Environment Management Plan

Imperial O&G

2021 Carpentaria 1 Work Program

NT Exploration Permit (EP) 187

(IMP3-4)

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Prepared for:

IMPERIAL OIL AND GAS

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Executive Summary

a. Introduction

Imperial is proposing to undertake a, Hydraulic Fracture (HF) and Extended Production Test (EPT) program at the Carpentaria 1 appraisal well, commencing during 2021.

The activities for the vertical drilling of the Carpentaria 1 well were covered under the "Environment Management Plan (Emp) For 2020 Drilling Program on Ep187" (Drilling Emp). The Drilling EMP was approved by the Minister for Environment and Natural Resources on the 2nd of March 2020. The drilling of Carpentaria 1 was carried out in Q3 and Q4 of 2020. The isolation and protection of aquifer present has been confirmed with integrity assessment checks provided to DITT following cementing and completion of construction of the well.

This EMP has been prepared regarding the Petroleum (Environment) Regulations 2016 (NT) and the Code of Practice: Petroleum Activities in the Northern Territory (Northern Territory Government, 2019). This EMP seeks approval to conduct a program of drilling, HF and appraisal tests of the Velkerri formations on the Carpentaria 1 exploration wellpad.

The objective of this EMP is to ensure that the activities are carried out in a manner by which the environmental impacts and environmental risks will be reduced to a level that is as low as reasonably practicable (ALARP) and acceptable.

The EMP covers the, HF and EPT activities proposed by Imperial, including all ancillary activities required to conduct the works.

Additional land clearing will be required for the 2021 EP187 program to increase the footprint of both Carpentaria 1 to accommodate the HF equipment, including produced water storage and treatment. Maintenance of the existing access tracks may require removal of regrowth within the original disturbance footprint. The site selection and construction of the Carpentaria 1 wellpad, access track, and associated infrastructure was covered in the Drilling EMP.

b. Description of the Activities.

The regulated activities to be carried out under this EMP;

- Clear up to 10.5 hectares for Carpentaria-1 wellpad extension, firebreak and access tracks
- Establish bunded tanks pads and tanks fitted with leak detection at the well site
- Hydraulic Fracture stimulation of the existing vertical exploration well, Carpentaria-1
- Completion and workover maintenance of a vertical exploration well
- Extended Production Testing (EPT) of a vertical exploration well, with EPT <=90 days
- Well suspension and decommissioning of an exploration well/s
- Routine maintenance and monitoring activities
- Any other minor works ancillary of the above.

c. Key Components of the regulated activity.

The table below shows the main key components of the regulated activity.

Table E1: Key components of the regulated activity

Component	Proposed
AAPA certificate:	Authority Certificate C2020/012; to be varied'
Total area of exploration lease (EP187):	4,427 km²
Total Area of disturbance under this EMP:	10.6 Ha
Number of exploration wells:	One – Carpentaria 1
Groundwater:	Gum Ridge Formation
Extraction license # and volume:	GRF10316, 22ML/year
Number of bores (include #s):	Two – RN041678 & RN41800
Estimated groundwater usage:	7.5 ML (based on a 5 HF stages)
Control bore/s:	Carpentaria 1 – CMB (RN041678)
Impact bore/s:	Carpentaria 1 – IMB (RN041800)
Timeframe:	
Activity duration:	Q2 2021 – Q4 2022 (includes well-testing)
Duration of drilling operations:	N/A
Duration of hydraulic fracturing operations:	One month
Duration of well testing (appraisal) operations:	Three months
Personnel:	
Operational workforce:	~20 during hydraulic fracturing ~1-4 persons during well testing
Camp capacity:	30+ persons
Traffic:	
Peak traffic movements for all activities (per day):	~50
Average traffic movements per day for the first three months:	~10-30

Component	Proposed
Average traffic movements per day for the remaining period:	~1-10
Truck load-out: Wastewater transport:	Up to 200 truck movements
Tanks:	
Water storage tank capacity (both make-up and flowback water):	Up to 5 ML
Maximum number and dimensions:	Total 2 1 of 70m x 3.75m 1 of 100m x 50m x 2m
Flowback / wastewater:	
Volume – initial predicted:	~2.5 ML
Volume– final predicted for treatment and off-site disposal:	<0.5 ML
Proppant and emissions:	
Proppant usage (total):	750t (for maximum 5 stages, or 150 t per stage)
tCO_2-e emissions:	9,991 (3 months testing)

d. Activity Location

Imperial Oil & Gas is the operator of Exploration Permit (EP) 187, which is located approximately 85 km southwest of Borroloola within the Carpentaria and Macarthur Basins of the Northern Territory. EP187 is situated in the upper reaches of the McArthur River, lies to the west of the Tablelands Highway, and is crossed east to west by the Carpentaria Highway. The activities covered under this EMP are at the Carpentaria 1 exploration wellpad, referred throughout this document as the Project area. Both the location of EP187 and the location of Carpentaria 1; in the southwest quadrant of EP187 are shown in Figure E1.

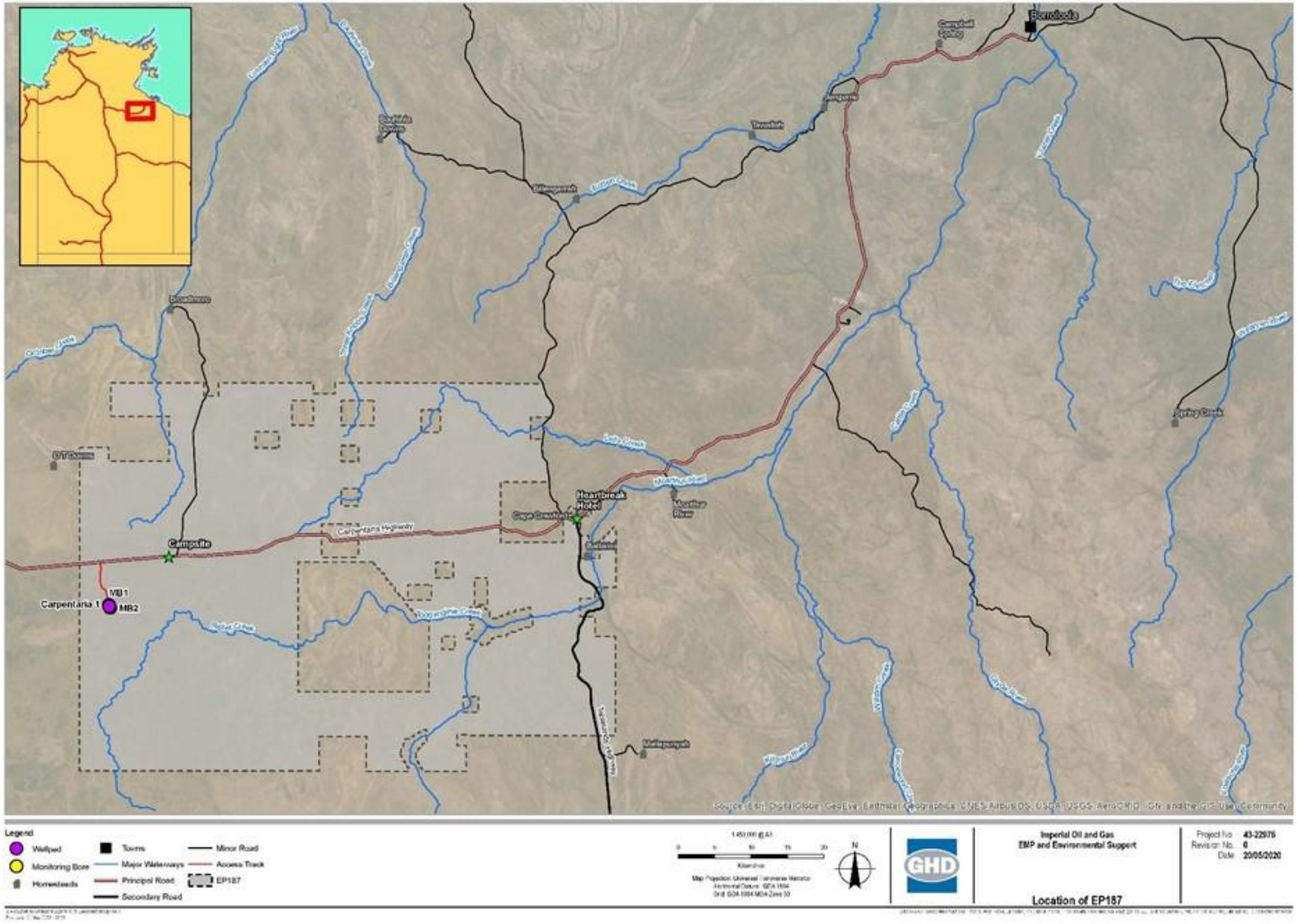

Figure E1: EP187 and Carpentaria 1 location.

e. Existing Environment

Carpentaria 1 is an existing wellpad, located in The Sturt Plateau Bioregion. Undulating plains surround the Project area; the vegetation is comprised of the majority by open forests and woodlands dominated by Darwin Stringybark (E. tetrodonta) (DLRM, 2008). The closest watercourse to the Project Area is the Relief Creek, which is <8km away from Carpentaria 1.

The climate of the Project area is described as a tropical savannah climate within the humid Zone with a distinct wet and dry season which can experience an average rainfall of between 600 – 800mm per year over the summer wet. The seasonal contrast between the wet and the dry has significant implications for surface water resources. The summer monsoon season brings rain and cyclones, and during this period, the Project area can experience large rainfall events. The primary groundwater resource in the region is the Cambrian Limestone Aquifer (CLA).

There are 13 threatened species listed as potentially occurring within the Project area, which includes a range of birds, mammals and reptiles. There are seven migratory species which are moderately likely to occur at the Project area and 15 weed species identified in the bioregion. As part of previous activities, Imperial Oil & Gas, in conjunction with a Senior Weeds Officer of the Department Environment Natural Resources (DEPWS), carried out a pre and post 2018/19 wet season weed survey over a larger portion of EP187, which included the Project area. Following this joint survey, a comprehensive weed management plan has been developed, which will be utilised for this project. No protected areas or places with historical or cultural significance were found to be within a 50km radius of the project area.

Environmental values and sensitivities that have the potential to occur in the vicinity of the Project area are provided in Table E2 below.

Table E2: Summary of Environmental Values and Sensitivities

Area	Environmental Factors	Environmental Values and Sensitivities	Summary
Land	Terrestrial Flora and Fauna	Sensitive or significant vegetation	Fox & Co, 2019 recorded riparian vegetation in the study area, present as predominantly sparse woodland.
		Groundwater dependent ecosystems	There is low potential for terrestrial GDEs and aquatic GDEs in the Project Area (BoM, 2020)
		Threatened fauna species and their habitat	The EPBC PMST identified 9 threatened species that have the potential to occur in the Project Area. The TPWC Act identified 1 (*Gouldian Finch*) that have a high potential to occur but a low risk to be impacted and Yellow-Spotted Monitor has a moderate likelihood of occurrence.
		Listed migratory species	The EPBC listed 13 migratory species that were potentially occurring in the Project Area. They are all scored a low potential to occur.
		Listed threatened flora species and ecological communities	There are no Threatened Ecological Communities (TECs) or threatened flora listed under the EPBC Act and/or TPWC Act known to occur within the 50km of the Project Area

Area	Environmental Factors	Environmental Values and Sensitivities	Summary
	Terrestrial Environmental Quality	Soils	The Project Area lies within a region of soils that are considered to be in their second cycle of erosion which has produced infertile soils with a near neutral reaction. These 'soils' are akin to alluvial soils in that they show no profile development.
Water	Inland water environmental quality	Groundwater	The Cambrian Limestone Aquifer provide regional scale aquifers for groundwater resources available for pastoral enterprises, domestic bores at homesteads and town water supplies several communities across the region.
		Surface water	The McArthur River is the primary watershed of the exploration area. This water course drains the whole area into the Gulf of Carpentaria. The Glyde is the main tributary to the McArthur River and lies to the east of the study area.
	Hydrological processes	Supply and quantity of water	The study area is part of the Gulf Fall and Uplands region and part of the catchment of the McArthur River and its tributaries. The McArthur River and its major tributary the Glyde River drain a significant portion of the Barkly tablelands and the low-lying country of the Southern McArthur Basin. The geology of this region does influence the drainage system and provides an extensive network of ephemeral creeks and streams.
Air	Air Quality and Greenhouse Gases	Air quality conducive to suitability for the life, health and wellbeing of humans and ecosystems	The Beetaloo Basin methane baseline monitoring program conducted by the CSIRO in 2018 is applicable across the operational area of EP187. No significant impact or risks anticipated
People and Community	Social, economic and cultural surroundings	Cultural heritage, sacred sites.	An AAPA Authority Certificate has been received (the 20th of February 2020) and submitted to DEPWS (reference 201909816). An extensive anthropological survey of the land area was conducted in May 2015 by the Anthropology Division of the Northern Land Council (NLC) in conjunction with the Traditional Owners of the land prior to grant of the tenement (Appendix 16).

Area	Environmental Factors	Environmental Values and Sensitivities	Summary
			An archaeological survey was conducted in August 2019 by Ellengowan Enterprises and approved NT archaeological consultant (Appendix 7)
	Human Health	People and communities	There are a number of pastoral properties with livestock and infrastructure in the vicinity or the Tenement. The nearest property is OT Downs Homestead located approximately 20km North-West of the proposed area.

f. Environmental Impacts and Environmental Risks of the activity.

An environmental risk assessment was undertaken; a summary of the environmental factors and key risks are given below in Table E3.

Table E3: Summary of the Environmental Factors and key risks.

Aspect	Key Risk
Air quality	• Dust emissions from vehicle movements on unsealed roads • Excessive exhaust emissions • Reduction of air quality - Increased in dust particles • Increased greenhouse gas emissions • Flora stress, dieback, or both due to dust covering of foliage • Extended Production testing flaring.
Land (Flora, Fauna and Environmental quality)	• Disruption on landform and soils from erosion and sediment control failure • Fauna entrapment in open pits • Soil contamination due to overflow, leaks or spills of fluid storage tanks • Impact on flora due to flaring (light), Extended Production testing (EPT) • Loss of soil productivity due to rehabilitation failure and poor topsoil management • Soil contamination due to poor waste and chemical management • Impact on flora, fauna and loss of habitat due to vehicle strikes • Soil contamination due to chemical spills, lack of appropriate bunding and poor refuelling, fuel transfer practices and oil and chemical handling • Introduction and spread of weeds due to vehicle movements • Ignition sources from plant and machinery and inappropriate cigarette disposal • Waste stored inappropriately attracting native and feral fauna • Soil contamination due to flowline failure during pumping and flowback operations.
Water (Groundwater & Surface water)	• Impact to groundwater quality and groundwater-dependent ecosystems due to well integrity failure or cross-flow • Use of groundwater for project activities

Aspect	Key Risk
	• Contamination of water bodies due to chemical spills, lack of appropriate bunding and poor refuelling, fuel transfer practices and oil and chemical handling. • Contamination of water bodies due to flowline failure during pumping and flowback operations • Contamination of water bodies due to storage (tank/vessels) failure or overflow • Impact to surface water due to inappropriate management of waste • Cross-flow during hydraulic fracture (HF) • Cross-flow caused by faults of major geographic structures enables.
People and community	• Road users, landholders discontent due to loss of visual amenity • Vehicle and plant movement on regional roads and access tracks • Land biodiversity impact due to heavy machinery movements • Noise and vibration due to vehicles movements, drilling, HF and EPT activities • Light pollution due to artificial lighting required for safe operations and camp • Disturbance to heritage sites due to works conducted out of the approved areas • Ignition sources from plant and machinery and well control events (flaring) • Light pollution due to extended Production Testing, flaring.

An acceptable risk has been achieved by the implementation of control measures that allowed all risk to be reduced to ALARP. Nonetheless, ALARP is not a final position over the life of the project. Ongoing monitoring will allow for the potential discovery of new mitigation measures that could be implemented. Key environmental risk mitigation areas covered in the EMP include:

- Activities do not impact aquifers
- Management of flaring to ensure no bushfires occur as a result of the activity
- Management of flowback activities to minimise the release of gas to the atmosphere
- Management of hydraulic fluids and chemicals to ensure no contact with aquifers or pollute soil or soil substrate
- Management of waste and wastewater, including prevention of spills, and
- Mitigating the introduction and spread of weeds.

g. Stakeholder Engagement

Imperial Oil & Gas has established and continues a mutually beneficial relationships with the stakeholder groups. Imperial endeavours to generate positive economic and social benefits for and in partnership with the communities.

Since the exploration program, Imperial Oil & Gas identified all affected stakeholders to ensure that they were engaged in the ongoing planning and development of the proposed activities and that specific issues could be considered and addressed.

The level of engagement undertaken with the identified stakeholders varied, depending on their potential to be affected by the proposed activities. Nonetheless, all process of engagement involved "Information, consultation, involvement, collaboration and empowerment" of relevant stakeholders to achieve the best outcome for both parties. The key relevant stakeholder groups include:

- Traditional Owners and Aboriginal People
- Landholders within the Project Area
- S-19 Leaseholders within the Project Area
- Pipeline operators within the Project Area
- Other land users within the Project Area

h. Referrals under NT and Commonwealth legislation

Imperial has assessed the regulated activities under the IMP2-06.1 in line with the Environmental Protection Act 2010. Imperial do not believe the proposed actions require to be referred under the Environment Protection Act 2019 as they do not have the potential for significant impact on the environment and the planning, assessment and works took into account:

- The principles of ecologically sustainable development
- The environmental decision-making hierarchy
- The waste management hierarchy
- Ecosystem-based management
- The impacts of a changing climate, and
- Public and stakeholder consultation.

Furthermore, actions to be carried out uses the best technology alternatives to ensure the least environmentally damaging approach and the appropriate mitigation of identified risks.

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Appendix 02 - Project Activities

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Appendix 04 - Environmental Risk Assessment

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Appendix 12 - Rehabilitation Management Plan

Appendix 13 - WOMP Rev 2.1 approval letter

1. Abbreviations and units

Abbreviations and units used in this EMP and appendices are listed in the table below.

