

Imperial O&G EMP IMP4-3 Appendices

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Spill Management Plan EMP IMP₄ and its revisions EP187

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1 Purpose

This Spill Management Plan has been developed to support the Project Activities covered in the EMP IMP₄ and its revisions (herein referred to as the EMP) for the exploration program that Imperial will undertake at Exploration Permit 187 (EP187).

This plan has been developed following the *Code of Practice: Onshore Petroleum Activities in the Northern Territory* (herein referred to as the Code) (DEPWS & DITT, 2019).

2 Key Legislation

Key legislation and documents consulted in the development of this plan are provided below. A complete list of applicable legislation is provided in the corresponding management plans.

- **Petroleum (Environment) Regulations 2016;** requires regulated activities to assess the environmental impacts and risks regarding any action proposed, including the prevention of a spill of the chemical or other substance;
- **Code of Practice: Onshore Petroleum Activities in the Northern Territory;** covers the management of chemicals and wastewater on-site, including the use of secondary containment, lined tanks and spill management plan
- **Transport of Dangerous Goods by Road and Rail (National Uniform Legislation) Act 2010;** covers the transportation of goods by road in the NT, also covers licences for vehicles and drivers carrying dangerous goods.
- **Workplace Health and Safety (National Uniform Legislation) Act 2011;** covers the storage and handling of chemicals on site.
- **Waste Management and Pollution Control Act 1998;** covers the requirements for the transportation and disposal of waste within the NT, including the requirements for contractors, vehicles and facilities managing listed wastes to be licenced.

3 Potential Spill Materials

Table 1 below provides information about how fluids, chemicals and wastewater will be stored, transported and transferred during the project. Further detailed information around these chemicals is included in this section and Table 6 through Table 8.

Table 1. Estimated volumes of chemicals and wastewater associated with the activity, per wellpad

Item	Maximum volumes on site	Storage Location	Containment
Diesel Fuel	50,000L per wellpad	Fuel storage tanks	Secondary containment (double skinned tanks)
General equipment maintenance chemicals (Hydraulic oil, lubricants, degreasers, etc.)	2,000L per wellpad	Storage tanks & drums	Secondary containment (double skinned tank or bunded containment area or bunded pallet storage)
Drilling and cementing chemicals	25,000L per well	Storage tanks & drums	Secondary containment (bunded storage)
Drilling fluids and cuttings	250 m ³ per well	Mud Tank System	Engineered tanks
		Pits	Engineered lined pits
HF Chemicals	55,000L per well	Storage tanks & drums	Secondary containment (bunded containment area or bunded pallet storage)
Tracers	<20kg per well	Storage tanks & drums	Secondary containment (engineered tank in bunded containment)
Stimulation fluid (Blended as required)	55ML per well	Blending and pumping equipment	Secondary containment (engineered self-bunded equipment)
Flowback Fluid and Produced Water	25ML per well	Storage tanks and open-topped treatment tanks	Secondary containment by liner
Condensate and oil	50,000L per well	Condensate storage tanks	Secondary containment (double skinned tanks)
Greywater and sewage	25,000L	Greywater treatment system	Secondary containment (double skinned tanks)

3.1 Fuels

Bulk Fuel will be stored within tanks equipped with safety features such as double-skins (or temporary bunding). Spill, leak and drip trays will be used to address the immediate risk associated with refuelling operations.

Any unconsumed fuel at the end of the program will be removed from the site.

3.2 General equipment maintenance chemicals

General equipment maintenance chemicals, including hydraulic fluids, lubricants and liquid chemicals, will be transported and stored within their original containers or tankers equipped with safety features such as double-skins (or temporary bunding).

Spill, leak and drip trays will be used to address the risk of minor drips and spills associated with filling operations.

Any unrequired general equipment maintenance chemicals will be removed from the site at the end of the program.

3.3 Drilling and cementing chemicals

Drilling chemicals will be transported within their original containers.

Liquid drilling chemicals will be stored in/on temporary bunding, with a volume greater than 110% of the largest container.

No drilling chemicals or additives to be used in the process will contain benzene, toluene, ethylbenzene and xylene.

A list of drilling chemicals and cementing products to be used under this EMP is provided in Table 6 through Table 8.

Any unconsumed fuel at the end of the program will be removed from the site.

3.4 Drilling fluid and cuttings

The proposed drilling fluid consists of predominantly water, with the remaining component made up of salts and fluid additives.

Drilling fluids and cuttings will be stored and treated in engineered, lined pits.

Disposal options are mentioned in Appendix o6 (Wastewater Management Plan).

3.5 Hydraulic Fracture Fluids

Hydraulic Fracture (HF) fluids are used as part of the HF process to fracture the subsurface formation, to enhance oil and gas extraction flow. Typically, stimulation fluids contain 90% water, 9.5 % sand (or proppants) and up to 0.5 % chemicals. Most of the chemical constituents that make up hydraulic stimulation fluid additives can be found in everyday household items or the food and drinks we consume.

Stimulation fluids will be mixed on the fly during HF pumping operations. A list of Hydraulic Fracture chemicals to be used under this EMP is provided in Table 8. Disposal options are mentioned in Appendix o6 (Wastewater Management Plan).

3.6 Tracers

Chemical water-based tracers are used in well testing to gather data about the movement and saturation of fluids and hydrocarbons in the subsurface. Liquid chemical tracers will be stored in bunded chemical storage areas or bunded pallet storage following the Code.

Any unused tracers will be removed from the site at the end of the program.

3.7 Flowback Fluids and Produced Water

Flowback fluids are a water-based solution that flows back to the surface after HF operations; it consists of the fluid used to fracture the targeted shale.

Flowback Fluid and Produced Water will be stored in closed topped tanks and treated in open-topped fluid treatment tanks, as per the *Code of Practice: Onshore Petroleum Activities in the Northern Territory* (DEPWS & DITT, 2019), see Appendix o6 (Wastewater Management Plan).

Open-topped fluid treatment tanks will be designed and operated for the period that treatment infrastructure contains wastewater to accommodate total rainfall anticipated based on the 1:1000 Average Recurrence Interval (ARI).

A chemical risk assessment for the products used is included in Appendix o6.01. The results are summarised in Section 7 of this document.

Also, the Santos – Tanumbirini Wastewater Flowback EP161, McArthur Basin – Assessment of Chemistry and Testing Requirements report (EHS Support, 2020) concluded:

- there are no degradants of the HF chemicals that would require additional analytical testing beyond the chemistry analyte specified in the Code
- there were no unacceptable risks to birds from potential ingestion of chemicals in the wastewater over one year
- no chemicals detected in the wastewater would result in soil levels above soil screening criteria⁵ for the protection of terrestrial plants and animals at their maximum concentration, under a hypothetical maximum release scenario.

As Imperial are using similar chemicals, the results should also be similar.

3.8 Greywater and sewage

Accommodation and messing facilities will be provided from a temporary on-site camp located on a designated pre-cleared pad. The camp will be equipped with a fully self-contained sewage treatment plant (e.g. Ozzi Kleen) furnished with an irrigation sprinkler system.

All treated wastewater produced from laundry, showers, kitchen, and treated sewage will be irrigated in an appropriately sized, designated area 50-100m away from the camp. The designated irrigation area will be fenced to exclude livestock access and have vegetation capable of enabling a high

evapotranspiration rate, as per the *Code of practice for small on-site sewage and sullage treatment systems and the disposal or reuse of sewage effluent* (Department of Health, 2014). The designated area will be checked daily to prevent pooling. Solid and macerated sewage will be transported to a licenced facility for disposal.

4 Potential Spill Scenarios

Table 2 presents the potential spills scenarios associated with the proposed activities.

These scenarios include:

- Spills from chemical and wastewater during transportation (off-site)
- Tank, drilling pit and containment vessel overflows and structural failures
- Spills from chemical and wastewater handling and storage activities on-site
- Spills from wastewater flowlines between wellpads

The loss of containment due to well barrier failure is covered under the Well Operations Management Plan (WOMP).

Table 2. Potential Spill Scenarios

Spill Scenario	Activity Duration	Mechanisms	Quantity	Quality of spill	Location	Key management controls
Poor refuelling or fuel transfer practices	- Seismic – 30 days - Civil construction – 21 days per wellpad - Drilling – 30 days per well - HF – 25 days per well - Testing – 90 days per well	Spill during fuel transfer	<100L	Diesel	- Seismic line - Access track during construction - Wellpad during construction	- Fueling procedures - Drip trays when refuelling - Spill kits available
Spills from chemical and wastewater during handling, treatment and storage on-site	- Drilling – 30 days per well - HF – 25 days per well - Well testing – 12 months per well	- Container rupture - Spill during chemical handling and mixing	<1,000L	- Saline drilling fluids - Saline Flowback Fluids and Produced Water - Saline wastewater - Various chemicals, as listed in Table 6 to Table 8	- Chemical storage area - Drilling rig - Drilling pits - HF Spread - Flowback fluid and Produced Water storage tanks - Well Test equipment	- Appropriate segregation of incompatible chemicals. - Secondary containment to be deployed under high-risk spill/leak storage and handling areas. - Routine inspections of chemicals stored - Spill kits available - Sites are manned during operations - WWMP in place - Induction training on chemical and wastewater during handling, treatment and storage on-site

Spill Scenario	Activity Duration	Mechanisms	Quantity	Quality of spill	Location	Key management controls
Spills from chemical and wastewater during transportation off-site	- Drilling chemical; transfer- 7 days of bulk chemical transfer, generally pre-drilling - HF chemical; transfer four truckloads of chemicals per week for ~2 weeks - Wastewater; disposal over 4 weeks- up to 50 truck movements total over the duration.	- Transport spill - Traffic accident (total or partial release)	25m ³ (1 truckload)	- Saline wastewater - Various chemicals, as listed in Table 6 to Table 8	Off-site along the highway	- All transport companies to be appropriately licenced to transport chemicals and waste (Dangerous goods and Waste Management and Pollution Control Act) - Access tracks will be assessed daily during periods of site activity for the impacts of wet weather - WWMP in place
Loss of containment during transfer on-site (leakage from pipes, hoses, fittings etc.)	- Drilling – 30 days per well - HF – 25 days per well - Testing – 90 days per well	Coupling, hoses or valve failure	<5000L	- Saline drilling fluids - Saline Flowback Fluids and Produced Water - Saline wastewater - Various chemicals, as listed in Table 6 to Table 8	- Chemical mixing and transfer areas on the drilling rig - Production test equipment - Wastewater storage equipment - Wastewater treatment equipment	- Secondary containment to be deployed under high-risk spill/leak storage and handling areas - Spill kits available - Daily inspection of all chemicals stored, handling areas, including wastewater transfer point and chemical mixing areas during operations - Sites are manned during operations - Wastewater management Plan (WWMP)

Spill Scenario	Activity Duration	Mechanisms	Quantity	Quality of spill	Location	Key management controls
Tank, drilling pit and containment vessel overflows and structural failures	Duration of all activities plus ongoing wastewater storage which may be extended beyond 12 months to allow for ongoing evaporation of fluids	- Overfilling of a pit and Flowback tank or pit - Structural failure of embankment or tank wall	>10,000L	- Saline drilling fluids - Saline Flowback Fluids and Produced Water - Saline wastewater	- Drilling Pits - Closed-topped storage tanks - Open-topped treatment tanks	- Daily inspection of pit and tank integrity during operations - Monitoring of pit and tank freeboard level during operation - Tank pads are bunded and capable of holding the carrying capacity of wastewater on the tank pad.
Loss of containment from buried flowline between wellpads	Duration of wastewater transfer periods – 90 days per well	Failure of buried flowline integrity	>859,000L	Saline Flowback Fluids and Produced Water	Flowlines between wellpads	- Inter-wellpad transfer procedures - In/out volume discrepancy monitoring during transfer operations - Weekly inspection of flowline route for site disturbance during transfer operations - Sites are manned during operations

4.1 Leak Worse Case Scenarios

Table 3. Worst-case Scenarios

Leak	Total volume that could be lost	Maximum likely time to locate the leak	Risk
Flowline leak	859,000L	~24h for a slow leak – overnight with the system, not under pressure. ~2h for a high-pressure leak - flowline volume constantly monitored while the system is in use.	This is a theoretical scenario as a whole flowline network would not drain to a single point, and irrespective would be found via the leak detection system before this.
Flowback Tank	3,756,000L	~12h on non-operational sites (Daily fluid levels are reviewed) ~2h during operations	In the event of a catastrophic failure of a tank, all wastewater will be contained within the bunded site. The site has the capacity to contain the full tank volume.
Pits	10,000L	~12h on non-operational sites (Daily fluid levels are reviewed) ~2h during operations	This would require that the pit be full and the earthen bund wall fails catastrophically. The liner in the earthen bund means that a washout of the wall from overflow is an unlikely scenario
Chemicals	1,000L contained within bund	~2 hours, chemicals are in regular use	In case of a chemical leak, it will be contained within the bunded area. Chemicals are in regular use and removed from the site as personnel are demobilised from the site.
Hydraulic Oil	3800L contained within bund	~2 hours	Removed from the site as personnel are demobilised from site.
Diesel Fuel	30,000L (size tank) contained within second tank lining	~2h hours, Fuel is in regular use during the day	It is a theoretical scenario as the diesel is contained in double bunded vessels. Fuel removed from the site as personnel are demobilised from site.
Gas emissions	3MMscf	Immediately as the EPT is permanently manned and monitored	Total greenhouse gas emissions for the Beetaloo Sub-basin are low compared to total NT and Broader Australia Greenhouse gas emissions. The worst-case percentage of total NT and Australian GHG emissions is estimated at 2.6% and 0.078%, respectively.

5 Potential Receptors

Appendix 01 of this EMP describes the environment at the Location of the Regulated Activities, including environmental and cultural sensitivities, with the potential to be impacted by a spill.

Maps are provided throughout the document illustrating the separation distance between project activities and sensitive receptors: Heritage sites, communities, protected areas, watercourses, etc.

5.1 Potential Impact on the Environment

In the unlikely event of a spill, the potential impact on the environment may reduce surface water, groundwater, or soil quality. Management controls and mitigations measures are in place to reduce the likelihood of spills to ALARP. For details of the controls, see the Risk Assessment in the EMP.

5.1.1 Groundwater

Chemicals and fuels used during the civils, seismic, drilling and hydraulic fracturing and extended production test activities may result in accidental releases to surface and infiltrate the ground, migrating to shallow groundwater, affecting groundwater quality.

Modelling was conducted to determine the potential impact on groundwater via infiltration in saturated and unsaturated soils. The modelling results indicated that water would take 158 years (through siltstone) and 115 days if the surficial sequence is consistent with limestone to reach groundwater at a depth of approximately 50m below ground level.

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.

5.1.2 Surface water

Spills to the surface have the potential to migrate to surface waters such as ephemeral watercourses, having the potential to affect surface water quality and ecological values of that habitat. Imperial has developed and implemented various systems and plans to control the transportation, storage, and handling of chemicals during field development and operational activities to minimise accidental release potential. These systems and processes are considered effective in lowering the probability of occurrence.

5.1.3 Soil

For smaller spills and leaks (<1m³), migration is likely to be contained within the surface soils and would be readily removed, contained or remediated. If a more significant spill were to occur, such as that from a bulk tanker, there is the potential that the product could infiltrate.

6 Risk Assessment

The risk of spills associated with the proposed activities is covered under the EMP.

7 Chemical Risk Assessment

Imperial engaged a consultant to carry out a risk assessment to evaluate the potential hazards of chemicals and the potential for exposures to human and environmental receptors and potentially hazardous chemicals where exposure pathways are complete; for the hydraulic fracturing (HF) fluids proposed to be used during HF.

The methodology used for the chemical risk assessment is aligned with the guidance provided by the Commonwealth and other national chemical risk assessments as per:

- Department of the Environment and Energy, Exposure Draft – Chemical Risk Assessment Guidance Manual: for chemicals associated with coal seam gas extraction, 2017 (herein referred to as DOE 2017)
- enHealth "Environmental Health Risk Assessment, Guidelines for Assessing Human Health Risks from Environmental Hazards", 2012
- National Industrial Chemicals Notification and Assessment Scheme (NICNAS), National Assessment of Chemicals Associated with Coal Seam Gas Extraction in Australia, 2017 (herein referred to as NICNAS 2017), and
- National Environment Protection (Assessment of Site Contamination) Measure 1999 (ASC NEPM); Schedule B4, Site-specific health risk assessment methodology, 2013

The chemical risk assessment comprised the following tasks:

- Hazard assessment; evaluates the environmental and human health hazards of the chemical additives in the hydraulic fracturing fluid, based on their environmental persistence, bioaccumulation, and aquatic toxicity properties. Chemicals of potential concern are identified for further assessment. An evaluation of human health toxicity is also provided,
- Exposure assessment; is an assessment of the surface and subsurface exposure pathways, including a mass balance calculation to identify the amount of each chemical additive within the hydraulic fracturing fluid, and
- Screening and validation processes via Tier 1 and Tier 2 assessments: this process determines chemicals known to be of low concern and identifies chemicals for further risk assessment.
 - o **Tier 1:** using published information about each chemical proposed to be used; identifies chemicals of low concern to ecological and human health. Tier 1 chemicals do not require additional risk assessment in the tier assessment process.
 - o **Tier 2:** A quantitative risk evaluation using toxicity values and quantitative estimates of chemical intake to provide an estimate of potential human health and environmental risk associated with hydraulic fracturing activities, based on the identification of complete exposure pathways and hazard identification.

7.1 Results of the Chemical Risk Assessment

For the Tier 1 and Tier 2 assessments, the potential for higher fluid concentrations has been considered. See Attachment o6.01 for the full report.

Tier 1 Assessment Results

The outcome of the Tier 1 assessment identified that most of the chemicals did not require further management or mitigation assessment. Nonetheless, five chemicals that could potentially pose significant hazards or risks were evaluated in the Tier 2 Assessment. Such chemicals are:

- Amine oxides, cocoalkyldimethyl (CAS number 61788-90-7)
- Chlorous acid, sodium salt (CAS number 7758-19-2)
- Crotonaldehyde (CAS number 123-73-9)
- Glutaraldehyde (CAS number 111-30-8), and
- Tributyl tetradecyl phosphonium chloride (CAS number 81741-28-8).

Tier 2 Assessment Results

The chemicals evaluated for the two hydraulic fracturing system formulations, the following additives were carried through to Tier 2 assessment:

- Hydrotreated light petroleum distillate (CAS number 64742-47-8) based on the potential for inhalation exposures to workers during hydraulic fracturing activities, and
- Chemicals were identified in the Tier 1 assessment with a high ecotoxicity hazard assessment, therefore having potential avian wildlife exposure to fluids stored in treatment tanks.

Workers

A quantitative risk characterisation, or the Margin of Exposure approach (MoE), was used to assess workers' potential for health risk from potential exposure to hydrotreated light petroleum distillate. For each occupational activity scenario (i.e., transport and storage, mixing/blending of hydraulic fracturing chemicals, injection of HF fluids, cleaning and maintenance and storage flowback), the MoE calculated from all exposure routes determined that it was greater than the threshold (100). Therefore, the chemical is considered of low health concern for workers. No further management controls are therefore considered necessary.

Avian Wildlife

The potential exposure was assessed for representative avian species based on the potential ingestion of flowback waters containing the selected chemicals from treatment tanks over approximately three weeks. Potential dietary intake of water containing these chemicals was compared to toxicity reference values developed specifically for avian wildlife to estimate a hazard quotient; a potential hazard quotient threshold level less than 1 indicates there are no unacceptable exposures to the avian species.

The hazard quotient for all the assessed avian species was orders of magnitude less than the threshold hazard quotient level of 1. Therefore, there were no unacceptable exposures to the avian species. In addition, as a further conservative consideration, even if the potential exposure period is expanded to one year, the hazard quotient for the assessed avian species is still orders of magnitude less than the threshold hazard quotient level of 1.

Management of Hydraulic Fracturing Chemicals

All chemicals were considered of low concern when standard chemical handling, storage and disposal practices were utilised. For each chemical, there is a Risk Dossier which includes a section on Safety and Handling and where relevant, it contains a subsection on storage and handling.

8 Control Measures

The key control measures to manage spills associated with exploration activities in the EMP IMP₄ and revisions are summarised in the list below.

The key management controls include:

- All flowback, completion fluids, chemicals, oil and fuel storage will be equipped with secondary containment (or dual liners), as per the codes of practice
- Secondary containment will have sufficient capacity to hold 100% of the volume of the largest container stored in the area plus 10% unless the container is equipped with individual secondary containment
- Drilling pits will be lined with Aquacon³⁴⁵, which meets the C.4.1.2 requirements for an impermeable membrane
- Drilling pits will be constructed and managed with enough freeboard to manage a 1:1000ARI during the wet season (~1100mm)
- Drilling pits will have a raised bund of 0.5m to prevent overland flow from adding any additional water to the pits.
- Tanks will be designed, installed and operated as per the manufacturer's specifications and COP
- Tank pads will be designed and constructed to prevent spills of hazardous chemicals; this includes compacting the tank pad surface to 100kpa to reduce infiltration
- Monitoring to detect spills will be undertaken following Section 10 of this document.
- Procedures will be developed by contractors designed to detect, remediate and report any spills; this includes;
 - o Chemical handling procedures
 - o Chemical Storage and handling Inspection procedures
 - o Spill prevention, detection and response procedures
- Stored chemical volumes will be managed to balance the amount on-site with transport requirements to avoid unnecessary vehicle movements and handling risks
- Secondary containment of stored chemicals will be compatible with the material or waste stored or used within the containment, be resistant to physical, chemical and another failure during handling, installation and use, and be maintained in good order at all times
- The transport off-site of hydraulic fracturing chemicals and wastewater during the wet season will be avoided unless a site-specific risk assessment indicates the risk is equal to or below moderate.
- Spill clean-up material readily available at each worksite while operational and on all mobile service trucks or vehicles, where hydrocarbons and chemicals are stored or used
- Inspection reports and maintenance records of secondary containment shall be kept and available for review upon request.
- Spill response drills to be completed as a part of routine emergency response
- Materials that escape from primary containment or are otherwise spilled onto secondary containment will be removed as soon as possible.

8.1 Secondary containment on flowlines

Section A.3.8 (f) of the Code of Practice: Onshore Petroleum Activities in the Northern Territory says, "Any hazardous chemicals or those that may cause environmental harm are to be stored within secondary containment."

The wastewater flow lines are not to store wastewater but are for handling wastewater, but they will contain wastewater for an extended period; therefore, Imperial believes it must meet this requirement.

Imperial has assessed that secondary containment of a flowline is not reasonably practicable for the following reasons;

- A clay liner surrounding the flowline for the entire length;
 - o The traffic volumes for the amount of clay required would add significant traffic to the activity.
 - Approximately 220 road trains
 - o The cost of importing the volume of clay required to this remote location in such large volumes would be too high
 - o The disposal of the volume of soil to the same volume as the clay liner would be too high
 - o Constructing and verifying a clay liner completely encompassing a flowline is impractical
- Geomembrane liners wouldn't achieve the desired water containment and cannot be checked and verified to their effectiveness post-construction.

Imperial has determined that the risk profile for any potential spill is ALARP with the leak detection and remediation process. Properly constructed and tested flowlines are recognised as ALARP and the safest, efficient, environmentally friendly way to transfer fluid the world over.

8.1.1 Leak Detection and monitoring

Imperial will fit inlet/outlet sensors to the wastewater flowlines with real-time flow volume monitoring. The monitoring system will alert on any discrepancy between inflow and outflow volumes in real-time to determine if there has been any wastewater lost. The system will also do a daily volume balance to determine whether there has been a gradual loss of volume. Suppose it has been determined that a volume of 100 litres has been unaccounted for (taking into account the accuracy of the inlet and outlet monitoring devices). In that case, Imperial will undertake an incident investigation to determine the cause of this discrepancy.

8.1.2 Leak remediation process

In the event of a leak being detected during operation or a daily imbalance has occurred, Imperial will cease using the Gathering Network. The leak will be located and repaired before the Gathering Network is brought back into service. The leak will be readily detected at the surface via wetted soil; if the wetting front does not travel to the surface, specific location equipment will be used to locate the leak. This specified equipment is the EM38 electro coil or similar equipment. As this tool measures the soil's conductivity, it will detect an increase in soil moisture from any leak.

Once the leak has been detected, Imperial will excavate the flowline to expose the leak and make repairs in line with the construction methodologies described above. The repaired section will then be tested before being brought back into operation.

Soil samples will be taken from areas where wastewater has wet the soil, for analysis and soil remediation will be carried out as required, in line with this document.

9 Spill Response and Management

The following section provides an overview of the response to spills during activities under the EMP. Where the spill results from an emergency, the Emergency Response Plan (ERP) will take precedence over this plan.

9.1 Initial Spill Assessment

When a spill occurs, the site supervisor will carry out the spill's initial assessment to identify the potential hazards, the type, location of the spill, and required assistance. The assessment will;

- Determine the safety hazard to immediate response personnel and whether additional resources (e.g. emergency services or specialised equipment or advice) are required to manage the spill safely,
- Determine the spill movement, including factors affecting the movement
- Determine the spill response priorities as per Table 4.
- Evaluate the material's hazardousness, including any potential risk associated with chemical mixing, such as oxidising and reducing agents.
- Determine the appropriate spill category and type of response required as per Section 9.2
- Determine the physical (volume and state) and location of the spill.

Table 4. Spill response priorities

Spill Priority	Response
People and communities	• Evacuate and muster (if deemed necessary) • Account for all people and determine missing persons • Stop unauthorised access • Provide a technical resource to the Emergency Services (if required) • Protect community (e.g. prevent incident escalation, community awareness).
Environment and Sacred Sites	• For emergencies that are safe to manage, on-site personnel will respond with available resources to limit the extent of the impact to the environment or a protected site • For larger incidents, or where it is unsafe for on-site personnel to respond, trained people will be mobilised to control and contain the emergency to minimise the impact to the environment or protected site.
Regulators	• Notify Regulators as per incident reporting requirements.
Assets	• Monitor automatic shutdown of the equipment or part thereof, or initiate manual shutdowns where it is safe to do so • Mobilise Emergency Services to intervene.
Reputation	• Notify neighbours (if required).

9.2 Spill Response

Drilling, HF and well testing contractors working under this EMP will develop generic spill containment clean-up procedures aligning with this plan's requirements. These procedures shall be adapted (where appropriate) to consider the site and chemical-specific hazards associated with each spill event. The procedures shall consider the following generic spill containment and response items in their development:

- Move all people out of harm's way
- Prevent people, livestock and wildlife access to hazardous material through fencing or other barriers
- Alert others nearby
- Assess the situation:
 - o determine what substances are involved. the substance must be known before taking any action (refer to MSDS)
 - o the potential receptors (people and the environment) and if additional support is required
- Where applicable, remove any possible risk escalating factors
 - o I.e. ignition hazards for inflammable/combustible spills
 - o Approach from up-wind to reduce fume risks and isolate the spill source (close containment valve, similar)
 - o Ensure appropriate controls requirements are met – e.g. PPE, first aid support, etc. - before conducting spill clean-up
- If it is safe to do so; stop the source of the leak (if possible) and contain the spill using on-site equipment to prevent from leaving the site or entering a waterway or sensitive feature
- Recover any free liquid and contaminated material as soon as practicable to mitigate infiltration.
- Store contaminated material in a manner to minimise the risk of additional contamination
- For level 2 spills and higher, the Project Manager shall be notified as soon as it is safe to do so, but within 2 hours. (Spill levels are defined in Section 13.1 of this document)
- Project Manager to ensure appropriate external (DPEWS/DITT) incident reporting requirements are actioned per Section 13.2 Incident Reporting of this document
- For level 2 spills and higher, the Project Manager will seek expertise on whether additional testing and remediation are required upon completion of the initial containment and clean up. This consideration will be undertaken following the National Environment Protection (Assessment of Site Contamination) Measure. (Spill levels are defined in Section 13.1 of this document)
- Upon rectifying a reportable spill, an incident investigation shall be completed as per the Petroleum (Environment) Regulations; this shall include;
 - o A root cause assessment of the incident
 - o Actions were taken to mitigate the impact
 - o Ongoing monitoring and maintenance are required to ensure the site is stable and non-polluting
 - o Actions taken to prevent future similar incidents from occurring again

9.3 Contaminated Material Disposal

Contaminated material disposal will consider the following while being undertaken:

- The storage of contaminated material must be undertaken in a manner that minimises additional contamination
- Off-site disposal must be undertaken following the NT Waste Management and Pollution Control Act 1998
- All listed waste transportation shall be undertaken by licenced contractors, be tracked and disposed of at approved waste management facilities.

10 Monitoring and Inspection

Monitoring measures used to manage risk during the proposed activities are presented in "Table 25. Monitoring Plan" of the Environmental Management Plan.

11 Roles and Responsibilities

The roles and responsibilities set out below are specific for the people responsible for managing and leading spill responses.

Project Manager

- Implementation of the Spill Management Plan
- Delegation of responsibilities for spill response
- Liaise with Environmental Specialist to set out remediation and rehabilitation requirements
- Comply with external reporting obligations
- Interface with government and regulatory bodies for communication and consents.

Site Supervisor

- Initial spill response
- Liaise with contractors in charge of work program to initiate spill assessment
- Engage emergency services (if required)
- Coordinate immediate spill clean-up operations.

Environmental and Compliance Reporting Officer

- Report spill to regulatory authorities
- Provide recommendations about remediation and rehabilitation requirements, including monitoring and future management controls.

Emergency response coordinator.

Provide specialist technical advice (Emergency Response) to support spill management activities

Other (including contractors)

All personnel, including contractors engaged to perform project activities, must comply with the Spill Management Plan and the *Code of Practice: Onshore Petroleum Activities in the Northern Territory*.

12 Implementation

All personnel, including contractors engaged to perform project activities, must comply with this Spill Management Plan and the Code.

13 Spill Reporting

13.1 Spill Rating

Table 5 provides a summary of the spill classification based upon the volume and location of the spill.

The hazards of the potential spill to people and the environment will be assessed to ensure incident-specific hazards and risks are considered in the spill response. This table guides as to the categorisation of potential spill scenarios. Different spill levels may trigger alternative incident reporting requirements. When classifying spills and determining the reporting requirements, Ministerial conditions and environmental outcomes and performance standards criteria should also be considered when determining whether the event is a recordable or reportable event.

The Spill levels are:

- **Level 1:** Spills that can be contained within a specific site and cleaned up by the operator without external resources. Spills on this level are likely to be less than 200L, require less than one day of cleaning time and are considered a non-recordable incident under the Petroleum (Environment) Regulations.
Non-recordable spills will be recorded in Imperial's incidents management system.
- **Level 2:** Spills that require additional resources to clean up or have not been completely contained within the site boundary. Spills on this Level are classified as recordable incidents under the Petroleum (Environment) Regulations and will be reported through a recordable incident report notification to DEPWS and potentially under the Waste Management and Pollution Control Act (WMPCA) pending the incident investigation.
- **Level 3:** Substantial additional resources are required to manage this spill. In general, it involves more than a week of clean up and is classified as reportable incidents under the Petroleum (Environment) Regulations.
Spills on this Level are reportable incidents and may require notification under the WMPCA.

Table 5. Spill Assessment Reporting

Description of receiving environment	Spill (L)		
	20-200L	200-2,500L	>2,500L
Bund or contained within an impervious area	Not recordable	Not recordable	Not recordable
On-site (lease pad, camp pad, hardstand, road or work area) compacted or sealed surface	Level 1		Level 2
Off-site permeable surfaces – areas adjacent to lease pads, camp pads, roads where spills have moved beyond the approved activity area.	Level 1 or	Level 2	Level 3
Sensitive environmental and cultural features such as waterways, drainage lines, wetland, high valued habitat and the sacred site or where the spill has or has the potential to cause material or serious environmental harm	Level 2		Level 3

Spills of Dangerous goods or wastes off-site may need to be reported under the NT Dangerous Goods Act or Waste Management and Pollution Control Act 1998.

13.2 Incident Reporting

Incidents may require reporting under the Petroleum (Environment) Regulations and Waste Management Pollution Control Act

13.2.1 Petroleum (Environment) Act Incident Reporting

13.2.1.1 Reportable Environmental Incident Reporting

The Petroleum (Environment) Regulations define a reportable incident as an incident arising from a regulated activity that has caused or has the potential to cause material environmental harm or serious environmental harm as defined under the Petroleum Act.

An interest holder must notify (this may be oral or in writing) DEPWS of a reportable incident as soon as practicable, but no later than two hours after the first occurrence of the incident or after the time the interest holder becomes aware of the incident.

DEPWS can be notified through the DEPWS Onshore gas non-compliance hotline on 1800 413 567.

A written report within three days must follow up any verbal report to DEPWS following the Petroleum (Environment) Regulations.

13.2.1.2 Recordable incidents

The Petroleum (Environment) Regulations define a recordable incident as an incident arising from a regulated activity that:

1. Has resulted in an environmental impact or environmental risk not specified in the current plan for the activity, or
2. Has resulted in a contravention of an environmental performance standard specified in the current plan for the activity, or
3. Is inconsistent with an environmental outcome specified in the current plan for the activity, and
4. Is not a reportable incident

These types of spills are typically a level 2 type spill, as defined in Table 5.

An interest holder must notify (this may be oral or in writing) DITT of a recordable incident as soon as practicable but no later than 15-days after the reporting period (agreed period or every 90 days after the day on which the EMP is approved).

13.2.2 Waste Management and Pollution Control Act Incident Reporting (WMPC Act)

Following the WMPC Act, where contaminants or waste is not confined within the land on which the petroleum activities are undertaken (i.e. the approved disturbance areas where the petroleum activity is occurring).

Imperial will notify the EPA of any incident causing or threatening to cause pollution as soon as practicable, but no less than 24 hours after becoming aware of the incident.

13.2.2.1 Notifiable incidents

Under the WMPC Act, a notifiable incident is defined as an incident that causes, or is threatening or may threaten to cause, pollution resulting in material environmental harm or serious environmental harm. The notification must include the following details:

- a) the incident causing or threatening to cause pollution;
- b) the place where the incident occurred;
- c) the date and time of the incident;
- d) how the pollution has occurred, is occurring or may occur;
- e) the attempts made to prevent, reduce, control, rectify or clean up the pollution or resultant environmental harm caused or threatening to be caused by the incident; and
- f) the identity of the person notifying

The notification shall be made to the NT EPA Pollution Hotline 1800 064 567 as soon as practicable, but no later than 24 hours after the first occurrence of the incident or after the time, the interest holder becomes aware of the incident.

13.3 Communication

Spill prevention and monitoring strategies will be communicated to personnel via:

- Site inductions
- Safety Meetings
- Tool Box Talks, and
- Daily Meetings.

14 Chemical Tables

Table 6. List of Potential Chemicals in the Drilling Fluids

Name	Description
Bentonite API	Weighting agent/viscosifier
Calcium Carbonate	Weighting agent/Bridging agent
Caustic Soda	pH adjustment
Citric Acid	pH adjustment
Glut g	Biocide
Magnesium Oxide	Conditioning chemical
PAC LV	Fluid loss additive
PHPA	Encapsulation
Potassium Carbonate	Potassium carbonate
Potassium Chloride (KCl)	Inhibitor
Salt	Weighting agent
SAPP (Sodium Acid Pyrophosphate)	Dispersant
Soda Ash	pH adjustment
Sodium Bicarbonate	pH adjustment
Sodium Sulphite	Oxygen scavenger
TEA	HT polymer stabiliser
Thinpool	Thinner
Xanthan Gum	Viscosity
ALL LOK	LCM severe loss
Ancor 1	Corrosion inhibitor
Avafoam NS	OCNS gold rated foamer
Barite	Weighting agent
Barium Sulphate	Weighting agent
Calcium Chloride	CaCl ₂
Corrosion Inhibitor	Corrosion Inhibitor
Defoamer	Defoamer
Deepclean	Specialised well displacement surfactant
Drillfoam	Foamer
Drill Thin	Dispersant
Driscal D	Synthetic polymer, rheology modifier
EP Lube	Lubricant
Fibre C	LCM coarse
Fibre F	LCM fine
Fibre M	LCM medium
Flotrol	Starch fluid loss additive
Frac Attack	LCM total loss
Incorr	Amines
Idcide 20	Biocide (Type THPS)
Lime	pH controller
Microflow	Reservoir stimulating agent
Pipefree	Free pipe additive
Potassium Nitrite	Tracer
Quickseal C	LCM coarse
Quickseal F	LCM fine
Quickseal M	LCM medium
Sodium Polyacrylate	Fluid loss additive, high temp

Name	Description
Squeeze N Lock	LCM total loss
Strata Vanguard	LCM severe loss
Supersweep Fibre	Viscous sweep material
TrueScav HD	Sulphite free oxygen scavenger
Zinc Oxide	H ₂ S Scavenger

Cementing Additives

Table 7. Cementing Additives

Chemical Code	Description
D013	Retarder
D020	Bentonite Extender (60 lb/ft ³)
D031	Weighting agent
D202	Low temp Solid Dispersant
D047	Liquid Antifoam Agent
D065	TIC Dispersant
D145A	Liquid Extender, Silicate Cement Additive
D075	Liquid Retarder, Low temperature
D081	UNIFLAC Fluid Loss Additive
D167	Liquid Fluid Loss Additive
D168	MUDPUSH II Spacer
D182	Flyash
D035	Calcium Chloride
S001	Fluid Loss additive Solid
D167	Fluid Loss additive Liquid
D168	Mid range fluid loss additive solid
D255	Silica Flour
D066	High-temperature retarder.
D110	Deaeromatised Hydrocarbons

Note: Schlumberger product names listed, Halliburton cement blends are very similar, but they use their labelling for the same products; this gives a good structure to what would be added.

Table 8. List of potential HS fluids to be used.

Name	CAS Number	Description
Acrylamide/ammonium acrylate copolymer	26100-47-0	Viscosifyer
1,4-Dioxane-2,5-dione, 3,6- dimethyl-, (3R,6R)-, polymer with rel-(3R,6S)-3,6-dimethyl-1,4- dioxane -2,5-dione and (3S,6S)- 3,6-dimethyl-1,4-dioxane-2,5- dione	9051-89-2	Diverter
2-Ethyl hexanol	104-76-7	Surfactant
2-Propenamid (impurity)	79-06-1	Impurity
2-Propenoic acid, polymer with sodium phosphinate	129898-01-7	Scale Inhibitor
Acetaldehyde	75-07-0	Corrosion Inhibitor
Acetic acid	64-19-7	pH Control, Acidizing
Acrylamide acrylate copolymer	9003-06-9	Viscosifyer
Acrylamide, sodium acrylate polymer	25987-30-8	Viscosifyer
Acrylonitrile	107-13-1	Diverter
Alcohols, C10-16, ethoxylated propoxylated	69227-22-1	Solvent
Alcohols, C12-14-secondary, ethoxylated	84133-50-6	Surfactant
Alcohols, C12-15, ethoxylated	68131-39-5	Surfactant
Alcohols, C12-16, ethoxylated	68551-12-2	Surfactant
Alcohols, C6-12, ethoxylated propoxylated	68937-66-6	Solvent
Aldol	107-89-1	H ₂ S Scavenger
Amides, tall-oil fatty, N,N- bis(hydroxyethyl)	68155-20-4	Scale Inhibitor
Amides, tall-oil fatty, N,N-bis(hydroxyethyl)	68155-28-4	Surfactant
Amine oxides, cocoalkyldimethyl	61788-90-7	Surfactant
Ammonium chloride	12125-02-9	Clay Stabilizer
Benzaldehyde	100-52-7	Corrosion Inhibitor
Bismuth oxide	1304-76-3	Corrosion Inhibitor
but-2-enedioic acid	110-17-8	pH Control
Butyl alcohol	71-36-3	Scale Inhibitor
Calcium Chloride	10043-52-4	Clay Stabilizer
Ceramic materials and wares, chemicals	66402-68-4	Proppant
Chlorous acid, sodium salt	7758-19-2	Breaker
Choline chloride	67-48-1	Clay Stabilizer
Cinnamaldehyde	104-55-2	Corrosion Inhibitor
Citric acid	77-92-9	pH Control
Cocobetaine	61789-40-0	Surfactant
Crotonaldehyde	4170-30-3	Corrosion Inhibitor
Crystalline silica, quartz	14808-60-7	Proppant
Diammonium peroxidisulphate	7727-54-0	Breaker
Dicoco dimethyl quaternary ammonium chloride	61789-77-3	Surfactant
Diethanolamine	111-42-2	Crosslinker
Diethylene glycol	111-46-6	Auxillary agent
Disodium octaborate tetrahydrate	12280-03-4	Crosslinker
Distillates (petroleum), solvent-dewaxed heavy paraffinic	64742-65-0	Solvent
Diutan gum	595585-15-2	Viscosifyer
Ethanol	64-17-5	Solvent
Ethoxylated branched C ₁₃ alcohol	68439-54-3	Solvent
Ethoxylated oleic acid	9004-96-0	Emulsifyer
Ethylene glycol	107-21-1	Solvent
Fatty acids, C8-C16, ethylhexyl ester	135800-37-2	Surfactant

Name	CAS Number	Description
Fatty acids, tall-oil, ethoxylated	61791-00-2	Surfactant
Gelatins	9000-70-8	Corrosion Inhibitor
Glutaraldehyde	111-30-8	Bactericide
Glycerine	56-81-5	Solvent
Guar gum	9000-30-0	Viscosifyer
Hydrochloric acid	7647-01-0	pH Control, Acidizing
Hydrotreated light petroleum distillate	64742-47-8	Solvent
Hydroxylpropyl guar	39421-75-5	Viscosifyer
Iron gluconate	299-29-6	H ₂ S Scavenger
Magnesium silicate hydrate (talc)	14807-96-6	Free-flow agent
Methanol	67-56-1	Solvent
Non-crystalline silica (impurity)	7631-86-9	Impurity
Poly(oxy-1,2-ethanediyl), alphahexyl-omega-hydroxy-	31726-34-8	Surfactant
poly(tetrafluoroethylene)	9002-84-0	Coating
Polyethylene glycol	25322-68-3	Solvent
Polypropylene glycol	25322-69-4	Solvent
Potassium chloride	7447-40-7	Clay Stabilizer
Propan-2-ol	67-63-0	Surfactant
Propylene glycol n-propyl ether	1569-01-3	Corrosion Inhibitor
Silica dioxide	112926-00-8	Proppant
Sodium bicarbonate	144-55-8	Buffer
Sodium bisulfite	7631-90-5	Breaker
Sodium carbonate	497-19-8	Buffer
Sodium chloride	7647-14-5	Clay Stabilizer
Sodium diacetate	126-96-5	Buffer
Sodium hydroxide	1310-73-2	Buffer
Sodium iodide	7681-82-5	Scale Inhibitor
Sodium perborate tetrahydrate	10486-00-7	Crosslinker
Sodium persulfate	7775-27-1	Breaker
Sodium polyacrylate	9003-04-7	Coating
Sodium sulfate	7757-82-6	Stabilizer
Sodium sulfite	7757-83-7	Breaker
Sodium Tetraborate Decahydrate	1303-96-4	Crosslinker
Sodium thiosulfate	7772-98-7	Stabilizer
Sorbitan monooleate polyoxyethylene derivative	9005-65-6	Viscosity Control
Sorbitan, mono-9-octadecenoate, (Z)	1338-43-8	Surfactant
Tributyl tetradecyl phosphonium chloride	81741-28-8	Scale Inhibitor
Triethanol amine	102-71-6	Stabilizer
Ulexite	1319-33-1	Crosslinker
Vinylidene chloride/methylacrylate copolymer	25038-72-6	Coating

15 References

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Appendix 08 - Fire Management Plan

8 - Fire Management Plan

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8.1 Introduction

The area of planned exploration within EP187 is generally an open grassland savannah area lightly timbered. The area is regularly burnt using aerial firebombing and traditional owner cultural fire management practices.

More recently, the area has been increasingly utilised for cattle grazing, and as a consequence, many new fence lines and fire breaks have been constructed through the exploration area. As a part of grazing management practices towards the end of the dry season, the area is regularly burnt to reduce fuel load and promote new pasture growth through the following wet season. The practice of regular burns reduces the risk of significant hot fires and allows for a cooler, less intense burn; however, the risk of bush fires and wildfires remains in some areas.

8.2 Analysis of baseline information

Baseline fire information has been sourced from The North Australia and Rangelands Fire Information (NAFI) website (NAFI, 2020). NAFI is independent, funded by the Commonwealth of Australia through the Department of Industry, Science, Energy and Resources. NAFI is the reputable source of Northern Territory (NT) fire management data. It is managed through the Darwin Centre for Bushfire Research as a branch of the Charles Darwin University's Research Institute for the Environment and Livelihoods. The NAFI fire data has been reviewed and analysed; the results are presented below.

As this work program will be carried out over an extended period, this document will be reviewed for currency of fire burn history as each wellpad is constructed.

8.2.1 Fire Frequency

The Location of the Regulated Activities has been burnt between two and seven times in the last ten years, as shown in Figure 1.

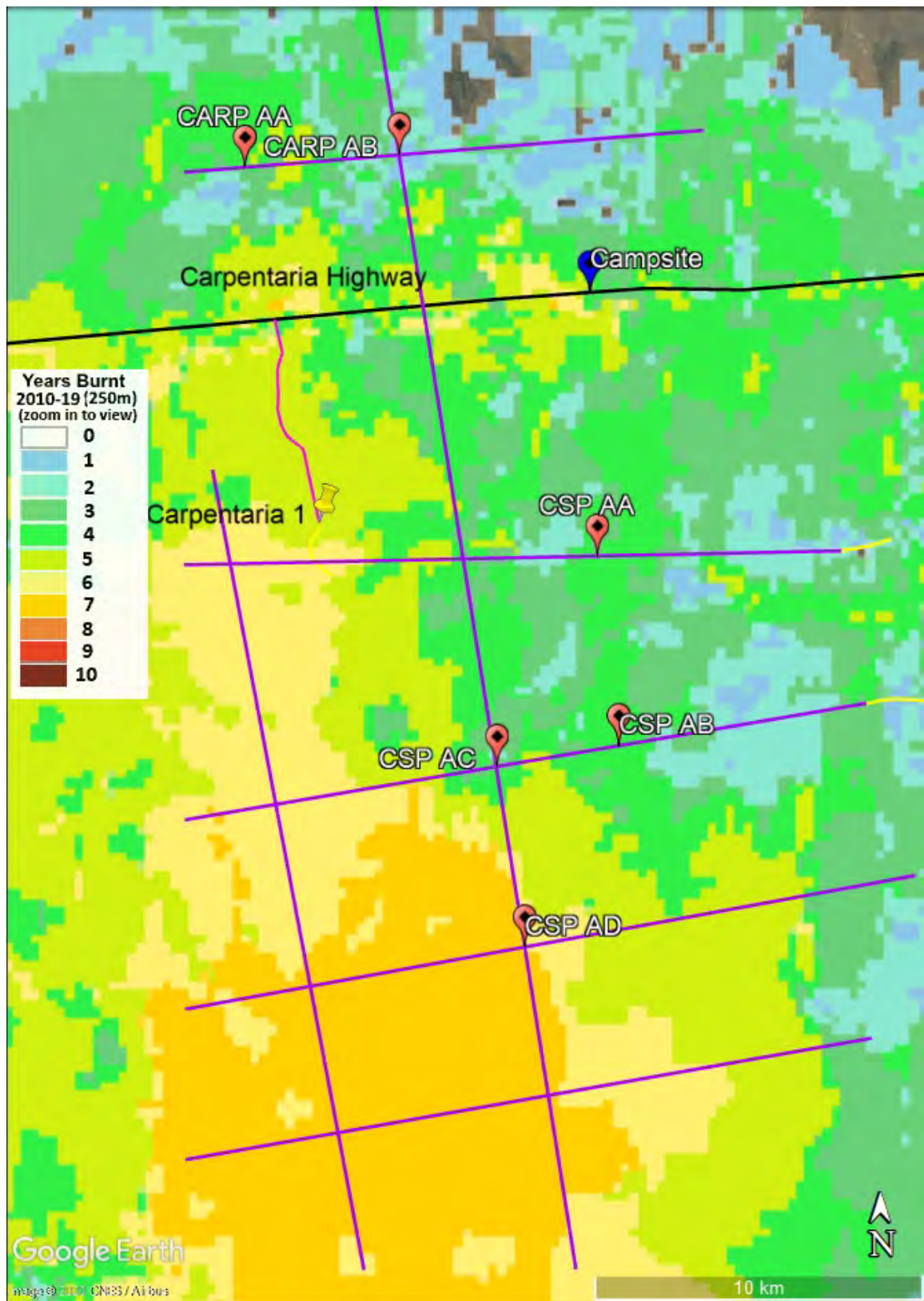


Figure 1: Fire Frequency 2010 -2019

8.2.2 Last Burn

The Location of the Regulated Activities was last burnt in the last three to five years, as shown in Figure 2.

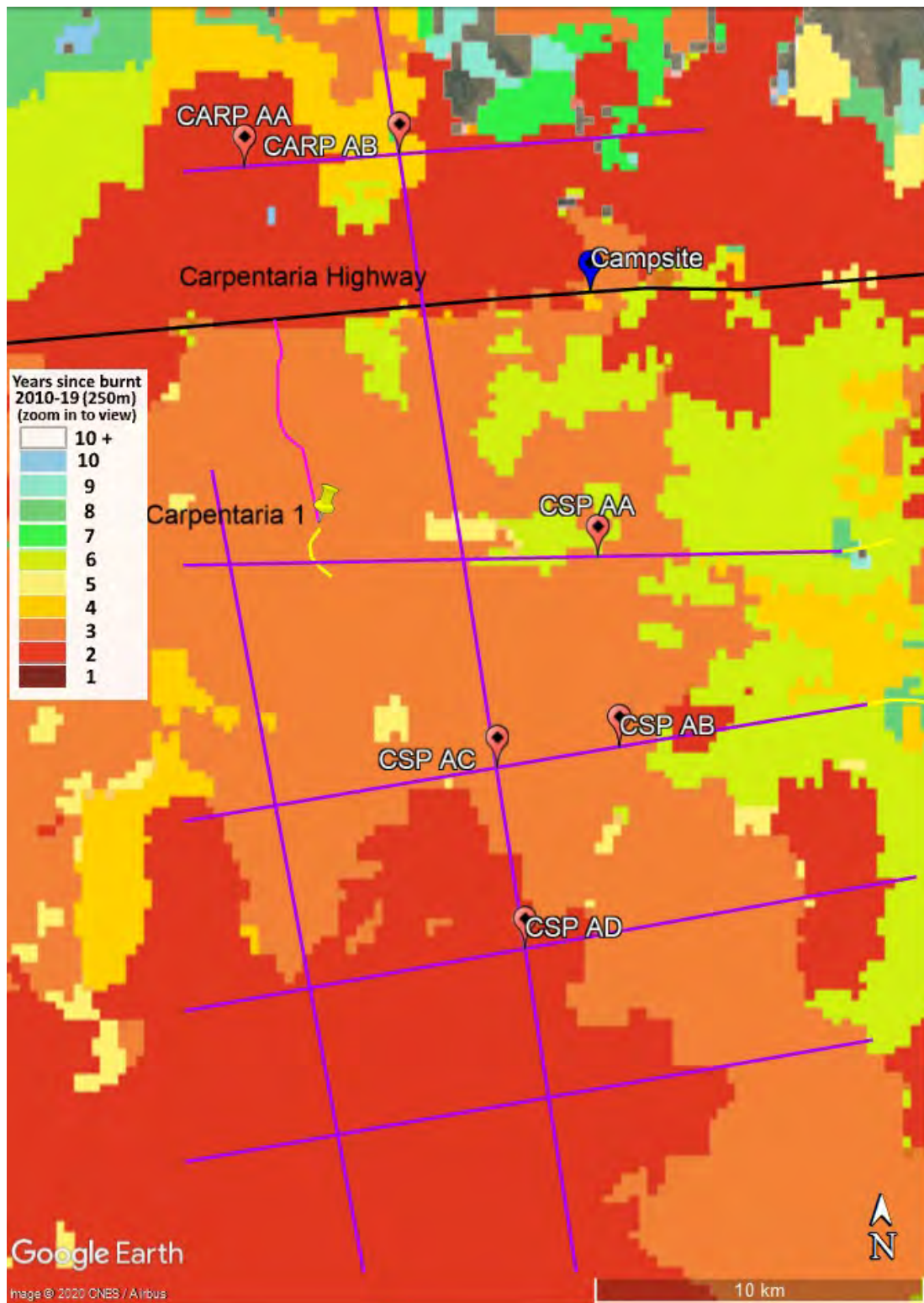


Figure 2: Years since last burn

8.3 Impacts of the proposed activities on the existing fire management

The project lies within the Savanna Fire Management Zone in the Northern Territory. The Department of Environment and Natural Resources, Savanna Regional Bushfires Management Plan (SRBMP) 2018 (DEPWS, 2018) has been developed to support community-wide fire management within the Savanna Fire Management Zone in line with the Bushfires Management Act 2016.

The SRBMP highlights a complex array of land uses, often with multiple uses on the same parcel of land, within the Savanna Fire Management Zone. The fire management objectives to support these land uses are even more diverse and summarised in Appendix B of the SRBMP. The SRBMP outlines the importance of working with gas exploration in its Land Use and Fire Management Objectives in 6.2 Appendix B.

The proposed activities do include the use of flares, fire exclusion from the wellpads is proposed utilising reduced fuel load areas and fire access trails. Outside of the wellpad, there will be no impact on fire management. This approach is consistent with the SRBMP 2018 and the Fire management objectives for petroleum exploration.

8.4 Coordination with the landholder and other land users

Imperial has ensured that the project does not affect the land managers fire management obligations and strategies through the land use agreement process. The proposed activities will be carried out on an extension of an already cleared area. The extension has been appropriately reviewed and consulted with the land managers to ensure there will be no impacts on the existing fire management regime.

The proposed activities are expected to commence in Q2 2021:

8.4.1 Seasonal Conditions and Fire Load Assessment

Fire load assessment will be carried out at civil construction works and ongoing through the site operations.

8.4.2 Fire access Trails and Fire Breaks

Fire access trails and fire breaks will be established as part of the civil construction works and maintained during operations as required.

8.4.3 Controlled Burns

There is no current need for controlled burns for the works under this EMP. Should conditions change, appropriate discussions with landholders and the Savanna Fire Management Zone team at DEPWS will occur.

8.4.4 Monitoring of bushfire alerts

Refer to Table 25 of the Environmental Management Plan for Monitoring of bushfire alerts.

8.4.5 Local bushfire brigades

As the works carried out under this EMP are of short duration, Imperial will not be joining local bushfire brigades.

8.4.6 Fire Control Measure

Imperial will have fire response equipment on-site during civil construction activities and establish and maintain fire breaks and fire access trails. All other activities will be carried out within the confines of the fire breaks and fire access trails. Firefighting equipment and systems will be available at the drilling rig to extinguish an ignition at the wellhead or on the rig floor

8.4.7 Annual Fire Mapping

The proposed activities are expected to commence in Q2 2021. If during operations it is identified that a fire has occurred immediately surrounding the Location of the Regulated Activities, Imperial, in consultation with the land managers, will map the extent of the fire effects within the immediate area and provide that information to DEPWS.

8.5 Infrastructure design, construction and operation

The wellpads are designed with a ring fire access trail/fire break ~30m from the fenceline; the area between the fire access trail and the fenceline will have large vegetation removed as a reduced fuel load area to minimise the risk of causing a fire in the surrounding environment.

The well site will be operated to minimise the risk of causing a fire on the well site or the surrounding environment.

All above-ground enclosed tanks will be designed and constructed to any standards that apply in the Northern Territory for the type of structure and be able to withstand bushfires.

All plant and equipment will be operated and maintained in line with manufacturers requirements to reduce the risk of fire, including spark arrestors on vehicles and diesel generators and appropriate maintenance schedules.

The Extended Production Test Flare system will be installed and operated with a 20m fuel load exclusion zone.

The welding temperatures for PE pipe used in constructing flowlines are not high enough to be considered a potential cause for ignition.

8.6 Summary Sheet

One-page summary sheets will be prepared when the final location of the wellpads is known to assist with on-site communication.

