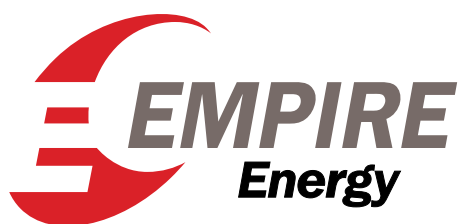


# EMPIRE ENERGY CARPENTARIA PILOT PROJECT



An aerial photograph of a large-scale construction project in a rural, forested area. The central focus is a large, circular concrete structure under construction, lined with blue material. To its right is a smaller, rectangular concrete structure. The surrounding landscape is a dense forest of green trees. In the foreground, there are dirt roads, construction equipment, and several white modular buildings. The sky is a clear, pale blue with some light clouds.

## **Acknowledgement of Country**

The Board and Management Team at Empire Energy Group acknowledge the traditional custodians of country throughout the Northern Territory and their traditions and connections with land, sea and community.

We pay our respects to all Aboriginal people on the land where we operate - past, present and emerging.

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- 3** Aquifer Protection
- 4** Exploration and Appraisal Activities
- 5** Managing Environmental Impacts
- 6** Local Business Opportunities and Engagement
- 7** Stakeholder Engagement



# Company Overview

Empire Energy Group Limited (**Empire**) is an Australian oil and gas company listed on the Australian Securities Exchange (ASX:EEG). Empire, with its wholly owned subsidiaries, Imperial Oil & Gas Pty Ltd (**Imperial**) and Imperial Oil & Gas A Pty Ltd (**Imperial A**), own and operate exploration permits across the McArthur Basin and the Beetaloo Sub-basin (**Beetaloo**). Imperial has carried out two seismic programs and drilled four wells in the Beetaloo, including Carpentaria-3H, the longest horizontal section of any well onshore Australia. Following encouraging flow testing results, Imperial is now proposing to move into the appraisal stage of its petroleum exploration through the Carpentaria Pilot Project.

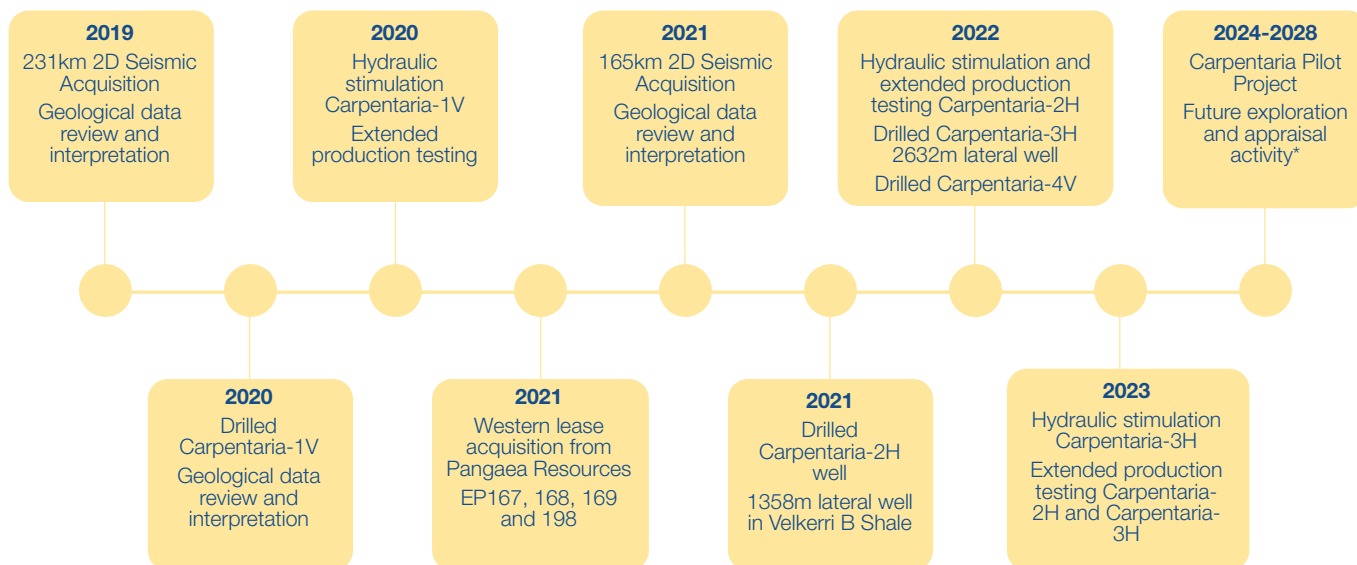
Empire is proud of its role in the exploration and appraisal of the world-class Beetaloo and, together with the exploration undertaken on the exploration permits Imperial A acquired from Pangaea (NT) Pty Ltd, has invested ~\$200m in the Northern Territory to explore and appraise the Beetaloo. This investment has contributed to generating economic opportunities for the regions, traditional owners and all Territorians. Empire has established strong connections with businesses and communities in the Northern Territory and is working hard to progress further opportunities from the Carpentaria Pilot Project.