Acronym / Abbreviation	Description
AAPA	Aboriginal Areas Protection Authority
AICS	Australian Inventory of Chemical Substances
ALARP	As low as reasonably practicable
ALRA	Aboriginal Land Rights (Northern Territory) Act 1976
APPEA	Australian Petroleum Production and Exploration Association
BoM	Bureau of Meteorology
CEO	Chief Executive Officer
CBL	Cement Bond Log
CLA	Cambrian Limestone Aquifer
the Code	Code of Practice: Petroleum Activities in the Northern Territory 2019
CPESC	Certified Professional in Erosion and Sediment Control
DAWE	Dept of Agriculture, Water and the Environment
DD	Data Deficient
DDR	Daily Drilling Report
DEPWS	Department of Environment, Parks and Water Security
DoEE	Department of Environment and Energy
DFIT	Diagnostic Fracture Injection Test
DITT	Department of Industry, Tourism and Trade
Drilling EMP	Environment Management Plan (EMP) For 2020 Drilling Program on NT Exploration Permit (EP) 187
D&C	Drilling and Completions
EC	Electrical Conductivity
EMP	Environmental Management Plan
EP	Exploration Permit
EP Act	Environmental Protection Act 2019
EPA	Environment Protection Authority (NT)
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999
EPS	Environmental Performance Standards
ERA	Environmental Risk Assessment
ESD	Ecologically Sustainable Development
EVNT	Endangered, Vulnerable or Near Threatened
EWCRP	Emergency and Well Control Response Plan
ha	Hectares
IADC	International Association of Drilling Contractors

Acronym / Abbreviation	Description
IMP	Integrity Management Plan
GDE	Groundwater Dependent Ecosystems
GIS	Geographic Information System
GISERA	Gas Industry Social and Environmental Research Alliance
HF	Hydraulic Fracturing HF
HSEMS	Health Safety Environment Management System
kg	Kilograms
km	Kilometre
KOP	Kick Off Point
LACA	Land Access Compensation Agreement
LWD	Logging While Drilling
NLC	Northern Land Council
L	Litres
LACA	Land Access and Compensation Agreement
LAG	Local Aboriginal Groups
LCP	Land Clearing Permit
LoR	Level of Reporting
m	Metres
mGL	Metres Ground Level
mm	Millimetres
mRT	Metres Rotary Table
MAASP	Maximum Allowable Annular Surface Pressure
MAOP	Maximum Allowable Operating Pressure
MD	Measured Depth
MESP	Maximum Expected Surface Pressure
ML	Megalitres (1,000,000 litres)
MoC	Management of Change
MNES	Matters of National Environment Significance
NAFI	North Australia Fire Information
NEPM	National Environment Protection Measure
NGERS	National Greenhouse Energy Reporting Scheme
NLC	Northern Land Council
NRM	Natural Resource Management
NT	Northern Territory
NT EPA	Northern Territory Environmental Protection Authority
NVIS	National Vegetation Information System
OEM	Original Equipment Manufacturer
Panel	Independent Scientific Panel

Acronym / Abbreviation	Description
PL	Petroleum Lease
PM	Project Manager
PMST	Environment Protection and Biodiversity Conservation Act 1999 Protected Matters Search Tool
PPE	Personal Protection Equipment
RSWC	Rotary Sidewall Coring (Via wireline)
PPL	Petroleum Pipeline License
SC	Site Coordinator
SEAAOC	South East Asia Australia Onshore Conference
Section 19	Section 19 of Aboriginal Land Rights (Northern Territory) Act 1976
Seismic EMP	EP187 2D Seismic Work Program Environment Management Plan
SHRR	Significant Hazard Risk Register
SSCC	Sacred Site Clearance Certificate
TEC	Threatened Ecological Communities
TO	Traditional Owners
TOC	Total Organic Content
TPWC Act	Territory Parks and Wildlife Conservation Act 2014
TD	Total Depth
TVD	True Vertical Depth
TVDSS	True Vertical Depth referenced to sea-level (Australian Height Datum)
WAC	Well Acceptance Criteria
WBIV	Well Barrier Integrity Validation
WCBD	Well Control Bridging Document
WMP	Weed Management Plan
WOMP	Well Operations Management Plan
the WOMP	Imperial O&G Carpentaria 1 EP187 Well Operations Management Plan
WoNS	Weed of National Significance
WWMP	Wastewater Management Plan

2. Introduction

2.1 Background and Purpose

Imperial Oil & Gas Pty Limited ("Imperial") is the operator and 100% owner of Exploration Permit (EP) 187 which is located approximately 85 km southwest of Borroloola within the Carpentaria and Macarthur Basin in the Northern Territory (Figure E1). EP187 is situated in the upper reaches of the McArthur River, it lies to the west of the Tablelands Highway, and is crossed east to west by the Carpentaria Highway.

Imperial is proposing a Hydraulic Fracture (HF) and Extended Production Test (EPT) program on the Carpentaria 1 appraisal Well during 2021that is covered by this EMP. This program of works as referred to as the project throughout this document.

Seismic activities associated with this project were carried out under EP187 2D SEISMIC WORK PROGRAM ENVIRONMENT MANAGEMENT PLAN (Seismic EMP).

Drilling activities related to this project are covered under the ENVIRONMENT MANAGEMENT PLAN (EMP) FOR 2020 DRILLING PROGRAM ON NT EXPLORATION PERMIT (EP) 187 (Drilling EMP).

For any additional work not included in this EMP, Imperial will seek approval before activities commence.

Table 4: Activities Covered under this EMP

Activity/Aspect	Seismic and Drilling EMPs	2021 program EMP (This EMP)	Total
Vegetation clearing	Cleared 70 hectares for seismic Cleared 1.4 hectares for well pad Cleared 4 hectares for access tracks	Clear 10.5 hectares for wellpad extension and access tracks	86 hectares
Water Extraction	License obtained (GRF10316) for extraction of 22ML per annum from bores RN0416878 & RN041800 Water to be used as follows: 5ML estimated for dust suppression 2.5 ML estimated for drilling program.	Water to be used as follows: 0.5 estimated for dust suppression 5ML estimated for hydraulic fracturing	
Camp	Established temporary 30-person camp Includes approval of wastewater treatment system and irrigation of treated wastewater from camp	No new camp works required, will use existing campsite and existing approval of camp wastewater treatment system. Estimated 20 people will use the camp for 2 months.	
Flowback and Produced water	Not applicable	Estimated will result in 4 ML of produced water per month Requires establishment of enclosed tanks and evaporation pond	

Activity/Aspect	Seismic and Drilling EMPs	2021 program EMP (This EMP)	Total
Closed topped tanks	Not applicable	Will establish 1-2 closed topped tanks Will manage with 0.5m freeboard	
Open topped Tanks	Not applicable	Will establish 1-2 open-topped tanks To be managed according to the season, with 1.1m of freeboard during the wet season and 0.5m of freeboard during the dry season.	
Open topped ponds	Established 3 open topped ponds. Managed according to the season, with 1.1m of freeboard during the wet season and 0.5m of freeboard during the dry season.	Utilize existing open topped ponds. To be managed according to the season, with 1.1m of freeboard during the wet season and 0.5m of freeboard during the dry season.	
Gravel pits	Not applicable. No gravel pits have been established for this project.	Not applicable No gravel pits have been established for this project.	
Chemical storage	Established a dedicated chemical store, bunded to 110% of largest volume OR Double skinned tanks used, earthen bund around well site	Establish a dedicated chemical store, bunded to 110% of largest volume OR Double skinned tanks used, earthen bund around well site	

Imperial is committed to undertake site activities in a manner that minimises and controls the impacts on the environment, including potential effects on pastoral lessees, and Traditional Owners (TO), who are also the landholders over the area in which this regulated activity will occur.

To meet this program, the exploration and supporting activities in 2021 may include:

- Clear up to 10.5 hectares for Carpentaria-1 wellpad extension, firebreak and access tracks
- Establish bunded tanks pads and tanks fitted with leak detection at the well site
- Hydraulic Fracture stimulation of the existing vertical exploration well, Carpentaria-1
- Completion and workover maintenance of a vertical exploration well
- Extended Production Testing (EPT) of a vertical exploration well, with EPT <=90 days
- Management, evaporation and residue disposal of Wastewater
- Well suspension and decommissioning of an exploration well/s
- Routine maintenance and monitoring activities
- Any other minor works ancillary of the above.

The Regulated Activities covered under this EMP are described in Section 3.

2.2 Well Operations Management Plan

Parallel to the EMP Imperial has a Well Operations Management Plan "Imperial_2020 Drilling_WOMP _Rev.1.2" to cover activities on Carpentaria 1; the WOMP was approved for the drilling activities on Carpentaria 1 by DITT on the 21st of September 2020, the approval letter is attached as Appendix 13. The WOMP will be revised to cover the planned, regulated activities and submitted to DITT for approval before those activities are carried out.

The WOMP covers requirements for section B of the Code, to avoid ambiguity in wording between the EMP and the WOMP, section B requirements of the Code will be covered under the WOMP rather than the EMP. One exception to this is Aquifer protection, where the EMP will address separation distances between aquifers on-site and the target formation.

2.3 Titleholders Details

Table 5 provides details of the permit titleholder and titleholder nominated liaison person.

Imperial will notify and provide updated details to the Department of Primary Industry and Resources (DITT) and the Department of Environment and Natural Resources (DEPWS) in the case that there is a change in the titleholder, the titleholder's nominated liaison person or a change in the contact details for the titleholder or liaison person.

Table 5: Details of Titleholder and Nominated Liaison Person

Titleholder Details	Liaison Contact Person
Name: Imperial Oil & Gas Pty Limited	Name: Alex Underwood
Address: Level 19, 20 Bond Street, Sydney NSW 2000	Position: Chief Executive Officer
Telephone: 02 9251 1846	Company: Imperial Oil & Gas Pty Limited
	Address: Level 19, 20 Bond Street, Sydney NSW 2000
	Telephone: 02 9251 1846
	Mobile: 0417 998 899
	Email: aunderwood@empiregp.net

2.4 Environmental Legislation and other requirements

2.4.1 Key Legislation Overview

The legislation relevant to environmental management of drilling, HF and EPT activities at the Carpentaria 1 appraisal well site is listed in Table 6 below.

Table 6: Key relevant Commonwealth and Northern Territory Legislation

Policy Jurisdiction	Legislation	Description
Commonwealth	Aboriginal and Torres Strait Islander Heritage Protection Act 1984	Protects areas and objects in Australia that are of significance to Aboriginals in accordance with Aboriginal tradition. The Act allows the Commonwealth Environment Minister, on the application of an Aboriginal person or group of persons, to make a declaration to protect an area, artefacts or class of objects from a threat of injury or desecration.
	Aboriginal Land Rights (Northern Territory) Act 1976	This Act is the key mechanism for the creation of Aboriginal-owned freehold land in the NT. It also includes

Policy Jurisdiction	Legislation	Description
		provisions for the establishment of Land Trusts (over which the Land Councils have oversight).
	Australian Heritage Council Act 2003	Establishes the Australian Heritage Council that is the principal adviser to the Australian Government on heritage matters. The Council's main role is to assess the heritage values of places nominated for the National Heritage List and the Commonwealth Heritage List, and to advise the Minister on promotion, research, education, policies, grants, conservation and other matters.
	Environment Protection and biodiversity Conservation Act 1999 (EPBC Act)	Provides for the protection of the environment and the conservation of biodiversity. It regulates a development or activity if it is likely to have a significant environmental impact on matters of national environmental significance (MNES). This Act is administered by the Commonwealth Department of the Environment and Energy (DoEE). It is considered that the proposed activities will not adversely impact MNES, therefore the project has not been referred for assessment nor approval under the EPBC Act.
	National Environment Protection Council Act 1994	Provides national standards for ambient air quality, movement of controlled wastes and contaminated sites. This Act is administered by DoEE.
	National Greenhouse and Energy Reporting Act 2007	Titleholders are required to report emissions and energy use annually in accordance with this Act.
	Native Title Act 1993	This Act provides statutory recognition and protection for the concept of native title, including provisions for reaching Indigenous land use agreements.
Northern Territory	Biological Control Act 2016	Makes provision for the biological control of pests in the NT, and related purposes.
	Bushfires Management Act 2016	Provides for the protection of life, property and the environment through the mitigation, management and

Policy Jurisdiction	Legislation	Description
		suppression of bushfires, and for related purposes.
	Dangerous Goods (Road and Rail Transport Act) 2012	Makes provision for safety in the transport of dangerous goods by road as part of the system of nationally consistent road transport laws and makes provision for safety in the transport of dangerous goods by rail. Establishes common guidelines so that dangerous goods can be transported between states and territories.
	Environmental Assessment Act 1982	The objects of this Act are: (a) to protect the environment of the Territory; and (b) to promote ecologically sustainable development so that the wellbeing of the people of the Territory is maintained or improved without adverse impact on the environment of the Territory; and (c)to recognise the role of environmental impact assessment and environmental approval in promoting the protection and management of the environment of the Territory; and (d) to provide for broad community involvement during the process of environmental impact assessment and environmental approval; and (e) to recognise the role that Aboriginal people have as stewards of their country as conferred under their traditions and recognised in law, and the importance of participation by Aboriginal people and communities in environmental decision-making processes.
	Environmental Offences and Penalties Act 1996	Establishes a penalty structure for environmental offences based around four offence levels. Penalties are defined in a variety of environmental statutes such as the Waste Management and Pollution Control Act and the Water Act.
	Fire and Emergency Act 1996	The Act provides for the establishment of the Northern Territory fire and rescue service, the operational and emergency response activities of the service, the protection of life, property

Policy Jurisdiction	Legislation	Description
		and the environment against fires and other emergencies and for related purposes.
	Heritage Act 2011	Establishes the Heritage Council and the NT Heritage Register. It sets the process by which places become heritage places, allows for interim protection of places and sets out the process for getting permission to do work to heritage places and allows for fines and imprisonment for offences against the Act.
Northern Territory	Northern Territory Aboriginal Sacred Sites Act 1989	Establishes the Aboriginal Areas Protection Authority (AAPA) as the body responsible for overseeing the protection of sacred sites in the NT. The AAPA provides a process for avoidance of sacred sites and/or entry onto sacred sites and the issue of Authority Certificates, which indemnify the holder against prosecution under the Act for damage to sacred sites in the certificate area, provided works or use has occurred in accordance with the conditions of the Authority Certificate.
	Pastoral land Act 1992	The Pastoral Land Act 1992 (NT) is an Act to make provision for the conversion and granting of title to pastoral land and the administration, management, and conservation of pastoral land, and for related purposes. In particular, the Act provides for: (i) the monitoring of pastoral land so as to detect and assess any change in its condition (ii) the prevention or minimisation of degradation of or other damage to the land and its indigenous plant and animal life; and (iii) the rehabilitation of the land in cases of degradation or other damage.
	Petroleum Act 1984 (supported by the Schedule of Onshore Petroleum Exploration and Production, 2019	The Petroleum Act is the principal legislation dealing with petroleum tenure, exploration and production activities onshore and in inland waters of the NT. The Act provides a legal

Policy Jurisdiction	Legislation	Description
	(The Schedule), The Petroleum (Environment) Regulations 2016 and Petroleum (Prospecting and Mining) Regulations 2001)	framework to undertake exploration for petroleum and to develop petroleum production so that the optimum value of the resource is returned to the NT. The Act and Requirements are administered by the Energy Division (Registry) which forms part of the DITT. The Minister for Mining and Industry (Minister) is the responsible Minister for the Act.
	Petroleum (Environment) Regulations 2016	The Petroleum (Environment) Regulations aim to ensure that: a. onshore oil and gas activities are carried out in a manner consistent with the principles of ESD b. environmental impacts and risk associates with onshore oil and gas activities are reduced to a level that is ALARP and acceptable. The regulations achieve these objectives by requiring interest holders to have an approved EMP in place before a "regulated activity" can be undertaken. The Regulations also provide that the EMP will also form the basis of a Notice of Intent under the Environmental Assessment Act.
Northern Territory	Public and Environmental Health Act 2011 (supported by Public and Environmental Health Regulations 2014)	Makes provision to protect and promote the health of individuals and communities in the Territory, and to monitor, assess and control environmental conditions, factors and factors and agents, facilities and equipment and activities, services and products that impact on, or may impact on, public and environmental health.
	Soil Conservation and Land Utilisation Act 1969	Makes provisions for the prevention of soil erosion and soil conservation and reclamation. It makes provisions for restricting construction activities that may damage or further damage land that is not environmentally stable, such as areas suffering soil erosion or areas that have the potential to erode.
	Waste Management and Pollution Control Act 1998 (WMPC Act)	Aims to protect, and where practicable, restore and enhance the quality of the NT environment; encourage ecologically sustainable development;

Policy Jurisdiction	Legislation	Description
		and facilitate the implementation of National Environmental Performance Measures established by the National Environment Protection Council. It is designed to prevent contamination of the surrounding environment, including soil, air, and water, and imposes a general duty on conducting an activity or action that causes or is likely to cause pollution resulting in environmental harm, or that generates or is likely to generate waste. The disposal of listed waste and discharge of water to the environmental requires a license under the Act.
	Water Act 1992	Provides for the investigation, allocation, control, protection, management and administration of water resources in the NT. The Act prohibits waste to come in contact with water or water to be polluted unless under authorisation.
Northern Territory	Weeds Management Act 2001	Aims to prevent the spread of weeds throughout the NT, ensuring the management of weeds is an integral component of land management. It is designed to ensure there is community consultation in the creation of weed management plans and that the landholder or interest holder takes responsibility in implementing weed management plans. If a weed is declared, all landholders, land managers and land users must comply with the declaration classification. The following are the three classes of declared weeds in the NT: • Class A – to be eradicated • Class B – growth and spread to be controlled • Class C – not to be introduced into the NT. All Class A and Class B weeds are also Class C weeds.

Policy Jurisdiction	Legislation	Description
	Work Health and Safety (National Uniform Legislation) Act 2011	The WHS Act is part of the nationally harmonised work health and safety laws, which aim to provide all workers in Australia with the same standard of health and safety protection regardless of the work they do or where they work as well as to provide guidelines for hazardous chemical handling at sites.
International Agreements	Migratory species: • Japan-Australia Migratory Bird Agreement • China-Australia Migratory Bird Agreement • Republic of Korea-Australia Migratory Bird Agreement • Convention on the Conservation of Migratory species of Wild Animals (Bonn Convention)	Australia is party to many international agreements to protect and conserve migratory species and their habitat. Migratory species listed on the annexes to these Agreements are placed on the migratory species list under the EPBC Act.

2.5 Summary of legislative requirements

A summary of legislative requirements, associated project environmental approvals and Imperial's actions and intent for each are provided in Table 7 below.