8.7 Bushfire - Contact Details

Entity	Contact Details
Bushfire NT Katherine Office	0889738873 - 0889738871
Bushfire NT Head Office	0889220840 – 0889220844 Bushfires.nt@nt.gov.au
Bushfire NT Alice Springs	0889523066
National Response Centre	1800076251
Emergency	000 or 112 mobile
NAFI North	http://www.firenorth.org.au/nafiz/
Secure NT (Fire Bans)	https://securent.nt.gov.au/alerts
Fire Incident map	https://pfes.nt.gov.au/incidentmap/

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Appendix 09 - Weed Management Plan

WEED MANAGEMENT PLAN EP187

Client: Imperial Oil and Gas

STATUS: Final

REPORT No: IG-04

ISSUE DATE: March 2021



FOX & CO
ENVIRONMENTAL

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EXECUTIVE SUMMARY

Previous weed assessments have been undertaken on the Imperial Oil and Gas Limited (IOG) exploration tenement EP187 in relation to the 2019-2020 seismic and drilling program. Previous pre-exploration weed surveys were undertaken in dry season conditions (October and November 2018 and September 2019) and post-wet season conditions (April 2019). A post-wet season / post-exploration activity weed survey was undertaken in June 2020 and in March 2021.

IOG proposes to undertake additional exploration activities on EP187, described herein as the 2021-2023 exploration program. A pre-exploration weed survey was undertaken in March 2021 over the proposed 2021-2023 exploration areas.

This report consolidates all previous weed survey activities and data and includes new survey data for post-seismic surveys and pre-seismic surveys undertaken in 2021.

One weed species was recorded inside the IOG work area during the 2021 post-wet season field survey (*Hyptis suaveolens* (Hyptis)) which is a Class B declared weed in the Northern Territory. *Themeda quadrivalvis* (Grader Grass) which is a Weed of National Significance (WONS) and Class B declared weed in the Northern Territory, was observed in one (1) location in EP187. The location of Grader grass is outside the proposed exploration area along the road verge of the Carpentaria Highway.

A range of mitigation measures and monitoring protocols have been recommended to reduce the risk and associated impacts of new weed introductions on the tenement.

Acronyms and Abbreviations

Acronyms/Abbreviation	Description
DEPWS	Department of Environment, Parks and Water Security (Formerly DENR)
IOG	Imperial Oil & Gas
LCP	IOG Land Clearing Permits
LCG	NT Land Clearing Guidelines LCG
WMP	Weed Management Plan
WONS	Weeds of National Significance

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1. INTRODUCTION

Fox & Co Environmental Pty Ltd (Fox & Co) conducted pre and post-seismic weed surveys for Imperial Oil & Gas (IOG) exploration activities on EP187 between 2018 and 2021. This report consolidates all previous weed survey activities and data and includes new survey data for post-seismic surveys and pre-seismic surveys undertaken in 2021. The following exploration programs are included in this Weed Management Plan (WMP):

- 2019 - 2020 Exploration Program
- 2021 – 2023 Exploration Program.

The following reports have been consolidated to inform preparation of this WMP:

- *Weed Management Plan, 2018 Seismic Program, EP187, Premise Environment, November 2018, Report # 1802587e*
- *EP187 Post-Wet Season Weed Survey, Fox & Co Environmental, June 2019, Report IG-01*
- *EP187 Post-Wet Season Weed Survey, Fox & Co Environmental, June 2020, Report IG-03*

In addition to the above reports, a desktop assessment and review was undertaken prior to all survey to familiarise with existing information and any changes (if any) of weed listing status. Literature reviewed included:

- DEPWS known weed records;
- DEPWS information alerts.

Weeds considered prime concern in relation to IOG's proposed seismic and drilling operations, based on known occurrence and threat of introduction include:

Mesquite (*Prosopis spp.*), Prickly acacia (*Vachellia nilotica*), Parkinsonia (*Parkinsonia aculeata*), Chinese apple (*Ziziphus mauritiana*), Mimosa (*Mimosa pigra*), Bellyache bush (*Jatropha gossypifolia*), Gamba grass (*Andropogon gayanus*), Neem (*Azadirachta indica*), Grader grass (*Themeda quadrivalvis*), Snake weed (*Stachytarpheta spp.*), Devils claw (*Martynia annua*), Hyptis (*Hyptis suaveolens*), Khaki weed (*Alternanthera pungens*), Sida (*Sida acuta*, *Sida cordifolia*, *Sida rhombifolia*), Lion's tail (*Leonotis nepetifolia*), Parthenium (*Parthenium hysterophorus*) and Rubber vine (*Cryptostegia spp.*).

A weed is defined as any plant that requires some form of action to reduce its harmful effects on the economy, the environment, human health and amenity. (Australian Government Department of Agriculture, Water and the Environment, 2017). There are two types of invasion: introduction of exotic plants and movement by native species into new areas well outside their native range. Weeds have an adverse effect on an area's environmental values and ecological functioning for the following reasons:

- Competition with native species;
- Change in the structure of a plant community through addition or removal of strata;
- Repress recruitment of native species;
- Change the natural fire fuel characteristics, which can change the natural fire regime to the detriment of native species, often resulting in the loss of native species;
- Change the food sources and habitat values available to native fauna, reducing some and increasing others;
- May change geomorphological processes such as erosion; and
- May lead to changes in the hydrological cycle.

Weed species considered to be of greatest threat to natural and economic values on a national basis have been ranked as Weeds of National Significance (WONS) (Thorp & Lynch, 2000). Weed significance at a national level was assessed using four major criteria:

- Invasiveness;
- Impacts;

- Potential for spread; and
- Socio-economic and environmental impacts.

At the Northern Territory level, the Weeds Management Act (the Act) (Northern Territory Government, 2001) identifies those weed species that represent a threat to primary industries, natural resources and the environment. The Act enables the following weed declaration classes:

- Class A – to be eradicated
- Class B – growth and spread to be controlled
- Class C* –Not to be introduced into the Northern Territory

All Class A and B weeds are also Class C

1.1 Location

EP187 is situated in the upper reaches of the McArthur River in proximity to the Barkly Tablelands. The tenement lies to the west of the Tablelands Highway and is crossed east to west by the Carpentaria Highway. Figure 1 displays the location of the tenement area. Access within the tenement is along the Carpentaria Highway and Broadmere Road.

1.2 2019-2020 Seismic Program Location

The 2019-2020 exploration program involved running six (6) seismic lines and progressing one (1) exploration well (SL-4). Pre-seismic weed surveys were undertaken in 2018 and 2019 across the proposed exploration areas and subsequent post-seismic weed surveys were undertaken over the entire rehabilitated project areas in 2020 and 2021.

The seismic work program was undertaken in late 2019, whilst the drilling program was undertaken in late 2020. A number of historical pastoral access ways exist through the area as well as newer access ways developed by pastoralists holding S19 permits (under the *Aboriginal Land Rights (Northern Territory) Act*). Where available access to seismic lines utilised the existing roadways and pastoral tracks and was in accordance with the NT Land Clearing Guidelines (LCG) (2019) and the IOG Land Clearing Permits (LCP). Access to the well pad (SL-4) was via the already cleared seismic line 4 which ran south off the Carpentaria Highway.

Table 1 provides the latitude and longitude coordinates of the start and end of the seismic lines. Figure 2 provides a map of the 2019/2020 seismic lines and exploration well SL-4.

Table 1 2019-2020 Seismic line coordinates for start and end (decimal degrees)

Line	Start Longitude	Start Latitude	End Longitude	End Latitude	Length (km)
1	135.0863884	-16.7411125	135.3952893	-16.71437661	32.9
2	135.0853852	-16.78513537	135.3213451	-16.76289145	25.1
3	135.0864645	-16.90880039	135.3249762	-16.51846278	49.8
4	135.1159045	- 6.94503599	135.0861566	-16.6214288	35.9
5	135.2179975	-16.92453057	135.1772632	-16.61601824	34.2
6	135.2696648	-16.9932462	135.2404939	-16.51967737	52.2

NB: All coordinates are provided in decimal degrees.

Table 2 Coordinates for Exploration well SL-4 (2019-2020)

SITE	Latitude (decimal degrees)	Longitude (decimal degrees)
Exploration bore(s)		
SL-4	-16.794398°	135.123266°
Grid: GDA94 Zone 53K		

1.3 2021-2023 Proposed Exploration Locations

The proposed 2021-2023 exploration activities include:

- Acquisition of 165km of 2 D Seismic data
 - Clear up to 82.5 hectares for seismic acquisition lines
 - Conduct 2D seismic acquisition operations
 - Rehabilitate cleared seismic acquisition lines
- Construction of up to six well pads
 - Clear up to 75 hectares for six well pads
 - Construct wellpads as per Figure 2
 - Establish lined ponds, as per Figure 2
 - Drill water production and monitoring bores on well pads
 - Establish Erosion and Sediment Control devices on well pads
- Construction of access tracks to six well pads
 - Clear up to 25 hectares for access tracks
 - Construct an intersection onto the Carpentaria highway
 - Establish Erosion and Sediment Control devices on access tracks
- Drilling gas exploration wells from the seven well pads (six to be constructed, plus Carpentaria 1 (existing well))
 - Drill 1 Lateral gas exploration wells from the existing Carpentaria 1 wellbore
 - Drill a total of 6 Vertical gas exploration wells from the six well pads, (up to six well from any well pad)
 - Drill a total of 6 Lateral gas exploration wells from the six well pads, (up to six well from any well pad)
- Establish bunded tanks pads and tanks fitted with leak detection at the above well site.

Table 3 2021-2023 Seismic Line and Access Track Coordinates for Start and End (decimal degrees)

Line	Start Longitude	Start Latitude	End Longitude	End Latitude	Length (km)
1	135.0838	-16.8062	135.2720	-16.8025	20.1
2	135.0838	-16.8692	135.2861	-16.8633	21.7
3	135.0838	-16.9275	135.2937	-16.8909	22.5
4	135.0838	-16.9685	135.2811	-16.9353	21.2
5	135.0925	-16.7793	135.1356	-16.9994	24.7
6	135.1376	-16.6447	135.1959	-16.9992	39.6

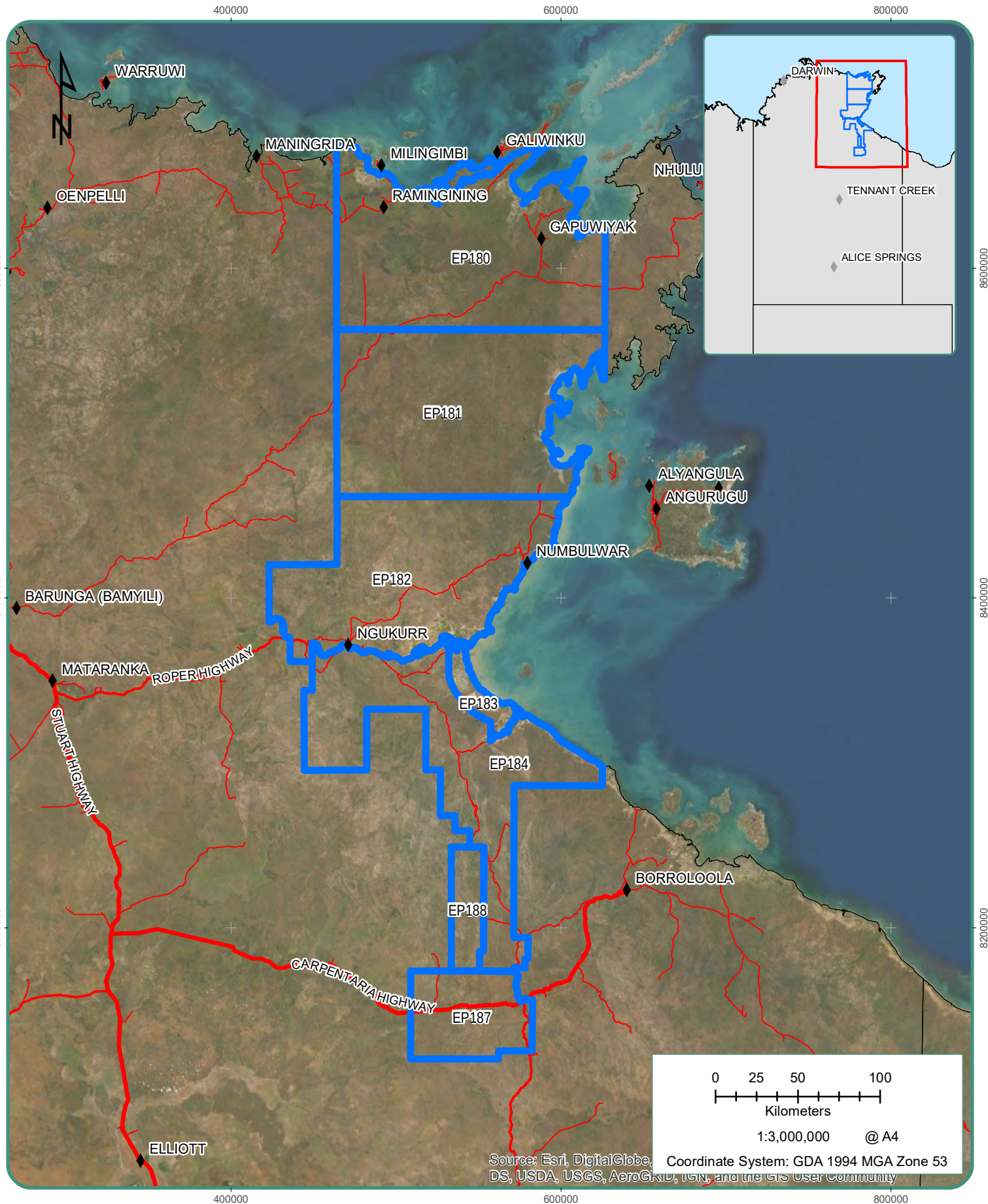
Line	Start Longitude	Start Latitude	End Longitude	End Latitude	Length (km)
7	135.0838	-16.6991	135.2330	-16.6874	16.0
Access track	135.1015	-16.6972	135.1209	-16.8042	12.5

Table 4 Coordinates for Exploration Wells (2021-2023)

SITE	Latitude (decimal degrees)	Longitude (decimal degrees)
Exploration bore(s)		
CARP AA-R1	-16.6972	135.1015
CARP AB-R1	-16.6919	135.1420
CSP AA	-16.8026	135.2019
CSP AB-R1	-16.8547	135.2081
CSP AC-R1	-16.8577	135.2019
CSP AD-R1	-16.9071	135.1809
Grid: GDA94 Zone 53K		

- NB: All coordinates are provided in decimal degrees.

A pre-exploration weed survey was undertaken over the above proposed exploration activity areas (including buffers) between 9-12 March 2021. Refer to Figure 6 for 2021-2023 proposed exploration areas.



TITLE: Regional Location	LEGEND ◆ Populated places □ Australian State Boundaries Roads — Principal Road — Secondary Road — Minor Road ■ Tenements
MAP NO: Figure 1	
PROJECT: Weed Management Plan (WMP)	



1.4 Legal Requirements

Of particular relevance to this WMP is the Northern Territory *Weeds Management Act 2001* (the Act).

A project specific weed management plan must be developed as part of the EMP which meets the requirements of the NT Weed Management Planning Guide: Onshore Petroleum Projects (DENR, 2019) and it must provide at least for the following:

- (a) baseline weed assessments prior to regulated activities being undertaken;
- (b) ongoing weed monitoring;
- (c) provision of a dedicated weed officer; and
- (d) consistency with statutory requirements including any relevant threat abatement plans under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

1.4.1 Weeds Management Act

The purpose of the Act is:

- I. to prevent the spread of weeds in, into and out of the Territory and to ensure that the management of weeds is an integral component of land management in accordance with the Northern Territory Weeds Management Strategy 1996 – 2005 or any other strategy adopted to control weeds in the Territory
- II. to ensure there is community consultation in the creation of weed management plans; and
- III. to ensure that there is community responsibility in implementing weed management plans.

The Act enables the following weed declaration classes:

- Class A – to be eradicated
- Class B – growth and spread to be controlled
- Class C* –Not to be introduced into the Northern Territory
- All Class A and B weeds are also Class C

1.5 Recommendations from Scientific Enquiry

1.5.1 Imperial Weed Officer

As per recommendation 8.3 of the Scientific Inquiry into Hydraulic Fracturing, gas companies must have a dedicated weed officer for each gas field. To ensure the required weed management outcomes, the weed officer must have relevant skills and experience and availability to successfully manage weed related issues for the project, including:

- Knowledge of the biology/ecology of local weeds including but not limited to gamba and grader grass
- Knowledge of relevant weed management frameworks including NT legislation and plans, the EPBC Act; and
- Understanding of existing weed management arrangements being undertaken by landholders As per Section 7 of the EMP, the Site Coordinator (SC) will be responsible for weed related issues.

Contact: K [REDACTED]

Title: Ingauge OCR

Location: Relief Creek

Contact Details: 0 [REDACTED]

1.5.2 DEPWS Weed Officer

Recommendation 8.3 of the Scientific Inquiry into Hydraulic Fracturing requires a dedicated Government weed officer who is responsible for:

- coordinating regional weed baseline assessments and subsequent weed surveillance; and
- overseeing strategic and effective management of any weed incursions by gas companies. This WMP has been prepared in consultation with the Northern Territory (DEPWS).

Contact: C [REDACTED]

Title: DEPWS Onshore Petroleum Weed Management Officer

Location: Floor 3, Goyder Centre, 25 Chung Wah Tce, Palmerston

Contact Details: c [REDACTED]

2. WEED INTRODUCTION AND RISKS

Section 1 of the EMP describes the exploration program and activities. In summary the exploration operation involves the following:

- Surveyors – pegging seismic lines
- Line preparation and well pad preparation- caterpillar H140 Grader will be used to sweep the ground surface of large rocks and fallen timber.
- Seismic survey and drilling
- Stick raking and slashing
- Rehabilitation

Table 5 Weed introduction risks and mitigation measures

Project Stage	Risk		Mitigation Measures
	Introduction of new weeds	Spread existing weeds	
Seismic and Drilling Operations	Machinery and equipment sourced from other locations infested with weed species not found in or around EP area	Traversing of weed infested areas with machinery	KD Machinery of Broadmere Station has been retained to provide the seismic line clearance. These operations will be supported by the indigenous contractor PDG-NT from Borroloola who will provide traffic control where required and additional labour and traditional owners as cultural monitors for the duration of the project. Machinery wash/blow down plans agreed with land owner / manager and implemented. Hygiene: vehicle wash down and inspection/certification of process adhered to and documented. All machinery will be inspected and certified as clean before entry into the project area. All contractors will be required to adhere to this process. Records of the

Project Stage	Risk		Mitigation Measures
	Introduction of new weeds	Spread existing weeds	
			certification will be retained by Imperial and made available immediately should it be requested. Mark no-go areas if infestations of WONS and/or Class A/C weeds are found within the seismic lines. GPS marking of blown down sites. GPS records of all wash and blow down sites will be recorded by all operators in the field. These GPS records will be retained by Imperial and the sites inspected as soon as practicable following the wet season to check for weed incursions and to undertake management actions as required.
	Personnel unable to identify weeds or unaware of weed species present in areas where machinery and equipment is sourced from	Existing weed distribution not known due to: insufficient survey effort, survey effort conducted at wrong time of year, persons undertaking survey not familiar with / unable to identify declared weed species	Premise and DENR weed surveys undertaken in October/November 2018 prior to seismic to map known weed distribution. Fox & Co Environmental personnel utilised for 2020 post-seismic surveys and new 2021-2023 pre-seismic weed surveys. Retained same personnel as previously used to retain site specific knowledge and consistency. Site operators to undergo weed identification training and reporting (onsite training delivered by DEPWS weed officer). Training for KD Machinery operators.
	Pushing tracks and construct intersection off from the Carpentaria Highway and Broadmere Road into weed free areas	Pushing tracks from identified weed areas into clean weed free areas. Hyptis and grader grass observed in disturbed areas along Carpentaria Highway and some areas along Broadmere Road.	Ensure to push tracks towards disturbed areas from clean weed free areas. If access is an issue, machinery inspections and washdowns if pushing tracks off Carpentaria Highway and Broadmere Road. Mark weed free areas to be used for access. Clearing, stick raking and slashing off Carpentaria Highway is undertaken last to avoid spreading weeds from the Highway to weed free areas. Wet season spray operations to occur along the Carpentaria highway and Broadmere road to mitigate potential of hyptis spread.

3. WEED SPECIES

The DEPWS Natural Resource (NR) maps database was used to identify all introduced flora species that have previously been recorded within the area of the tenement associated with the proposed seismic program. Weeds along the Carpentaria Highway between Cape Crawford (Heartbreak Hotel) were also identified as this is the road upon which contractors will be travelling each day.

Figure 3 shows the historical weed locations and weeds identified during the 2018 and 2019 surveys undertaken for the 2019/2020 exploration program.

Figure 4 shows the post-seismic weed survey undertaken in 2020 for the 2019/2020 exploration program.

Figure 5 shows the post-seismic weed survey undertaken in March 2021 for the 2019/2020 exploration program.

Figure 7 shows the historical weed locations and weeds identified during pre-seismic weed survey undertaken in March 2021 for the proposed 2021-2023 exploration program. Historical and recent surveys reported Hyptis along the Carpentaria Highway. No weeds were reported in other proposed exploration areas.

3.1 Regional Priorities

The DEPWS Katherine Regional Weed Management Plan 2015-2020 is guided by three (3) regional priorities to manage weeds. These are:

- I. Priority weeds;
- II. Priority landscape areas; and
- III. Priority pathways of spread

The below table lists weeds that have previously been recorded in the area and also priority weed species as per the Katherine Regional Weed Management Plan 2015-2020.

Table 6 Previously recorded and priority weed species

Scientific Name	Common Name	Declaration	Where located (e.g. on EP, machinery source location, extractive proppant/s, corridors)
<i>Prosopis spp.*</i>	Mesquite*	WONS, Class A, Class C	Not recorded. Priority weed
<i>Vachellia nilotica</i> (previously <i>Acacia nilotica</i>)*	Prickly acacia	WONS, Class A, Class C	Previous records. Refer Figure 3.
<i>Parkinsonia aculeata</i>	Parkinsonia	WONS, Class B	Previous and recent (October 2018 survey) records. Refer Figure 3.
<i>Ziziphus mauritiana*</i>	Chinese apple	Class A, Class C	Not recorded. Priority weed
<i>Mimosa pigra*</i>	Mimosa	WONS, Class A, Class C	Not recorded. Priority weed
<i>Jatropha gossypifolia*</i>	Bellyache bush	WONS, Class A, Class C	Previous records along Carpentaria Highway. Refer Figure 3

Scientific Name	Common Name	Declaration	Where located (e.g. on EP, machinery source location, extractive proppant/s, corridors)
<i>Andropogon gayanus*</i>	Gamba grass	WONS, Class A, Class C	Not recorded. Priority weed
<i>Azadirachta indica</i>	Neem	Class B	Not recorded. Priority weed
<i>Themeda quadrivalvis</i>	Grader grass	WONS, Class B	June 2020 and March 2021 record. Priority weed
<i>Stachytarpheta spp</i>	Snake weed	Class B	Not recorded. Priority weed
<i>Martynia annua</i>	Devils claw	Class A	Not recorded. Priority weed
<i>Hyptis suaveolens</i>	Hyptis	Class B	Previous and recent (October 2018, April & Sept 2019, June 2020 & March 2021 survey) records along Carpentaria Highway. Refer Figures 3, 4, 5 and 7
<i>Alternanthera pungens</i>	Khaki weed	Class B	Previous records. Refer Figure 3.
<i>Sida acuta, Sida cordifolia, Sida rhombifolia</i>	Sida	Class B	Previous records. Refer Figure 3.
<i>Leonotis nepetifolia</i>	Lion's tail		Previous records Refer Figure 3.
<i>Tribulus sp.</i>	Caltrop	Class B	Recent record (2019)

Table 5 lists weed alert species as per the Katherine Regional Weed Management Plan 2015-2020. These species are not yet naturalised in the region, however have the potential to have a high level of impact to the region.

Table 7 Weed Alert Species

Scientific Name	Common Name
<i>Chromolaena odorata</i>	Siam weed
<i>Cryptostegia spp.</i>	Rubber vine
<i>Parthenium hysterophorus</i>	Parthenium
<i>Eichhornia crassipes</i>	Water hyacinth
<i>Cabomba caroliniana</i>	Cabomba

Scientific Name	Common Name
<i>Annona glabra</i>	Pond apple
<i>Salvinia molesta</i>	Salvinia
<i>Schinus terebinthifolius</i>	Brazilian pepper

Parthenium hysterophorus (parthenium) and *Cryptostegia spp* (rubber vine) are of particular concern as they are considered to be a very high risk of introduction to this area of the Northern Territory. This area of the Northern Territory is often accessed from Queensland where these two (2) weed species are well established and have had detrimental impacts to the Queensland beef industry.

On the 14th November 2018, the NT DEPWS issued a media release stating that Parthenium was recently detected in the Katherine region. Weed management officers controlled the occurrence with assistance from the landholder and is subject to ongoing monitoring. This finding in the region highlights the high risk of introduction of this weed in the area.

3.2 2021 Post Wet-Season Weed Survey Results

3.2.1 2019/2020 Exploration Program

One weed species was recorded during the 2021 post-wet season field survey (*Hyptis suaveolens* (Hyptis) which is a Class B declared weed in the Northern Territory. Hyptis was recorded in all previously recorded locations. No new infestations were recorded. One small patch of grader grass was identified along the Carpentaria Highway outside of IOGs work area. Hyptis was primarily recorded along the Carpentaria Highway in disturbed areas and drainage culverts. The seismic activities have not caused an increase in the abundance of Hyptis nor spread it to other areas. The grader grass was recorded east of the eastern most end of Seismic Line 1 adjacent to the Carpentaria Highway.

Hyptis records along the Carpentaria Highway were comparable with previous survey data. Seismic works for Seismic Line 1 was along the northern side of the Carpentaria Highway. Hyptis was recorded on both sides. No hyptis was recorded off the Carpentaria Highway (excluding Broadmere road). This suggests the seismic program was undertaken as per the EMP and LCP requirements and did not result in spreading hyptis.

Figures 3 – 5 show the pre and post-seismic weed results recorded between 2018 – 2021 for the 2029/2020 exploration program. All figures show the survey tracks.

Appendix A provides a table of the pre and post exploration survey results for the 2019/2020 exploration program. These results were supplied to DEPWS in the required format within 7 days of undertaking the weed survey.

3.2.2 2021- 2023 Exploration Program

Hyptis was recorded along the Carpentaria highway which is consistent with previous weed surveys. No weeds were identified on the proposed seismic lines, well pads, pipelines or access tracks.

Table 8 Weeds Observed During 2021 Post-wet Season Weed Survey

Weed	Details	Location	Plate
Weeds Observed During 2021 Wet Season Survey (March 2021)			
<i>Hyptis suaveolens</i> (Hyptis).	Hyptis was primarily recorded along the Carpentaria Highway (and also in some areas along Broadmere Road)	135.2474039 -16.53130396 135.1991994 -16.73235367 135.0817638 -16.74155369 135.094250 -16.74059011 135.11648- -16.73876822 135.1164812 -16.73876822 135.1090543 -16.73967926 135.1607469 -16.7349109 135.3226097 -16.72085056	

3.2.3 Previous Weed Survey Observations

Table 9 provides a summary of previous weed survey observations recorded during the pre-exploration weed surveys on EP187.

Table 9 Previous Weed Survey Observations

Weed	Details	Location	Plate
Weeds Observed During 2018 Dry Season Survey (Oct and Nov 2018)			
<i>Hyptis suaveolens</i> (Hyptis).	Hyptis was primarily recorded along the Carpentaria Highway (and also in some areas along Broadmere Road)	Carpentaria Highway	
<i>Parkinsonia aculeata</i> (Parkinsonia)	Parkinsonia was recorded at a stock water bore (No. 3 bore) north of the Carpentaria Highway.	No.3 Bore	

Weed	Details	Location	Plate
Weeds Observed During 2019 Weed Surveys (April and September 2019)			
<i>Hyptis suaveolens</i> (Hyptis). Class B herbaceous weed.	Hyptis was observed along the Carpentaria Highway in disturbed areas (ie. Truck rest stops) or drainage lines. It was also observed at the proposed camp location (which is a truck rest area).	Location: - 16.710633, 135.349883	
<i>Tribulus sp.</i> (Caltrop). Class B herbaceous weed.	Caltrop was observed at the picnic area at the jump-up proximate to the eastern end of Seismic Line 1, just off the Carpentaria Highway.	Location: - 16.703183, 135.366863	
Weeds Observed During 2020 Post Wet Season Survey			
<i>Hyptis suaveolens</i> (Hyptis). Class B herbaceous weed.	Hyptis was observed along the Carpentaria Highway and Broadmere Rd in disturbed areas (ie. Truck rest stops) or drainage lines.	Location: - - 16.732533, 135.1994	
<i>Themeda quadrivalvis</i> (Grader grass).	Observed outside (east) of IOG work area, adjacent to the Carpentaria Highway.	Location: - 16.71181, 135.4232	

4. ANNUAL ACTION PLAN

Control options will be undertaken in accordance with the species-specific Statutory Weed Management Plans, and the NT Government's Weeds in the NT" database (Northern Territory Government, 2020).

Table 10 Action Plan (2019-2020 Exploration Program)

Weed Management Area	Weed Species	Management Objective	Survey Time/s	Treatment Time/s	Control Method/s	Herbicide
Seismic Line 1	Khaki Weed <i>Alternanthera pungens</i> (not observed in October 2018 survey or 2019 post-wet survey)	No spread. No introduction of new weed species.	End of wet season	Immediately upon identification	Foliar spray	2, 4-D amine (Various trade names) or Glyphosate (Various trade names and formulations) or MCPA + Dicamba (Various trade names)
	Hyptis <i>Hyptis suaveolens</i>	No spread. No introduction of new weed species.	End of wet season	Immediately upon identification	Foliar spray	2, 4-D amine (Various trade names) or Glyphosate (Various trade names and formulations)
	Caltrop (<i>Tribulus sp.</i>)	No spread. No introduction of new weed species.	End of wet season	Immediately upon identification	Foliar spray	Glyphosate (various trade names)
Seismic Line 2	None observed in October 2018	No introduction of new weed species.	End of wet season	Tba	Tba	Tba
Seismic Line 3	Parkinsonia east of line 3 at No. 3 Bore.	No spread. No introduction of new weed species.	End of wet season	Immediately upon identification	Ground applied/ Foliar Spray	Grazon® Extra for foliar treatment or Tebuthiuron (Graslan ^R) for ground applied

Weed Management Area	Weed Species	Management Objective	Survey Time/s	Treatment Time/s	Control Method/s	Herbicide
	Hyptis (<i>H. suaveolens</i>) is present in proximity to where Line 3 crosses Line 1 (Carpentaria Highway) and also where it crosses Broadmere Road	No spread. No introduction of new weed species.	End of wet season	Immediately upon identification	Foliar Spray	2, 4-D amine (Various trade names) or Glyphosate (Various trade names and formulations) for Hyptis
Seismic Line 4	Hyptis (<i>H. suaveolens</i>) is present in proximity to where Line 4 crosses Line 1 (Carpentaria Highway)	No spread. No introduction of new weed species.	End of wet season	Immediately upon identification	Foliar spray	2, 4-D amine (Various trade names) or Glyphosate (Various trade names and formulations)
Seismic Line 5	Hyptis (<i>H. suaveolens</i>) is present in proximity to where Line 5 crosses Line 1 (Carpentaria Highway)	No spread. No introduction of new weed species.	End of wet season	Immediately upon identification	Foliar spray	2, 4-D amine (Various trade names) or Glyphosate (Various trade names and formulations)
Seismic Line 6	Hyptis (<i>H. suaveolens</i>) is present along Broadmere Road (northern end).	No spread. No introduction of new weed species.	End of wet season	Immediately upon identification	Foliar spray	2, 4-D amine (Various trade names) or Glyphosate (Various trade names and formulations)
	Lion's tail has also been previously observed around the large Elenor Pool	No spread. No introduction of new weed species.	End of wet season	Immediately upon identification	Foliar spray	2,4-D amine (various trade names) or Grazon® Extra
Exploration Bores SL-1 to SL-4, alternative SL-4 locations and both access track options	Hyptis (<i>H. suaveolens</i>) is present along Broadmere Road and Carpentaria Hwy proximate to the proposed side access tracks for all wells	No spread. No introduction of new weed species.	Prior to construction of access tracks and well pads. At start of seismic before well pad locations are finalised.	Immediately upon identification	Foliar spray	Glyphosate (various trade names)

Weed Management Area	Weed Species	Management Objective	Survey Time/s	Treatment Time/s	Control Method/s	Herbicide
Proposed camp adjacent to Carpentaria Highway	Hyptis (<i>H. suaveolens</i>) is present	No spread. No introduction of new weed species.	Prior to construction of access tracks and well pads. At start of seismic before well pad locations are finalised.	Immediately upon identification	Foliar spray	Glyphosate (various trade names)

Treatment times and control methods are provided on the NT Government's "Weeds in the NT" database.

Table 11 Action Plan (2021/2023 Exploration Program)

Weed Management Area	Weed Species	Management Objective	Survey Time/s	Treatment Time/s	Control Method/s	Herbicide
Seismic Lines 1 – 7	None observed in March 2021	No introduction of new weed species.	End of wet season	Tba	Tba	Tba
Well Pads (CARP AA-R1, CARP AB-R1, CSP AA, CSP AC-R1, CSP AB-R1, CSP AD-R1)	None observed in March 2021	No introduction of new weed species.	End of wet season	Tba	Tba	Tba
Access tracks	None observed in March 2021	No introduction of new weed species.	End of wet season	Tba	Tba	Tba

5. MITIGATION MONITORING

Field surveys were undertaken along each proposed seismic line and proposed infrastructure areas to determine weed species presence. Other information such as presence of feral animals and vegetation community / species were described along the proposed seismic lines.

Follow-up monitoring (e.g. timeframes following treatment) is species specific and will be undertaken in accordance with the species-specific Statutory Weed Management Plans for the priority weeds (if identified on site) listed in **Tables 6 and 7**.

A post-wet season (2022) survey will be undertaken to actively determine weed presence (if any) within the proposed exploration areas. Access tracks options for the well pads were surveyed in March 2021 for the 2021-2023 exploration program. Tracks were selected to avoid sensitive areas as per the LCG (2019).

All data will be supplied to DEPWS.

5.1 Mitigation

Weed mitigation measures should include hygiene protocols to minimise the likelihood of introduction and spread of environmental, agricultural and declared weeds. These should include:

- Vehicle wash-down procedures and facilities to avoid the potential for weed spread including inspection by a certified weed inspector and certification.
- Requirement that all equipment/machinery arrives on site clean of plant and soil matter. This will include inspection by a certified weed inspector and records of weed hygiene certificates for all vehicles and plant arriving on site.
- Require that all equipment/machinery is clean of plant and soil matter before demobilising from one site and working on another.
- Restrict movement of topsoil from sites where significant or declared weeds are known to exist to prevent the spread of weeds on the lot.
- Immediately control and/or remove all weeds that have been introduced or exacerbated by the works.
- Develop weed identification material to be made available to staff and contractors while working on the lot. Problem weeds can be defined during pre-work toolboxes.
- Compulsory site inductions will present information to staff and contractors working on site on problem weed species and protocols to minimise risk of introduction including wash down locations and procedures, certification of plant and machinery before entering site, weed hygiene measures, non-compliance and reporting procedures
- Use existing and designated tracks where possible. Restrict access to areas outside of the cleared footprint to limit the disturbance area to within the approved footprint
- Conduct post-wet season weed surveys to determine whether any weed introductions have occurred and to monitor existing weed populations. Take the appropriate and government authority preferred corrective actions where necessary.
- Rehabilitate seismic lines and tracks.
- Monitoring data of weed populations based on pre-seismic presence and abundance around the seismic lines and tracks.

If weed monitoring indicates new introductions and/or detrimental changes in existing weed species density and abundance, the following should be undertaken:

- Immediate notification to DEPWS
- Determine the cause of the incident and review the process to ensure that the incident does not re-occur.
- Assess and implement the appropriate course of action in consultation with relevant authorities and landholder

6. NOTIFICATION PROCEDURE

Should a new weed species in the project area be identified, the DEPWS Onshore Petroleum Weeds Officer (refer Section 1.4.2) will be contacted within 48hrs of discovery. Initial notification will be via telephone and subsequently followed up with an email (written notification) within seven (7) working days with details of species, location (latitude and longitude), abundance and any other relevant details such as life stage.

7. RECORDING

During weed surveys over the EP187 seismic lines and proposed exploration areas, weed data was collected using the Northern Territory Government WeedMate App as well as via Arc Collector in accordance with the DEPWS Weed Data Collection Field Guide.

All weed data was supplied to the DEPWS Onshore Petroleum Weed Management Branch.

8. REPORTING

Following the post-wet / post-exploration weed survey, an annual report will be submitted to DEPWS. The report will include the following:

- a) Details of activities implemented to address weed spread and introduction risks (e.g. vehicle wash down / blow down locations, examples of track construction from working from weed free areas into weed infested areas to reduce spread)
- b) Submission of all weed data collected
- c) Details of survey and monitoring events, including dates, personnel, maps and track data; and
- d) Overview of weed control events and success rates (weed control should be captured in detail through the data collection process and submitted as a component of (a)).

9. WORKS CITED AND RELEVANT REFERENCE LIST

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- Northern Territory Government. (2020). *Weed management plan for prickly acacia 2012 to 2022*. Retrieved from A-Z list of weeds in the NT:
https://nt.gov.au/__data/assets/pdf_file/0003/231429/prickly-acacia-management-plan.pdf
- Northern Territory Government. (2020). *Weed Management Plan Gamba Grass 2020-2030*. Retrieved from A-Z list of weeds in the NT:
https://nt.gov.au/__data/assets/pdf_file/0006/954789/weed-management-plan-for-gamba-grass-2020-2030.PDF
- Thorp, J. R., & Lynch, R. (2000). *The Determination of Weeds of National Significance*. Canberra: National Weeds Strategy Executive Committee.

APPENDIX A WEED DATA

RECORDER:		Paul Fox			PROJECT:		Inspection					LOCALITY:	Carpentaria Downs		
ORG_NAME:		Premise Environment			GPS NAME/MODEL:		Garmin etrex touch 25					RECORDING METHOD :	Handheld GPS		
SITE_ID	DATE_REC	LAT_G94	LONG_G94	WEED_NAME	SIZE_DIA_M	DENS_CAT	SEEDLINGS	JUVENILES	ADULTS	SEED_PRES	PAST_TREAT	TREATMENT	HERBICIDE	COMMENTS	
WP171	6/10/2018	-16.71204800720	135.21427497300	Hyptis - specigera	50	3			Yes	Yes		No treatment		seeded	
WP191	6/10/2018	-16.52172499340	135.24369000500	Hyptis - specigera	50	3			Yes	Yes		No		Yes	
WP192	6/10/2018	-16.52186798860	135.24872903700	Hyptis - specigera	50	3			Yes	Yes		No treatment			
WP193	6/10/2018	-16.52844803410	135.24906397800	Hyptis - specigera	100	3			Yes	Yes		No treatment			
WP197	6/10/2018	-16.59243296830	135.26548303700	Parkinsonia	100	3	Yes	Yes	Yes	Yes		No treatment		flowering	
WP206	7/10/2018	-16.73224797470	135.20043502600	Hyptis - specigera	20	3			Yes	Yes		No treatment		Truck stop	
WP207	7/10/2018	-16.73270998520	135.19163402700	Hyptis - specigera	50	3			Yes	Yes		No treatment		both sides of Hwy.	
WP208	7/10/2018	-16.73286697830	135.18943503500	Hyptis - specigera	50	3			Yes	Yes		No treatment		Table drain	
WP209	7/10/2018	-16.73398302870	135.18131800000	Hyptis - specigera	100	2			Yes	Yes		No treatment		bore	
WP210	7/10/2018	-16.73349796790	135.18002400200	Hyptis - specigera	50	3			Yes	Yes		No treatment		drain. Both sides of Hwy.	
WP211	7/10/2018	-16.73507401720	135.16079097100	Hyptis - specigera	100	3			Yes	Yes		No treatment		road	
WP212	7/10/2018	-16.73552102410	135.15512798900	Hyptis - specigera	100	3			Yes	Yes		No treatment		road	
WP213	7/10/2018	-16.73615897070	135.14850301700	Hyptis - specigera	100	3			Yes	Yes		No treatment		road	
WP214	7/10/2018	-16.73635602930	135.14597101100	Hyptis - specigera	100	3			Yes	Yes		No treatment		road	
WP215	7/10/2018	-16.73703496340	135.13726799700	Hyptis - specigera	50	3			Yes	Yes		No treatment			
WP216	7/10/2018	-16.73753402200	135.13157199100	Hyptis - specigera	20	2			Yes	Yes		No treatment		Burnt area	
WP217	7/10/2018	-16.73767902890	135.13046499300	Hyptis - specigera	100	3			Yes	Yes		No treatment		Burnt, both sides of road	
WP218	7/10/2018	-16.73883003180	135.11673401100	Hyptis - specigera	50	3			Yes	Yes		No treatment		Both sides of road	
WP219	7/10/2018	-16.73977802510	135.10514301200	Hyptis - specigera	50	3			Yes	Yes		No treatment		drain on southern side of Hwy	
WP220	7/10/2018	-16.74060196620	135.09386600000	Hyptis - specigera	20	2			Yes	Yes		No treatment		north side of Hwy.	
WP221	7/10/2018	-16.70519596900	135.37026998600	Hyptis - specigera	20	2			Yes	Yes		No treatment		drain of jump up on Carp. Hwy	
WP222	7/10/2018	-16.71280397100	135.41172000600	Hyptis - specigera	100	3			Yes	Yes		No treatment		north side of Hwy.	

[illegible]

[illegible]

[illegible]

APPENDIX B FIGURES

Figure 2 2019-2020 Exploration Program

Figure 3 2019-2020 Exploration Program, pre-exploration weed survey (2018/2019)

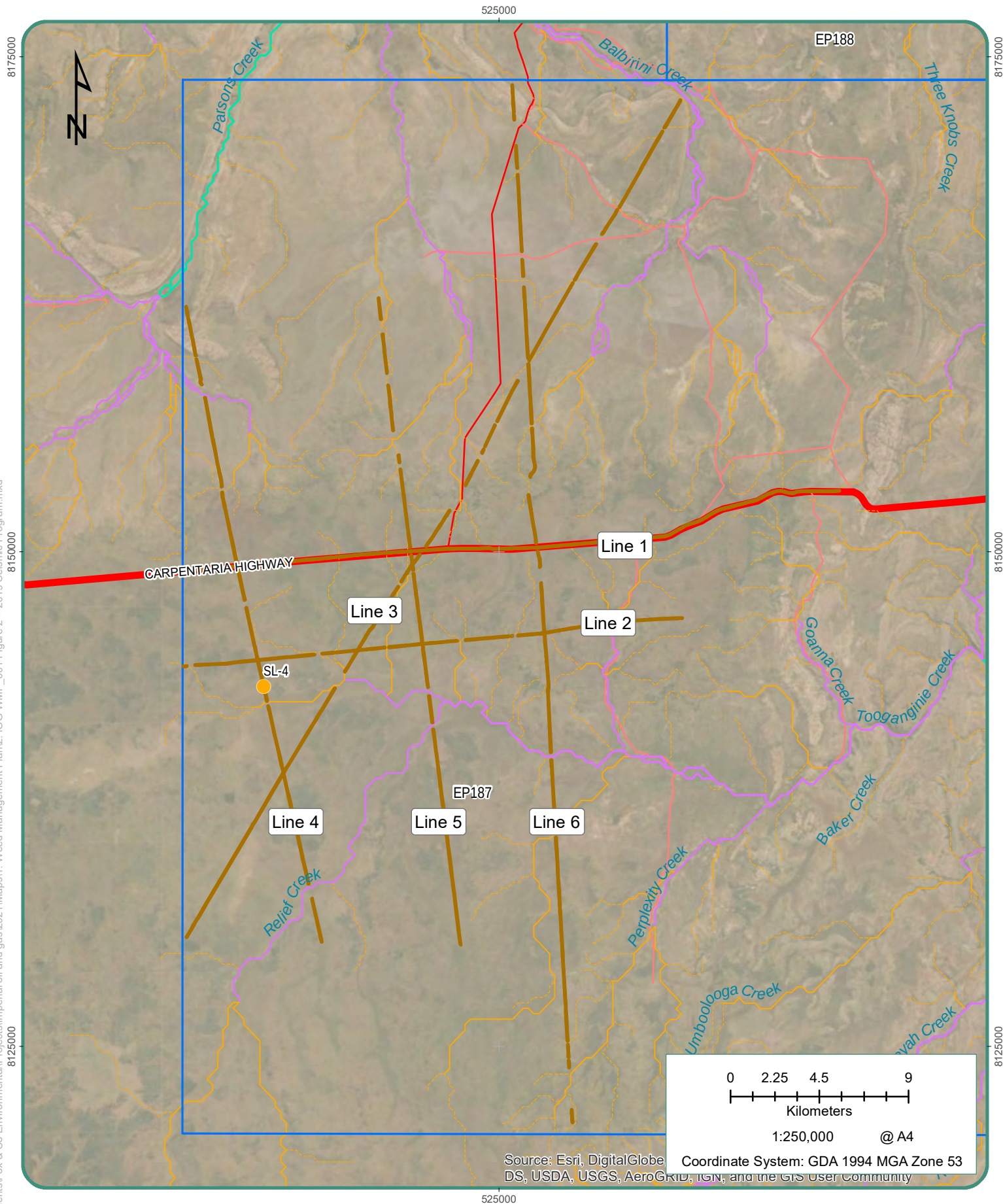
Figure 4 2019-2020 Exploration Program, post-exploration weed survey (2020)

Figure 5 2019-2020 Exploration Program, post-exploration weed survey (2021)

Figure 6 2021-2023 Exploration Program

Figure 7 2021-2023 Exploration Program, pre-exploration weed survey (March 2021)

Document Path: C:\Users\greenvalle\Documents\Fox & Co Environmental\Projects\Imperial oil and gas\2021\Maps\1. Weed Management Plan\2. IOG WMP_001 Figure 2 - 2019 Seismic Program.mxd



TITLE:

2019/2020 Seismic Program

MAP NO: Figure 2

PROJECT: Weed Management Plan (WMP)

LEGEND

Exploration bores

- Exploration bore SL-4
- 2019 Seismic lines (30m corridor)
- Tenements

Stream Order

- Intermittant Streams
- 1
- 2
- Creeks
- 3
- 4

Rivers

- 5
- 6
- 7

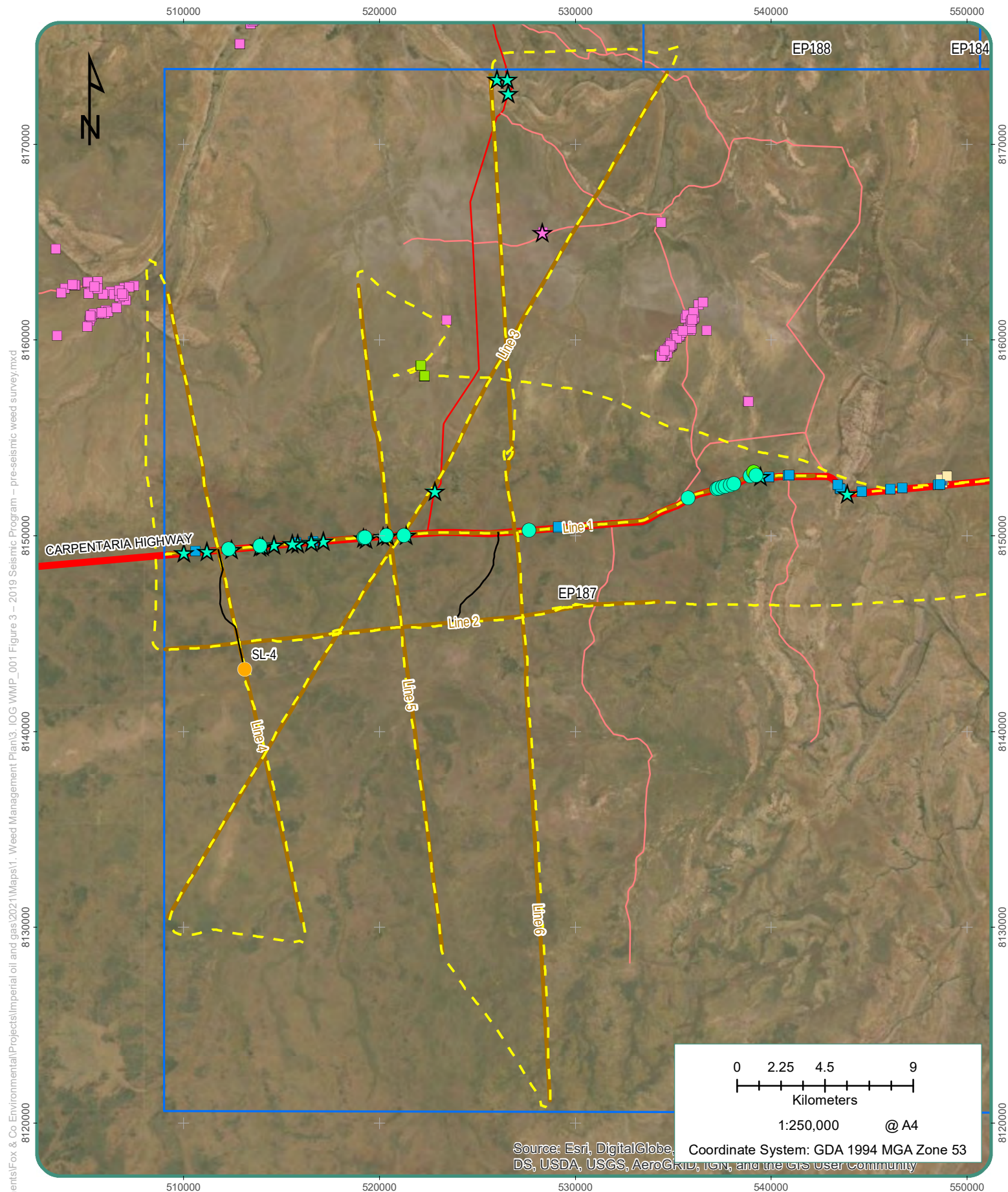
Roads

- Principal Road
- Secondary Road
- Minor Road
- Track

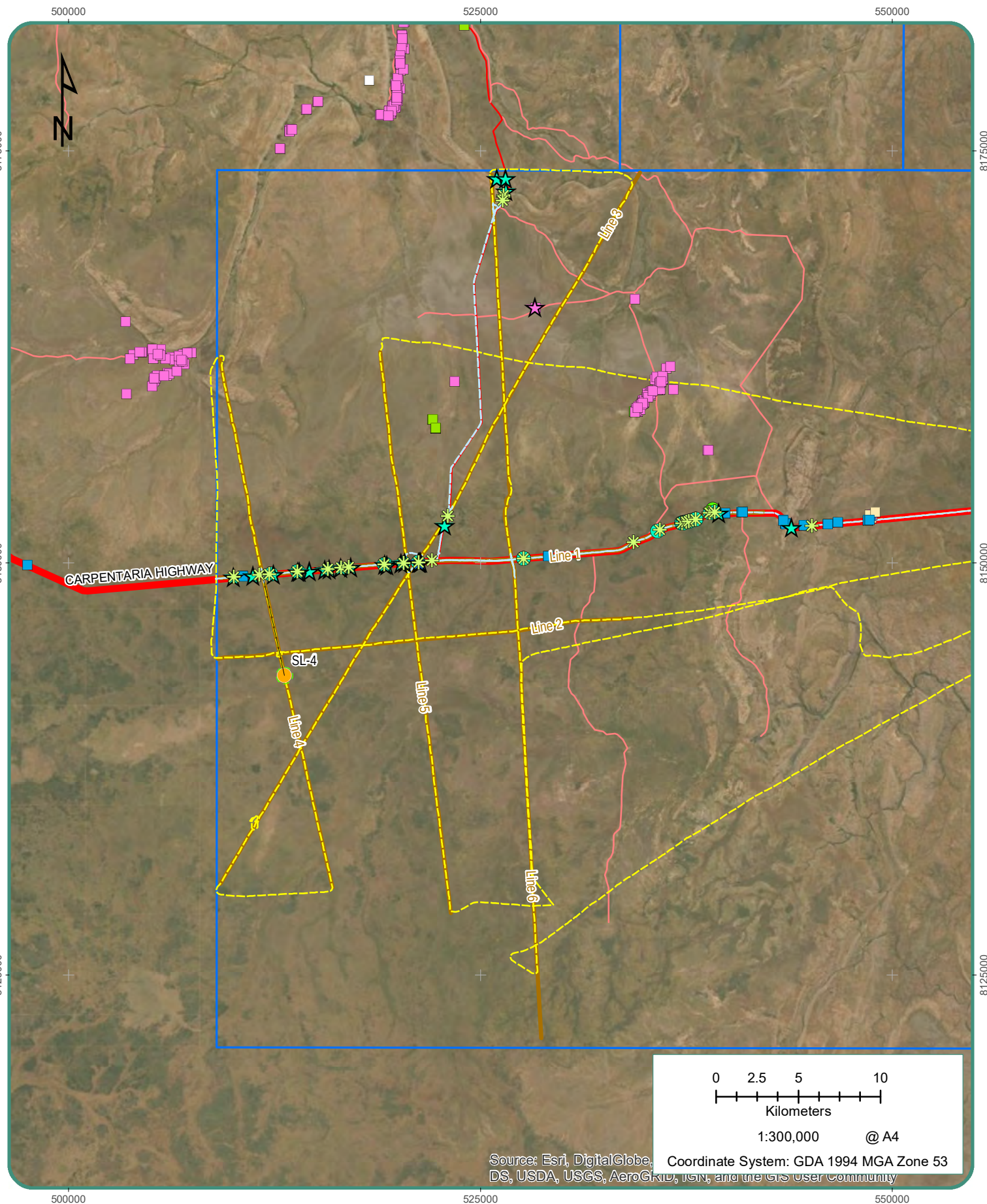


Date: 23/03/2021

Data Source: Vegetation Survey of McArthur River Catchment, Northern Territory, 2011-12-01, Department of Environment and Natural Resources
NVIS Version 3.1 National Vegetation Information System, NT Data Compilation, 2000-01-14, Department of Environment and Natural Resources



TITLE: 2019/2020 Seismic Program - pre-seismic weed survey		LEGEND			
MAP NO: Figure 3		Dry season (2018)			
PROJECT: Weed Management Plan (WMP)		★ Hyptis ★ Parkinsonia			
		Post wet season (2019)			
		● Caltrope ● Hyptis ● Exploration bore SL-4			
		Weed name		● Neem ● Parkinsonia ● Prickly acacia ● Sida - Spiny head ● Sida sp ● GPS track log ● Proposed bore access	
		● Bellyache bush ● Burr - Star ● Caltrop - terrestri ● Hyptis ● Khaki weed		● 2019 Seismic lines ● Tenements	



TITLE:

**2019/2020 Seismic Program
- post-wet season, post-seismic
weed survey (2020)**

MAP NO: Figure 4

PROJECT: Weed Management Plan (WMP)

Dry season (2018)

★ Hyptis

★ Parkinsonia

Post wet season (2019)

● Caltrope

● Hyptis

Dry season (2019)

★ Hyptis

Post wet season (2020)

