be transported in enclosed tankers and stored in 1.8m high tanks which will be present at the well site for a short duration. Tanks are enclosed on the top with steel mesh to prevent fauna access while allowing the levels of the tanks to be visually inspected.

Wastewater generated during hydrostatic testing will travel along the gathering pipelines for disposal in the existing onsite evaporation ponds (there is on handling once the water enters the equipment and pipework for testing).

7.3.3 Water / Wastewater Storage

Figure 4-1 shows the layout of the well lease and water / wastewater storage that may be used during the drilling campaign. Storages are as follows:

- Flare pit – used for the temporary storage of fill materials brought up during workovers
- Engineered mud tanks / mixing tanks / hopper – used for storage and mixing of the workover fluid ready for use during workovers.

Section 4.6.4 provides an overview of the wastes that are likely to be generated during the workover and wellhead equipment, safety systems and gathering line installation campaign.

7.3.4 Estimated Wastewater Quality and Quantity

Table 7-2 provides an overview of the estimated wastewater quantity (per well basis) and quality.

Table 7-2 Estimated wastewater quality and quantity summary

Wastewater Type	Estimated Quantity	Target Quality
Workover fluid (groundwater mixed with chemical additives)	Approximate total volume of 0.10 ML stored at a given well site, workover fluid used as need (exact volume used will depend on purpose and conditions at the well)	pH range 6-10.5 2-5% KCl 0.02% biocide 8-30 mS/cm conductivity
Hydrostatic test waster	2000 L	As per source water quality (commercially supplied freshwater)

7.3.5 Management Hierarchy

CP has implemented the National Waste Policy 2018 waste management hierarchy as per Table 7-3 Waste management hierarchy implementation

Table 7-3 Waste management hierarchy implementation

Waste Management Hierarchy	Implementation
1. Avoid: Eliminate or substitute an activity that results in wastewater	As a first measure, CP plans to undertake workover activities without the use of workover fluid where possible. Where this is achieved, no wastewater (i.e. used workover fluid) will be generated.
2. Reduce: lower the generation of waste water as part of a process or activity	When workover fluid is needed, CP will aim to re-use the water between wells, to reduce the total volume of waste water generated.
3. Reuse: beneficial re-use of wastewater for another purpose without treatment, or with minimal treatment	No beneficial reuse of the workover fluid wastewater or hydrostatic testing waste water has been identified.
4. Treat: bring wastewater back into use through treatment to improve water quality or to make quality suitable for disposal	In some cases where workover fluid is reused between wells,, additives may need to be added to maintain the required chemical composition. CP will keep a record of the volume of wastewater treated for reuse.
5. Dispose	Upon final use of the workover fluid, it will be disposed of at the existing on-site evaporation ponds or tanks, or at an approved disposal facility. Where workover fluid is returned to the evaporation ponds, CP will obtain third party certification that the material is acceptable to be disposed of to land. Wastewater generated during hydrostatic testing will also be directed to the evaporation ponds.

7.3.6 Rainfall Characteristics

The Code requires an estimate of the 1 in 1000 ARI rainfall rate⁴ using Australian Rainfall methodologies for the critical period during which there would be the greatest rate of overtopping of any structures holding wastewater which are not enclosed. To address this requirement, the flare pit and workover fluid tanks will be managed to contain the volume of the 1:1000 ARI 72 hr rainfall event. The 1 in 1000 (0.1%) year AEP for a 72 hour rainfall event for the MRN is 470mm. The tanks are above ground structures that have no ingress of surface water. The flare pit as a wastewater storage, will only be used as an overflow for secondary containment, as a secondary function.

As the workover campaign is likely to be undertaken during the wet season, CP will ensure that the flare pit can cater for the 1:1000 ARI rainfall event (e.g. by evaporating fluids in the flare pit and pumping out, transporting and disposing of fluids in the MRN evaporation ponds).

7.3.7 Environmental Risks and Impacts

Environmental risks and impacts associated with wastewater generation are discussed in detail in Section 6.8 of this EMP and include:

- Contamination of aquifers
- Contamination of surface water
- Contamination of soil
- Fauna deaths / injury
- Reduced waste steam (produced water) (positive impact associated with re-use of produced water)

⁴ The 1:1000 ARI event is equivalent to a 0.1% AEP event

7.3.8 Monitoring

A wastewater monitoring program will be implemented during the workover and wellhead equipment, safety systems and gathering line campaigns. Table 7-4 provides a summary of the monitoring program.

Table 7-4 Wastewater monitoring program

Item	Requirements	Frequency	Parameters
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
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
Workover retrieved material	Measure quantity (estimate based on actual workover data) Measure quality	Quantity – Prior to disposal	Volume Naturally Occurring Radiation Material (NORMs) As per <i>Waste Management and Pollution Control (Administration) Regulations 1998</i> (if offsite transport required)
		Prior to decision on disposal method	Leachability (as per AS4439.2 and 44396.3) Quality - as per Table 9 of the Code
Mud tanks capacity / integrity	Analysis of available freeboard within the tank	Daily during workovers Monthly or after significant rainfall event until rehabilitated	Volume
	Visual inspection of integrity of tank		
Wildlife / stock / human interactions	Inspect control measures at flare pit / tanks	Daily during workovers Other times - Monthly	Tanks – no bridging equipment to the tank Flare pit – temporary fencing intact or fauna ramp installed

Water samples will be collected by a suitably qualified person and be in accordance with AS/NZ5667.1:1998 *Water Quality Sampling Part 1: Guidance on the design of sampling programs, sampling techniques and the preservation and handling of samples*. All samples will be collected by appropriately qualified personnel, with all meters calibrated in accordance with the manufacturer's instructions.

Samples will be collected in laboratory supplied sampling containers and placed in chilled eskies and transported under chain of custody procedures. Analysis will be performed by laboratories with National Association of Testing Authorities (NATA) accredited analysis methodology. Where there is no NATA accredited laboratory for a specific analyte or substance, then duplicate samples will be sent to two separate laboratories for independent testing.

7.3.9 Measurement Criteria / Control Measures

The measurement criteria and control measures outlined in Table 7-5 have been developed to demonstrate that risks associated with wastewater storage are reduced to ALARP.

Table 7-5 Wastewater measurement criteria and control measures

Environmental Outcome	Performance Standard	Measurement Criteria
Avoid adverse environmental impacts and risks associated with the use and generation of waster during the EMP activities	No overtopping events from the tanks will occur	No incidents recorded relating to overtopping of tanks
	No wastewater will be released beyond the well lease	No incidents recorded relating to release of wastewater beyond the well lease
	Wastewater spills will be limited to a maximum of 1,000L	No incidents relating to spills of wastewater greater the 1000L
	Access to wastewater storage restricted	Records show fences around flare pit and well maintained to prevent access by wildlife and stock No records of fauna/stock entering fenced flare pit and well area

7.3.10 Wastewater Tracking and Reporting

Wastewater tacking requirements are provided in Section 9.5.1. Other requirements for tracking and reporting include:

- Wastewater tracking will also be in accordance with other legislative requirements such as those imposed under the Waste Management Pollution Control Act 1998, which requires wastewater tracking to be documented in an audible chain of custody system to include details of the licence number of any licensed waste transporters, and the Radiation Protection Act 2004
- Wastewater tracking documentation will be reported to the Minister at least annually in accordance with the framework provided in Section 10.0.

7.4 Spill Management Plan

The Code of Practice requires a spill management plan 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. The spill management plan must contain the following:

- Description of chemicals, water and wastewater and the way that they will be stored, transported and transferred as part of the petroleum activity, this includes fluids which are mixed and pumped on site
- Description of the spill scenarios that may occur including an assessment of the duration of the activity and the mechanism, location, quality and quantity of a material that may be spilled
- Risk assessment of the potential impact to the environment of a spill
- Description of the procedures and processes to be used to prevent or minimise the risk of spill from occurring
- Description of methods used to detect a spill, including monitoring methods, frequency of monitoring and the minimum volume spill or leak that would be detected between monitoring events
- Spill management response strategy including a communications plan.

Spill management regarding well operations will be undertaken in accordance with MRN FEMP.

7.4.1 Application of the Waste Management and Pollution Control Act

For an activity that is authorised under the Petroleum Act 1984, the Waste Management and Pollution Control Act 1998 (WMPC Act) only applies if a contaminant or waste is not confined within the authorised lease boundary.

If a contaminant or waste is emitted or discharged from land on which a petroleum extraction activity is being undertaken, it will be considered to be an incident (as defined by the WMPC Act) if it threatens or may threaten to cause pollution resulting in material or serious environmental harm. Similarly, if a contaminant or waste is emitted or discharged from land greater than 1 kilometre from the centre of a pipeline, it will also be considered an incident if it threatens to, or may threaten, to cause pollution resulting in material or serious environmental harm.

Where an incident causes, or threatens to cause, pollution resulting in material environmental harm or serious environmental harm, the person conducting the activity must notify the Northern Territory Environment Protection Authority (NT EPA) in accordance with section 14 of the WMPC Act.

In locations where the WMPC Act applies, CP has a General Environmental Duty under section 12 of the WMPC Act to take all measures that are reasonable and practicable to prevent or minimise pollution or environmental harm and reduce the amount of waste. In addition, it is a requirement that transport of any listed waste (Schedule 2 of the Waste Management and Pollution Control (Administration) Regulations 1998) must be conducted by a person licensed under the WMPC Act to transport that waste and that waste must be transported to a facility that is licensed under the WMPC Act to accept that waste.

The WMPC Act, administered by the NT EPA is separate to and not reduced or affected in any way by other legislation administered by other Departments or Authorities. The Environmental Operations Branch of the Environment Division may take enforcement action or issue statutory instruments should there be non-compliance with the WMPC Act.

7.4.2 Potential Spill Materials

Table 4-3 and Table 4-4 contains a list of the chemicals that are stored at the well lease (and their designation as dangerous chemicals) and are subject to potential spill. Section 4.7 also assesses whether the spill materials are a hazardous substance. Workover fluid described in Section 4.7.5 and wastewater described in Section 7.3 also has the potential for spills.

7.4.3 Procedures and Processes

In accordance with Section A.3.8 of the Code, CP will implement several procedures and processes to minimise the risk from leaks and spills from occurring. In general, these are:

- Chemicals are stored enclosed portable storage trailer in the bunded, compacted chemical storage area and in accordance with their approved SDS which meets the minimum requirements mandated by NT Worksafe
- When outside bunded areas, chemical containers / tanks have spill absorbent materials underneath them to minimise contact with the soil
- Minimising the quantity of chemicals stored onsite to those that may be required (including the contingency chemicals required)
- Undertaking a monitoring program to detect leaks or spills in an expedient manner. The monitoring program frequency is designed to detect a spill or leak before sufficient quantity has been released that would cause environmental impacts to a ground or surface water.
- Spill kits are available at each well lease

In addition to those listed above, Table 7-6 provides a summary of the additional spill detection measures that will be undertaken for specific spill scenarios

7.4.4 Potential Spill Scenarios

Potential sources of spills associated with the EMP activities include:

- Storage of chemicals, dangerous goods and hazardous substances
- Handling / mixing of chemicals, dangerous goods and hazardous substances
- Transfers between tanks and the rig
- Rig refuelling
- Transportation (on/off site) of chemicals, dangerous goods, hazardous substances and drilling fluids
- Storage in tanks on lease pads.
- The loss of containment due to the failure of well barriers is covered under the accepted WOMP.

Table 7-6 provides a summary of the spill scenarios that may occur during activities under this EMP. Figure 7-1 shows an example of the spill kit locations on a workover rig set-up.