# Appraising the Beetaloo

## RESPONSIBLE AND SUCCESSFUL APPRAISAL OF THE BEETALOO MEANS:

- More jobs for local companies, increased regional and Aboriginal employment and procurement opportunities due to the transition from exploration to appraisal activities.
- Empire carries out on-ground activities with the consent of traditional Aboriginal owners.
- Royalties will be paid to the Territory which can go towards improving local community services, regional roads, more police, schools, hospitals, and infrastructure.
- Appraisal gas recovered under the Carpentaria Pilot Project will contribute to energy security for the Northern Territory with increased domestic gas supply to the market.

## EXPLORATION AND APPRAISAL ACTIVITY INDICATIVE TIMELINE



\*Subject to change

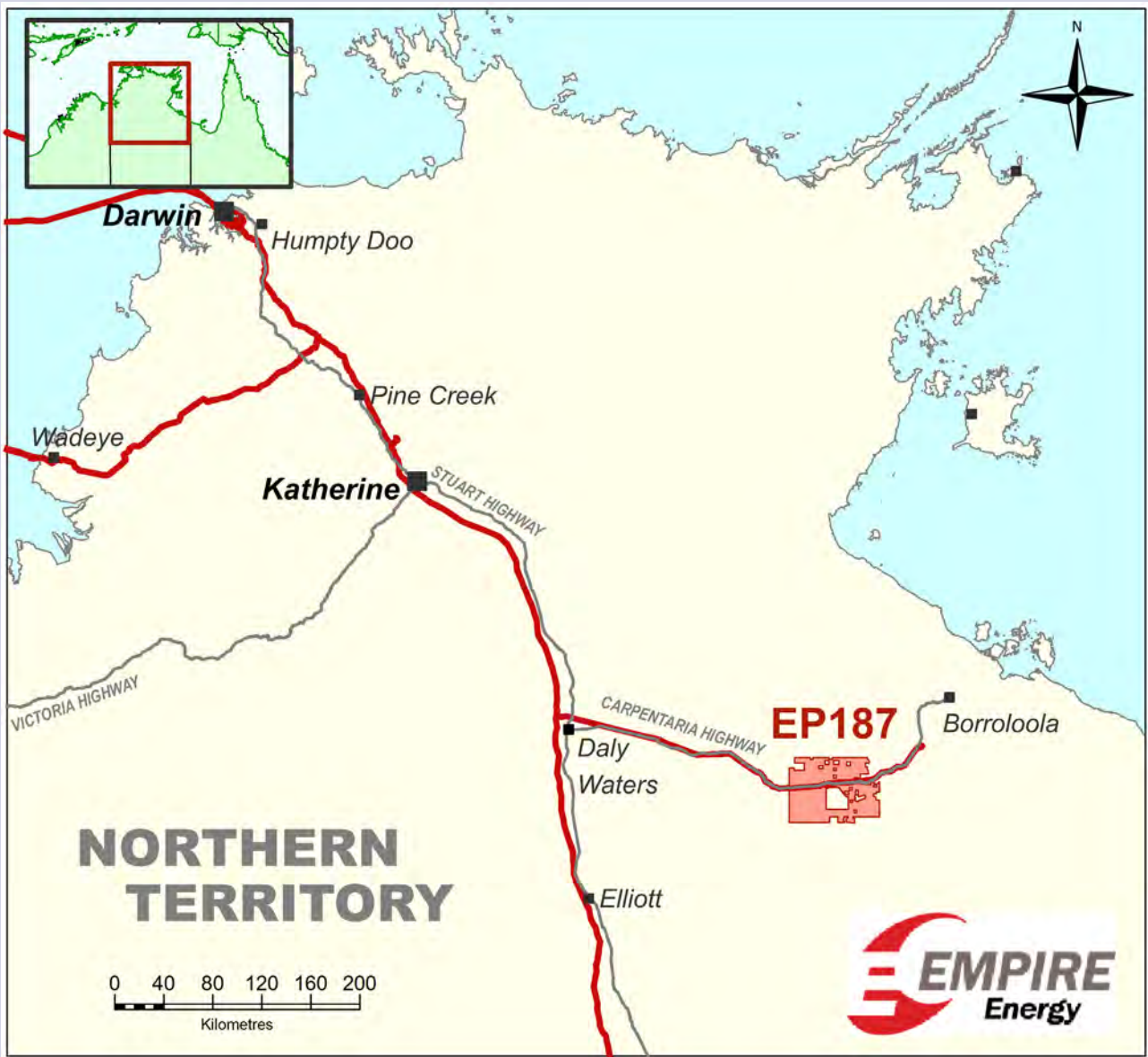


Image: Location of EP187

**PROPOSED APPRAISAL ACTIVITIES UNDER THE CARPENTARIA PILOT PROJECT WILL INCLUDE:**

- Constructing up to 25 km of new access tracks
- Constructing up to four new wellpads
- Extension of up to two existing wellpads
- Construction of up to 60km of water and wastewater flowlines
- Construction of up to 60km of gas flowlines
- Drilling and stimulating up to 10 new horizontal wells
- Construction of a compressor station
- Construction of a small camp facility
- Construction of a small office, warehouse, and workshop facility
- Installation of a water/ wastewater facility
- Operation of the above infrastructure and of infrastructure constructed under the exploration phase to facilitate the appraisal of the project area

# About Imperial's Carpentaria Pilot Project

## INDICATIVE PROJECT BRIEF AND LOCATION OF ACTIVITIES

Imperial's Carpentaria Pilot Project relates to the appraisal of a part of petroleum exploration permit 187 (EP187), located approximately 135 kilometres southwest of Borroloola within the Beetaloo and greater McArthur Basin. Imperial proposes a multi-year appraisal program in the western flank of EP187, commencing in 2024, building on the fieldwork carried out under the previous 2019 to 2023 work programs.