★ Hyptis

— Bore access track

Weed name

■ Bellyache bush

■ Burr - Star

■ Caltrop - terrestris

■ Hyptis

■ Khaki weed

■ Neem

■ Parkinsonia

■ Prickly acacia

■ Sida - Spiny head

■ Sida sp

● Exploration bore SL-4

— On ground weed survey track log

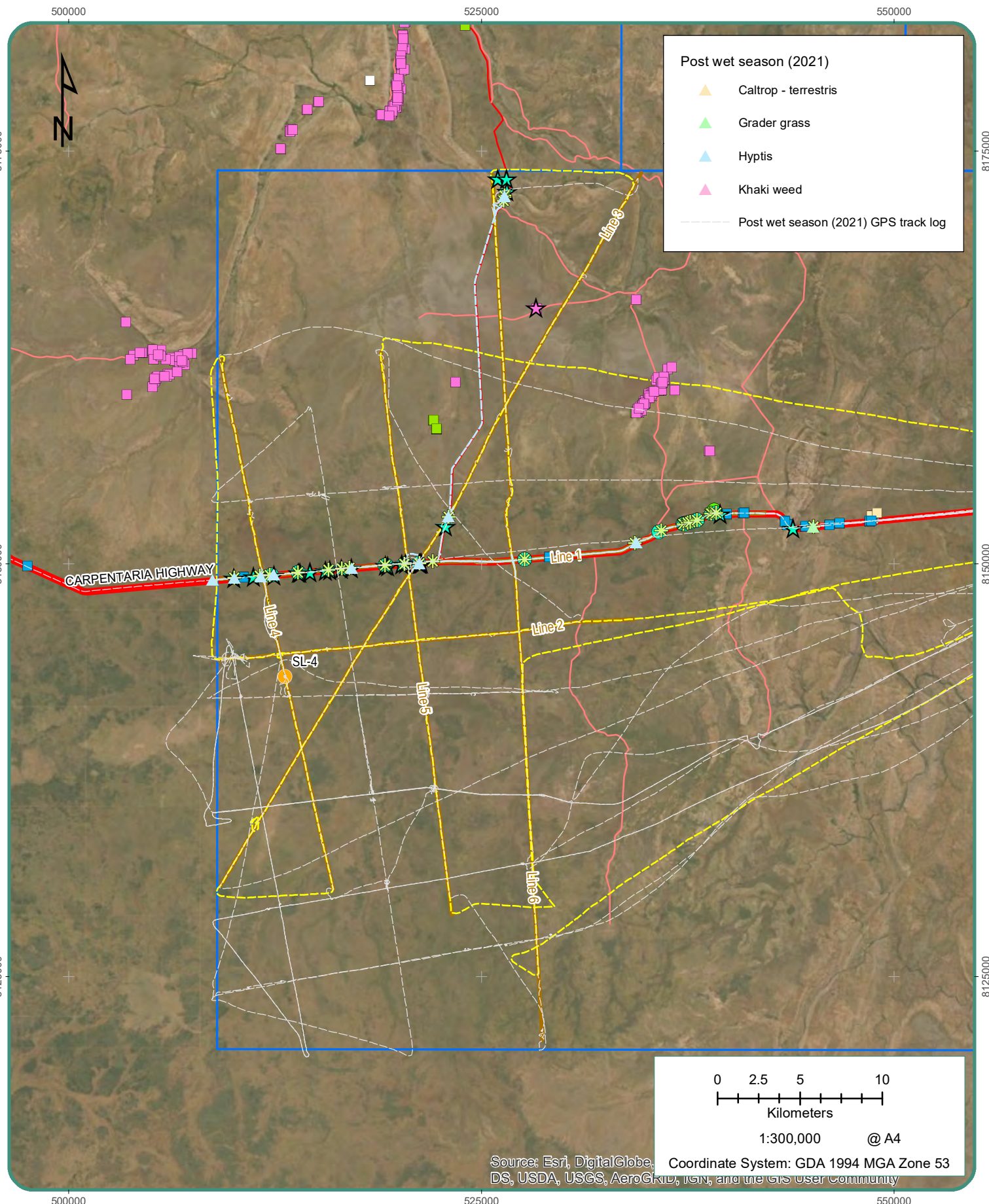
— Aerial weed survey track log

— 2019 Seismic lines

■ Tenements



Document Path: C:\Users\greenvale\Documents\Fox & Co Environmental\Projects\Imperial oil and gas\2021\Maps\1. Weed Management Plan\5. IOG WMP_001 Figure 5 - post-wet season, post-seismic weed survey (2021).mxd



TITLE:
2019/2020 Seismic Program -
post-wet season,
post-seismic weed survey (2021)

MAP NO: Figure 5

PROJECT: Weed Management Plan (WMP)

Dry season (2018)

★ Hyptis

★ Parkinsonia

Post wet season (2019)

● Caltrop

● Hyptis

Dry season (2019)

★ Hyptis

Post wet season (2020)

★ Hyptis

— Bore access track

Weed name

■ Bellyache bush

■ Burr - Star

■ Caltrop - terrestris

■ Hyptis

■ Khaki weed

■ Neem

■ Parkinsonia

■ Prickly acacia

■ Sida - Spiny head

■ Sida sp

● Exploration bore SL-4

— On ground weed survey track log

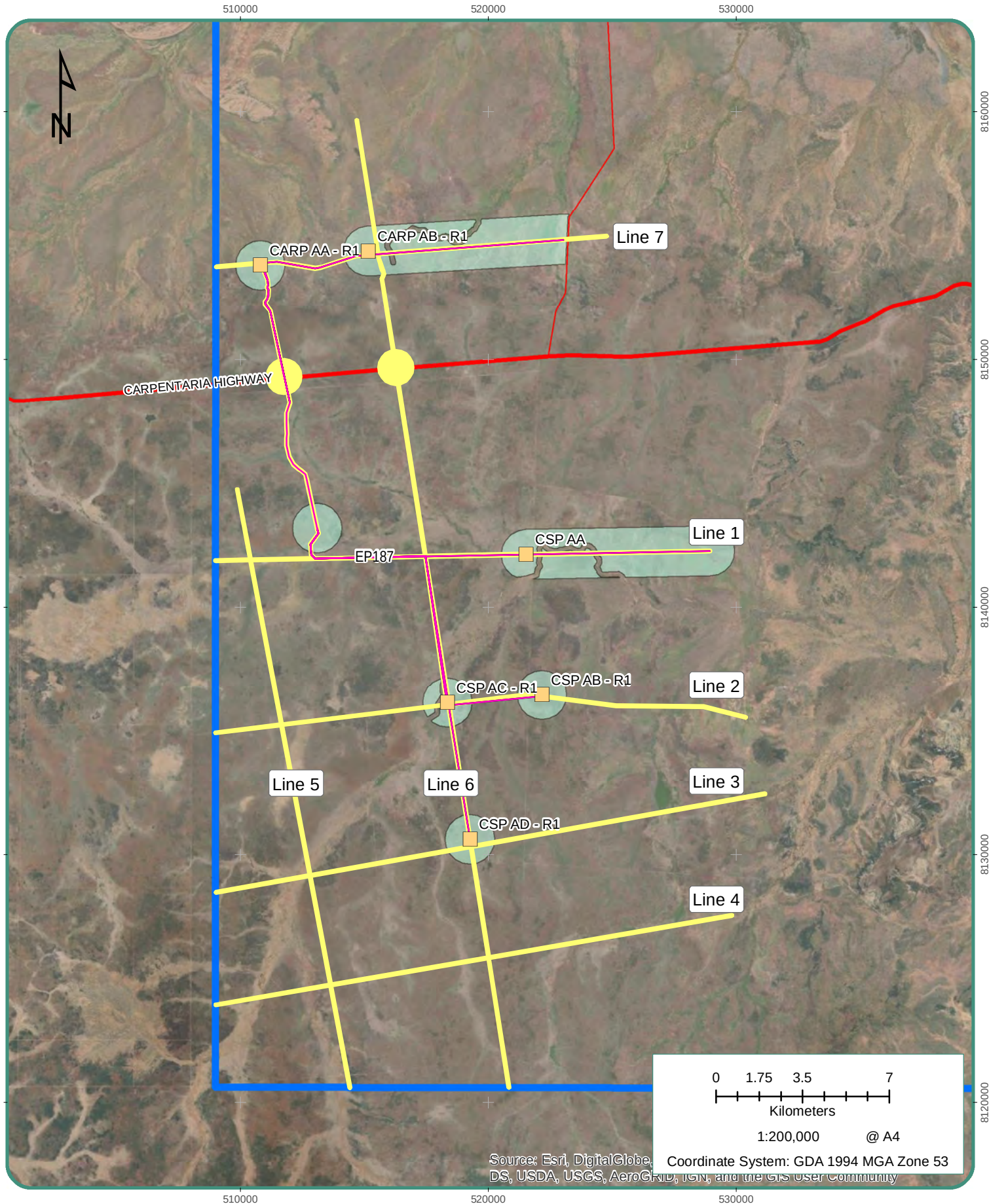
— Aerial weed survey track log

— 2019 Seismic lines

■ Tenements



Document Path: C:\Users\greenvalle\Documents\Fox & Co Environmental\Projects\Imperial oil and gas\2021\Maps\1. Weed Management Plan\1. OG WMP_001 Figure 2021-2023 EP187 Exploration Program.mxd



TITLE:

**2021-2023 EP187
Exploration Program**

MAP NO: Figure 6

PROJECT: Weed Management Plan (WMP)

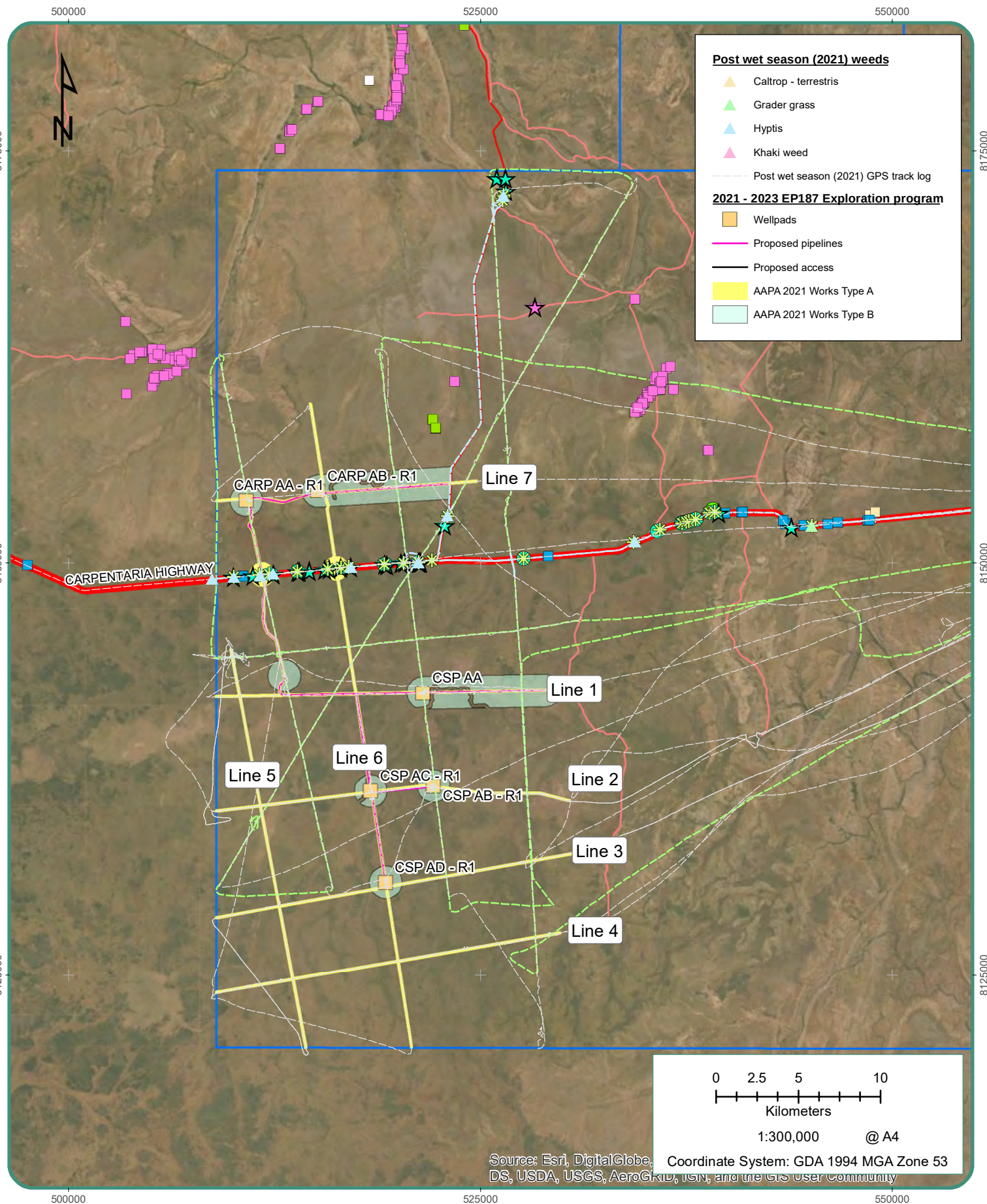
LEGEND

- | | |
|------------------------|----------------|
| Wellpads | Roads |
| Proposed pipelines | Principal Road |
| Proposed access | Secondary Road |
| AAPA 2021 Works Type A | Minor Road |
| AAPA 2021 Works Type B | |
| Tenements | |



Data Source:

Date: 23/03/2021



TITLE:
2021-2023 EP187
Exploration Program
- pre-works weed survey

MAP NO: Figure 7

PROJECT: Weed Management Plan (WMP)

Dry season (2018)

- Hyptis
- Parkinsonia

Post wet season (2019)

- Caltrop
- Hyptis

Dry season (2019)

- Hyptis

Post wet season (2020)

- Hyptis

Weed name

- Bellyache bush
- Burr - Star
- Caltrop - terrestris
- Hyptis

- Khaki weed

- Neem

- Parkinsonia

- Prickly acacia

- Sida - Spiny head

- Sida sp

- On ground weed survey track log
- Aerial weed survey track log





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ENVIRONMENTAL

Appendix 10 - Methane Emissions Management Plan

10. - Methane Emissions Management Plan

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10.1 Background

Imperial proposes exploration activities in the Beetaloo Basin from 2020 onwards; this Methane Emissions Management Plan (MEMP) supports EMP IMP₄ and its revisions.

Under the Petroleum (Environment) Regulations (the Regulations), interest holders in petroleum titles must prepare and submit an EMP. Approval of an EMP is necessary for all activities that have an environmental impact or risk and is only one of several approvals required for the activity to proceed. An approved EMP is a statutory document that is enforceable.

The Code of Practice (CoP) for Petroleum Activities in the Northern Territory sets out the mandatory requirements for management plans for methane emissions monitoring, leak management, detection and reporting. The CoP states that an EMP for a petroleum activity must include a Methane Emissions Management Plan.

10.2 Scope

This MEMP assesses and manages the risks posed by conducting drilling, stimulation, well testing, and ongoing petroleum activities as part of the EMP IMP₄ and its revisions.

10.3 Purpose

Following the CoP, this MEMP has been designed to outline the measures as to how the risks of methane emissions associated with Imperial's exploration activities will be managed.

This MEMP aims to reduce emissions to a level that is As Low As Reasonably Practicable (ALARP) and acceptable via emissions detection and management. The active monitoring and management described in this MEMP aim to reduce fugitive methane emissions from petroleum activities.

10.4 Principles

This MEMP aims to reduce emissions to ALARP and acceptable via emissions detection and management. Active monitoring and management aim to reduce fugitive methane emissions from petroleum activities.

10.5 Activity Description

All activities, including drilling, well testing and ongoing operation of exploration wells will be conducted as per the requirements of the CoP. A description of these activities is described in Table 1 below. The project activities under this EMP do not include any production, compression or flowline activities.

Table 1: Activity and emission description summary

Activity	Emission Description	Controls	Emission monitoring and frequency
Seismic	Methane emissions are not expected to be produced as part of the seismic activities	N/A	N/A
Drilling	Methane is not expected to be encountered. If any is found, emissions are expected to be small (<1 tonne) and restricted to outgassing of hydrocarbon within intersected geological formations brought to the surface	- While drilling, the well is kept overbalanced to prevent gas influx from geological formations into the wellbore - Shale formations have negligible permeability with a limited influx of gas from target formations	- Due to low emission levels, gas is qualitatively monitored in mud streams as a concentration (not flow rate). - Gas desorption data is collected from the target reservoir, allowing emission estimates
Stimulation	During stimulation, the well will be overbalanced, restricting the flow of hydrocarbons to the surface	- Well is kept overbalanced to prevent gas influx during and after stimulation. - Stimulation fluids are kept within the formation after each stage (until flowback).	N/A

Activity	Emission Description	Controls	Emission monitoring and frequency
Flowback and Well testing	- The completed well is unloaded to allow hydrocarbons and fluid to flow to the surface - All fluids and hydrocarbons diverted to a separator and in turn to a flare system, with only a small amount released to the atmosphere from flowback fluid. flaring will be used rather than venting, and venting will only be used where flaring is not feasible - Small volumes (kg's/day) of methane is entrained within liquid hydrocarbons, and flowback fluid can't be captured and will be released into the atmosphere - Small emissions (<1 tonne) of methane may be released before the onset of flaring, as the hydrocarbon production rate may not be enough to sustain a flare initially	- Wellheads are designed per the NT Code of Practice and API standards to minimise loss of methane containment. - All gas is sent to a flare, and a small amount is released into the atmosphere - Personal Gas Detector during all operational visits	- All operational personnel will carry and monitor personal calibrated gas detectors during every routine operational visit to well sites - Ongoing during well testing
Ongoing well operations / suspension	Methane emissions are restricted to unplanned leaks from wellheads, including surface casing vents	- Operation staff to carry personal calibrated gas detectors during every routine operational visit to well sites - Routine wellhead maintenance as per well Integrity Management System - Each well and equipment on a well pad to be inspected every six months for leaks using a US EPA Method 21	- Personal Gas Detector during well testing activities - Six monthly leak detection until abandonment

10.6 Risk Assessment

An assessment of environmental impacts and environmental risks posed by the activities to be carried out under EMP IMP₄ and its revisions has been carried out. This risk assessment includes an assessment of the risks posed by leaks from the operating plant.

For completeness and consistency with the environmental risk assessment of all activities, this is presented in Appendix 04. As demonstrated in the risk assessment, the risk assessment controls and Table 1 reduce emissions to ALARP and acceptable.

10.7 Equipment selection

The uncontrolled emissions of natural gas during drilling and well testing activities represents a potential hazard to works and the environment. All equipment will be selected to minimise the emissions during production activities and with the requirements shown below in Table 2.

Table 2: ISO/API Standards for Material Selection

Component	Applicable Standards
Casing	ISO 11960: Steel pipes for use as casing or tubing for wells
Couplings	ISO 13679 Procedures for testing casing and tubing connections
Cement and additives	American Petroleum Institute Recommended Practice, (API RP) 10B-2 Recommended Practice for Testing Well Cements
Drilling fluids	- ISO 10414-1: Recommended Practice for the Field-Testing Water Based Drilling Fluids. - American Petroleum Institute (API) 13B-1 and 13B-2 Recommended Practices
Well control equipment	- API STD 53: Blow-Out Prevention Equipment Systems for Drilling Wells. - API 16A (ISO 13533): Specification for drill-through equipment. - API 16D: Specification for Control Systems for Drilling Well Control Equipment and Control Systems for Diverter Equipment.
Wellheads	- API 6A: Specification for wellhead and Christmas tree equipment. - ISO 10423: Petroleum and Natural Gas Industries – Drilling and Production Equipment – Wellhead and Christmas Tree Equipment.

Leak detection equipment will be consistent with the Code, including standard leak detection instruments (Section D.5.3 of the Code) as detailed in Section 3.2.1 below. Ongoing well maintenance will be conducted following the Well Operations Management Plan.

10.8 Monitoring methodology and monitoring frequency

Mandatory inspections will be completed on all surface infrastructure (vents, flanges, valves, connections, drains, pressure relief vents, etc.) of the exploration well following section D.5.3 standard leak detection instruments and D.5.2 inspection frequency and procedure of the Code.

10.5.1 Monitoring Method

Routine inspections will be carried out to detect potential fugitive methane emissions from petroleum activities and mitigate them as soon as practicable. All gas leak surveys will be conducted by suitably qualified personnel using appropriate gas detection instruments calibrated and maintained following the manufacturer's requirements.

Leak testing will be undertaken using the United States Environmental Protection Agency (USEPA) Method 21 or optical gas imaging (OGI). Method 21 inspections are used to survey individual pieces of equipment. These types of inspections require access to the equipment's surface and are extremely effective at pinpointing leaks.

The following procedure is to be followed when conducting method 21 inspections:

Ensure gas detector is calibrated and functioning properly

1. Ensure the appropriate permitting is obtained before entry into a hazardous area
2. Place the probe inlet at the surface of the component interface where leakage could occur.
3. Move the probe along the interface periphery while observing the instrument readout. If an increased meter reading is observed, slowly sample the interface where the leakage is indicated until the maximum meter reading is obtained.
4. Leave the probe inlet at this maximum reading location for approximately two times the instrument response time (i.e. at least a minute).
5. If the maximum observed meter reading is greater than 500PPM at the surface of a piece of infrastructure, the leak will be measured again at 150mm immediately above (and downwind) of the leak in an open-air environment
6. The leak will be classified following section 4.3
7. The location of the leak will be documented and photographed (if safe to do so)
8. Any liquid petroleum leaks will also be identified, including estimates of leak rate and the volume released.

10.5.2 Inspection and monitoring frequency

Training will play a crucial key in detecting emissions; all personnel conducting routing emission inspection will be appropriately trained. Inspections will be carried out at the well sites as per "Table 25. Monitoring Plan" of the Environmental Management Plan.

10.5.3 Leak classification, repair, and notification

Each leak will be classified, repaired and reported following Table 3. It should be noted that the classification of leaks is only undertaken using US EPA method 21, as described in Section 10.5.1.

Table 3: Leak classification and remediation summary

Classification	Threshold	Response	Notification	Comments
Minor leak	>500ppm measured at the surface of the component per section 4.1	All minor leaks will be documented and repaired as soon as practicable but within 30 days of identification. The Minister will be notified where 30 days is unachievable, with the reason for the delay and the target date for completion.	All minor leaks will be documented within Imperial's system and reported where required, including the NGER.	A minor leak is an unplanned release that does not occur during commissioning or bringing equipment back into service. These leaks will be corrected immediately as a part of commissioning. A Minor leak originates from an above-ground source.
Significant leak	>5000ppm (or ten %of the Lower Explosive Limit) when measured at 150mm above the leak source. Or A Liquid Petroleum	1. The activities safety management plan, risk assessment and emergency response requirements will be followed. 2. Remediation work will only commence after a suitable risk assessment has been undertaken (at a level appropriate to the nature of the leak) and the relevant safety procedures are followed, including the consideration of all the required Personal Protective Equipment and emergency response material.	In the case of an emergency, DITT will be notified within 24 hours via the emergency response hotline number 1300 935 250. Notification will include the date of identification, nature and level of the leak, infrastructure name, number and location, as well as	A significant leak is an unplanned release that does not occur during commissioning or bringing equipment back into service. These leaks will be corrected immediately as a

Classification	Threshold	Response	Notification	Comments
	(condensate/oil) loss of containment that exceeds 200L. Or The leak is too large or not safe to measure.	3. If safe to do so, the leak source will be isolated and repaired immediately. The response priority will be to make the site safe above all other actions. 4. The leak will be repaired or made safe as soon as practicable, as follows: a. the leak will be isolated, repaired if possible, contained or otherwise made safe within 72 hours. b. An exclusion zone will be established around the leak, and appropriate restrictions on access to the exclusion zone imposed where isolation and repair are not possible. c. in the event the 72hour deadline is unachievable, the reason for the delay and the target date for repair will be submitted to DITT before the deadline passed 5. If it is contended that the risk of immediately repairing the leak exceeds the risk posed by the leak, an extension of the 72-hour deadline may be sought provided that other measures to mitigate the risk are undertaken (e.g. ensuring an appropriate exclusion zone has been implemented). 6. For leaks identified on well equipment, higher-order controls such as containment by repair will be implemented wherever possible. 7. For leaks identified on well casings or adjacent to the well casing (where a workover rig is necessary to effect repair), it will be determined whether the leak requires immediate repair or whether the risk can be adequately managed via other control measures until a workover of the well is scheduled for normal operational reasons. The risk assessment to determine the above will consider the location of the well, likely access to the well from landholders or the general public, and landholder/community concerns in relation to the leak.	the initial actions to minimise the risk. The landowner or occupier of the property in which these leaks are occurring will be notified in the following circumstances: a. if the leak cannot be repaired immediately; and b. ii) if the leak is likely to affect any of the landowners or occupiers facilities or activities. A written closeout report will be submitted within five business days of the remediation of the leak, specifying the date of identification, nature and level of the leak, location and name of the operating plant, and the rectification actions are taken. If finalising the remediation is delayed more than seven (7) business days from the identification of the leak, an update will be submitted on that day. The final closeout report will be provided when all work is complete.	part of commissioning.

10.5.4 Remediation work and leak response

Remediation works will only commence work after a suitable risk assessment has been undertaken and relevant safety procedures are followed, including consideration of all the required Personal Protective Equipment (PPE) and the Imperial Emergency Response Plan.

For leaks identified on:

- Well equipment, higher-order controls, such as containment by repair, will be implemented wherever possible
- Well casings or adjacent to the well casing (where a workover rig is necessary to effect repair) repairs will be completed as soon as reasonably practicable in consideration of the location of the well, safety to personnel and the public, potential environmental harm, likely access to the well from landholders or the general public, and landholder/community concerns in relation to the leak.

10.9 Reporting

10.6.1 Leak reporting

As per COP D.5.6.2(g), a written closeout report will be submitted within five business days of the leak's remediation, specifying the date of identification, nature and level of a leak, location and name of the operating plant, and the rectification actions are taken.

If finalising the remediation is delayed more than seven business days from identifying the leak, an update will be submitted on that day. The final closeout report will be provided when all work is completed as per COP D.5.6.2(h).

10.6.2 Greenhouse Gas Emissions Estimates

Emissions from exploration, well construction (including during flowback) and workovers will be measured. These emissions will be measured using methods consistent with the National Greenhouse and Energy Reporting (Measurement) Determination 2008.

- Imperials reporting will be in accordance with Section D.5.6. leak remediation and notification and 5.9 Venting and Flaring of the Code.
- Imperial will estimate and report all greenhouse gas emissions as per the requirements of the Australian Government's Clean Energy Regulator and the National Greenhouse Energy Reporting Act as required.
- If Imperials operations are below the reporting threshold specified by the Commonwealth National Greenhouse and Energy Reporting Act (2007), Scope 1 emissions will still be reported for the approved regulated activities in this EMP to the Northern Territory Government under Code.

10.6.3 Annual Reporting

An annual report will be provided to the Northern Territory Government summarising the following:

1. The records of the stages of flowback activities, including:
 - a. The date and time of the onset of flowback
 - b. The date and time of each attempt to route flowback fluid to the separator
 - c. The date and time of each occurrence in which the operator reverted to the initial flowback stage
 - d. The date and time of well shut-in or connected into adjacent gathering lines
 - e. The date and time that temporary flowback equipment is disconnected
 - f. The total duration of venting, combustion and flaring over the flowback period.
2. The results of leak detection surveys (in the annual report under the Code) outlining:
 - a. The extent of compliance with the leak management plan
 - b. A summary of monitoring undertaken during the period
 - c. A summary of minor and significant leaks identified during the reporting period including:
 - i. The date of identification and
 - ii. Repair for each leak and those leaks that could not be repaired
 - d. 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.

Appendix 11 - Stakeholder Engagement Log

11 - Stakeholder Engagement Log

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11.1 Overview

This appendix contains a log of communications with Stakeholders, in relation to EMP IMP₄, to the date of submission.

11.2 Log

Table 1: Key Relevant Stakeholder Communications log

Stakeholder	Contact Details	Date	Information provided	Written Response Received	Imperial Response	Change to EMP
CEO & Manager Minerals and Energy NLC	GPO Box 1222, Darwin NT 0801	15/10/2020	Introductions and discussions on IOG future work programs, in particular, and working with NLC and TOs towards commercialising hydrocarbon extraction and associated local jobs and royalties	No; No objections or concerns raised	No response required	No change needed
Senior Project Officer & Manager Minerals and Energy NLC	GPO Box 1222, Darwin NT 0801	20/10/2020	2021 work program (refer Section 1.3.1 for a copy of information provided)	Yes; Concerns raised in regards to a. surface water impacts from the extraction of groundwater, as Relief Creek is identified as a moderate potential GDE; b. the potential for hydrocarbon contamination of aquifers and any mitigation measures to manage this; c. impacts from erosion and sedimentation associated with the seismic work; and d. the proposed rehabilitation methods for impacted areas (refer Section 1.3.2 for a copy of information provided)	Refer to Section 1.3.4 for a copy of the information provided	No change needed
Senior Project Officer & Manager Minerals and Energy NLC	GPO Box 1222, Darwin NT 0801	23/10/2020	NATA accredited laboratory report for the dissolved gas (Methane, Ethane, Propane) concentrations from the groundwater sampling program. (refer Section 1.3.2 for a copy of information provided)	No; No objections or concerns raised	No response required	No change needed
S19 Pastoralist Relief creek	P.O. BOX 559 Relief Creek Borroloola. NT. 0854.	4/11/2020	Phone conversation covering; Ongoing requirements for weekly monitoring over the wet season, access, gates etc Planned activities and schedule for 2021	No; No objections or concerns raised	No response required	No change needed
Senior Project Officer & Manager Minerals and Energy NLC	GPO Box 1222, Darwin NT 0801	10/11/2020	Draft of this EMP and appendices	Yes Request for clarification on multiple items	Yes, table supplied with responses to clarifications. (refer Section 1.3.4 for a copy of information provided)	No change needed

Stakeholder	Contact Details	Date	Information provided	Written Response Received	Imperial Response	Change to EMP
Senior Project Officer & Manager Minerals and Energy NLC	GPO Box 1222, Darwin NT 0801	21/10/2020	Supplied; 1)IOG independent Chemical analysis report on Fracture Stimulation Fluids (refer Appendix 06.01 for a copy of information provided) 2) IOG EP187 2019 Groundwater report	No; No objections or concerns raised	No response required	No change needed
S19 Pastoralist Relief Creek	P.O. BOX 559 Relief Creek Borroloola. NT. 0854.	9/12/2020	Face to face meeting to discuss the proposed program scope, relevant to pastoralists holding. Discussion of previous work programs relevant to pastoralist holding. Hand delivery of letter, laying out the proposed program scope, relevant to pastoralists holding. (refer Section 1.3.6 for a copy of information provided)	No; No objections or concerns raised; General feedback was; - If we use their access tracks/fencelines for accessing seismic lines, we will need to maintain grade them as were - No concerns if we keep operating as we have done so far	No response required	No change needed
S19 Pastoralist West Balbarini	Po Box 1262 Charters Towers QLD 4820	9/12/2020	Face to face meeting to discuss the proposed program scope, relevant to pastoralists holding. Discussion of previous work programs relevant to pastoralist holding. Hand delivery of letter, laying out the proposed program scope, relevant to pastoralists holding. (refer Section 1.3.7 for a copy of information provided)	No; No objections or concerns raised	No response required	No change needed
Traditional Owners and other local aboriginal community members		11/11/2021	Small group Face to Face meetings to discuss the proposed program scope. Imperial personnel in Borroloola park for the day, with local people coming and going	No Written responses, Questions were raised about the protection of aquifers from fracture stimulation fluids and petroleum	It was discussed that the aquifers are separated from the flow of fluids and petroleum by multiple layers of steel casing, and cement and that water monitoring bores located on the good pad upstream and downstream of the petroleum well collect water samples to ensure that there is no change to the aquifer water quality and that if there ever is such a change potentially caused by Empire's activities, work would immediately stop while the cause is determined	No change needed

Stakeholder	Contact Details	Date	Information provided	Written Response Received	Imperial Response	Change to EMP
Traditional Owners and other local aboriginal community members		11/11/2021	Small group Face to Face meetings to discuss the proposed program scope. Imperial personnel in Borroloola park for the day, with local people coming and going	No Written responses, Questions were raised about the risk of ponds overtopping in the wet season.	It was discussed that the freeboard is designed to withstand a 1 in 1000 year rainfall event and that the ponds are checked regularly and levels monitored. If the freeboard limit is approaching, fluids are removed to ensure that the freeboard is maintained.	No change needed
Borroloola Traditional Owners Senior Project Officer NLC	GPO Box 1222, Darwin NT 0801	11/11/2020 To 12/11/2020	Day 1 On country meeting in Borroloola with NLC and TO's outlining Planned activities and schedule for 2021, including additional 2D seismic acquisition, 6 well pad clearances and hydraulic stimulation of Carpentaria 1 vertical and lateral well. Day 2 4 NLC and 10 TO's visited Carpentaria 1 escorted by Imperial COO to see post drilling wellsite and rehabilitated 2019 2D seismic lines. The first time NLC and majority of TO's had visited a hydrocarbon wellsite	No; Concerns raised regarding: 1. Hydraulic Fracturing and its impacts on aquifers 2. Hydraulic Fracturing Chemicals 3. Water usage 4. The size wellpads and the impacts (on day one only)	With respect to concerns raised 1. Discussion around Hydraulic Fracturing and how aquifers are protected 2. Discussion re HF Chemicals and risk assessment 3. Discussion re water usage and licencing 4. A site visit to Carpentaria 1	No change needed
Senior Project Officer & Manager Minerals and Energy NLC	GPO Box 1222, Darwin NT 0801	27/01/2020	Draft of this EMP and appendices	No; no objections or concerns raised	No response required	No change needed
Senior Project Officers NLC	GPO Box 1222, Darwin NT 0801	02/02/2021	1) 2021 EP187 Work Program 2) Appendix 02 – Project Activities - (Draft) 3) Appendix 03 – HF Chemicals Risk Assessment 4) EP187 Archeological Report (not redacted)	No; no objections or concerns raised	No response required	No change needed
Senior Project Officer & Manager Minerals and Energy NLC	GPO Box 1222, Darwin NT 0801	04/03/2021	Program Scope discussions	No written; Verbal request to include a statement regarding HF fluids do not contain Toluene or BTEX components	No response required	No change needed as EMP states that HF fluids do not contain Toluene or BTEX components
S19 pastoralists O.T Downs	PMB 77 Katherine NY 0852	9/03/2021	Phone discussion regarding the increased scope of flowlines and multiwell pads	No; no objections or concerns raised	No response required	No change needed

Stakeholder	Contact Details	Date	Information provided	Written Response Received	Imperial Response	Change to EMP
S19 pastoralists West Balbarini	Po Box 1262 Charters Towers	9/03/2021	Phone discussion regarding the increased scope of flowlines and multiwell pads	No; no objections or concerns raised	No response required	No change needed
S19 pastoralists O.T Downs	PMB 77 Carpentaria Downs Katherine NY 0852	5/04/2021	letter, laying out the proposed program scope, relevant to pastoralists holding (refer Section 1.3.8 for copy of information provided)	No; no objections or concerns raised	No response required	No change needed
S19 pastoralists West Balbarini	Po Box 1262 Charters Towers QLD 4820	5/04/2021	letter, laying out the proposed program scope, relevant to pastoralists holding (refer Section 1.3.10 for a copy of information provided)	No; no objections or concerns raised	No response required	No change needed
S19 pastoralists O.T Downs	PMB 77 Carpentaria Downs Katherine NY 0852	5/04/2021	letter, laying out the proposed program scope, relevant to pastoralists holding (refer Section 1.3.11 for a copy of information provided)	No; no objections or concerns raised	No response required	No change needed
Confidential Aboriginal Community Member		08/05/2021	Program scope discussion	No written; verbal concern regarding wellpad size	Face to face meeting to discuss the proposed program scope, Discussion regarding sizing of wellpads, explained that the wellpads needed to be that big to accommodate the safe storage and treatment of fluids, and the size would be reduced when the development from that wellpad was completed.	No change needed
Confidential Aboriginal Community Member		08/05/2021	General Discussion	No; no objections or concerns raised	Discussion of artwork	No change needed
Confidential Aboriginal Community Member		08/05/2021	Program scope discussion	No; no objections or concerns raised	Discussion and agreement that development companies and aboriginal people need to work closely together	No change needed

11.3 Correspondance

Correspondence related to this EMP is presented below

1.3.1 Correspondance ; NLC - 2021 Work Program - 20/10/2020

Document Title	EP187 Beetaloo Sub-basin – 2021 Work Program
Document Number	EP187-XPN-GEN-PLN-001

Ver	Status	Prepared by	Checked by	Approved By	Date
1	Draft	David Evans	Alex Underwood		16-10-2020
2	Final Draft	David Evans	Kylie Arizabaleta		19-10-2020
3	Final	David Evans			20-10-220

EP187

2021 WORK PROGRAM

Beetaloo Sub-basin

Document Title	EP187-Beetaloo Sub-basin – 2021 Work Program
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Introduction

In accordance with the conditions of the agreement “*Aboriginal Land Rights (Northern Territory) Act 1976* Exploration Deed Exploration Permit Application 187” between Imperial Oil & Gas Pty Ltd (‘Imperial’) and the Northern Land Council (‘NLC’) this report identifies the proposed work program planned to be conducted by Imperial across the Aboriginal Land contained within the approved exploration permit area in 2021.

Imperial has been active in the Northern Territory’s McArthur Basin and Beetaloo Sub-basin since 2010. During that time, it has conducted approximately 26 On Country meetings with Traditional Owners and has a strong track record of environmental compliance and stakeholder engagement. Building on its safe and successful 2019 2D seismic acquisition survey and 2020 drilling of the Carpentaria 1 exploration well Imperial proposes to undertake two key exploration activities during the 2021 year to further demonstrate the prospectivity of EP187 for the presence of hydrocarbons within the Beetaloo Sub-basin. The body of this report provides the required information under the terms of the agreement.

These activities are:

1. The acquisition of an additional ~155-line kilometres of 2D seismic and sighting of 6 potential future drilling locations
2. The vertical and lateral hydraulic stimulation of the 2020 drilled Carpentaria 1 exploration well

The objective of the exploration and appraisal program is to build on work carried out by Imperial in 2019 and 2020 to further delineate a hydrocarbon resource of unconventional gas and oil from potential source/reservoir formations found within the Beetaloo Sub-basin, and to determine an economic extraction process.

Scope

The scope of this document is to identify the work sites, site access and work programs that Imperial requests cultural ethnographic heritage and sacred site clearances for in accordance with the requirements of the Exploration Deed entered into under the Aboriginal Land Rights (Northern Territory) Act 1976 for the tenement EP187 between Imperial the NLC as representatives for the Local Aboriginal Groups. These site clearances are supplemental to those carried out in 2019 and 2020

Background

Organically rich source rocks with the potential to generate and host both oil and gas are present in several intervals within thick Meso and Palaeo-Proterozoic age shale formations of the McArthur Group such as the Kyalla and Velkerri Shale Formations. The 2020 Carpentaria 1 well location in the Beetaloo Sub-basin and well stratigraphic showing the depth of the Velkerri Shale Formations is shown in Figure 1.

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The Kyalla and Velkerri Shale Formations within the Roper Group are the major organic rich source rocks of the basin and are the primary unconventional reservoir targets for hydrocarbon generation. These formations have been proven to be gas-bearing in exploration wells drilled and tested during 2012 and 2013 by Armour Energy, Santos/Tamboran in 2014 and 2020, Origin 2020 and Imperial Oil & Gas 2020, Carpentaria 1, Figure 1.

The uppermost unit, the Roper Group varies between 1,500 and 4,000 m in thickness. The Roper Group thickens to the northwest from EP187 as it develops across the Beetaloo Sub-basin of the McArthur Basin. It consists of alternating quartz arenites, siltstones and shales. The Roper Group unconformably overlies the McArthur and the Nathan Groups.

The sedimentary sequences within the Roper Group have significant lateral extent, with more uniform facies when compared to the underlying successions of the Tawallah, McArthur and Nathan Groups. The estimated age of the Roper Group is at least 1,430 Ma. An un-named succession of sandstones and shales of probable Neo-Proterozoic age, overlays the Roper Group, these have a maximum thickness in excess of 600 m.

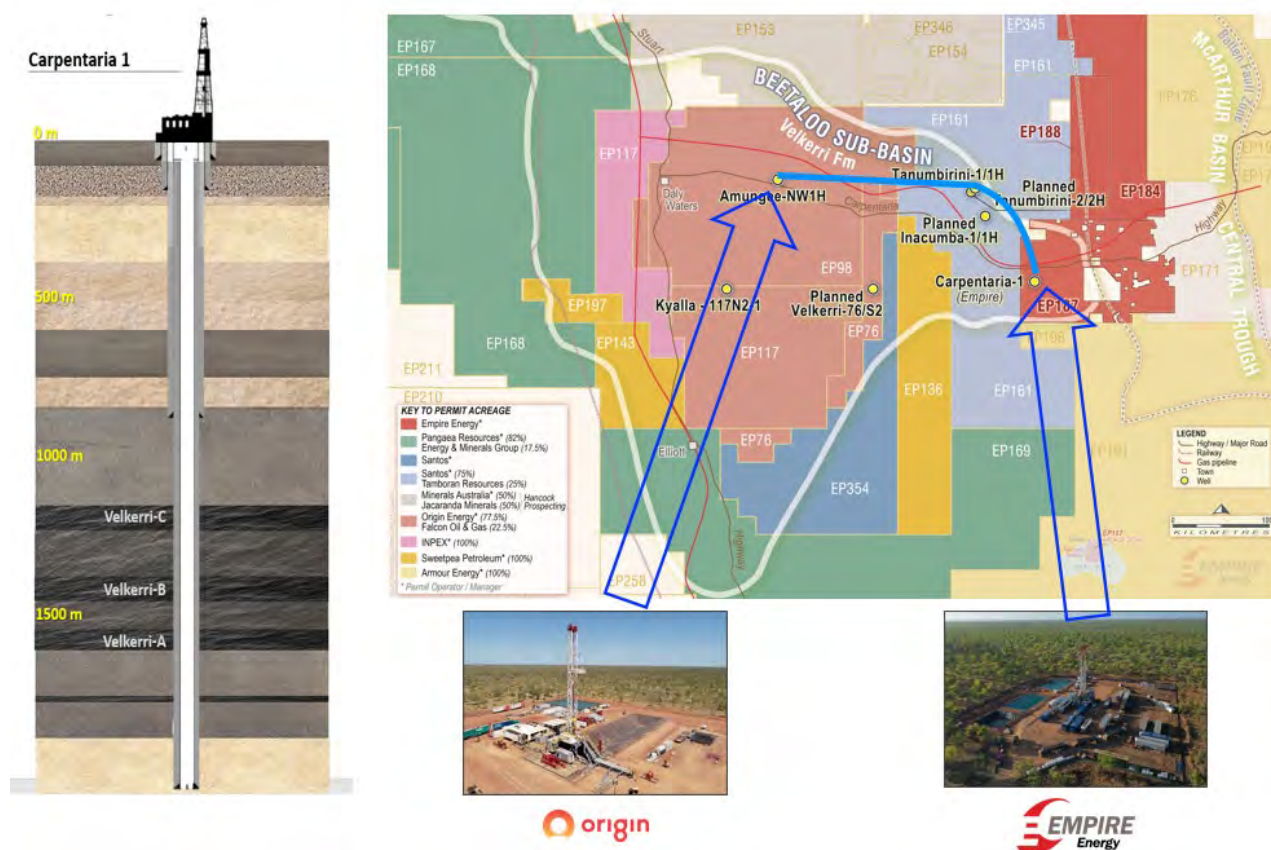


Figure 1. 2020 Carpentaria 1 well schematic showing the Velkerri shale objectives and map of the Beetaloo Sub-basin with EP187 and Imperial (Empire Energy) 2020 Carpentaria-1 photograph showing proximity to other tenure holders and Operators

It is proposed to further evaluate the petroleum system within Imperial’s EP187 tenement area in 2021 by acquiring supplemental 2D seismic data to add to the seismic data safely and successfully acquired by the company in 2019. In addition Imperial plans a vertical hydraulic stimulation of the 2020 Carpentaria 1 well in early 2021 followed by lateral drilling of this well and hydraulic

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stimulation and testing in the latter half of 2021, utilising the current well pad and access track that was culturally heritage (CH) cleared and built in 2020.

Cultural Heritage clearance is required for the planned seismic work and proposed new well pads which include the development of access ways, seismic lines, and drill pads. The drill pads are all located on the prospective 2021 seismic lines. The re-entry of the Carpentaria 1 well for hydraulic stimulation in 2021 at this time will not require Cultural Heritage clearance as the current well pad and site access is deemed appropriate for operational purposes.

The 2021 2D seismic data acquisition will be used to further constrain the subsurface basin geometry and depth of burial of the prospective formations beneath younger formations. The preclearing of 6 potential drilling pad locations as part of the seismic program is the same process Imperial successfully utilised in the 2019 seismic program when Imperial Cultural Heritage cleared 4 well pad localities as part of that program. This allows Imperial geoscientists the opportunity to choose the best well location to use once they have had the chance to study and interpret the new seismic data whilst ensuring that Cultural Heritage sites are protected. It also mitigates future land disturbance.

A Department of Environment and Natural Resources (DENR) approved Environmental Management Plan (EMP) was completed by Imperial for the 2019 seismic survey and the 2020 drilling of the Carpentaria 1 exploration well, DENR link <https://denr.nt.gov.au/onshore-gas/environment-management-plan/approved-emps>

An additional EMP is currently being developed for the vertical and lateral hydraulic stimulation of Carpentaria 1 in 2021 and will be submitted to the DENR for approvals. In addition, a new EMP for the 2021 2D seismic survey will be developed and submitted to DENR in conjunction with the granting of the NLC and Local Aboriginal Group ('LAG') approvals to conduct the work. An Oil Spill Contingency Plan, Safety Management Plan and an Emergency Response Plan have been developed and incorporated into current and future EMPs covering the company's exploration activities. An environmental baseline study of surface water, flora and fauna has been completed and updated and is incorporated in the NLC EP 187 Imperial Oil & Gas 2019-20 annual report. The results of these environmental surveys have been incorporated into the currently open EMPs and the 2 further EMPs for the 2021 work program under development. An ongoing sub surface (aquifer) water monitoring and analysis program is also underway as part of the DENR EMP approval for Carpentaria 1 drilling and future hydraulic stimulation effects to ensure that Imperial's activities are carried out in a manner which ensures that aquifer water quality is maintained. 2 water bores were drilled on the Carpentaria 1 well pad for aquifer monitoring purposes and a sampling and independent analysis for baseline water quality and water movement through the rock formations is ongoing.

A Cultural Heritage Management Plan ('CHMP') has successfully been developed and used and will be updated with the assistance of members of the relevant LAG's. In accordance with the requirements of the deed of agreement [and in particular the protection of sacred sites and objects and sites of cultural sensitivity as identified under Clause 5 Sacred Sites and Sacred Objects of the agreement] Imperial will not enter upon any part of the Deed Area for the first time unless accompanied by two persons nominated by the NLC to provide a familiarisation and orientation

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inspection of the Deed Area and the Company will pay such persons in accordance with Schedule 4 of the agreement.

Imperial is committed to proactive management of its environmental responsibilities and has developed a successful track record of doing so. This commitment extends to all aspects of our field activities. Imperial has proven environmental management strategies and procedures in place for the Company’s proposed 2021 2D seismic acquisition program and vertical and lateral hydraulic stimulation of the 2020 Carpentaria 1 exploration program. These include specific systems, procedures, and practices to ensure that the environmental impacts and risks of the work programs are reduced to as low as reasonably practical.

2021 Seismic Program

To achieve the objective of the 2D seismic acquisition survey program the company is likely to use the services of either Terrex Pty Ltd or Geokinetics Pty Ltd as qualified and experienced companies in the acquisition of seismic. Geokinetics was awarded the 2019 2D seismic acquisition program. A mid 2021 commencement is envisaged for the arrival of an advance party to commence survey and line access preparation. Survey mapping of the route prior to acquisition of the seismic is expected to be approximately 10 days of pre-acquisition survey along the proposed lines. Seismic survey acquisition is projected to take 20 days. Line and access clearing where appropriate will be restricted to following existing road or access ways and where practical with minimal clearance of vegetation from the proposed path when crossing country.

No trees of significance or environmentally sensitive flora or fauna will be impacted by the proposed program. All site activities will be conducted in accordance with the Northern Territory Government approved Imperial Environmental Management Plan. As in the 2019 2D seismic program there will be an overlap of the survey, acquisition and rehabilitation phase of the seismic program reducing the overall time of the survey and associated rehabilitation to approximately 30 days. A plan showing the area of the survey is attached for reference Figures 2 & 3 identify the registered consent/non-consent areas within the tenement.

In the event that trees of significance or environmentally sensitive flora or fauna are unexpectedly encountered during access track preparation or culturally sensitive sites are identified by the Cultural Monitors present on site, the trajectory of the seismic access tracks will be adjusted by up to 250m from their previously planned trajectories to ensure that these sites are protected.

The 2D seismic will be laid down along the proposed route(s) within the designated blocks as identified in these maps. It is planned to lay out OYO GSR nodal with six SM-24 phones per receiver station at project group intervals. The GSR is designed for autonomous nodal seismic data recording. The self-contained units include 1 to 4 channels of 24-bit digitization, an integrating/high sensitivity GPS receiver, built in test signal generator and up to 4GB per channel of non-volatile solid-state data storage with a high-speed data port. The units are housed in sealed casing, with input connectors, extended life battery connector/data port connectors. Comprehensive source array tests will be conducted prior to normal data acquisition to optimize the source array and configurations.

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The staging area for the operations will be based at the commercial facilities available at Heartbreak Hotel, Cape Crawford or another appropriate commercial location if the facilities at the Heartbreak Hotel are not available. This staging point will provide accommodation and office base for the duration of the acquisition program. Due to proximity of the proposed seismic lines to the Carpentaria Highway there should be no logistical constraints to access the survey area and implement the seismic survey program.

Carpentaria 1, 2021 Vertical and Lateral Well Hydraulic Stimulation and Testing Program

The company proposes to undertake the vertical hydraulic stimulation and test of Carpentaria 1 at the beginning of the 2021 dry season, and based on results of these tests complete a lateral well from the Carpentaria 1 wellbore and undertake a multi-stage hydraulic stimulation and test. Imperial is currently completing an EMP to submit to Department of Environment and Natural Resources (DENR) to cover the 2021 Carpentaria 1 vertical and lateral hydraulic stimulation and testing programs. In addition, a Well Operations Management Plan (WOMP) covering the multi-stage hydraulic stimulation and test program will be submitted to the Department of Industry, Tourism and Trade (DITT). The Carpentaria 1 well was constructed in a way to ensure the shallow Gum Ridge aquifer is fully cased and cemented through 3 sets of premium steel casing and cement to ensure that there cannot be any interaction between the well and surrounding ground.

The well hydraulic stimulation (HS) and testing procedure on Carpentaria 1 although not finalised will follow best, tried, and tested oilfield operational procedure. The HS process is a series of operations designed to increase the permeability within the target shale formation to enhance the amount of hydrocarbons that migrate into the wellbore and flow to the surface. HS activities involve the injection of a slurry which primarily consist of water and sand (proppant), plus chemicals that are commonly found in food and other household domestic products. All fluid additives (water and chemicals) and sand are mixed on the surface through hydraulic stimulation equipment. The mixture and pumping schedules (rates, volumes and proppant) are based on an HS model which determines the desired stimulation attributes.

The HS fluid is pressurised by the high-pressure pumping units and directed downhole via a manifold to discrete target intervals along the vertical or horizontal wellbore (referred to as “stages”). Each stage is isolated and perforated using a plug and perforation assembly deployed via wireline. As the pressure is sustained, the fractures propagate radially from the well, through the target formation. Once optimal fracture propagation has been achieved, the proppant (sand) is pumped down the well and into the open fractures. This process is repeated for each stage. The final number of stages pumped is dependent on the useable length of the wellbore and in-situ geological conditions. Once all stages are complete, the well is suspended awaiting completion and well testing activities.

Wellbore pressures are monitored during each HS to ensure operations have not compromised the integrity of the production casing or the cement barriers. To promote and achieve safe operations; Imperial will undertake all HS activities per the Code and relevant NT and Federal Government legislation and regulations. Also, all activities will be conducted per the respective WOMP;

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chemicals used will be risk assessed, real-time monitoring of pressure during HS, well barrier tested, and Spill and Emergency Response Plans will be in place

The chemicals used for hydraulic fracture HF account for less than 1% of the mixture to assist in carrying and dispersing the sand in the low permeability rock, the balance is fresh water and sand. These chemicals are also commonly used in household products including food additives, soap, cosmetics, toothpaste. All chemicals added to HS fluid perform a specific purpose, including:

- Acids and bases: controls pH and clears perforations before HF,
- Chemical inhibitors: such as iron or scale prevention,
- Biocides: controls or eliminates bacteria in the fluid to prevent introduction to target formation,
- Clay Control: prevents clays from swelling,
- Corrosion inhibitors: prevents equipment from rusting,
- Friction reducers: reduces friction between the HF fluid and piping allowing the fluid to be injected further without pressure drop,
- Surfactants: reduces the surface tension of the hydraulic fracturing fluid, and
- Viscosity regulators: increases or decreases the thickness of a fluid

All transportation, handling, storage and disposal of chemicals will comply with the required NT regulations, this includes:

- Transportation: from the supplier warehouse to the wellpad and between wellpads (Transport of Dangerous Goods by Road and Rail (National Uniform Legislation)),
- Use: handling, blending, injecting etc. (NT Dangerous Goods Act, Work Health and Safety Act and the Code),
- Storage: storage of chemicals and recovery of fluids (including storage in produced water and flowback fluid treatment tanks) at the well pad and associated vendor chemicals. (NT Dangerous Goods Act, Work Health and Safety Act and the Code), and
- Disposal: recovered vendor chemical additives in wastes and hydraulic fracturing flowback (NT Waste Management and Pollution Control Act 1998).

The HS spread, consists of up to 15 truck-mounted storage, blending and pumping units will be set up, and finally, HS will commence. HS initial setup and pumping activities will be conducted during daylight hours. Light vehicle movements and HS support activities, e.g. HS stage setup and perforation operations will be carried out on a 24-hour basis. The HS program is anticipated to commence in April 2021 and conclude in May 2021. The HS program will be followed by Extended Production Testing (EPT), its anticipated that the testing program will run between 90 and 180 days.

Accommodation and messing facilities in support of the companies HS program will be provided mainly by the commercial facilities at Cape Crawford “Heartbreak Hotel” located 50km east from the main entrance to the Carpentaria 1 well site details. If accommodation is not available at Heartbreak Hotel, Imperial will locate a mobile camp at an existing DPIL campsite along the Carpentaria Highway (Latitude: 16°43'56.13", Longitude: 135°12'0.30"E) that was used for the drilling of Carpentaria 1 in 2020. The camp will have a capacity to accommodate 30 people, with all meals provided on-site. The camp will have a sewage treatment plant fitted with an irrigation

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system that drains all the treated water into a benign area away from the camp. This system will be per the Code of Practice for Small On-Site Sewage and Sullage Treatment Systems and the Disposal or Reuse of Sewage Effluent, issued by the NT Department of Health. The designated area does not require clearing and will be fenced to exclude livestock access. Under the above Code of Practice, any septic systems releasing to the environment must not be within minimum separation distance to a potable groundwater supply bore. All camps will be managed per the NT Environmental Health Fact Sheet No 700, Requirements for mining and construction projects and “Health requirements for mining and construction camps” at: <https://nt.gov.au/property/building-and-development/health-and-safety/health-requirements-mining-construction-projects>

Location of Activity

The Imperial petroleum exploration tenement EP187 is in the Southern Gulf region of the Northern Territory. Located in the transition zone between the tropical and arid zones. EP187 sits in the upper reaches of the McArthur River in proximity to the Barkley Tablelands. The tenement lies to the west of the Tablelands Highway and is crossed east to west by the Carpentaria Highway, Figures 1-3.

Table 1 provides the location of the proposed 2021 2D seismic survey lines and **Table 2** identifies the location of the proposed future exploration wells.

Description of the Activity

2D Seismic acquisition

Dual-frequency GPS receivers are used to verify existing control points and to establish any additional control stations required for the efficient execution of the operation. The control network for the project is tied into the National Geodetic Survey Network. Working survey datum and transformation parameters and working geoidal model are verified in the process.

The field procedures adopted ensure that any established control points are part of a geometrically strong and well-distributed network, with ample redundant baselines ensuring confidence in the accuracy of solutions. All control points used in the survey are independently occupied on two occasions during the course of the control verification program. The major factors that affect baseline accuracy and observation times are baseline length, number of satellites and satellite geometry. To ensure that data integrity is not affected by periods of poor coverage survey preplanning is carried out and the factors affecting baseline accuracy monitored. Based on the method of data acquisition (i.e. static, rapid static or kinematic) the observation period is of adequate duration to ensure that ample redundant raw data is available to provide an accurate solution.