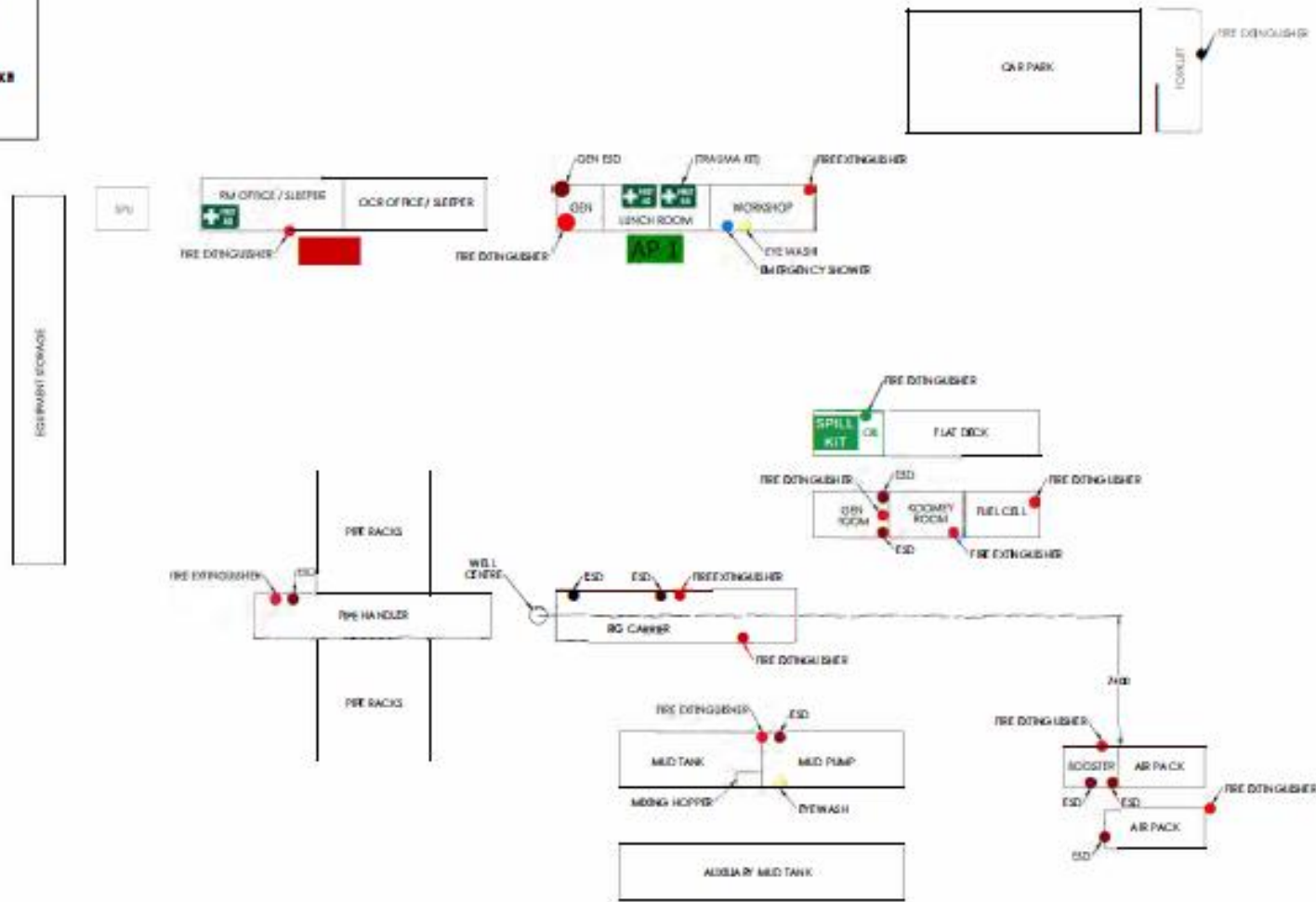
Table 7-6 Spill scenario summary

Activity	Activity Duration	Spill Mechanism	Location	Potential Spill Quantity	Quality	Controls
Storage of chemicals in the on the well lease chemical storage area	10 - 20 days per well	Container rupture Lids / taps not fitted / fitted correctly	Portable trailer within chemical storage area	25 L	As per SDS	Daily visual checks of the chemical storage area Secondary containment
Handling / mixing of chemicals on the well lease	10 - 20 days per well	Poor handling / mixing practices Poor transfer into tanks Overtopping of tank	Chemical storage area Chemical loading area	100 L	As per SDS	Handling / mixing performed by a competent person Visual assessment during mixing / transfers Daily visual checks of the chemical storage and loading area Compacted well lease Temporary absorbent mats used
Transfers between tanks / rigs on the well lease	10 – 20 days per well	Coupling, hosing and pipe failures	Chemical loading area Pipework	100 L	As per SDS	Real time monitoring of tank volumes Daily visual checks during workovers Well lease pad compacted
Truck / rig refuelling on well lease	Every day during use	Incorrect refuelling setup Poor refuelling practices	Rig fuel tank Diesel truck	100 L	As per SDS	Operators maintain visual contact whilst refuelling fuel tank
Chemical transportation from location outside of OL4 and OL5 to the well lease	1 day mobilisation and 1 day demobilisation	Incorrect storage Incorrect loading / unloading technique Traffic incident	Vehicle	20-100L Traffic incident – up to 20,000kg	As per SDS	Visually assessment during loading/unloading Emergency response in event of traffic incident
Storage of workover fluid in tanks on well lease	10-20 days per well	Container rupture Lids / taps not fitted correctly	Workover fluid tanks	Up to 0.10 ML (all tanks rupture simultaneously)	As per Section 12.3	Daily visual checks during workovers Flare pit capacity of 0.18 ML (enough to hold capacity if all tanks rupture)
Hydrotest of piping with fresh water on the well lease and pipeline corridor within OL4 and OL5	<24 h for each day wellhead equipment, safety systems and gathering line installation is occurring	Leaking through flange/fitting	Along pipework or fitting	<2000L water/well	Potable water	Inspection Flange management prior to hydrotest

LEGEND

- RESO** Remote ESD
- AP x** Emergency Assembly Point
- SPILL KIT** Emergency Spill Kit

SECONDARY MUSTER POINT WILL BE DETERMINED BY THE RIG MANAGER, AS LEASE ACCESSES & SIZE VARIES. THIS WILL BE NOTED ON THE RIG UP CHECKLIST (SHOWN AS 'AP 2')



<p>APPROVED FOR AND BY: [Signature]</p> <p>DATE: 21/11/2017</p> <p>TIME: 12:00 PM</p> <p>BY: [Signature]</p>		<p>ISSUED BY: [Signature]</p> <p>DATE: 21/11/2017</p> <p>TIME: 12:00 PM</p>	<p>APPROVED BY: [Signature]</p> <p>DATE: 21/11/2017</p> <p>TIME: 12:00 PM</p>	<p>APP NOX. MASS: 0.00kg</p> <p>TITLE: Wild Desert Rig #18 layout</p> <p>NO: PT03928</p> <p>REV: A2</p> <p>REV: B0</p>
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Figure 7-1 Example spill kit locations at the wellsite during workovers

7.4.5 Spill Risk Assessment

The risks associated with spill scenarios are covered in the risk assessment component (Table 6-5). In summary the spill scenarios present the following risks and potential impacts:

- Contamination of groundwater – chemicals used during the works have the potential to leak or be spilled at surface and infiltrate to the ground, migrating to shallow or perched aquifers. This may affect groundwater quality.
- Contamination of surface water - chemicals used during the works have the potential to leak or be spilled at surface and migrate to surface water and affect surface water quality and ecological values of the habitat.
- Contamination of soil – chemicals used during the works have the potential to leak or be spilled at surface. Smaller spills and leaks are likely to be retained in the soil and not migrate to ground or surface waters.

7.4.6 Spill Monitoring

The monitoring requirements for this spill management plan are provided in Section 9.5.1. Where any spills / leaks are observed or potential integrity issues are identified, these are to reported as per regulatory requirements, and the necessary maintenance work and control measures performed as soon as practicable. As per Code clause C.6.1(a)vii, volumes of water or wastewater spilled will be recorded.

7.4.7 Spill Response Management

The following sections provide an overview of the response to spills that may occur during activities under this EMP. Where the spill is assessed as triggering the Emergency Response Plan the requirements of the Emergency Response Plan will prevail over the requirements contained in this Spill Management Plan

7.4.7.1 Spill Categories

CP uses a three-tiered spill category to determine whether a spill may trigger the Emergency Response Plan. Table 7-7 outlines the three spill categories.

Table 7-7 Spill categories

Category	Factors Assessed/Actions
Level 1	Spills that can be contained within the disturbance footprint and can be cleaned up by on-site personnel without involvement of external organisations. Most Level 1 spills are likely to be less than 200 L and would include diesel spills during fuel transfer, oil spillage during routine maintenance, chemical spills during mixing storage or small wastewater spills. Clean up time is generally less than 1 day. Emergency Response Plan not triggered.
Level 2	Spills that have not been completely contained within the site boundary and/or may require additional resources to clean-up and the spill has not entered a sensitive environmental or cultural feature (e.g. waterways, significant fauna habitat, sacred site etc). Emergency Response Plan not likely to be triggered.
Level 3	Spills that cannot be contained by the operator and requires substantial additional resources to manage the spill or the spill has entered a sensitive environmental or cultural feature (e.g. waterways, significant fauna habitat, sacred site etc). Clean up time is generally greater than a week. Emergency Response Plan to be triggered.

7.4.7.2 Rapid Spill Assessment

Where a spill occurs the On-Site Supervisor is to be notified and they will conduct a rapid spill assessment to determine whether the Emergency Response Plan is to be triggered or whether containment and clean up in accordance with Section 7.4.7.3 is to occur. The rapid spill assessment is to consider the following:

- Volume and location of the spill
- Spill containment and clean up required
- Spill category
- Safety hazards to personnel from the spill and during containment and clean up.

7.4.7.3 Spill Containment and Clean Up Process

The following process is to be utilised during containment and clean-up of a spill:

- Ensure personnel are removed from any harm / potential harm
- Alert others to the spill
- If safe to do so:
 - Remove any potential escalation factors (e.g. ignition sources etc)
 - Isolate the spill source
- Contain the spill using onsite containment resources (e.g. spill kit materials, stockpiles etc). SDSs for the spilled materials are to be reviewed to determine the appropriate containment approach
- Clean-up the spill using onsite clean-up equipment (e.g. spill kit materials etc) by:
 - Recovering free liquid
 - Removing contaminated material and storing in the waste storage area
- Where clean-up will take longer than one day, consider the use of fencing to prevent access by personnel, livestock, and terrestrial fauna
- Store used clean-up materials in the waste storage area

- Arrange for wastes to be disposed offsite in accordance with the Waste Management and Pollution Control Act 1998

7.4.7.4 Communications

Spills will be communicated to the following people / organisations:

- DENR / DIPR
- Leaseholders – within 24 hours of the Emergency Response Plan being triggered.

CP ensures the well site is clearly identified with the well name, well number, major hazards and contact name and contract details of the interest holder displayed at each well site. Where leaseholders observe spills / leaks occurring from unmanned sites they will be able to report these to CP based on the displayed information.

Any spills that occur outside of the permit area will be reported to the NT Pollution Hotline (1800 064 567) and in accordance with the *Waste Management and Pollution Control Act*. If a spill occurs inside the permit area and then travels outside of the permit area it will be reported to the NT Pollution Hotline in addition to the reporting requirements in Section 10.0.

7.5 Methane Emissions Management Plan

7.5.1 Purpose

The Methane Emissions Management Plan 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.

7.5.2 Equipment Selection and Activity Design

The uncontrolled emissions of natural gas during drilling and well testing activities represents a potential hazard to workers and the environment. All equipment will be selected to minimise the emissions during these activities. Wells and associated surface infrastructure shall be designed to mitigate leaks in accordance with the relevant standards. These Standards include:

- 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.
- Ongoing well maintenance as per the Well Operations Management Plan.

7.5.3 Leak Inspection Frequency

In accordance with the Code., all gas containing equipment will be inspected for leaks within 48 hours of recommissioning / commissioning. The procedure for the inspections includes a check sheet that lists the equipment at each well site to be inspected, including potential sources of emissions such as vent caps, valves and metering instruments.

Where a leak has been detected at a particular asset the frequency of inspections for the asset will be re-assessed and may be increased where a risk assessment determines an increased frequency is required.

Following the completion of the workover, regular visits will be made to inspect the operational well site and gathering system for leaks as follows:

- Well pad equipment: 6 monthly
- Low pressure pipelines and fittings: annually

These inspections will be undertaken when the wells are operational and therefore conducted under the Mereenie FEMP.

Leak detection is only undertaken by personnel who have been appropriately trained and are competency assured.

7.5.4 Leak Detection Instruments

Operators undertaking well site inspections carry personal gas detectors to detect leaks by identifying any ambient methane around the wellhead. Operators currently carry a 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)).

Gas detectors are calibrated, and bump tested in line with manufacturer's recommendations.

7.5.5 Leak Detection Procedure

Leak detection is undertaken in accordance with the USEPA Method 21. The following is a summary of the process CP undertakes for leak detection:

- Prior to commencing monitoring the gas detector is calibrated.
- The operator then undertakes the following monitoring at each of the wells sites (example hazardous zones on a workover rig shown in Figure 7-2) and along the gathering system (vents, drains, metering instruments, manifolds):
 - 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 (as per) 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
- If the leak is too large or not safe to be measured it will be assumed that the leak is above the reportable threshold level identified in Section D.5.5 of the Code.

7.5.6 Leak Remediation and Notification

When a leak is detected the source will be isolated immediately and rectified. Remediation of the leak (including timeframes) will be undertaken in accordance with section D5.6 of the Code.

The leak will also be recorded in CP's internal reporting system and reported to the Regulator as required in the EMP.

7.5.7 Venting and Flaring

During workovers, gas will be flared at the wellsite during the workover activities at a maximum rate of approximately 5 TJ per well per day over a period of three days. During workovers, gas will be flared at the wellsite during the workover activities at a maximum rate of approximately 5 TJ (~300 tons CO₂eq) per well per day over a period of three days.