Table 7. Summary of Legislative Requirements

Legislative Source	Requirement	Applicability	How Met
Petroleum (Environment) Regulations 2016 (NT)	s 30 Requirement for current plan s 18 Revision required at end of each 5-year period	Imperial has a current plan for the regulated activity, approved 20/03/2020	Submission of this revised EMP for 5-year approval
		Imperial has an interest in EP187, with regulated activity planned to commence Q2 2021	This Environmental Management Plan, submitted for approval
	s 10(2) legislative requirements include the requirement to comply with the code of practice	Imperil has a work program for exploration in EP187, which includes:	The EMP has been developed in accordance with the Code of Practice,

Legislative Source	Requirement	Applicability	How Met
	s 4A. The code of practice is the Code of Practice: Onshore Petroleum Activities in the Northern Territory ...	• Civil works, to establish a well site, campsite and access tracks • Drilling of an exploration well. These are regulated activities.	including all mandatory requirements, applicable to the regulated activities. Specific cross-references to the clauses in the Code are included in the EMP, as relevant.
Code of Practice: Onshore Petroleum Activities in the Northern Territory	The Code of Practice applies to all conventional and unconventional oil and gas exploration, appraisal, development and production and ancillary activities in the Northern Territory.	Provide a guideline to Interest Holders for the management of environmental risks and environmental impacts associated with the conduct of regulated activities.	Every section of the EMP has been developed in accordance with the requirements presented in the Code
Environment Protection Act 2019(NT)	Clause 6a proponent is required to provide a referral to the NT EPA of the proposed action that may have the potential to impact on the environment	Ensure there is no unacceptable impact on the environment resulting from actions, now or in the future of the proposed activities; and that all actions are assessed under the principles of ecologically sustainable development, decision-making and waste management hierarchy, ecosystem-based management and the impacts of a changing climate.	A detailed review of and assessment against each prescribed Environmental Objectives for each Environmental Factor was conducted in relation to the proposed Hydraulic Fracturing Program, which is discussed in Table 16 and Appendix 04(Risk Assessment Table). Imperial believe the proposed activity does not represent any potential impact to the environmental, therefore does not required an EIA.
Petroleum Act 1984 (NT)	s 117AAC(1) A person must not, during the conduct of an operation authorised under this	During the conduct of the regulated activity contaminants and waste will be generated, and	Appendix 01 Description of existing environment

Legislative Source	Requirement	Applicability	How Met
	Act, intentionally do an act, or fail to do an act, that causes the release of a contaminant or waste material …	some of these wastes will be listed waste.	Appendix 04 Environmental Risk Assessment Appendix 06 Waste Management Plan Appendix 07 Spill Management Plan
Waste Management and Pollution Control Act 1998 (NT)	s. 96 offence against WMPC Act. s. 12 general environmental duty. s. 38 environmental harm and environmental nuisance.	During conduct of the regulated activity, Imperial has an obligation to prevent noise pollution and not cause "environmental nuisance" by creating adverse effect on the amenity of an area	Appendix 04 Environmental Risk Assessment Appendix 06 Waste Management Plan Appendix 07 Spill Management Plan Appendix 12 Rehabilitation Management Plan
	s 6(2) This Act does not apply in relation to a contaminant or waste: (a) that results from, … the carrying out of: … (ii) a petroleum exploration activity, or petroleum extraction activity … on land on which the activity is authorised … and (b) that is confined within the land on which the activity is being carried out. s 14 Duty to notify of incidents causing or threatening to cause pollution	During conduct of the regulated activity, Interest Holder has an obligation to report pollution in the event a contaminant or waste leaves the regulated site and/or causes, or has the potential to cause, material or serious environmental harm.	Section 7.5 Reporting
Water Act 1992 (NT)	s 16 Prohibition of pollution s 7(2) Section 16 does not apply to waste that comes into contact with water, or water that is polluted, if … the … pollution occurs in the	Ensure that all activities are carried out in a way that the use of water is efficient, conserved and properly managed. To the disposal underground of waste in the course of carrying out	Appendix 04 Environmental Risk Assessment Appendix 06 Waste Management Plan

Legislative Source	Requirement	Applicability	How Met
	course of carrying out a … or petroleum activity; and … is confined within the … petroleum site on which the activity is being carried out. s 17A Hydraulic fracturing waste and water	a petroleum activity on a petroleum site if the waste is not confined	Appendix 07 Spill Management Plan Section 11.5 Aquifer Protection
Environment Protection and Biodiversity Conservation Act 1999 (Cth)	The EPBC Act provides for protection of 'matters of national environmental significance' including not only listed species but also heritage properties and Ramsar wetlands.	The location of the regulated activity is not in the vicinity of any 'matters of national environmental significance' Important Wetlands.	Appendix 01 Description of existing environment

2.6 Relevant Agreements and Operating Consents

All titleholders are required to reach an agreement with landholders before the commencement of exploration activities to comply with the land access guidelines under the Petroleum Act. Stakeholder engagement undertaken as part of this project are discussed in Section 9.

TOs under the Native Title Act, and Aboriginal owners under the Aboriginal Land Rights (Northern Territory) Act 1976 (ALRA) are allowed to negotiate an agreement denoting how petroleum activities must occur following statutory processes described in each Act.

The agreement, Co-operation and Exploration Agreement - Exploration Permit Application EP187, Northern Territory, executed on the 28th of February 2019, is a legal agreement between AAPA, the Northern Land Council (NLC) (the body corporate representing the TOs) and Imperial.

Imperial will ensure that all agreements are reached, and approvals are in place before the commencement of any activity proposed under this EMP. All works will adhere to the terms and conditions stipulated in the agreements.

2.7 Code of Practice: Petroleum Activities in the Northern Territory 2019 and relevant guidelines

The Code of Practice: Petroleum Activities in the Northern Territory 2019 (the Code) applies to all activities involved in both conventional and unconventional oil and gas exploration, appraisal, development and production and ancillary activities in the Northern Territory. The Code covers all

petroleum activities including all petroleum well types including exploration, appraisal, development, monitoring, injection and production wells.

Imperial Oil & Gas adheres to the Australian Petroleum Production and Exploration Association (APPEA) Environmental Code of Practice, containing substantial detail on all aspects of industry operations and in particular the APPEA Environmental Policy.

In addition to compliance with this Environment Management Plan; contractors undertaking activities will be required to comply with the following environmental standards, guidelines and codes of practice:

- The Imperial Oil & Gas Pty Ltd Health Safety Environment Management System (HSEMS),
- Australian Petroleum Production and Exploration Association (APPEA) Code of Conduct and Environmental Practice (2008),
- NT EPA Environmental Factors and Objectives (NT EPA, 2018)
- Code of Practice: Petroleum Activities in the Northern Territory (2019),
- Vegetation Retention Technical Note No. 12 Erosion and Sediment Control Guidelines. DLRM, and
- Clearing Methodology Technical Note No. 18 Erosion and Sediment Control Guidelines DLRM The Regulated Activity

2.7.1 Referrals under NT and Commonwealth legislation

2.7.1.1 Referral under the Environment Protection and Biodiversity Conservation Act

The Environment Protection and Biodiversity Conservation Act 1999 enables the Australian Government to join with the states and territories in providing a national scheme of environment and heritage protection and biodiversity conservation. The objective of the EPBC Act is to provide for the protection of the environment, especially matters of national environmental significance, conserve Australian biodiversity, enhance the protection and management of important natural and cultural places etc. Referral of the project to the Department of Environment and Energy is required if the proposed action will have or is likely to have a significant impact, which is discussed in Section 6.2.1.

2.7.1.2 Referral under the Environment Protection Act 2019 (EP Act)

Imperial, in conjunction with a suitable qualified person has assessed the regulated activities under this EMP in line with the Environment Protection Act 2019 (EP Act) and the Environment Protection Regulations 2020 (EP Regulations). The self-assessment of the potential environmental impacts due to the proposed activities was conducted using the screening tool available on the guidelines provided by the NT EPA (NT EPA b., 2019) which took into consideration:

- Hazardous nature

- Site selection
- Construction and operation that may give rise to impact sources and pathways for impacts to environmental values and sensitivities outside the development footprint
- The residual or ongoing impacts at the end of life of the proposed activities, and
- The cumulative impacts that could result as a combination of smaller impacts arising from the proposed activities.

Imperial does not believe the proposed actions require to be referred under the Environment Protection Act 2019 as they do not have the potential for significant impact on the environment. Planning, assessment and works took into account:

The principles of ecologically sustainable development

The environmental decision-making hierarchy

The waste management hierarchy

Ecosystem-based management

The impacts of a changing climate, and

Public and stakeholder consultation.

Furthermore, actions to be carried out uses the best technology alternatives to ensure the least environmentally damaging approach and the appropriate mitigation of identified risks.

2.8 Description of the regulated activity

In support of the exploration campaign conducted at the beginning of 2020; Imperial proposes to undertake a Lateral Drilling, Hydraulic Fracture (HF) and Extended Production Test (EPT) Program on the Carpentaria 1 well during 2021.

The activities covered in this EMP include:

- Civil Construction
    - Clear up to 10.5 hectares for Carpentaria-1 wellpad extension, firebreak and access tracks
    - Establish bunded tanks pads and tanks fitted with leak detection at the well site
- Well integrity verification:
    - The existing Carpentaria 1 wellbore will be assessed to ensure that sufficient well integrity is in place to withstand hydraulic fracturing pressures as per the Code
- HF activities of the existing Carpentaria 1 wellbore
    - Injection of a slurry (water, sand & chemicals generally found in food and domestic household products) into the target section of the existing Carpentaria 1 wellbore at high pressure to allow an open passage for the hydrocarbons to flow to surface freely
- Completion of the existing Carpentaria 1 wellbore

- Installation of packers and tubing to allow production from the existing Carpentaria 1 wellbore
- Extended Production Testing activities of the exiting Carpentaria 1 wellbore:
  - Flowback fluid management; flaring of gaseous hydrocarbons; storage and/or flaring of potential produced condensate; storage and disposal of HF wastewater; removal of HF wastewater residue to licensed disposal facility from the existing Carpentaria 1 wellbore.
- Well suspension.

2.9 Timing of the regulated activity

An indicative project schedule including estimated start dates and durations of regulated activities is provided in Table 8 below.

Table 8: Indicative Project Schedule

Activity	Estimated commencement	Estimated duration
Civil Construction	Q2 2021	Two weeks
HF of existing Carpentaria 1 Vertical Wellbore	Q2 2021	Two weeks
Completion of existing Carpentaria 1 Vertical Wellbore	Q2 2021	One weeks
Extended Production T and flowback fluid management of existing Carpentaria 1 Vertical Wellbore	Q2 2021	Three Months
Well suspension, Plugging and Abandonment	To be determined	Four weeks

2.10 Description of the existing environment for the Project Area

A description of the Existing environment for the Project Area can be found in Appendix 01.

3. Well Information and Activities

3.1 Well information

Carpentaria 1 is an appraisal well close to the western boundary of EP187 of the McArthur Basin (Beetaloo Sub-basin as determined earlier in 2020 by NTGS), approximately 55km south of Broadmere – 1; it was drilled under the Drilling EMP. Table 9 presents the general well information and Figure 2 the Stratigraphy, casing and cement of the well.

The shallowest target formation, being the Velkerri – Amungee – C Shale formation top, was intersected at 1095mRT. The formations and depths as intercepted during the drilling program are shown in Figure 2 and in Table 10.

Among the various formations intersected during drilling, the Gum Ridge Aquifer (shallowest) was encountered from 50 to 115mRT and the deepest aquifer being the Bukalara Sandstone was encountered from 115m to 244mRT. Therefore, a minimum offset of 851m is present between the base of the deepest aquifer and the top of the shallowest primary target of the well (Velkeri - Amungee C Shale formation). This separation distance complies with the minimum offset of 600m between top target zone and base aquifer as mandated by the Code. All encountered aquifers were isolated behind cemented casing.

Table 9: General Well Information

General Well Information		
Permit Area:	EP 187	
Basin:	Beetaloo Sub-basin	
Well Name	Carpentaria 1	
Well Location (MGA94, Zone 53)	Latitude Longitude Easting Northing Elevation	S 16.79450° E 135.12306° 513112 8143174 195 mGL
Well Type:	Exploration	
Primary Target	Velkerri - Amungee Shale Sequence	
Predicted Hydrocarbon	Dry Gas	
Depth	1909mRT	

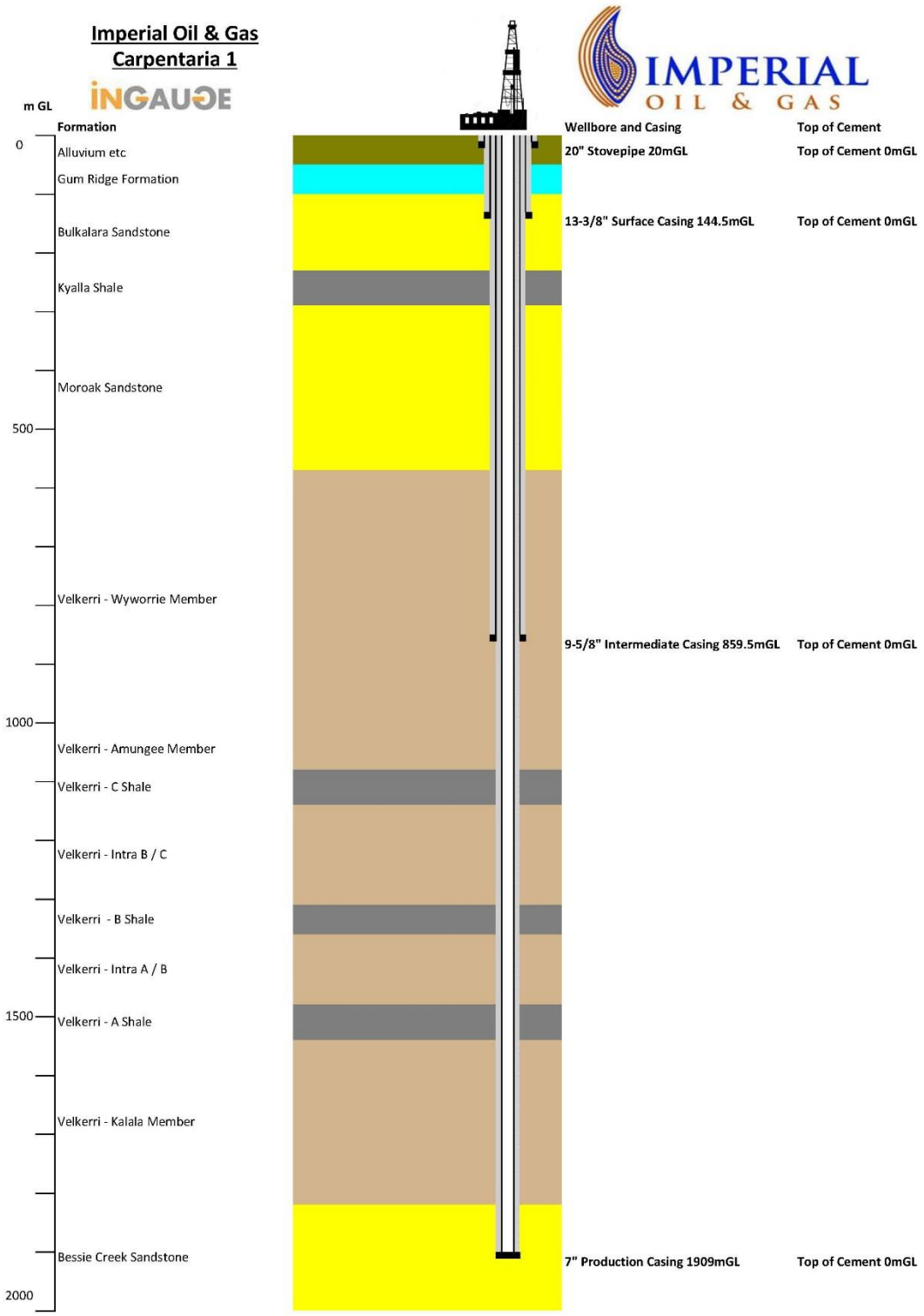

Figure 2: Carpentaria 1- Stratigraphy, Casing and Cement

Table 10: Formation depths at Carpentaria 1

Formation depths at Carpentaria 1	mRT
Alluvium etc	0
Gum Ridge Formation	50
Bukalara Sandstone	115
Kyalla Shale	244
Moroak Sandstone	307
Velkerri - Wyworrie Member	589
Velkerri - Amungee Member	1024
Velkerri - Amungee - C Shale	1095
Velkerri - Amungee - Intra B / C	1155
Velkerri - Amungee - B Shale	1323
Velkerri - Amungee - Intra A / B	1379
Velkerri - Amungee - A Shale	1493
Velkerri - Amungee - Kalala Member	1551
Bessie Creek Sandstone	1832

3.1.1 Well integrity validation

To ensure that sufficient well integrity is in place to withstand HF pressures; the wellbore was assessed as part of the Drilling EMP activities, these assessments included:

- Cement bond logs (CBL) to ensure good quality cement is present from the target reservoir to the nearest aquifer to ensure zonal isolation
- Confirmation of geological barriers and assessment of geological hazards (if any), and
- Mechanical integrity evaluation of the production casing via a casing pressures test to the Maximum Allowable Operating Pressure (MAOP).

This validation data has been submitted to and verified by DITT as part of the drilling EMP activities.

After drilling of the lateral wellbore section, and before the HF activities of the lateral wellbore section the Lateral section integrity will be validated by the same tests and submitted to DITT for approval.

4. Project Water Use

For the Carpentaria 1 2021 program and ancillary activities; Imperial intends to extract water from two water bores (– RN041678 & RN41800)which are located on the Carpentaria 1 wellpad, under the approved water license GRF10316.Imperial will apply for an increase in the volume to be extracted under GRF10316 to cover the requirements of this and future work programs.

Water required for the project is anticipated to be 7.5 ML. A breakdown of the water usage and its volumes is provided in Table 11.

The personnel water use will be approximately 200 L/day per person, which is a total of approximately 0.5 ML/month, over two months, which is the anticipated duration of the Drilling and HF Programs.

Table 11:Estimated Water Use

Use	Scope	Total Use (ML)
Civil Construction	0.5	0.5
Vertical HF fluid make-up	5.0ML per well	5.0
Vertical Completion	0.5ML per well	0.5
Operational Activities	Road and site maintenance at 1ML p/m Vehicle wash downs (0.1ML per month)	1
Camp Use	200L/day per person for 10 days on site (0.5ML per Month)	0.5
Totals		7.5

Upon completion of the Carpentaria 1 2021 program; water consumption and extraction amounts will be submitted to DITT and DEPWS. Table 12 presents the estimated consumption of water for the whole program.

Table 12. Estimated Water Use for the whole program

Use	Scope	Total Use (ML)
2019 Seismic Program	As Per EMP IMP001-03, Epi87-EMP-XPN-RFP-007	0.5
2020 Drilling Program	As Per EMP IMP2-6.1	5.6
2021 Program	As per Table 11	7.5
Totals		13.6

5. Greenhouse Gas Emissions

The threshold calculator developed for the National Greenhouse and Energy Reporting scheme was used to estimate the Greenhouse gas (GHG) emissions related to activities covered in this EMP. The estimation was calculated using factors and formulas available in the Emissions and Energy Threshold Calculator – 2018 from the National Greenhouse and Energy Reporting (Measurement) Determination 2008 (NGER Determination).

GHG emissions generation will be mitigated through the adoption of the NT Petroleum CoP. This code requires Imperial to utilise a Reduced Emissions Completion (REC) and undertake routine monitoring for leaks. RECs involve the capture and combustion of hydrocarbons in a flare. The combustion of gasses produced will reduce the emissions generated when compared to venting. The GHG estimates for the HFS program are provided in Table 13 below.