The Carpentaria Pilot Project multi-year extended well testing program is required to determine whether the shale gas reservoir identified by Imperial is commercially exploitable. Instead of venting or flaring the gas produced from extended well testing to the environment, Imperial proposes to seek the consent of relevant traditional Aboriginal owners and the Minister responsible for the *Petroleum Act*<sup>1</sup> to recover gas on an appraisal basis and provide that gas to the domestic market. Imperial believes the Carpentaria Pilot Project is consistent with comments in the Australian Government

(Department of Industry, Science and Resources) *Future Gas Strategy consultation paper*<sup>2</sup> that 'Producers can reduce production-related emissions by working to ensure more gas gets to customers. Minimising venting, flaring, fugitives and fuel gas are some of the ways to do this.'

Appraisal gas recovery under the Carpentaria Pilot Project will deliver royalty payments directly to the Territory and provide economic benefits to traditional Aboriginal owners and to suppliers, contractors and employees of the Carpentaria Pilot Project.

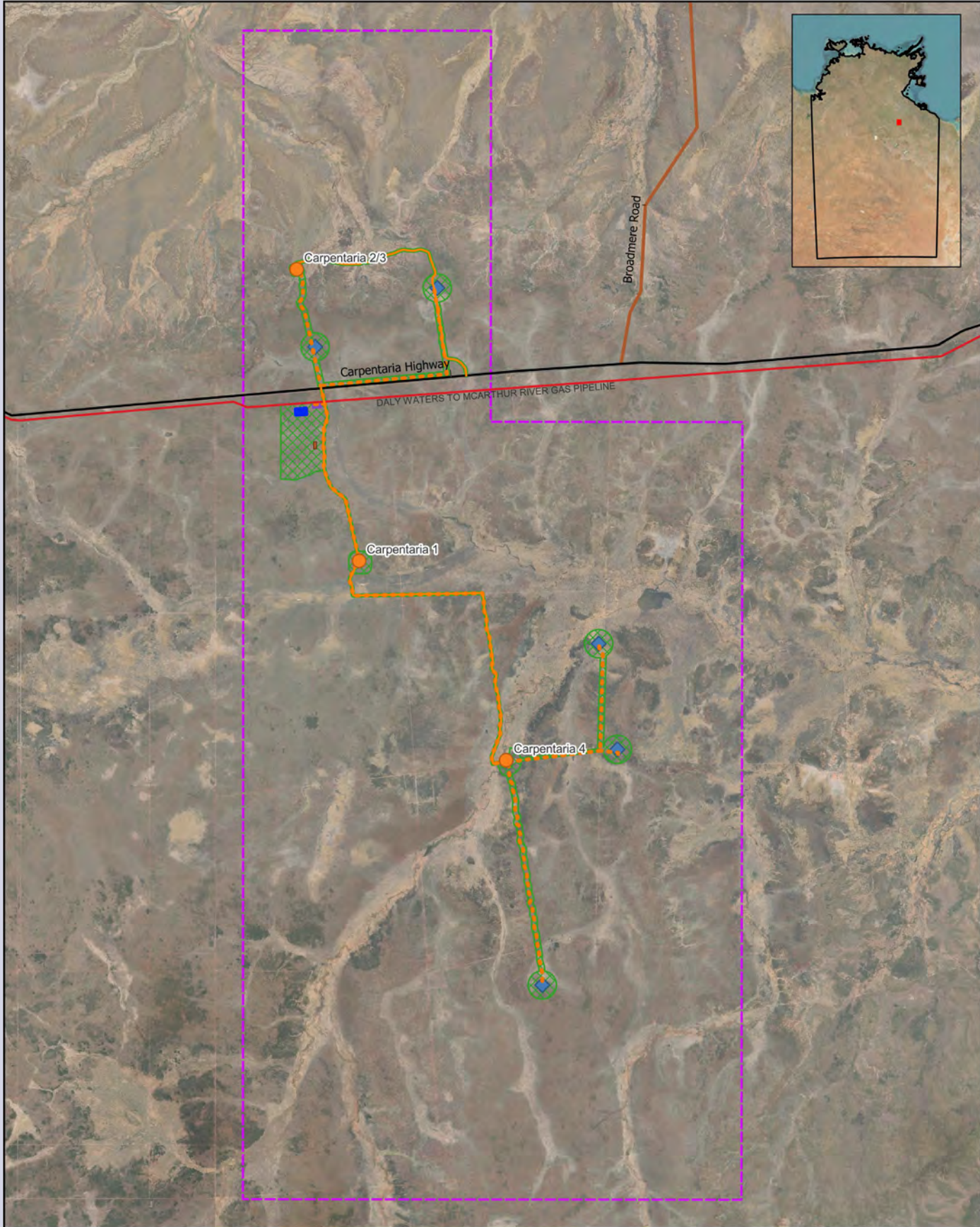
The following information is provided as an overview of proposed activities for the Carpentaria Pilot Project. Imperial is seeking early feedback to help inform Carpentaria Pilot Project planning.