In accordance with the Code, 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 wellhead equipment, safety systems and gathering line 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. This data is also used in calculation of emissions for the annual emissions reporting prepared under the requirements of the

National Greenhouse and Energy Reporting Scheme as per the National Greenhouse and Energy Reporting (Measurement) Determination 2008.

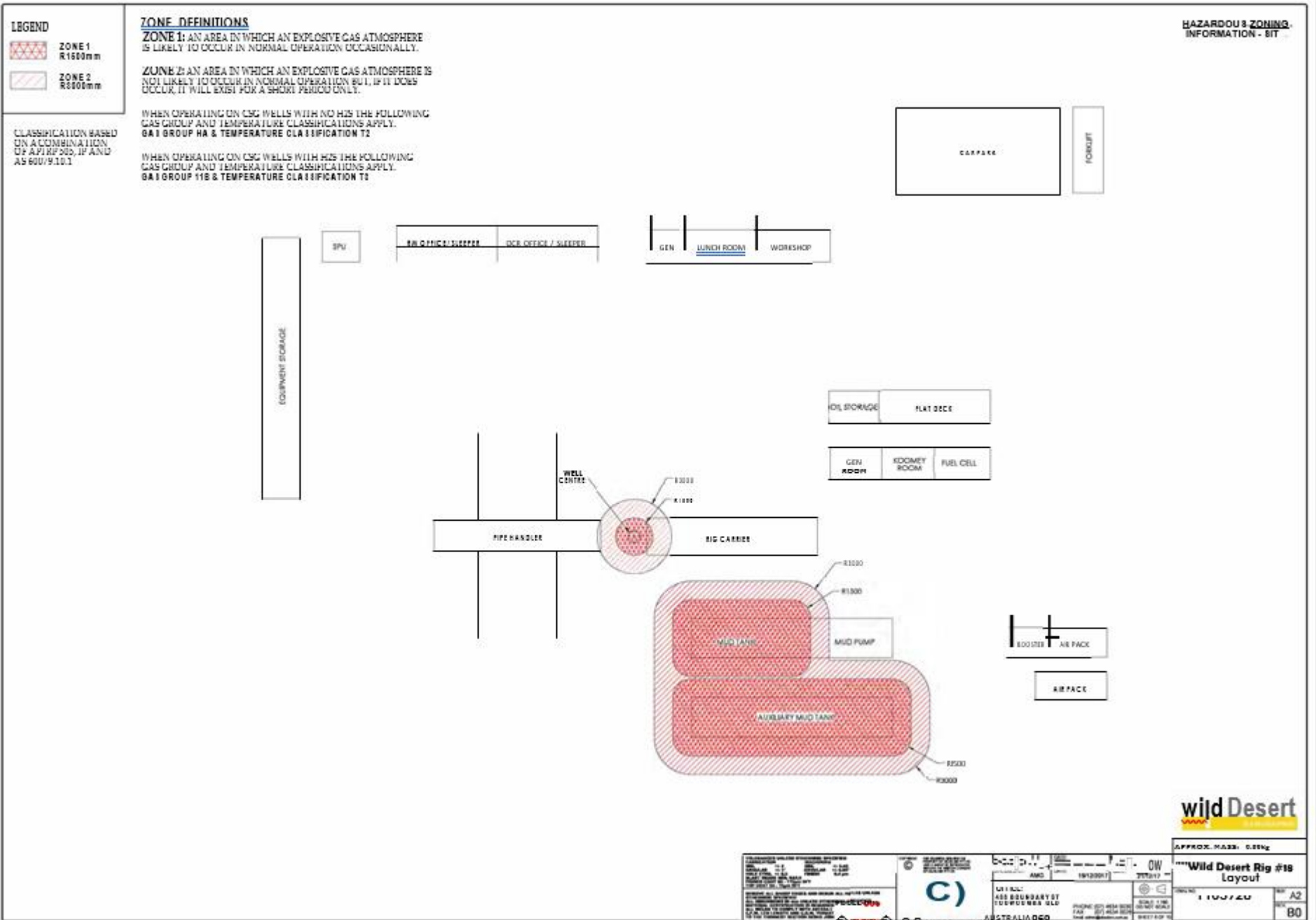


Figure 7-2 Hazardous zoning information for the workover rig

7.6 Erosion and Sediment Control Plan

7.6.1 Introduction

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 specific environmental outcomes and environmental performance standards included in the Implementation Strategy in the EMP.

This section provides the project specific ESCP and has been developed in accordance with the following documents:

- The Code
- Best Practice Erosion and Sediment Control (International Erosion Control Association, 2008)
- NT EPA Erosion and Sediment Control Plan Content (formally NRETAS, 2006)
- Land Clearing Guidelines (DENR, 2019)
- Erosion and Sediment Control Guidelines for Rural Development Environment Fact Sheet (Department of Land and Resource Management, 2018).

This Primary Erosion and Sediment Control Plan (ESCP) has been developed to prevent erosion and sedimentation impacts during the MRN workover and wellhead equipment, safety systems and gathering line activities. It is important to note that all leases are existing from previous drilling campaigns and the leases have been managed under the operations with no erosion and sediment issues. All the existing pads are stable landforms.

This ESCP summarises relevant information from the MRN FEMP and recommends additional controls to reduce impacts of erosion and sediment specific to the workovers activities, noting that there is no predicted impact from the wellhead equipment, safety systems and gathering line works above and beyond normal operations which is managed under the MRN FEMP. This ESCP includes:

7.6.2 Objective

The objective of this ESCP is to outline management measures to reduce impacts to land and water during soil disturbance activities undertaken as part of the workover works.

The objectives will be achieved by:

- Preventing erosion and sediment discharge
- Managing stormwater and protecting water quality downstream of the well site
- Providing adequate pollution and drainage control measures for potential disturbance areas

7.6.3 Disturbance Areas

The workover and wellhead equipment, safety systems and gathering line activities are to be undertaken with minimal to no soil disturbance:

- no stripping of vegetation
- no construction / maintenance of roads and river crossings
- no major earthworks or stockpiling of soil.

The landforms within the MRN are stable and there are currently no major erosion issues in the operational areas. Figure 7-3 shows the current state of the well lease pads at WM20, WM14, WM15, WM19 and EM39. The well lease pads areas are pre-disturbed, flat compacted areas and are examples of typical well pads in the MRN. Existing roads and well pads will be used by vehicles and machinery to access the site. For workovers, rig and associated infrastructure will be sited on the existing disturbance footprint.



Figure 7-3 Well lease pads at WM20, WM14, WM15, WM19 and EM39

The only earthworks to be conducted under this EMP will be for:

- the re-establishment of a flare pit (maximum dimensions 12m length x 10m width x 1.5m depth) adjacent to the wellsite (where historical flare pit has been previously backfilled and where the rig flare system cannot be used)
- the construction of a drain/trench to capture potential overflow from workover fluid tanks (300mm width x 300mm depth around the tank). The drain/trench will direct overflow water to the flare pit where it can be pumped out and returned to the evaporation pond or disposed of at a licenced

facility. The flare pit will remain a permanent feature while the workover fluid tank drain/trench will be backfilled and compacted to obtain a stable landform.

- rehabilitation (most likely removal by excavation) of any contaminated soil.

Excavated soil from flare pit and drain/trench will form an embankment around the flare pit for flame retardation.

No soil disturbance is planned for the wellhead equipment, safety systems and gathering line activities so there are not likely to be any erosion and sediment impacts above normal operations (managed under the MRN FEMP).

7.6.4 Climate

The MRN is in the monsoonal tropics of North Australia and experiences a hot wet season from November to March and a warm dry season May to September, with April and October being transitional months. As rainfall mainly occurs from November to March (Figure 7-4), this is the period where soil disturbance activities may have potential for erosion and sedimentation impacts.

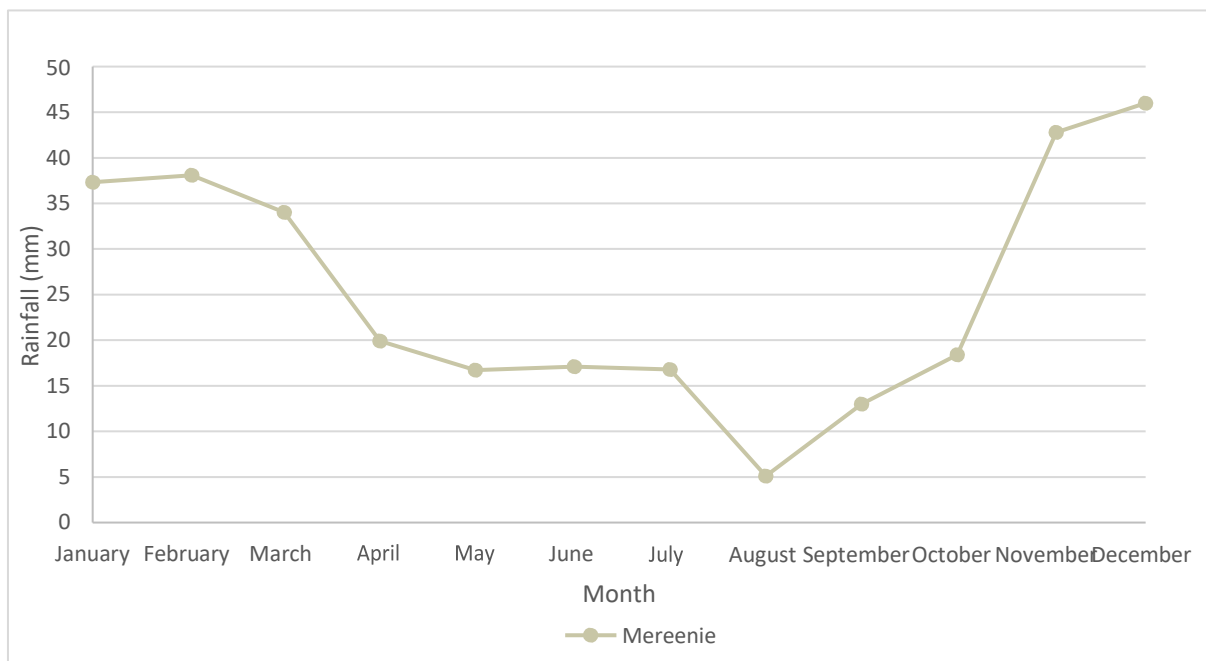


Figure 7-4 Average rainfall (mm) for the Mereenie field

7.6.5 Sources of Erosion and Sedimentation

The activities which may result in erosion and subsequent sedimentation during the workover and wellhead equipment, safety systems and gathering line works include:

- Earthworks to re-establish flare pit
- Earthworks to construct workover fluid tank trench/drain
- Earthworks to remediate a contaminated area
- Vehicle and machinery movements

This ESCP targets the above activities areas to control erosion and sedimentation impacts.

7.6.6 Erosion Risk Assessment

Table 5-3 describes the erosion hazard, according to the three land systems within the MRN, as being low to moderate.

Erosion risk has been calculated according to ICEA guidelines, considering rainfall, erosivity of the soil and likely soil loss volume. The annual estimated soil loss for the MRN sites is considered Very Low

(27.1-32.3 t/ha/yr), while the average monthly rainfall erosion risk ranges from Very Low (between April and October) to Low (November, January to March) and Moderate in December (the highest rainfall month). Similarly, monthly rainfall erosivity (R factor) ranges from 190-360, increasing over the wet summer months.

Rainfall erosivity risk is only present if a rainfall event occurs during the earthworks and before stabilisation controls are implemented.

7.6.7 Erosion and Sediment Control

7.6.7.1 General Measures

The site has been assessed as Very Low to Moderate risk of erosion. All measures proposed in the following section should be assessed for suitability given the site features and availability of supplies. Generally, other devices from the same device type (as defined by IECA) can be employed if required. The ESC measures will be designed to minimise the potential impact on downstream water quality. Wind and water erosion of disturbance areas cannot be eliminated completely however, measures may be taken as appropriate to minimise the impact by:

- Undertake disturbance works, as much as is practically possible, during the dry season (May to November) and during periods when good weather is forecast
- Appropriate storage of soil stockpiles in areas away from roadways and other drainage lines. Suitable sediment control measures will be installed downslope of soil stockpiles and upslope clean water runoff diverted (where possible)
- Containment of all contaminated water on-site prior to treatment or disposal in a suitable manner
- Minimising soil erosion (i.e. drainage and erosion control measures) at the source, rather than trapping resultant sediment
- Ensuring sediment-laden runoff is treated via designated sediment control devices
- Clearly identifying/communicating no-go areas to maintain disturbance areas and traffic movement to the designated areas
- Effective dust suppression measures
- Any liquid wastes, fuels and oils stored on-site will be sufficiently bunded to contain any potential spills. Accidental spillage or poor management of fuels, oils, lubricants, hydraulic fluids, solvents and other chemicals will be controlled through spill management actions (including the availability of spill kits) and no further mitigation measures are considered necessary. Captured liquid wastes, fuels and oils should be pumped out and disposed of at an appropriately licenced facility
- Implementing an effective monitoring and maintenance program for the site

Section 4.3 of IECA provides further guidance on design requirements. These measures will need to be employed as per the plan, with regular inspections and maintenance (as required). If the measures are not effective in reducing capturing sediment, further controls may be necessary, and should be implemented as per the IECA guideline

7.6.7.2 Specific Measures

The workovers and wellhead equipment, safety systems and gathering line activities are to be conducted on the pre-existing, stable well lease pad and roads. Erosion and sediment controls (such as sediment fences, berms) are to be focused on the workover fluid tank drain/trench and any constructed flare pits. Devices should aim to divert water away from the structures, ensure structure batters are stable, and slow the flow of any diverted runoff. Erosion and sedimentation outside of these areas because of the activities is unlikely given the stable nature of the landform.