Table 13: Gas emissions estimates for the work program

Source of Emission	Inputs	Assumptions	tCO2-e
Vegetation Clearance	10.5Ha of eucalypt woodland	Based on FullCAM model.	1995
Transport fuel combustion	3 kL Diesel oil (post-2004 vehicles)	Site Transport - Diesel volumes estimated at 100L/day for 30 days. Estimate based on the Emissions and Energy Threshold Calculator – 2018.	4
Fugitive emissions HFS	25.9 tonnes of methane (CH_4)	Based on Australian National Greenhouse Accounts National Inventory Report 2011 Vol 1 Emissions Factor for gas well completions of 25.9 tonnes/completion day and 1 day. Conversion of emissions factor from CH_4 to CO_2 (25 tCO_2-e/CH_4).	26
Flaring	Flared gas EPT Vertical 90 day EPT 1.2mmscf/d Lateral 90-day EPT 5mmscf/d 11,440 tonnes	Based on the National Greenhouse and Energy Reporting (Measurement) Determination 2008 (Section 3.44) Emissions factor of CO_2-e/tonnes flared, with assumed tip efficiency on flare (<96%?) CO_2 factor tCO_2-e is 2.8 (2,195t x 2.8) = 6,145 CH_4 factor tCO_2-e is 0.8 (2,195t x 0.8) = 1,756 N_2O factor tCO_2-e is 0.03 (2,195t x 0.03) = 66	7966
		Total	9,991

*Flaring is the combustion of fuels for non-productive (non-commercial) reasons. For the estimation of emissions from flaring of fuel "Method 1" has been used.

Table 14 presents the cumulative gas emissions for the stimulation program and preceding works.

Table 14: Cumulative Gas emissions estimates for the stimulation program and preceding works

Source of Emission	Assumptions	tCO2-e
Seismic Program	As Per EMP IMP001-03, Epi87-EMP-XPN-RFP-007	6,638
Drilling Program	As Per EMP IMP2-6.1	4,158
2021 work program	As per Table 13 above	9,991
Total	Cumulative emissions	20,787

To control and monitor greenhouse gas emissions; CSIRO completed a baseline methane monitoring before commencing stimulation as per the Code of Practice for Petroleum Activities, a reduced emission completion will be utilised to reduce the GHG intensity of the activity, all flaring will be measured using flow meters compliant with NGERS, a methane emissions monitoring program will be implemented, the well will be tested every six months for any leaks as per the NT petroleum CoP, and the emissions will be reported in accordance with the NGERS.

6. Traffic Management and Traffic volumes

There are no main road works required for the 2021 Work Program as required upgrades were carried out under the Drilling EMP.

The estimated traffic volume for the 2021 Work Program is shown in Table 15 below.

Table 15: Estimated operational trucking requirements

Activity	Total Loads	Truck Movements per week
Food Truck Delivery	12	1
Rubbish and Waste Removal	12	1
Potable Water	24	2
Fuel Delivery	12	1
Drilling Rig	30	30
Completions Rig	10	10
HF Spread	20	20
Material Delivery	60	20

7. Waste Management

Waste will be managed per the internationally accepted guide for prioritising waste management practices to achieve optimal environmental outcomes. Waste will be managed per the following hierarchy:

1. Avoid: eliminate the generation of wastes through design modification,
2. Reduce: reduce unnecessary resource use or substitute a less resource-intensive product or service,

3. Re-use: reuse a waste without further processing,
4. Recycle: recover resources from a waste,
5. Treatment: treat the waste to reduce the hazard of the waste before disposal, and
6. Disposal: disposal of waste if there is no viable alternative.

Refer to the Appendix 06 Wastewater Management Plan for details.

8. Emergency Response Plan

Imperial will update its emergency response plan and associated bridging documents as part of revising the WOMP for the proposed activities.

9. Environmental Risk Assessment

An environmental risk assessment was undertaken by suitably qualified personnel for the proposed Regulated Activities under this EMP using the methodology outlined in Appendix 03 (Environmental Risk Assessment Framework)

The results of this risk assessment are shown in Appendix 04 (Environmental Risk Assessment), a summary of the environmental factors and key risks are given below in Table 16 below.

Table 16: Summary of the Environmental Factors and key risks.

Aspect	Key Risk
Air quality	• Dust emissions from vehicle movements on unsealed roads • Excessive exhaust emissions • Reduction of air quality - Increased in dust particles • Increased greenhouse gas emissions • Flora stress, dieback, or both due to dust covering of foliage • Extended Production testing flaring
Land (Flora, Fauna and Environmental quality)	• Disruption on landform and soils from erosion and sediment control failure • Fauna entrapment in open pits • Soil contamination due to overflow, leaks or spills of fluid storage tanks • Impact on flora due to flaring (light), Extended Production testing (EPT) • Loss of soil productivity due to rehabilitation failure and poor topsoil management • Soil contamination due to poor waste and chemical management • Impact on flora, fauna and loss of habitat due to vehicle strikes • Soil contamination due to chemical spills, lack of appropriate bunding and poor refuelling, fuel transfer practices and oil and chemical handling • Introduction and spread of weeds due to vehicle movements • Ignition sources from plant and machinery and inappropriate cigarette disposal

Aspect	Key Risk
	• Waste stored inappropriately attracting native and feral fauna • Soil contamination due to flowline failure during pumping and flowback operations.
Water (Groundwater & Surface water)	• Impact to groundwater quality and groundwater-dependent ecosystems due to well integrity failure or cross-flow • Use of groundwater for project activities • Contamination of water bodies due to chemical spills, lack of appropriate bunding and poor refuelling, fuel transfer practices and oil and chemical handling • Contamination of water bodies due to flowline failure during pumping and flowback operations • Contamination of water bodies due to storage (tank/vessels) failure or overflow • Impact to surface water due to inappropriate management of waste • Cross-flow during hydraulic fracture (HF) • Cross-flow caused by faults of major geographic structures enables.
People and community	• Road users, landholders discontent due to loss of visual amenity • Vehicle and plant movement on regional roads and access tracks • Land biodiversity impact due to heavy machinery movements • Noise and vibration due to vehicles movements, drilling, HF and EPT activities • Light pollution due to artificial lighting required for safe operations and camp • Disturbance to heritage sites due to works conducted out of the approved areas • Ignition sources from plant and machinery and well control events (flaring) • Light pollution due to extended Production Testing, flaring

9.1 Geological Hazard Assessment

A geohazard assessment was conducted as part of the Drilling EMP to identify subsurface hazards that could pose an environmental risk during the HF Program. No major geohazards or faults have been identified at the Project location. Observations of the Assessment are available in Table 17.

Hazards identified are assessed in Appendix 04 as part of the Environmental Risk Assessment.

Table 17: Geological Hazard Assessment

Hazard Type	Assessment/Observations
Fault Penetrations	Wells have been located to avoid intersections with major fault zones. Carpentaria 1 - well is located approximately 30 km from the interpreted Beetaloo Sub-basin edge. There is evidence of seismically-resolvable faulting in the area within 1km, though there is no evidence of any major faults nearby.
Hazardous Gases	Hydrogen sulphide or other hazardous gases are unlikely to be observed based on mud gas data acquired across the Sub-basin and the reported gas composition from the Amungee NW-1H well testing results. Hydrogen sulphide detectors will be used during HF, flowback and appraisal (production) operations as per best practice for exploration activities.

10. Surface activities

The activities under this EMP will be carried out utilising an expansion of the existing Carpentaria 1 wellpad and the associated access track, which was assessed and approved under the drilling EMP.

The original Carpentaria 1 wellpad was constructed on the minimum footprint required for the activities of that program. The disturbance footprint of the Carpentaria 1 wellpad will be expanded beyond the current disturbance footprint by 10.25 hectares to cover the requirements for the proposed activities to be carried out under this EMP This layout reduces the impacts on the environment as much as practicable while allowing for safe and efficient operations and fire protection. A breakdown of this new disturbance is shown in Table 18.

Table 18:Additional clearing at Carpentaria 1 wellpad

Description	Area to be cleared under this EMP
Wellpad	5.5 Ha
Access track/Fire Trails	1.25 Ha
Fire protection, low fuel load zone	2.5 Ha
Timber stockpile area (for rehab)	1 Ha
Total	10.25 Ha

The proposed Carpentaria 1 wellpad is shown in Figure 3 below, including the boundary of the existing Carpentaria 1 wellpad for reference.

Imperial will provide geospatial files to DEPWS for the proposed clearing footprint as part of this EMP submission.

Imperial will utilise checklists during construction, site operations and periods where the wellpad is not operational to monitor and ensure compliance; example checklists are provided in section 22.

Imperial will provide geospatial files of the extent of clearing to DEPWS after construction activities are completed.

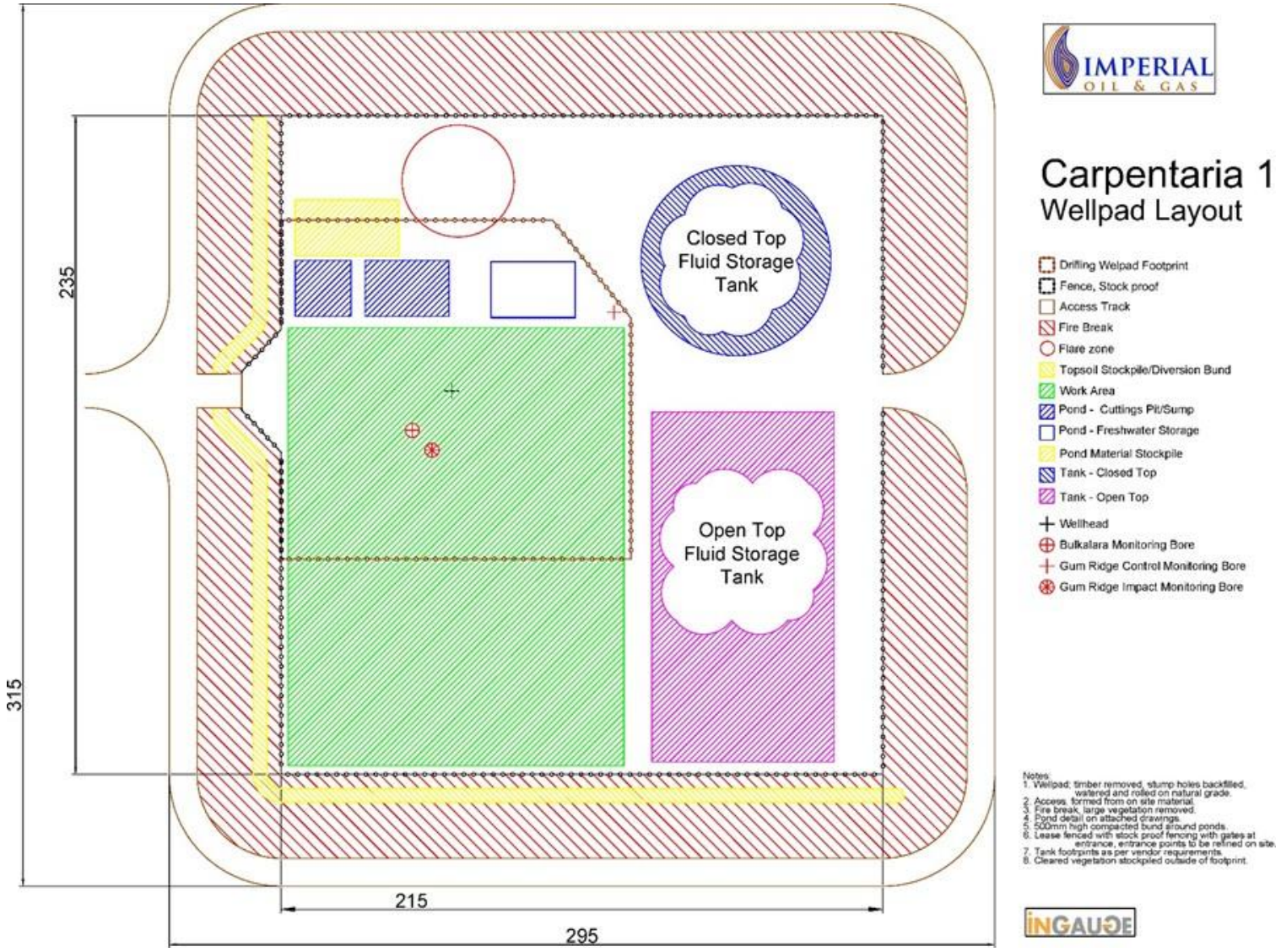

Figure 3: Carpentaria 1 Wellpad footprint with indicative tanks layout

10.1 Well Pad Selection

The activities under this EMP will be an extension to the existing Carpentaria 1 wellpad and the use of the pre-existing associated access track. The Carpentaria 1 wellpad selection was assessed and approved under the Drilling EMP; as such, this EMP does not further consider Well Pad Selection.

10.2 Noise

Due to the remote location of Carpentaria 1, there are no receptors as defined in table 3.5 of the Northern Territory Noise Management Framework Guideline Version 0.1 within 10km. Regulated activities will not be above the minimum project intrusiveness noise levels as defined in table 3.4 of the same document, at any receptors.

10.3 Erosion and Sediment Control and Hydrology

The activities under this EMP will be carried out utilising the extension of the existing Carpentaria 1 wellpad and the associated access track. The planned activities will alter the scale of the Erosion and Sediment Control (ESC) requirements and Hydrology of the site, but not the control measures required. As such, the ESCP for Carpentaria 1 has been updated, and is attached as Appendix 05.

Imperial will utilise checklists during construction, site operations and periods where the wellpad is not operational to monitor and ensure compliance; example checklists are provided in section 22.

10.4 Biodiversity Protection

The activities under this EMP will be carried out utilising the existing Carpentaria 1 wellpad and the associated access track. The disturbance footprint will be expanded beyond the current footprint, as shown in Figure 3.

The planned activities will not alter the biodiversity protection requirements of the site. There will be no new stream crossings constructed under this EMP. The location and extent of areas cleared, as mentioned above, will be provided to the Minister, including geospatial information.

Imperial will utilise checklists during construction, site operations and periods where the wellpad is not operational to monitor and ensure compliance, example checklists are provided in section 22.

10.5 Weed Management

A project-specific weed management plan has been developed as part of the EMP, refer to Appendix 09 for the Weed Management Plan.

Imperial will utilise checklists during construction, site operations and periods where the wellpad is not operational to monitor and ensure compliance. Example checklists are provided in section 22.

10.6 Fire Management

A project-specific fire management plan has been developed as part of the EMP, refer to Appendix 08 for the Fire Management Plan.

Imperial will utilise checklists during construction, site operations and periods where the wellpad is not operational to monitor and ensure compliance. Example checklists are provided in section 22.

10.7 Containment of Contaminants

10.7.1 HF Chemical Risk Assessment

A independent risk assessment was carried on HF Chemicals, the full risk assessment is provided in Appendix 06.01 (HF Chemical Risk Assessment)

The goal of the chemical risk assessment was to demonstrate that potential risks have been eliminated or reduced as much as is reasonably practicable to potentially expose human and ecological receptors. The life cycle of the hydraulic stimulation fluid system chemicals was assessed specifically for hydraulic stimulation operations and included:

- Activities associated with hydraulic stimulation chemical mixing and use at the well pad, and
- Management of flowback water (i.e., stored on-site) during or after the completion of hydraulic stimulation activities at the well pad.

The Risk Assessment found that hydraulic stimulation chemicals within the life cycle (i.e., mixing, usage and storage) may result in potential exposure to human receptors and the environment through accidental releases. These potential releases, whilst unexpected, are considered to have a very low probability of occurrence and are constrained by the EMP requirements to managing risk, existing legislative requirements and the ongoing mitigating of potential impacts.

Imperial has developed and implemented a range of systems and plans to control the transportation and storage of chemicals during field development and operational activities. This includes personnel induction and training, effective traffic management and routing to minimise the potential for accidents and spill management planning and response equipment. These systems and processes are considered effective in lowering the probability of occurrence of consequence associated with the transportation incidents.

The human health and ecological hazard mitigation information provided in the chemical risk assessment dossiers and SDSs primarily focuses on safe handling, transportation and worker protection.

Based on the outcomes of this assessment, no further management controls were considered necessary.

10.7.2 Containment of Contaminants

Activities that involve wastewater or chemical storage will be carried out according to:

- The Wastewater Management Plan, Appendix 06.
- The Spill Management Plan, Appendix 07.

The transport of chemicals and wastewater on unsealed roads during the wet season has been demonstrated to be ALARP and acceptable. Please refer to the "Transport vehicle accident due to weather" and "Transport vehicle stuck due to mechanical or weather events." in Appendix 05 (Environmental Risk Assessment).

Imperial will utilise checklists during construction, site operations and periods where the wellpad is not operational to monitor and ensure compliance; example checklists are provided in section 22.

10.7.2.1 Freeboard management

Freeboard for tanks and ponds will be set and managed according to the season, and to whether the site is operational, as shown in Table 19 below.

Table 19: Wastewater Storage Freeboard

Storage	Wet Season	Dry Season
Pond	1.1m	0.5m
Tank Open Top	1.1m	0.5m
Tank Closed top	0.5m	0.5m

10.7.2.2 Significant Rainfall Event Response

Freeboard in wastewater storage devices will be managed as per Table 19.
As per condition C.7.1.1 (a) ii, Imperial will:

- Monitor the stored volume and available freeboard of all open-top tanks in line with condition C.5.5 (b) of the Code.
- If a "significant rainfall event" is forecast by the BOM, subtract the event forecast from the current freeboard, this will become the "calculated post significant event freeboard".
- If the "calculated post significant event freeboard" is less than the freeboard requirements shown in Table 19 Imperial will transfer enough produced water and flowback fluid into above-ground enclosed tanks to give a "calculated post significant event freeboard" equal to, or greater than shown in Table 19, at least 8 hours before the significant event is forecast to start.

10.7.2.3 Storage of Condensate

If condensate is produced during EPT operations at Carpentaria 1 in significant volumes it will be stored for offsite disposal at a registered facility, if the condensate volumes are small, it will be sent to flare.

If condensate is stored or separated on site at Carpentaria 1, it will be done in designated double-lined storage tanks as per AS1940. These tanks will be monitored and have controls to prevent vapours from exceeding the Lower Explosive Limit (LEL) of the condensate outside the tank.

10.8 Rehabilitation

A project-specific rehabilitation management plan has been developed as part of the EMP, refer to Appendix 12 for the Rehabilitation Management Plan.

11. Well Operations

11.1 Well History

The drilling of Carpentaria 1 was carried out in Q3 and Q4 of 2020 under the drilling EMP.

The isolation and protection of aquifer present has been confirmed with integrity assessment checks provided to DITT following cementing and completion of construction of the well.