An Environment Management Plan (**EMP**) is being prepared by Imperial. An EMP must be approved under the *Petroleum (Environment) Regulations 2016* (NT)<sup>3</sup> before any regulated activities commence.

<sup>1</sup> <https://legislation.nt.gov.au/en/Legislation/PETROLEUM-ACT-1984>

<sup>2</sup> <https://consult.industry.gov.au/future-gas-strategy>

<sup>3</sup> <https://legislation.nt.gov.au/en/Legislation/PETROLEUM-ENVIRONMENT-REGULATIONS-2016>



Legend		Appraisal Facilities (Indicative)	
Public infrastructure	CGAP area	Compressor station	0 2.5 5 7.5 10 km
Highway	Infrastructure movement areas	Radio Tower	
Road	Wellpads (Indicative)	Water treatment facility	<b>INGAUGE</b> <small>Reliable   Experienced   Engaged</small>
pipelines	Linear infrastructure	Campsite	
Existing Wellpad	Access tracks		<b>EMPIRE</b> <small>Energy</small>
Existing Access Track	Water/wastewater lowlines		
	Gas flowlines (Indicative)		

**Imperial Oil and Gas EP187**  
**Carpentaria Pilot Project (CPP)**  
**Proposed works**

Project name: EP187  
 Document Name: CPP Work Program  
 Revision No: 1  
 Created by: Jon Bennett  
 Created: 14/11/2023  
 inGauge Energy Pty Ltd

Map Projection: Universal Transverse Mercator  
 Horizontal Data: WGS84  
 Grid: WGS84 / UTM Zone 53

Data Sources:  
 Living Atlas - World Imagery  
 NRMmaps  
 Geosciences Australia  
 SREBA  
 CSIRO  
 EP187 CPP workscope

# Aquifer protection

Imperial understands the importance of aquifers to traditional Aboriginal owners, pastoralists, and the broader community. Protecting the water quality in the region's aquifers and the availability of water for all users is fundamental to Imperial's exploration and appraisal activities. To achieve this, Imperial is required to:

- build a baseline understanding of aquifer quality before drilling gas wells
- monitor the aquifer quality on an ongoing basis
- drill through the aquifers using water-based drilling fluids
- construct and maintain the integrity of a barrier between the gas well and the aquifer
- monitor the aquifer during hydraulic fracturing operations
- obtain a Ground Water Extraction License for water used by the Carpentaria Pilot Project.

## BUILDING AN UNDERSTANDING OF AQUIFER QUALITY

Before drilling a gas well, Imperial collects data to build an understanding of the aquifer water quality

at each wellpad by taking multiple samples from a control water monitoring bore located on the wellpad over six months. Accredited laboratories analyse these water samples to build a baseline of the water quality to which all future water analyses will be compared.

## ONGOING AQUIFER MONITORING

Before drilling a gas well that will be hydraulically fractured, Imperial drills a second water bore to monitor potential impacts. Each wellpad then has:

- a Control Monitoring Bore (CMB) within 100m of the well pad upstream relative to the water flow direction in the aquifer; and
- an Impact Monitoring Bore (IMB) within 20m downstream of the gas wells on that wellpad.

Water from both bores is sampled and sent for analysis at accredited laboratories at frequencies determined by the Regulator.

Information from all of Imperial's water bore analysis is available at: <https://depws.nt.gov.au/onshore-gas/onshore-gas-in-the-northern-territory/industry-compliance-and-reporting/groundwater-monitoring-results>