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Table 1: Planned location of EP187 2021 future seismic lines (FL)

Line	Start Easting	Start Northing	End Easting	End Northing
FL1	509020	8153742	524783	8154981
FL2	509151	8139792	528955	8142529
FL3	509481	8134270	528743	8137502
FL4	509235	8128522	529237	8132114
FL5	50901	8123943	525304	8126770
FL6	510285	8142587	514420	8120596
FL7	514700	8159659	520886	8120543

Map Grid of Australia Zone 53 (GDA 94)

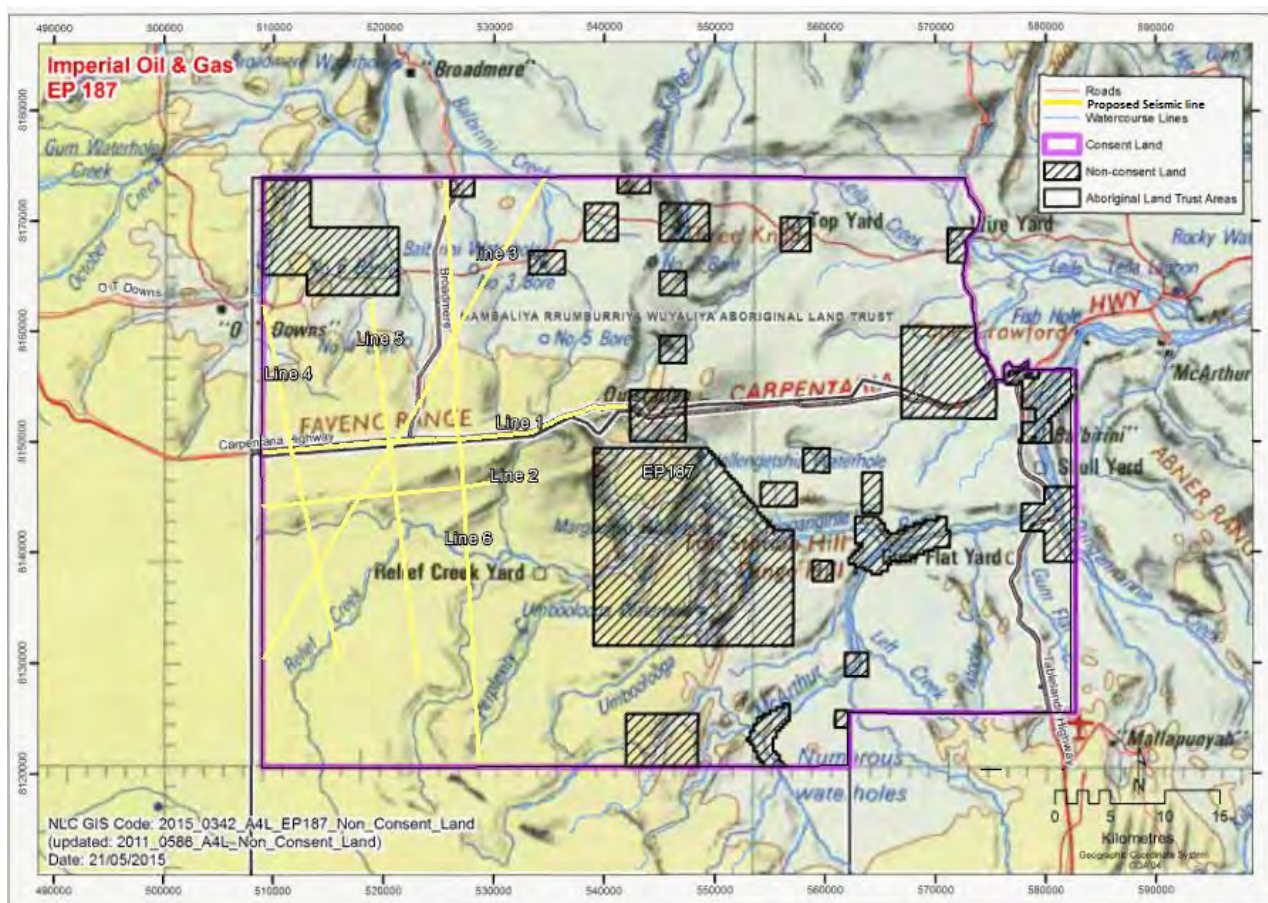


Figure 2: Yellow lines mark the 2D seismic lines safely and successfully acquired by Imperial Oil & Gas in 2019. **NB:** Black hashed boxes represent non-consent areas

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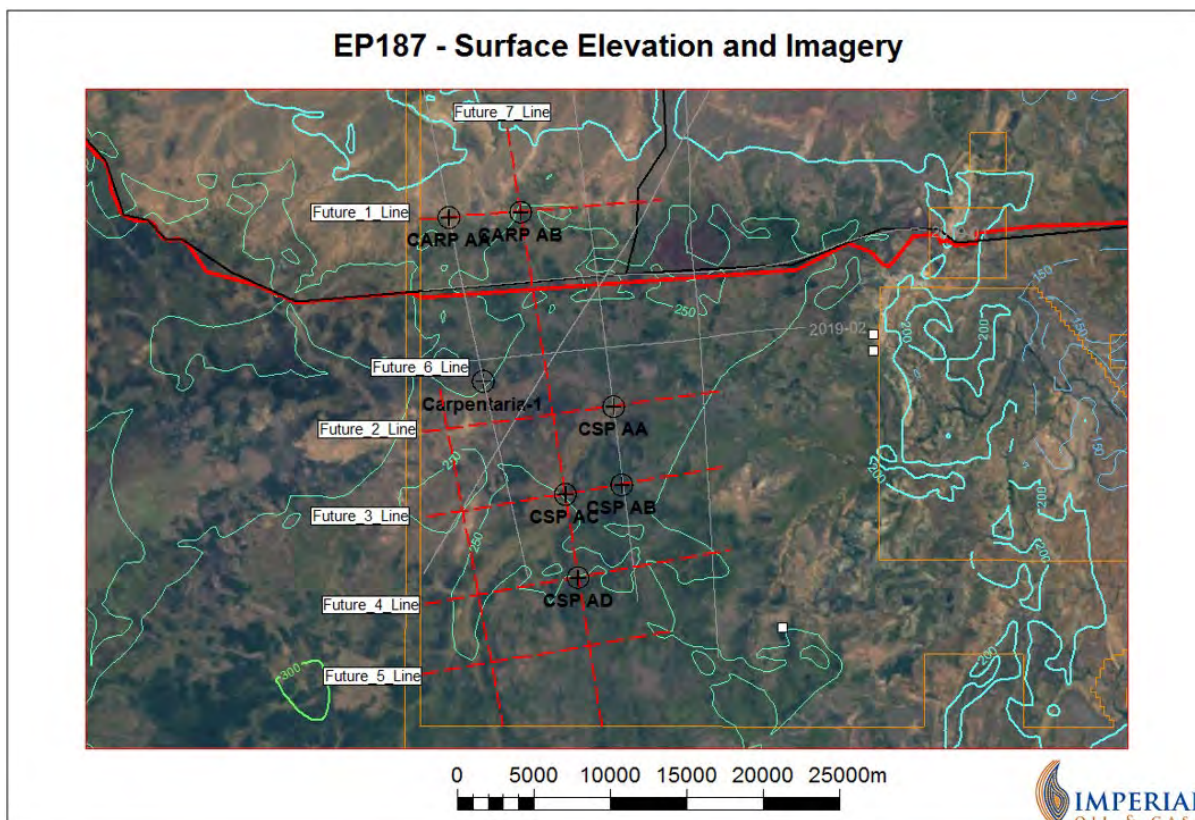


Figure 3: Google image of EP187 proposed 2021 seismic lines, (dashed red) and future well locations, & 2020 Carpentaria-1 exploration well location. **NB:** Grey lines show 2019 seismic lines acquired by Imperial, Carpentaria Hwy marked in red.

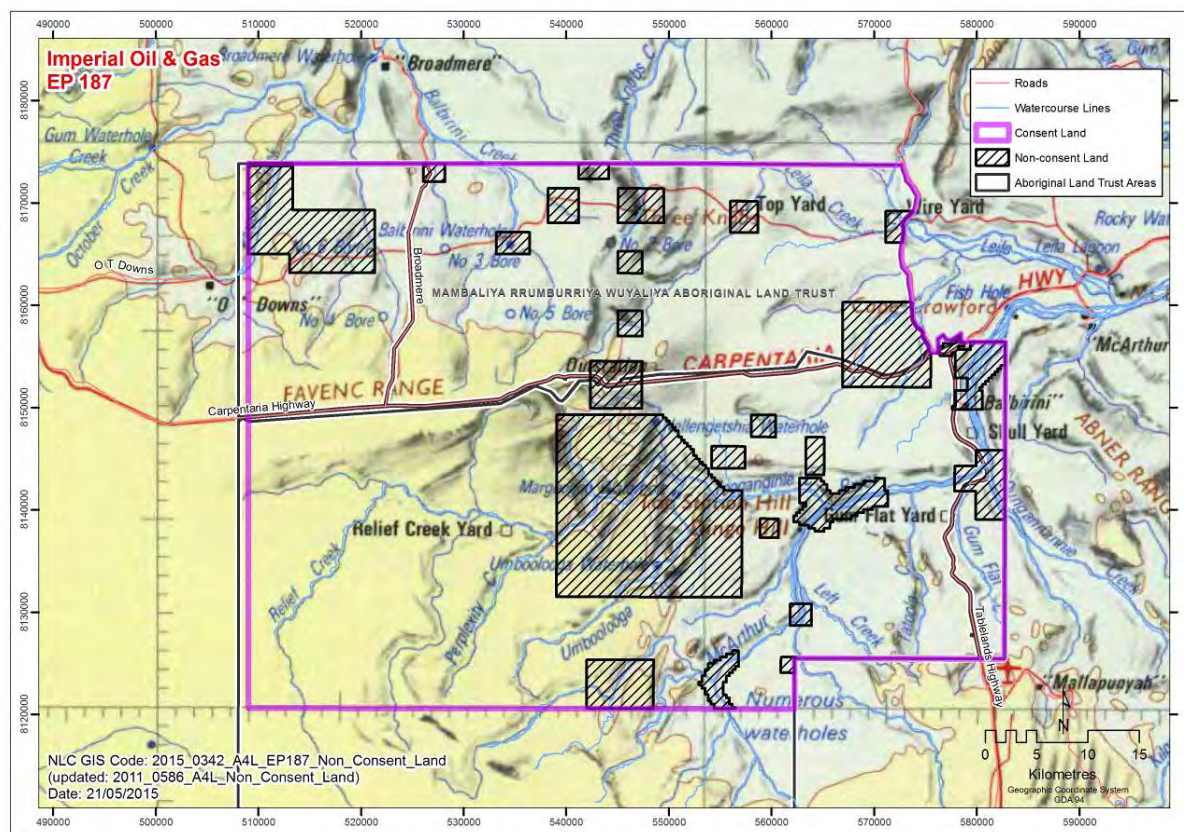


Figure 4: locations of non-consent areas known recorded and registered in EP187
Map supplied by the Northern Land Council Darwin Northern Territory Australia. 2015.

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Based on our experience gained from the safe and successfully acquired 2019 2D seismic survey line clearance will be kept to a minimum, thus limiting environmental impact and facilitating fast regeneration of vegetation. Line restoration works are minimised via a proactive approach to line preparation. All relevant environmental and local authority guidelines are adhered to. A GPS-based navigational guidance system is utilized to guide all line preparation and rehabilitation machinery.

The Flip-Flop seismic acquisition technique is utilised, involving two separate source arrays online, alternating shaking as they move through the spread. Cleared spread can be picked up from the rear of the 2D line, moved to the front and re-deployed as required. The Flip-Flop method of acquisition in land seismic uses two or more sets of vibrators, whereby one set begins sweeping at the moment that the other's listening time finishes and whilst the other set is moving up to the next VP. In this way there is no delay in recording such as experienced when a single source array is utilized and the move up between VPs is essentially dead time. The use of the Flip-Flop technique can increase productivity significantly in scenarios where spread movement capability isn't the limiting factor. The two source arrays can either be distance separated or in close proximity. For the Imperial 2021 2D survey, AHV-IV vibrators will be utilized, operating as a single source array of two to three vibrators.

Type of seismic equipment to be used:

For the Imperial 2021 2D seismic survey, AHV-IV vibrators will be utilized, operating as a single source array of two to three vibrators. Fairfield's ZLand nodes is a cable free node, making it both quick and environmentally friendly. The ZLand Gen II nodal system provides reliable and flexible performance, making them the system of choice in sensitive environmental or logistically challenging environments. The high sensitivity point receivers provide a superior integrated solution as compared to the more conventional field array methodology. ZLand nodes are lightweight, environmentally friendly, and easy to place and activate. They provide continuous, trouble-free recording with less equipment to deal with and minimal disruption to the environment.

For line clearing and preparation a caterpillar H140 Grader and or D7 dozer (or similar equipment if this is not available) will be used to sweep the ground surface of large rocks and fallen timber sufficient to provide safe access for vehicles and good ground contact of the geophones. The experience we gained on country in 2019 clearing the 2D seismic survey showed we used the Grader and Dozer very rarely. Where vegetation clearing is required it will be kept to a minimum. Root stocks will be left in place to enable rapid regrowth of vegetation.

Work crews

A Senior Observer / Recording Crew Manager, supervises the logistical, quality control and general management of the data acquisition operations, and serves as the point of contact to other departments. Line coordinators are provided to manage field recording labour and allow the observers to concentrate on actual system operation for optimum efficiency. The recording labour crew is structured in discrete groups, each group being able to deploy and retrieve their selected spread independently. The field crews receive inductions, job specific procedural training and

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equipment familiarisation instruction, before being deployed to the field. A Project Manager to supervise and coordinate the groundwork program and to act as journey management and emergency response coordinator is present on site.

In accordance with the requirements of the deed of agreement [Clause 5] Imperial will not enter upon any part of the Deed Area for the first time unless accompanied by two persons nominated by the Land Council to provide a familiarisation and orientation inspection of the Deed Area and the Company will pay such persons in accordance with Schedule 4 of the agreement. To achieve this objective each field crew will be accompanied by two TO's for the area to be mapped and sampled.

Proposed Well Pads and Operations in 2021-22

On the success of HS operations on Carpentaria 1 in 2021, positive results from 2021 seismic survey Imperial will be able to technically rank the 6 precleared well locations for future drilling subject to all regulatory approvals being in place. The Company may propose to undertake the drilling of at least one or more exploration wells within EP187 in the latter half of 2021 or early 2022 subject to technical work due diligence, regulatory approvals, and suitable drilling equipment availability. On surveying in the proposed well locations site tolerance for each exploration hole location of approximately 500m in each cardinal direction will be required from the marked proposed well centre to accommodate unforeseen site specific conditions such as sites of ethnographic and or cultural sensitivity and or uneven terrain.

Each exploration well will be drilled from its own well pad and each pad when formed will require clearing of a 150m x 150m area. Each drill pad will involve the construction of 2-3 plastic lined fenced water sumps of typically 30 x 25m, plus the construction of a flare pit to meet the NT Petroleum Act and Regulation requirements. Vegetation will be stockpiled to the side of the drill site and separate from any topsoil that may need removal to level the site to a safe operating standard.

On any drill pads selected to drill an exploration well on the EMP mandates 2 water bores will to be drilled by the company on each well pad for the purpose of provision of drilling water and to establish a subsurface water monitoring program.

Site access will utilize the existing road network, existing pastoral access ways and planned seismic lines where possible. For the exploration wells where required the access way will be widened to 10m to permit the safe transport of oversize machinery to site and enable the safe passing of vehicles to and from the drill site.

In support of the exploration drilling program, due to the extended length of time necessary to drill such a well, an additional area of approximately 60m x 60m may need to be cleared to permit the establishment of a temporary mobile work camp for the duration of the well drilling. This camp is proposed to be situated alongside the access track approximately 250m back from the drill site. However based on the success of the 2020 Carpentaria 1 drilling campaign, Imperial (depending on the travel time to any future well locations) will locate a mobile camp at the existing DPIL campsite along the Carpentaria Highway (Latitude: 16°43'56.13", Longitude: 135°12'0.30"E). The camp will

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have a capacity to accommodate 30 people, with all meals provided on-site. Thus reducing size of well pad required and environmental disturbance.

The drilling of the exploration well(s) is planned to be carried out with a 300,000lb (or similar) drill rig. Air compressors, Mud and Cement pump systems, a control house, a lubrication module, a crib and washroom. A front-end loader, trucks and other ancillary equipment will accompany the drill rig.

Table 2: EP187 Coordinates of proposed future drill sites for CH clearance all locations are positioned on future seismic lines to reduce disturbance.

SITE	Easting	Northern
Potential Exploration well bore(s)		
CARP AA	510864	8153887
CARP AB	515557	8154239
CSP A	521634	8141517
CSP B	522171	8136399
CSP C	518479	8135780
CSP D	519307	8130331
Map Grid of Australia Zone 53 (GDA 94)		

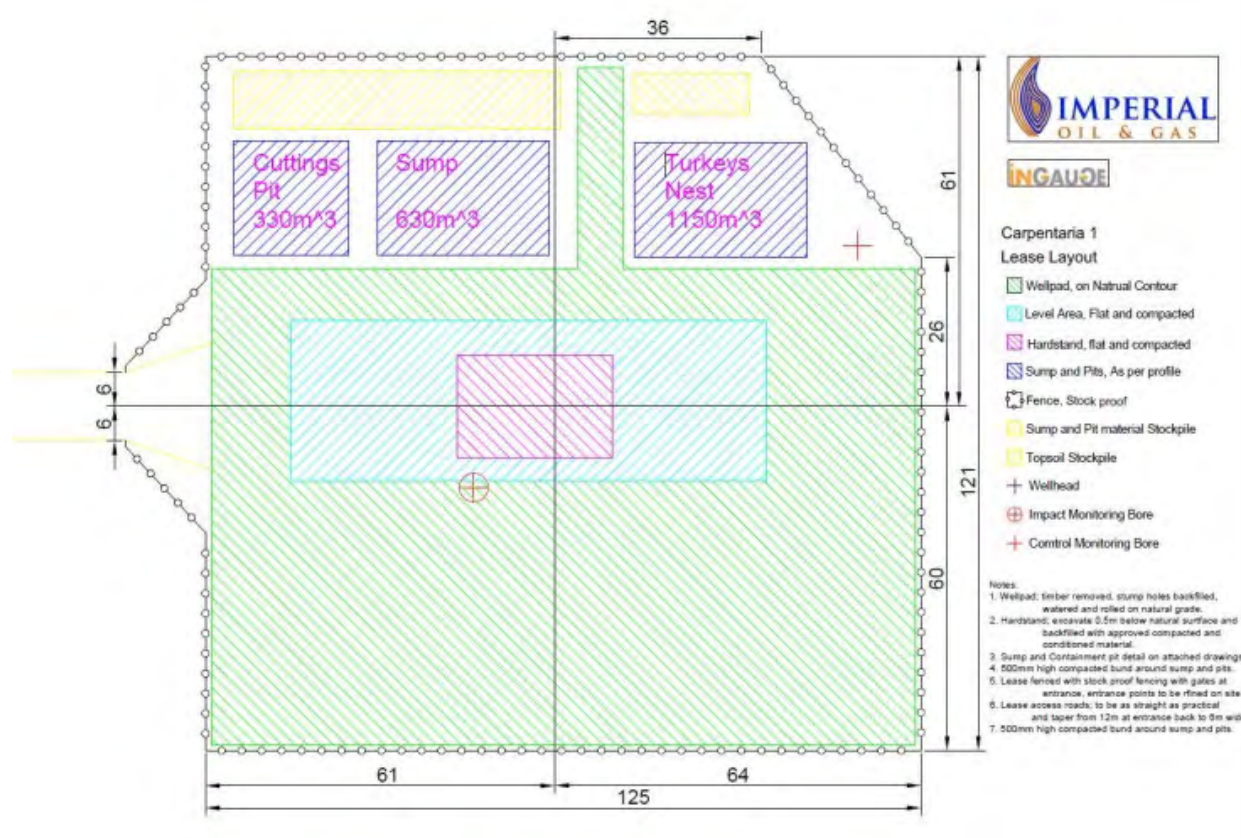


Figure 5: Well pad template as per Carpentaria 1 (2020) that would be used for any future exploration drill site, including control monitoring and impact monitoring water bores.

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The drilling crew will total 25 to 30 people including drillers, supervisors, maintenance support people, well loggers and well cementers. Additional to these will be the camp support personnel of cooks, cleaners and camp supervision and security and may total an additional 15 to 20 personnel. Access for light and heavy vehicles to the work area will be required. A 4WD ambulance will be stationed at the wellsite for medivac situations.

On completion of the site operations the site will be cleared of all machinery, any water sumps will be drained of water and backfilled with the original rock material. Topsoil, where removed, and the cleared vegetation will be respread across the site to allow for the natural regeneration of local plant species. Where required tree and grasses seeds will be sown to aid in regeneration of suitable native species.

This work program is the safest and most cost-effective way to build on the results from the 2020 Carpentaria 1 well results to prove up an economic hydrocarbon resource in EP187 with the least environmental footprint.

Access construction

The clearance of temporary tracks for the purpose of acquisition of sites for drilling is to be undertaken along the proposed seismic lines and existing access tracks where possible and as designated in the appropriate maps, Figure 6 provided for the purpose. The tracks must be of a temporary nature and be of such a fashion to permit the access of light vehicles to medium to heavy vehicles.

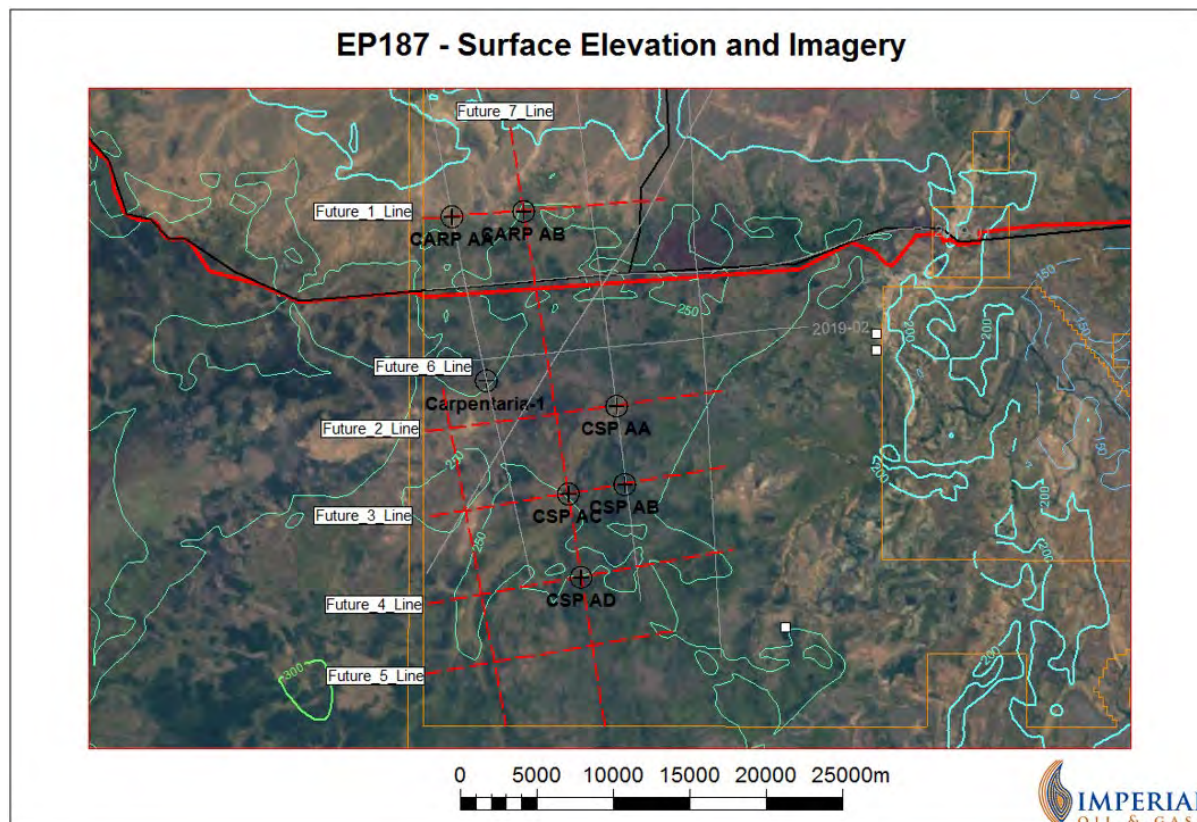


Figure 6: Map of EP187, proposed site access route is off the Carpentaria Highway and a portion of the existing Broadmere Road. All seismic lines branch off 'Future_7_Line',

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NB: *Proposed well pads are located on planned 2021 seismic lines to minimise disturbance and gives the geoscientists flexibility in deciding which well locations to use for future programs.*

Where selective vegetation is required to be removed it must only be done so under the specific supervision of the appropriate Traditional Owner. Material cleared from the site will be stockpiled for respreading. To wit: vegetation material must be stockpiled separately from any soil or rock material in such a fashion that this material can be respread across the cleared area on completion of activities.

Where it is required to undertake new access works suitable to allow heavy vehicle traffic along the proposed site access route this is expected to comprise light grading of the surface with the filling and compacting of any ‘wash outs’ along that new access way sufficient to permit heavy vehicle access. This work will occur along the designated routes in consultation with the relevant Traditional Owners, the NMLC ethnographic and cultural heritage approvals and approvals received from the Dept. of Mines & Energy.

No windrows are to be left along any cleared access or seismic path and no clearing of vegetation is to be undertaken without the specific approval of the appropriate Traditional Owner(s) and the Company. Where possible grasses will be left on the tracks to stabilize the earth and permit rapid regeneration. Root stocks are to be left in place in such a manner as to minimise risk of puncture to tired vehicles. The removal of trees of significant stature is forbidden.

On completion of work program activities all temporary access tracks and seismic lines as identified by the company are to be rehabilitated to permit regrowth of native vegetation. This will involve the pulling in of all lines. Tracks are not to be ripped. All work is to be monitored by an appropriate Traditional Owner. Imperial Oil & Gas has successfully undertaken this process on its 2019 seismic program.

Hours of operation

Seismic operations will be undertaken seven days a week during daylight hours. The proposed Survey is a transient operation and as such will not have any long-term impact on the local environment.

Proposed well hydraulic stimulation (HS) of Carpentaria 1 and drilling operations will be conducted 24 hours a day seven days a week. Location of drill pad sites have been chosen to avoid impact to noise and sensitive receptors.

Earth works

Access to the drill pads will be achieved by upgrading the appropriate sections of the seismic lines where available and through the establishment of new tracks where required. This procedure was followed for the 2020 Carpentaria 1 exploration well. The location of the 6 future potential drill sites has been selected based on petroleum prospectivity, proximity to the main access throughout EP187 and to take advantage of low-density vegetation or previously cleared sites where possible. The access clearance will be kept to the minimum required to each location to permit the safe

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movement of personnel and machinery. No potential drill site access way prepared will be wider than 10m and no windrows will be left on completion of rehabilitation. The width of the drill site access is to permit the safe transport of wide loads to the drill pad. The creation of new tracks and extent of earthworks used to upgrade and establish tracks will be minimised as much as possible.

Potentially no more than 6 exploration well drill pads will be prepared for drilling activities at any one time. Drill pads and access ways will be immediately rehabilitated after all site operations have been completed on a specific pad and all associated equipment has been relocated. As the proposed access and seismic routes cross over the McArthur Gas pipeline it will be necessary to build an earthen ramp over the pipe to facilitate access. The company now has demonstrated successfully it can safely and responsibly undertake these works based on experience from the 2019 2D seismic acquisition survey and 2020 Carpentaria 1 drilling campaign.

The earthworks involve the use of a grader, dozer, excavator, front end loader, sheep's foot roller and water truck. A crew of 6 people plus a site supervisor are used for the earthworks program. The preparation of access and initially prepared well pads is expected to take up to 4 weeks. Further preparation of work pads and rehabilitation activities will continue with the drilling program associated with Imperials Environmental Management Plans (EMP). All drilling sites will be made good and secured prior to the onset of wet season in accordance with the approved Imperial Environmental Management Plan and associated documents.

Infrastructure utilized in the program

Infrastructure to be utilized for the completion of the program is the existing framework to be found within the community of Borroloola, the commercial facilities at Cape Crawford, and the McArthur River Mine. Where possible the existing road network and pastoral access ways will be used for site access. Safety and Environmental Management will be managed using the Imperial Emergency Response Plans, Environmental Management Plans, Oil Spill Contingency Plan, and Cultural Heritage Management Plan.

For the seismic acquisition program accommodation and meals will be provided by the commercial facilities at Cape Crawford 'Heartbreak Hotel' for the seismic crew and associated access development personnel. The drill crews and associated personnel will be locate a mobile camp at an existing DPIL campsite along the Carpentaria Highway (Latitude: 16°43'56.13", Longitude: 135°12'0.30"E) that was used for the drilling of Carpentaria 1 in 2020. The camp will have a capacity to accommodate 30 people, with all meals provided on-site. The mobile camp will provide accommodation and meals for the work crews for the duration of the drilling and well testing.

Justification of the activity

The purpose of EP187 as granted is to permit the exploration for hydrocarbons. The purpose of the proposed programs is to further delineate the economic potential of unconventional gas and oil resources of the permit. As such the justification for the 2021 seismic survey and the further evaluation of the 2020 Carpentaria 1 well with a vertical and lateral fracture stimulation and flow test is:

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- The granting and the existence of the Permit;
- Its suitability as an exploration site;
- The approved work plan for the permit;
- The intent of the permit holder;
- The consent of the landowner;
- Current and future demand profiles for gas as an alternative to less greenhouse friendly energy sources; and
- Current and future demand for natural gas in the region.
- Economic benefit and energy security of all Territorians and ultimately Australia

Evaluation of alternatives

The EP187 region of the Beetaloo Sub-basin is defined as a frontier petroleum province. Exploration activities within the region to date have been confined to mineral exploration with petroleum exploration is in its early stages.

To date Imperial's exploration endeavours have focused on the western margin of EP187. Some other sites are available for exploration within the exploration permit area. However, the programs and significant investments to date in EP187 prioritised by Imperial are in an area that the primary shale targets (Velkerri shale Formations) outcrop at surface in EP187 thereby affording the rare opportunity for effective early hydrocarbon investigations of these gas/oil shale targets within a focused environmental footprint, away from already determined areas of cultural heritage significance to the east of the permit.

Tenure and Land Use

The area of EP187 is Aboriginal Land trust. Areas of which are given over to pastoral leasehold land either by agreement or S19 agreement with the land trust. Figure 7, Land Tenure Map. Imperial Oil & Gas has a deed of agreement with the land trust over the area identified as EP187.

Environmental Performance Criteria

Under the requirements of the Schedule of Onshore Exploration Requirements an evaluation assessment has been made of the environmental impact of the proposed activity within the area. These materials are included in Imperial's current EMPs that can be found on:-

<https://denr.nt.gov.au/onshore-gas/environment-management-plan/approved-emps>

Building on desk top and field based environmental evaluations conducted and completed by the company including surface water quality and environmental assessments of EP187 a well-defined environmental assessment report on the area's current status provides a baseline of:

- habitat and vegetation community descriptions;
- opportunistic fauna (terrestrial and aquatic) species list, including introduced species and any threatened species present;
- locations of fauna breeding places and other habitat features; and

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- likelihood of targeted threatened species to occur generally over the site and within areas of known proposed impact (e.g. drilling locations and seismic lines).

The study included surface water sampling that identified key ecological characteristics and potential constraints within the project area. Desktop and site information provided input to the Environmental Assessment Report. The surface water study of the environmental assessment was repeated following the 2015/16 wet season and again prior to the 2016/17 wet season this was further updated in 2019, to account for seasonal variabilities in water quality. In support of the field studies a desktop review of available databases, studies and literature was also undertaken to confirm existing information received and investigate other characteristics of the study sites.

Databases or information reviewed include:

- Commonwealth Department of Environment protected matters search tool;
- NRETAS Flora/Fauna Atlas datasets for species records;
- NRETAS vegetation mapping (NVIS mapping data);
- Northern Territory Herbarium Database;
- Birds Australia Bird Atlas;
- Northern Australian Frogs Database;
- Previous terrestrial and aquatic surveys in the area;
- Australian Wetland Database;
- Northern Territory Museum fauna records;
- Topographic and hydrological mapping;
- Available geology and soils mapping;
- Atlas of Australian Soils and Explanatory Data Sheet for area
- Any other previous environmental studies or EIS in the vicinity of the project area; and
- Available remotely sensed imagery such as Google Earth or orthorectified aerial photography.

In combination with field visits these data has been used to identify sites of potential environmental significance or sensitivity within the proposed project areas and is focused on ecological values, water quality, aquatic habitat, and soil surface stability. An assessment of the likelihood of occurrence for threatened species or communities identified through searches has also been undertaken.

Freshwater water quality monitoring included in-situ field measurements of physical parameters and the collection of samples for laboratory analysis of metals (arsenic, cadmium, chromium, copper, nickel, lead, zinc and mercury (total and dissolved)), suspended solids, sulfate, major cations, hardness, total nitrogen, total phosphorus, total petroleum hydrocarbons (TPH) and benzene, toluene, ethyl-benzene and xylenes (BTEX). These works continue in monthly independently analysed and certified water samples collected from the companies 2 wellbores on the Carpentaria 1 well pad. These data are shared with DENR as part of EMP compliance ahead of approval to undertake hydraulic stimulation activities.

<https://denr.nt.gov.au/onshore-gas/environment-management-plan/approved-emps>

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Ecology assessments included descriptions of vegetation communities, identification of fauna species present and habitat assessments (including aquatic). Ecological observations of breeding places and targeted threatened species searches has also been conducted in order to gather information to help inform subsequent surveys.

These assessments have deemed the proposed work program to have minimal environmental impact and will not endanger or significantly harm any endangered flora or fauna existing within the area. A weed management plan has also been implemented to reduce as far as reasonably practical the transfer of seed or other plant material into, across, or out of the area. The environmental sensitivity of the types of operation proposed is considered to have a minimal low to non-consequential impact. Weed hygiene and management plans are incorporated into Imperials current EMPs and include pre and post wet season assessments.

Air Quality

The activities associated with the seismic acquisition and drilling programs will have a negligible impact on air quality. Dust may be created by the travel of vehicles along the roadway however this dust is generally restricted to the immediate area and is expected to be transient and no more than generated by any other local traffic. Tracks proposed to be utilised are generally isolated and will not impact on any residence or create undue dust issues.

Water Quality

The seismic activities will not impact any sensitive surface or sub surface water systems or aquifers. Seismic acquisition does not require water for operations other than potable water for personal consumption. This water will be obtained from the commercial facility at Cape Crawford. Water for access way construction and dust suppression may be required. When construction of the 2020 Carpentaria 1 well pad was undertaken initial construction, water was purchased from the local grazier. No water will be taken from surface sources, this will ensure protection of all naturally occurring water holes, lagoons, billabongs and river and creek systems and the protection of the aquatic environment while maintaining adequate water supply for naturally occurring wildlife.

Water required for drilling and the monitoring of HS activities was obtained under permit from the government authority by the drilling of a 2 water bores (impact and control monitoring) as part of the drilling EMP for Carpentaria 1. On completion of the use of the well the water bore will be either capped or given to the relevant appropriate land/stakeholder under relevant permission obtained for the purpose. The location of the bores is shown in Figure 5.

The water bores for Carpentaria 1 were drilled using licensed drillers with best industry practice and where necessary and relevant the appropriate aquifers were isolated and cased to prevent cross aquifer contamination. The water bores were also logged

In 2016 the Company implemented a sub-surface water quality monitoring program via monitoring standing water table height in a number of water bore holes as well as water quality parameters. These parameters will include site measurements of pH, turbidity and total alkalinity and the

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collection of samples for laboratory analysis of metals (arsenic, cadmium, chromium, copper, nickel, lead, zinc and mercury (total and dissolved)), suspended solids, sulfate, major cations, hardness, total nitrogen, total phosphorus, total petroleum hydrocarbons (TPH) and benzene, toluene, ethyl-benzene and xylenes (BTEX). The objective of this subsurface water quality monitoring program is to ensure no cross-aquifer contamination and no contamination of aquifers due to drilling operations. This monitoring is ongoing and was updated in 2019 see attached report.

Community

The nearest community is the township of Borroloola which is located outside and to the East of EP187. The township lies approximately 110 km from the eastern boundary of EP187 and approximately 180km from the proposed sites of operation. The commercial facilities of Cape Crawford (Heartbreak Hotel and campground) lie on the eastern margin of the exploration permit.

Any proposed work activities have minimal aural and visual impact. Access to the area is via public sealed roads. Noise, engine exhaust and dust from vehicle movements will have zero to negligible impact on dwellings due to the location of work activities and distance to sensitive receptors.

Other than restriction of access to the immediate sites for safety purposes, there will be no significant curtailment to beneficial uses of the environment, either during or subsequent to the exploration activities. The areas of work activity have been chosen to avoid intensive land use. No access routes will be blocked on the property.

In field Work hours and noise

Normal work hours during the seismic survey and acquisition phase will be on a daylight 12 hour per day basis. The HS and drilling operations will be conducted on a 24 hour seven days a week basis. These activities should cause no disturbance to communities or rural/pastoral residents.

Visual Assessment

The route for the seismic acquisition has been chosen from information obtained through desk top studies and based on the Imperials safe and successful 2019 2D seismic acquisition and 2020 Carpentaria 1 drilling program. No visual impairment will result from these activities as no long-term presence is required at any one location and necessary field equipment is mobile and minimal.

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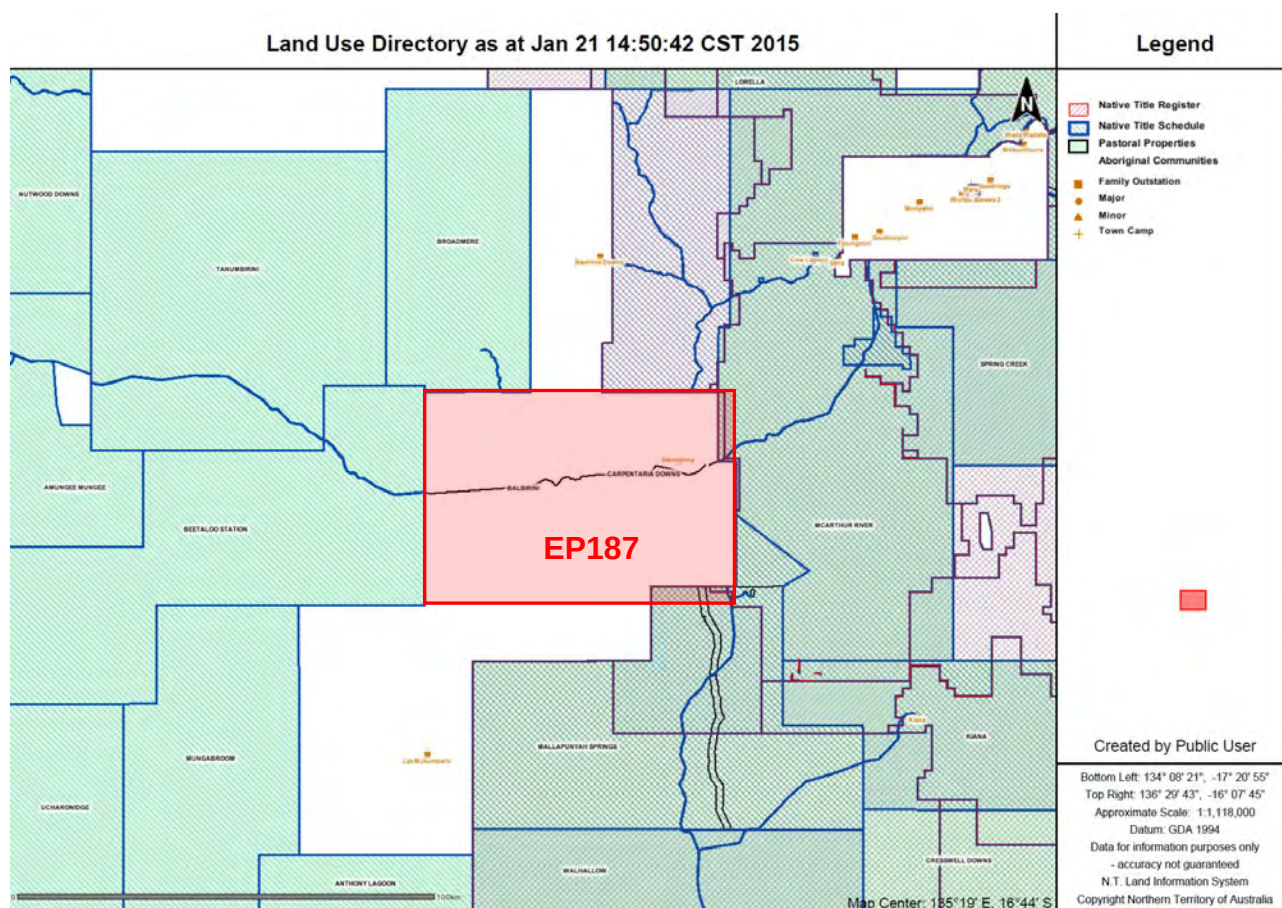


Figure 7: Land Tenure Map

Map from NT Atlas and Spatial Data Directory – Land Information Systems. NT Government.

http://www.ntlis.nt.gov.au/imfPublic/imf.jsp?site=nt_atlas

Heritage

The areas proposed for field activities of seismic acquisition, potential drilling pad locations and HS activities have been chosen to possess no identified special or unique attributes in connection with aesthetic, anthropological, archaeological, architectural, cultural, social or other special values, either for present or future generations. Existing mapped areas of cultural sensitivity have been marked and taken into consideration when planning the survey and associated work programs.

A search of the Australian Government Australian Heritage data base has been undertaken as part of the desk top study and maps created using the information supplied by the Aboriginal Areas Protection Authority and anthropological on ground site survey conducted by the NLC for the purpose of tenement grant to identify sites of cultural and historical significance. Any known sites of ethnographic or cultural significance have been excluded from operations as either “Non Consent”, “Restricted Work Areas [RWAs]” or “No Go” areas. It is recognised that the proposed seismic routes will pass in proximity to known sites of cultural significance however all personnel and equipment will be maintained within the approved easement and will be accompanied by approved Traditional Owners with knowledge of and responsibility for the country.

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Aboriginal Heritage

Imperial utilises a strict Heritage Protection Protocol and Cultural Heritage Management Plan. A search of the Aboriginal Sites Register database and the Cultural Heritage data base has been undertaken prior to field work to identify areas known to be Aboriginal sites and ensure these are recorded in or near the proposed work sites. In addition, all field crews will operate in the company of Traditional Owners' for the land in accordance with clause 5 of the agreement to ensure sites of significance are identified and avoided. Pursuant to Section 146 of the Heritage Act, 1977 if any artifact is found, then work will stop until the local government Heritage Officer and/or Aboriginal Land Council nominee are notified, and advice sought.

In addition, a Cultural Heritage Protocol has been adopted by both Imperial and its agents. This document forms part of the Exploration Site Supervision Manual and acts a part of the Environmental Management Plan. In particular, the NLC and the Local Aboriginal Group have provided contact details should expert local advice be required at short notice.

Other Cultural Heritage

Areas known to contain historical, cultural or anthropological artefacts or 'relics' will not be impacted by the either the seismic acquisition route or HS and drilling activities. Every effort will be made to avoid disturbing such objects should they be encountered during activities. If any collection of historical objects more than 50 years old is identified during work, then work will stop and their presence is to be notified to local government heritage officers and the relevant Territory Heritage Council and advice sought.

A search of the of listed cultural heritage sites for the area and heritage listing website has been undertaken to identify known historical, cultural or anthropological artefacts or relics within the proposed locations.

Transport & Accommodation Plan

Accommodation for all personnel involved in the seismic work program, including the relevant Traditional Owners, will be provided at the Heartbreak Hotel. The accommodation will provide all necessary meals for those involved in the program including breakfast, lunch and dinner. Incidental personal items (such as cigarettes, soft drinks, sweets, etc.) will be solely at the cost of each individual. Imperial will provide potable drinking water for field use for all personnel involved in the program.

Transport to sites for seismic activities will be by vehicle to permit the safe and efficient transport of the work crew and the Traditional Owner(s). Access will be via the existing Carpentaria Highway and utilizing dual cab 4WD motor vehicles or similar suitable vehicles.

For hydraulic stimulation crews if accommodation is not available at Heartbreak Hotel, Imperial will locate a mobile camp at an existing DPIL campsite along the Carpentaria Highway (Latitude: 16°43'56.13", Longitude: 135°12'0.30"E) that was used for the drilling of Carpentaria 1 in 2020. The camp will have a capacity to accommodate 30 people, with all meals provided on-site. The designated area does not require clearing and will be fenced to exclude livestock access.

Document Title	EP187-Beetaloo Sub-basin – 2021Work Program
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Alcohol and drugs are forbidden on the seismic and well sites and in proximity to operating machinery by the Imperial Occupational Health and Safety System and by relevant safety legislation. All personnel will be subject to random drug and alcohol testing with a zero tolerance.

The use of helicopters for medical emergency response will require Traditional Owners to be aware of the use of this form of transport and to be comfortable with the mode of travel. It is intended that the helicopter will be a Bell Jet Ranger or similar aircraft.

Approved Traditional Owners of the relevant Local Aboriginal Group with knowledge of the cultural history of the region and approved by the NLC will accompany operations to identify regions of sensitivity previously unknown and limit access by non-indigenous and or non-authorised personnel where appropriate to the relevant locations. Any previously unknown sites of significance identified through the work programs will be recorded on a map for future reference and exclusion of work programs.

Due to the static nature of well operations and 24Hour nature of the program over an extended period it is proposed that once the site clearance has been achieved and the drill site preparation complete that no Cultural Monitors will be required to attend the drilling operation. The attendance of traditional owners working as cultural monitors will continue to be required to accompany the seismic crews where operating and the site preparation and rehabilitation crews.

Emergency response:

Imperial has developed a proven emergency response program that incorporates the following key parameters. (A copy of this plan has been previously submitted to the NLC.)

- Ensure qualified trained senior first aid personnel are available on site to manage first response for foreseeable emergency
- Raise awareness through training staff regarding appropriate emergency evacuation procedures and response
- Document plans and procedures outlining management actions to be undertaken during foreseeable emergencies.
- Define and document staff responsibilities for overseeing the implementation of emergency plans and procedures.
- Ensure that adequate communication and emergency response equipment is available for use during incidents and that the equipment is maintained in good working order.

1.3.2 Correspondance; NLC - IOG EP187 2019 Groundwater report - 21/10/2020

1.3.3 Correspondance; from NLC - Work Program concerns - 21/10/2020

From: Jesse [REDACTED] <[REDACTED]>
Sent: Wednesday, 21 October 2020 3:48 PM
To: Alex [REDACTED] <[REDACTED]> David [REDACTED] <[REDACTED]>
Cc: Greg [REDACTED] <[REDACTED]> Tess [REDACTED] <[REDACTED]>
Subject: Imperial Oil & Gas Work Program Submission

Hi David and Alex,

There is some critical information I have been unable to find within the supplied Work Program.

The NLC would be pleased to receive a revised Work Program addressing the following information:

1. Further details regarding the composition of any fluids and solids proposed for use in the drilling of any well or any Hydraulic Fracturing (cl 13.2(f)).
2. Further details of likely environmental impacts and proposals to mitigate the impacts, including:
 - a. surface water impacts from the extraction of groundwater, as Relief Creek is identified as a moderate potential GDE;
 - b. the potential for hydrocarbon contamination of aquifers and any mitigation measures to manage this;
 - c. impacts from erosion and sedimentation associated with the seismic work; and
 - d. the proposed rehabilitation methods for impacted areas.

It would be useful if this could be presented as a risk assessment that details how risks were identified, categorised and mitigation measures. (cl 13.2(g))

There are a number of other sections of the agreement that specify information that is required to be provided to the NLC prior to commencing any hydraulic fracturing or stimulation, I would direct your attention to Clause 14 and Clause 4.8. Can you please confirm these clauses have been and will be complied with.

Can you also please provide a copy of NATA accredited laboratory report for the dissolved gas (Methane, Ethane, Propane) concentrations from the groundwater sampling program? This request is to ensure that I can address any questions raised during the Work Program meeting.

The tentative dates for the Work Program meeting remain tentative and contingent on adequate information being provided by COB 23/10/2020. Once you provide a revised Work Program that complies with the requirements of Clause 13 of the Exploration Agreement, I will respond with a revised date.

Finally, I would like to request, in accordance with Clause 8.1, that in preparing any Project Plan and any Environmental Impact Statement (including in connection with any amendment thereto), Imperial Oil & Gas regularly consult with and seek input from the Land Council and provide the Land Council with adequate and ongoing opportunities to review, comment on and propose reasonable amendments to such documents.

Kind regards,

Jesse Pottage

1.3.4 Correspondance; NLC -. Work Program Review - 24/12/2020

The below columns have been made to address the Northern Land Councils recommendations in response to the email received on the 2 December 2020.

General Comments and Recommendations			Imperial Response	
Environment al Domain	Comments	Recommendations	Imperials Comments	Conclusion
Water 1.0	The regional and local understanding of water movement and potential risks should be expanded futher in the current and future EMPs.	Groundwater sampling should consider the inclusion of Sulfate and Bicarbonate analytes to enable a more detailed understanding of aquifer connectivity. temporal changes need to be captured. An investigation into water movement through the environment should be undertaken. Aquifers should be delineated and mapped with cross sections of aquifer boundaries shown in the EMP.	Ground water sampling will be undertaken as per the Code of Practice. The SREBA is currently undertaking analysis of the aquifer connectivity and water movement in the area as well as mapping of aquifer boundaries. The regional flow direction within the Beetaloo Basin is to the north-west. Gradients in the CLA are flat-lying averaging around 10m per 100km (gradient of 0.0001) and flow rates are in the order of metres/year (Tickell, 2003).	Not applicable as already covered in the pre-draft EMP.

Water 2.0	The regional and local understanding of water movement and potential risks should be expanded further in future EMPs.	The risks related to existing faults should be identified and addressed.	The SREBA is currently undertaking analysis of the water movement in the area. Fault zones where known are taken into account in the WOMP as part of drilling activities.	The regional and local understanding of water movement and potential risks are already covered in the EMP. EP187 is not within a water allocation plan area. It lies immediately to the east of the Daly Roper Beetaloo Water Control District, straddling the northeast boundary of the Georgina Basin. It partially overlies the aquifer known as the Gum Ridge Formation, part of the extensive regional Cambrian Limestone Aquifer which includes the Tindall Limestone Aquifer to the north in the Daly Basin. Any guidelines published by the Northern Territory
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General Comments and Recommendations			Imperial Response	
Environment al Domain	Comments	Recommendations	Imperials Comments	Conclusion
				Government relating to groundwater monitoring parameters, methodologies, frequencies, reporting and data submission for petroleum operations will be followed, including the Preliminary Guideline: Groundwater Monitoring Bores for Exploration Petroleum Wells in the Beetaloo Sub-basin and the requirements for a water extraction license
Land	Expansion of current drill pad areas proposed in EMP not consistent with information provided to NLC in Work Program document or associated GIS files.	Revise Work Program or EMP to ensure consistency.	EMP in pre-final form and will reflect work to be undertaken.	EMP to be updated.

General Comments and Recommendations			Imperial Response	
Environment al Domain	Comments	Recommendations	Imperials Comments	Conclusion
Geology	Details of how micro-seismic activity will be measured have not been included.	Please include the monitoring, triggers and response related to any microseismic activity or substantial pressure changes during Hydraulic Fraccking.	Micro-seismic measurement not required given the knowledge of the regions geological setting and formations. Continuous measurement of the fracturing rock treating pressures in the well is undertaken real-time during the process. The area is remote from major built structures and geologically is an area of ancient stable craton. Geoscience Australia, Natural Seismic Hazard Assessment Map 2018 shows the area to have the lowest seismic hazard risk of the whole Australian landmass. Fraccking and non fraccking induced seismicity can be an issue in other parts of the world when millions of barrels a day of produced water have been reinjected into young rocks (~65 Million years) over many decades for example around Oklahoma City USA. 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.	No update to the EMP.

General Comments and Recommendations			Imperial Response	
Environment al Domain	Comments	Recommendations	Imperials Comments	Conclusion
ESCP	The erosion and sediment control plan contains details of management actions, see screen shot below. During the recent site inspection there was no observable evidence of soil binder or gravel on the pad. 	Please include evidence that the specific recommendation to “retain existing ground cover within pad area (excluding high traffic areas) or stabilise with gravel or soil binder if exposed” has been adhered to.	This modification is not required. Wording is; “retain existing ground cover withing pad area (excluding high traffic areas) or stabilise with gravel or soil binder if exposed.” Should areas be exposed and form ESC issues then the above will occur as part of management in response.	No change to the EMP required
Other	The composition and environmental toxicity of the hydraulic fracturing fluid remains unclear.	Proposed chemicals should be identified and the toxicity and composition of the hydraulic fracturing fluid should be analysed once it has been finalised.	Imperial will follow the COP which outlines the management and mandatory requirements of Hydraulic Fracturing Fluids. Although allowable under the COP Imperial has removed any BTex containing products from the approved frac components list.	No change to the EMP required

General Comments and Recommendations			Imperial Response	
Environment al Domain	Comments	Recommendations	Imperials Comments	Conclusion
Other	Independent Environmental Audit evidence not found within EMP	During the 2020 Work Program meeting the requirement of an annual independent environemtnal audit was raised. Imperial staff noted that this information would be contained within the EMP submission. Provide information as to where this information can be found within the EMP.	Imperials Rehabilitation Management plan outlines the requirement for a third-party review and sign off following the NTG Environmental Closeout Procedures for Petroleum Activities.	No change to the EMP required
Rehabilitatio n	Details of well rehabilitation work and monitoring are not sufficiently described.	A well abandonment program should be presented in the EMP that includes: • identification of geological zones along the well that need to be isolated in the long term; • information about the durability of cements and casing; • details of a long-term monitoring program based on an evaluation of post-abandonment monitoring approaches; and • calculation of costs of abandonment, to assist in the calculation of security bonds.	Well abandonment is covered under the WOMP	

Specific Comments and Recommendations			Imperials Response	
Section	Comments	Recommendations	Imperials Comment	Conclusion

Appendix 3 Section 3.15 Page number 216	Quote: “there is a lack of permanent surface waters and aquatic GDEs in the Project area” Based on a search of the Groundwater Dependent Ecosystems Atlas there are Known, High Potential and Moderate Potential aquatic and terrestrial GDEs within EP187. There is also potential connectivity between the groundwater intercepted at the proposed drilling locations and sacred sites downstream.	The existence of GDEs within the bounds of EP187 should be identified, clearly stated and delineated within the EMP.	A search of the National Groundwater Dependent Ecosystems (GDEs) Atlas Invalid source specified. conducted in November 2020 did not identify any terrestrial or aquatic GDEs within the Project area. However, there is a moderate potential of terrestrial GDE occurring along the Relief Creek located at 9.5km southeast from site. The riparian vegetation communities present along the watercourse, particularly those dominated by Eucalyptus camaldulensis may rely on rainfall stored in alluvial sediments and therefore may be groundwater dependent; and a high potential of GDE occurring at 20km southwest from site related to Melaleuca citrolens, M. viridiflora low woodland ecosystem. Other materials such as previous groundwater test conducted in the nearby water bores results did not identify terrestrial or aquatic GDEs within the Project area. Imperial Oil & Gas believes that the likelihood of GDEs in the area is very low and is confident that the project activities are unlikely to have any impact on these communities.	
Appendix 3 Section 3.15 Page number 216	Quote: “The area of planned disturbance Requires minimal volumes of groundwater extraction less than 5 ML.”	The assessment of 5ML being a minimal volume should be discussed with regard to the local context.	License obtained (GRF10316) for extraction of 22ML per annum from bores RNo416878 & RNo41800 Water to be used as follows:	Area is very sparsely populated, demand on aquifer is minimal, and water extraction is

Specific Comments and Recommendations			Imperials Response	
Section	Comments	Recommendations	Imperials Comment	Conclusion
	It is unclear how the 5ML volume identified as being minimal in the context of the local environment.		5ML estimated for dust suppression 2.5 ML estimated for drilling program. 5ML estimated for hydraulic fracturing	licenced. Aquifer can support activities

Appendix 4 Section N/A Page number 223	Quote: "Terrestrial Environmental Quality Overflow of fluid storage tanks, Sumps or cuttings pits, Leaching from storage tanks, Flowline failure Impact to soil quality"	Impacts to downstream environments, including sacred sites, should also be included in the impacts section.	summary of control measures to prevent spills: A Wastewater Management Plan (WWMP) has been developed and implemented to govern how wastewater will be managed onsite (Refer to Appendix o6 EMP) Tanks will be designed, installed and operated as per the WWMP All flowback, completion fluids, chemicals, oil and fuel storage will be equipped with secondary containment (or dual liners) as per the Code Monitoring to detect spills will be undertaken in accordance with Section 7.4 of the EMP. Inspection reports and maintenance records of secondary containment shall be kept and available for review upon request. Flowback will be stored in tanks located in earthen bunded areas to prevent release to surrounding areas. Procedures will be in place to detect (e.g. regular inspections), remediate and report spills. Well pad area is designed and constructed to prevent spills of hazardous chemicals; this includes: Compacted areas to prevent infiltrations and Chemical segregation areas. Spill clean-up material readily available at each work site and on all mobile service trucks or vehicles, where	
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Specific Comments and Recommendations			Imperials Response	
Section	Comments	Recommendations	Imperials Comment	Conclusion
			hydrocarbons and chemicals are stored and/or used.	