11.2 Lateral Wellbore

A lateral wellbore is not planned to be drilled under this EMP.

11.3 Well Operations Management Plan

A Well Operations Management Plan (WOMP) is currently in place for Carpentaria 1, being "Imperial_2020 Drilling_WOMP_Rev1.2".(the WOMP) The Imperial_2020 Drilling_WOMP will be reviewed and updated to include the activities to be carried out under this EMP before site works commence. Imperial will provide DEPWS notification when the revised WOMP is approved by DITT. For the sake of usability, information that is currently included in the WOMP, or will be included in a revised version of the WOMP has not been repeated in this EMP.

11.4 Well Integrity Management

Well integrity management requirements are covered in the WOMP. The WOMP will be revised and approved by DITT before the regulated activities under this EMP are carried out. Imperial will provide DEPWS Notification when DITT approves the revised WOMP.

11.5 Aquifer Protection

Among the various formations intersected during drilling, the Gum Ridge Aquifer (shallowest) was encountered from 50 to 115mRT. The deepest aquifer was the Bukalara Sandstone encountered from 115m to 244mRT. The shallowest target formation, being the Velkerri – Amungee – C Shale formation top, was intersected at 1095mRT. The formations and depths as intercepted during the drilling program are shown Figure 2 and in Table 10.

Therefore, a minimum offset of 851m is present between the base of the deepest aquifer and the top of the shallowest primary target of the well (Velkeri - Amungee C Shale formation). This separation distance complies with the minimum offset of 600m between top target zone and base aquifer as mandated by the Code.

Both the Gum Ridge Aquifer and the Bulkaraa Sandstone were isolated from the surface and hydrocarbon bearing zones by the surface, intermediate and production casing strings and their respective cement jobs, during the drilling phase, as shown in Figure 2.

Imperial has drilled a Control Monitoring Bore, and an Impact Monitoring Bore for the Gum ridge formation under the Drilling EMP, the logs from these bores were utilised to build an accurate understanding of what aquifers and potential geohazards exist at the site and their depth from surface. The location of the control monitoring bore (CMB) is approximately 100 metres up-gradient from the Carpentaria-1 petroleum well. The location of the impact monitoring bore (IMB) is approximately 20 metres down-gradient from the well in compliance with the Code. Ground water quality reporting from the impact monitoring bore (IMB) to DEPWS will continue in compliance with the Code. This monitoring is to further demonstrate that the Carpentaria-1 petroleum well has isolated and protected the Gum Ridge aquifer and to confirm that no impact to groundwater is occurring as a result of the regulated activities.

Imperial has supplied DEPWS with 6 months of local baseline data for water quality indicators as part of the Drilling EMP activities, in line with Table 7 of the Code, and the required analyte testing from the Preliminary Guideline: Groundwater Monitoring Bores for Exploration Petroleum Wells in the Beetaloo Sub-basin.

A baseline and reporting thresholds from the six months of monitoring data is shown in Table 20. Reporting thresholds for all analytes have been derived by use of statistically derived outliers from baseline measurements of groundwater quality analytes. Imperial will report any water sampling results that exceed these thresholds.

Table 20: Carpentaria 1 Baseline and reporting thresholds

Key Analytes	Gum Ridge Baseline	Exceedance to be reported Gum Ridge IMB
Electrical Conductivity	1120	>1200
Chloride (mg/L)	60	>70
Radiation (Bq/L)	0.3	>0.5
Arsenic (mg/L)	<0.001	>0.001
Mercury (mg/L)	<0.0001	>0.0001
Methane/Ethane/Propane (µg/L)	<10	>10
Total Recoverable Hydrocarbons (µg/L)	<100	>100
BTEX (µg/L)	<5	>5

11.6 Well Design and Well Barriers

11.6.1 High-Pressure Temperature well design

There were no high-pressure temperature wells found during the offset well review, Carpentaria 1 well is not a high pressure-temperature well as defined in the Code of Practice.

11.7 Working with Hydrogen Sulfide (H2S)

There was no evidence of Hydrogen Sulphide in any of the wells, or during the offset well review or during the drilling of Carpentaria 1.

11.8 Casing and Tubing

Casing and tubing requirements are covered in the WOMP. The WOMP will be revised and approved by DITT before the regulated activities under this EMP are carried out. Imperial will provide DEPWS Notification when DITT approves the revised WOMP.

11.9 Primary Cementing

Cementing requirements are covered in the WOMP. The WOMP will be revised and approved by DITT before the regulated activities under this EMP are carried out. Imperial will provide DEPWS Notification when DITT approves the revised WOMP.

11.10 Wellheads

Wellhead requirements are covered in the WOMP. The WOMP will be revised and approved by DITT before the regulated activities under this EMP are carried out. Imperial will provide DEPWS Notification when DITT approves the revised WOMP.

11.11 Well Control

Well Control requirements are covered in the WOMP. The WOMP will be revised and approved by DITT before the regulated activities under this EMP are carried out. Imperial will provide DEPWS Notification when DITT approves the revised WOMP.

11.12 Drilling Fluids

Drilling fluid requirements are covered in the WOMP. The WOMP will be revised and approved by DITT before the regulated activities under this EMP are carried out. Imperial will provide DEPWS Notification when DITT approves the revised WOMP.

11.13 Air and Gas Drilling Fluids

Air and Gas drilling fluids are not planned to be used under this EMP.

11.14 Well Evaluation, Logging, Testing and Coring

Well Logging, Open Hole Testing and Coring requirements are covered in the WOMP. The WOMP will be revised and approved by DITT before the regulated activities under this EMP are carried out. Imperial will provide DEPWS Notification when DITT approves the revised WOMP.

11.14.1 Extended production testing

Before Extended Production Testing (EPT) activities are carried out, the WOMP will be revised and approved by DITT before the regulated activities under this EMP are carried out. Imperial will provide DEPWS Notification when DITT approves the revised WOMP

11.14.1.1 Extended Production Testing Program

The Extended Production Testing Program (EPT) timing and duration is shown in Table 8.

The well test surface equipment will be designed, prepared and operated in accordance with API Specification 6A, NACE MR-01-075, ASME B31.3 (Spools & X-Over), having a working pressure above all anticipated pressures, it will be tested following relevant stands; this will be covered in more detail in the revised WOMP.

A hazardous classification assessment will be carried out and included in the revised WOMP, be submitted to, and approved by DITT before EPT activities are carried out

During the well test, actual flowing conditions will be recorded and compared to the predicted values.

Proposed well schematics for Carpentaria 1 Vertical and Lateral completions will be compiled as part of the WOMP revision.

The proposed method of disposal of petroleum produced is covered in section in the Wastewater Management Plan and Section 11.15.

The proposed method of disposal of produced water is covered in the Wastewater Management Plan.

The proposed method of disposal of flowback fluid is covered in the Wastewater Management Plan.

The proposed method of disposal of gas produced is covered in Wastewater Management Plan and Section 11.15.

A pressure test that exceeds the maximum anticipated pressures will be completed to demonstrate mechanical integrity and define a maximum allowable operating pressure (MAOP) on all cased hole completions before EPT is carried out.

Imperial will utilise checklists during construction, site operations and periods where the wellpad is not operational to monitor and ensure compliance; example checklists are provided in section 22.

11.15 Hydraulic Stimulation and Flowback Operations

Hydraulic Stimulation and Flowback Operations requirements are covered in the WOMP. The WOMP will be revised and approved by DITT before the regulated activities under this EMP are carried out. Imperial will provide DEPWS Notification when DITT approves the revised WOMP.

11.15.1 Design

The final HF design will be developed using industry recognised software and geomechanics data, taking into consideration; the target zones, sealing mechanism(s) (both natural geological seals as well as adequate casing and annular cement), the risk of casing deformation and aquifers, to minimise the possibility of hydraulic fracturing fluids migrating from the designed fracture zone(s).

The WOMP will be revised and approved by DITT before the regulated activities under this EMP are carried out. Imperial will provide DEPWS Notification when DITT approves the revised WOMP.

The WOMP revision will take into account the location and characteristics of known geohazards and any other wells nearby and that demonstrate that fractures are contained within the proposed stimulation area, containing the target zone(s) and that the stimulated area and target zone(s) are sufficiently separated from aquifers.

11.15.2 Hydraulic Fracturing Fluids

As far as reasonably practicable, fluids with the lowest toxicity will be used in hydraulic stimulation, and the concentrations used will be the minimum required to facilitate effective operations.

During HF design HF fluid additives will be selected and managed to ensure all products are used in accordance with the manufacturer's recommendations and relevant safety data sheets.

Refer to Section 51 for BTEX considerations for HF fluids.

Imperial has considered the use of recycled water for HF operations, but the volume required and the remoteness of the location does not make it reasonably practical, Imperial will consider utilising flowback fluids from this operation in future EP187 operations.

For each stage (or depth level) pumped; the as pumped composition of any fracture stimulation fluids will be monitored and recorded;

- The total volume pumped
- Pumping pressure
- The quality of water used, tested for analytes in section C.8 of the Code
- Typical and maximum concentrations of chemicals or other substances used.

11.15.3 Hydraulic Fracturing Activities

A pressure test that exceeds the maximum anticipated hydraulic fracture stimulation pressures at screenout conditions will be completed before HF activities to demonstrate mechanical integrity and define the MAOP.

The pressure kicks out on the pump units, and in-line pressure relief valves (where utilised) will be set below the MAOP from above.

The casing annuli pressure will be monitored during HF pumping and flowback activities.

Imperial will install a groundwater level/pressure logger in the Impact Monitoring Bore (IMB) during the regulated activity as an additional measure to demonstrate ongoing isolation of the aquifer. Groundwater quality in IMB will continue to be monitored after hydraulic fracturing activities and reported to DEPWS.

Imperial will utilise checklists during construction, site operations and periods where the wellpad is not operational to monitor and ensure compliance; example checklists are provided in section 22.

11.15.4 Flowback Activities, Venting and Flaring

Due to the remoteness of Carpentaria 1 and the likely volumes produced, it is not practical to capture the gas for sale or other use.

All flowback fluid will flow to a separator package fitted with accurate flow measurement devices, with the gas flowing to a completion combustion device equipped with a continuous ignition device to minimise the release of gas to the atmosphere.

Venting may be carried out rather than flaring if, the gas flow is insufficient to allow the separator to function correctly, or the use of a combustion device creates a fire or safety hazard.

Where venting is the only technically feasible option for managing produced gas, the technical considerations preventing the use of the recovered gas will be recorded and included in Imperial's annual report.

Gas volumes emitted during the drilling, HF, completion, flowback, and workovers will be measured using direct measurement as governed under the Commonwealth National Greenhouse and Energy Reporting (Measurement) Determination (2008), and reported per Part D of the Code.

During system upsets or accidental release emissions will be estimated using methods consistent with the National Greenhouse and Energy Reporting (Measurement) Determination 2008.

The management of chemicals and wastes will be conducted at the well lease using drums, intermediate bulk containers and engineered tanks designed to contain the fluids. No storage of chemicals, flowback or wastes will be conducted in ponds or sumps and therefore the potential for releases is considered limited. Water will be managed through the use of engineered treatment tanks that will contain liquids but may have the potential for exposures to avian receptors.

Imperial will utilise checklists during construction, site operations and periods where the wellpad is not operational to monitor and ensure compliance; example checklists are provided in section 22.

11.16 Workover and Intervention

Workover and intervention requirements are covered in the WOMP. The WOMP will be revised and approved by DITT before the regulated activities under this EMP are carried out. Imperial will provide DEPWS Notification when DITT approves the revised WOMP.

11.17 Well Suspension and Decommissioning

Well suspension and decommissioning requirements are covered in the WOMP. The WOMP will be revised and approved by DITT before the regulated activities under this EMP are carried out. Imperial will provide DEPWS Notification when DITT approves the revised WOMP.

11.18 Site Material and Fluids Management

For site selection and design, please refer to sections 10 and 10.1.

For fire management, please refer to Appendix 08 for the Fire Management Plan.

The wellpad will be signposted to identify;

- The well name and number
- Any major hazards
- Details of the interest holder
- The name of the person in charge

The wellsite will be fenced during construction activities.

The management of chemicals on-site is covered in the Spill Management Plan see appendix 07.

The management of liquid wastes is covered in the Waste Management Plan see appendix 06

For freeboard management please refer to Section 10.7.2.1.

For response to a significant rainfall event, please refer to Section 10.7.2.2

Imperial will utilise checklists during construction, site operations and periods where the wellpad is not operational to monitor and ensure compliance; example checklists are provided in section 22.

11.19 Groundwater Monitoring

Groundwater monitoring for activities under this EMP is covered in Section 11.5.

11.20 BTEX

Drilling fluids and Hydraulic fracturing fluids will not contain benzene, toluene, ethylbenzene, or xylene (BTEX).

Imperial will utilise checklists during construction, site operations and periods where the wellpad is not operational to monitor and ensure compliance; example checklists are provided in section 22.

12. Well Site Water Management

12.1 Drilling Fluids

The management of drilling fluids for the regulated activities under this WMP are covered in the Wastewater Management Plan and the Spill management Plan. See appendices 06 and 07.

Imperial will utilise checklists during construction, site operations and periods where the wellpad is not operational to monitor and ensure compliance; example checklists are provided in section 22.

12.2 Management of Produced Water and Flowback Fluid

The management of Produced Water and Flowback fluids for the regulated activities under this WMP are covered in the Wastewater Management Plan and the Spill management Plan. See appendices 06 and 07.

For freeboard management please refer to Section 10.7.2.1.

For response to a significant rainfall event, please refer to Section 10.7.2.2

Imperial will utilise checklists during construction, site operations and periods where the wellpad is not operational to monitor and ensure compliance; example checklists are provided in section 22.

13. Monitoring mandatory requirements

13.1 General Monitoring Requirements

Monitoring programs are be described in the WWMP and SMP. See appendices 06 and 07.

Imperial will utilise checklists during construction, site operations and periods where the wellpad is not operational to monitor and ensure compliance; example checklists are provided in section 22.

13.2 Drilling Materials

The management of Drilling Materials is covered in the Wastewater Management Plan. See appendix 06.

Imperial will utilise checklists during construction, site operations and periods where the wellpad is not operational to monitor and ensure compliance; example checklists are provided in section 22.

13.3 Hydraulic Fracturing Fluid Monitoring

The monitoring of HF fluid is covered in the Wastewater Management Plan. See appendix 06.

Imperial will utilise checklists during construction, site operations and periods where the wellpad is not operational to monitor and ensure compliance; example checklists are provided in section 22.

13.4 Flowback Fluid Monitoring

The monitoring of flowback fluid is covered in the Wastewater Management Plan. See appendix 06.

Imperial will utilise checklists during construction, site operations and periods where the wellpad is not operational to monitor and ensure compliance; example checklists are provided in section 22.

13.5 Produced Water and Flowback Fluid Storages

The storage of produced water and flowback fluid is covered in the Wastewater Management Plan. See appendix 06.

For freeboard management please refer to Section 10.7.2.1.

For response to a significant rainfall event, please refer to Section 10.7.2.2

Imperial will utilise checklists during construction, site operations and periods where the wellpad is not operational to monitor and ensure compliance; example checklists are provided in section 22.

14. Reporting Mandatory Requirements

14.1 Water and Wastewater Tracking and Reporting Requirements

The tracking of water and wastewater is covered in the Wastewater Management Plan. See appendix 06.

Imperial will utilise checklists during construction, site operations and periods where the wellpad is not operational to monitor and ensure compliance; example checklists are provided in section 22.

15. Mandatory Requirements for Management Plans for Wastewater and Spills

15.1 Wastewater Management Plan

A project-specific Wastewater Management Plan has been developed for this EMP.

The Wastewater Management Plan is provided in Appendix 06.

Imperial will utilise checklists during construction, site operations and periods where the wellpad is not operational to monitor and ensure compliance; example checklists are provided in section 22.

15.2 Wastewater Treatment, Reuse and Disposal

Wastewater treatment, re-use and disposal is covered in the Wastewater Management Plan, Appendix 06.

Imperial will investigate opportunities to re-use wastewater, and for beneficial use opportunities in line with the Code.

Imperial will utilise checklists during construction, site operations and periods where the wellpad is not operational to monitor and ensure compliance; example checklists are provided in section 22.

15.3 Spill Management Plan

A project-specific Spill Management Plan has been developed for this EMP.

The Spill Management Plan is provided in Appendix 07.

Imperial will utilise checklists during construction, site operations and periods where the wellpad is not operational to monitor and ensure compliance; example checklists are provided in section 22.

16. Methane emissions monitoring, leak management, detection, and reporting

16.1 Baseline Methane Assessment

The Beetaloo Basin methane baseline monitoring program conducted by the CSIRO in 2018 is applicable across the operational area of EP187.

16.2 Regional Methane Assessment Program (RMAP)

Imperial has studied the available CSIRO report (Ong C., Myers M., Mainson M., Maney B., & Day S., 2019) on baseline methane values across the Beetaloo Sub-basin in consideration of compliance with the requirements of the NT Scientific Inquiry into Hydraulic Fracturing (the 'Inquiry'). Imperial consider The Beetaloo Basin methane baseline monitoring program conducted by the CSIRO in 2018 applicable across the operational area of EP187. Data collected of this monitoring are available online (CSIRO, 2020).

16.3 Routine Periodic Atmospheric Monitoring Programme

As there are no production activities covered under this EMP, a Routine Periodic Atmospheric Modelling Programme is not required.

16.4 Methane Emissions Management Plan

A project-specific Methane Emissions Management Plan has been developed for this EMP.

The Methane Emissions Management Plan is provided in Appendix 10.

16.5 Inspection Frequency and Procedure

Refer to Appendix 10, being the Methane Emissions Management Plan for the Inspection Frequency and procedures for the activities covered under this EMP.

16.6 Standard Leak Detection Instruments

Refer to Appendix 10, the Methane Emissions Management Plan for the Leak Detection Equipment to be used for the activities covered under this EMP.

16.7 General Leak Detection Procedure

Refer to Appendix 10, the Methane Emissions Management Plan for the Leak Detection Procedure to be used for the activities covered under this EMP.

16.8 Leak Remediation and Notification

Refer to Appendix 10, the Methane Emissions Management Plan for the Leak Remediation and Notification for the activities covered under this EMP.

16.9 Compressors and Pneumatic Devices

There will be no Compressors, or Pneumatic Devices utilised for the activities under this EMP. As such, this EMP does not further consider Compressors and Pneumatic Devices.

16.10 Flowback Activities

Flowback activities under this EMP is covered in Section 11.15.4.

16.11 Venting and Flaring

Venting and flaring activities under this EMP is covered in Section 11.15.4.