In the event erosion is seen at the site, additional ESC measures may need to be employed. The following section provides guidance on the controls that may be used to minimize erosion and sedimentation from sheet and concentration flow. Guidance is also provided for check dam and sediment fence installation.

The default classification of sediment control techniques are outlined in Table 7-8 for sheet and concentrated flow treatment techniques. IECA recommends either Type 1, 2 or 3 devices to be employed depending on the annual soil loss estimates and erosion risk assessments. Type 3 devices are recommended which include, rock check dams, sediment fence (or the alike) and U-shaped sediment control structures.

Table 7-8 Erosion and sediment control measures (IECA, 2008)

Type 3	
Sheet Flow Techniques	
Buffer Zone	Filter fence
Excavated drop inlet protection	Modular sediment trap
Fabric drop inlet protection	Straw bale barrier
Fabric Wrap Field Inlet sediment trap	Sediment fence
Concentrated Flow Treatment Techniques	
Coarse Sediment Trap	U-Shaped Sediment Trap
Modular Sediment Trap	

Check Dams

Check dams are used in channels to trap sediment and reduce the potential for scouring to occur. They can be made from different materials including rock, sandbags, coir logs, and hay bales. Check dams are typically installed at regular intervals which are typically closer together on steeper slopes.

It is important that check dams are installed such that flows cannot pass around the sides and that they overflow over the check dams themselves. The use of sandbags and hay bales are limited to temporary erosion and sediment control in channels during construction, as these devices tend to deteriorate over time. Where sandbags are used, it is important not to overfill them as this can cause gaps when the sandbags are wedged together. Three quarters to two thirds full is generally the right amount of material within each sandbag.

Sediment Fences

Sediment fences act as minor sediment dams. They temporarily detain runoff, trapping sediment and allowing filtered water to pass. Sediment fences should be constructed around the base of any small areas of exposed land that are not subject to concentrated overland flows and that are not adequately protected by existing structures. Sediment fencing should be installed around the extent of the disturbance area where sediment-laden water could potentially enter clean downstream receiving waters. They are placed on the contour or slightly convex to the contour and each end of the fence should be turned to create a stilling pond up slope of the fence. Sediment fences require regular maintenance. Trapped sediments should be removed, pickets straightened, filter cloth re-secured and tightened as required.

7.6.8 Monitoring

Erosion and sediment control devices will be inspected as per Section 9.5.1 of this EMP. Notifications of non-conformance will be managed as per Section 9.5.4 of this EMP. Notifications of non-compliance will specify the type of non-conformance, corrective actions needed and a time schedule for achieving conformance.

7.6.9 Maintenance

All erosion and sediment control measures are to be maintained in a functioning condition by the workover and wellhead equipment, safety systems and gathering line team. Upon demobilisation from the wellsite, the wells will be handed back to operations and the erosion and sediment control devices will be managed by CP under the MRN FEMP.

Where controls are observed to not be functioning correctly, the controls are restored to meet the required standard. Where significant erosion is observed to be occurring on a regular basis, additional controls are to be implemented.

7.6.10 Emergency Procedures and Incident Reporting

Environmental incidents and emergencies relating to erosion and sediment control failures will be managed as per Section 9.6 of this EMP.

7.7 Rehabilitation Management Plan

7.7.1 Scope

The rehabilitation management plan applies to the following aspects of the MRN workover and wellhead equipment, safety systems and gathering line works only:

- trench/drain constructed around workover fluid tanks
- any contamination or damage to soil or infrastructure.

As per Section 4.5, final rehabilitation of the MRN wells and infrastructure including the installed wellhead equipment, safety systems and gathering line and flare pits is to be managed under the MRN FEMP.

7.7.2 Objectives

- Ensure disturbed / damaged land is re-established to its pre-disturbed condition
- No residual contamination

7.7.3 Environmental Actions and Monitoring

Table 7-9 details the actions required to meet the environmental requirements for rehabilitation and monitoring to determine that the objectives have been achieved.

Table 7-9 Environmental actions and monitoring

Activity	Factors Assessed/Actions	Timing
Soil Stability	<ul style="list-style-type: none"> ▪ Implement the Erosion and Sediment Control Plan (Section 7.6 of this EMP) ▪ Remove any flow concentration points that may block overland sheet flow ▪ Erosion and sedimentation devices maintained and installed as appropriate to best practise guidelines by the DENR and IECA 	As soon as practicable once issue identified but no longer than 12 months after the activities have been completed at the site
Contaminated soil	<ul style="list-style-type: none"> ▪ Undertake remediation of contaminated soil as per NEPM 2013 guidelines, spill management plan and/or emergency response plan 	As soon as practical after land contamination has been identified during investigation of spills / leaks
Monitoring	<p>Establish photographic monitoring points prior to commencing rehabilitation activities so to benchmark against in later surveys.</p> <p>The following monitoring program is proposed:</p> <ul style="list-style-type: none"> ▪ Immediately after rehabilitation works completed and at completion of the works: Check for integrity of works and ability for future rehabilitation success ▪ Future monitoring: conducted annually under the MRN FEMP <p>Photographic monitoring to be conducted at each monitoring event listed above to compare progress.</p>	As prescribed

7.7.4 Rehabilitation Success

Rehabilitation under this EMP will be considered a success when:

- Contaminated soil is remediated or removed from site
- Soil suitability and stability is equivalent to the surrounding soil units

Upon completion of any rehabilitation during the workover and wellhead equipment, safety systems and gathering line works, the site will be handed back to operations to maintain and monitor under

the MRN FEMP until final rehabilitation of the MRN which will be conducted under the MRN FEMP and will have additional criteria for rehabilitation success.

7.7.5 Rehabilitation Reporting

Rehabilitation conducted as a result of the MRN workover and wellhead equipment, safety systems and gathering line works will be included in the Annual Environmental Report submitted DENR as per Section 10.2.1.

7.8 Wet Season Management Plan

7.8.1 Scope

The EMP activities will be conducted during the wet season. This plan has been developed to address the additional potential impacts, risks and management controls that may be required to ensure environmental protection during wet season activities. The objective of this plan are to:

- Ensure that all activities can be undertaken safely and with minimal risk to the environment during the wet season
- Have the ability to transport critical items if necessary, during the wet season

7.8.2 Wet Season

Please refer to Section 7.6.4 for climate information. Wet season at the MRN typically occurs between November and March.

7.8.3 Wet Season Monitoring

During activities in the wet season CP will undertake the monitoring as per Section 9.5.1, which will provide the necessary information to communicate to staff and contractors when to be wet-weather prepared and inform the necessary actions to be undertaken.

7.8.4 Wet Season Management

Where wet season activities are undertaken the following risk controls will be implemented:

- Sufficient chemicals, fuels, equipment, tanks and materials required for ongoing operations will be stored onsite prior to the onset of the wet season. This includes 10 days allowance of required fuel.
- Activities are shut down during significant wet weather or flooding and only restarted once potential for extensive damage has passed.
- Following shut down due to flooding or inundation the risk assessment will be revisited to ensure controls are still appropriate to manage risk to ALARP.
- All civil equipment required to respond to emergency situations will be onsite; this include earth moving equipment and cementing equipment etc.
- All chemicals storage areas will be bunded, with covers used to prevent rain ingress and bund overflows where possible.
- Wastewater tanks will have enough freeboard to manage an entire 1:1000 ARI wet season event.
- Helicopters will be used to transport people and supplies in and out of site when access is restricted.
- Where transportation of chemicals is necessary during the wet season, the logistics of the delivery of chemicals will be undertaken in consideration of the monitoring information. Chemicals will not be unloaded during rain events.
- Driving on access tracks will be avoided for 24 hours following significant rainfall events (i.e. >10mm in 24 hours)
- After a rain event any unsealed roads will be inspected to ensure they are safe for the transportation of chemicals and materials.
- Earthworks during the wet season will be minimised as much as possible.

- Erosion & Sediment Controls will be examined after each rain event and repairs undertaken if required.
- Overland flow will be diverted around lease pads.

8.0 Environmental Management

The approach taken in this EMP is based on Ecologically Sustainable Development (ESD) principles. It aims to provide measurable procedures and practises, to reduce the identified environmental risks to ALARP. This will ensure that the MRN workover and wellhead equipment, safety systems and gathering line activities will have as minimal negative environmental impact as possible.

There will be continual stakeholder engagement and consultation throughout the activities and implementation of the EMP to prevent and mitigate the identified risks and any new risks. Feedback from affected stakeholders will be used to update and enhance the risk assessment and management process.

8.1 Ecological 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 CP is to utilise the natural environment to meet the current needs of CP 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 area 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 MRN workover and wellhead equipment, safety systems and gathering line activities are minimised.

8.2 Environmental Outcomes and Performance Standards

Based on the result of the risk assessment, CP has categorised the environmental outcomes, performance standards and measurement criteria into the following broad categories:

- Biodiversity Management
- Land Management
- Water Management
- Air Quality Management
- Fire Management
- Heritage Management
- Community Management

The environmental outcomes, performance standards and measurement criteria for these categories are described in Table 8-1 to Table 8-10.

8.2.1 Biodiversity Management

Table 8-1 outlines the environmental outcomes, performance standards and measurement criteria that CP commit to under this EMP for biodiversity management.

Table 8-1 Biodiversity environmental outcomes, performance standards and measurement criteria

Environmental Outcome	Environmental Performance Standard	Measurement Criteria
AllICP’s activities minimise impacts on conservation significant fauna and flora	Driving will only to occur on designated roads, access tracks and well pads. Vehicle speed will be limited on access tracks within the MRN to 70km/hr	No incidents of driving off designated roads, access tracks and well pads No incidents involving vehicle related fauna strikes with speeds above 70 km/hr
	All personnel attending the MRN for the workover and wellhead equipment, safety systems and gathering line works will be inducted on speed limits and times to avoid driving	Induction material shown to include information on speed limits and times to avoid driving Training records to confirm inductions were undertaken for all personnel who attended the MRN workover and wellhead equipment, safety systems and gathering line works.
	All vehicles, equipment and machinery from known weed infested areas will be cleaned and inspected for weeds prior to attending the MRN for the workover and wellhead equipment, safety systems and gathering line works	Weed free certifications were maintained for each vehicle, equipment, and machinery from known weed infested areas available
	Weeds identified on the environmental sensitivity maps as occurring on the well lease will be site-verified and managed prior to rig mobilisation	Records of weed management (treatment/removal)
	Weed Management Plan will be implemented including the use of the dedicated Weeds Officer to assist in weed identification, management and control	Weed Management Plan audit to confirm it is being implemented as designed
	All personnel attending the MRN for the workover and wellhead equipment, safety systems and gathering line works will be inducted on the weed management requirements as per this EMP	Induction material shown to include information on weed management Training records to confirm inductions were undertaken for all personnel who attended the MRN workover and wellhead equipment, safety systems and gathering line works

Environmental Outcome	Environmental Performance Standard	Measurement Criteria
	The well and flare pits will fenced for the duration of the activities	No record of conservation significant fauna deaths in the flare pit
	Waste containers will be fauna and vermin proof	Photographic evidence of waste containers No recorded incidents of fauna / vermin in waste containers
	Wastes will be removed from site by an approved person and disposed at an approved facility	Records of waste transport and disposal

8.2.2 Land Management

Table 8-2 outlines the environmental outcomes, performance standards and measurement criteria that CP commit to under this EMP for land management.