1.3.5 Correspondance; Eleanor, O T Downs, No. 9 Block - 09/12/2020

Imperial Oil & Gas 2021 Seismic and Drilling program – Eleanor, O T Downs & No. 4.

Dear

As Imperial Oil & Gas representatives have discussed with you, there is a proposed Seismic, Drilling and Hydraulic Fracturing program to be carried out in EP187, part of this program overlaps your Section 19 lease.

The current plan is to carry out the Seismic program in Q2 of 2021, and the drilling program in Q3 & Q4 of 2021 pending approvals. If approvals are not obtained in time, the programs may be delayed.

There is a formal agreement in place between Imperial Oil & Gas and Mambaliya Rrumburriya Wuyaliya Aboriginal Land Trust to carry out these activities, and a formal agreement is not required between Imperial Oil & Gas and the Section 19 sublease holders. However Imperial Oil & Gas wants to continue to develop our positive working relationship and shared understanding with Section 19 sublease holders.

The proposed activities for Eleanor, O T Downs & No. 4 are outlined in the attached map and activity area table.

Activity Area Table

Infrastructure	ID	Holding	Length (km)	Width	Area (Ha)
Seismic Line	7	OT Downs	13.8	5	6.9
Seismic Line	5	OT Downs	10	5	5
Seismic Line	7	No. 4	2	5	1
Wellpad	Carp AA	OT Downs		0	12.25
Wellpad	Carp AB	OT Downs		0	12.25
Access Track	Carp AA	OT Downs	4.7	6	2.82
Access Track	Carp AB	OT Downs	9.4	6	5.64
Totals			39.9		45.86

Seismic Lines

The equipment utilised for Seismic operations requires a 5m access track, Imperial Oil & Gas has lodged a clearing Permit that has a 100m wide buffer to operate in.

In areas where the timber is sufficiently open, graders will be utilised and avoid mature trees (by meandering around trees whilst maintaining their position within the 100m buffer) to give the 5m access.

In areas of lancewood and denser vegetation it will require clearing a 5m path to allow the Vibroseis buggies to traverse the seismic line.

Line clearing and preparation will be carried out with a bulldozer and grader to sweep the ground surface of large rocks and fallen timber sufficient to provide safe access for vehicles, good ground contact of the geophones and to minimise the risk of fire. Where lines go through lancewood, the line will be cleared by pushing timber clear of the line with the bulldozer.

In open grassy areas where ground visibility is good, raised blade clearing will be utilised to reduce ground disturbance. This area of raised blade clearing is unknown due to the changing seasonal nature of grass cover, however will be deployed wherever possible.

Grass and brush rootstock will be left in place where practicable to enable soil stability and rapid regrowth of vegetation.

Imperial Oil & Gas will restore the seismic disturbance footprint before the start of the next wet season after the seismic program is completed.

Line clearing and rehab activities will be carried out with a fire tender on site.

Access Tracks

Access tracks will be 6m wide and formed up from in situ material, water graded and rolled to consolidate. Where practical the access tracks will avoid larger mature trees, whilst allowing road train access. Whoa-boys and turn out drains will be constructed as required to reduce erosion.

Wellpads

Wellpads will be up to 10 hectares depending on the rig contracted. Wellpads will be fenced.

Trees will be removed from the wellpad footprint, the majority of the wellpad will be water graded and rolled on the natural contour from existing material, the hardstand area of the wellpad will be levelled and consolidated to support the weight of the drilling rig. Sumps and Pits on the wellpads will be constructed as required.

Fencing

Imperial Oil & Gas will install gates in any fences crossed as part of the Seismic or drilling program to a similar standard to the current fencing.

Water

Imperial Oil & Gas will construct water bores on the wellpads for the supply of water for the EP187 operations.

Wells and water monitoring bores

Imperial Oil & Gas will hand over any water monitoring bore drilled on Section 19 subleases to the landholder Mambaliya Rrumburriya Wuyaliya Aboriginal Land Trust for use by the sublease holder when the holder no longer requires them of EP187; as long as this meets legal compliance with the regulator and landholder. Imperial Oil & Gas does not intend to convert exploration wells to water bores when they are no longer required.

Cash Compensation

Additional Services

Imperial Oil & Gas is interested in engaging Section 19 Leaseholders for services that can be rendered to assist the field activities, e.g. fencing, weed management, water haulage etc. If you can offer these or other services, please provide details.

Contacts

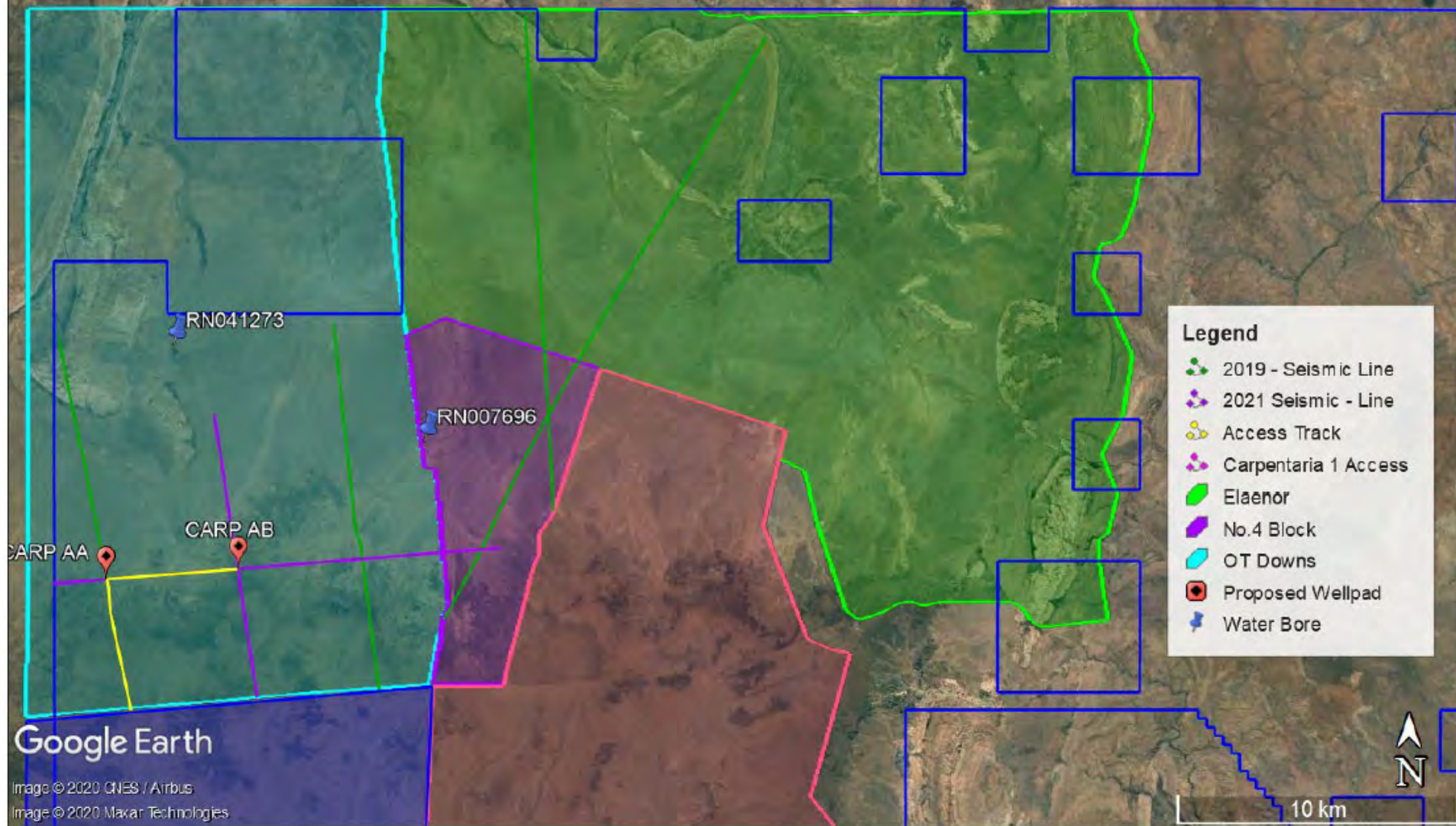
For any queries related to Imperial Oil & Gas's upcoming activities, please contact:

Name: XXXXXXXX

Email: XXXXXXXX

Phone: XXXXXXXX

2021 - Seismic and future drilling



1.3.6 Correspondance; Relief Creek - 09/12/2020

Imperial Oil & Gas 2021 Seismic and Drilling program – Relief Creek

Dear

As Imperial Oil & Gas representatives have discussed with you, there is a proposed Seismic, Drilling and Hydraulic Fracturing program to be carried out in EP187, part of this program overlaps your Section 19 lease.

The current plan is to carry out the Seismic program in Q2 of 2021, and the drilling program in Q3 & Q4 of 2021 pending approvals. If approvals are not obtained in time, the programs may be delayed.

There is a formal agreement in place between Imperial Oil & Gas and Mambaliya Rumburriya Wuyaliya Aboriginal Land Trust to carry out these activities, and a formal agreement is not required between Imperial Oil & Gas and the Section 19 sublease holders. However Imperial Oil & Gas wants to continue to develop our positive working relationship and shared understanding with Section 19 sublease holders.

The proposed activities for Relief Creek are outlined in the attached map and activity area table.

Activity Area Table

Infrastructure	ID	Holding	Length (km)	Width	Area (Ha)
Seismic Line	2	Relief Creek	12.5	4	5
Seismic Line	1	Relief Creek	6.9	5	3.45
Seismic Line	2	Relief Creek	8	5	4
Seismic Line	3	Relief Creek	9.8	5	4.9
Seismic Line	4	Relief Creek	8.2	5	4.1
Wellpad	CSP AB	Relief Creek		0	12.25
Totals			32.9		28.7

Seismic Lines

The equipment utilised for Seismic operations requires a 5m access track, Imperial Oil & Gas has lodged a clearing Permit that has a 100m wide buffer to operate in.

In areas where the timber is sufficiently open, graders will be utilised and avoid mature trees (by meandering around trees whilst maintaining their position within the 100m buffer) to give the 5m access.

In areas of lancewood and denser vegetation it will require clearing a 5m path to allow the Vibroseis buggies to traverse the seismic line.

Line clearing and preparation will be carried out with a bulldozer and grader to sweep the ground surface of large rocks and fallen timber sufficient to provide safe access for vehicles, good ground contact of the geophones and to minimise the risk of fire. Where lines go through lancewood, the line will be cleared by pushing timber clear of the line with the bulldozer.

In open grassy areas where ground visibility is good, raised blade clearing will be utilised to reduce ground disturbance. This area of raised blade clearing is unknown due to the changing seasonal nature of grass cover, however will be deployed wherever possible.

Grass and brush rootstock will be left in place where practicable to enable soil stability and rapid regrowth of vegetation.

Imperial Oil & Gas will restore the seismic disturbance footprint before the start of the next wet season after the seismic program is completed.

Line clearing and rehab activities will be carried out with a fire tender on site.

Access Tracks

Access tracks will be 6m wide and formed up from in situ material, water graded and rolled to consolidate. Where practical the access tracks will avoid larger mature trees, whilst allowing road train access. Whoa-boys and turn out drains will be constructed as required to reduce erosion.

Wellpads

Wellpads will be up to 10 hectares depending on the rig contracted. Wellpads will be fenced.

Trees will be removed from the wellpad footprint, the majority of the wellpad will be water graded and rolled on the natural contour from existing material, the hardstand area of the wellpad will be levelled and consolidated to support the weight of the drilling rig. Sumps and Pits on the wellpads will be constructed as required.

Fencing

Imperial Oil & Gas will install gates in any fences crossed as part of the Seismic or drilling program to a similar standard to the current fencing.

Water

Imperial Oil & Gas will construct water bores on the wellpads for the supply of water for the EP187 operations.

Wells and water monitoring bores

Imperial Oil & Gas will hand over any water monitoring bore drilled on Section 19 subleases to the landholder Mambaliya Rumburriya Wuyaliya Aboriginal Land Trust for use by the sublease holder when the holder no longer requires them of EP187; as long as this meets legal compliance with the regulator and landholder. Imperial Oil & Gas does not intend to convert exploration wells to water bores when they are no longer required.

Cash Compensation

Additional Services

Imperial Oil & Gas is interested in engaging Section 19 Leaseholders for services that can be rendered to assist the field activities, e.g. fencing, weed management, water haulage etc. If you can offer these or other services, please provide details.

Contacts

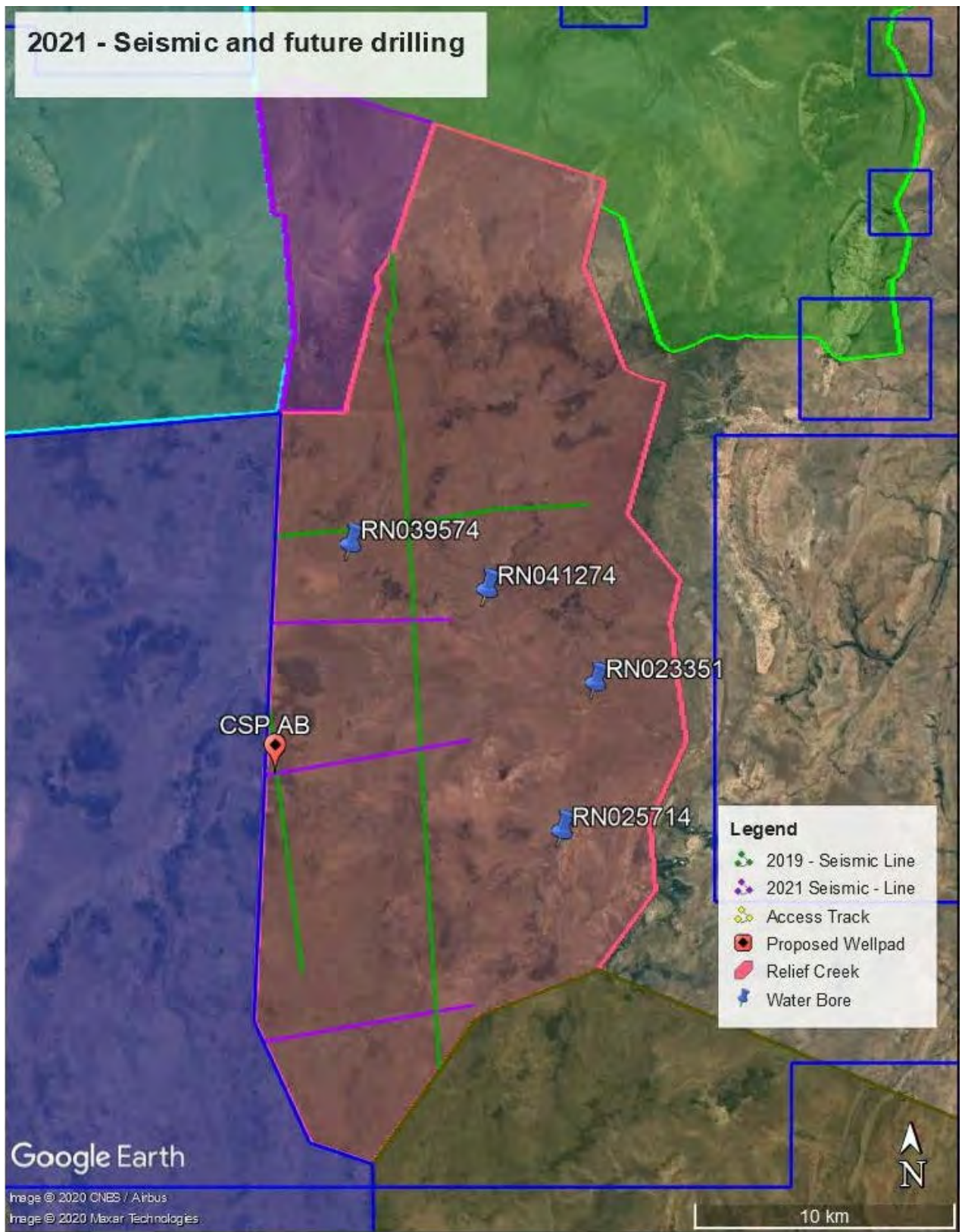
For any queries related to Imperial Oil & Gas's upcoming activities, please contact:

Name: XXXXXXXX

Email: XXXXXXXX

Phone: XXXXXXXX

2021 - Seismic and future drilling



1.3.7 Correspondance; West Balbarini - 09/12/2020

Imperial Oil & Gas 2021 Seismic and Drilling program – West Balbarini

Dear

As Imperial Oil & Gas representatives have discussed with you, there is a proposed Seismic, Drilling and Hydraulic Fracturing program to be carried out in EP187, part of this program overlaps your Section 19 lease.

The current plan is to carry out the Seismic program in Q2 of 2021, and the drilling program in Q3 & Q4 of 2021 pending approvals. If approvals are not obtained in time, the programs may be delayed.

There is a formal agreement in place between Imperial Oil & Gas and Mambaliya Rrumburriya Wuyaliya Aboriginal Land Trust to carry out these activities, and a formal agreement is not required between Imperial Oil & Gas and the Section 19 sublease holders. However Imperial Oil & Gas wants to continue to develop our positive working relationship and shared understanding with Section 19 sublease holders.

The proposed activities for West Balbarini are outlined in the attached map and activity area table.

Activity Area Table

Infrastructure	ID	Holding	Length (km)	Width	Area (Ha)
Seismic Line	6	West Balbarini	24.6	5	12.3
Seismic Line	5	West Balbarini	29.4	5	14.7
Seismic Line	1	West Balbarini	13	5	6.5
Seismic Line	2	West Balbarini	13	5	6.5
Seismic Line	3	West Balbarini	12.7	5	6.35
Seismic Line	4	West Balbarini	12.9	5	6.45
Wellpad	CSP AA	West Balbarini		0	12.25
Wellpad	CSP AC	West Balbarini		0	12.25
Wellpad	CSP AD	West Balbarini		0	12.25
Access Track	CSP AA	West Balbarini	10	6	6
Access Track	CSP AB	West Balbarini	16	6	9.6
Access Track	CSP AC	West Balbarini	12.2	6	7.32
Access Track	CSP AD	West Balbarini	17.7	6	10.62
Totals			161.5		123.09

Seismic Lines

The equipment utilised for Seismic operations requires a 5m access track, Imperial Oil & Gas has lodged a clearing Permit that has a 100m wide buffer to operate in.

In areas where the timber is sufficiently open, graders will be utilised and avoid mature trees (by meandering around trees whilst maintaining their position within the 100m buffer) to give the 5m access.

In areas of lancewood and denser vegetation it will require clearing a 5m path to allow the Vibroseis buggies to traverse the seismic line.

Line clearing and preparation will be carried out with a bulldozer and grader to sweep the ground surface of large rocks and fallen timber sufficient to provide safe access for vehicles, good ground contact of the geophones and to minimise the risk of fire. Where lines go through lancewood, the line will be cleared by pushing timber clear of the line with the bulldozer.

In open grassy areas where ground visibility is good, raised blade clearing will be utilised to reduce ground disturbance. This area of raised blade clearing is unknown due to the changing seasonal nature of grass cover, however will be deployed wherever possible.

Grass and brush rootstock will be left in place where practicable to enable soil stability and rapid regrowth of vegetation.

Imperial Oil & Gas will restore the seismic disturbance footprint before the start of the next wet season after the seismic program is completed.

Line clearing and rehab activities will be carried out with a fire tender on site.

Access Tracks

Access tracks will be 6m wide and formed up from in situ material, water graded and rolled to consolidate. Where practical the access tracks will avoid larger mature trees, whilst allowing road train access. Whoa-boys and turn out drains will be constructed as required to reduce erosion.

Wellpads

Wellpads will be up to 10 hectares depending on the rig contracted. Wellpads will be fenced.

Trees will be removed from the wellpad footprint, the majority of the wellpad will be water graded and rolled on the natural contour from existing material, the hardstand area of the wellpad will be levelled and consolidated to support the weight of the drilling rig. Sumps and Pits on the wellpads will be constructed as required.

Fencing

Imperial Oil & Gas will install gates in any fences crossed as part of the Seismic or drilling program to a similar standard to the current fencing.

Water

Imperial Oil & Gas will construct water bores on the wellpads for the supply of water for the EP187 operations.

Wells and water monitoring bores

Imperial Oil & Gas will hand over any water monitoring bore drilled on Section 19 subleases to the landholder Mambaliya Rumburriya Wuyaliya Aboriginal Land Trust for use by the sublease holder when the holder no longer requires them of EP187; as long as this meets legal compliance with the regulator and landholder. Imperial Oil & Gas does not intend to convert exploration wells to water bores when they are no longer required.

Cash Compensation

Additional Services

Imperial Oil & Gas is interested in engaging Section 19 Leaseholders for services that can be rendered to assist the field activities, e.g. fencing, weed management, water haulage etc. If you can offer these or other services, please provide details.

Contacts

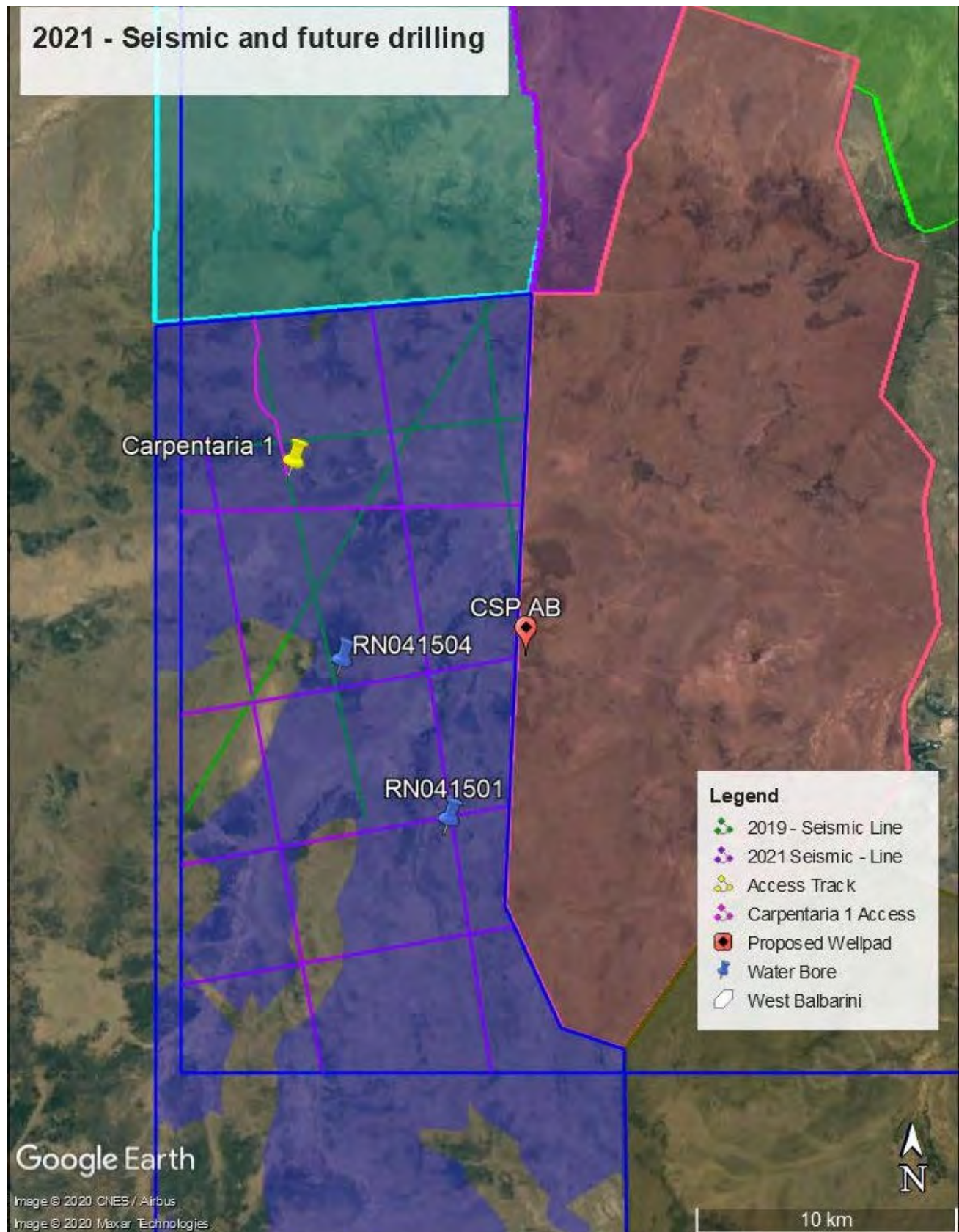
For any queries related to Imperial Oil & Gas's upcoming activities,

please contact: Name: XXXXXXXX

Email: XXXXXXXX

Phone: XXXXXXXX

2021 - Seismic and future drilling



1.3.8 Correspondance NLC; 2021-23 EP187 Work Program – 02/02/2021

The following documents were attached to this communication:

- EP187 2021-23 Work Program (below)
- Imperial O&G - EP187 - Archaeological Report - 2021 Seismic and 6 well program (not redacted)
- Appendix 02 - Project Activities (Draft)
- Appendix 03 - HF Chemical Risk Assessment



Work Program

Imperial O&G

Revised 2021 EP187 Work Program

NT Exploration Permit (EP) 187

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Prepared for:

IMPERIAL OIL AND GAS

Document Control:

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1	Revised to include full 2021-23 Work Program	02/02/2021	JB	AU

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Appendices

The following Appendices support this Work Program:

Appendix 01 -	Archaeological Report
Appendix 02 -	Project Activities
Appendix 03 -	HF Chemical Risk Assessment

Summary

Imperial proposes an infill 2D seismic survey, Wellpad and access construction, Drilling, Hydraulic Fracture (HF) and Extended Production Test (EPT) program in the Western flank of EP187, commencing Q2 of 2021.

This program builds on the 2019 Seismic program and the 2020 Drilling program which were covered under previous Work Programs.

Because of the basin's geographical remoteness, an official wet season period spanning six months and multi-agency clearances and permissions required to undertake work programs this interrelated Work Program is the fit for purpose, cost-effective and environmentally responsible way to progress EP187's exploration and evaluation appraisal pilot stage. Unlike conventional hydrocarbon prospects, play risk analysis and geological chance of success are not major issues. In unconventional prospects estimates of initial productivity, decline production rates, mechanical efficiency, and success planning dominate rather than a volumetric determination. Only with this information collected and analysed from the programs covered by this Work Program will Imperial reach the techno-commercial decision point to commit to Field Development Planning (FDP) coupled with application and further regulatory approvals to do so.

This Work Program has been prepared regarding clause 13 of the Exploration Deed, Exploration Permit Application 187 between Imperial Oil and Gas Pty Ltd and The Northern Land Council.

This Work Program seeks approval to conduct a program of infill 2D seismic acquisition, Wellpad and access construction, Drilling, Hydraulic Fracture (HF) and Extended Production Test (EPT) along the Western flank of EP187, including all ancillary activities required to conduct the works.

This Work Program's objective is to ensure that the activities are carried out in a manner by which the impacts and risks to Traditional Owners, their culture and society and to the environment will be reduced to a level that is as low as reasonably practicable (ALARP).

Land clearing will be required for this Work Program; this includes; Line clearing for the 2D seismic program, and Wellpad and access track construction for the Drilling, Hydraulic Fracture (HF) and Extended Production Test (EPT) program

Imperial has engaged a consultant to carry out archaeological survey of the proposed work area, the report for this survey is attached as appendix 1. During this archaeological survey 2 significant sites were discovered outside of EP187, the reports of these discoveries have been provided to NLC, but are not included in this work program.

(a) Work Program Location

Imperial has selected a proposed location for the activities and a buffer to allow moving locations to reduce the on-ground impacts, as per previous Work Programs.

The proposed locations of Wellpads to be constructed and have activities carried out on them under this Work Program are listed in Table 1

Maps showing the proposed locations of the activities to be carried out under this Work Program, and the buffer to allow moving on-site are;

- Figure 1: Location of proposed Seismic Lines under this Work Program
 - o Showing the proposed location of proposed Seismic lines
 - o Showing the location of previous Work Program Activities
 - o Showing the location of Major and Minor Drainage, as per NR Maps
- Figure 2: Location of proposed Wellpads under this Work Program
 - o Showing the proposed location of proposed Wellpads
 - o Showing the location of previous Work Program Activities
 - o Showing the location of Major and Minor Drainage, as per NR Maps
- Figure 3: Location of proposed Access Tracks under this Work Program
 - o Showing the proposed location of proposed Access Tracks
 - o Showing the location of previous Work Program Activities
 - o Showing the location of Major and Minor Drainage, as per NR Maps
- Figure 4: Location of proposed Pipelines under this Work Program
 - o Showing the proposed location of proposed Pipelines
 - o Showing the location of previous Work Program Activities
 - o Showing the location of Major and Minor Drainage, as per NR Maps
- Figure 5: Location of Land Type A for activities under this Work Program
 - o Showing the buffer for the movement of seismic lines, access tracks and pipelines, to allow moving locations to reduce the on-ground impacts while meeting program objectives
- Figure 6; Location of Land Type B for activities under this Work Program
 - o Showing the buffer for the movement of wellpads, to allow moving locations to reduce the on-ground impacts while meeting program objectives
 - o Land Type B has a 100m buffer on mapped "Major Drainage" and "Minor Drainage" as shown on NR Maps
- Figure 7; Location of Land Type C for activities under this Work Program
 - o Showing the extent of lateral Drilling and Hydraulic Fracturing activities under this Work Program wellpads, to allow moving locations to reduce the on-ground impacts while meeting program objectives

Shapefiles of the proposed activities, and their relevant buffers is provided as part of this Work Program

Mapping does not have coordinates shown on them as the labels cover too much detail on the map.

Table 1: General Well Information

General Well Information			
Carpentaria 1 (MGA94, Zone 53)	Latitude	S 16.79450°	
	Longitude	E 135.12306°	
	Easting	513112	
	Northing	8143174	
Carp AA Well Location (MGA94, Zone 53)	Latitude	S 16.697670°	
	Longitude	E 135.101902°	
	Easting	510864	
	Northing	8153887	
Carp AB Well Location (MGA94, Zone 53)	On a line between the two points listed below, not within 100m of mapped as Major or Minor drainage on NR Maps		
	Line End	Western	Eastern
	Latitude	S 16.694461°	S 16.688857°
	Longitude	E 135.145919°	E 135.217441°
	Easting	515557	523183
Northing	8154239	8154852	
CSP AA Well Location (MGA94, Zone 53)	Latitude	S 16.803939°	
	Longitude	E 135.202105°	
	Easting	521535	
	Northing	8142123	
CSP AB Well Location (MGA94, Zone 53)	On a line between the two points listed below, not within 100m of mapped as Major or Minor drainage on NR Maps		
	Line End	Western	Eastern
	Latitude	S 16.855676°	S 16.802557°
	Longitude	E 135.208130°	E 135.271673°
	Easting	5221171	528948
Northing	8136399	8142267	
CSP AC Well Location (MGA94, Zone 53)	Latitude	S 16.861304°	
	Longitude	E 135.173477°	
	Easting	518479	
	Northing	8135780	
CSP AD Well Location (MGA94, Zone 53)	Latitude	S 16.910554°	
	Longitude	E 135.181297°	
	Easting	519307	
	Northing	8130331	



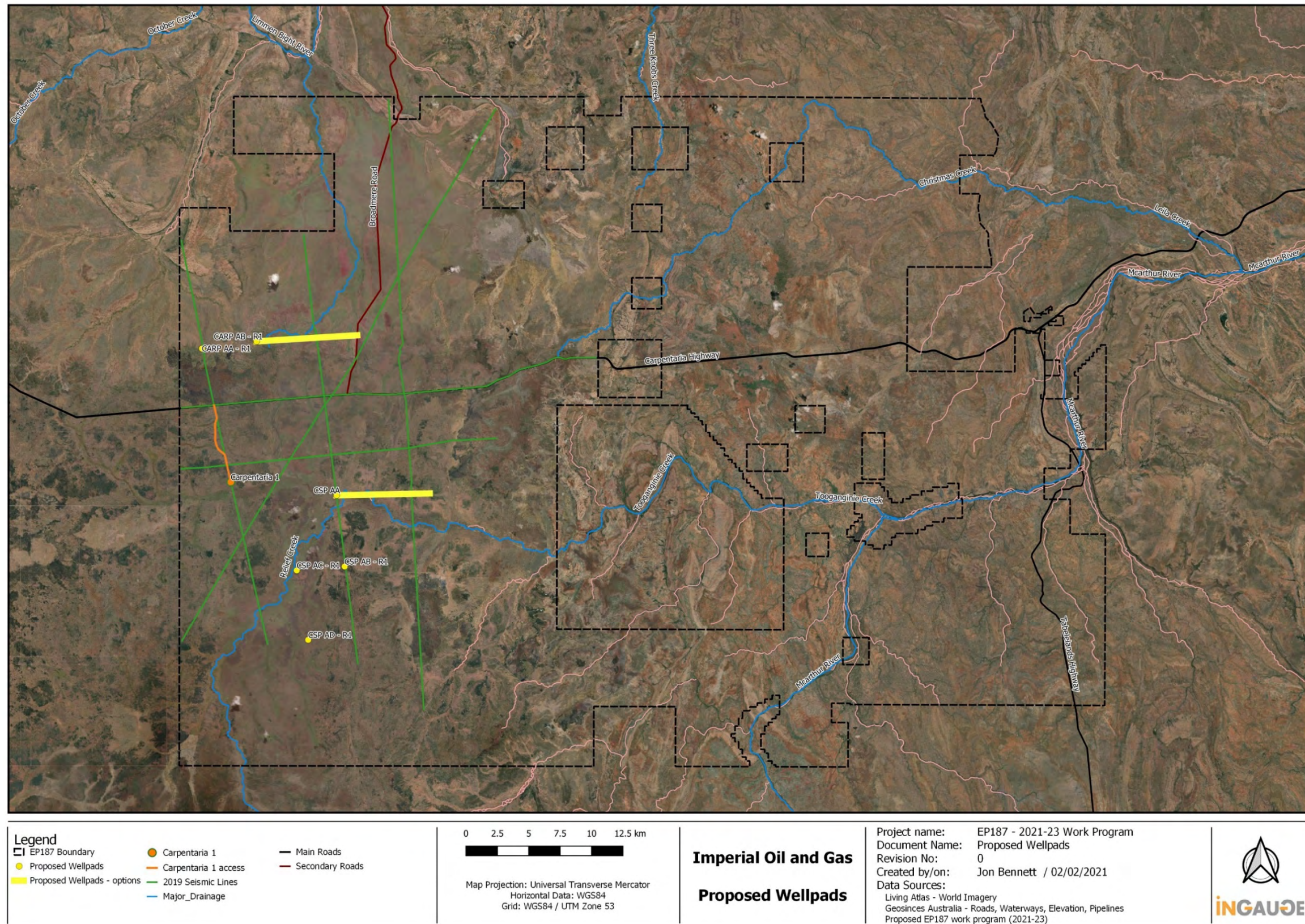


Figure 2: Location of proposed Wellpads under this Work Program



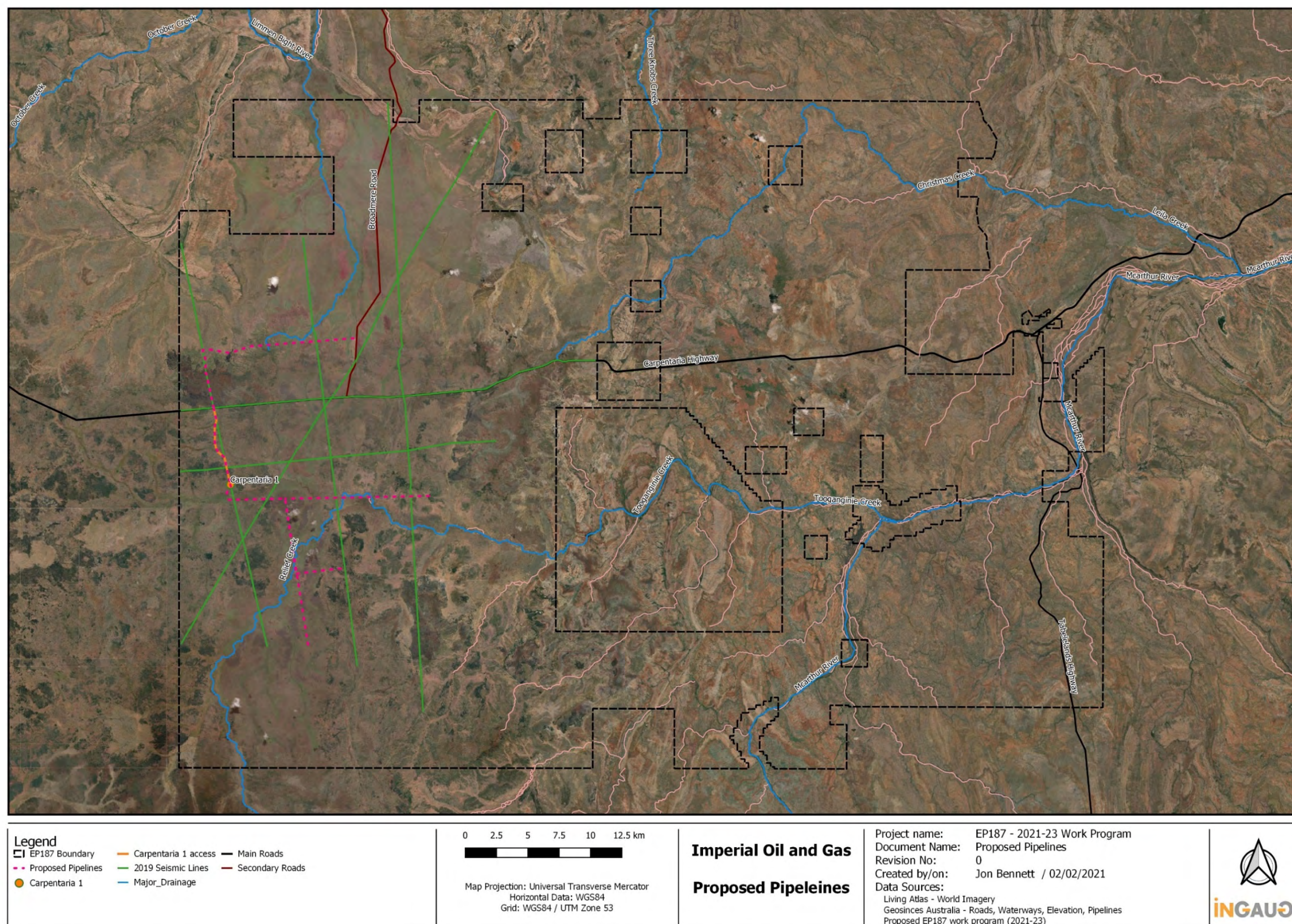


Figure 4: Location of proposed Pipelines under this Work Program

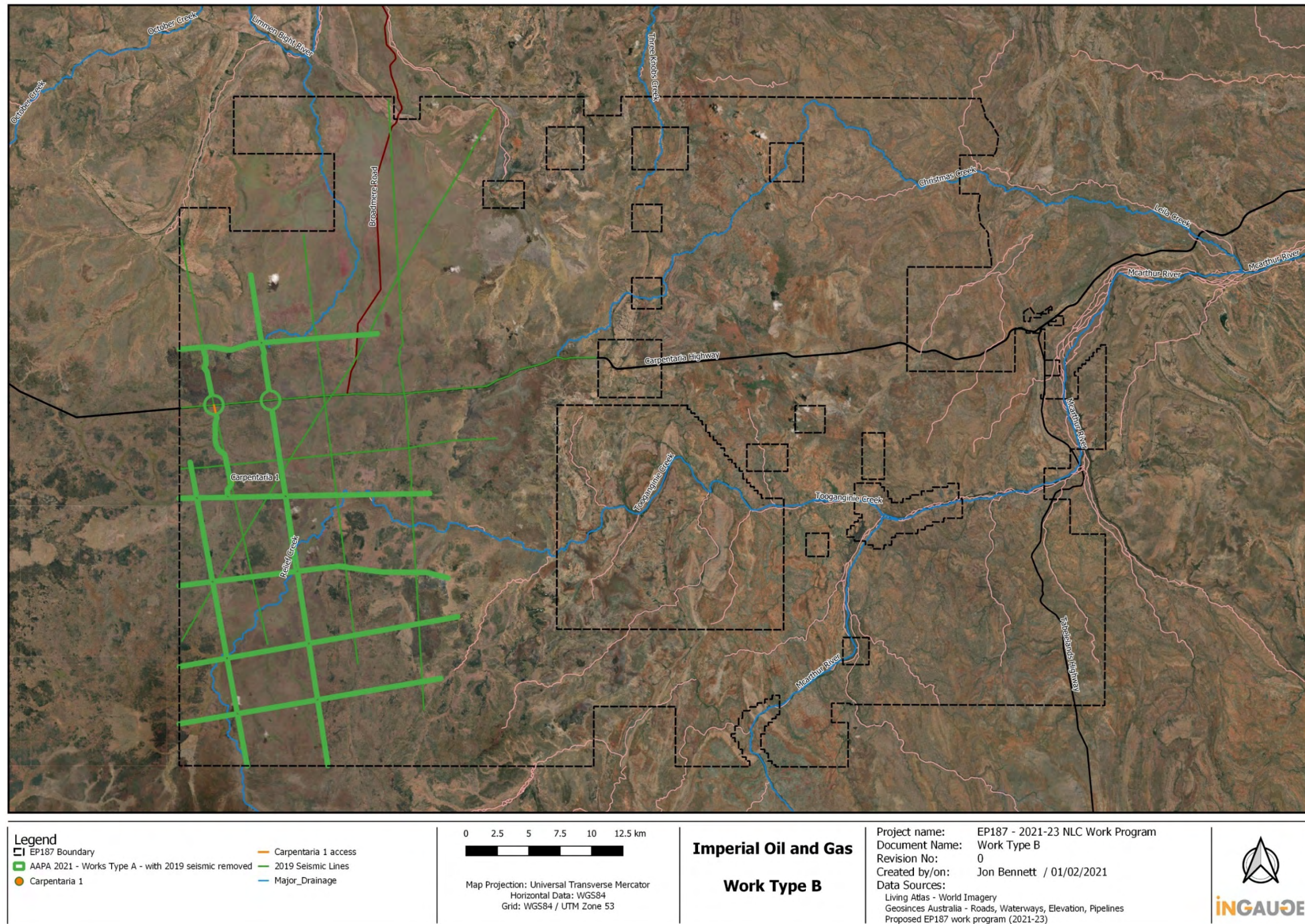


Figure 5: Location of Land Type A for activities under this Work Program

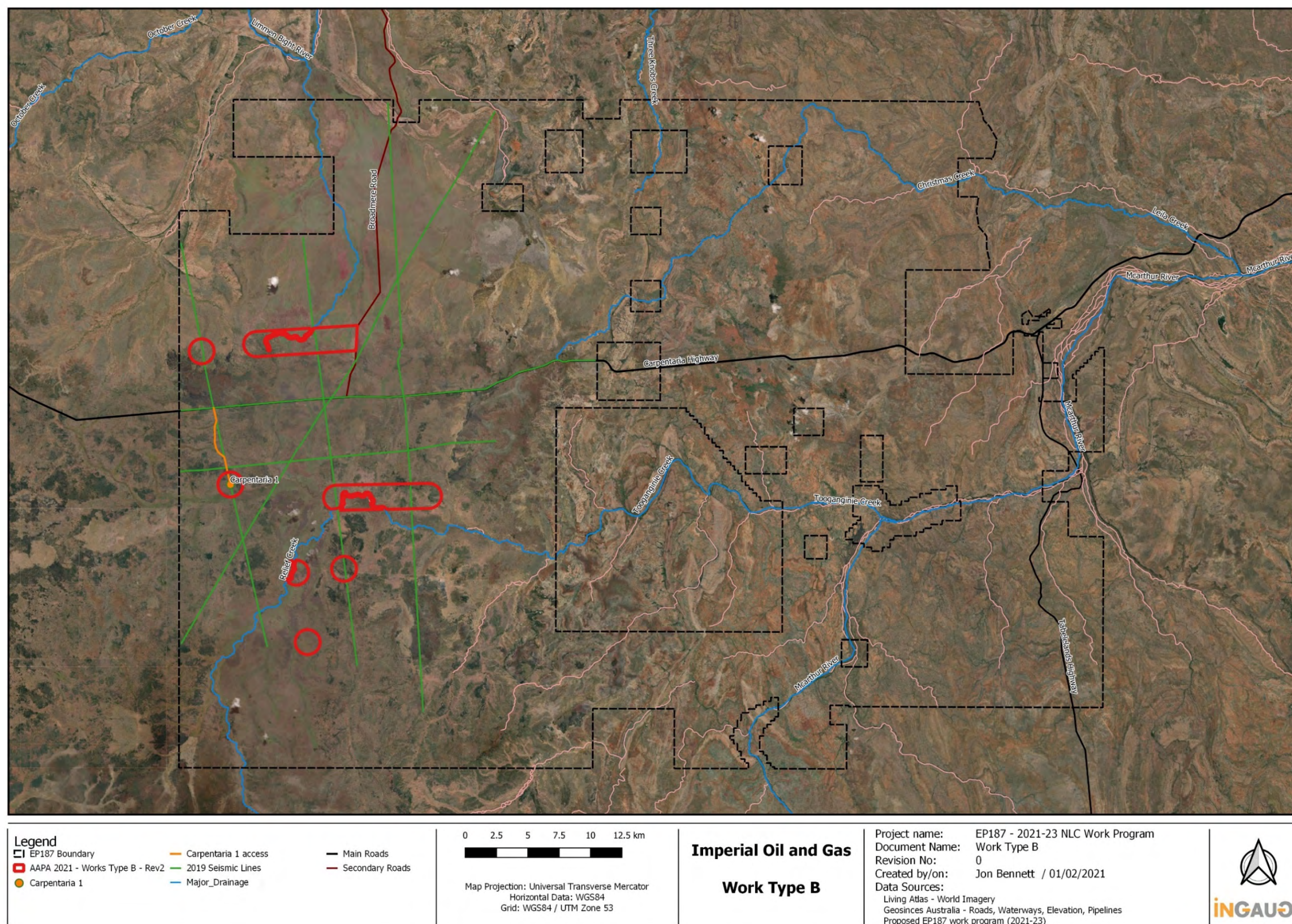


Figure 6; Location of Land Type B for activities under this Work Program

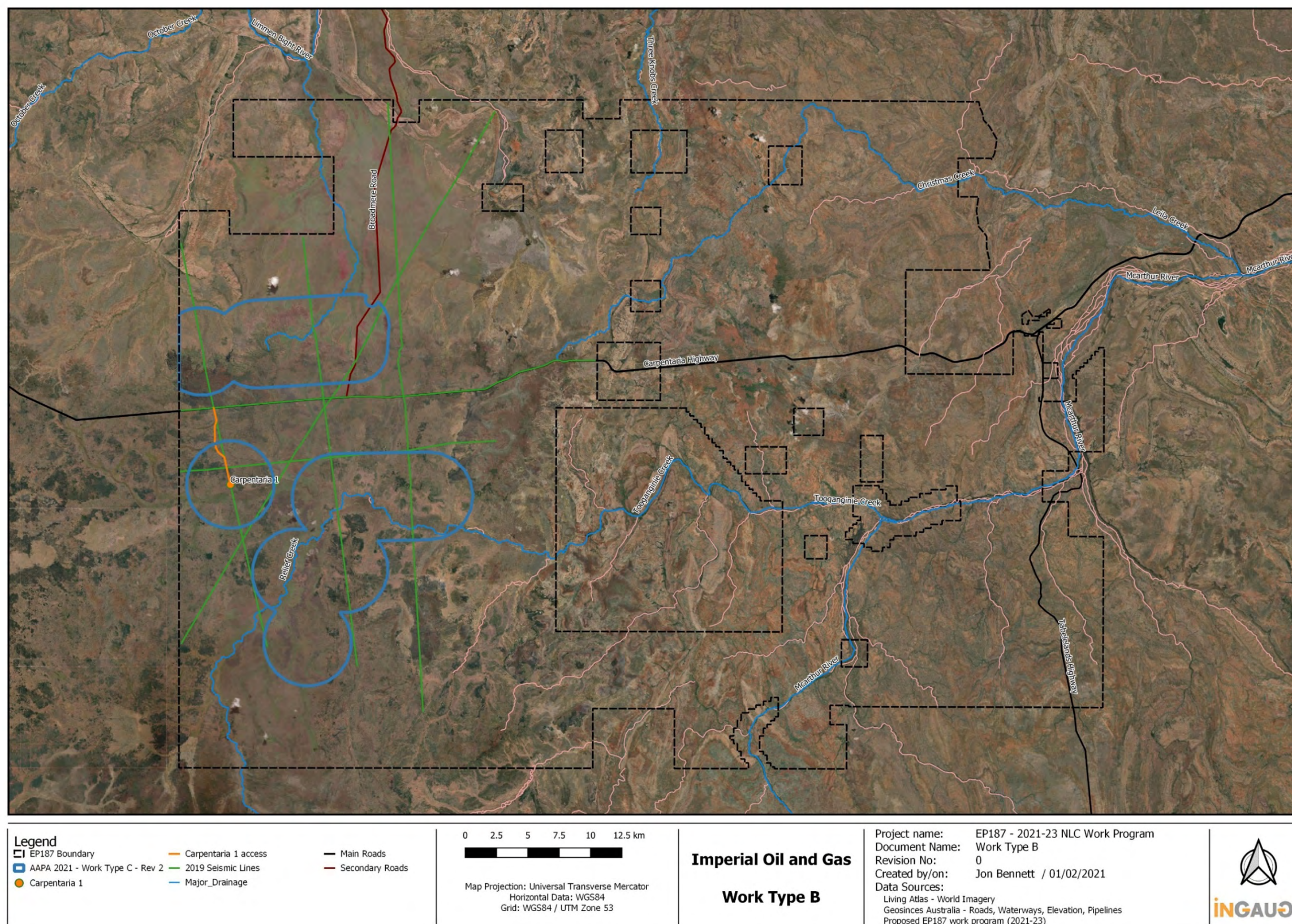


Figure 7; Location of Land Type C for activities under this Work Program

(b) Work Program Activities

The regulated activities to be carried out under this Work Program are;

- Acquisition of up to 165km of 2 D Seismic data
 - o Clear up to 82.5 hectares for seismic acquisition lines
 - o Conduct 2D seismic acquisition operations
 - o Rehabilitate cleared seismic acquisition lines
- Extend Carpentaria 1 wellpad, as per Figure 8
- Construction of up to six well pads
 - o Clear up to 75 hectares for six well pads
 - o Construct wellpads as per Figure 8
 - o Establish lined ponds, as per Figure 8
 - o Drill water production and monitoring bores on wellpads
 - o Establish Erosion and Sediment Control devices on wellpads
- Construction of access tracks to six well pads
 - o Clear up to 25 hectares for access tracks
 - o Construct an intersection onto the Carpentaria highway
 - o Establish Erosion and Sediment Control devices on access tracks
- Drilling gas exploration wells from the six wellpads
 - o Drill 6 Vertical gas exploration wells from the six wellpads
 - o Drill 6 Lateral gas exploration wells from the six wellpads
 - o Drill 1 Lateral gas exploration well from the existing Carpentaria 1 wellbore
 - o Evaluate, log test and core above wells, including DFIT
- Continued appraisal of the existing Carpentaria 1 Vertical wellbore, as per the dot points below
- Establish bunded tanks pads and tanks fitted with leak detection at the above well sites
- Hydraulic Fracture stimulation of the above wells
- Completion and workover maintenance of the above wells
- Extended Production Testing (EPT) of the above wells
- Well suspension and decommissioning of the above wells
- Construction of low-pressure water flowlines between well pads
 - o Clear up to 10.5 hectares for flowline right of way
 - o Install up to 45 km of buried low-pressure water flowlines
 - o Establish Erosion and Sediment Control devices on flowline alignments
- Routine maintenance and monitoring activities
- Any other minor works ancillary of the above.

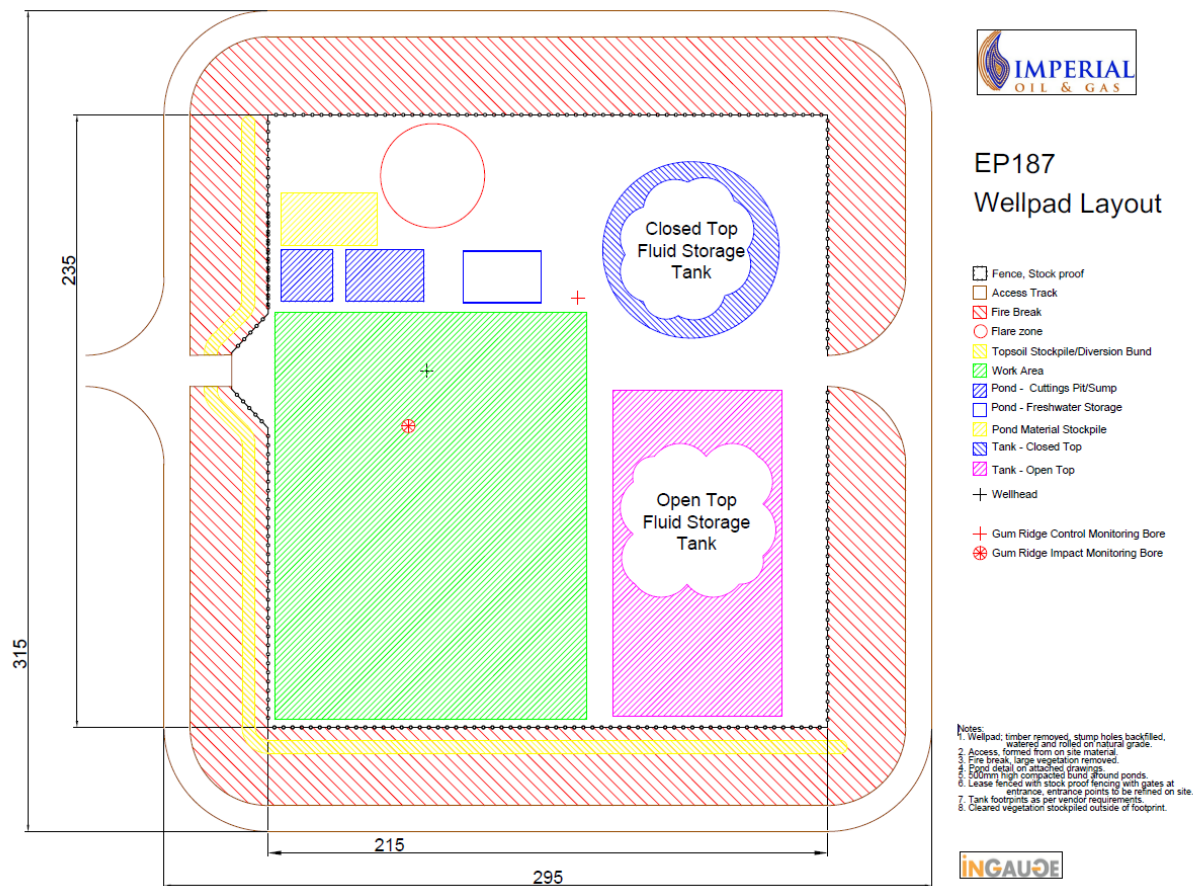


Figure 8:EP187 Wellpad footprint with indicative tanks layout

(c) Work Program Timing

An indicative project schedule, including estimated start dates and durations of regulated activities, is provided in Table 2 below. The actual timing of the work program activities outlined below may be earlier or later than indicated.

Table 2: Indicative Project Schedule

Activity	Estimated commencement	Estimated duration
2D Seismic Program	Q2 2021	Six weeks
Hydraulic Fracturing of Carpentaria 1 Vertical	Q2 2021	Four Weeks
Extended Production Testing and flowback fluid management of Carpentaria 1 vertical2	Q2 2021	Three Months
Civil Construction for Carpentaria 2	Q3 2021	Four weeks
Civil Construction for Carpentaria 3	Q3 2021	Four weeks
Drilling, including testing and evaluation of Carpentaria 2	Q3 2021	4-6 weeks
Drilling, including testing and evaluation of Carpentaria 3	Q3 2021	4-6 weeks
Hydraulic Fracturing of Carpentaria 2	Q3 2021	Two weeks
Extended Production Testing and flowback fluid management of Carpentaria 2	Q3 2021	Three Months
Drilling, including testing and evaluation of Carpentaria 1 & 3 laterals, and Carpentaria 4, 5, 6, & 7	2022	4-6 weeks (each)
HF of proposed Carpentaria 1 lateral and Carpentaria 3	2022	Two weeks (each)
Extended Production Testing and flowback fluid management of Carpentaria 1 lateral and Carpentaria 3	2022	Three Months (each)
HF of proposed Carpentaria 3, 4, 5, 6, & 7	2023	Two weeks(each)
Extended Production Testing and flowback fluid management of proposed Carpentaria 3, 4, 5, 6, & 7	2023	Three Months (each)
Installation of water pipeline between wellpads	To be determined	Four weeks (each)
Well suspension, Plugging and Abandonment	To be determined	Four weeks (each)

(d) Work Program Techniques, infrastructure and equipment

The work program techniques, infrastructure, and equipment used for the activities under this Work Program are attached in Appendix 1.