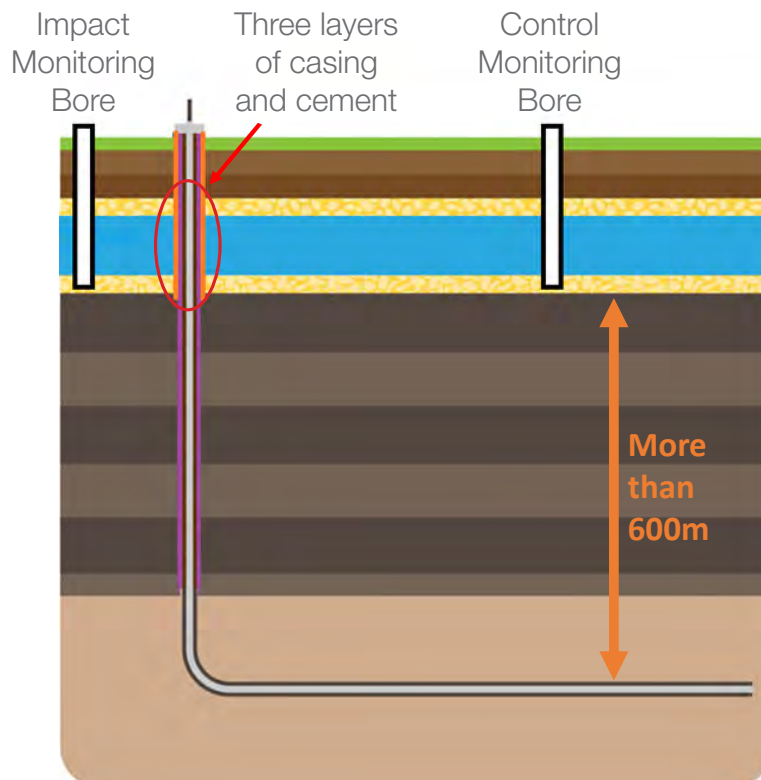


Diagram: Water monitoring bores and wellbore isolation



## WELLBORE BARRIERS

There is a minimum of 600m of vertical separation between the bottom of any aquifer present and the top of any hydrocarbon-bearing formation that Imperial will extract gas from under the Carpentaria Pilot Project; Imperial builds on and maintains this natural barrier to protect aquifers from contamination.

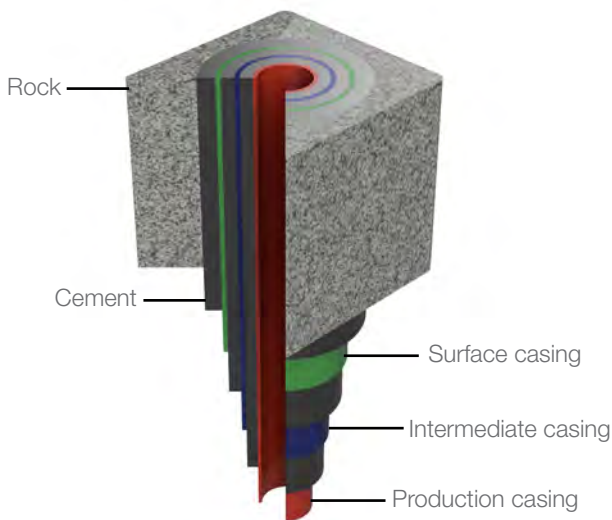


Diagram: Wellbore isolation through aquifer

When drilling, Imperial sets and cements the first casing string on all gas wells as soon as practicable after drilling through the base of the aquifer/s present. This surface casing string provides a barrier of engineered cement and ~1cm thick high-grade steel between the aquifer and all subsequent drilling operations. A second casing string is set on the well before drilling into any hydrocarbon-bearing formation. Combining the surface and intermediate casing strings provides two engineered cement barriers and 2 ~1cm thick high-grade steel between the aquifer and all subsequent drilling operations.

Before drilling into the hydrocarbon-bearing zone, Imperial carries out a Formation Integrity Test to ensure that the barriers present at the base of

the second casing string are adequate to contain any pressures likely to be encountered in the hydrocarbon-bearing formations. The gas well is then drilled to its full depth and length before a third string of casing is run and cemented in place. Once this is complete, a cement bond log is carried out on this production casing string to check the integrity of the engineered cement.

A Well Barrier Integrity Validation (**WBIV**) assessment is carried out by an independent auditor after each gas well operation that affects the wellbore barriers. The WBIV report is then verified by the Regulator. The WBIV reports for Imperial's gas wells are on the NT POINT website at <https://point.nt.gov.au/weave/point.html>.

## AQUIFER MONITORING DURING HYDRAULIC FRACTURING

During hydraulic fracturing operations, Imperial monitors the groundwater pressure and level of the water in the Impact Monitoring Bore on the wellpad where hydraulic fracturing operations are taking place. This is to provide an indicator of well-integrity failure, particularly during the well hydraulic fracturing when the differential pressure between the aquifer and well annulus is extremely high, and thus a breach of well-integrity would be instantaneously detected.

Before, during and after hydraulic fracturing activities, the monitoring bores have a logger that will take a reading at the wellpad every four minutes:

- two weeks before hydraulic fracturing
- during hydraulic fracturing
- four weeks after hydraulic fracturing

After this logging period, the data is downloaded and assessed, and a report is compiled and supplied to the Regulator.

No effect on the aquifers has been recorded during Imperial's hydraulic fracturing operations.