17. Implementation strategy

17.1 Environmental Outcomes, Performance Standards and Measurement Criteria

As ALARP and Acceptability are **key approval criteria** that the Minister is to be satisfied with, addressing ALARP and Acceptability in a robust manner is a strict requirement and requires proper consideration. Clause 1 of the Code of Practice states the Code outlines standards and processes to ensure risks are managed to ALARP, and regulated activities are carried out in a manner that is consistent with ESD principles, and environmental impacts and risks are reduced to ALARP and acceptable.

However, the Code does not include mandatory requirements for all impacts and risks. Imperial has its own mitigation methods for those not covered in the Code, Imperial has also supplemented the Code with additional controls where it is possible, and justifiable for reducing risk further.

Imperial has undertaken risk reduction in accordance with the hierarchy of controls, i.e. 1) elimination, 2) substitution, 3) Engineering/design, and 4) procedures and administrative controls. This EMP has been developed to specifically protect and ensure the integrity of the existing and surrounding environment from risks associated with the drilling and HF activities at Carpentaria 1; through the establishment and implementation of:

- Environmental Performance Outcomes, means an outcome that will be achieved if the environmental impacts and environmental risks of a regulated activity are reduced to a level that is:
  a) as low as reasonably practicable; and
  b) acceptable.
- Environmental Performance Standards, means a standard that:
  a) relates to the management of environmental impacts and environmental risks of a regulated activity; and
  b) applies to persons, systems, equipment or procedures involved in carrying out the activity.
- Measurement Criteria, means the criteria to be used in determining whether an environmental outcome or environmental performance standard has been met.
- Responsibility, means the person who is responsible for the process or the implementation of an activity or

The following section provides the management controls that Imperial will implement during its activities to protect environmental values such as:

- Terrestrial Flora and fauna,
- Terrestrial Environmental Quality,
- Inland Environmental Water Quality,
- Hydrological processes,
- Air Quality and Greenhouse Gasses,and
- Human Health

The tables below outline the environmental values, the environmental outcomes, the performance standards and Imperial's management controls and measurement criteria to reduce risks as identified in Appendix 04. Risk from each environmental value associated to the EP187 area will be managed to ALARP to meet Imperial's management objectives and successfully deliver the detailed environmental outcomes as detailed in each of the following tables.

Table 21: Environmental Outcomes, Performance & Measurement – Human Health

Environmental Performance Outcome	Activity	Environmental Performance Standard (Performance measure)	Measurement Criteria (Monitoring and records)	Responsibility
Conduct of the regulated activity does not create safety risks for the public or landholders	Operations resulting in the creation of dust	• Operations carried out in a manner that does not create excessive dust	• Community complaints register shows no complaints received concerning dust generation • Site induction records show all personnel inducted and induction materials include consideration of impact on air quality from dust generation	**Project Manager**
		• Speed limits posted on unsealed access tracks adhered to	• Site induction records show all personnel inducted and induction materials include requirements related to adhering to speed limits. • Incident management system shows no records of non-adherence to speed limits	**Project Manager**
		• Dust suppression activities undertaken on unsealed access roads during the dry season	• Roads to be dampened with water when required to minimise dust potential • Daily records show use of water cart linked to access track condition assessment, and site activities.	**Project Manager**
	Vehicle and Plant Movement	• Speed limits posted on unsealed access tracks adhered to	• Site induction records show all personnel inducted and induction materials include requirements related to adhering to speed limits. • Incident management system shows no records of non-adherence to speed limits	**Project Manager**
		• Vehicle movements on publicly accessible roads carried out in a safe manner	• Community complaints register shows no complaints received concerning dangerous driving • Incident management system shows no records of dangerous driving or non-adherence to road rules	**Project Manager**
	General Operations	• Well site fenced and signposted permanently with the well name, well number, major hazards and details of the interest holder	• Signage that is compliant with the Code of Practice is erected at the well site before commencement of the regulated activity • The name of the person-in-charge of any active well operations is displayed in writing at all approaches to the well site	**Project Manager**
		• Well site remains fenced at all times to prevent access from livestock	• Weekly checklist shows well site fence installed and intact throughout the regulated activity.	**Project Manager**

Table 22: Environmental Outcomes, Performance & Measurement – Terrestrial Flora and Fauna

Environmental Performance Outcome	Activity	Environmental Performance Standard (Performance measure)	Measurement Criteria (Monitoring and records)	Responsibility
Sensitive receptors, significant conservation areas, or listed species or their habitat, is not permanently affected by conduct of the regulated activity	• Clearing of vegetation for conduct of the regulated activity	• No vegetation cleared beyond the approved areas	• Site induction records show all personnel involved in clearing operations inducted and induction materials include requirements related to clearing limits • Spatial analysis of final disturbance footprint against approved clearing areas and buffers shows that all clearing is within cleared footprint	**Project Manager**
	• Vehicle and plant movements	• No introduction of new weed species, or spread of existing weed populations as a result of conduct of the regulated activity	• Site induction records show all personnel inducted and induction materials include requirements related to weed impacts and prevention of spread. • Weed inspections as outlined in the Weed Management Plan (Appendix 09) conducted according to the timetable indicated • Weed control activities undertaken as specified in the approved Weed Management Plan • All vehicles entering the site are inspected for the presence of weed seeds/vegetative material	**Project Manager**

Environmental Performance Outcome	Activity	Environmental Performance Standard (Performance measure)	Measurement Criteria (Monitoring and records)	Responsibility
	• Ignition sources from plant and machinery	• No fires in surrounding areas resulting from conduct of the regulated activity	• Site induction records show all personnel inducted and induction materials include requirements related to impacts of wildfire and requirements to prevent off-site fires • Fire and emergency drill records demonstrate a minimum of one training event per each quarter that has site activities • Monitoring records show an annual assessment of fuel load undertaken • Annual regional fire mapping documented and used to reassess fire risk each dry season • Weekly inspection records show assessment of fire breaks and fire access trails completed at least monthly during the dry season • Community engagement records show consultation with pastoralists regarding fire management	**Project Manager**
	• Waste handling and disposal	• All putrescible waste stored in vermin-proof enclosed receptacles	• Site induction records show that all personnel inducted and induction materials include waste segregation, storage, and disposal requirements. • Daily checklist records show no incidences of introduced pests in waste storage area • Daily checklist records show no incidences of putrescible waste being accessible to wildlife and/or vermin	**Project Manager**
		• All listed waste transported by licensed waste contractors	• Listed waste transfer records show Environment Protection Licence (EPL) number of waste contractor • Waste records show the volume of wastewater removed from the well site for off-site disposal by a licensed waste contractor	**Project Manager**
		• No waste is disposed of on-site	• Waste records show removal of all waste from site	**Project Manager**
		• All waste segregated on-site according to whether it is hazardous, recyclable or for general disposal	• Weekly checklists confirm waste appropriately segregated	**Project Manager**
		• Wastewater from drilling stored in lined wastewater sumps	• Documentation available demonstrating the lining in wastewater sumps meet the requirements of the Code of Practice clause C.4.1.2 (b)	**Project Manager**
	• Lighting, noise and vibration from vehicles, plant and equipment	• All vehicles, plant and equipment maintained and operated per manufacturer requirements to prevent unnecessary noise or vibration creating disturbance	• Site induction records show all personnel inducted and induction materials include requirements related to minimising noise, vibration and light spill. • Maintenance records for vehicles demonstrate all vehicles serviced following service schedule. • Maintenance records for equipment demonstrate servicing following the manufacturers specifications and/or Imperial's maintenance and service schedule.	**Project Manager**
		• No impacts on landholders or the community regarding from lighting, noise or vibrations	• Community complaints register shows no complaints received concerning noise, vibration or light spill	**Project Manager**
		• All site lighting directed inward, where practicable	• Site inspections conducted during night time to confirm that lights are directed inwards where practicable	**Project Manager**

Table 23: Environmental Outcomes, Performance & Measurement – – Terrestrial Environmental Quality

Environmental Performance Outcome	Activity	Environmental Performance Standard (Performance measure)	Measurement Criteria (Monitoring and records)	Responsibility
Terrestrial environmental quality, including surface waters, is not permanently affected by conduct of the regulated activity.	• Clearing of vegetation for conduct of the regulated activity	• No ground disturbance occurs outside of designated areas approved for ground disturbance	• Site induction records show all personnel involved in clearing operations inducted and induction materials include requirements related to clearing limits • Spatial analysis of final disturbance footprint against approved clearing areas and buffers shows that all clearing is within cleared footprint	**Project Manager**
	• Vehicle and plant movements	• No vehicle movements outside of designated areas approved for ground disturbance	• Site induction records show all personnel inducted and induction materials include prohibition of movement outside of approved areas. • Incident management system has no records related	**Project Manager**

Environmental Performance Outcome	Activity	Environmental Performance Standard (Performance measure)	Measurement Criteria (Monitoring and records)	Responsibility
			to unauthorised movement off-site	
		• No unauthorised vehicle crossing of flowing creeks or watercourses	• Site induction records show all personnel inducted and induction materials include prohibition of crossing of flowing creeks or watercourses, unless approved by Site Manager • Incident management system has no records related to unauthorised crossing of flowing creeks or watercourses • Evidence of risk assessment undertaken and subsequent decision available for each instance of an approved crossing of a flowing creek or watercourse	**Project Manager**
	• Storage and handling of hazardous substances, including HF fluid and flowback fluid wastewater	• All liquid chemicals and hazardous substances stored within secondary impermeable containment at all times or bunded areas that can hold 110% of the largest container	• Site induction records show all personnel inducted and induction materials include requirements related to the use and storage of hazardous chemicals. • Weekly inspection records confirm all hazardous materials stored in compliance with relevant SDS	**Project Manager**
		• All storage vessels for wastewater and hazardous substances are maintained at 100% integrity	• Daily inspection records confirm tanks and storage vessels intact and free from defects or tears • Incident management system includes records of failures of integrity of storage vessels	**Project Manager**
		• No instances of loss of containment of wastewater	• Incident management system includes records of loss of containment of wastewater	**Project Manager**
		• Freeboard for all wastewater sumps, flowback water tanks and produced water tanks maintained at all times	• Site induction records show all personnel inducted and induction materials include requirements related to storage of wastewater. • All tanks marked with freeboard levels as per seasonal requirements • Daily inspections confirm wastewater levels do not exceed freeboard • Records of exceedance of the freeboard are included in the incident management system and evidence of corrective actions and preventative measures implemented	**Project Manager**
		• All spills remediated immediately on discovery	• Site induction records show all personnel inducted and induction materials include requirements to immediately remediate all spills to ground. • Daily inspections show no evidence of soil contamination from spills/leaks not immediately rectified • Weekly inspections show the hazardous materials and storage area is clean and free from spills and leaks • Daily inspections show bunds inspected and contents removed on daily basis during wet season • Hazardous materials register to be maintained during site operations • Records of spill remediation to confirm immediate response • SDS register compliant with NT WorkSafe requirements and kept at location of chemicals at all times • Daily inspections show spill kits appropriate to the chemical in use are available at the location of use	**Project Manager**
	• Surface water usage	• No water to be taken from surface water sources	• Site induction records show all personnel inducted and induction materials include prohibition of use of surface water at any time. • Incident management system includes records of unauthorised use of surface water	**Project Manager**

Table 24: Environmental Outcomes, Performance & Measurement – Hydrological Process

Environmental Performance Outcome	Activity	Environmental Performance Standard (Performance measure)	Measurement Criteria (Monitoring and records)	Responsibility
The conduct of the regulated activity does not result in the over extraction or contamination of groundwater resources	• Groundwater extraction for project activities	• Compliance with the groundwater extraction licence	• Groundwater extraction volumes recorded on-site and provided to DITT and DEPWS at the end of the project operations • Groundwater taken is less than maximum permitted volume for the activity • Water extraction to be undertaken at approved registered groundwater bores.	**Project Manager**
	• Drilling and Hydraulic Fracturing of wellbore/s	• No contamination of aquifers from the regulated activities	• Six months of local baseline data collection for water quality indicators • Groundwater monitoring per the *Preliminary Guideline: Groundwater Monitoring Bores for Exploration Petroleum Wells in the Beetaloo Sub-Basin* • Groundwater monitoring results do not show contamination of the local aquifers from the regulated activities	**Project Manager**

Table 25: Environmental Outcomes, Performance & Measurement – Inland Environmental Water Quality

Environmental Performance Outcome	Activity	Environmental Performance Standard (Performance measure)	Measurement Criteria (Monitoring and records)	Responsibility
Local inland water quality is not permanently affected by conduct of the regulated activity.	• Vehicle and plant movements	• No unauthorised vehicle crossing of flowing creeks or watercourses	• Site induction records show all personnel inducted and induction materials include prohibition of crossing of flowing creeks or watercourses, unless approved by Site Manager • Incident management system has no records related to unauthorised crossing of flowing creeks or watercourses • Evidence of risk assessment undertaken and subsequent decision available for each instance of an approved crossing of a flowing creek or watercourse	**Project Manager**
	• Storage and handling of hazardous substances, including HF fluid and flowback fluid wastewater	• All liquid chemicals and hazardous substances stored within secondary impermeable containment at all times or bunded areas that can hold 110% of the largest container	• Site induction records show all personnel inducted and induction materials include requirements related to the use and storage of hazardous chemicals. • Weekly inspection records confirm all hazardous materials stored in compliance with relevant SDS	**Project Manager**
		• All storage vessels for wastewater and hazardous substances are maintained at 100% integrity	• Daily inspection records confirm tanks and storage vessels intact and free from defects or tears • Incident management system includes records of failures of integrity of storage vessels	**Project Manager**
		• No instances of loss of containment of wastewater	• Incident management system includes records of loss of containment of wastewater	**Project Manager**
		• Freeboard for all wastewater sumps, flowback water tanks and produced water tanks maintained at all times	• Site induction records show all personnel inducted and induction materials include requirements related to storage of wastewater. • All tanks marked with freeboard levels as per seasonal requirements • Daily inspections confirm wastewater levels do not exceed freeboard • Records of exceedance of the freeboard are included in the incident management system and evidence of corrective actions and preventative measures implemented	**Project Manager**
		• All spills remediated immediately on discovery	• Site induction records show all personnel inducted and induction materials include requirements to immediately remediate all spills to ground. • Daily inspections show no evidence of soil contamination from spills/leaks not immediately rectified • Weekly inspections show the hazardous materials and storage area is clean and free from spills and leaks • Daily inspections show bunds inspected and contents removed on daily basis during wet season • Hazardous materials register to be maintained during site operations • Records of spill remediation confirm immediate response	**Project Manager**

Environmental Performance Outcome	Activity	Environmental Performance Standard (Performance measure)	Measurement Criteria (Monitoring and records)	Responsibility
			• SDS register compliant with NT WorkSafe requirements and kept at location of chemicals at all times • Daily inspections show spill kits appropriate to the chemical in use are available at the location of use	
		• All storage vessels for wastewater and hazardous substances are maintained at 100% integrity	• Daily inspection records confirm tanks and storage vessels intact and free from defects or tears • Incident management system includes records of failures of integrity of storage vessels	**Project Manager**
	• Surface water usage	• No water to be taken from surface water sources	• Site induction records show all personnel inducted and induction materials include prohibition of use of surface water at any time. • Incident management system includes records of unauthorised use of surface water	**Project Manager**

Table 26: Environmental Outcomes, Performance & Measurement – Air Quality and Greenhouse Gasses

Environmental Performance Outcome	Activity	Environmental Performance Standard (Performance measure)	Measurement Criteria (Monitoring and records)	Responsibility
Minimise emissions, including greenhouse gases, created by conduct of the regulated activity.	• General project activities creating emissions	• Operations carried out in a manner that does not create excessive emissions	• Community complaints register shows no complaints received concerning excessive emissions from site • Site induction records show all personnel inducted and induction materials include consideration of impact on air quality from emissions	**Project Manager**
	• Vehicle and plant emissions	• All vehicles, plant and equipment maintained and operated per manufacturer requirements to minimise emissions	• Records and schedules to be managed for machinery and vehicles maintenance as per manufacturers requirements	**Project Manager**
	• Production testing creating fugitive emissions	• Flaring to be used rather than venting during production testing	• All venting and flaring during production testing will be measured using flow meters compliant with NGERS • Records kept of venting and flaring events and volumes during production testing • Emissions will be reported per NGERS	**Project Manager**
		• Gas leak detection, repair and notification to be conducted throughout all phases of the project that have live equipment	• Site induction records show all production and evaluation personnel inducted and induction materials include leak detection, repair and notification requirements • Weekly inspection reports confirm leak detection carried out on live equipment • Records of leak remediation confirm immediate response • Records of leak remediation confirm reporting within five business days of the remediation of the leak	**Project Manager**

18. Reporting

18.1 Routine Reporting

Imperial will provide to DEPWS, unless otherwise agreed by the Minister, a quarterly Environmental Performance Report as required under Part 3, Division 1, Regulation 35 of the Petroleum (Environment) Regulations. The report will provide information regarding project progress and performance, including breaches, if any, to the Project Specific Environmental Objectives, Performance and Standards. The Project Specific Environmental Objectives, Performance and Standards are those mentioned in the above section in tables 20-26. Furthermore, Imperial will report on any actions taken to fix, mitigate or avoid any adverse environmental findings.

Imperial will submit an annual report to the NT Government summarizing the following:

- The records of the stages of flowback activities including:
    - The date and time of the onset of flowback
    - The date and time of each attempt to route flowback fluid to the separator
    - The date and time of each occurrence in which the operator reverted to the initial flowback stage
    - The date and time of well shut-in or connected into adjacent gathering lines
    - The date and time that temporary flowback equipment is disconnected
    - The total duration of venting, combustion and flaring over the flowback period
    - The cumulative number of hours of operation for each reciprocating compressor, or the number of months since initial start-up or the previous reciprocating compressor rod packing replacement
    - The results of leak detection surveys (in the annual report under the Act) outlining
    - The extent of compliance with the leak management plan
    - A summary of monitoring undertaken during the period
    - A summary of minor and significant leaks identified during the reporting period, including the date of identification and repair for each leak and those leaks that could not be repaired
    - An explanation of why any component could not be repaired and what actions will be taken to either decommission the component or otherwise remedy the problem.
- Imperial will utilise checklists during construction, site operations and periods where the wellpad is not operational to monitor and ensure compliance; example checklists are provided in section 22.

19. Management of Change

Imperial wil use inGauge's Managament of Change Procedure for operations in EP187.

The Management of Change process is applied to all changes and deviations for regulated activities. These activities include planning and operations including civil construction, drilling, hydraulic stimulation, production testing, well abandonments or workovers, or any other work designed and executed by Imperial on EP187.

Deviations from the operations may become necessary due to uncertainties in the operating environment or problems encountered during operations. It is the purpose of the change control procedures contained within the Management of Change procedure (ING_PRO_MOC_01) to guide for facilitating the agreement of change with the various stakeholders (e.g. Imperial, inGauge Management Team). It is achieved by determining and agreeing on the value and impact of a change and subsequently documenting the approval process accepting the change.