(e) Seismic line location

The location of proposed seismic lines to be constructed under this Work Program are shown in

Figure 1: Location of proposed Seismic Lines under this Work Program
, and are included in the attached Shapefiles.

(f) Drilling and Hydraulic Fracturing materials

Full details regarding the composition of any fluids and solids proposed for use in drilling any well or any Hydraulic Fracturing to be carried out under this Work Program are provided in Imperial's Spill Management plan for EMP IMP₄, which is attached to this Work Program as Appendix 3.

Imperial will not use benzene, toluene, ethyl benzene or xylene in any fluids used in hydraulic fracturing

(g) Environmental Impact

The likely Environmental Impact of any activity and any proposals to minimise such impact has been described in Imperial's Environmental Management Plans IMP₃, and IMP₄.

IMP₃, and IMP₄ have been provided to the NLC.

(h) Access

Equipment and services mobilisation

The potential traffic-related impacts of the regulated activities carried out under this Work Program, including Seismic acquisition, civils construction, drilling, stimulation, well testing, and ongoing operations, are not considered significant. Traffic associated with exploration activities is generally small and of short duration. The access to project area is via the Carpentaria Highway, approximately 202km East of the Stuart Highway intersection, and 60km West of Cape Crawford. The Carpentaria Highway has a 100km/h posted speed limit in the vicinity of the project, and is generally a two-way road with a single lane sealed strip, the balance of the road width is unsealed. The majority of equipment to be utilised for the regulated activities carried out under this Work Program will mobilise to site from Queensland or South Australia. The majority of equipment will come via the Tableland highway to Cape Crawford, then West to site, with the balance coming via the Stuart Highway to the Highway Inn, then East to site.

The peak maximum anticipated traffic movements associated with all of the regulated activities under this Work Program would be for the mobilisation and demobilisation of the equipment "Spreads" (the term used to describe the various trucks and equipment needed) for drilling and HF activities into the project area, at approximately 50 vehicles per day. The duration of the mobilisations and demobilisations will be approximately five days each at the start and end of each drilling or HF campaign. Imperial will design and construct the internal access tracks so that equipment and personnel in field movements avoid using public roads as much as practicable.

The peak maximum anticipated traffic movements of civil construction, Seismic acquisition, completions and workover equipment are anticipated to be minor, with a peak of 15 vehicle movements for several days during equipment mobilisation and demobilisation. Average daily traffic additions during the remainder of the project period are likely to be 10-15 movements per day for the first three months of each well, reducing down to three-four movements per day for the remainder of the period once the wells undergo testing.

Supplies delivery and personnel movements

There will also be 30-50 loads to each wellsite required to transport drilling fluids, casing, cement, fuel, etc. to each wellpad for drilling activities.

There will also be 40-80 loads to each wellsite required to HF proppant, chemicals fuel, etc. to each wellpad for HF activities.

There will be no dominant traffic flow direction for the program's supplies delivery, with traffic likely to be roughly split between north (from Darwin) and south (From Queensland and South Australia).

There will be a daily commute by 4WD to mobilise and demobilise Civil Construction, and Seismic acquisition crews from Cape Crawford to the project area for the duration of those activities.

There will be a twice-daily commute by 4WD to mobilise and demobilise crews from the camp to the drilling and HF spreads for the duration of those activities.

Traffic Volumes

The estimated traffic volume for the Work Program is shown in Table 3 below.

Table 3: Estimated operational trucking requirements

Activity	Total Loads (per well)	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

Airborne access to site will utilise existing airstrips, volumes of airborne access is likely to be less than five planes per week.

Roadworks and construction activities.

The activities under this Work Program require the construction of up to two intersections onto the Carpentaria Highway. Imperial will lodge and gain approval for constructing this intersection/s and the associated Traffic Management Plan from DPIL before the intersection construction works are carried out. Imperial will notify DEPWS when this approval is granted.

Imperial does not propose to upgrade or construct any landing strips under this work program.

(i) Campsites

Imperial will use the existing DPIL campsite on the Carpentaria Highway for this Work Program, as used for previous work Programs.

Imperial will also use wellpads constructed under this Work Program, and previous Work Programs for temporary campsites, as required.

(j)Resources obtained from within the Permit Area

For the activities under this Work Program; Imperial intends to extract water from two water bores (– RNo41678 & RN41800) located on the Carpentaria 1 wellpad and water bores to be drilled on the new wellpads, under the approved water license GRF10316. Imperial will apply for an increase in the volume to be extracted under GRF10316 to cover this and future work programs' requirements.

Water required for the project is anticipated to be 136ML. A breakdown of the water usage and its volumes is provided in Table 4.

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

Table 4:Estimated Water Use for this Work Program

Use	Scope	Total Use (ML)
Civil Construction	0.5 per wellpad	3
Drilling	2.5ML per well	17.5
HF fluid make-up	12ML per well	84
Completion	0.5ML per well	6
Lateral Completion	0.5ML per well	6.5
Operational Activities	Road and site maintenance at 1ML p/m Vehicle wash downs (0.1ML per month)	13
Camp Use	200L/day per person per day on site (0.5ML per Month, by 12 months)	6
Totals		136

Imperial does not foresee the timber being obtained from within the Permit Area and surrounding areas.

Imperial will obtain gravel from the wellpads constructed under this and existing Work Programs to build and maintain infrastructure required for this Work Program.

(k) Proposed Contractors

Imperial is in the process of contracting and procurement for the activities to be carried out under this Work Program; the identity of the parties tendering is commercial in confidence at this time.

Imperial uses a prequalification process while selecting contractors to ensure that they have the safety systems and procedures in place to ensure all works re carried out safely and in line with Imperials approval conditions.

(l) Personnel

The number of personnel likely to be on the Permit Area from time to time and their roles in undertaking the Exploration is shown in Table.;

Table 5: Expected Personnel

Activity	Number of Personnel	Role
2D Seismic Program	10 25	Operation Line Clearing equipment Operation of Seismic Acquisition equipment
Civil Construction	10	Operation of Civil Construction equipment
Drilling, including testing and evaluation	30	Operation of Drilling, including testing and evaluation equipment
Hydraulic Fracturing	15	Operation of Hydraulic Fracturing equipment
Extended Production Testing and flowback fluid management	5	Operation of Extended Production Testing and flowback fluid management equipment
Installation of water pipeline between wellpads	20	Operation of pipeline construction equipment
Well suspension, Plugging and Abandonment	10	Operation of Well suspension, Plugging and Abandonment equipment

(m) Access Roads

Access roads and tracks to be used under this project are;

- Public roads, including but not limited to
 - o Carpentaria Highway
 - o Broadmere Road
 - o Relief Creek Road
- Imperial Constructed Access Tracks
 - o As shown in Section o mapping
- Existing pastoralist access tracks
 - o Not shown in Section o mapping

(n) Other activities

Imperial does not expect that there will be any other aspect of any activity that is likely to have an Environmental Impact or impact upon the Traditional Owners.

1.3.9 Correspondance; Eleanor, O T Downs, No. 9 Block - 05/04/2021
Imperial Oil & Gas 2021-25 Seismic and Drilling program – Eleanor, O T Downs,
NO. 9 Block

Dear

As Imperial Oil & Gas representatives have discussed with you, a proposed Seismic, Drilling, Hydraulic Fracturing and pipeline installation program will be carried out in EP187. Part of this program overlaps your Section 19 lease.

The current plan is to carry out the Seismic program in Q2 of 2021. And to start the drilling hydraulic fracturing and pipeline construction program in Q3 & Q4 of 2021 continued over subsequent years. If approvals are not obtained in time, the start of the programs may be delayed.

There is a formal agreement in place between Imperial Oil & Gas and Mambaliya Rrumburriya Wuyaliya Aboriginal Land Trust to carry out these activities, and a formal agreement is not required between Imperial Oil & Gas and the Section 19 sublease holders. However, Imperial Oil & Gas wants to continue to develop our positive working relationship and shared understanding with Section 19 sublease holders.

The proposed activities for West Balbarini are outlined in the attached map and activity area table.

Activity Area Table

Infrastructure	ID	Holding	Length (km)	Width	Area (Ha)
Seismic Line	7	OT Downs	13.8	5	6.9
Seismic Line	5	OT Downs	10	5	5
Seismic Line	7	No. 4	2	5	1
Wellpad	Carp AA	OT Downs		0	12.25
Wellpad	Carp AB	OT Downs		0	12.25
Access Track	Carp AA	OT Downs	4.7	6	2.82
Access Track	Carp AB	OT Downs	9.4	6	5.64
Flowline	Carp AA	OT Downs	4.7	6	2.82
Flowline	Carp AB	OT Downs	9.4	6	5.64

Seismic Lines

The equipment utilised for Seismic operations requires a 5m access track; Imperial Oil & Gas has lodged a clearing Permit that has a 100m wide buffer to operate in.

In areas where the timber is sufficiently open, graders will be utilised and avoid mature trees (by meandering around trees whilst maintaining their position within the 100m buffer) to give the 5m access.

In areas of lancewood and denser vegetation, it will require clearing a 5m path to allow the Vibroseis buggies to traverse the seismic line.

Line clearing and preparation will be carried out with a bulldozer and grader to sweep the ground surface of large rocks and fallen timber sufficient to provide safe access for vehicles, good ground contact of the geophones and to minimise the risk of fire. Where lines go through lancewood, the line will be cleared by pushing timber clear of the line with the bulldozer.

In open grassy areas where ground visibility is good, raised blade clearing will be utilised to reduce ground disturbance. This area of raised blade clearing is unknown due to the changing seasonal nature of grass cover, however will be deployed wherever possible.

Grass and brush rootstock will be left in place where practicable to enable soil stability and rapid regrowth of vegetation.

Imperial Oil & Gas will restore the seismic disturbance footprint before the start of the next wet season after the seismic program is completed.

Line clearing and rehab activities will be carried out with a fire tender on site.

Access Tracks

Access tracks will be 6m wide and formed from in situ material, water graded and rolled to consolidate. Where practical, the access tracks will avoid larger mature trees, whilst allowing road train access. Whoa-boys and turn out drains will be constructed as required to reduce erosion.

Wastewater Pipelines

Buried pipelines may be installed in a Right Of Way (ROW) adjacent to access tracks, where required for efficient operations. ROWs will be cleared 6m wide, where the pipelines will be trenched in ~750mm deep, signposts will be erected to indicate the pipeline's location. Whoa-boys and turn out drains will be constructed as required to reduce erosion.

Wellpads

Wellpads will be up to 12.5 hectares depending on the rig contracted. Wellpads will be fenced.

Trees will be removed from the wellpad footprint. The majority of the wellpad will be water graded and rolled on the natural contour from existing material. The hardstand area of the wellpad will be levelled and consolidated to support the weight of the drilling rig. Sumps and Pits on the wellpads will be constructed as required.

Fencing

Imperial Oil & Gas will install gates in any fences crossed as part of the Seismic or drilling program to a similar standard to the current fencing.

Water

Imperial Oil & Gas will construct water bores on the wellpads for water supply for the EP187 operations.

Wells and water monitoring bores

Imperial Oil & Gas will hand over any water monitoring bore drilled on Section 19 subleases to the landholder Mambaliya Rumburriya Wuyaliya Aboriginal Land Trust for use by the sublease holder when the holder no longer requires them of EP187; as long as this meets legal compliance with the regulator and landholder. Imperial Oil & Gas does not intend to convert exploration wells to water bores when they are no longer required.

Cash Compensation

Additional Services

Imperial Oil & Gas is interested in engaging Section 19 Leaseholders for services that can be rendered to assist the field activities, e.g. fencing, weed management, water haulage etc. If you can offer these or other services, please provide details.

Contacts

For any queries related to Imperial Oil & Gas's upcoming activities, please contact:

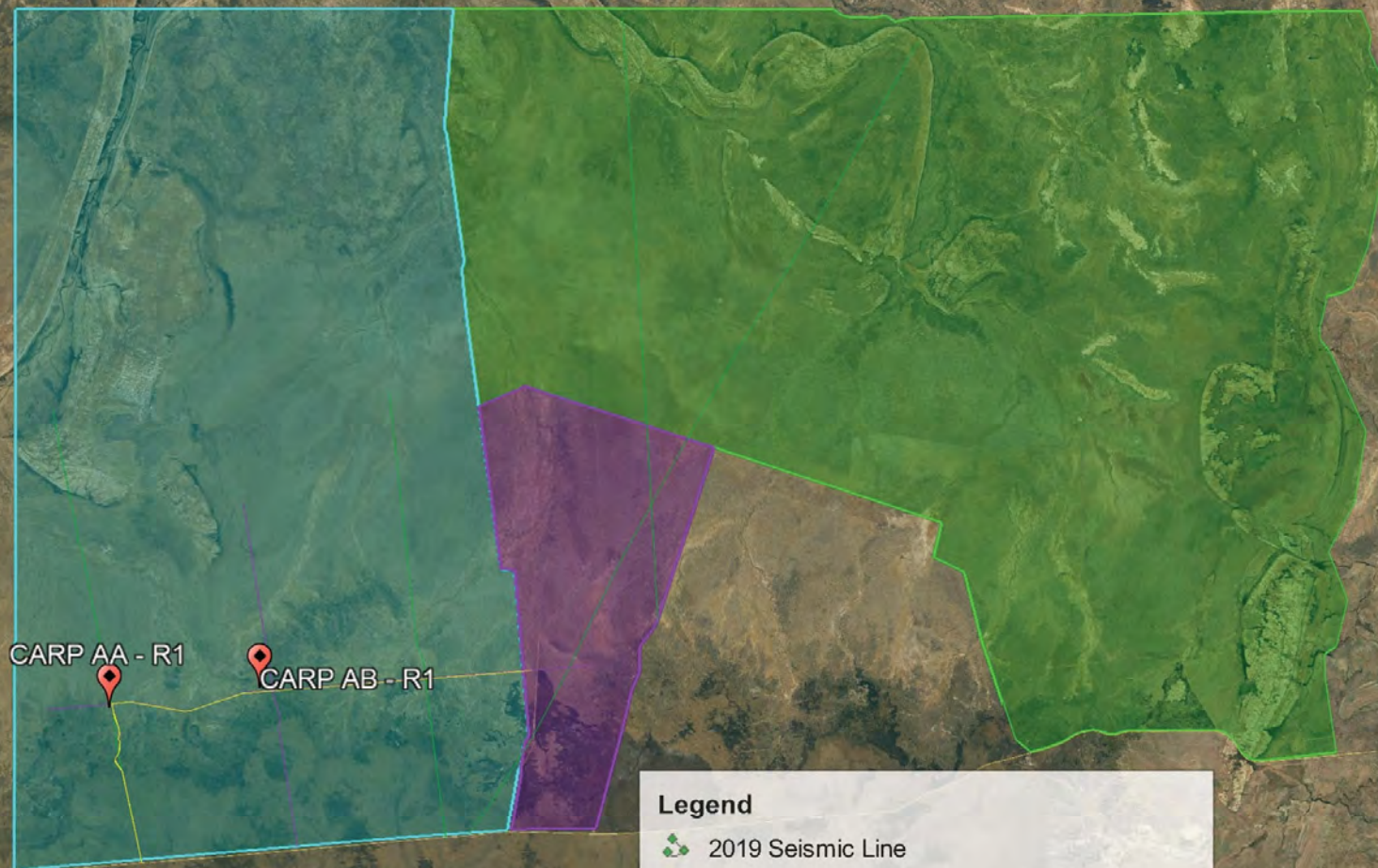
Name: [REDACTED]

Email: [REDACTED]

Phone: [REDACTED]

EP187 -2021-25 Work Program

Eleanor, OT Downs, NO.4 Block



Legend

- 2019 Seismic Line
- 2021 Seismic - Line
- New Access Track and Wastewater Flowline
- New Wellpad
- Elaenor
- No.4 Block
- OT Downs

Google Earth

Image © 2021 CNES / Airbus

Image © 2021 Maxar Technologies

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10 km



1.3.10 Correspondance; Relief Creek - 05/04/2021

Imperial Oil & Gas 2021-25 Seismic and Drilling program – Relief Creek

Dear

As Imperial Oil & Gas representatives have discussed with you, a proposed Seismic, Drilling, Hydraulic Fracturing and pipeline installation program will be carried out in EP187. Part of this program overlaps your Section 19 lease.

The current plan is to carry out the Seismic program in Q2 of 2021. And to start the drilling hydraulic fracturing and pipeline construction program in Q3 & Q4 of 2021 continued over subsequent years. If approvals are not obtained in time, the start of the programs may be delayed.

There is a formal agreement in place between Imperial Oil & Gas and Mambaliya Rrumburriya Wuyaliya Aboriginal Land Trust to carry out these activities, and a formal agreement is not required between Imperial Oil & Gas and the Section 19 sublease holders. However, Imperial Oil & Gas wants to continue to develop our positive working relationship and shared understanding with Section 19 sublease holders.

The proposed activities for West Balbarini are outlined in the attached map and activity area table.

Activity Area Table

Infrastructure	ID	Holding	Length (km)	Width	Area (Ha)
Seismic Line	1	Relief Creek	6.9	5	3.45
Seismic Line	2	Relief Creek	8	5	4
Seismic Line	3	Relief Creek	9.8	5	4.9
Seismic Line	4	Relief Creek	8.2	5	4.1
Wellpad	CSP AB	Relief Creek		0	12.25
Access Track	CSP AB	Relief Creek	16	6	0.5
Flowline	CSP AB	Relief Creek	16	6	9.6

Seismic Lines

The equipment utilised for Seismic operations requires a 5m access track; Imperial Oil & Gas has lodged a clearing Permit that has a 100m wide buffer to operate in.

In areas where the timber is sufficiently open, graders will be utilised and avoid mature trees (by meandering around trees whilst maintaining their position within the 100m buffer) to give the 5m access.

In areas of lancewood and denser vegetation, it will require clearing a 5m path to allow the Vibroseis buggies to traverse the seismic line.

Line clearing and preparation will be carried out with a bulldozer and grader to sweep the ground surface of large rocks and fallen timber sufficient to provide safe access for vehicles, good ground contact of the geophones and to minimise the risk of fire. Where lines go through lancewood, the line will be cleared by pushing timber clear of the line with the bulldozer.

In open grassy areas where ground visibility is good, raised blade clearing will be utilised to reduce ground disturbance. This area of raised blade clearing is unknown due to the changing seasonal nature of grass cover, however will be deployed wherever possible.

Grass and brush rootstock will be left in place where practicable to enable soil stability and rapid regrowth of vegetation.

Imperial Oil & Gas will restore the seismic disturbance footprint before the start of the next wet season after the seismic program is completed.

Line clearing and rehab activities will be carried out with a fire tender on site.

Access Tracks

Access tracks will be 6m wide and formed from in situ material, water graded and rolled to consolidate. Where practical, the access tracks will avoid larger mature trees, whilst allowing road train access. Whoa-boys and turn out drains will be constructed as required to reduce erosion.

Wastewater Pipelines

Buried pipelines may be installed in a Right Of Way (ROW) adjacent to access tracks, where required for efficient operations. ROWs will be cleared 6m wide, where the pipelines will be trenched in ~750mm deep, signposts will be erected to indicate the pipeline's location. Whoa-boys and turn out drains will be constructed as required to reduce erosion.

Wellpads

Wellpads will be up to 12.5 hectares depending on the rig contracted. Wellpads will be fenced.

Trees will be removed from the wellpad footprint. The majority of the wellpad will be water graded and rolled on the natural contour from existing material. The hardstand area of the wellpad will be levelled and consolidated to support the weight of the drilling rig. Sumps and Pits on the wellpads will be constructed as required.

Fencing

Imperial Oil & Gas will install gates in any fences crossed as part of the Seismic or drilling program to a similar standard to the current fencing.

Water

Imperial Oil & Gas will construct water bores on the wellpads for water supply for the EP187 operations.

Wells and water monitoring bores

Imperial Oil & Gas will hand over any water monitoring bore drilled on Section 19 subleases to the landholder Mambaliya Rrumburriya Wuyaliya Aboriginal Land Trust for use by the sublease holder when the holder no longer requires them of EP187; as long as this meets legal compliance with the regulator and landholder. Imperial Oil & Gas does not intend to convert exploration wells to water bores when they are no longer required.

Cash Compensation

Additional Services

Imperial Oil & Gas is interested in engaging Section 19 Leaseholders for services that can be rendered to assist the field activities, e.g. fencing, weed management, water haulage etc. If you can offer these or other services, please provide details.

Contacts

For any queries related to Imperial Oil & Gas's upcoming activities, please contact:

Name: xxxxxxxxxxxx

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Phone: xxxxxxxxxxxx

EP187 -2021-25 Work Program

Relief Creek

Legend

-  2019 Seismic - Line
-  2021 Seismic - Line
-  New Access Track and Wastewater Flowline
-  New Wellpad
-  Relief Creek

CSP AB - R1

Google Earth

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Image © 2021 Maxar Technologies



10 km

1.3.11 Correspondance; West Balbaini - 05/04/2021
Imperial Oil & Gas 2021-25 Seismic and Drilling program – West Balbarini

Dear

As Imperial Oil & Gas representatives have discussed with you, a proposed Seismic, Drilling, Hydraulic Fracturing and pipeline installation program will be carried out in EP187. Part of this program overlaps your Section 19 lease.

The current plan is to carry out the Seismic program in Q2 of 2021. And to start the drilling hydraulic fracturing and pipeline construction program in Q3 & Q4 of 2021 continued over subsequent years. If approvals are not obtained in time, the start of the programs may be delayed.

There is a formal agreement in place between Imperial Oil & Gas and Mambaliya Rrumburriya Wuyaliya Aboriginal Land Trust to carry out these activities, and a formal agreement is not required between Imperial Oil & Gas and the Section 19 sublease holders. However, Imperial Oil & Gas wants to continue to develop our positive working relationship and shared understanding with Section 19 sublease holders.

The proposed activities for West Balbarini are outlined in the attached map and activity area table.

Activity Area Table

Infrastructure	ID	Holding	Length (km)	Width	Area (Ha)
Seismic Line	6	West Balbarini	24.6	5	12.3
Seismic Line	5	West Balbarini	29.4	5	14.7
Seismic Line	1	West Balbarini	13	5	6.5
Seismic Line	2	West Balbarini	13	5	6.5
Seismic Line	3	West Balbarini	12.7	5	6.35
Seismic Line	4	West Balbarini	12.9	5	6.45
Wellpad	CSP AA	West Balbarini		0	12.25
Wellpad	CSP AC	West Balbarini		0	12.25
Wellpad	CSP AD	West Balbarini		0	12.25
Access Track	CSP AA	West Balbarini	10	6	6
Access Track	CSP AB	West Balbarini	16	6	9.6
Access Track	CSP AC	West Balbarini	12.2	6	7.32
Access Track	CSP AD	West Balbarini	17.7	6	10.62
Flowline	CSP AA	West Balbarini	10	6	6
Flowline	CSP AB	West Balbarini	16	6	9.6
Flowline	CSP AC	West Balbarini	12.2	6	7.32
Flowline	CSP AD	West Balbarini	17.7	6	10.62
Flowline	Carpentaria 1	West Balbarini	6.5	6	3.9

Seismic Lines

The equipment utilised for Seismic operations requires a 5m access track; Imperial Oil & Gas has lodged a clearing Permit that has a 100m wide buffer to operate in.

In areas where the timber is sufficiently open, graders will be utilised and avoid mature trees (by meandering around trees whilst maintaining their position within the 100m buffer) to give the 5m access.

In areas of lancewood and denser vegetation, it will require clearing a 5m path to allow the Vibroseis buggies to traverse the seismic line.

Line clearing and preparation will be carried out with a bulldozer and grader to sweep the ground surface of large rocks and fallen timber sufficient to provide safe access for vehicles, good ground contact of the geophones and to minimise the risk of fire. Where lines go through lancewood, the line will be cleared by pushing timber clear of the line with the bulldozer.

In open grassy areas where ground visibility is good, raised blade clearing will be utilised to reduce ground disturbance. This area of raised blade clearing is unknown due to the changing seasonal nature of grass cover, however will be deployed wherever possible.

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Water

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Cash Compensation

Additional Services

Imperial Oil & Gas is interested in engaging Section 19 Leaseholders for services that can be rendered to assist the field activities, e.g. fencing, weed management, water haulage etc. If you can offer these or other services, please provide details.

Contacts

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Email: xxxxxxxxxx

Phone: xxxxxxxxxx

EP187 - 2021-25 Work Program

West Balbarini

Carpentaria 1

CSP AA

CSP AC - R1

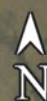
CSP AD - R1

Legend

- 2019 Seismic Line
- 2021 Seismic - Line
- Carpentaria 1
- Carpentaria 1 Access - new Wastewater Flowline
- New Access Track and Wastewater Flowline
- New Wellpad
- West Balbarini

Google Earth

Image © 2021 CNES / Airbus
Image © 2021 Maxar Technologies



10 km

Appendix 12 - Rehabilitation Management Plan

12. - Rehabilitation Management Plan

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12.1 Purpose

The purpose of this rehabilitation management plan is to meet the requirements set out in the *Code of Practice: Onshore Petroleum Activities in the Northern Territory*. All rehabilitation activities will be conducted following the Code of Practice (the Code) (DEPWS, 2019). Following completion of the rehabilitation works.

This rehabilitation plan has been written by a suitably qualified person to be appropriate to the scale and nature of the activity as described in the Environmental Management Plan.

12.2 Scope

The rehabilitation management plan applies to land disturbance as a result of the EMP IMP₄ and its revisions program that includes access roads, well leases and decommission after seismic, drilling, hydraulic fracturing activities and extended production testing.

Once a determination has been made to decommission an asset, site-specific strategies will also be implemented/developed to ensure the history (e.g. spills) of each disturbed area is taken into account.

As per the Code of Practice, rehabilitation will commence within 12 months of determining an asset is no longer required.

12.3 Final land use

The Rehabilitation Management Plan sets out the appropriate rehabilitation objectives and goals to achieve the environmental outcomes and ensure that all significantly disturbed land be reinstated to its pre-disturbed condition.

Imperial aims to ensure that all disturbed areas no longer required of the proposed activities are returned to, as close as possible, the pre-existing environmental condition. For areas that previous contained native vegetation, native vegetation will be re-established via natural regrowth, such that the corridors become ecologically integrated into the surrounding landscape.

Where an asset is no longer required for operations, the site will be rehabilitated using assisted natural regeneration back to a safe, stable landform that is integrated into the surrounding land use.

12.4 Rehabilitation goals

Imperials environmental rehabilitation goals are set out to be the high-level standard to which Imperial will show appropriate environmental compliance and the proper rehabilitation level has been met.

Rehabilitation goals are as follows:

- Removal of all wastewater residue from site
- Removal of all solid waste (drilling cuttings material) that does not meet criteria for unconfined burial (inert landfill) from site
- Removal of all petroleum activity infrastructure from site
- Removal of all rubbish and waste from site
- Removal of introduced or spread of weeds caused by the project activities
- Return all disturbed areas to a safe and stable landform, re-shaping it as close as possible to the surrounding environment
- Re-spread of stockpiled topsoil
- The re-establishment of native vegetation so that corridors become ecologically integrated into the surrounding landscape
- Monitoring and reporting rehabilitation progress following the closure of an area in compliance with Rehabilitation Plan Guide for Surface Disturbance: onshore petroleum exploration, September 2020
- No land management concerns from land managers/owners that are un-addressed

Following completion of the rehabilitation works, final photo point revisits and any required additional rehabilitation, Imperial will submit the final Environmental Reports to DITT and DEPWS along with the application to release the long-term Rehabilitation Security. Following the Environmental Closeout Procedures for Petroleum Activities (DITT, 2016), the final rehabilitation assessment and endorsement will be conducted by an appropriately qualified third party.

The success of the rehabilitation will be measured in regards to the following measurement criteria:

- Landholder and DEPWS agree in writing that the land supports the pre-disturbance land use
- Soil suitability and stability is equivalent to the surrounding soil unit
- No subsidence, erosion or introduced weeds species or weed species at levels higher than the surrounding environment
- A minimum of 70 % foliage cover and diversity of analogue sites is maintained in the rehabilitated sites.
 - Analogue sites will be established during the Baseline Ecological Assessment and will be reflective of each vegetation type/landform subject to ground disturbance
- Establish a density of habitat structures (litter cover, fallen woody material and hollow logs etc.) similar to the surrounding area
- Maintenance is no greater than that required for the land before its disturbance.

Where a site is rehabilitated, monitoring will be undertaken annually to assess the rehabilitation success and determine where additional remedial works are required.

12.5 Progressive rehabilitation plan

Imperial promotes methodologies for the progressive rehabilitation of areas no longer required for operational use. Progressive rehabilitation of significantly disturbed land, which is not required for the ongoing conduct of the approved regulated activities or future activities, will commence as soon as practicable, but no longer than 12 months following the cessation of activities on the land.

Below outlines the three progressive rehabilitation steps that Imperial will undertake in the lifecycle of the petroleum activities.

12.5.1 During Operations

During operations, the following will be in place to promote an easier rehabilitation transition for the petroleum activity site.

- Topsoil stockpiles stored around the edge of the well site lease in low profile mounds (<2m), on the upslope side, if the terrain is sloped, this is undertaken to ensure that any seed in the mounds is a viable option for re-spread on-site post operations.
- Vegetation stockpiles stored separately mounds
- Erosion and sediment devices installed per site-specific ESCP (Appendix 05)
- All waste stored following Appendix 06
- Weed management measure in place following Appendix 09.
- Maintenance of gravel pits, when required and still in used by:
 - Contouring of gravel pits to ensure drainage of disturbed area is directed to shallow, low-sloped voids (internal)
 - Consolidation of stockpiled subsoil material (to occupy minimal area).
 - Light contour ripping of reshaped surface.
 - Retention of perimeter bunds (topsoil)

12.5.2 After cessation of the petroleum activity

After cessation of the petroleum activity and disturbed land, which is not required for the ongoing conduct of the petroleum activities or future activities, will within the 12 months following have the below progressive rehabilitation steps be implemented.

- No wastes or infrastructure remaining in areas that are not required for the ongoing conduct of petroleum activities
- Any water-holding, waste or by-product holding facilities to be removed from the site following appropriate sampling and waste disposal methodologies if no longer required
- If contamination is detected, remediation to commence immediately following the spill management plan Appendix 07
- Hardstand areas to be deep ripped
- Topsoil evenly re-spread over the cleared area
- Vegetation stockpiles re-spread over the disturbed area
- Surface lightly scarified if required for water retention
- Inspections are undertaken to ensure no new weed species or invasive species detected within the immediate vicinity of the regulated activity

-
- Temporary erosion and sediment devices installed following site-specific ESCP (to be updated at the time of cessation of petroleum activities) to ensure soil stability post-progressive rehabilitation earthworks.
 - For gravel pits or sections within them that are no longer required, rehabilitation should start and include:
 - Removal of stockpiled subsoil material
 - Contouring by ripping and reshaping surface to ensure drainage of disturbed area is directed to shallow, low-sloped voids (internal)
 - Respread topsoil across disturbed surface at 50-100mm depth. Topsoil should be handled in damp condition, avoiding over-compaction or smooth surface (rough is preferred).
 - Placement of residual organic matter across reshaped landform, mixed with local native grass species if possible to encourage vegetation regrowth.
 - Prevent vehicles traffic entering rehabilitated gravel pits.

12.5.3 After Full Decommissioning

After the decommissioning of the petroleum activity, Imperial is dedicated to the full rehabilitation of all environmental aspects resulting from its operations. Including, but not limited to the following in the aim to achieve the rehabilitation goals.

- All petroleum activity to be decommissioned following industry best practice, the WOMP and DITT approval
- No wastes remaining on the activity location
- No infrastructure to be remaining on location.
- Any water-holding, waste or by-product holding facilities to be removed from the site following appropriate sampling and waste disposal methodologies if no longer required
- All hardstand areas to be deep ripped
- Topsoil to be evenly spread over any cleared area
- Vegetation, if available to be spread over the disturbed areas
- Any disturbed area to be lightly scarified if required for water retention
- Inspections are undertaken to ensure no new weed species or invasive species detected within the immediate vicinity of the regulated activity
- Temporary erosion and sediment devices installed following site-specific ESCP (to be updated at the time of full decommissioning) (IECA, 2019), and DLRM best practice principles and guidelines to ensure soil stability post-progressive rehabilitation earthworks.
- Continue all sampling and data collection as required
- If contamination is detected, remediation to commence immediately following the spill management plan Appendix 07

12.6 Rehabilitation Success

Rehabilitation site success is identified through information obtained in the pre-disturbance land condition assessment and adjacent vegetation communities. Some of the risks to rehabilitation success and proposed actions to address include:

- Erosion & sediment impacts occurring before the vegetation has a chance to establish. An ESCP will be developed specifically to the rehabilitation program to minimise this risk
- Climate - these sites are located in semi-arid locations, and if rainfall does not occur, it will impede/delayed revegetation.
- Lack of topsoil and soil inversion can impact the success of rehabilitation. The soils are to be returned to pre-disturbance soil profiles, and topsoil spread over the entire lease evenly.
- Weed infestations may hinder rehabilitation. Imperial will implement the weed management plan to minimise the risk of weed impacts
- Grazing of the well pad by the landowner's livestock could impact the success of the rehabilitation. The wellpad area will be fenced to limit impacts from grazing during rehabilitation.
- Although grazing will impact rehabilitation, linear infrastructure will not be fenced during rehabilitation.

Table 3 details the performance standards and measurement criteria that Imperial will implement to assess the success of rehabilitation.

12.7 Monitoring and maintenance program

Imperial will undertake regular maintenance and at least yearly monitoring of rehabilitated areas to measure compliance against this Rehabilitation Plan. This monitoring and maintenance process will be repeated after each program is completed or after the closure of any site/infrastructure that is not required for future activities.

To ensure success in the rehabilitation process and effective monitoring that provides a balanced representation of the ground condition and various landform and vegetation types encountered before clearance, photo points will be established at each wellsite. Each photo point will be geo-referenced and is captured digitally to ensure consistency.

Table 1 details the actions and proposed timing for the rehabilitation of sites disturbed under this EMP.

Refer to “Table 25. Monitoring plan” of the Environmental Management Plan for details of Rehabilitation Monitoring

Table 2 presents the Monitoring, Maintenance, and Reporting plan required to meet the environmental outcomes and rehabilitation goals set in this plan.

Table 3 shows the Rehabilitation Measurement Criteria.

Table 1: Rehabilitation and Closure Plan Management Environmental Actions

Aspect	Factors Assessed/Actions	Timing
Actions	- Establish photo monitoring points to compare the appearance of rehabilitation areas to the surrounding environment. - Photos to be conducted at each monitoring event to compare progress.	As prescribed
Reporting	- Complete remediation of the lease pads - Removal of all surface infrastructures - Visual inspection/photo points after the remediation	After the remediation/project.

Table 2: Monitoring, Maintenance, and Reporting plan

Timing	Monitoring Inspection Criteria	Maintenance	Reporting
Immediately after any rehabilitation works completed	Review implementation of work undertaken against the Rehabilitation Management Plan requirements. Review of rehabilitation works and ability for future rehabilitation success against the environmental outcomes and rehabilitation goals.		Include rehabilitation and maintenance activities in annual reports
Year 1 after full decommissioning	Rehabilitated land will be reviewed post first wet season after site closure works to determine the following: Appropriate implementation of ESCP stability of soil, landform Vegetation establishment type and re-growth No new weeds or invasive species.	Repair and reinstate ESC controls as required Assist re-establishment in areas where it is not occurring Treat and remove weeds as required	Include monitoring results and maintenance activities in annual reports
Year/ 2-ongoing after site decommissioning.	Yearly inspection post wet season of any areas that have not deemed as rehabilitated and the security returned to determine the following; Appropriate implementation of ESCP stability of soil, landform Vegetation establishment type and re-growth No new weeds or invasive species Long term rehabilitation success measured by landform stability and vegetation re-growth	Repair and reinstate ESC controls as required Assist re-establishment in areas where it is not occurring Treat and remove weeds as required	Include monitoring results and maintenance activities in annual reports

All rehabilitation monitoring activities are scheduled around post wet seasons, re-entry to the leases will be subject to weather/road conditions and current activity of the region.

Table 3. Rehabilitation measurement criteria

Rehabilitation Outcome	Performance Standard	Measurement Criteria	Justification
Impacted land to resemble pre-operation state	Access tracks and seismic lines are indistinguishable from the surrounding area/vegetation, other than maturity of trees	- Ground cover - 70% foliage cover and density of the surrounded area - No evidence of soil subsidence and >2% erosion across the site (qualitative – photo evidence of scarring, rill/sheet erosion) - Rehabilitation sites achieves: 70% vegetation cover of same composition as surrounded area, and 50% of the organic litter and coarse woody debris of the surrounded area	- Species richness shows the rehabilitation site can support the full complement of species from analogue sites, even if not all species are yet at the same abundance - In arid regions soil stability is critical for the success of rehabilitation - Cover equivalent to 70% of the surrounded area is likely to self sustain over time and ecologically integrated with local vegetation
	No introduction or spread of weeds caused by the proposed program	- No declared weed species under the Northern Territory Weeds Management Act - No greater abundance of common weed species than in the local vicinity	By undertaking pre and post operational weed impact surveys the pre-operation state can be determined.
	Vegetation composition of the rehabilitation is of the same composition as the surroundings (e.g. type, density)	- Ground cover - 70% foliage cover and density of the surrounded area - Rehabilitation sites achieves: 70% vegetation cover of same composition as surrounded area, and	- Species richness shows the rehabilitation site can support the full complement of species from analogue sites, even if not all species are yet at the same abundance - Cover equivalent to 70% of the surrounded area is likely to self

Rehabilitation Outcome	Performance Standard	Measurement Criteria	Justification
		0 50% of the organic litter and coarse woody debris of the surrounded area	sustain over time and ecologically integrated with local vegetation
Stable Landform	No adverse erosion caused from Imperial activities	• Vegetation have established, stabilising soils and reducing erosion potential • No evidence of soil subsidence and >2% erosion across the site (qualitative – photo evidence of scarring, rill/sheet erosion)	In arid regions soil stability is critical for the success of rehabilitation
No impact on groundwater resources	Water characteristics are the same or have not significantly changed from the baseline groundwater monitoring	Ground water monitoring program to show major difference to ground water quality and availability.	Quality and quantity of available groundwater resources are expected by the community.

12.8 Rehabilitation reporting

Imperial will submit to the DEPWS an annual rehabilitation report with the information including:

- Area of disturbed land available for rehabilitation at the start of the reporting period
- Area of disturbance that occurred during the reporting period
- Area where rehabilitation commenced during the reporting period
- Area of disturbed land remaining to be rehabilitated at the end of the reporting period (including land not currently available for rehabilitation as it is still required for the activities to be undertaken as described in the EMP)
- Photographic monitoring point GPS locations and results of monitoring undertaken during the reporting period
- Geospatial files showing areas under rehabilitation in comparison to areas disturbed
- Progressive rehabilitation progress and outcomes as per activities outlined in Section 12.5
- Outcome of erosion and sedimentation assessments and corrective actions
- Outcome of stakeholder consultations related to rehabilitation
- Any issues that may have affected the rehabilitation success factors noted in Section 12.6, and remedial actions are taken or required to be undertaken to allow the success factor to be realised
- Outcome of monitoring of remediated contaminated sites (if any)
- Outcome of weed monitoring in rehabilitated areas

References

- DEPWS. (2019, May). *Code of Practice: Onshore Petroleum Activities in the Northern Territory*. Retrieved July 2020, from Department of Environment and Natural Resources: https://denr.nt.gov.au/__data/assets/pdf_file/0011/705890/code-of-practice-onshore-petroleum-activity-nt.pdf
- DITT. (2016, November). *Environmental Closeout Procedures for Petroleum Activities*. Retrieved October 2020, from Department of Primary Industry and Resources: <https://frackinginquiry.nt.gov.au/submission-library?a=449380>
- IECA. (2019). *Best Practice Erosion and Sediment Control (BPESC) document*. Retrieved November 2020, from International Erosion Control Association: <https://www.austieca.com.au/publications/free-downloads>

Appendix 13 - Traffic Impact Assessment



MCARTHUR BASIN ACCESS REVIEW
CARPENTARIA HIGHWAY, NORTHERN TERRITORY
TRAFFIC IMPACT ASSESSMENT



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Client: Imperial Oil and Gas

Client contact: Adrian Gallagher (Fyfe Pty Ltd)

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1. EXECUTIVE SUMMARY

CIRQA has been engaged to undertake a review of the traffic aspects associated with Imperial Oil and Gas' drilling program in the McArthur Basin, McArthur, Northern Territory. Specifically, CIRQA has been requested to prepare a Traffic Impact Assessment (TIA) of the proposed access arrangements on the Carpentaria Highway for the exploration program.

This report summarises the traffic review undertaken of the access arrangements. The review has been prepared in accordance with the Austroads' *"Guide to Traffic Management – Part 12: Impacts of Developments"* (including general adoption of its recommended report structure).

The subject exploration program comprises seismic acquisition, civil constructions, drilling, stimulation and testing in relation to the drilling of seven wells on 'Mambaliya Rumburriya Wuyaliya' (NT Portion 5706). Vehicle access to the well sites will be provided via two access points on the Carpentaria Highway.

An existing accommodation camp will be used as part of the subject program. The campsite is understood to be located adjacent the Carpentaria Highway, with direct access to/from the highway.

Assessment of the turning warrants against the requirements of the Austroads' Guide indicates that formalised separate turn lanes are not warranted. Furthermore, the Austroads' Guide also indicates that appropriate sight distances can be established at each of the three access points.

Assessment of the additional traffic associated with the construction of the subject wells indicates that up to 78 weekly vehicle movements could be generated by Imperial Oil and Gas' exploration program. These movements will be distributed to the Carpentaria Highway via the three well site intersections and associated camp access. Such movements will readily be accommodated at the access points and on the adjacent road network.

2. PROPOSED DEVELOPMENT

2.1 BACKGROUND DEVELOPMENT

Access to the well sites will be provided via private unsealed roadways. The roadways will intersect with the Carpentaria Highway, providing connectivity to the broader road network.

Access to the campsite will be provided directly via the Carpentaria Highway.

2.2 DESCRIPTION OF ON-SITE DEVELOPMENT

2.2.1 LAND USE AND INTENSITY

The land use comprises seven new wells and a campsite within the subject site. The intensity of traffic movements associated with the proposal will be low and it is anticipated that the highest level of traffic generation will occur during the construction phase (as detailed below).

2.2.2 LOCATION

The wells will be located on 'Mambaliya Rrumburriya Wuyaliya', approximately 202 km east of the Carpentaria Highway and Stuart Highway intersection, and 60 km west of Cape Crawford.

Specifically, wells 'CARP AA' and 'CARP AB' will be accessed via an access road connecting to the Carpentaria Highway ('Intersection 3'), located approximately 202.3 km east of the Stuart Highway/Carpentaria Highway intersection along the Carpentaria Highway (-16.739356589, 135.110517631). The well sites will be located north of the Carpentaria Highway and will be accessed via a new private (unsealed) roadway.

It should be noted that the terrain between wells 'CARP AA' and 'CARP AB' is somewhat unknown. Should it be determined that an internal access road between the two wells is unfeasible, a second access road (for 'CARP AB') will be constructed connecting to the Carpentaria Highway ('Intersection 1'). This access would be located 206.8 km (approx.) east of the Stuart Highway/Carpentaria Highway intersection (-16.735668644, 135.152638619).

The remaining wells ('Carpentaria 1', 'CSP AA', 'CSP AB', 'CSP AC', and 'CSP AD') will be accessed via an access road connecting to the Carpentaria Highway ('Intersection 2'), located 212.6 km east of the Stuart Highway/Carpentaria Highway along the Carpentaria Highway (-16.731689019, 135.207000917). The well sites will be located south of the Carpentaria Highway and will be accessed via a new private (unsealed) roadway.

Finally, the existing campsite access is located approximately 212 km east of the Stuart Highway/ Carpentaria Highway along the Carpentaria Highway (-16.7322247, 135.199918). The campsite has been constructed within close proximity to the Carpentaria Highway (albeit with appropriate setbacks for vehicle manoeuvring and queuing).

2.2.3 ZONING

The subject wells (and associated campsites) are not located within a Zone defined by the Northern Territory Planning Scheme (NTPS).

2.2.4 PHASING AND TIMING

The subject exploration program is anticipated to be undertaken over a two-year period. An indicative project schedule has been prepared by InGauge, outlining the various activities throughout the program as well as their expected commencement and duration. Table 1 illustrates the indicative project schedule.

Table 1 – Indicative project schedule provided by InGauge

Phase	Activity	Estimated Commencement	Estimated Duration
A	2D Seismic Program	Q2 2021	Six weeks
B	Civil Construction for Carpentaria 2	Q3 2021	Four weeks
C	Civil Construction for Carpentaria 3	Q3 2021	Four weeks
D	Drilling, including testing and evaluation of Carpentaria 2	Q3 2021	4-6 weeks
E	Drilling, including testing and evaluation of Carpentaria 3	Q3 2021	4-6 weeks
F	HF of proposed Carpentaria 2	Q3 2021	Two weeks
G	Extended Production T and flowback fluid management of Carpentaria 2	Q3 2021	Three Months
H	Drilling, including testing and evaluation of Carpentaria 1 & 3 laterals, and Carpentaria 4, 5, 6, & 7	2022	4-6 weeks (each)
I	HF of proposed Carpentaria 1 lateral and Carpentaria 2	2022	Two weeks (each)
J	Extended Production Testing and flowback fluid management of Carpentaria 1 lateral and Carpentaria 2 (each)	2022	Three Months
K	HF of proposed Carpentaria 3, 4, 5, 6, & 7	2023	Two weeks (each)
L	Extended Production Testing and flowback fluid management of proposed Carpentaria 3, 4, 5, 6, & 7 (each)	2023	Three Months

Phase	Activity	Estimated Commencement	Estimated Duration
M	Installation of water pipeline between wellpads	To be determined	Four weeks (each)
N	Well suspension, Plugging and Abandonment	To be determined	Four weeks (each)

The exploration program is expected to commence in the second quarter of 2021 (upon receipt of relevant planning approvals and other relevant considerations).

3. EXISTING AREA CONDITIONS

3.1 STUDY AREA

3.1.1 AREA OF INFLUENCE

The study area is contained to parcel of land 5706 (referred to as NT Por 5706 or 'Mambaliya Rrumburriya Wuyaliya') and does not include adjacent/neighbouring properties. Figure 1 illustrates the subject parcel of land with regard to the adjacent road network.

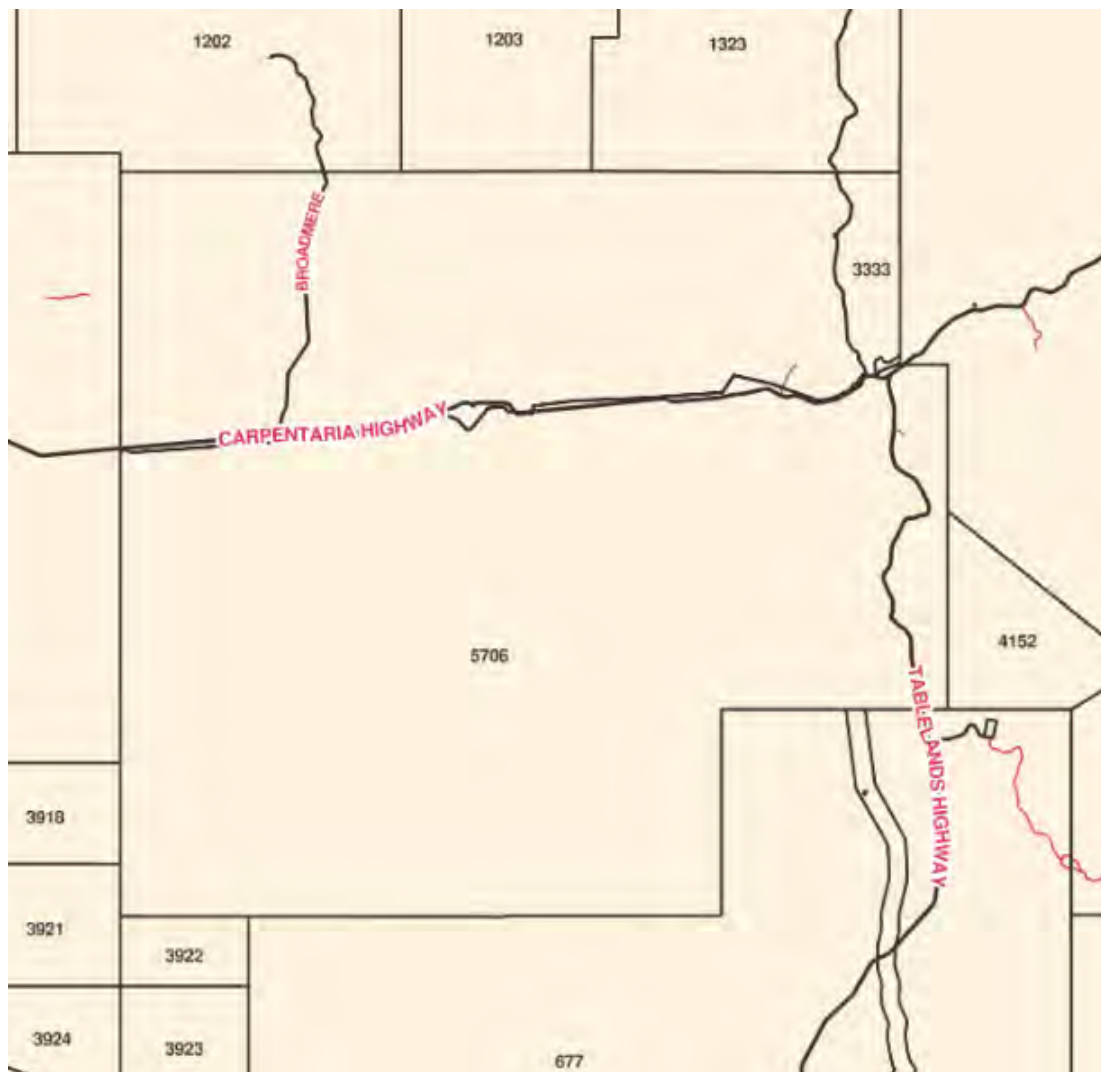


Figure 1 – The subject parcel of land (NT Por 5706) (Source: Northern Territory Government, 2019)

3.1.2 AREA OF SIGNIFICANT TRANSPORTATION IMPACT

The adjacent road network will easily accommodate the increased traffic generation associated with the subject site. The primary impact will generally be

limited to the access points on Carpentaria Highway. Further discussion of traffic volumes and their associated impacts are provided below.

3.2 STUDY AREA LAND USE

3.2.1 EXISTING LAND USES

The subject parcel of land is currently used as a cattle station. The parcels of land bounding 'Mambaliya Rrumburriya Wuyaliya' are primarily cattle stations and are named as follows:

- **North**
 - NT Por 1202 ('Broadmere' – Private ownership)
 - NT Por 1203 ('Jandanku' – Aboriginal Lands)
 - NT Por 1323 (Unknown – Unregistered Crown Land)
- **East**
 - NT Por 3333 (Unknown – Private ownership)
 - NT Por 4319 ('McArthur River' – Private ownership)
 - NT Por 4152 ('Mallapunyah Springs' – Private ownership)
- **South**
 - NT Por 677 ('Mallapunyah Springs' – Private ownership)
 - NT Por 2101 ('Mallapunyah Springs' – Private ownership)
 - NT Por 3922 (Unknown – Private ownership)
- **West**
 - NT Por 702 ('Beetaloo Station' – Private ownership)
 - NT Por 3918 (Unknown – Private ownership)
 - NT Por 3921 (Unknown – Private ownership)

3.2.2 EXISTING ZONE

The subject wells (and associated campsites) are not located within a Zone defined by the NTPS.

3.2.3 ANTICIPATED FUTURE DEVELOPMENT

Within the study area, no other development is anticipated in the near future. It is understood that other drilling programs are in the process of being undertaken within the broader area. However, the likelihood of peak traffic movements associated with the various projects aligning is considered limited.

3.3 SITE ACCESSIBILITY

3.3.1 AREA ROADWAY SYSTEM

Within the study area, the only public road is the Carpentaria Highway.

The Carpentaria Highway forms part of the 'Highway 1' network and is under the care and control of the Northern Territory Government. Between the Stuart Highway and the study area, the Carpentaria Highway generally comprises a central sealed traffic lane with unsealed shoulders on both sides. Frequent two-way width sealed areas are located along the length of the Carpentaria Highway.

Furthermore, it is noted that the Carpentaria Highway (between Borroloola and the Carpentaria Highway/Tablelands Highway intersection) comprises of a continuous two-way width seal.

The Carpentaria Highway is subject to a 100 km/h speed limit.

3.3.2 TRAFFIC VOLUMES AND CONDITIONS

3.3.2.1 CARPENTARIA HIGHWAY

Traffic data has been obtained from the Northern Territory Government for one primary (permanent) and two coverage counter stations along the Carpentaria Highway. The key stations and their respective locations are as follows:

- **RKVDP008** (*primary*) – 44 km east of the Stuart Highway;
- **RTVDC031** (*coverage*) – 5 km west of Tablelands Highway; and
- **RTVDC033** (*coverage*) – 5 km east of Tablelands Highways.

Traffic data (in the form of Annual Average Daily Traffic volumes) has been obtained at each of the above counter locations over a 10-year period (from 2010 to 2019 inclusive). Table 2 illustrates the Annual Average Daily Traffic (AADT) volumes recorded at the above counter stations along the Carpentaria Highway.

Table 2 – Yearly AADT count data from counter stations along the Carpentaria Highway

Year	RKVDP008	RTVDC031	RTVDC033
2010	49	57	81
2011	58	N/A	N/A
2012	74	68	97
2013	73	N/A	N/A
2014	70	75	97
2015	73	85	N/A
2016	68	70	84
2017	66	N/A	N/A
2018	64	69	93
2019	79	N/A	N/A

In addition to the above, monthly data has been obtained at the primary counter station location (2 km east of the Stuart Highway) for the last available year (2019). The data illustrates the variation in traffic volumes across the calendar year as well as the respective 'seasonal factor'. The data obtained is illustrated in Table 3.

Table 3 – Monthly traffic count data (from detector RKVDP008) and respective seasonal adjustment factors

Month	AADT	Seasonal Factor
January	37	0.49
February	46	0.61
March	61	0.80
April	64	0.84
May	81	1.07
June	104	1.37
July	117	1.54
August	118	1.55
September	84	1.11
October	83	1.09
November	71	0.93
December	53	0.70

As illustrated in Table 3, traffic volumes on the Carpentaria Highway are lower during the summer months of the year. This is due to the roadway being subject

to restrictions associated with the 'wet season' and a reduced level of roadway safety being associated with large commercial vehicle movements.

Typical restrictions enforced on the Carpentaria Highway during the 'wet season' include weight restrictions such as '100% legal axle group mass limits' (i.e. no over-mass vehicles) and maximum 'Gross Vehicle Masses' (GVM) such as light vehicles only. On rare occasions (i.e. extreme weather events), the Carpentaria Highway has been closed to all traffic movements.

3.3.3 TRANSIT SERVICE

No public transport services are provided within the vicinity of the study area.

3.3.4 PEDESTRIANS AND CYCLISTS

Given the site's remote nature, pedestrian and cyclist movements along the Carpentaria Highway would be extremely unlikely and are not expected to occur.

4. PROJECT TRAFFIC

4.1 PROPOSED SITE ACCESS

4.1.1 INTERSECTION 1

Should access between wells 'CARP AA' and 'CARP AB' be unfeasible internally within subject land, a third access would be constructed on the Carpentaria Highway. The private roadway will intersect with the Carpentaria Highway at a priority controlled (Give Way) T-intersection, located approximately 206.8 km east of the Stuart Highway. All turning movements will be permitted at the intersection.