## GROUNDWATER EXTRACTION

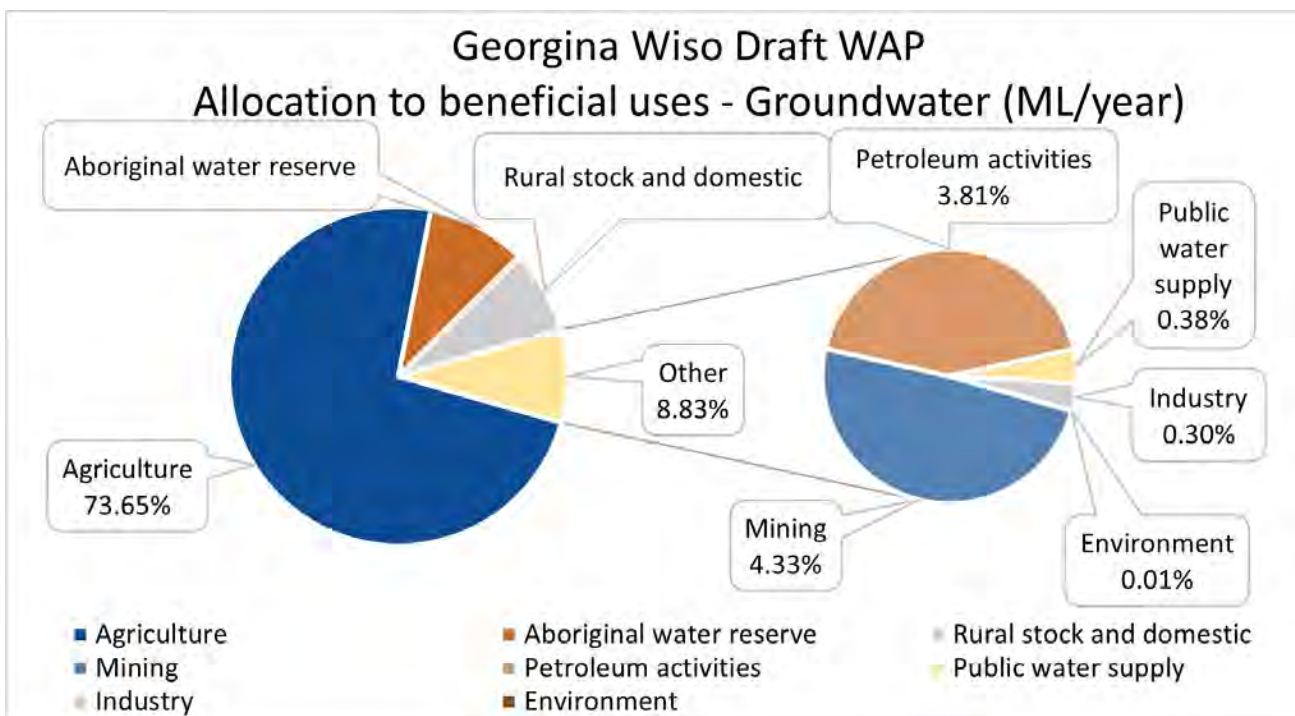
Before groundwater can be used for any activities, Imperial must apply for a groundwater extraction licence (**GWEL**) from the Northern Territory in accordance with the *Water Act* (NT) <sup>4</sup>. The Territory can issue a licence based on their data analysis and considering how much water is being used by other industries and water users.

Groundwater is regulated in the Northern Territory by the *Water Act* (NT) <sup>4</sup>, and consistent monitoring is required. Monitoring allows Imperial to understand the natural groundwater variation and detect any groundwater impacts that may occur. No surface water will be used for the Carpentaria Pilot Project.

The Carpentaria Pilot Project is located within the *Georgina-Wiso Water Allocation Plan* <sup>5</sup> (**WAP**) area. The estimated sustainable yield in the WAP is 262 GL per year. This is approximately 0.01% of the estimated storage volume (>2,000,000 GL) in the Gum Ridge aquifer (*Knapton 2020*) <sup>6</sup> and underscores the conservative approach adopted in the WAP.

The allocation to Beetaloo petroleum activity is capped at 10 GL p.a. in the WAP. The estimated total stock and domestic groundwater extraction for the Georgina Basin is approximately 14 GL p.a. The total present GWEL's in the Gum Ridge aquifer in the Beetaloo for petroleum-related activities is 0.75GL p.a.

Imperial will apply for an increased volume in its GWEL from 85ML p.a. up to 750ML p.a. from the Gum Ridge aquifer for the Carpentaria Pilot Project. 750ML p.a. is 7.5% of the proposed 10GL GWEL cap on Beetaloo petroleum production in the WAP; and less than 0.3% of the overall proposed GWEL cap in which the estimated sustainable yield is 262 GL p.a. in the WAP.



<sup>4</sup> <https://legislation.nt.gov.au/en/Legislation/WATER-ACT-1992>

<sup>5</sup> [https://nt.gov.au/\\_data/assets/pdf\\_file/0007/1284829/georgina-wiso-water-allocation-plan-2023-2031.pdf](https://nt.gov.au/_data/assets/pdf_file/0007/1284829/georgina-wiso-water-allocation-plan-2023-2031.pdf)

<sup>6</sup> Knapton 2020 - Knapton, A. (2020) *Upgrade of the Coupled Model of the Cambrian Limestone Aquifer and Roper River Systems*. Report prepared by CloudGMS for the NT Department of Environment and Natural Resources.

# Exploration and appraisal activities

## DRILLING

Gas wells are drilled to safely extract gas from the hydrocarbon-bearing formations whilst protecting the environment, including aquifers. Before drilling into hydrocarbon-bearing formations, blowout preventers will be fitted to the wellhead and tested to verify operations. The blowout preventers are designed and function to give added protection to hydrocarbon well drilling operations by containing the pressure in the wellbore and releasing it in a controlled manner if required.