Table 8-2 Land management environmental outcomes, performance standards and measurement criteria

Environmental Outcome	Environmental Performance Standard	Measurement Criteria
CP's activities: <ul style="list-style-type: none"> ▪ Avoid, minimise and control soil erosion / sedimentation ▪ Maintain the viability of soil through preventing contamination 	Erosion and Sediment Control Plan will be implemented	Photographic evidence of control devices installed Evidence of inspections as per inspection schedule within the Erosion and Sediment Control Plan
	Spill Management Plan will be implemented	No incidents against the Spill Management Plan
	Rehabilitation Management Plan implemented	Annual audit shows Rehabilitation Management Plan implemented
	Wet Season Management Plan will be implemented	No incidents recorded against the Wet Season Management Plan
	Driving on access tracks will be avoided for 24 hours following significant rainfall events (i.e. >10mm in 24 hours)	No recorded incidents of driving on access tracks within 24 hours of significant rainfall event
	Site inspections will be undertaken daily and within 5 business days of a significant rainfall event to assess and address erosion / sedimentation issues	Site inspections undertaken as required with records maintained

Environmental Outcome	Environmental Performance Standard	Measurement Criteria
	Job Hazard Analysis will be conducted for any new task or new use of equipment to ensure appropriate control measures are identified	Job hazard analysis undertaken as required and records maintained
	Driving will only occur on designated roads, access tracks and well pads.	No recorded incidents of driving outside designated infrastructure areas
	Portable spill containment equipment (e.g. spill trays) will be available at each of the well sites	Pre-spud assessment prior to commencement and monthly audits to confirm portable spill containment equipment is available (drip trays checked daily) No recorded incidents
	Minimal volumes of fuels, oils and other chemicals will be stored at the wellsite	Weekly checks to confirm quantities stored at sites
	Daily inspections to be undertaken of wellsite and equipment for leaks/spills. Where leaks and spills are identified, corrective actions are raised, and repairs are undertaken in a timeframe commensurate with the risk of environmental harm escalating if not repaired	Hourly inspections undertaken for workover fluid tanks within notification records in the event of a leak / integrity issue Records of any corrective action undertaken
	Implement fuel and chemical handling and storage procedure	No recorded incidents Records of pre-spud assessment prior to commencement Monthly audits to confirm the procedure is being followed
	Risk assessment of road conditions for heavy vehicle transport will be conducted prior to mobilisation on unsealed roads using detailed weather forecasting	Risk assessment undertaken and records maintained
	Provide spill response kits appropriate for the types of spills possible at each wellsite	No recorded incidents Monthly audits were undertaken to confirm spill kits were available
	Follow the appropriate Australian Standards and Code for the fuel / chemical being stored and used	No recorded incidents Monthly audits were undertaken to confirm relevant Australian Standards and Codes of Practice were being followed
	On-site SDS and handling procedures for fuel / chemicals will be available at the fuel /chemical storage area	Monthly audit shows SDS and handling procedures available

Environmental Outcome	Environmental Performance Standard	Measurement Criteria
	Liquid wastes stored in secured containers, with waste storage area bunded	During activities monthly inspections undertaken and records maintained
	All personnel attending the MRN for the workover and wellhead equipment, safety systems and gathering line works will be inducted on speed limits, times to avoid driving, correct waste storage, segregation and disposal	Induction materials include information on speed limits, times to avoid driving, waste storage, segregation and disposal. Training records confirm inductions were undertaken for all personnel who attended the MRN workover and wellhead equipment, safety systems and gathering line works.
	Removal of listed wastes for off-site disposal will be via an NT EPA approved contractor	MRN waste management register records all workover waste removed for off-site by NT EPA approved contractor.

8.2.3 Water Management

Table 8-3 outlines the environmental outcomes, performance standards and measurement criteria that CP commit to under this EMP for water (surface and ground).

Table 8-3 Water environmental outcomes, performance standards and measurement criteria

Environmental Outcome	Environmental Performance Standard	Measurement Criteria
CP's activities avoid impacts to surface water and groundwater	Erosion and Sediment Control Plan will be implemented	Photographic evidence of control devices installed Inspections conducted as per Inspection Schedule within the Erosion and Sediment Control Plan
	Site inspections will be undertaken within 5 business days of a significant rainfall event to assess erosion / sedimentation issues	Inspections undertaken as required and records maintained
	Wastewater Management Plan will be implemented	No recorded incidents against the Wastewater Management Plan
	Spill Management Plan will be implemented	No recorded incidents against the Spill Management Plan
	Wet Season Management Plan will be implemented	No incidents recorded against the Wet Season Management Plan

Environmental Outcome	Environmental Performance Standard	Measurement Criteria
	Job Hazard Analysis will be conducted for any new task or new use of equipment to ensure appropriate control measures are identified	Job hazard analysis undertaken as required and records maintained
	Bunding will be provided to the chemical storage area, portable storage area and diesel tank in accordance with the secondary containment requirements of the Code	Monthly inspections shows bunding complies with the Code
	Inspections will be undertaken of wellhead and equipment for leaks/spills. Where leaks and spills are identified, corrective actions are raised, and repairs are undertaken in a timeframe commensurate with the risk of environmental harm escalating if not repaired	Weekly inspections undertaken and records maintained Daily inspection undertaken and records maintained with hourly record for workover tank inspection All corrective actions were recorded and maintained
	Waste storage area will be banded and liquid wastes will be stored in secured containers	Weekly inspections undertaken and records maintained
	Waste storage are will not be located in a flood prone area	Monthly audit confirms location is outside flood prone area
	Spill response kits will be provided at each wellsite appropriate for the types of spills	No recorded incidents Monthly audit confirms spill kits available
	Minimal volumes of fuels, oils and other chemicals will be stored on the job site	Weekly inspection to confirm quantities stored at sites
	Workover activities conducted in accordance with Code compliant and accepted WIMP and WOMP	Annual audit confirms WIMP and WOMP were followed
	No overtopping of the onsite tanks	No recorded incidents of tanks overtopping
	Groundwater extraction licence will be in place prior to groundwater extraction for workover activities	Record of approved groundwater extraction licence
	Groundwater monitoring program will be implemented	Records confirm groundwater monitoring program implemented

Environmental Outcome	Environmental Performance Standard	Measurement Criteria
	Groundwater monitoring program results show no significant impact to groundwater resources from workover activities	Groundwater monitoring confirms no significant impact to groundwater resources from workover activities

8.2.4 Air Quality Management

Table 8-4 outlines the environmental outcomes, performance standards and measurement criteria that CP commit to under this EMP for air.

Table 8-4 Air environmental outcomes, performance standards and measurement criteria

Environmental Outcome	Environmental Performance Standard	Measurement Criteria
CP's activities do not create a measurable decrease in air quality at sensitive receptors through: <ul style="list-style-type: none"> ▪ Dust generation ▪ Emissions (gas leaks) ▪ Combustion 	All diesel used on site will be compliant with the Federal Government's Fuel Quality Standards (Automotive Diesel) Determination 2019	Records show diesel supply from an authorised supplier
	Dust control measures, including the use of water trucks, will be where there is evidence of unacceptable dust generation and/or a dust complaint related to the EMP activities	Weekly inspection assesses presence of dust Records show controls implemented where unacceptable dust generation has been detected and/or a dust related complaint has been received
	Vegetation in no-use area will be left undisturbed	No recorded incidents
	Speed limited on access tracks to 60km/hr	No recorded incidents
	Use of non-intrinsically safe material will only allowed inside the facilities if accompanied by a gas detector and the appropriate permit	No recorded incidents
	Well to be managed in accordance with Code compliant and accepted Well Integrity Management Plan and Well Operation Management Plan	Monthly audit confirms wells management in accordance with accepted Well Integrity Management Plan and Well Integrity Operations Plan
	Implement Methane Emissions Management Plan	No incidents against Methane Emissions Management Plan

Environmental Outcome	Environmental Performance Standard	Measurement Criteria
	Weekly inspections to be undertaken of wellhead and equipment for leaks/spills. Where leaks and spills are identified, corrective actions are raised, and repairs are undertaken in a timeframe commensurate with the risk of environmental harm escalating if not repaired	No recorded incidents Annual audit results confirm appropriate measures are in place

8.2.5 Fire Management

Table 8-5 outlines the environmental outcomes, performance standards and measurement criteria that CP commit to under this EMP for fire management.

Table 8-5 Fire environmental outcomes, performance standards and measurement criteria

Environmental Outcome	Environmental Performance Standard	Measurement Criteria
CP's activities are not the cause of fires in the region	Only diesel is the only fuel to be used on site	Monthly audit results confirm only diesel is stored onsite
	Methane Emissions Management Plan will be implemented	No incidents against Methane Emissions Management Plan
	Bushfire Management Plan will be implemented	No bushfire incidents from CP activities Monthly audit to confirm controls are in place
	Smoking is only permitted in designated smoking areas	Designated smoking areas documented and were available No recorded incidents of smoking outside designated smoking areas
	Job Hazard Analysis will be conducted 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	Job hazard analysis undertaken as required and records maintained
	When attending site, a daily toolbox meeting will be conducted with on-site personnel regarding current fire danger, presence of fire in the area and current vegetation condition	Toolbox meetings notes included temperature and current fire danger information
	Inductions will include information on the designated smoking areas, fire extinguisher locations and emergency response plan	Induction material includes information on emergency response plan, designated smoking areas fire extinguisher locations

Environmental Outcome	Environmental Performance Standard	Measurement Criteria
		Training records to confirm inductions were undertaken for all personnel who attended the MRN workover and wellhead equipment, safety systems and gathering line works.
	Fire extinguishers will be available in any vehicle which visits the MRN for the workover and wellhead equipment, safety systems and gathering line works	No recorded incidents of vehicles not having fire extinguishers whilst at MRN Annual audit confirms vehicles onsite are fitted with fire extinguishers
	Hazardous zones for each well will be determined in accordance with the relevant Australian Standard	Annual audit confirms hazardous zones are in accordance with the relevant Australian Standard
	Fire breaks will be installed and maintained	Monthly inspections undertaken of fire breaks and records maintained
	Only equipment authorised within the hazardous zone will be used whilst on site	No recorded incidents

8.2.6 Community Management

Table 8-6 outlines the environmental outcomes, performance standards and measurement criteria that CP commit to under this EMP for community management.

Table 8-6 Community environmental outcomes, performance standards and measurement criteria

Environmental Outcome	Environmental Performance Standard	Measurement Criteria
CP's activities minimise the following: <ul style="list-style-type: none"> ▪ Reduction in capacity of road infrastructure up to and within the MRN ▪ Maintain and enhance community relationships ▪ Safety risks to the community 	All activities will stay within the approved area	No incidents for work being conducted outside of operational areas
	All personnel and site visitors will have appropriate CLC approval and complete the appropriate inductions	Records available
	A full stakeholder consultation log will be maintained by CP	Stakeholder consultation logs developed and records maintained
	Early and ongoing Community consultation and engagement approach will be maintained prior to and throughout the regulated activities	On-going Community consultation and engagement was undertaken

Environmental Outcome	Environmental Performance Standard	Measurement Criteria
	Local communities and stakeholders will be advised of CP contact number through multiple channels	CP contact information was available were provided to Local communities and stakeholders
	Where possible, local and/or Indigenous people will be employed	Identify and record any local and/or Indigenous people employed
	Stakeholders will be consulted as per CP's agreement with the CLC	Stakeholder consultation and engagement was undertaken
	Approved Traffic Management Plan will be in place	No recorded incidents
	Transportation of over-width or over-dimension loads will be approved under a DIPL permit	No recorded incidents Identify if any over-width or over-dimension loads were undertaken and verify permits were used and records maintained
	No unauthorised third-party access to infrastructure	No recorded incidents
	Routine alcohol and/or drugs testing will be conducted for anyone attending the sites	No recorded breaches of CP Policy Testing was undertaken and records maintained
	Personnel will be appropriately licensed to perform works	Only appropriately licensed people / companies to performed works
	Journey management plans will be implemented	Journey management plans developed and records maintained
	Heavy vehicle loads will avoid regional centres	No recorded complaints from regional centres about heavy vehicle movement in area
	Vehicle speeds will be reduced if activities are causing significant dust on NT controlled roads	No recorded complaints about dust on NT controlled roads
	Wet Season Management Plan will be implemented	No incidents recorded against the Wet Season Management Plan

9.0 Environmental Management System Implementation

9.1 Health, Safety and Environment Integrated Management System

The feasibility, planning and assessment of the gas field development are undertaken within the framework of CP’s Health, Safety and Environment Integrated Management System (HS&E MS), which incorporates environmental management. The key elements of the system include:

- Matching of legal obligations to the practical needs of all operations
- Assignment of responsibilities required to meet the commitments set out in the CP Health, Safety and Environment Policy
- Common measurement process to check that standards are complied with
- Encouragement of improvement in process and performance through feedback processes
- Appropriate and comprehensive documentary support
- Application of the system to all levels and areas of the organisation (including work by contractors), and to all working conditions and any activities that may have the potential to affect the health and safety of people or harm the environment.

The system has been constructed in a hierarchical manner, with the following tiers of documents shown in Figure 9-1.