20. Internal Auditing

Imperial will undertake a 5 stage internal audit process of operations based upon the cross referencing and checking of the imperial checklists covered under section 19 of the EMP. In the carrying out and recording of the audits as per the checklists in 22Section Imperial can determine if the environmental performance standards and the measurement criteria specified in the plan is being met.

Audits will be carried out at athe end of each regulated activity, with spot audits during the regulated activity, using the checklists below (Table 27).

Table 27. Internal Auditing

Activity and Audit Periods	Checklists
Civil Construction Activities	Table 28 through to Table 31, inclusive.
Drilling and Completion Activities	Table 32 through to Table 35, inclusive.
Hydraulic Fracturing Activities	Table 36 through to Table 39, inclusive.
Flowback and Production Testing Activities	Table 40 through to Table 43, inclusive.
Non Operational Site	Table 44

21. Non-conformances.

For the activity, a non-conformance is classed as:

- A breach of an Environmental Outcome or Environmental Performance Standard (Section 17.1).
- Is inconsistent with an environmental outcome specified in the current plan for the activity.
- Failure to implement a requirement in the implementation strategy.
- An environmental impact or environmental risk not specified in the EMP for the activity.

Non-conformances are identified via:

- Audits and inspections
- Incident reporting and investigations

Where a non-conformance is identified, actions will be implemented to assess the cause of the non-conformance, to immediately correct it and prevent reoccurrence.

To ensure that non-conformances lead to learning and improvements for the activity and on a company-wide basis, non-conformance are:

- Communicated to the Imperial and inGauge management, along with corrective actions to help prevent recurrence of similar incidents.
- Communicated to operational personnel at daily pre-start meetings via the Site Supervisor to ensure personnel are made aware of non-conformances and corrective actions to help prevent recurrence of similar incidents.

Non Conformances and corrective actions will be .

- Recorded in Imperial's Incident Management System, and actions tracked to completion.
- Reviewed by the actioner's manager prior to being closed to ensure actions are completed and implemented.

22. Checklists

Table 28: Checklist - Civil Construction - Procurement

IMPERIAL OIL & GAS			Imperial Oil & Gas Checklist; Civil Construction - Procurement					INGAUGE			
Date: Report No: Well Name: Client Name:		CARPENTARIA 1 Imperial O&G	Tenure Holder: Tenure: Operator:	Imperial O&G EP187 Imperial O&G	Contractor Rig Rig Type Basin		Spud Date / Time Days from Spud				
Checked		Item Checked	Inspection Comment			Inspect Initial	Action required			Action by (Date)	Supervisor Initial
Erosion Sediment Control			**ESCP Drawing #:**								
		Before Use:									
		ESCP Drawing current for the scope?									
		ESCP Drawing supplied as part of the Civils Workscope?									
		Required amount of sediment fence supplied as part of the Civils Workscope?									
		Required amount of stockpile cover supplied as part of the Civils Workscope?									
		General observations									
Fire Preparedness			**Fire Management Plan Drawing#:**								
		Before Use:									
		Fire Management Plan summary current for the scope?									
		Fire Management Plan summary supplied as part of the Civils Workscope?									
		Appropriate fire response equipment supplied as part of the Civils Workscope?									
		General observations									
Housekeeping and security											
		Before Use:									
		Required amount of fence supplied as part of the Civils Workscope?									
		NLC Permit requirement communicated as part of the Workscope?									
		Weed inspection requirement communicated as part of the Workscope?									
		General observations									
Ponds											
Sump	Cutting Pit	Turkeys Nest	**Geosynthetic Liner Issue;**								
			Coefficient of permeability of less than 10^{-9} m/s tested in accordance with AS 1289.6.7.2?								
			Resistance to tearing >0.5kN (AS Std D 4533)?								
			Static puncture >0.5kN (AS Std D 4833)?								
			Tensile strength > 20 kN/m (AS Std D 1295)?								
			General observations								
Tanks											
A	B	C	**Before Use Testing;**								
			Designed and manufactured to a certified standard?								
			Designed to meet local wind loading conditions?								
			Designed with outer wall/framework with no climb access points for fauna?								
			Fitted with secondary containment for 110% of the operating volume?								
			Fitted with leak detection on the primary liner?								
			Fitted with appropriate bleed vents, if covered?								
			Fitted with a system to remove rainwater from above the cover, if covered?								
			Civil preparation requirements supplied?								
			System of level monitoring in place?								
			General observations								

Table 29: Checklist; Civil Construction - Prestart

IMPERIAL OIL & GAS	Imperial Oil & Gas Checklist; Civil Construction - Prestart	INGAUGE

Date:		Tenure Holder:	Imperial O&G	Contractor		Spud Date / Time	
Report No:		Tenure:	EPL07	Rig		Days from Spud	
Well Name:		Operator:	Imperial O&G	Rig Type			
Client Name:	CARPENTARIA 1 Imperial O&G			Basin			

Checked	Item, Checked	Inspection Comment	Inspect Initial	Action required	Action by (Date)	Supervisor Initial
Pad Maintenance:						
	Is the;					
	Traditional Owner representatives on site for clearing operations?					
	Landowner requirements been discussed in prestart meeting?					
	Weed inspections in place for all equipment on site?					
	Site free from weeds?					
	ESCP Drawing been discussed in prestart meeting?					
	Fire risk and response been discussed in prestart meeting?					
	Photographs taken?					
	General observations					
Ponds		**Freeboard Requirement:** m				
Sump / Cutting Pit / Turkeys Nest	**Is the;**					
	Liner on site?					
	Fauna Ladder materials on site?					
	Required Freeboard known?					
	General observations					
Tanks						
A / B / C	**Is the;**					
	Vendor site checklist for tank on Site?					
	Compaction requirements for tank on site?					
	Leveling requirements for tank on site?					
	Bunding requirements for tank on site?					
	General observations					
Erosion, Sediment Control		**ESCP Drawing #:**				
	Is the;					
	Correct ESCP Drawing on site?					
	Required amount of sediment fence on site?					
	Required amount of stockpile cover on site?					
	General observations					
Housekeeping and security						
	Is the;					
	Required amount of fence material on site?					
	Site free from loose rubbish?					
	Site free from visible signs of spills or leaks?					
	General observations					
Fire Preparedness;		**Fire Management Plan Branding?;**				
	Is the;					
	Fire Management Plan summary on site?					
	Appropriate fire response equipment on site?					
	General observations					

Table 30: Daily Site Inspection report; Civil Construction

IMPERIAL OIL & GAS	Imperial Oil & Gas Daily Site Inspection report; Civil Construction				INGAUGE
Date: Report No: Well Name: Client Name: CARPENTARIA 1 Imperial O&G	Tenure Holder: Tenure: Operator:	Imperial O&G EP187 Imperial O&G	Contractor Rig Rig Type Basin	Bonaparte Basin	Spud Date / Time Days from Spud	

Checked	Item, Checked	Inspection Comment	Inspect Initial	Action required	Action by (Date)	Supervisor Initial
Housekeeping and security						
	In Bay:					
	Perimeter fence in place?					
	Site free from loose rubbish?					
	Site free from visible signs of spills or leaks?					
	General observations					
Chemical Storage						
	In Bay:					
	Liquid chemical adequately bunded?					
	Dry chemical covered?					
	General observations					
Waste						
	In Bay:					
	Volume of wastewater removed from site in last 24 hours					
	Volume of solid waste removed from site in last 24 hours					
	Waste receptacles free from fauna ingress					
	General observations					
Erosion Sediment Control						
	In Bay:					
	Sediment fence on perimeter in place					
	Rainfall Greater than 10mm in last 24 hours					
	Erosion visible on site					
	General observations					

Table 31: Checklist; Civil Construction -Completion

IMPERIAL OIL & GAS	Imperial Oil & Gas Checklist; Civil Construction -Completion	INGAUGE

Date: Report No: Well Name: Client Name:	CARPENTARIA 1	Tenure Holder: Tenure: Operator:	Imperial O&G EP187 Imperial O&G	Contractor Rig Rig Type Basin	Basin	Spud Date / Time Days from Spud	

Checked			Item, Checked	Inspection Comment	Inspect Initial	Action required	Action by (Date)	Supervisor Initial
Ponds				**Freeboard Requirement:** m				
Sump	Cutting Pit	Turkeys Nest	**In Bay;**					
			Bund Greater than 500m?					
			Liner free/installed securely?					
			Liner free/from damage?					
			Freeboard level marked?					
			Fauna Ladder in place?					
			Photographs taken?					
			General observations					
Tanks								
A	B	C	**In Bay;**					
			Vendor site checklist for tank completed?					
			Compaction requirements for tank validated & recorded?					
			Leveling requirements for tank validated & recorded?					
			Bunding requirements for tank validated & recorded?					
			Photographs taken?					
			General observations					
Erosion, Sediment Control				**ESCP Drawing #:**				
			Are the;					
			Diversion bunds in place as per ESC Plan drawing?					
			Level Spreaders in place as per ESC Plan drawing?					
			Sediment fences in place as per ESC Plan drawing?					
			Entrance Wash Bays in place as per ESCP drawing					
			Stockpiles as per ESC Plan drawing?					
			Photographs taken?					
			General observations					
Housekeeping and security								
			In Bay;					
			Perimeter fence in place?					
			Site free from loose rubbish?					
			Site free from visible signs of spills or leaks?					
			Site free from weeds?					
			Disturbance footprint survey complete?					
			Photographs taken?					
			General observations					
Fire Preparedness;				**Fire Management Plan Drawing#;**				
			In Bay;					
			Fire break in place as per Fire Management plan drawing?					
			Photographs taken?					
			General observations					

Table 32: Checklist; Drilling & Completions – Procurement

Imperial Oil & Gas Checklist; Drilling/Completions - Procurement							
Date: Report No: Well Name: Client Name: CARPENTARIA 1 Imperial O&G		Tenure Holder: Tenure: Operator:	Imperial O&G EPI 07 Imperial O&G	Contractor Rig Rig Type Basin	Bonaparte Basin	Spud Date / Time Days from Spud	
Checked	Item, Checked	Inspection Comment	Inspect Initial	Action required		Action by (Date)	Supervisor Initial
Chemicals							
	Are the;						
	Chemicals free from BEST?						
	Chemicals compatible with an aqueous based drilling fluid?						
	Safety Data Sheets for all Chemicals supplied?						
	General observations						
Chemical Storage							
	Is there;						
	Bunding for lubricants and rig supplied chemicals?						
	Sufficient bunding available for liquid Chemicals?						
	Sufficient covering available for dry chemicals?						
	General observations						
Fire Preparedness;		**Fire Management Plan Breakdown;**					
	Are the;						
	Fire Management Plan summary current for the scope?						
	Fire Management Plan summary communicated as part of the Workscope?						
	General observations						
Housekeeping and security							
	Are the;						
	NLC Permit requirement communicated as part of the Workscope?						
	Weed inspection requirement communicated as part of the Workscope?						
	General observations						
Waste							
	Are the;						
	Waste receptacles designed to prevent fauna ingress?						
	General observations						

Table 33: Checklist; Drilling & Completions – Prestart

Imperial Oil & Gas Checklist; Drilling/Completions - Prestart								
Date: Report No: Well Name: Client Name:	CARPENTARIA 1 Imperial O&G	Tenure Holder: Tenure: Operator:	Imperial O&G EP187 Imperial O&G	Contractor Rig Rig Type Basin	Beetaloo Basin	Spud Date / Time Days from Spud		
Checked	**Item, Checked**	**Inspection Comment**		**Inspect Initial**	**Action required**		**Action by (Date)**	**Supervisor Initial**
Chemical Storage								
	Is/Are the;							
	Liquid chemical adequately bunded?							
	Dry chemical covered?							
	Current Spill Management Plan on Site?							
	Safety Data Sheets for all Chemicals on Site?							
	General observations							
Erosion Sediment Control								
	Is/Are the;							
	Sediment fence on perimeter in place							
	Erosion visible on site							
	General observations							
Fire Preparation;		**Fire Management Plan Drawing#;**						
	Is/Are the;							
	Current Fire Management Plan summary Displayed on site?							
	Fire break in place as per Fire Management plan drawing?							
	General observations							
Housekeeping and security								
	Is/Are the;							
	NLC Permits in place?							
	Weed inspection requirements in place?							
	Perimeter fence in place?							
	Site free from loose rubbish?							
	Site free from visible signs of spills or leaks?							
	General observations							
Ponds	**Freeboard Requirement:**	**m**						
Sump / Cutting Pit / Turkeys Nest	Is/Are the;							
	Liner free from damage?							
	Freeboard level mark visible?							
	Fluid level below the freeboard level?							
	Bund in place, not breached?							
	Fauna Ladder in place?							
	Pond free from fauna?							
	General observations							
Waste								
	Is/Are the;							
	Current Wastewater Management Plan on Site?							
	Waste receptacles on site?							
	Greywater sprinkler area free from ponding?							
	Waste receptacles designed to prevent fauna ingress?							
	General observations							

Table 34: Checklist; Drilling & Completions - Daily Site Inspection

IMPERIAL OIL & GAS	Imperial Oil & Gas Daily Site Inspection Report; Drilling/Completions				INGAUGE
Date: Report No: Well Name: Client Name: CARPENTARIA 1 Imperial O&G	Tenure Holder: Tenure: Operator:	Imperial O&G EP187 Imperial O&G	Contractor Rig Rig Type Basin	Beetaloo Basin	Spud Date / Time Days from Spud	

Checked	Item, Checked	Inspection Comment	Inspect Initial	Action required	Action by (Date)	Supervisor Initial
Chemical Storage						
	Bunding:					
	Liquid chemical adequately bunded?					
	Dry chemical covered?					
	General observations					
Erosion, Sediment Control						
	Bunding:					
	Sediment fence on perimeter in place?					
	Rainfall Greater than 10mm in last 24 hours?					
	Erosion visible on site?					
	General observations					
Housekeeping and security						
	Bunding:					
	Perimeter fence in place?					
	Site free from loose rubbish?					
	Site free from visible signs of spills or leaks?					
	Chemical drums segregated for recycling?					
	General observations					
Ponds	**Treatment Requirement:**	m				
Sump / Cutting Pit / Turkeys Nest	Bunding:					
	Liner free from damage?					
	Freeboard level mark visible?					
	Fluid level below the freeboard level?					
	Bund in place, not breached?					
	Fauna Ladder in place?					
	Pond free from fauna?					
	General observations					
Waste						
	Bunding:					
	Volume of wastewater removed from site in last 24 hours?					
	Volume of solid waste removed from site in last 24 hours?					
	Greywater sprinkler area free from ponding?					
	Waste receptacles free from fauna ingress?					
	General observations					

Table 35: Checklist; Drilling & Completions – Demobilisation

IMPERIAL OIL & GAS	Imperial Oil & Gas Checklist; Drilling/Completions - Demob				INGAUGE
Date: Report No: Well Name: Client Name: CARPENTARIA 1 Imperial O&G	Tenure Holder: Tenure: Operator:	Imperial O&G EPP7 Imperial O&G	Contractor Rig Rig Type Basin	Basta to Basin	Spud Date / Time Days from Spud	

Checked	Item, Checked	Inspection Comment	Inspect Initial	Action required	Action by (Date)	Supervisor Initial
Erosion, Sediment Control		**ESCP Drawing #:**				
	Area Bac;					
	Diversion bunds in place as per ESC Plan drawing?					
	Level Spreaders in place as per ESC Plan drawing?					
	Sediment fences in place as per ESC Plan drawing?					
	Entrance/Wash Bays in place as per ESCP drawing					
	Stockpiles as per ESC Plan drawing?					
	Photographs taken?					
	General observations					
Fire Preparation		**Fire Management Plan Drawing#:**				
	Bd/Area Bac;					
	Fire break in place as per Fire Management plan drawing?					
	Photographs taken?					
	General observations					
Housekeeping and security						
	Bd/Area Bac;					
	Perimeter fence in place?					
	Site free from loose rubbish?					
	Site free from visible signs of spills or leaks?					
	Site free from weeds?					
	Photographs taken?					
	General observations					
Ponds		**Freeboard Requirement:** m				
Sump / Cutting Pit / Turkeys Nest	Bd/Area Bac;					
	Bund Greater than 500m?					
	Liner free/installed securely?					
	Liner free/from damage?					
	Freeboard level marked?					
	Fauna Ladder in place?					
	Fauna exclusion fence in place?					
	Fluid/cutting samples taken?					
	Photographs taken?					
	General observations					
Wellhead Integrity						
	Bac Bac;					
	Well Barrier Integrity Verification data supplied to Drill It?					
	Isolated and locked?					
	General observations					

Table 36: Checklist; Hydraulic Fracturing – Procurement

Imperial Oil & Gas Checklist; Hydraulic Fracturing - Procurement							
Date: Report No: Well Name: Client Name: CARPENTARIA 1 Imperial O&G		Tenure Holder: Tenure: Operator:	Imperial O&G EPI 07 Imperial O&G	Contractor Rig Rig Type Basin		Spud Date / Time Days from Spud	
Checked	Item, Checked	Inspection Comment		Inspect Initial	Action required	Action by (Date)	Supervisor Initial
Chemicals							
	Are the;						
	Chemicals free from BTEX?						
	Chemical monitoring and reporting requirements communicated as part of the Workscope?						
	General observations						
Chemical Storage							
	Is there;						
	Bunding for lubricants and frac spread supplied chemicals?						
	Sufficient bunding available for liquid Chemicals?						
	Sufficient covering available for dry chemicals?						
	General observations						
Fire Preparedness;		**Fire Management Plan Drawings?;**					
	Is/Are the;						
	Fire Management Plan summary current for the scope?						
	Fire Management Plan summary communicated as part of the Workscope?						
	General observations						
Housekeeping and security							
	Is/Are the;						
	NLC Permit requirement communicated as part of the Workscope?						
	Weed inspection requirement communicated as part of the Workscope?						
	General observations						
Waste							
	Is/Are the;						
	Sufficient tank storage for the expected flowback volume?						
	Waste receptacles designed to prevent fauna ingress?						
	Sufficient tank storage for the expected flowback volume?						
	General observations						