Drilling operations are carried out using specialised petroleum well drilling rigs and contractors. When drilling, drill fluid is used to maintain well control and to bring the drill cuttings from the drill bit to the surface. Imperial proposes to only use water-based drilling fluids on the Carpentaria Pilot Project.

Drilling fluid and cuttings are stored in lined ponds with an impermeable barrier and bunded to prevent entry from overland flow. The drilling fluid ponds are fitted with sensors and remote monitoring capability to monitor the fluid level in the pond. The drilling fluid may be re-used on subsequent Carpentaria Pilot Project drilling operations or disposed of by evaporation. The residue from drilling fluid and cuttings after evaporation may be disposed of on-site after independent testing and regulatory approval. If independent testing does

not demonstrate the residue is suitable for on-site disposal the residue will be disposed of at a licensed waste facility.

The Carpentaria Pilot Project aims to drill horizontal well sections approximately 3km long to reach large areas of the target hydrocarbon-bearing formation. Multiple wells will be drilled on the same wellpad. This reduces the number of wellpads, access tracks, and flowline right of ways required and significantly reduces the surface impact of activities. Wellpad surface infrastructure can also be utilised for the multiple wells on the wellpad, allowing one set of tanks and ponds to be re-used for several wells.

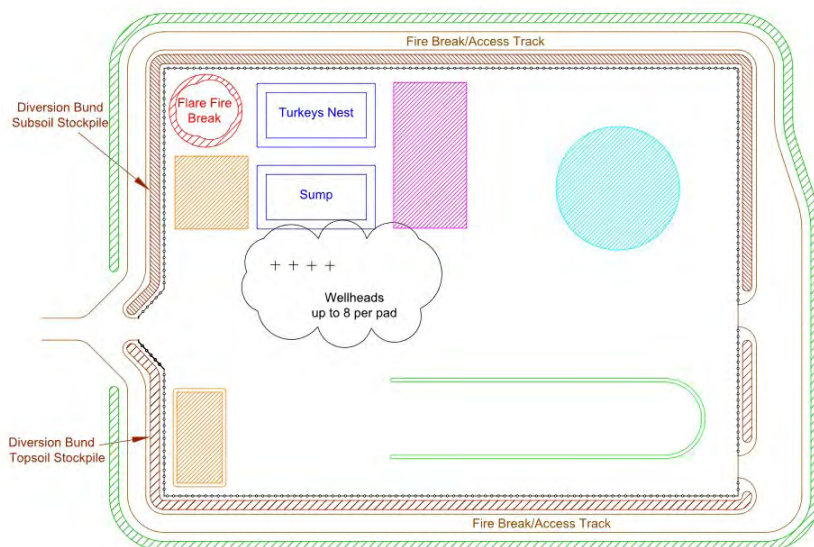
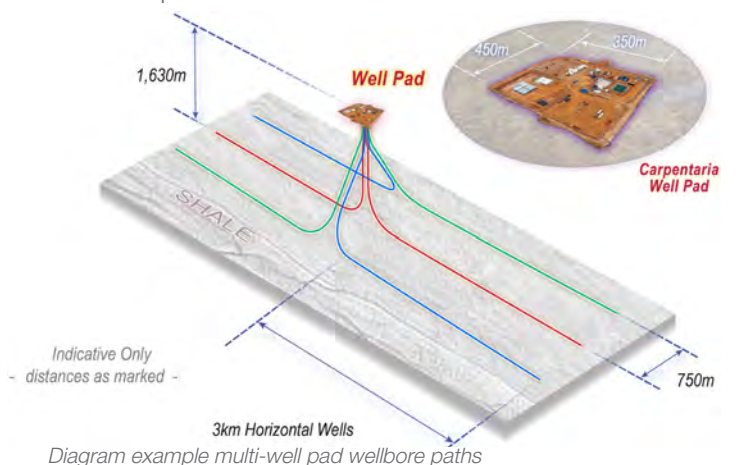


Diagram: Example wellpad layout for multi-well pad

## HYDRAULIC FRACTURING

The hydrocarbon-bearing formations in the Carpentaria Pilot Project area are shale formations. Before gas can be extracted from the shale gas reservoir, hydraulic fracturing must occur. Hydraulic fracturing is a technique used to enhance the production of gas.

During hydraulic fracturing operations fluids are pumped into the well under pressure until the rock develops very small fractures. The fluids carry sand grains (proppant), which move into the fractures to stop them from closing when pumping stops, enabling the gas to flow to the surface. The fractures allow the gas to flow from pore spaces into the well bore and allows gas to be extracted from the shale.

Fractures extend horizontally by a few hundred metres and vertically by tens of metres. Detailed engineering and design work is carried out to ensure fractures stay within the shale rock and do not extend too far from the well bore. Vertical fracture height growth is restricted by overlying rocks, which form a barrier.