4.1.2 INTERSECTION 2

Access to wells 'Carpentaria 1', 'CSP AA', 'CSP AB', 'CSP AC', and 'CSP AD' is proposed via the use of the Carpentaria Highway and a new private unsealed roadway. The private roadway will intersect with the Carpentaria Highway at a priority controlled (Give Way) T-intersection, located approximately 212.6 km east of the Stuart Highway. All turning movements will be permitted at the intersection.

4.1.3 INTERSECTION 3

Access to wells 'CARP AA' and 'CARP AB' is initially proposed via the use of the Carpentaria Highway and a new private unsealed roadway. The private roadway will intersect with the Carpentaria Highway at a priority controlled (Give Way) T-intersection, located approximately 202.3 km east of the Stuart Highway. All turning movements will be permitted at the intersection.

4.1.4 CAMPSITE

Access to the campsite will remain directly from the Carpentaria Highway. The campsite is understood to form a priority controlled (Give Way) T-intersection, located approximately 212 km east of the Stuart Highway. All turning movements are permitted at the intersection.

4.2 TRAFFIC GENERATION

Forecast vehicle movements have been provided by Imperial Oil and Gas for each item of the exploration program schedule. It should be noted that volumes have only been provided for the exploration program and not the operation of the well (albeit it is expected that volumes associated with its operation will be lower than those of the exploration program). The information provided by Imperial Oil and Gas is illustrated in Table 4.

Table 4 – Forecast vehicle movements associated with Imperial Oil and Gas's proposed exploration program.

Activity	Truck Movements	Movement Occurrence
Food Truck Delivery	1	Each week during D, E, F, H, I & K
Rubbish and Waste Removal	1	Each week during D, E, F, H, I & K
Potable Water	1	Each week during D, E, F, H, I & K
Fuel Delivery	1	Each week during D, E, F, H, I & K
Drilling Rig	30	Start and end of D, E & H
Completions Rig	10	End of F, I & K
HF Spread	20	Start and end of F, I & K
Material Delivery	60	1/3 at the start of D, E & H 2/3 at the start F, I and K

On the basis of the information provided by InGauge (illustrated in Table 4), the following weekly traffic generation volumes (trucks) have been determined:

- 54 truck movements each at beginning of phases D, E and H;
- 34 truck movements each at end of phases D, E and H;
- 64 truck movements each at beginning of phases F, I and K; and
- 34 truck movements each at end of phases F, I and K.

In addition to the above, InGauge has advised that:

- 1 light vehicle movement will occur each day during phases A, B and C; and
- 2 daily vehicle movements will occur each day during phases D, E, F, H, I & K.

Taking into consideration the additional light vehicle forecasts, the peak weekly traffic generation associated with the exploration program will occur at the beginning of phases F, I & K (i.e. at the beginning of the HF phases). During the initial week, in the order of 78 vehicles (64 truck and 14 light) are anticipated to access a given well site.

However, it should be noted that the HF spread of multiple well sites will not occur simultaneously (i.e. HF of wells 3-7 in phase H will occur consecutively). Furthermore, given that multiple wells will be accessed by each intersection, vehicle movements associated with HF activities will not be required to access the external road network between each well. The peak period associated with the exploration program will therefore only occur at the beginning of an HF phase (when HF spread and material deliveries occur simultaneously) for two of the well sites (one well located to the north of the Carpentaria Highway and one well located to the south). This is due to the transportation of equipment associated with the HF spread.

On the basis of the above, this assessment has therefore excluded detailed traffic impacts at other times. This is considered to be a conservative approach as the assessment outlined below represents the worst-case scenario with regard to traffic volumes using the broader road network.

4.3 TRAFFIC DISTRIBUTION & MODAL SPLIT

A high-level traffic distribution has been provided by InGauge with regard to subject exploration program. Within the initial week of an HF phase for a given well, the following vehicle movements are forecast:

- 14 light vehicle movements will occur between the camp and well site per week (2 vehicles per day);
- 20 truck movements associated with HF spread will occur between Queensland, Darwin and South Australia per week (3 trucks per day);
- 40 truck movements associated with materials deliveries will occur between Queensland, Darwin and South Australia per week (6 trucks per day);
- 1 truck movement associated with the delivery of food will occur between Queensland, Darwin and South Australia per week (less than 1 truck per day);
- 1 truck movement associated with the rubbish and waste removal will occur between Queensland, Darwin and South Australia per week (less than 1 truck per day);
- 1 truck movement associated with the delivery of potable water will occur between Queensland, Darwin and South Australia per week (less than 1 truck per day); and
- 1 truck movement associated with the delivery of fuel will occur between Queensland, Darwin and South Australia per week (less than 1 per truck day).

The information also identifies that the majority of truck movements (approximately 50%) will occur to/from Queensland (i.e. east of the subject area via the Carpentaria Highway and Tablelands Highway), with the remaining portion

being split evenly between Darwin (north via the Carpentaria Highway and Sturt Highway) and South Australia (south via the Carpentaria Highway and Stuart Highway). All truck movements are assumed to be 53.5 m Road Trains (A-Triples).

4.4 TRIP ASSIGNMENT

Based upon the above information, daily traffic volumes have been determined for the HF works at the beginning of a phase. Daily traffic forecast volumes along each key section of road are as follows:

- Darwin to Daly Waters (Stuart Highway north of Carpentaria Highway) – 7 two-way truck movements per day;
- Adelaide to Daly Waters (Stuart Highway south of Carpentaria Highway) – 7 two-way truck movements per day;
- Daly Waters to subject area (Carpentaria Highway west of a given intersection) – 14 two-way truck movements per day;
- Queensland to the subject area (Carpentaria Highway east of a given intersection) – 14 two-way truck movements per day;
- Campsite to subject area (Carpentaria Highway east of a given intersection) – 4 two-way light vehicle movements per day.

It should be reiterated that the above traffic volumes are considered to represent the maximum daily traffic volumes anticipated throughout the drilling program. This is due to higher vehicle movements anticipated at the beginning of each HF period than what would occur during other phases.

4.5 FUTURE TRAFFIC

It is not considered necessary to analyse 'future traffic' volumes along the Carpentaria Highway as part of this assessment. This is due to the following reasons:

- the traffic volumes identified in Section 4.4 are associated with the HF phase of the project (which is expected to be complete in 2023) and are considered to represent the 'worst-case' scenario;
- existing traffic volumes along the Carpentaria Highway are very low;
- traffic volumes recorded at the primary counter station (2 km east of the Stuart Highway) have changed negligibly over the last available 10-year period; and
- no significant traffic generating development is expected to occur within the vicinity of the site during the construction phase of the drilling and completions program.

4.6 TOTAL TRAFFIC

Based upon the traffic volumes identified in Section 3.3.2, total traffic volumes have been forecast on various sections of the Stuart Highway and Carpentaria Highway for the beginning of an HF phase within Imperial Oil and Gas's exploration program. Total traffic volumes (i.e. existing volumes plus volumes related to an HF phase) are as follows:

- Darwin to Daly Waters (Stuart Highway north of Carpentaria Highway) – 477 vehicle movements per day;
- Adelaide to Daly Waters (Stuart Highway south of Carpentaria Highway) – 461 vehicle movements per day;
- Daly Waters to subject area (Carpentaria Highway west of a given intersection) – 93 vehicle movements per day;
- Queensland to the subject area (Carpentaria Highway west of a given intersection) – 83 vehicle movements per day;
- Campsite to subject area (Carpentaria Highway west of a given intersection) – 87 vehicle movements per day;

In addition to the above, total daily traffic volumes have been forecast for 'Intersection 1' (with the minor approach located south of the Carpentaria Highway), and 'Intersection 2' or 'Intersection 3' (both with the minor approach located north of the Carpentaria Highway).

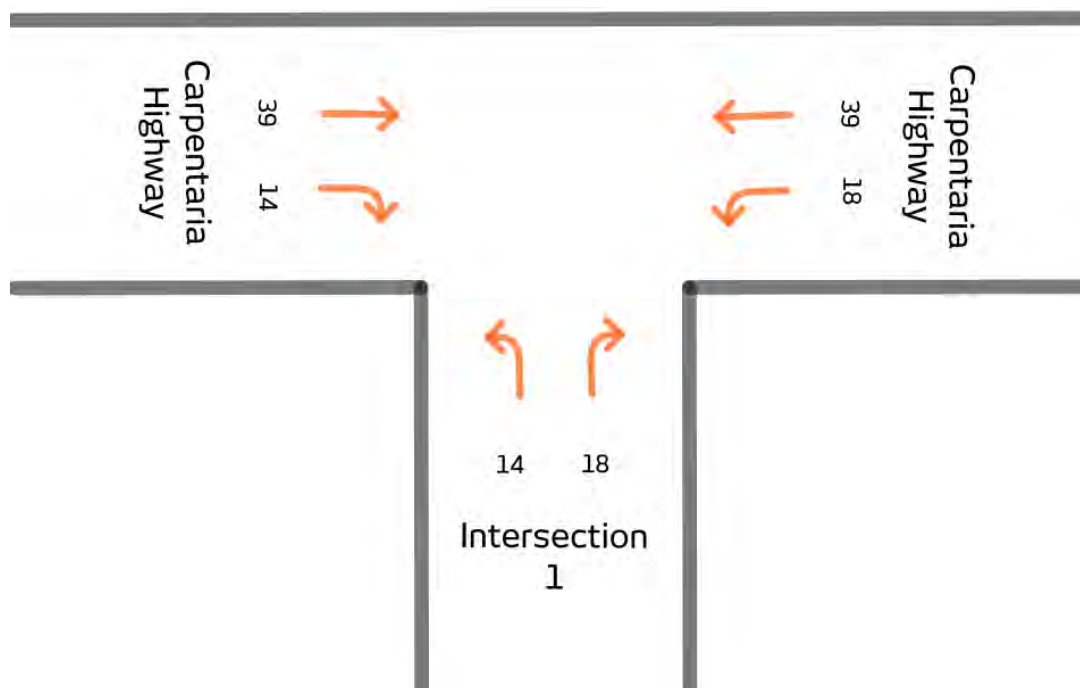


Figure 2 – Forecast daily traffic volumes at 'Intersection 1' at the beginning of an HF phase.

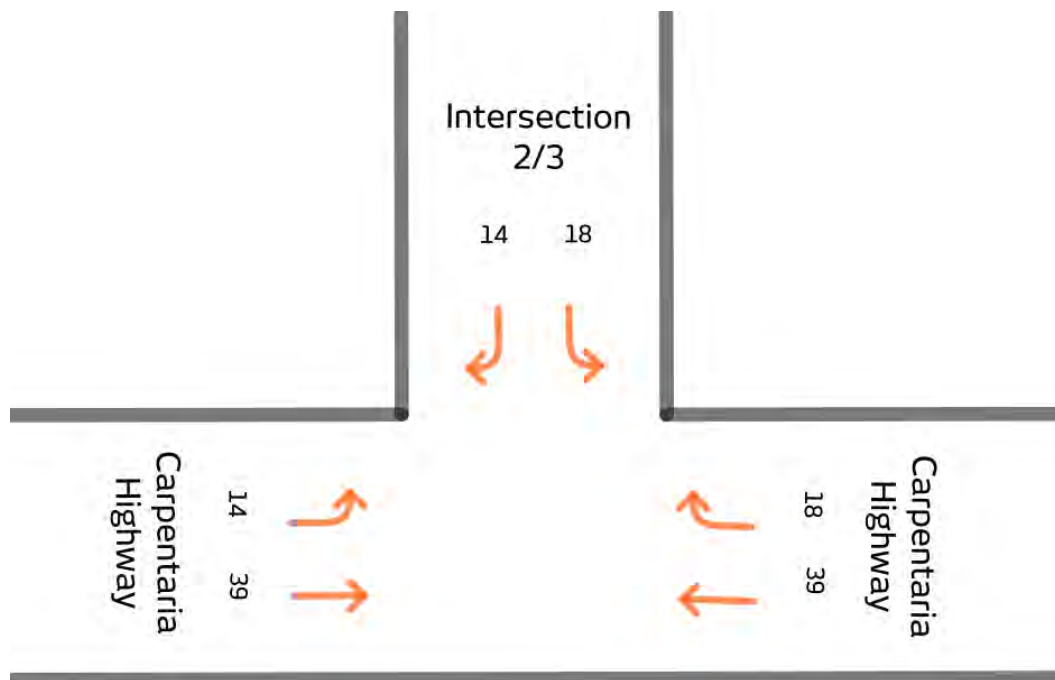


Figure 3 -Forecast daily traffic volumes at 'Intersection 2' (or 'Intersection 3') at the beginning of an HF phase.

5. TRANSPORTATION AND ANALYSIS

5.1 CAPACITY AND LEVEL OF SERVICE

5.1.1 CARPENTARIA HIGHWAY/INTERSECTION 1, 2/3

Given the low number of movements forecast to be associated with 'Intersection 1' or 'Intersection 2/3', the proposed access point will operate satisfactorily as a priority controlled (Give Way) T-intersection.

However, in order to determine if an intersection treatment is warranted, an assessment has been undertaken against the requirements of the relevant Austroads' Guidelines (Figure 2.26 (a) of the *"Guide to Traffic Management – Part 6: Intersections, Interchanges and Crossings"*).

Based upon the forecast peak hour traffic volumes (10% of the volumes identified in Figure 2 or Figure 3), the Austroads' Guide identifies that Basic Left-turn (BAL) and Basic Right-turn (BAR) treatments are required (i.e. no separated turn lanes are warranted).

5.1.2 CARPENTARIA HIGHWAY/CAMPSITE ACCESS

As the existing traffic volumes on the Carpentaria Highway and the forecast traffic movements associated with the campsite are very low, the proposed access point will operate satisfactorily as a priority controlled (Give Way) T-intersection (i.e. no separated turn lanes are warranted).

Taking into consideration peak hour traffic volumes at the proposed intersection (approximately 10% of those identified in Section 4.6) and the requirements of Figure 2.26 (a) of the relevant Austroads' Guide, Basic Left-turn (BAL) and Basic Right-turn (BAR) treatments are required (i.e. no separated turn lanes are warranted).

5.2 TRANSPORTATION SAFETY

5.2.1 ROAD GEOMETRY

As identified in Section 3.3.1, the Carpentaria Highway generally comprises a single sealed traffic lane within the centre of the roadway, with wide unsealed shoulders on both sides. The Austroads' *"Guide to Road Design – Part 3: Geometric Design"* identifies that on roads "... where traffic volumes less than 150 vehicles per day and, particularly, where terrain is open, single carriageways may be used". Such a scenario requires that "... one or both vehicles must have the outer wheels on the shoulders while passing".

As identified in Section 4.6, the Carpentaria Highway is not forecast to have daily traffic volumes above 150 vehicles per day (vpd) during the peak period of the

exploration program. On this basis, the annual average daily traffic (AADT) will remain below 150 vpd on the Carpentaria Highway. Conditions therefore will remain in line with the recommendations of the Austroads' Guide.

In addition, it is noted that the moving of large rig equipment may require light vehicle escorts to travel in front of and behind oversized vehicles. Given that such vehicles will be travelling in a group (of at least three vehicles) and that oncoming vehicles will have adequate warning to oversized vehicles (via the use of signage and flashing lights), the existing road geometry is considered to be appropriate.

5.2.2 SIGHT DISTANCE

A desktop sight distance assessment has been undertaken at subject access points on the Carpentaria Highway. Sight distance assessments have been undertaken based upon the requirements of Austroads' *"Guide to Road Design – Part 3: Geometric Design"* and *"Guide to Road Design – Part 4A: Unsignalised and Signalised Intersections"* for both cars and type two road trains. This is due to the differing speed environments in which the respective vehicles are permitted to travel.

Specifically, light vehicles are permitted to travel at the posted speed limit of 100 km/h and, as such, a design speed of 110 km/h has been adopted. However, with regard to road trains, such vehicles are restricted (by law and typically by a governing device installed within the vehicle) to a maximum of 90 km/h. As such, a design speed of 100 km/h has been adopted for such vehicles.

Due to the rural and remote nature of the Carpentaria Highway, an increased driver reaction time of 2.5 seconds (applicable to roads with large distances between towns and isolated features) has been adopted in the assessments.

A standard deceleration coefficient of 0.36 has been adopted for the assessment with the exception of the consideration of sight distance provisions for type two road trains (such as triple road trains), for which a deceleration coefficient of 0.26 has been adopted.

On the basis of the above, there would be a sight distance requirement of 301 m for light vehicles (based upon a design speed of 110 km/h) and 305 m for type two road trains (based upon a design speed of 100 km/h).

5.2.2.1 Carpentaria Highway/Intersection 1

At the Intersection 1/Carpentaria Highway intersection, the following sight distances were recorded:

- **West** - in excess of 500 m; and

- **East** – in excess of 500 m.

On the basis of the available sight distances identified above, adequate sight distance will be provided at the Intersection 1/Carpentaria Highway intersection for both light vehicles and type two road trains (photographs unavailable at this access location).

5.2.2.2 Carpentaria Highway/Intersection 2

At the Intersection 2/Carpentaria Highway intersection, the following sight distances were recorded:

- **West** - in excess of 500 m; and
- **East** – in excess of 500 m.

On the basis of the available sight distances identified above, adequate sight distance provisions will be achieved at the Intersection 2/Carpentaria Highway intersection for both light vehicles and type two road trains (photographs unavailable at this access location).

5.2.2.3 Carpentaria Highway/Intersection 3

At the Intersection 3/Carpentaria Highway intersection, the following sight distances were recorded:

- **West** - in excess of 500 m; and
- **East** – in excess of 500 m.

On the basis of the available sight distances identified above, adequate sight distance provisions will be achieved at the Intersection 3/Carpentaria Highway intersection for both light vehicles and type two road trains (photographs unavailable at this access location).

5.2.2.4 Carpentaria Highway/Campsite Access

At the campsite access road and the Carpentaria Highway intersection, the following sight distances were recorded:

- **West** - in excess of 500 m; and
- **East** – in excess of 500 m.

On the basis of the available sight distances identified above, adequate sight distance will be provided at the campsite access road/Carpentaria Highway

intersection for both light vehicles and type two road trains (photographs unavailable at this access location).

5.2.3 OVERSIZE OR OVERMASS VEHICLES

Imperial Oil and Gas intend to operate a small portion of oversize and/or overmass vehicles along the Carpentaria Highway. It is understood that Imperial Oil and Gas has applied to the Northern Territory Government for an 'oversize or overmass permit', and has since received a permit, to allow such vehicles to travel to/from the subject wells.

As part of the permit, it is understood that pilot/escorts will be required (in front of and behind) when the vehicle is oversize to forewarn vehicles approaching the oversize vehicle. Such requirements are common and considered to be acceptable with regard to the moving of oversize loads.

6. IMPROVEMENT ANALYSIS

6.1 IMPROVEMENTS TO ACCOMMODATE EXISTING TRAFFIC

6.1.1 CARPENTARIA HIGHWAY/INTERSECTION 1

Given the very low number of movements along the Carpentaria Highway and the negligible movements anticipated to be associated with the Intersection 1 access road, it is not considered that any upgrades are warranted to accommodate existing volumes.

6.1.2 CARPENTARIA HIGHWAY/INTERSECTION 2

Given the very low number of movements along the Carpentaria Highway and the negligible movements anticipated to be associated with the Intersection 2 access road, it is not considered that any upgrades are warranted to accommodate existing volumes.

6.1.3 CARPENTARIA HIGHWAY/INTERSECTION 3

Given the very low number of movements along the Carpentaria Highway and the negligible movements anticipated to be associated with the Intersection 3 access road, it is not considered that any upgrades are warranted to accommodate existing volumes.

6.1.4 CARPENTARIA HIGHWAY/CAMPSITE ACCESS

Given the very low number of movements along the Carpentaria Highway and the negligible movements anticipated to be associated with campsite access road, it is not considered that any upgrades are warranted to accommodate existing volumes.

6.2 IMPROVEMENTS TO ACCOMMODATE BACKGROUND TRAFFIC

For the reasoning identified in Section 4.5, traffic volumes are not expected to significantly increase within the next 10-year period. As such, no improvements (apart from general road maintenance) are considered to be warranted in order to accommodate 'background traffic'.

6.3 IMPROVEMENTS TO ACCOMMODATE TOTAL TRAFFIC

6.3.1 CARPENTARIA HIGHWAY/INTERSECTION 1

The proposed 'Intersection 1' on the Carpentaria Highway will be constructed to appropriately accommodate movements associated with the largest vehicles anticipated to access the site (53.5 m Road Trains). Preliminary drawings have been provided by Fyfe illustrating the proposed intersection layout (attached in Appendix A).

A concept plan illustrating associated signage provisions at proposed access (to adequately warn drivers associated with the site and through-bound movements on the Carpentaria Highway) is attached in Appendix B.

It should be noted that combined, the preliminary drawing and concept plan meets (and generally exceeds) the layouts shown on the Northern Territory Government's *"Guide to Rural Intersections Treatments Sheet 1 – Types 1 & 2"* (drawing no. C(S)1842-0).

6.3.2 CARPENTARIA HIGHWAY/INTERSECTION 2

Similarly to Intersection 1, the proposed Intersection 2 will be constructed to accommodate the movements of the largest vehicles which will be required to access the site (53.5 m Road Trains). The preliminary drawing attached in Appendix C illustrates the proposed design, while the signage layout in Appendix B illustrates appropriate signage provisions.

6.3.3 CARPENTARIA HIGHWAY/INTERSECTION 3

The proposed Intersection 3 will be constructed to accommodate the movements of the largest vehicles which will be required to access the site (53.5 m Road Trains). The preliminary drawing attached in Appendix D illustrates the proposed design, while the signage layout in Appendix B illustrates appropriate signage provisions.

6.3.4 CARPENTARIA HIGHWAY/CAMPSITE ACCESS

The campsite access is understood to have been constructed to accommodate the movements of vehicles up to 53.5 m in length (such as Road Trains). The concept layout shown in Appendix B illustrates the recommended signage provisions.

6.4 EVALUATION

On the basis of the above, it is considered that the additional vehicle movements generated by the proposed drilling program will be adequately accommodated with the following treatments:

- construction of the proposed access points in line with the preliminary drawings attached in Appendix A, C and D (as well as the signage as illustrated in Appendix B) in order to ensure that the largest vehicle anticipated to require access (53.5 m Road Trains) can be accommodated;
- appropriate work zone traffic management signage in accordance with the Australian Standards' *"Manual of uniform traffic control devices-Traffic control for works on roads"* (AS 1742:3-2009) at each of the three access points; and
- should construction be required during the 'wet season', additional work zone traffic management provisions should be implemented (for instance,

reduction in the posted speed limit in the vicinity of the access points). Additional maintenance on the condition of the access points may also be required.

7. FINDINGS AND RECOMMENDATIONS

7.1 SITE ACCESSIBILITY

Intersections 1, 2 and 3 (as well as the campsite access) will be provided via T-intersections of the Carpentaria Highway. The access points will accommodate the turn paths of heavy vehicles such as 53.5 m Road Trains. The access points will comply with the requirements of the Austroads' Guidelines in regard to turning warrants and sight distances.

7.2 TRANSPORTATION IMPACTS

The additional number of movements associated with the construction program will be very low. Based upon information provided by InGauge, daily traffic volumes along the Carpentaria Highway are not forecast to exceed 150 vpd throughout the duration of the exploration program. Accordingly, volumes are expected to remain well below the 150 vpd 'limit' associated with single (centrally sealed) carriageway rural roads as identified in the relevant Austroads' Guide. As such, the traffic volumes associated with the proposed exploration program will be readily accommodated.

Furthermore, the proposed access arrangements will be adequate to accommodate the forecast movements to/from the subject wells.

7.3 ROADWAY IMPROVEMENTS

7.3.1 CARPENTARIA HIGHWAY

On-going inspections and maintenance should be undertaken to ensure the integrity of both the sealed carriageway and unsealed shoulders is of an appropriate standard in the vicinity of the three access points.

7.3.2 CARPENTARIA HIGHWAY/INTERSECTION 1

Refer to Section 6.3.1, Appendix A and Appendix B.

7.3.3 CARPENTARIA HIGHWAY/INTERSECTION 2

Refer to Section 6.3.2 and Appendix C and Appendix B.

7.3.4 CARPENTARIA HIGHWAY/INTERSECTION 3

Refer to Section 6.3.3 and Appendix D and Appendix B.

7.3.5 CARPENTARIA HIGHWAY/CAMPSITE ACCESS INTERSECTION

Refer to Section 6.3.4 and Appendix B.

7.4 REPORTING

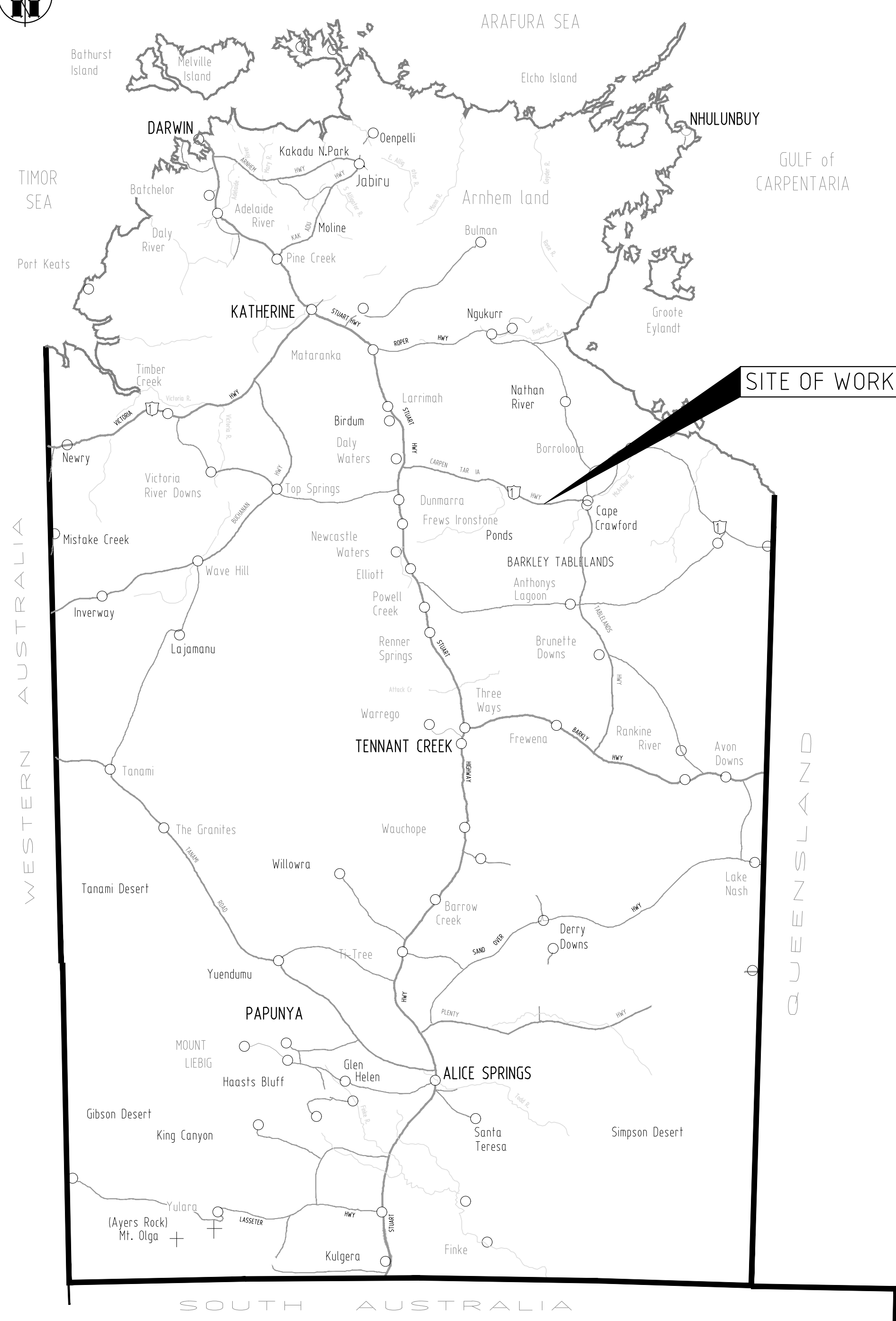
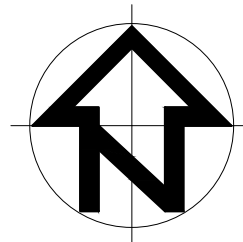
This report has been prepared in accordance with Austroads' *"Guide to Traffic Management – Part 12: Impacts of Developments"*. Specifically, this report has been prepared based upon the reporting structure outlined in Appendix C of the Austroads' Guide.

APPENDIX A

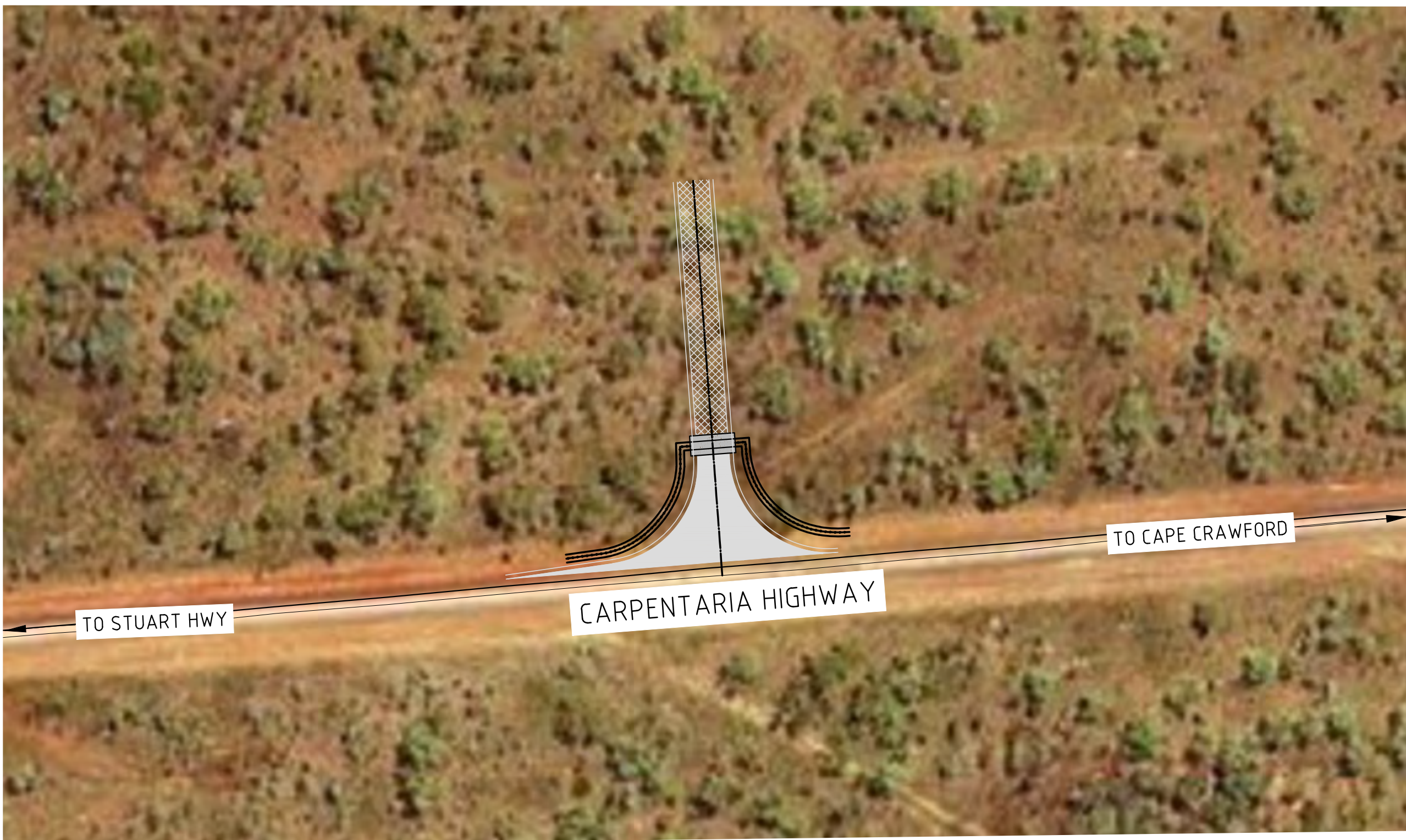
PLANS PREPARED BY FYFE

PRELIMINARY INTERSECTION 1 DRAWINGS

PROPOSED ROAD INTERSECTION ON CARPENTERIA HWY (CH. 206Km800 APPROX.) NORTHERN TERRITORY



LOCALITY PLAN
NOT TO SCALE



SITE PLAN
NOT TO SCALE

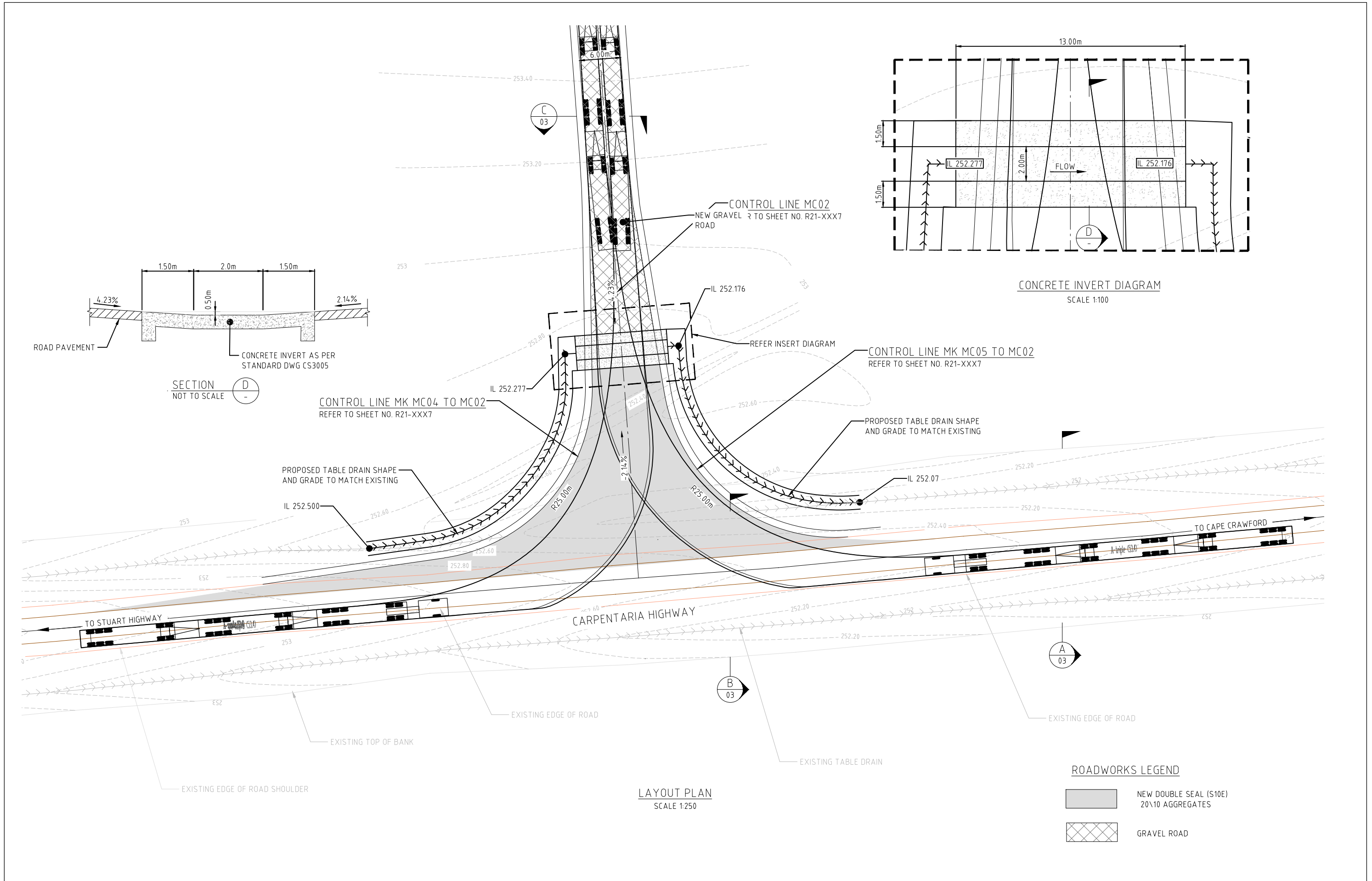
DRAWING SCHEDULE

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R21-XXX3	GENERAL CONSTRUCTION NOTES
R21-XXX4	ROAD TYPICAL SECTIONS AND DETAIL
R21-XXX5	EXISTING SURVEY FEATURES AND DEMOLITION PLANS
R21-XXX6	INTERSECTION LAYOUT PLAN
R21-XXX7	INTERSECTION DETAIL AND SETOUT INFORMATION
R21-XXX8	LONGITUDINAL SECTIONS - SHEET 1
R21-XXX9	LONGITUDINAL SECTIONS - SHEET 2
R20-XX10	MC04 CROSS SECTIONS
R21-XX11	ROAD SIGNS

DIPL STANDARD DRAWINGS

CS-3005	RURAL RESIDENTIAL PROPERTY ACCESS
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A		ISSUED FOR APPROVAL.		~01/2021		-		FYFE.		FYFE FYFE PTY LTD ACN 008 116 130 77B SMITH STREET, ALICE SPRINGS, NT 0870 PO BOX 151, ALICE SPRINGS, NT 0870 T (08) 899 7819 info@fyfe.com.au www.fyfe.com.au				DRAWN VDS DATE DEC 2020 DESIGNED VDS DATE DEC 2020 DESIGN PROJECT LEADER A.GALLAGHER DATE		CHECKED FYFE DATE DEC 2020 CHECKED FYFE DATE DEC 2020 NTG PROJECT MANAGER NIM PARERA DATE Dec-20		Northern Territory Government		DARWIN REGION CARPENTARIA HIGHWAY (CH. 206Km800 APPROX.) INTERSECTION LOCALITY & PLAN AND SCHEDULE OF DRAWINGS											
No.		DESCRIPTION		DATE		INIT.		DEPT/COMPANY.		PROJECT NO: 73166		REV: A		STATUS: FOR APPROVAL		DRAWN BY: VDS		DRAFTING CHECK: FYFE		DESIGNED BY: VDS		DESIGN CHECK: S.PAUL		APPROVED BY:		APPROVED DATE: Dec-20		CAD Ref:		Date Plotted:	
AMENDMENTS																															



A		ISSUED FOR APPROVAL				XX/01/2021	-	FYFE		
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APPENDIX B

PLAN PREPARED BY CIRQA

CONCEPT SIGNAGE LAYOUT

INSTALL "SIDE ROAD INTERSECTION - RIGHT"
(W2-4C-R) SIGN AND "DISTANCE (80m)" SIGN
(W-5C) 80 METRES FROM ACCESS

INSTALL "TRUCKS ENTERING" (T2-25)
SIGN 110 METRES FROM ACCESS



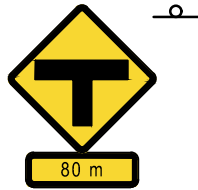
EXISTING UNSEALED SHOULDERS

EXISTING SEALED CARRIAGEWAY

NOTES:
CONCEPT ONLY - SUBJECT TO DETAILED DESIGN AND NTG APPROVALS
SIGNAGE TO BE INSTALLED IN ACCORDANCE WITH THE RELEVANT
REQUIREMENTS OF AS1742

INSTALL "TRUCKS ENTERING" (T2-25)
SIGN 110 METRES FROM ACCESS

INSTALL "SIDE ROAD INTERSECTION - LEFT"
(W2-4C-L) SIGN AND "DISTANCE (80m)" SIGN
(W-5C) 80 METRES FROM ACCESS



INSTALL "SIDE ROAD INTERSECTION - LEFT"
(W2-4C-L) SIGN AND "DISTANCE (80m)" SIGN
(W-5C) 80 METRES FROM ACCESS

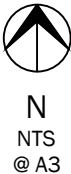


ABN: 12 681 029 983 | PO Box 144, Glenside SA 5065 | E: info@cirqa.com.au

This drawing is a concept plan only and subject to the provision of detailed survey information (by others) and the preparation of detailed design. The drawing is not suitable for construction purposes. The information and data identified within this drawing are the property of CIRQA Pty Ltd and copyright. This drawing and the information contained therein is for the use of the authorised Client noted below. The drawing may not be used, copied, reproduced or modified in whole or in part for any purpose other than for which it was supplied by CIRQA Pty Ltd. CIRQA Pty Ltd accepts no responsibility or liability to any other party who may use or rely upon this drawing or the information contained therein.

DRAWING AMENDMENTS				
REV	DATE	DESCRIPTION	DWN	CHK
A	20/08//2019	CONCEPT ONLY	BNW	BNW

C19269_01.DWG 20/8/2019 12:09 PM

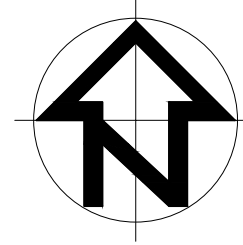
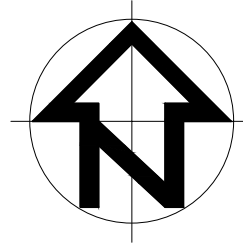


McARTHUR DRILLING PROGRAM
TRAFFIC CONTROL TREATMENT
CONCEPT DESIGN FOR ACCESS PROVISIONS
PROJECT # 19269 SHEET # 01_SH01

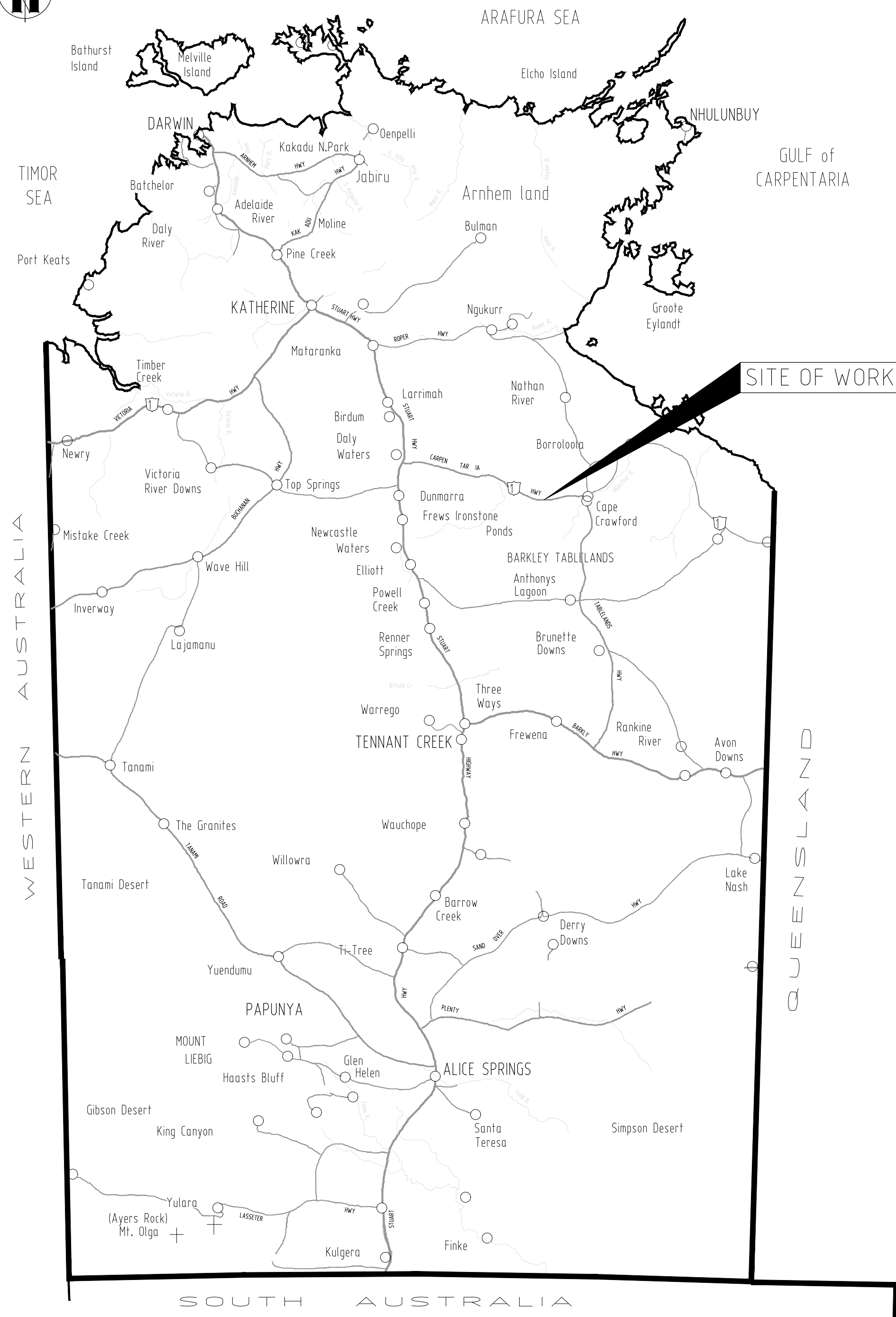
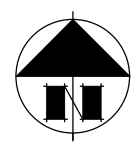
APPENDIX C

PLANS PREPARED BY FYFE

PRELIMINARY INTERSECTION 2 DRAWINGS



PROPOSED ROAD INTERSECTION ON CARPENTARIA HWY (CH. 212Km600 APPROX.) NORTHERN TERRITORY



LOCALITY PLAN
NOT TO SCALE



SITE PLAN
NOT TO SCALE

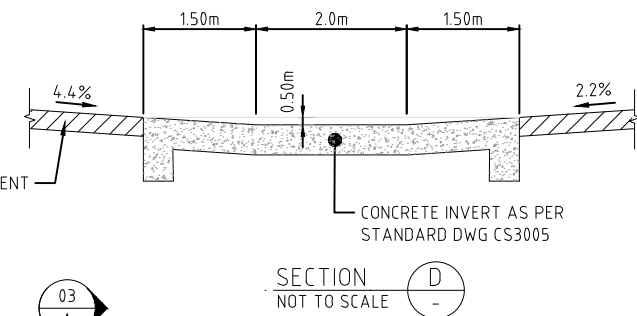
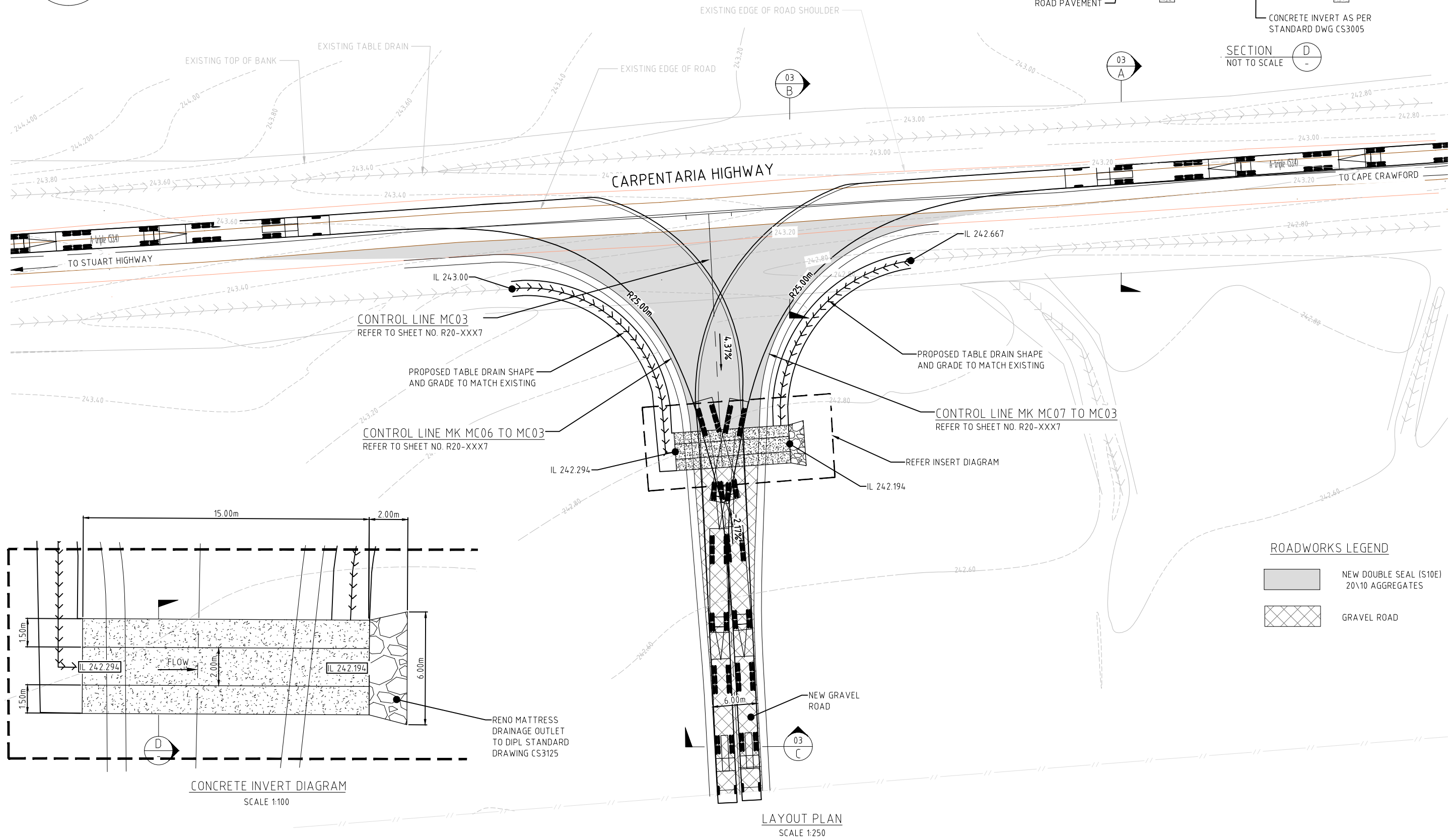
DRAWING SCHEDULE

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R20-XXX3	GENERAL CONSTRUCTION NOTES
R20-XXX4	ROAD TYPICAL SECTIONS AND DETAIL
R20-XXX5	EXISTING SURVEY FEATURES AND DEMOLITION PLANS
R20-XXX6	INTERSECTION LAYOUT PLAN
R20-XXX7	INTERSECTION DETAIL AND SETOUT INFORMATION
R20-XXX8	LONGITUDINAL SECTIONS - SHEET 1
R20-XXX9	LONGITUDINAL SECTIONS - SHEET 2
R20-XX10	MC03 CROSS SECTIONS
R20-XX11	ROAD SIGNS

DIPL STANDARD DRAWINGS

CS-3005	RURAL RESIDENTIAL PROPERTY ACCESS
CS-3125	DRAINAGE OUTLET CHUTE

A	ISSUED FOR APPROVAL	--/01/2021	-	FYFE	FYFE PROJECT NO: 73166 REV: A STATUS: FOR APPROVAL DRAWN BY: VDS DRAFTING CHECK: FYFE DESIGNED BY: VDS DESIGN CHECK: S.PAUL APPROVED BY: APPROVED DATE: Dec-20 CAD Ref: Date Plotted:	DRAWN VDS DATE DEC 2020 DESIGNED VDS DATE DEC 2020 DESIGN PROJECT LEADER A.GALLAGHER DATE CHECKED FYFE DATE DEC 2020 CHECKED FYFE DATE DEC 2020 NTG PROJECT MANAGER NIM PARERA DATE Dec-20	Northern Territory Government	DARWIN REGION CARPENTARIA HIGHWAY (CH. 212Km600 APPROX.) INTERSECTION LOCALITY & PLAN AND SCHEDULE OF DRAWINGS				
								NTG PROJECT No.	NTG ASSET No. R0XXX	SHEET No. 1 OF 10	NTG DRAWING No. AMENDMENT R20-XXX2 A	SHEET SIZE A1



ROADWORKS LEGEND

- NEW DOUBLE SEAL (S10E) 20\10 AGGREGATES
- GRAVEL ROAD

CONCRETE INVERT DIAGRAM
SCALE 1:100

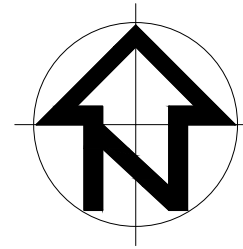
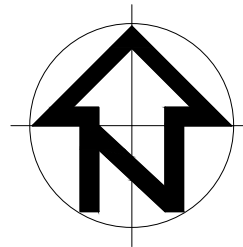
LAYOUT PLAN
SCALE 1:250

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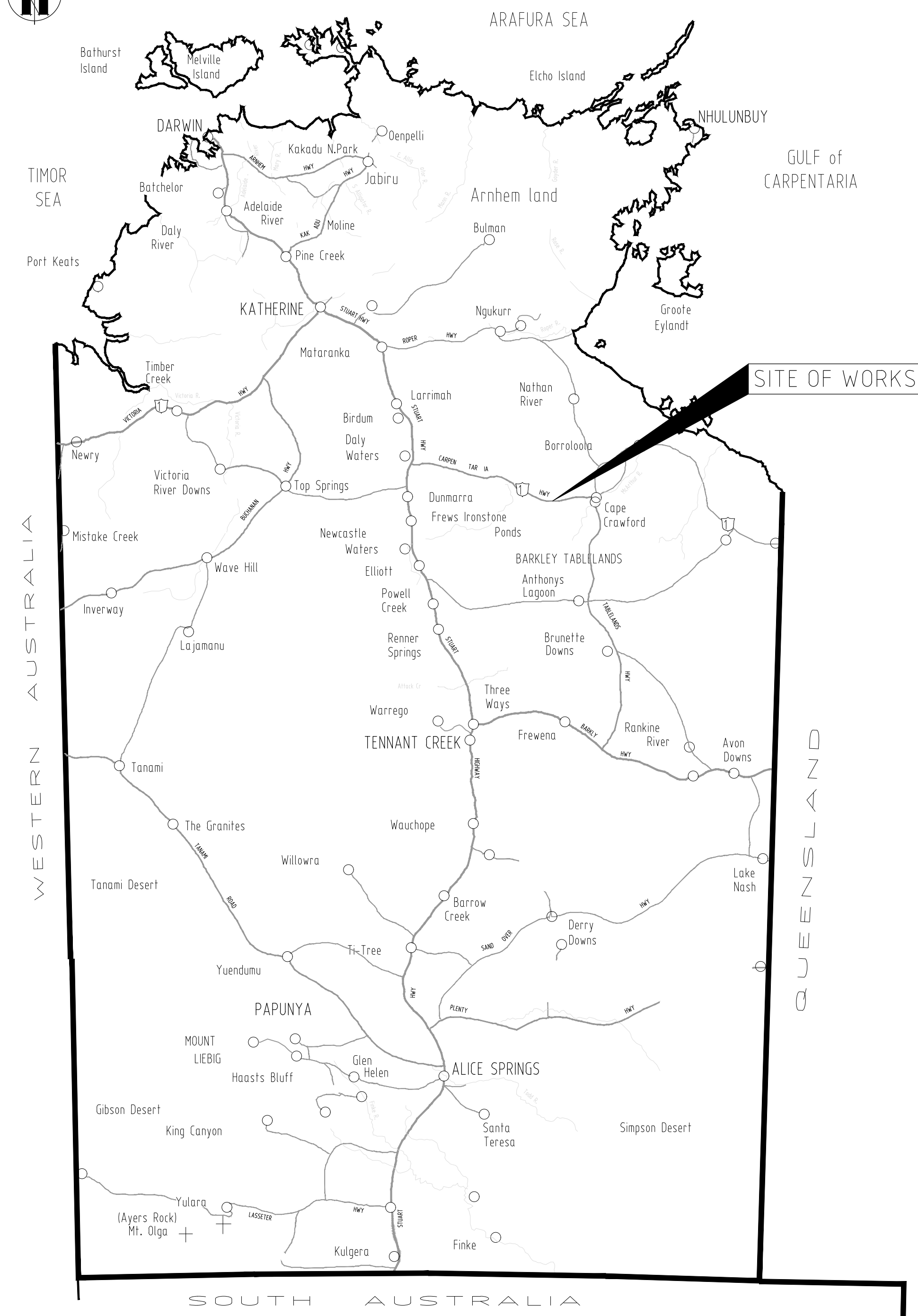
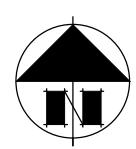
APPENDIX D

PLANS PREPARED BY FYFE

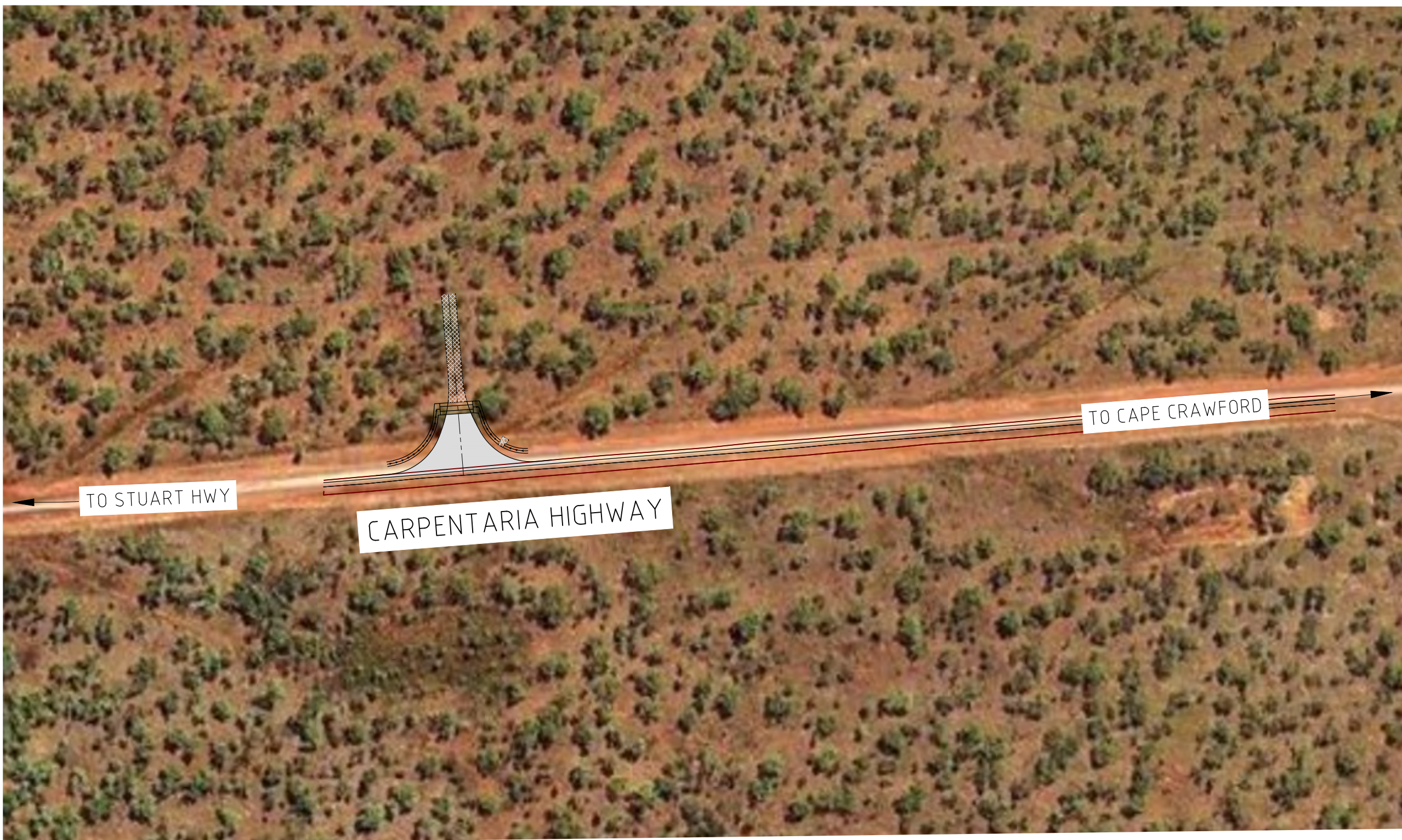
PRELIMINARY INTERSECTION 3 DRAWINGS



PROPOSED ROAD INTERSECTION ON CARPENTARIA HWY (CH. 202Km300 APPROX.) NORTHERN TERRITORY



LOCALITY PLAN
NOT TO SCALE



SITE PLAN
NOT TO SCALE

DRAWING SCHEDULE

DRG No.	DESCRIPTION
R22-XXX2	LOCALITY & PLAN AND SCHEDULE OF DRAWINGS
R22-XXX3	GENERAL CONSTRUCTION NOTES
R22-XXX4	ROAD TYPICAL SECTIONS AND DETAIL
R22-XXX5	EXISTING SURVEY FEATURES AND DEMOLITION PLANS
R22-XXX6	INTERSECTION LAYOUT PLAN
R22-XXX7	INTERSECTION DETAIL AND SETOUT INFORMATION
R22-XXX8	LONGITUDINAL SECTIONS - SHEET 1
R22-XXX9	LONGITUDINAL SECTIONS - SHEET 2
R22-XX10	MC01 CROSS SECTIONS
R22-XX11	ROAD SIGNS

DIPL STANDARD DRAWINGS

CS-3005	RURAL RESIDENTIAL PROPERTY ACCESS
CS-3125	DRAINAGE OUTLET CHUTE

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Appendix 14 - Emergency Response Plan



Emergency Response Plan

EMP IMP₄

NT Exploration Permit (EP) 187

Version	Description	Date	Author(s)	Reviewer	Approved
3.4	Updated	02/09/2020	Diana Gomez	Kelvin Wuttke	David Evans
3.5	Updated	05/04/2021	Diana Gomez	Kelvin Wuttke	Jon Bennett
3.6	Updated	15/04/2021	Diana Gomez	Kelvin Wuttke	Jon Bennett

This document has been prepared for Imperial Oil & Gas by:

InGauge Energy Australia

E: admin@ingauge.com.au

ABN: 51 164 429 190



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1 Introduction

This Emergency Response Plan (ERP) describes processes to be followed by Imperial Oil & Gas (Imperial) in the event of an emergency during oil and gas exploration, appraisal and production activities at Exploration Permit 187 (EP187).