Table 37: Checklist; Hydraulic Fracturing – Prestart

Imperial Oil & Gas Checklist: Hydraulic Fracturing - Prestart												
Date: Report No: Well Name: Client Name:		CARPENTARIA 1 Imperial O&G	Tenure Holder: Tenure: Operator:	Imperial O&G EP187 Imperial O&G	Contractor Rig Rig Type Basin		Surface Basin	Spud Date / Time Days from Spud				
Checked			Item, Checked		Inspection Comment		Inspect Initial	Action required			Action by (Date)	Supervisor Initial
Chemical Storage												
			Ref/Am Req:									
			Liquid chemical adequately bunded?									
			Dry chemical covered?									
			Current Spill Management Plan on Site?									
			Safety Data Sheets for all Chemicals on Site?									
			General observations									
Erosion Sediment Control												
			Ref/Am Req:									
			Sediment fence on perimeter in place?									
			Erosion visible on site?									
			General observations									
Fire Preparedness					Fire Management Plan Branding?:							
			Ref/Am Req:									
			Current Fire Management Plan summary Displayed on site?									
			Fire break in place as per Fire Management plan drawing?									
			General observations									
Housekeeping and security												
			Ref/Am Req:									
			NLC Permits in place?									
			Weed inspection requirements in place?									
			Perimeter fence in place?									
			Site free from loose rubbish?									
			Site free from visible signs of spills or leaks?									
			General observations									
Ponds					Freeboard Requirement:	m						
Turkeys Nest			Ref/Am Req:									
			Liner free from damage?									
			Freeboard level mark visible?									
			Fluid level below the freeboard level?									
			Bund in place, not breached?									
			Fauna Ladder in place?									
			Pond free from fauna?									
			General observations									
Tanks												
A	B	C	Before the Tank/s:									
			Designed and manufactured to a certified standard?									
			Fitted with secondary containment for 110% of the operating volume?									
			Fitted with leak detection on the primary liner?									
			Fitted with appropriate site vents, if covered?									
			Fitted with a system to remove rainwater from above the cover, if covered?									
			Civil preparation verified to suppliers standards?									
			System of level monitoring in place?									
			Interconnecting pipe/hoses free from damage?									
			General observations									
Waste												
			Ref/Am Req:									
			Current Wastewater Management Plan on Site?									
			Sufficient tank storage for the expected flowback volume?									
			Waste receptacles on site?									
			Greywater sprinkler area free from ponding?									
			Waste receptacles designed to prevent fauna ingress?									
			General observations									
Wellhead Integrity												
			Req'd By:									
			Well Integrity been verified?									
			Pressure test been carried out that exceeds screenout condition ?									
			system for monitoring annulus pressure been put in place?									
			General observations									

Table 38: Checklist; Hydraulic Fracturing - Daily Site Inspection

IMPERIAL OIL & GAS	Imperial Oil & Gas Daily Site Inspection Report; Hydraulic Fracturing	INGAUGE

Date: Report No: Well Name: Client Name:	CARPENTARIA 1 Imperial O&G	Tenure Holder: Tenure: Operator:	Imperial O&G EP187 Imperial O&G	Contractor Rig Rig Type Basin	Spud Date / Time Days from Spud

Checked	Item, Checked	Inspection Comment	Inspect Initial	Action required	Action by (Date)	Supervisor Initial
Chemical Storage						
	Bund/Area Bund:					
	Liquid chemical adequately bunded?					
	Dry chemical covered?					
	General observations					
Erosion, Sediment Control						
	Bund/Area Bund:					
	Sediment fence on perimeter in place?					
	Rainfall Greater than 10mm in last 24 hours?					
	Erosion visible on site?					
	General observations					
Housekeeping and security						
	Bund/Area Bund:					
	Perimeter fence in place?					
	Site free from loose rubbish?					
	Site free from visible signs of spills or leaks?					
	Chemical drums segregated for recycling?					
	General observations					
Ponds	**Freeboard Requirement:** m					
Turkeys Nest	Bund/Area Bund:					
	Liner free from damage?					
	Freeboard level mark visible?					
	Fluid level below the freeboard level?					
	Bund in place, not breached?					
	Fauna Ladder in place?					
	Pond free from fauna?					
	General observations					
Tanks						
A B C	Bund/Area Bund:					
	Primary liner free from damage?					
	Freeboard level marked?					
	Level monitoring system functioning?					
	Level below freeboard requirement?					
	Secondary liner free from damage?					
	Leak detection system functioning?					
	Vents free from blockage, if covered?					
	Cover free from sign from minister minister, if covered?					
	Interconnecting pipe hoses free from damage?					
	General observations					
Waste						
	Bund/Area Bund:					
	Volume of wastewater removed from site in last 24 hours?					
	Volume of solid waste removed from site in last 24 hours?					
	Greywater sprinkler area free from ponding?					
	Waste receptacles free from fauna ingress?					
	General observations					

Table 39: Checklist; Hydraulic Fracturing – Demobilisation

IMPERIAL OIL & GAS	Imperial Oil & Gas Checklist; Hydraulic Fracturing - Demob	INGAUGE

Date:		Tenure Holder:	Imperial O&G	Contractor		Spud Date / Time
Report No:		Tenure:	EP187	Rig		Days from Spud
Well Name:	CARPENTARIA 1	Operator:	Imperial O&G	Rig Type		
Client Name:	Imperial O&G			Basin	Beetaloo Basin	

Checked	Item, Checked	Inspection Comment	Inspect Initial	Action required	Action by (Date)	Supervisor Initial
Erosion Sediment Control		**ESCP Drawing #:**				
	Area Bac;					
	Diversion bunds in place as per ESC Plan drawing?					
	Level Spreaders in place as per ESC Plan drawing?					
	Sediment fences in place as per ESC Plan drawing?					
	Entrance/Wash Bays in place as per ESCP drawing					
	Stockpiles as per ESC Plan drawing?					
	Photographs taken?					
	General observations					
Fire Preparation		**Fire Management Plan Drawing#:**				
	Bef/Aft Bac;					
	Fire break in place as per Fire Management plan drawing?					
	Photographs taken?					
	General observations					
Housekeeping and security						
	Bef/Aft Bac;					
	Perimeter fence in place?					
	Site free from loose rubbish?					
	Site free from visible signs of spills or leaks?					
	Site free from weeds?					
	Photographs taken?					
	General observations					
Ponds		**Freeboard Requirement:** m				
Turkeys Nest	Bef/Aft Bac;					
	Bund Greater than 500m?					
	Liner fee/installed securely?					
	Liner free/from damage?					
	Freeboard level marked?					
	Pond Ladder in place?					
	Pond exclusion fence in place?					
	Fluid samples taken?					
	Photographs taken?					
	General observations					
Tanks						
A B C	Bef/Aft Bac Testing;					
	Primary liner free/from damage?					
	Freeboard level marked?					
	Level monitoring system functioning?					
	Level below freeboard requirement?					
	Secondary liner free/from damage?					
	Leak detection system functioning?					
	Vents free/from blockage, if covered?					
	Cover free/from significan rainwater rainwater, if covered?					
	Interconnecting pipe/hoses free/from damage?					
	Photographs taken?					
	General observations					
Wellhead Integrity						
	New Bac;					
	Well Integrity been verified?					
	Isolated and locked?					
	Photographs taken?					
	General observations					

Table 40: Checklist; Flowback and Production testing – Procurement

IMPERIAL OIL & GAS	Imperial Oil & Gas Checklist; Flowback/EPT- Procurement				INGAUGE
Date: Report No: Well Name: Client Name: CARPENTARIA 1 Imperial O&G	Tenure Holder: Tenure: Operator:	Imperial O&G EPA17 Imperial O&G	Contractor Rig Rig Type Basin	Basin: Bonaparte Basin	Spud Date / Time Days from Spud	

Checked	Item, Checked	Inspection Comment	Inspect Initial	Action required	Action by (Date)	Supervisor Initial
Chemical Storage						
	Is there;					
	Bunding for lubricants and frac spread supplied chemicals?					
	Sufficient bunding available for liquid Chemicals?					
	Sufficient covering available for dry chemicals?					
	General observations					
Fire Preparedness;		**Fire Management Plan Drawings?;**				
	Refer file;					
	Fire Management Plan summary current for the scope?					
	Fire Management Plan summary communicated as part of the Workscope?					
	General observations					
Fire Equipment						
	Is the fire equipment;					
	Rated for the flow rates expected?					
	Fitted with a self ignition system?					
	General observations					
Flowback Equipment						
	Is the flowback equipment;					
	Designed in accordance with API Specification 6A, NACE MR-01-01, Addendum 1?					
	Rated for the expected temperature, pressures and flow rates?					
	Fitted with Wellhead Pressure measuring equipment?					
	Fitted with flowback water volume/flow measuring equipment?					
	Fitted with gas volume/flow measuring equipment?					
	Fitted with Condensate volume/flow measuring equipment?					
	Fitted with flowback water EC, pH and temperature measuring equipment?					
	Are historical as-drawings compiled for flowback equipment?					
	General observations					
Housekeeping and security						
	Refer file;					
	NLC Permit requirement communicated as part of the Workscope?					
	Weed inspection requirement communicated as part of the Workscope?					
	General observations					
Waste						
	Refer file;					
	Sufficient tank storage for the expected flowback volume?					
	Waste receptacles designed to prevent fauna ingress?					
	Sufficient tank storage for the expected flowback volume?					
	General observations					

Table 41: Checklist; Flowback and Production testing – Prestart

IMPERIAL OIL & GAS	Imperial Oil & Gas Checklist; Flowback/EPT- Prestart	INGAUGE

Date: Report No: Well Name: Client Name:	CARPENTARIA 1 Imperial O&G	Tenure Holder: Tenure: Operator:	Imperial O&G EP187 Imperial O&G	Contractor Rig Rig Type Basin	Spud Date / Time Days from Spud

Checked	Item, Checked	Inspection Comment	Inspect Initial	Action required	Action by (Date)	Supervisor Initial
Chemical Storage						
	Is/Are the;					
	Liquid chemical adequately bunded?					
	Dry chemical covered?					
	Current Spill Management Plan on Site?					
	Safety Data Sheets for all Chemicals on Site?					
	General observations					
Fire Prevention;		**Fire Management Plan Brooklyn?;**				
	Is/Are the;					
	Current Fire Management Plan summary Displayed on site?					
	Fire breaks in places per Fire Management plan drawing?					
	General observations					
Fire Equipment						
	Is the fire equipment;					
	Installed > 15m from analysed boundary and tanks?					
	Rated for the flow rates expected?					
	Self ignition system functioning?					
	General observations					
Flowback Equipment						
	Is the flowback equipment;					
	Installed in accordance with API Specification 6A, NACE MR-01-075, AS/NZS 4853?					
	Tested for the expected temperature, pressures and flowrates?					
	Wellhead Pressure measuring equipment functioning?					
	Flowback water volume/flow measuring equipment functioning?					
	Gas volume/flow measuring equipment functioning?					
	Condensate volume/flow measuring equipment functioning?					
	Flowback water EC, pH and temperature measuring equipment functioning?					
	Installed as per hazardous area drawings?					
	General observations					
Housekeeping and security						
	Is/Are the;					
	NLC Permits in place?					
	Weed inspection requirements in place?					
	Perimeter fence in place?					
	Site free from loose rubbish?					
	Site free from visible signs of spills or leaks?					
	General observations					
Tanks						
A B C	**Is/Are the Tank/s;**					
	Designed and manufactured to a certified standard?					
	Fitted with secondary containment for 110% of the operating volume?					
	Fitted with leak detection on the primary liner?					
	Fitted with appropriate size vents, if covered?					
	Fitted with a system to remove rainwater from above the cover, if covered?					
	Civil preparation verified to suppliers standards?					
	System of level monitoring in place?					
	Interconnecting pipe/hoses free from damage?					
	General observations					
Waste						
	Is/Are the;					
	Sufficient tank storage for the expected flowback volume?					
	Current Wastewater Management Plan on Site?					
	Sufficient tank storage for the expected flowback volume?					
	Waste receptacles on site?					
	Greywater sprinkler area free from ponding?					
	Waste receptacles designed to prevent fauna ingress?					
	General observations					

Table 42: Checklist; Flowback and Production testing - Daily Site Inspection

IMPERIAL OIL & GAS	Imperial Oil & Gas Daily Site Inspection Report; Flowback/EPT			INGAUGE
Date: Report No: Well Name: Client Name:	Tenure Holder: Tenure: Program Name: CARPENTARIA L Imperial O&G	Imperial O&G EP187 Imperial O&G	Contractor Rig Rig Type Basin	Spud Date / Time Days from Spud Beetaloo Basin

Checked	Item Checked	Inspection Comment	Inspect Initial	Action required	Action by (Date)	Supervisor Initial
Chemical Storage						
	Bunding:					
	Liquid chemical adequately bunded?					
	Dry chemical covered?					
	General housekeeping					
Erosion Sediment Control						
	Bunding:					
	Sediment fences are in place?					
	Rainfall: Greater than 10mm in last 24 hours?					
	Erosion visible on site?					
	General housekeeping					
Fire Equipment						
	Fire Extinguishers:					
	Site free from vegetation?					
	Secure?					
	Spill ignition system functioning?					
	General housekeeping					
Flowback Equipment						
	Fire Extinguishers:					
	Wellhead Pressure monitoring equipment functioning?					
	Flowback water volumetric measuring equipment functioning?					
	Gas volumetric measuring equipment functioning?					
	Condensate volumetric measuring equipment functioning?					
	Flowback water E.C. pH and temperature measuring equipment functioning?					
	General housekeeping					
Hydrocarbon sampling and assembly						
	Bunding:					
	Perimeter fence in place?					
	Site free from loose rubbish?					
	Site free from visible signs of spills or leaks?					
	Chemical drums segregated for recycling?					
	General housekeeping					
Permits	**Function of Requirement:**	**as**				
Training Hour:	Bunding:					
	Liner free from damage?					
	Freeboard level mark visible?					
	Fluid level below the freeboard level?					
	Guard in place, not breached?					
	Frame Ladder in place?					
	Pond free from Fauna?					
	General housekeeping					
Tanks						
A B C	Bunding & Trenching:					
	Primary liner free from damage?					
	Freeboard level as rated?					
	Level monitoring system functioning?					
	Level below freeboard requirement?					
	Secondary liner free from damage?					
	Leak detection system functioning?					
	Vents free from blockage, if covered?					
	Cover free from significant amount rainwater, if covered?					
	Interconnecting pipelines free from damage?					
	General housekeeping					
Ponds						
A B C	Turbidity:					
	Volume of water monitored in?					
	Volume of water monitored in?					
	Volume of water evaporated?					
	Volume of water gained from rainfall?					
	Freeboard?					
	Bunding:					
	Volume of wastewater removed from site in last 24 hours?					
	Volume of solid wastes removed from site in last 24 hours?					
	Groundwater sprinkler areas free from ponding?					
	Waste receptacles free from loose litter?					
	General housekeeping					

Table 43: Checklist; Flowback and Production testing – Demobilisation

IMPERIAL OIL & GAS	Imperial Oil & Gas Checklist; Hydraulic Fracturing - Demob	INGAUGE

Date: Report No: Well Name: Client Name: CARPENTARIA 1 Imperial O&G	Tenure Holder: Tenure: Operator:	Imperial O&G EP187 Imperial O&G	Contractor Rig Rig Type Basin	Basin: Beetaloo Basin	Spud Date / Time Days from Spud

Checked	Item, Checked	Inspection Comment	Inspect Initial	Action required	Action by (Date)	Supervisor Initial
Erosion Sediment Control		**ESCP Drawing #:**				
	Are the;					
	Diversion bunds in place as per ESC Plan drawing?					
	Level Spreaders in place as per ESC Plan drawing?					
	Sediment fences in place as per ESC Plan drawing?					
	Entrance/Wash Bays in place as per ESCP drawing					
	Stockpiles as per ESC Plan drawing?					
	Photographs taken?					
	General observations					
Fire Preparation		**Fire Management Plan Drawing#:**				
	Is/Are the;					
	Fire-break in place as per Fire Management plan drawing?					
	Photographs taken?					
	General observations					
Housekeeping and security						
	Is/Are the;					
	Perimeter fence in place?					
	Site free from loose rubbish?					
	Site free from visible signs of spills or leaks?					
	Site free from weeds?					
	Photographs taken?					
	General observations					
Ponds		**Freeboard Requirement: m**				
Turkeys Nest	**Is/Are the;**					
	Bund Greater than 50.0m?					
	Liner free/installed securely?					
	Liner free/from damage?					
	Freeboard level marked?					
	Fauna Ladder in place?					
	Fauna exclusion fence in place?					
	Fluid samples taken?					
	Photographs taken?					
	General observations					
Tanks						
A B C	**Before the Testing;**					
	Primary liner free/from damage?					
	Freeboard level marked?					
	Level monitoring system functioning?					
	Level below freeboard requirement?					
	Secondary liner free/from damage?					
	Leak detection system functioning?					
	Vents free/from blockage, if covered?					
	Cover free/from significan rainwater rainwater, if covered?					
	Interconnecting pipe/hoses free/from damage?					
	Photographs taken?					
	General observations					
Wastes						
A B C	**Tanks;**					
	Volume of water?					
	Freeboard?					
	Photographs taken?					
	General observations					
Wellhead Integrity						
	Manifolds;					
	Isolated and locked?					
	Photographs taken?					
	General observations					

Table 44: Checklist; Non-operational site - Weekly Site Inspection

IMPERIAL OIL & GAS			**Imperial Oil & Gas** **Weekly Site Inspection Report**					INGAUGE Well Engineering & Project Management Reliable | Experienced | Engaged			
Date: **Report No:** **Well Name:** **Client Name:**		CARPENTARIA 1 Imperial O&G	**Tenure Holder:** **Tenure:** **Operator:**	Imperial O&G EP187 Imperial O&G	**Contractor** **Rig** **Rig Type** **Basin**	Beetaloo Basin		**Inspected by:** **Received by:** **Received date:**			
Checked			**Item, Checked**	**Inspection Comment**		**Inspect Initial**	**Action required**		**Action by (Date)**	**Supervisor Initial**
Erosion Sediment Control										
			Is/Are the;							
			Sediment fence in place?							
			Sediment fence free from debris and sediment?							
			Access track free from erosion?							
			Access track free from sediment build up?							
			Wellpad free from erosion?							
			Wellpad free from sediment build up?							
			General observations							
Housekeeping and security										
			Is/Are the;							
			Perimeter fence in place?							
			Site free from loose rubbish?							
			Site free from visible signs of spills or leaks?							
			General observations							
Ponds										
Sump	Cutting Pit	Turkeys Nest	**Is/Are the;**							
			Liner free from damage?							
			Freeboard level mark visible?							
			Fluid level below the freeboard level?							
			Bund in place, not breached?							
			Fauna Ladder in place?							
			Pond free from fauna?							
			Security fence in place?							
			Monitoring Cameras free from obstruction?							
			General observations							
Rainfall										
			Since the last weekly check;							
			Has there been rainfall greater than 10mm in any one day?							
			What is the total rainfall?							
			General observations							
Tanks										
A	B	C	**Is/are the Tank/s;**							
			Primary liner free from damage?							
			Freeboard level marked?							
			Level monitoring system functioning?							
			Level below freeboard requirement?							
			Secondary liner free from damage?							
			Leak detection system functioning?							
			Vents free from blockage, if covered?							
			Cover free from significan rainwater rainwater, if covered?							
			Interconnecting pipe/hoses free from damage?							
			General observations							

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