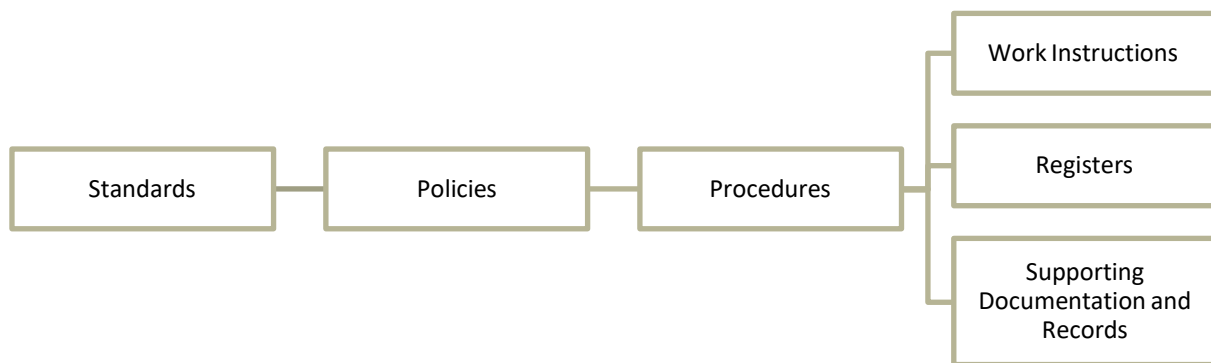


Figure 9-1 Document hierarchy

To provide for a comprehensive HS&E MS, the Standards outlined in Table 9-1 have been developed.

Table 9-1 HS&E MS structure

Standard	Management Element
Standard 1	Environment, Health and Safety Policies
Standard 2	Legal and Other Obligations
Standard 3	Objectives and Targets
Standard 4	Improvement Plans
Standard 5	Responsibility and Accountability
Standard 6	Training and Competency
Standard 7	Consultation and Communication
Standard 8	Document and Record Management
Standard 9	Hazard Identification, Risk Assessment and Control
Standard 10	Contractor and Supplier Management

Standard	Management Element
Standard 11	Operations Integrity
Standard 12	Management of Change
Standard 13	Emergency Preparedness
Standard 14	Monitoring, Measurement and Reporting
Standard 15	Incident Investigation
Standard 16	Management System Audit and Assessment
Standard 17	Management Review

9.2 Integrity Management

Asset integrity management is a key focus to ensuring the activities conducted under this EMP are done so in an effective and safe manner and is the basis for Standard 11 under the HS&E MS. The asset integrity system under Standard 11 are depicted in Figure 9-2. The asset integrity system is under continual review with elements updated as required.

CP’s approach to well integrity is consistent with section B4.1 of the Code.

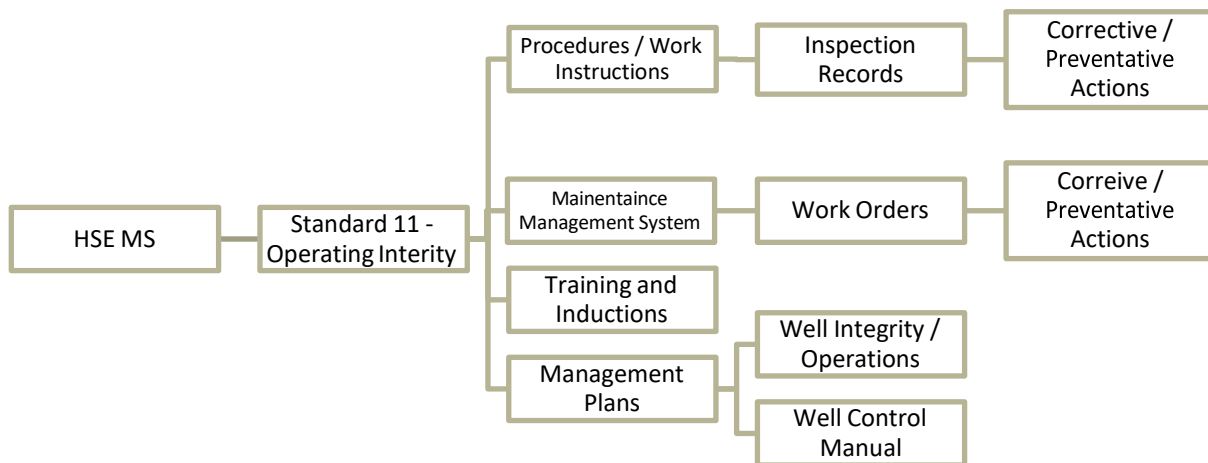


Figure 9-2 CP’s asset integrity system

International Standards Organisation (ISO) 16530-1:2017 Petroleum and natural gas industries – Well integrity – Part 1: Life cycle governance outlines methods to effectively manage well integrity through each phase of a well’s life cycle. Among other phases, the life cycle governance defines the minimum requirements or recommendations for assessing well barriers prior to and after any well intervention/recompletions that involves breaking the established well barrier containment system.

CP’s asset integrity system is consistent with ISO 16530-1:2017 and deals with the entire lifecycle of an asset, including workovers, as well as procurement requirements relating to process containment, ignition control systems for protection, detection, shutdown and emergency response.

9.2.1 Procedures / Work Instructions

Procedures, work instructions and management plans have been developed to ensure a consistent approach is undertaken by CP personnel when assessing asset integrity.

Under the NT Schedule of Onshore Petroleum Exploration and Production Requirement Clause 301, “a well workover which is classified as a regulated activity shall not be commenced without an accepted Well Operations Management Plan (WOMP or plan) in force”. CP is currently working on the

WOMP(s) for the workover wells and anticipate having them submitted for approval over the next three months from date of submission of this EMP. There will be an accepted WOMP in place before any workover activity takes place.

The accepted WOMPs and WIMPs form part of CP’s Well Integrity Management System. In addition, there will be numerous other procedures / work instructions implemented during the recompletions and wellhead equipment, safety systems and gathering line works, including and relating to:

- Chemical management procedure (MSTD11-PC002)
- Emergency response plan (MSTD13-MER-PL001) (and rig contractor emergency response plan)
- Spill response procedure (MSTD13-PL002)
- Incident reporting and investigation procedure (MSTD15-PC005)
- Reporting and management procedure (MSTD15-PC005)
- NORMs (Radiation) management plan (MSTD09-PL025)
- Fuel and chemical storage and handling measures
- Inspection and maintenance of shut of valves
- Testing and maintaining function of vehicles, plant and equipment
- Fauna management measures as identified as necessary in planning
- Methane emission monitoring
- Reviews and audits of the well integrity management system
- Pressure inspections and monitoring

Where a test or inspection is performed on an asset it is recorded on a proforma / checklist and retained in CP’s document management system for future reference. Any actions arising from inspections are entered into the Register and Closeout of Correcting Actions (RCCA).

The above procedures and work instructions are consistent with the requirements of the Code and this EMP.

9.3 Roles and Responsibilities

Figure 9-3 shows an overview of the organisational roles that are applicable to this EMP. The responsibilities of these roles are then described in the following sections.

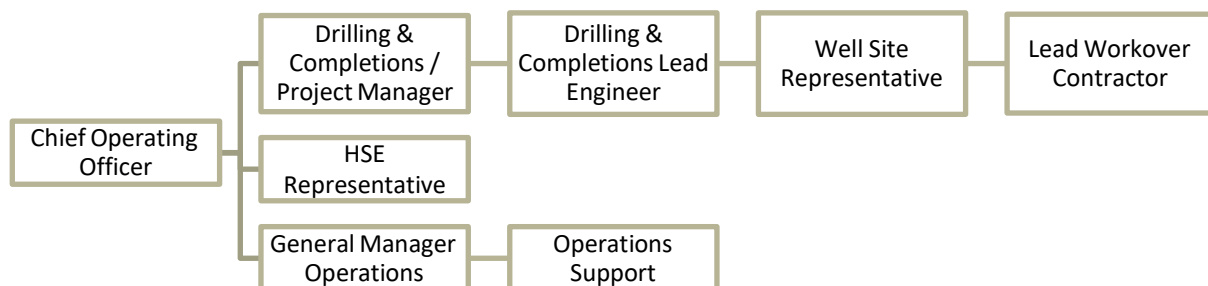


Figure 9-3 Workover EMP roles

9.3.1 Chief Operating Officer

The Chief Operating Officer is responsible for the overall operation of CP’s activities in the NT. Under this EMP it is the responsibility of the Chief Operating Officer to ensure that:

- The EMP is implemented
- Personnel are appointed to investigate the merit of stakeholder objections / claims
- Environmental incidents are reported to the CP management team and where required to the regulator
- Appropriate communications are in place between CP, the landholder and other stakeholders to keep them informed of project issues and developments that may affect their activities.

- Notifications as required under the EMP are provided to the Minister, occupier and owner of land on which activities are to be carried out
- Reporting as required under the EMP is provided to the Minister and regulators

9.3.2 Drilling and Completions Manager / Project Manager

Under this EMP it is the responsibility of the Drilling and Completions Manager / Project Manager to ensure that:

- Reviews of the EMP are undertaken as per the review schedule in the EMP
- Activities under the EMP conform with the CP HSS&E MS
- All permits and approvals to conduct activities under the EMP are obtained and complied with
- Internal and external compliance audits are conducted
- Environment Incidents are reported to the Chief Operating Officer

9.3.3 Drilling and Completions Lead Engineer

Assists the Drilling and Completions Manager / Project Manager and the Chief Operating officer in all aspects of program development, HSE implementation and detailed programming. They are responsible on a day to day basis to ensure that the workover activities are executed in accordance with the works program, EMP and CP's HSS&E policies.

9.3.4 Onsite Company Representative

The Well Site Representative is the person based at each workover site who is responsible to ensure the following occurs:

- Activities are performed in accordance with the EMP, accepted WOMP and WIMP and CP's HSS&E policies
- Act as the onsite Weeds Officer
- Induct all personnel who attend the workover site
- Communicate the content of the EMP to all personnel who attend the workover site
- Notify the Drilling and Completions Manager / Project Manager of any environmental incidents
- Notify the Chief Operating Officer and Drilling and Completions Manager / Project Manager of any stakeholder objections or claims
- Undertake monitoring for bushfires and alert the HSS&E team and landholders as needed
- Ensure all hazards, incidents and near misses are promptly reported, investigated and appropriate corrective action completed
- Prepare reports in accordance with the EMP
- Liaise with the workover contractor when the Emergency Response Plan is activated
- Perform duties as outlined in the applicable emergency response plan if it is activated

9.3.5 Lead Workover Contractor

A nominated member within each contracting company that is responsible for delivering the commitments outlined in this EMP. The Lead Workover Contractor must ensure their personnel are aware of their obligations, are approximately trained and that procedures and controls are fully implemented and complied with.

9.3.6 HSE Representative

CP representative who provides guidance and advice to site personnel on the day-to-day management of the environment specifically in the planning and reporting phases. The HSE Representative is responsible for coordinating the activities of the Dedicated Weeds Officer under the Weed Management Plan.

9.4 Training and Competencies

CP takes all steps to ensure ongoing training and awareness is conducted with all personnel and contractors. This enables CP, its workforce and contractors to cooperate effectively in developing and promoting measures to ensure a high level of HSS&E knowledge and compliance. Additional training will be provided on an as required basis.

CP's HSS&E MS training and awareness include:

- Compulsory site inductions
- Pre-start (Toolbox) meetings
- Routine HSS&E meetings and reports
- Shift handovers
- Dissemination and display of HSS&E related information.

A register of training and competencies for CP personnel and contractors is maintained for compliance with CP's management system for training and competency requirements

9.4.1 Site Inductions

Site inductions are compulsory and are the key mechanism CP employs to ensure all personnel, contractors and visitors are informed of CP HSS&E MS and this EMP including legislative responsibilities.

As a minimum, CP will ensure all personnel and contractors are trained in and are aware of the following CP systems:

- Wellsite permit to work system
- Isolation and tagging procedures
- Job hazard analysis
- Remote communication equipment and procedures
- Emergency response plan
- Spill prevention
- Land disturbance
- Waste management
- Pest, plant and animal control
- Incident reporting
- Environmental awareness
- Speed limits
- Roles and responsibilities under this EMP.

Once approved, the EMP will be rolled out across the business by the Risk and HSE Manager.

A copy of the EMP is available on site to all employees and contractors.

Visitors will receive a limited site induction that covers emergency response and this EMP. All visitors must be signed in and be accompanied by a CP representative at all times whilst on site unless a full site induction is provided.

A register of inducted CP personnel and contractors/visitors will be maintained for auditing purposes.

9.4.2 Pre-start (Toolbox) Meetings

A toolbox meeting will be held daily and prior to any change in activity commencing on the day of an activity occurring. These are designed for employees to discuss task HSS&E issues and specific requirements for the day's operations, including work permits.