The ERP is designed to guide the Imperial response team for the project in conjunction with the support from the engineering and project management subcontractors and relevant third parties to respond effectively and promptly to site-level emergencies and return the site to normal operations.

This ERP will be used in conjunction with relevant;

- Spill Management Plan/s
- Bushfire Management Plan/s

Drilling, Workover and HF contractors are required to have their contractor specific ERPs.

In these cases, this ERP will be bridged to the contractor specific ERPs to ensure alignment and clarity between the two plans.

2 Scope

This plan applies to all employees, contractors, and visitors; involved with the EP187 project operations, including:

- Exploration activities,
- Appraisal activities,
- Operations and maintenance activities,
- Ancillary activities, including field studies, site visits,
- Transport of chemicals and wastewater

3 Background

The EP187 project includes ongoing exploration, appraisal and operational activities following the successful drilling of Carpentaria 1, an exploration well in the eastern margin of the Beetaloo Sub-Basin, within EP187. The project area is in the Northern Territory, approximately 200km to the East of Daily Waters, on the southern side of the Carpentaria Highway.

The works include seismic acquisition, well drilling, well evaluation, fracture stimulation, rehabilitation, wellsite facility construction, pipeline construction, and other associated activities, such as civil construction works, water bore drilling and temporary camp installation.

The location of the area that this ERP applies to is shown in Figure 1 below.

All activities involved with the project operations will not rely on the NT Fire and Rescue services (NTFRS), as the project area is outside the NTFRS Emergency Response Area.

4 Emergency Response Priorities

All actual or potential emergencies will be assessed under the following activation trigger principles:

- **People:** Serious injuries/loss of life or emotional harm,
- **Environment:** Serious impact to the biological, physical environment or eco-system functions,
- **Asset:** significant damage or threat to property/assets,
- **Reputation:** serious impact to community, cultural heritage sites, or both,
- **Liability:** serious regulatory breach,
- **Continuity:** loss or extended disruption to critical services & ability to continue operations.

Refer to Figure 2 and Figure 3 for incident assessment and activation flowchart.

4.1 Activation Immediate Actions

When a site-level emergency is declared, follow the Activation immediate actions flow chart available in Figure 3 and escalate it where appropriate. Refer to Section 7 for specific response scenarios.

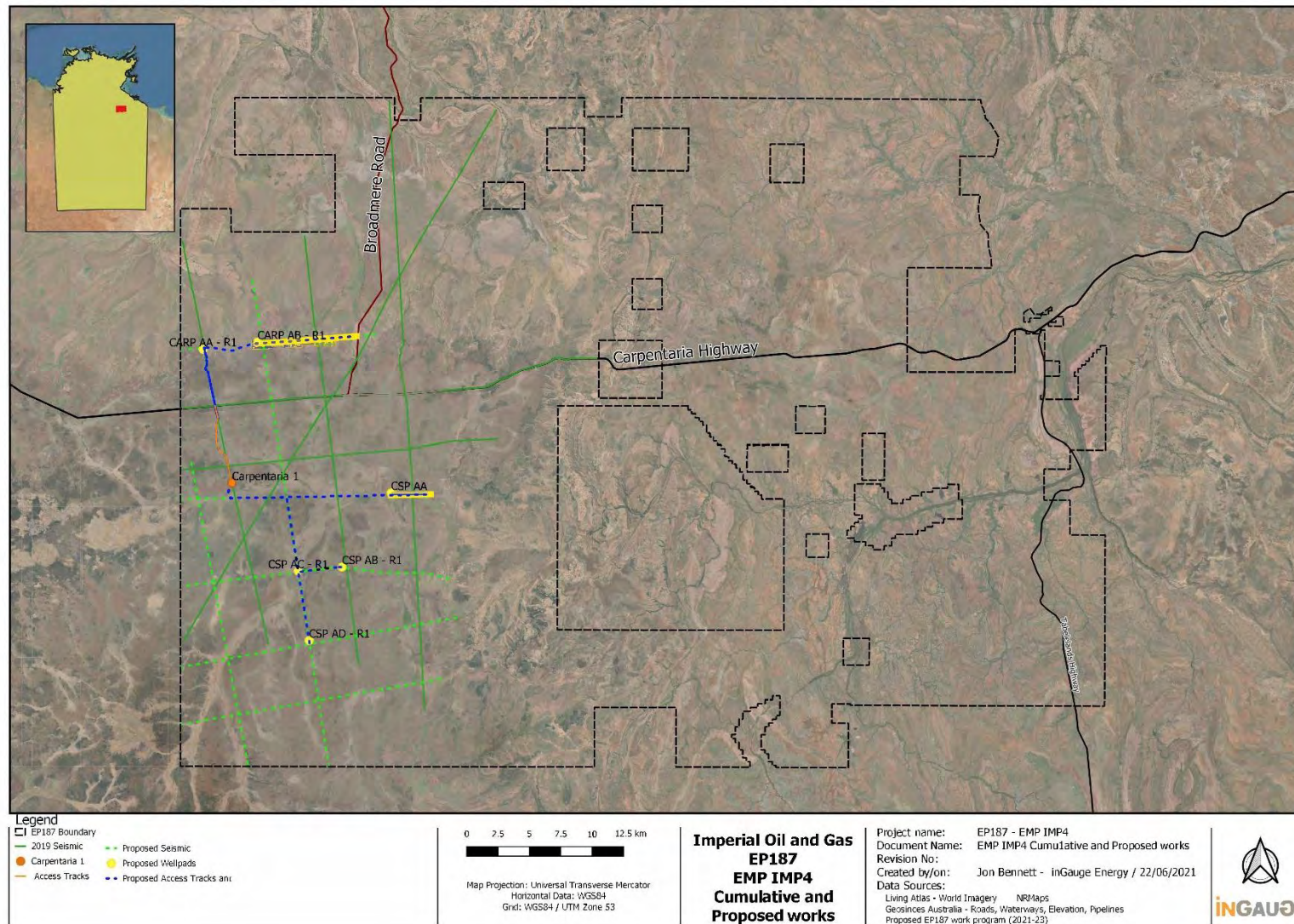


Figure 1. Proposed Drill Site, camp location and Existing Roads

5 Definition of Site Emergency

An emergency could be defined as an accident or deliberately caused situation that poses an immediate risk within a specific site. In many cases, the situation could be dangerous, requiring urgent/immediate intervention to prevent the situation from escalating or worsening. Incidents could have an impact on:

- **People:**
 - o Death, injury or near-miss
- **Environment:**
 - o Uncontrolled release of a substance to air, land, or water
- **Asset:**
 - o Loss or damage to physical assets
- **Reputation:**
 - o Loss or damage to business
 - o Loss of control of any health, safety environment or community related incident
- **Liability:**
 - o The potential for any of the above

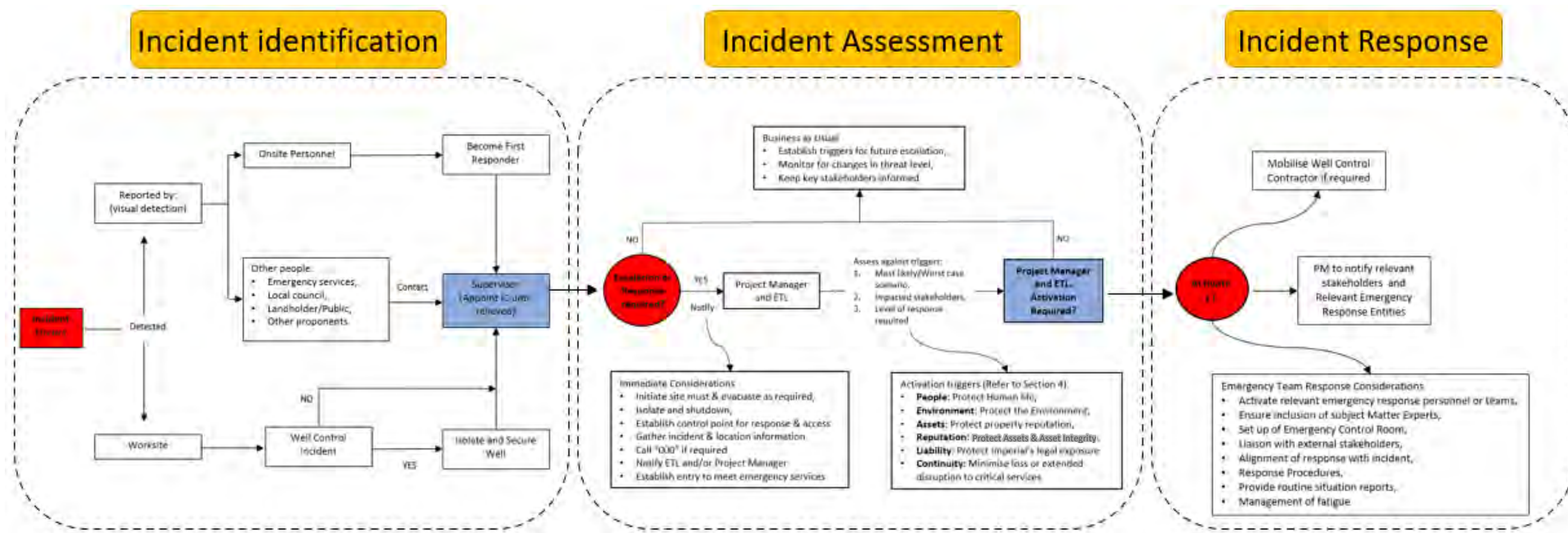


Figure 2. Identify, Assess, Response Flowchart

Activation Flow-Actions

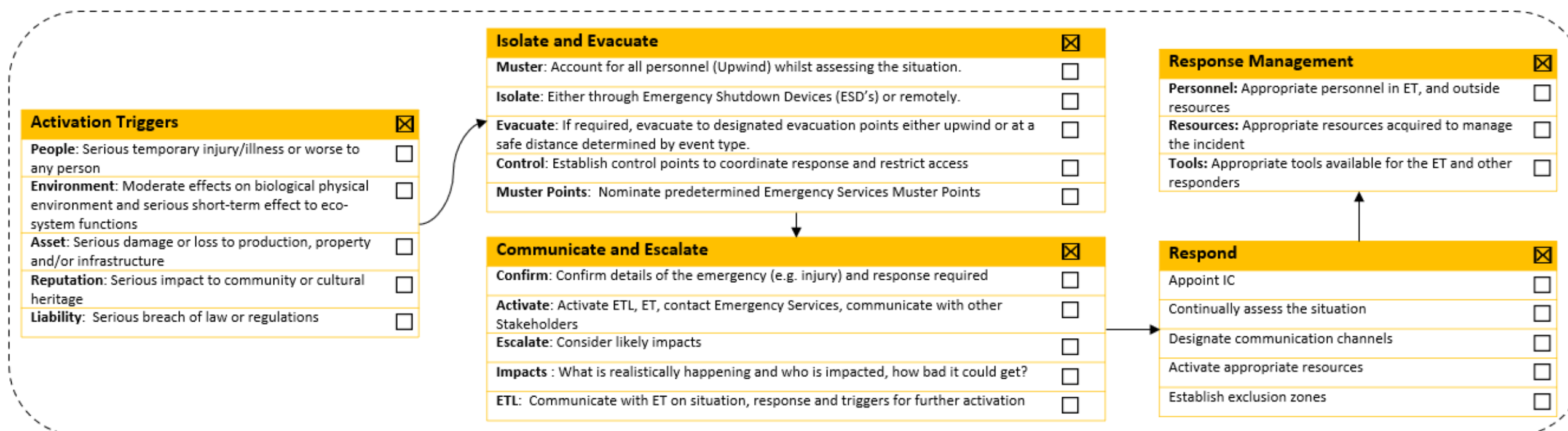


Figure 3. Activation Actions

6 Roles & Responsibilities

Person(S)	Responsibilities
First Responder Located at the scene, this could be on-site personnel or a contractor	- Adhere to the Project Emergency Response Plan. - Maintain a high level of awareness of actions to be taken in the event of an emergency. - On identification of an emergency, immediately report to the Site Supervisor indicating the location, type of emergency, need for assistance, and intentions to assist. - Check the area and assess any person for injuries, provide First Aid to injured persons within training and ability levels. - Move injured, only if they are in immediate and/or further danger, to avoid any additional injuries/risk to persons - Note the impacts of the emergency and any potential requirements for evacuations.
First Aiders Located at the site	- Provide first aid treatment or assessment as needed, working within their skill level. - Determine the need for medical assistance and provide information to Medical personnel or Emergency services as required. - Ensure that First Aid kits are maintained and complete, and items are in-date. - Ensure that all treatments provided, regardless of the type or complexities, are recorded.
Incident Commander (IC) - Located at the incident scene - Manage first response at site level	- Act as the site Incident Commander (IC) and manage the first response at the site level. - Maintain familiarisation with Imperial site ERP and Contractor ERP's, key emergency respondents and respective notification and callout requirements. - Ensure all initial Emergency Response Resources (ERR) are available and in working order. - Ensure the Emergency Team Leader (ETL) is notified ASAP in the event of an alert or emergency event. - Escalate to the Operations/Project Manager and Emergency Services if required. - Monitor the safe suspension of operations and associated activities. - Ensure that emergency action plans are discussed regularly at Pre-Start / Toolbox meetings so that all persons under their control are aware of the project emergency procedures. - Maintain a log of incident events, actions, messages, and decisions made in the chronological summary and provided to ETL. - Ensure the safety of other team members and establish exclusion zones around the incident scene if appropriate.
Emergency Team Leader (ETL) Located at either the Site Emergency Control Room (ECR), or	- Responsible for the overall management of emergencies on Imperial controlled worksites - Nominate IC for the incident Alert emergency contact(s), Confirm details, Activate resources (as required) - Ensure adequate personnel and resources are available to support, manage and close out any site emergency, - Conduct emergency response drills.

Person(S)	Responsibilities
In the main office	- Arrange additional support staff for the Emergency Team (ET) communications/administrative activities as required. - Filter incident events information to ET. - Utilise Emergency Response Incident Log Sheets. - Ensure early notification and Site reports are sent to ET as appropriate.
Project Manager (PM) Located in the main office	- During project planning, ensure this ERP is bridged to relevant Contractor ERP/EHSMS - Provide support to the ETL. - Act as journey contact for field teams. - Pass on information to Imperial relevant personnel to communicate to impacted/relevant stakeholders. - Support field team with emergency service direction/calls as requested.
Emergency Team (ET) Located in the main office.	- Provide support to the ETL and Site Supervisor regarding operations, planning, logistics etc. - Provide tactical response to site incidents. - Provide direction and backup support to Stakeholders. - Provide expertise and technical advice in support of the Emergency response effort. - Open, clear, and prepare the Emergency Control Room (ECR) for immediate use.
Crisis Management Team (CMT) Located at the inGauge Operations Base in Brisbane	- The ET has a reporting responsibility to the CMT for all low-level incidents or greater, as per the Imperial Incident Report and Investigation Procedure. - The CMT will assume an operational support overview of incidents and provide operational management support to site ET during incidents that present an actual or potential threat to Imperial operations. - The CMT will request emergency response drills as appropriate and ensure appropriate authority and equipment to hold the emergency response drills. - Maintain a log with all the information regarding the incident. - Manage media in concert with the Imperial CEO and COO.
Personnel on-site	- Avoid placing themselves or others in danger. - Maintain familiarisation with Imperial site ERP, relevant Contractor ERP's, and respective emergency notification requirements. - Be familiar with the site Muster Points and evacuation procedures. - Be alert for and report hazardous situations that could escalate into an emergency. - Immediately report any actual or potential emergencies. - Report any further emergency arising from an existing incident to the nominated Imperial Site Supervisor / ETL or designated IC. - MUST NOT communicate with the Media under any circumstances.

7 Response Scenarios

Imperial emergency preparedness and response capability are supported by underpinning risk management processes. Each site must risk assess potential emergency events to support the site emergency management requirements.

Table 1 describes some emergency response scenarios and recommended actions.

Table 1. Response Scenarios

Category	Response	☒
Basic Emergency Response	Remove yourself and others from danger	☐
	Raise the alarm – Notify the Site Supervisor through the available channels of communication (e.g. radio) - Report location, - type and extent of the incident	☐
	Stop all work and makes sure the area is safe	☐
	Activate emergency shutdown devices/isolate equipment as necessary if safe to do so	☐
	Provide First Aid to any injured persons (DRSABCD)	☐
	Account for people	
	Reach Emergency Team Leader	☐
	Call emergency services if required	☐
	Follow the directions of emergency services or response personnel and assist as required if you feel safe and capable to do so	☐
	Follow the Response Procedure and Gather information (Table 2)	
	Notify appropriate Imperial contacts	☐
	Determine the recovery strategy and resources required: - Check for equipment integrity, - Ensure all protection systems are restored, - Replenish, replace or return emergency equipment.	☐
Fire, Building Evacuation	Initiate Emergency Response Plan	☐
	If you see SMOKE, FLAMES or hear a FIRE ALARM, alert others in your vicinity immediately	☐
	Remove anyone in danger if safe to do so	☐
	Activate the Fire Alarm	☐
	If you can see a fire, attempt to extinguish it if safe to do so. If the fire is small enough, use a nearby fire extinguisher to control and extinguish the fire. Do not fight the fire if the following conditions exist: - You have not been trained or instructed in using a fire extinguisher. - You don't know what's burning. - The fire is spreading rapidly and might block your means of escape. - You don't have the proper equipment. - You might inhale toxic smoke. - Your instincts tell you not to do so.	☐

Category	Response	☒
	If the first attempts to put out the fire fail, evacuate the building immediately.	
	Close any doors if safe to do so	☐
	Call 000 and contact the Fire Brigade	☐
	Ensure all personnel leave the building	☐
	All persons leaving the building should follow the Green Exit Signs to leave through the nearest emergency exit	☐
	All persons should leave the property via the identified entrance to ensure clear access for emergency service and proceed to Emergency Evacuation Point	☐
Fire, (Building Evacuation)	Do not return to the building until advised by emergency personnel	☐
	Do not leave the Emergency Evacuation Point at any time without advising and gaining the approval of the Building Warden or Managing Director	☐
	Follow Imperial Incident Notification and Investigation Procedure	☐
Injury (Medical Emergency)	Initiate Emergency Response Plan	☐
	If injuries require more than First Aid but are not critical or life-threatening, and the person can be transferred by vehicle, take the injured person/s to the closest medical facility or site paramedic if available	☐
	If injuries are critical or life-threatening, call 000 and then the site paramedic if available	☐
	Continue First Aid until assistance arrives	☐
	Follow Imperial Incident Notification and Investigation Procedure	☐
Criminal Activity (Civil disturbance)	Initiate Emergency Response Plan	☐
	Always avoid physical confrontation	☐
	Contact your supervisor and police if necessary	☐
	Move to the muster location or safe location	☐
Snakebite	Initiate Emergency Response Plan	☐
	Life-threatening effects from snakebite aren't usually seen for a few hours but can appear in minutes - what to look for: - Fang marks - Headache, difficulty breathing - Nausea and vomiting - Stomach pain - Swollen glands in the armpits & groin - Weakness, collapse	☐
	Check the immediate area for danger to yourself or the injured person	☐
	Calm the person and keep them still	☐
	Call for assistance	☐
	If a person is unconscious, check breathing & pulse and apply CPR	☐
	Do not wash or suck the bite or use a tourniquet	☐

Category	Response	☒
	If bitten on a limb, apply a pressure bandage or cloth approximately 10-15cm wide upwards from the fingers or toes, firm but not too tight	☐
	Keep the limb still by using a splint	☐
	If able to do so, mark the area of the bandage where you think the bite occurred – this will assist medical staff	☐
	Leave the splint or bandage on until reaching the hospital	☐
	Follow Imperial Incident Reporting an investigation Procedure	☐
Vehicle Accident	Raise the alarm (report location, type and extent of incident)	☐
	Request assistance of Emergency Services as required	☐
	Switch off the vehicle ignition	☐
	Assess vehicle and site damage; take relevant actions to secure the accident scene	☐
	If the vehicle is in contact with power lines, stay clear and advise occupants to stay in the vehicle	☐
	Do not try to remove casualties from the vehicle until sure other dangers are not present	☐
	When possible, remove trapped/injured personnel, provide medical aid (as qualified)	☐
Bushfire	Initiate Emergency Response Plan	☐
	Initiate Medical Emergency Response if required	☐
	Account for all personnel	☐
	Contact Supervisor	☐
	Obtain information about the fire, such as location and size of the fire	☐
	Initiate contact with emergency services	☐
	Consider escape routes and alternate routes	☐
	Consider task timings and pack up timings	☐
	Consider checking of fire breaks if safe to do so	☐
	Follow Imperial Incident Notification and Investigation Procedure	☐
Environmental Incidents (Hazardous Spill – chemicals & wastewater)	Notify ET and advise situation and request assistance if needed	☐
	Consider ESD – depending on location, proximity or safety need	☐
	Ensure all personnel are safe and clear of the area -Stay clear of Vapour, Fumes, Smoke and Spills	☐
	All necessary action should be taken to minimise the size and any adverse effects of the release. Different PPE (Face shields, goggles, heavy gloves, Gumboots) may be required to perform the task safely	☐
	If adequate resources are not available to contain the release and if it threatens public health, property or the environment, the state fire brigades should be contacted for emergency assistance - phone 000	☐
	Always pay attention to fire and health hazards. Remove all sources of ignition to reduce the potential fire hazard;	☐

Category	Response	☒
	Establish the source of spill/leak, and determine the extent of pollution	☐
	Stop further leakage (e.g. stop pumping or in case of pipeline leak give warnings to stop the flow), close valves, attempt to stop leaks, move the object on its side;	☐
	Activate containment operations immediately to Isolate spill or leak area for at least 100 metres (330 feet) in all directions to prevent the spread of spilled product (if the situation requires- i.e. block drains, dam ditches, boom watercourses, close water intakes);	☐
	Divert or stop traffic (do not start vehicles if a low flash-point product has been split);	☐
	Clean up - Retrieve as much as possible with sorbents - Permeable ground - break up remaining patch/s with a rake to aerate the soil - Remove contaminated subsoil to reduce transfer to groundwater	☐
	Points to Remember: - Activate containment operations immediately - Do not allow vehicles to run over any spill saturated areas - Do not flush the spill down clean drains on areas or other inlets - Do not use mechanical excavators on areas with free oil on the surface - Contain & recover at the source - Never attempt to perform a rescue without support or adequate forethought	☐
Missing/ Overdue Personnel	After being notified of a missing or overdue person, Journey Management plan timeframes will be utilised to escalate the tracing and notification processes. Refer to Section 11.	☐
	Obtain information on the time and location of the last sighting	☐
	Attempt to establish communication with the missing person via mobile phone and SMS contact and, if possible, UHF, VHF, Satellite phone	☐
	Advise Supervisor and EHS Representative	☐
	If possible, contact the destination point, e.g. hotel/motel/camp, to determine if the person has arrived	☐
	If possible and safe to do so (i.e. weather conditions), despatch other nearby employees to look for the missing person	☐
	After some time without contact (as determined collaboratively by the Supervisor, Manager, EHS Representative and Senior Management), notify the police of the missing person	☐
Subsurface incident (Loss of well control)	Initiate Emergency Response Plan	☐
	Initiate Medical Emergency Response if required	☐
	Initiate inGauge Well Control Procedure if required	☐
	Account for all personnel	☐

Category	Response	☒
	Contact Supervisor	☐
	Contact emergency services if required	☐
	Consider escape routes and alternate routes	☐
	Consider task timings and pack up timings	☐
	Follow Imperial Incident Notification and Investigation Procedure	☐
Weather-Related (Flood, cyclone)	Initiate Emergency Response Plan	☐
	Initiate Medical Emergency Response if required	☐
	Account for all personnel	☐
	Contact Supervisor	☐
	Contact emergency services if required	☐
	Take shelter if possible	☐
	Monitor weather alerts and radio stations	☐
	Consider escape routes and alternate routes	☐
	Consider task timings and pack up timings	☐
	Never cross a flooded creek, road or causeway – always assess the risk before crossing	☐
	Follow Imperial Incident Notification and Investigation Procedure	☐
Transport of Chemicals and wastewater (Spills/release, road haulage – wet weather)	Ensure vehicles can safely navigate to and from areas of concern – provide alternate routes if possible	☐
	Ensure all personnel are safe and clear of the area -Stay clear of Vapour, Fumes, Smoke and Spills. Use safety-related equipment as required to safely extract personnel if in immediate danger	☐
	Always pay attention to fire and health hazards. Extricate personnel and team to a safe distance and clear of potential hazardous fumes (Upwind);	☐
	All necessary action should be taken to minimise the size and any adverse effects of the release	☐
	Activate containment operations immediately to prevent the spill from reaching a surface watercourse or groundwater	☐
	Attempt to Identify the spill - refer to the HAZCHEM code, Truck Placarding, Driver or SDS for methods of control/management;	☐
	If adequate resources are not available to contain the release and if it threatens public health, property or the environment, the state fire brigades should be contacted for emergency assistance - phone 000	☐
	Divert or stop traffic (do not start vehicles if a low flash-point product has been split) if tanker truck or Chemical event is involved in a fire, ISOLATE for 800 metres in all directions	☐
	If fluid forms, attempt to prevent the spread of spilled product from the vehicle itself (shut valves – internal/external) if safe to do so, using hazard-specific PPE	☐
	Remove all sources of ignition to reduce any potential of fire	☐
	Notify ET and advise situation and request assistance if needed	☐

Category	Response	☒
	Clean up. - Retrieve as much as possible with sorbents - Permeable ground - break up remaining patch/s with a rake to aerate the soil - Remove contaminated subsoil to reduce transfer to groundwater	☐
	Points to Remember: - Activate containment operations immediately - Do not allow vehicles to run over any spill saturated areas - Do not flush the spill down clean drains on areas or other inlets - Do not use mechanical excavators on areas with free oil on the surface - Contain & recover at the source - Never attempt to perform a rescue without support or adequate forethought;	☐

8 Respond communication

The following flowchart (Figure 4) presents the communication between the first responders (internal or external personnel) and the organisation management team, including external support agencies' contact.

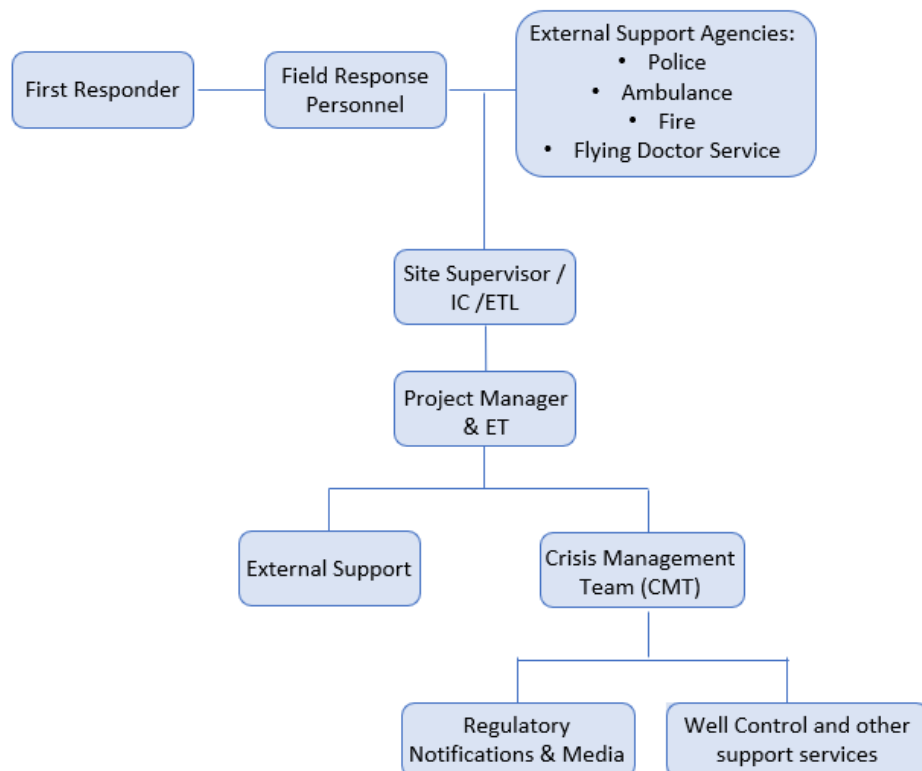


Figure 4. Communication Flow

8.1 Stakeholder Communication

The Project Manager may be required to communicate/liaise with relevant stakeholders that could be impacted by the incident/emergency. Potential stakeholders include regulatory authorities (local councils, landowners, emergency services, etc.).

Initial information should include the state/type of the emergency, possible cause, effects/consequences, likely duration, and potential impacts.

8.2 Regulatory Notification

A regulatory notifiable incident is an incident or non-compliance with a Mandatory External Obligation or Voluntary External Obligation that requires notification or reporting to a Regulator as prescribed by applicable Laws and Regulations. HSE regulatory notifiable incidents required to be reported to a regulator are listed in Appendix 1

The Project Manager must be consulted to determine contractual obligations for incident notification and reporting.

8.3 Media Enquiries

All personnel have been instructed to direct all media enquiries to the Project Manager, redirecting the calls to the questions to the Imperial representative as required.

It is important to remember that there is no such thing as "off the record". Even if you are speaking informally, you could be quoted at any time.

9 Incident notification

Table 2 below provides some examples of the information required to be gathered during an incident. Refer to Appendix 1 for Incident Notification Guideline.

Table 2. Incident notification examples

Element	Information examples	☒
Initial contact	- Name of the caller and receiver - Personnel involved in the incident	☐
Incident location	- Coordinates or landmarks - Clear directions on how to get to the incident site	☐
Incident Type and description	- Injury - Explosion - Vehicle accident - Fire - Well incident related - Missing personnel	☐
Description of the incident	- Time incident occurred - Cause of incident if known - Any actions taken on-site and emergency required	☐
Incident size or injury severity	- Area - Height - Volume - Description of injury - Number of people involved - Preliminary assessment of medical assistance required	☐
Current status	- Has the incident or potential of the incident to cause more damage or injury stopped - Level of emergency response required - First Aid applied to date and Degree/Level of controls in place - Environmental situation (wind, rain, etc.).	☐

10 Emergency Response Equipment and Personnel

Table 3 presents the different emergency equipment available on-site at any one time to provide, where possible, the initial response required to avoid any incident from escalating.

Table 3. Emergency Response Equipment

Equipment	Location
First Aid	First Aid kits will be located at the site office, with additional First Aid Kits available in the Imperial Site Supervisor vehicle.
Fire Equipment	Fire extinguishers will be located within all operating plant. Further fire equipment will be available in Imperial Site Supervisors vehicle, including extinguishers and blankets and at site offices where established.
Defibrillator	A defibrillator unit is to be located at any drilling rig site and any permanent facility.
Oil Spill Kits	Oil Spill Kits will be located at the rig site for rig operations and any permanent facility.
Ambulance	An ambulance will be located at the rig site for all drilling operations scheduled to last more than 30 days. The ambulance will be on-site from the date rig operations commence until rig release.
Paramedic	First Aid trained personnel will be on-site for all operations.
CareFlight	Available on-call; 1 hour 50 minutes to McArthur River Mine Airport (approx. 115km drive) 1 hour 15 minutes to Tanumbirini Station Airstrip (approx. 75km drive)

Drilling rigs are the most likely place of injury/incidents, the most likely location of the higher severity incidents, and a higher concentration of personnel for longer periods than other operations. Therefore the rig will require an ambulance for any drilling expecting to last more than 30 days. However, wellsites, campsites and other construction and operational areas are included in the HSE regime and planning.

All campsites and wellsites with personnel carrying out project activities will maintain communications with each other and with the ambulance (if applicable). The ambulance (if applicable) will attend any emergencies at campsites or wellsites.

The camp will be located on the Carpentaria 1 wellpad, approximately 202km from the Highway Inn turnoff onto the Stuart Highway near Daly Waters.

11 Journey Management

All contractors engaged in carrying out work at Imperial's well sites must have a sound Journey Management (JM) process. Each contractor will provide detail of their company journey management process (JMP) during prequalification. At a minimum, or where no journey management process is in place, the following procedures shall be complied with:

- All contractors shall have been inducted and trained in the JM system being utilised.
- Suitable safety equipment must be installed in each vehicle and operable (e.g. satellite phone, first aid kit).
- Should the contractor company not have their JMP system, they shall utilise this Imperial procedure.
- All travelling personnel or groups shall have a Journey Coordinator (JC) allocated to assist with journey management. The Journey Coordinator and the travelling person must be aware of who has been allocated to the JC role and the responsibilities of each party.
- The JC should advise the Site Supervisor (SS) of the impending journey, confirm their status as JC and keep the SS updated on the journey details. The SS may be used as the JC, but it must be clear that the SS has this responsibility.

When a journey is undertaken, the Journey Coordinator should maintain close communication with the travelling person/group and ensure all information about the journey has been gathered and tracked for the whole journey. Information should include:

- Full name(s) of person(s) travelling
- Frequency and method of check-in during the journey
- Contact details for all members of the travelling group and the JC
- Next of kin of people travelling
- Date of the trip
- Estimated Time of Departure (ETD)
- Estimated Time of Arrival (ETA)
- Route to be followed
- Description of vehicle eg registration number and vehicle type

Any changes to the above should be informed to the JC before departure.

It is critical that communication protocols be established between the JC and travelling person/group and clearly understood by both parties.

When ETA has not been fulfilled, the following actions will be taken by JC & SS:

Communication 1 Hour Overdue

- Call and keep monitoring all communication channels;
- Communicate with next of kin to check if the person(s) has communicated;
- Supervisor to alert IC & ET of the situation as required;
- Confirm the last known location of the vehicles tracker unit;
- Initiate a search party if the situation demands.

Communication 2 Hours Overdue

- Request the ERP be activated, if not already underway;
- If not already activated, ensure rescue party is underway, by road if suitable;
- Prepare for air search (if necessary) on latest coordinates and planned route; and
- Inform authorities and other parties in the area;
- Alert the most suitable Medical person(s) of the situation.

Action 4 Hours Overdue

- Authorities take control of incident;
- Keep monitoring progress of the search parties by road; and
- Relevant supervisor to keep PM and ET informed.

12 External support (Road & Air)

External support can be sourced to support during an emergency. This support can be either obtained by road (e.g. Ambulance) or air (e.g. CareFlight)

12.1 Road

- Ambulance services can be dispatched from:
 - o McArthur clinic and be on-site in approximately 1.5 hours,
 - o Boroloola clinic and be on-site in approximately 2 hours, and
 - o Mataranka Clinic and be on-site in approximately 4 hours.
- Emergency Services will be intercepted by an Imperial employee at a designated location along the Carpentaria Highway and directed to the site,
- On-site first aiders will provide an initial response until further assistance arrives on site.
 - o On-site ambulance will be used for emergency transport if available to the nearest and fit for purpose clinic/hospital (e.g. Tennant Creek Hospital 7 hours driving)
- Constant communication will be maintained with external support to avoid service delays or to obtain assistance for an adequate on-site response.

12.2 Aircraft

- CareFlight services will be contacted when the severity of the incident/injury cannot be mitigated or responded to by Road assistance.
- Landing of aircraft can be conducted at Tanumbirini Airstrip (76km) or McArthur River Mine Airstrip (116km), as selected by Careflight.
 - o Ensure constant communication is held with aircraft personnel and IC.
 - o Do not approach aircraft until the pilot has given you the approval to do so.
 - o Remove any loose clothing (e.g. hats) when approaching aircraft.
- Careflight may also choose to task a helicopter, as they have availability and deem appropriate. The helicopter landing site would be agreed upon subject to incident location in discussion with the paramedic and the IC.

13 Recovery Actions

Table 4 provides post-emergency actions required to be followed to return to pre-incident state operations.

Table 4. Recovery Actions

Action	Description
Review	- Discuss strength and weaknesses, - Necessary improvements for this plan and related procedures, - Identify actions to be undertaken.
Investigate	- Secure incident site and do not disturb area until the investigation has been completed - Collect any evidence that may assist in the investigation (e.g. testimonies, records of actions taken, photographs, etc.)
Recover	- Verify infrastructure integrity as well as security equipment restoration, - Replenish, replace, or return emergency equipment, - Ensure personnel impacted by the incident receive the required counselling or information to continue with safe operations, - Revised ERP and implement changes or training as required.
Clean-up	- Assess for potential decontamination needs - Repair or replace damaged equipment and test for safe functionality - Attend to commissioning and site reinstatement.

13.1 Emergency Conclusion

After the emergency has ended, several key issues must be considered when standing down personnel. These issues relate to ongoing emergency control, investigation processes and recovery actions, including appropriate resources for key responsibilities. Final information releases must be considered for affected parties and key stakeholder groups, including:

- External Contractors and Services
- Government Authorities
- Shareholders
- Media
- Employees/employee relatives.

An emergency would be over when:

- Where involved, the Emergency Services have formally declared the emergency is over and returned control of the affected site
- The Emergency Team declares the emergency has been terminated and the site facilities have been returned to a safe condition
- All people have been accounted for
- Injured persons have been stabilised and/or evacuated
- Effective environmental controls are in place.

13.2 Debriefing

A debriefing is to be conducted by the Project Lead to discuss problems and necessary improvements for incorporation into the emergency preparedness and procedures. This discussion should include:

- Recognition of success and what was accomplished exceedingly well
- Equipment or procedure deficiencies
- Unsafe practices/near-miss incidents
- The cause of any injuries sustained
- Unforeseen problems and relevant resolution steps
- Communication/supervision problems
- Environmental considerations
- External problems, i.e. media, landowners, local authority, producers or customers

The minutes from the debrief meeting, when available, will be sent to all attendees.

14 Training

Personnel who receive the necessary training are more able to perform more effectively when responding to an emergency. The training will give the employee a greater understanding of their responsibilities and build their confidence to accurately react during an emergency event to minimise or reduce the likelihood of an incident from escalating.

All personnel will be trained against this plan. Training will be provided in the form of:

- Practical drills,
- Simulated exercises,
- Competency-based training,
- Toolbox meetings,
- Resource and equipment checks,
- Desktop exercises.

15 Review and update

The ERP will be reviewed and updated as necessary in response to one or more of the following:

- Annually
- When major changes have occurred, which may affect the Emergency Response coordination or capabilities
- Following routine testing of the plan
- After an actual emergency
- Before installing and commissioning new plant and equipment

During the review, the following aspects are also to be considered:

- Lessons learned from an emergency
- Lessons learned from exercises
- Changes in legal requirements
- Improvements to effectiveness in terms of response strategy, management and communication
- Developments in the latest techniques and technology in handling an emergency
- Changes to, or movement of people within our organisation
- Changes to contact numbers of internal and external organisations
- Revisions to existing, or availability of, emergency management tools and equipment and resource suppliers and contractors

16 Emergency Contact Details

See Appendix 2 for the Site Emergency Response Display Sheet.

Imperial Oil and Gas

Name	Position	Contact Number
A [REDACTED]	Chief Executive Officer	0 [REDACTED]
K [REDACTED]	Office Manager	0 [REDACTED]

inGauge Energy

Position	Name	Phone Number	E-mail
Principal Engineer	K [REDACTED]	[REDACTED]	[REDACTED]
Project Manager and Superintendent	J [REDACTED]	[REDACTED]	[REDACTED]
Civils and Approvals Coordinator	J [REDACTED]	[REDACTED]	[REDACTED]
Site Supervisor InGauge OCR	S [REDACTED]	[REDACTED] [REDACTED]	[REDACTED]

Government and Stakeholders

Name	Location	Contact Number
Department of Industry, Tourism and Trade (DITT)	Darwin	Ph: 08 8999 6567 - 08 8999 6350 A.H: [REDACTED] Emergency: 1300 935 250
Environment, Parks and Water Security (DEPWS)	Darwin	Ph: 08 8973 8871 or 08 8973 8872 or 08 8973 8870
Ngukurr Essential Services Officer	Ngukurr	08 89754656
NT Work Safe	Darwin	1800 019 115
Roper Gulf Shire Office		08 8975 4656 - 0488 954 221

Other

Entity	Name	Location	Contact Number
Medical Services	Royal Darwin Hospital	Darwin	(08) 8922 8888
	Katherine Hospital	Katherine	(08) 8973 9211
	St Johns Katherine Ambulance	Katherine	(08) 8972 8500
	St Johns Alice Springs Ambulance	Alice Springs	(08) 8959 6600
	Mataranka Clinic	Mataranka	(08) 8975 4547 (0830 – 1600 Mon-Fri only)
	Borooloola Health Clinic	Borooloola	(08) 8975 8757 (0900 – 1700 Mon-Fri only)
	Tennant Creek Hospital	Tennant Creek	(08) 8962 4399
Aeromedical Services	CareFlight	NT, WA & SA	(08) 8928 9777 24hr Emergency 1300 655 855
Police	Emergency		000 24h Assistance 131444
	Alice Springs Police	Alice Springs	(08) 8951 8823
	Katherine Police	Katherine	(08) 8973 8000 (0830 – 1600 Mon-Fri only)
Fire Services	NT Fire & Rescue AH	NT	(08) 8922 1555
	Katherine Fire Station	Katherine	(08) 8973 8014
	Alice Springs Fire Station	Alice Springs	(08) 8951 6688
Service Station	Heartbreak Hotel	Cape Crawford	(08) 8975 9928
	BP Service Station Katherine	Katherine	(08) 8971 9924 (08) 8971 9955
	Erlunda Roadhouse	Stuart Hwy	(08) 8956 0984
	Hi-way Inn Petrol Station	Daly Waters	(08) 8975 9925
	BP Service Station Adelaide River - NT	NT	(08) 8976 7047
	United Petroleum	Pine Creek	(08) 8976 1217

17 Appendixes

Appendix 1. Incident Notification Guideline

Regulation	Incident Description	Communication by	Contact Details	Timeframe
Work Health and Safety (National Uniform Legislation) Act 2016 and Regulations 2017	PCBU must notify the regulator as soon as they become aware of a death, serious injury or illness or dangerous incident that arises out of the business or undertaking's conduct. A dangerous incident includes: • Uncontrolled escape, spillage or leakage of a substance, gas or pressurised substance, • Uncontrolled implosion, explosion or fire, • Electric shock • Fall or release from height of plant, substance or thing, • Collapse, overturning, failure or malfunction of, or damage to, any plant/equipment/structure/excavation, • In-rush of water, mud or gas in an underground excavation tunnel or interruption of ventilation in said tunnel A serious injury or illness means that results in: • work-related injury, • immediate hospital treatment as an in-patient, • immediate treatment for serious injuries (for example, amputation, scalping, a spinal injury, loss of a bodily function or a serious laceration, burn, head injury or eye injury), or • medical treatment within 48 hours of exposure to a substance.	Telephone	1800 019 115 Worksafe ntworksafe@nt.gov.au	Immediately after becoming aware
Schedule of Onshore Petroleum Exploration and Production	An incident involving death or serious injury (reports shall be in addition to and not take precedence over reports required by NT WorkSafe) A serious injury is one that requires immediate attention by a medical practitioner	Telephone and in writing	1300 935 250 or 08 8999 6350 DITT Petroleum.Operations@nt.gov.au	Immediately after becoming aware

Regulation	Incident Description	Communication by	Contact Details	Timeframe
Requirements 2017				
Schedule of Onshore Petroleum Exploration and Production Requirements 2017	An incident involving serious damage (other than Environmental Harm) including loss, destruction or damage to property exceeding \$50k or when any person dies or suffers serious injury	Telephone and in writing	1300 935 250 or 08 8999 6350 DITT Petroleum.Operations@nt.gov.au	Immediately after becoming aware
	An incident involving or could potentially involve the injury to a person or serious damage to property that is professionally considered to have been caused by an event that is not in the normal or ordinary course of an operation (Potentially Hazardous event)			
	An incident where damage to property occurs that is not serious damage to property, but which results in a significant loss of structural integrity or load-bearing capacity in the property damaged or resulted in some other significant unsafe condition			
	An incident that is considered to be an emergency	Telephone		Immediately (after 000)
Petroleum (Environment) Regulations 2016	An incident arising from a regulated activity that has caused, or has the potential to cause, material environmental harm or serious environmental harm as defined under cl. 117AAB(1) the Petroleum Act	Telephone and in writing	1800 413 567 DEPWS	As soon as practicable but no later than two hours after the first occurrence of the incident or after the time Imperial becomes aware of the incident
Petroleum Act 2018 and associated Regulations 2016	<i>Applicable to ON TENURE SPILLS (note Off tenure spills under Waste Management and Pollution Control Act 1998):</i> Reportable Incident: <i>An incident arising from a regulated activity that has caused or has the potential to cause material environmental harm or serious environmental harm.</i>	Telephone and in writing	1300 935 250 or 08 8999 6350 DITT Petroleum.Operations@nt.gov.au	As soon as practicable (not later than two hours after the incident)

Regulation	Incident Description	Communication by	Contact Details	Timeframe
	Material environmental harm means harm that: a) Is not trivial or negligible in nature; b) Consists of an environmental nuisance of a high impact or on a wide scale; c) Results, or is likely to result, in not more than \$50k or the prescribed amount (whichever is greater) being spent in taking appropriate action to prevent or minimise the environmental harm or rehabilitate the environment; or d) Results in actual or potential loss or damage to the value of not more than \$50k or the prescribed amount (whichever is greater). Serious environmental harm means environmental harm that is more serious than material environmental harm and includes environmental harm that: a) Is irreversible or otherwise of a high impact or on a wide scale; b) Damages an aspect of the environment that is of a high conservation value, high cultural value or high community value or is of special significance; c) Results or is likely to result in more than \$50k or the prescribed amount (whichever is greater) being spent in taking appropriate action to prevent or minimise the environmental harm or rehabilitate the environment; or d) Results in actual or potential loss or damage to the value of more than \$50k or the prescribed amount (whichever is greater).			<24 hours after oral notice (written notification) Three days after the incident (initial report) 90 days intervals from the date of the initial report (interim reports) 30 days after clean up or rehabilitation (final)

Regulation	Incident Description	Communication by	Contact Details	Timeframe
Petroleum Act 2018 and associated Regulations	Recordable Incident: An incident that has resulted in an environmental impact or environmental risk not specified in the current plan for the activity; or has resulted in the contravention of an environmental performance standard specified in the current plan for the activity; or is inconsistent with an environmental outcome specified in the current plan for the activity; and it is not a reportable incident.	In writing	1300 935 250 or 08 8999 6350 DITT Petroleum.Operations@nt.gov.au	15 days after each 90 day period after the day on which the environmental management plan is approved
Environmental Protection Biodiversity Conservation Act	Incidents considered having an impact on Matters of National Environmental Significance	In writing	Compliance@environment.gov.au & DAWE	within 5 business days of becoming aware
Energy Pipelines Act 2015 and associated Regulations	A reportable incident that involves: • Death or serious injury (or the potential to cause) • Significant damage to a pipeline (or potential to cause) • Immediate investigation	Telephone and in writing	1300 935 250 or 08 8999 6350 DITT Petroleum.Operations@nt.gov.au	As soon as practicable
	A significant pipeline accident event that: • Is connected with work carried out on or in relation to a pipeline • Causes, or has the potential to cause human death			
Waste Management and Pollution Control Act 1998 and associated Regulations	Duty to notify of incidents causing or threatening to cause pollution <i>Applicable to off tenure related spills (note ON tenure spills under Petroleum (Environment) Regulations):</i> 1) Where: a) an incident occurs in the conduct of activity; and b) the incident causes, or is threatening or may threaten to cause, pollution resulting in material environmental harm or serious environmental harm, the person conducting the activity must notify the NT EPA in accordance with subsection (3) as soon as practicable after (and in any case	Telephone	NT EPA Pollution Hotline, 24h: 1800 064 567 Pollution@nt.gov.au & DEPWS	As soon as practicable after (and in any case within 24 hours) first becoming aware of the incident or the time they ought reasonably be expected to become aware of the incident.

Regulation	Incident Description	Communication by	Contact Details	Timeframe
	within 24 hours after) first becoming aware of the incident or the time he or she ought reasonably to be expected to have become aware of the incident." An incident that causes, or is threatening or may threaten to cause, pollution resulting in material environmental harm or serious environmental harm. Refer to the definition of material and <i>serious environmental harm</i> provided in the <i>Petroleum Act</i> section above. Pollution means: a) A contaminant or waste that is emitted, discharged, deposited or disturbed or that escapes, or b) A contaminant, effect or phenomenon, that is present in the environment as a consequence of an emission, discharge, deposition, escape or disturbance of a contaminant or waste. Note: does not apply to incidents confined within petroleum activities land (including air and water above or below) – see the EMP for the area of petroleum activities land			
Environmental Protection Act and associated Regulations	Alteration of action in such a manner that the environmental significance of the proposed action may be changed	In writing	08 8924 4218 NT EPA ntepa@nt.gov.au	As soon as practicable
Bushfire Management Act 2016 and associated Regulations	Unable to control a fire on the land	All reasonable steps	08 8973 8871 or 08 8973 8872 or 08 8973 8870 DEPWS Note, also required to notify landholder	Following the fact

Regulation	Incident Description	Communication by	Contact Details	Timeframe
Heritage Act 2016 and associated Regulations	Discovery of archaeological places and objects	In writing	08 8999 5039 DTC - Heritage Branch heritage@nt.gov.au & DEPWS	As soon as practicable (within 7 days of discovery)
Weeds Management Act 2013	(a) First becoming aware of a declared weed that has not previously been, or known to have been, present on the land.	Not specified	08 8999 4567 DEPWS – Weed Management Branch weedinfo@nt.gov.au	14 days of becoming aware
Transport of Dangerous Goods by Road and Rail (National Uniform Legislation)	If a driver of a road vehicle transporting dangerous goods and the vehicle is involved in an incident resulting in a dangerous situation they must notify the prime contractor for the goods, the Competent Authority, and the police or fire service, of the incident.	Not specified	The prime contractor for the goods, the Competent Authority, and the police or fire service	As soon as practicable after the incident

Appendix 2. Site ERP Display Sheet

Project Name: EP187 ERP			
Coordinates:			
Tanumbirini Airstrip (YTNR);			
Latitude: 16°27'00.00"S		Longitude: 134°38'59.98"E	
Emergency Response Meeting Point; Carpentaria 1 intersection on Carpentaria Highway			
Latitude: 16°44'21.78"S		Longitude: 135°06'37.69"E	
Wellpad; Carpentaria 1			
Latitude: 16°47'40.20"S		Longitude: 135°07'22.98"E	
Emergency Contacts			
Entity		Location	Number
General	Police - Emergency	-	000 24h Assistance 131444
	Ambulance	Mataranka	(08) 8975 4547
	Ambulance	Katherine	(08) 8972 8500
	Fire Services	Katherine	(08) 8973 8014
		NT	(08) 8922 1555
	Service Station	Heartbreak Hotel	(08) 8975 9928
Medical Services	Royal Darwin Hospital	Darwin	(08) 8922 8888
	Katherine Hospital	Katherine	(08) 8973 9211
	Borrooloola Doctor	Borrooloola	WH: 08 8975 8711 AH: 08 8975 9859
Aeromedical Services	Care Flight	NT	(08) 8928 9777 24hr Emergency 1300 655 855
inGauge Energy			
Position		Name	Number
Principal Engineer		K██████████	0██████████
Project Manager and Superintendent		J██████████	0██████████
Civils and Approvals		J██████████	0██████████