The meeting is designed to discuss the following issues daily:

- Activities to be conducted during the next 24 hours
- Any hazards identified in the last 24 hours that may affect the work force or operations

- Any incidents or accidents that have occurred since the last pre-start meeting.

9.4.3 Shift Handovers

CP have developed and 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. The handover checklist includes as a minimum:

- Any equipment damaged or out of service
- Status of current operations (inclusive of matters pertaining to the EMP)
- Any personnel or crew issues that the relief needs to be aware of
- Third party equipment or operation in the area.

9.4.4 HS&E Related Information

CP makes relevant HS&E information available by displaying on the HSS&E notice board available at each location. This may include:

- Policies and environment and safety management documentation
- Legislation, standards and guidelines
- Emergency contact information
- Appropriate signs being displayed relating to fire, safety and PPE requirements
- Emergency evacuation plans for the site
- Safety alerts and technical bulletins
- HSS&E minutes; from six monthly HSS&E meeting
- Emergency drill reports
- The Register and Closeout of Correcting Actions report.

9.5 Monitoring, Auditing and Non-Conformance

9.5.1 Monitoring

Activities undertaken for this EMP will be routinely monitored by site personnel, external service providers and CP management. Monitoring is supported by CP HSE personnel to ensure the management controls described in Section 8.0 are implemented and that the performance measures are achieved.

Table 9-2 provides an outline of the main monitoring activities that will be undertaken.

All equipment used for monitoring will be calibrated in accordance with manufacturer's specifications.

Table 9-2 Activities to monitor control effectiveness

Control	Monitoring	
	Action	Frequency
All		
Site inductions	Records of site inductions show 100% participation by all personnel, contractors and visitors	For all new staff members and visitors before access to the site Annual review of training records
Job hazard analysis	Perform a job hazard analysis of any new task or new use of equipment	Prior to commencing new task or using new equipment
Asset Integrity – Workover		
Well commissioning following workover	Monitoring of wellhead pressure	During commissioning and into operations phase under the MRN FEMP
Asset Integrity – Wellhead Equipment, Safety Systems and Gathering Line		

Control	Monitoring	
	Action	Frequency
Gas processing	Routine testing, inspection and preventative maintenance program for each well	Per inspection regime within CP's maintenance management system as conducted under the MRN FEMP
Chemical and Hazardous Materials Management		
Storage of chemicals, fuel and oils	Routine visual inspection of storage areas to ensure adequate bunding and containment strategies implemented, no leaks or spill. Records of inspections and routine maintenance to be maintained. Records show repairs carried out as soon as practicable following detection.	Weekly inspections when in use unless use occurs during wet season in which case the frequency is daily
Spills and leaks of chemicals, fuel and oils	Routine emergency response drills	Monthly
	Records kept of location, clean-up procedure and communication with DPIR regarding any leaks or spills	As required when applicable
Waste Management		
Waste tracking – to and from site	Records kept of quantities of waste in and out from site	During works as required
Waste tracking - clean up materials	Records of when clean-up material was removed from site and volumes of material removed	During works as required
Waste tracking - NORMs	Records of NORMs disposal	During works as required
Waste tracking - transport	Records waste transporter licences show they are licenced under the WMPC Act to transport the waste	Each waste transport event
Waste tracking – disposal	Records of waste disposal facilities licences showing that they are licenced under the WMPC Act to accept the waste	Each waste disposal event
Waste receptacles	Visual inspection of waste receptacles to ensure no fauna access to waste storage locations, lids are secure, waste are appropriately stored and there are no leaks	Weekly
Water Usage		
Water usage tracking - groundwater extraction	Records of volume of groundwater extracted for the EMP activities	Following extraction and use
Water usage tracking – commercial freshwater	Record volume of commercial freshwater used	Following purchase and use
Water usage tracking – produced water	Records of volume of produced water used during the EMP activities	Following use
Water usage tracking– tank transfer	Records of volume of water transferred to each tank	Following transfer
Water usage tracking – spills	Records of volumes of water spilled	Following spill
Erosion and Sediment Control		
Erosion and sedimentation on site	Records of location and size	Site inspection at beginning of the works and then following any significant rainfall events (>15mm in 24 hours)

Control	Monitoring	
	Action	Frequency
Erosion control	Visual inspection ensuring adequate control devices in place in accordance with DENR and IECA best practice guidelines No erosion occurring	Site inspection at beginning of operation Then following any significant rainfall events (>10mm in 24 hours)
Decommissioning and Rehabilitation Management		
Decommission and rehabilitation activities	Visual inspection of rehabilitation areas	Yearly
	Photographic point monitoring before during and after rehabilitation	As required before, during and after the rehabilitation works
Biosecurity Management		
Weed free certification	Weed free certificates to be obtained when equipment and materials are mobilised to site from known weed infested areas with records kept	When equipment / materials are brought to site from known weed infested areas
Weed management	Inspection to identify weed outbreaks	Prior to mobilisation to site if weed identified on environmental sensitivity map – Competent person Annually – Weeds Officer as per Weed Management Plan
Biodiversity Management		
Fauna management	Inspect well lease and flare pit fencing to ensure secure	During activities
Bushfire Prevention		
Bushfire prevention	Check local weather condition and fire danger warnings	Daily check
Fire control	Inspect fire breaks	Annually
Fire fuel load reduction	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 on existing fire breaks.	Once prior to commencement of activities at nominated wellsite, and annually if required
Annual mapping	Annual fire mapping at MRN to monitor changes to fire frequency in the area	Annually
Air Quality Protection Measures		
Emissions minimisation	Maintenance records of vehicles and equipment	Per manufacture's specifications
Flaring records	Record of all flaring events	During activities as required
Dust emissions management (onsite)	Monitoring of conditions within the MRN	Weekly
Traffic and Transport Management		
No unauthorised off-road driving, all drivers inducted into the potential impacts of driving on soil	Records kept of any incident	During activities as required
Fauna strike records	Records kept in a fauna register of any near misses or strikes	During activities as required

Control	Monitoring	
	Action	Frequency
Zone designated speed limits	Records of any failures to comply and corrective action taken	During activities as required
Dust management (offsite)	Records kept of any visual monitoring of dust on NT controlled roads and action to reduce vehicle speeds	During activities as required
Appropriate licences for handling and transporting hazardous loads	Routine checks of licences	During activities as required
Community Impact Minimisation		
Complaints management	Records of complaints from community in regards to activities including response to complaint and any actions taken	During activities as required
Noise and Vibration		
Vehicle servicing	Compliance with vehicle manufactures specifications	Before mobilisation of vehicle to site as required
Cultural Heritage and Sacred Sites Preservation		
Manage incident of interference with Aboriginal Sacred Sites, places or objects of archaeological significance	Implement protocol to prevent further disturbance and notify AAPA as soon as reasonably practicable	Records kept of any incident including notifications and remedial actions when applicable
Soil Contamination Management		
Management of soil contamination	Soil sampling directly after clean up at any location where spill/ contamination has occurred. Soil testing of any area of remediation following spill/contamination if applicable. Sampling conducting in accordance with AS 4482.1-2005 or other industry standard.	As required, following incident, until soil is classified as remediated in accordance with NEPM 2013 guidelines for contaminated sites
Surface Water Contamination Management		
Management of surface water contamination	Water/soil sampling directly after incident to determine extent of contamination and following removal of contamination source. Samples will be taken in accordance with the protocols detailed in the Australian and New Zealand Guidelines for Fresh and Marine Water Quality field sampling program (or as otherwise required by the Code) and samples analysed at a NATA-accredited laboratory.	As required, following incident, until soil is classified as remediated in accordance with NEPM 2013 guidelines for contaminated sites and / or appropriate surface water guidelines Then one year later
Groundwater Contamination Management		
Groundwater monitoring	Monitor groundwater levels and quality at five groundwater extraction bores (RN017657, RN013861, RN018955, RN17898, RN004620) which screen the Mereenie Sandstone, to detect potential hydrocarbon migration and contamination.	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.

Control	Monitoring	
	Action	Frequency
	Samples will be taken in accordance with the protocols detailed in the Australian and New Zealand Guidelines for Fresh and Marine Water Quality field sampling program (or as otherwise required by the Code) and samples analysed at a NATA-accredited laboratory for the parameters shown in Table 9-3, which are taken from B.4.17.1	At the completion of the EMP activities, groundwater monitoring for the operation of the field reverts to the MRN FEMP requirements.
Wet Season Monitoring		
Weather forecast	Review http://www.bom.gov.au/nt/ to <u>assess potential rainfall and implement wet-weather management measures if required</u>	Daily for next day and coming week
Road conditions	Review https://roadreport.nt.gov.au/home to <u>determine whether there are any road conditions have been impacted by rainfall and that require management</u>	After a rain event
Chemical and waste storage areas	Visual inspection with records of inspection and any action taken to improve/repair rainfall containment	Daily
Wastewater Management		
Wastewater tracking – treated wastewater used	Records kept of quantities of wastewater treated for re-use (equivalent to ‘water usage tracking – produced water’)	Every time wastewater is treated and used
Wastewater tracking – wastewater generated during workovers	Measure and record volumes of wastewater generated during workovers If wastewater to be transported and disposed of offsite, a NORMs assessment will be conducted Wastewater will need to be assessed for Leachability (as per AS4439.2 and 44396.3) as per Table 9 of the Code	Upon generation and prior to onsite or offsite disposal
Wastewater tracking – wastewater transferred to tanks	Measure and record volume of wastewater transferred to tanks	Every time wastewater is transferred
Wastewater tracking – wastewater spilled	Records of volume of wastewater spilled	Following spill
Baseline soil sampling	Conduct baseline soil sampling at 0.6m deep soil cores from 2 locations across the well site, adjacent to storage / mixing tanks and flare pit. Analysis parameters will include: Permeability, Particle size, Total chlorides, Exchangeable sodium, Emmerson aggregate test Sampling conduct in accordance with AS 4482.1-2005 or other industry standard	Prior to civil works occurring at the well lease

Control	Monitoring	
	Action	Frequency
	Sampling conducting in accordance with AS 4482.1-2005 or other industry standard	
Wastewater tank (mud tank will contain the used workover fluid i.e. wastewater) integrity	Records kept of visual inspections to assess tank integrity including assessment of freeboard	Weekly inspections when in use unless use occurs during wet season in which case the frequency is daily
Wildlife/ stock/ human interactions -	Records of visual inspection of temporary fencing around flare pit and well	Daily during workovers Other times - Monthly
Wildlife/ stock/ human interactions – trends	Review of recorded wildlife/stock interactions to ensure controls are effective and guide additional management if review shows unacceptable results	Annually

Table 9-3 Groundwater monitoring suite and limits of reporting

Parameter	Limit of reporting	Parameter	Limit of reporting
Field parameters ¹		Hydrocarbons	
Electrical conductivity ¹	1 µS/cm	Total recoverable hydrocarbons (TRH)	100 µg/L
pH ¹	0.01 pH units	PAH Suite	0.5 µg/L
Temperature ¹	0.1°C	Benzene, toluene, ethylbenzene and xylenes (BTEX)	10 µg/L
General Parameters		Dissolved methane, ethane and propane	10 µg/L
pH (laboratory)	0.01 pH units	Metals/metalloids	
Electrical conductivity (laboratory)	1 µS/cm	Chromium	0.001 mg/L
Total dissolved solids	1 mg/L	Copper	0.001 mg/L
Total suspended solids	1 mg/L	Lead	0.001 mg/L
Gross alpha	0.05 Bq/L	Manganese	0.001 mg/L
Gross beta	0.1 Bq/L	Mercury	0.001 mg/L
Major Anions and Cations		Silver	0.001 mg/L
Alkalinity (carbonate and bicarbonate)	1 mg/L	Arsenic	0.001 mg/L
Chloride	1 mg/L	Barium	0.001 mg/L
Sulfate	1 mg/L	Boron	0.05 mg/L
Nitrate	0.01 mg/L	Cadmium	0.0001 mg/L
Nitrite	0.01 mg/L	Lithium	0.001 mg/L
Fluoride	0.1 mg/L	Selenium	0.01 mg/L
Sodium	1 mg/L	Silica	0.1 mg/L
Potassium	1 mg/L	Strontium	0.001 mg/L
Calcium	1 mg/L	Zinc	0.005 mg/L
Magnesium	1 mg/L	Pressure	
Iron	0.05 mg/L	Water level	±0.1mAHD

¹ Not specifically required by the Code

9.5.2 Auditing

In addition to regular monitoring, inspections and audits assessing compliance with this EMP will be undertaken by a 'suitably qualified person'⁵. System deficiencies, adverse or potentially adverse environmental conditions arising from the activities may be subject to the issue of environmental non-conformances. These non-conformances and the suitable corrective actions will be entered into the CP Event and Action Tracking System for tracking of action progress to closure.

As per Table 9-4, CP undertakes site inspections to assess conformance to the EMP. Assurance audits of implementation of the EMP commitments will be completed annually and included in the annual environmental report.

Table 9-4 EMP audit schedule

Audit Type	Scope of Audit	Frequency	Responsibility
Site Inspections	Checklist inspections of activities approved under this EMP. Items to be actioned as required	As per Table 9-2	HSE Representative, Well Site Representative, delegate or Environmental Consultant
Annual Assurance	Compliance against EMP commitments, environmental outcomes and environmental performance standards and	Annually	HSE Representative or Environmental consultant

9.5.3 Continuous Improvement

CP is committed to continual improvement in its HS&E performance and develops improvement plans in accordance with HSS&E Management Standard 4 – Improvement Plans (IP). The content of a HSS&E Improvement Plan supports:

- Strategic improvement initiatives
- Actions necessary to address compliance deficiencies and audit findings (including from the inspections and audits required under the EMP)
- Opportunities to improve environmental outcomes, reduce key risks and improve environmental performance through changes in process, new technologies and/or changes in implementation of an activity to meet CP's environmental objectives.

9.5.4 Incident and Non-conformance Management

CP's incident management procedures are designed to:

- Ensure all near misses and incidents are reported in a standard format so that consistency and accuracy of the process is maintained
- Identify the underlying and basic causes of all near misses and/or incidents
- Implement mechanisms to prevent the recurrence of similar near misses/incidents
- Provide information to prepare the CP near miss/incident statistics
- Identify potential losses and suitable corrective actions.

It is CP's policy to report and investigate near misses, major hazards and incidents and to implement action to mitigate any identified contributing factors.

⁵ means a person who has the abilities, formal qualifications, relevant experience or potential to acquire, within a reasonable time, the skills and competencies necessary to perform a particular job

Incident management procedures are detailed in the CP HSS&E MS.

Environmental incidents that may arise during activities under this EMP include:

- Well control event
- Well integrity failure
- Petroleum, grey water, chemical or sewerage spills (including uncontrolled escapes)
- Introduction and spread of weeds, invasive species or flora and fauna diseases
- Fauna injury/fatality
- Uncontrolled fire
- Clearing of threatened flora species
- Clearing of threatened fauna species habitat
- Disturbance to heritage areas.

All environmental incidents and near misses that arise due to the presence of hazards on site are reportable to CP management for inclusion in the incidents/near misses register. External reporting will follow the requirements set out in Section 10.0.

9.6 Emergency Preparedness

CP's emergency planning includes:

- Emergency response plan, manual and procedures
- Dedicated trained emergency response personnel
- Dedicated emergency response vehicles and equipment
- Emergency simulation training exercises (drills); and
- Preventative maintenance programs.

Types of emergency situations that may arise during activities under this EMP include:

- Spills
- Fire or explosion
- Well control failure.

For the workover program, development of the Emergency Response Plan is done in conjunction with the workover contractor, which has not yet been chosen by CP. Appendix 8 contains the Emergency Response Plan developed for CP's last workover program which used the same drill rig as an example of the type of Emergency Response Plan that will be developed for the activities under this EMP.

Once the drilling contractor is appointed, CP will provide the DENR with the Emergency Response Plan/s for the activities under this EMP.

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

CP's Emergency Response Plan, manuals and procedures are reviewed and updated to incorporate new information arising from incidents, near misses and emergency simulation training sessions.

9.7 Record Keeping

CP will keep the environmental records required under this EMP. The list of environmental records that may be generated and kept include:

- Induction records
- Waste tracking records
- Incident register
- Hazardous materials manifests and records of all chemicals stored on site
- Visual inspection records
- Diesel fuel usage
- Weed monitoring and control records
- Non-compliances and corrective action records

- Internal audits and inspection records
- External audits
- All maintenance records
- Site access register
- Water usage
- Flared gas volumes
- Environmental survey and sampling work results.

Environmental records will generally be retained for a minimum period of five years. To the extent any of these records are 'prescribed records' for the purpose of the *Petroleum (Environment) Regulations 2016*, they will be kept for the longer of five years following the period during which the petroleum interest is in force or 15 years after the record comes into existence.

10.0 Reporting

10.1 Incident Reporting

Internal incident management and reporting requirements are outlined in Section 9.

All required incident reports shall be made formally in writing to external stakeholders with copies sent to applicable CP managers, with incident details registered into the database.

10.1.1 Reportable Incidents

As per Section 7.4.1. for environmental incidents, that occur and are not within the scope of this EMP, (e.g. an incident that occurs on a road not under the control of CP) as defined under Section 14 of the *Waste Management and Pollution Control Act*, CP will report to the NT EPA on their Pollution Hotline 1800 064 567 as soon as possible (at most within 24 hours).

Under the Petroleum (Environment) Regulations 2016, a reportable incident means an incident arising from a regulated activity that has caused, or has the potential to cause, material environmental harm or serious environmental harm as defined under the *Petroleum Act 1984*, Division 2.

In this case, CP will notify (this may be oral or in writing) the Minister of a reportable incident as soon as practicable but no later than 2 hours after the first occurrence of the incident or after the time CP becomes aware of the incident (if orally notified a written notification must follow within 24 hours). The contact number for phone notifications is 1300 935 250.

The notification will include at a minimum:

- Details of the interest holder
- All material facts and circumstances
- Information about any action taken to avoid or mitigate material environmental harm
- Information about the corrective action that has been taken.

If it is confirmed that the incident is a reportable incident, a written report must be submitted within three (3) days. The report will contain:

- All material facts and circumstances about the incident and the results of any investigations
- The nature and extent of the material environmental harm
- Information about any corrective actions necessary to prevent re-occurrence of a similar incident
- Any actions taken, or proposed to be taken to rehabilitate an affected area
- Details and timing of any further corrective actions required (such as a full root cause analysis and investigation).

In addition, CP will provide a final report about a reportable incident 30 days after the clean up or rehabilitation of the area affected by the reportable incident is completed.

The final report must include a comprehensive and detailed root cause analysis of the reportable incident. At no longer than 90-day intervals, progress reports will be submitted about the incident investigation and steps taken to mitigate any environmental harm.

Incidents involving sacred sites will be reported to AAPA as soon as practicable.

10.1.2 Recordable Incidents

The *Petroleum (Environmental) Regulations 2016* define a recordable incident as an incident that is not a reportable incident and arises from the activity that:

- Has resulted in an environmental impact or environmental risk not specified in the EMP or
- Has resulted in a contravention of an environmental performance standard specified in the EMP or
- Is inconsistent with the environmental outcomes specified in the EMP and
- Is not a reportable incident.

CP will maintain a register of recordable incidents and report them to the DENR in accordance with section 35 of the *Petroleum (Environment) Regulations 2016*.

10.2 Routine Reporting

The reports in Table 10-1 will be maintained and submitted to the nominated parties within the table.

Table 10-1 Routine reporting

Report	Internally Recorded	Submitted	Reported To
Annual Environmental Report	Collate daily, weekly and monthly reports	Annually	Minister (via DENR)
Quarterly recordable incident reporting	As per CP HSS&E MS – incident reporting and management procedure	Quarterly	DENR
NGERS annual greenhouse gas emissions reporting	Collate required data, perform calculations and develop report	Annually	Clean Energy Regulator

10.2.1 Annual Environment Performance Report

An Annual Environment Performance Report (AEPR) is required under the Petroleum Environment Regulations 2016. The AEPR outlines the environmental performance of CP with respect to the EMP activities. Specifically, the AEPR provides for an assessment of whether CP has met the environmental outcomes and environmental performance standards included in the approved EMP. The content of the MRN AEPR will follow the content and structure requirements as provided in the AEPR Template by the Northern Territory Government (May 2020, Version 0 or as amended).

11.0 Stakeholder Engagement and Consultation

11.1 Stakeholder Engagement

CP is committed to upholding its reputation with a range of stakeholders and other interested parties including:

- Community
- Landholders
- Indigenous Traditional Owners
- Government
- Other key non-commercial external stakeholders (e.g. industry bodies, non-government organisations)
- Industrial relations stakeholders
- Other commercial external stakeholders
- Internal stakeholders

CP seeks to establish and maintain enduring and mutually beneficial relationships with the communities of which it is a part; ensuring that our activities generate positive economic and social benefits for and in partnership with these communities.

In relation to the field workover and wellhead equipment, safety systems and gathering line activities, the stakeholders that are directly affected by the EMP activities are:

- Indigenous Traditional Owners represented by the Central Land Council (CLC) as per the Mereenie Agreement 2003

It should be noted that all of the EMP activities are defined as ongoing production enhancement activities and included under the existing CLC agreements.

11.2 Stakeholder Engagement Undertaken

CP undertook some preliminary consultation with Traditional Owners at community meetings in late November 2019 (outlined in Appendix 6) to provide an overview of its anticipated field workover and wellhead equipment, safety systems and gathering line activities program for 2020. The information provided was general in nature as the CLC have specific requirements around what information can be shared with Traditional Owners outside of local community meetings (LCMs).

There has been limited face to face stakeholder consultation undertaken since then due to restrictions in place as a result of the COVID-19 pandemic. CP has maintained communication with the CLC via telecommunication and emails to keep them informed of the Project and this EMP focusing on:

- The activities to be undertaken on country and proposed locations.
- Their 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 environmental management plan.
- Planning and execution of on country meetings to discuss the drilling program and complete the Sacred Site Clearance and avoidance surveys of land with the CLC.

Traditional owners are aware of the planned activities, the locations and have been to site with AAPA to clear the impacted areas. An AAP clearance certificate has been granted for these activities and locations.

With restrictions due to be eased CP will re-engage with the CLC when formal community liaison meetings are arranged by the CLC as per the conditions of SSCC C2013-046 and the Mereenie Agreement.

No consultation with the Commonwealth Government has been undertaken 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. However, consultation with the Northern Territory government has occurred in the drafting of this EMP.

11.3 Consultation Planned to Occur

The next Liaison Committee Meeting (organised by the Central Land Council) is scheduled for late September / October,. CP is intending to attend this meeting and provide a further update on the planned field workover and wellhead equipment, safety systems and gathering line activities in accordance with requirements of the Petroleum Environment Regulations including:

- The activity the CP proposes to carry out,
- The locations of the activities,
- The anticipated environmental impacts and environmental risks of the activity,
- The proposed environmental outcomes in relation to the activity, and
- The possible consequences of carrying out the activity to the stakeholder's rights or impacts on stakeholders activities.

11.4 Ongoing Consultation

CP is actively engaged with all relevant stakeholders for the OL4 and OL5 under an existing approved Field EMP for the Mereenie. However, in support of this process CP maintains a record of all ongoing interactions and communications with stakeholders and affected parties in relation to activities under this EMP. This information is maintained in a Communication Log. The communication log will record the following details:

- Date
- Topic discussed
- Type of engagement
- CP representative
- Primary stakeholder
- Outcomes – Any issued resolved or identified.

In addition to the communication log, during the period of the EMP, CP will also record the following:

- Copy of information provided to any stakeholder
- If written responses have been received by any stakeholders, a summary and copy of each response
- An assessment of the merits of any objection or claim made by a stakeholder about the anticipated environmental impact of the proposed activity
- A statement of CP's response to each objection or claim made by a stakeholder
- Details of changes made by CP as a result of stakeholder engagement.

11.5 Assessment of Merit of Stakeholder Objection or Claim

The process that CP will undertake in assessing any stakeholder objection / claim that it receives in relation to activities under this EMP is:

- All stakeholder objection / claims are to be provided to the Chief Operating Officer who will appoint a person to confirm that the objection / claim relates to the activities under this EMP
- The Chief Operating Officer to notify the stakeholder of the results of the above findings (this will generally be via written communication)
- - If the results confirm that the objection / claim is not related to CP no additional action is required by CP.
- - If the results confirm that the objection / claim is related to CP follow applies
- Chief Operating Officer to appoint a person to investigate the stakeholder objection / claim
- Person appointed to investigate the objection / claim is to investigate and provide a documented report to the Chief Operating Officer

- Once the report is accepted by the Chief Operating Officer, they will provide a response to the stakeholder that reflects the outcomes of the investigation (including any actions that CP have/will undertake to address the objection / claim – if required)
 - This response will generally involve a verbal discussion with the stakeholder on the outcomes of the investigation and be followed up with written correspondence. The Chief Operating Officer will determine the appropriate method to respond to each stakeholder.

11.6 Details of Changes Due to Engagement

Any changes in operations, policy or procedures because of stakeholder consultation or other engagement will be recorded in writing. CP Management will review and assess any changes for merit and if deemed necessary to be undertaken these changes will be approved by CP management before any action is taken. Where required, CP management will submit details of the proposed changes to the regulator for approval. A summary of any changes to operations that derive from stakeholder consultation or other engagement will be included in the annual environmental report and reflected in future versions of this EMP.

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