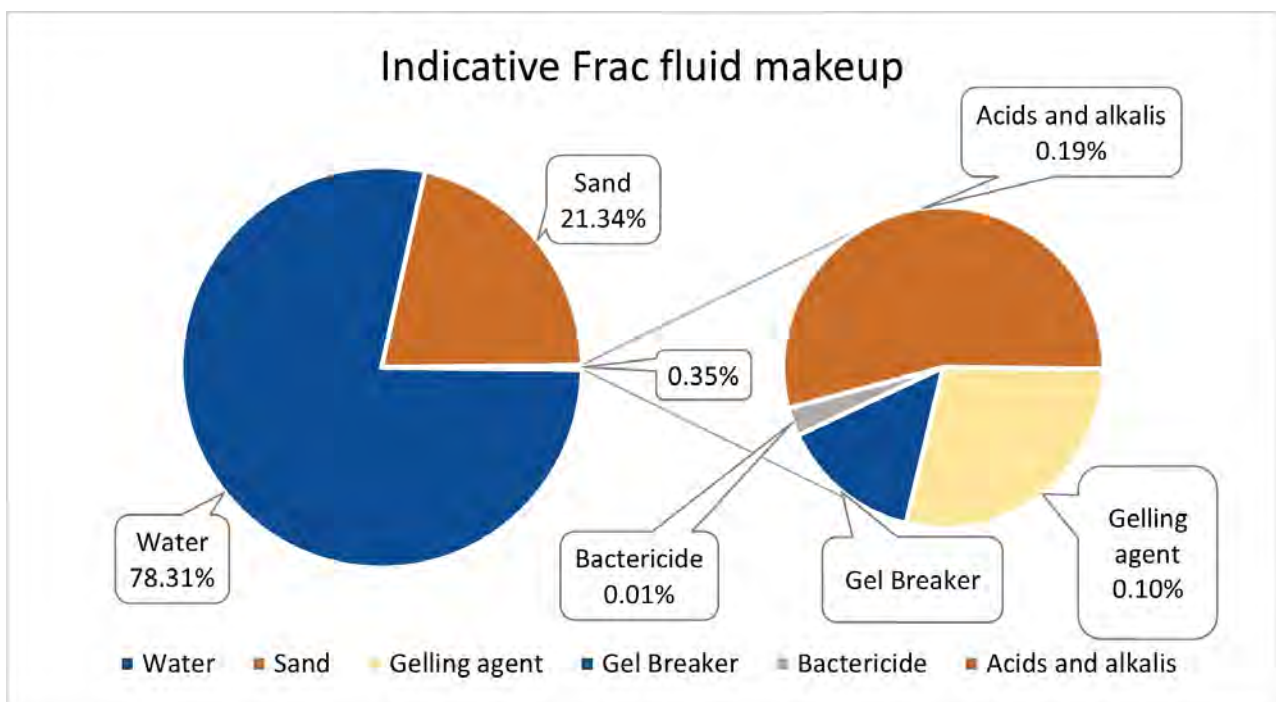
## HYDRAULIC FRACTURING FLUIDS

Hydraulic fracturing fluid comprises approximately 99.65% water and sand; other chemical additives make up the other 0.35%. The chemicals commonly used in the fluid are similar to products found in everyday uses:

- a gelling agent, such as guar gum, is used to create a gel to suspend the proppant in the water and transport the proppant through the fracture
- a gel breaker, such as ammonium persulfate (used in hair bleach), that reduces the viscosity or thickness of the hydraulic fracturing gels so that they can transmit water and gas surfactants, such as ethanol, together with a cleaning agent, to allow high pump rates and reduce pressure

- a bactericide or disinfectant, such as sodium hypochlorite (pool chlorine) and sodium hydroxide (used to make soap), to control bacteria growth in the well that contaminates the gas and restricts gas flow
- acids and alkalis, such as acetic acid (vinegar) and sodium carbonate (washing soda), assist in the initiation of the fracture and improve fluid flow in the rocks.

Imperial will not use BTEX chemical additives (benzene, toluene, ethylbenzene and xylenes) in the Carpentaria Pilot Project.



## EXTENDED PRODUCTION TESTING

Production testing is the process that occurs after a well is successfully drilled and fracture stimulated. The purpose of production testing is to understand the rate and volume of gas that can be extracted from a well.

Firstly, a proportion of the fluid pumped into a well during hydraulic fracturing is returned to the surface to allow the well to flow gas on its own. Gas flow from the well is sent to a separator so fluids can be removed and redirected to the wellpad wastewater tanks or the water/wastewater flowline network. The gas is measured over a period of time to provide information about the composition of the gas and the amount of recoverable resources.

Previously, Extended Production Testing (EPT) has been carried out for ~90-120 days to build a preliminary understanding of the recoverable resources. During the appraisal phase of the Project, extended production testing will be carried out over a much longer duration to evaluate the recoverable resources.

During the initial EPT in exploration, the gas was sent to flare where it was burned. For the extended well testing of the Carpentaria Pilot Project Imperial proposes to capture the gas produced from extended well testing and to gather the gas, process and compress the gas and then have the gas transported to market for use.



Image: Carpentaria-3H site during EPT



Image: Separator on Carpentaria site

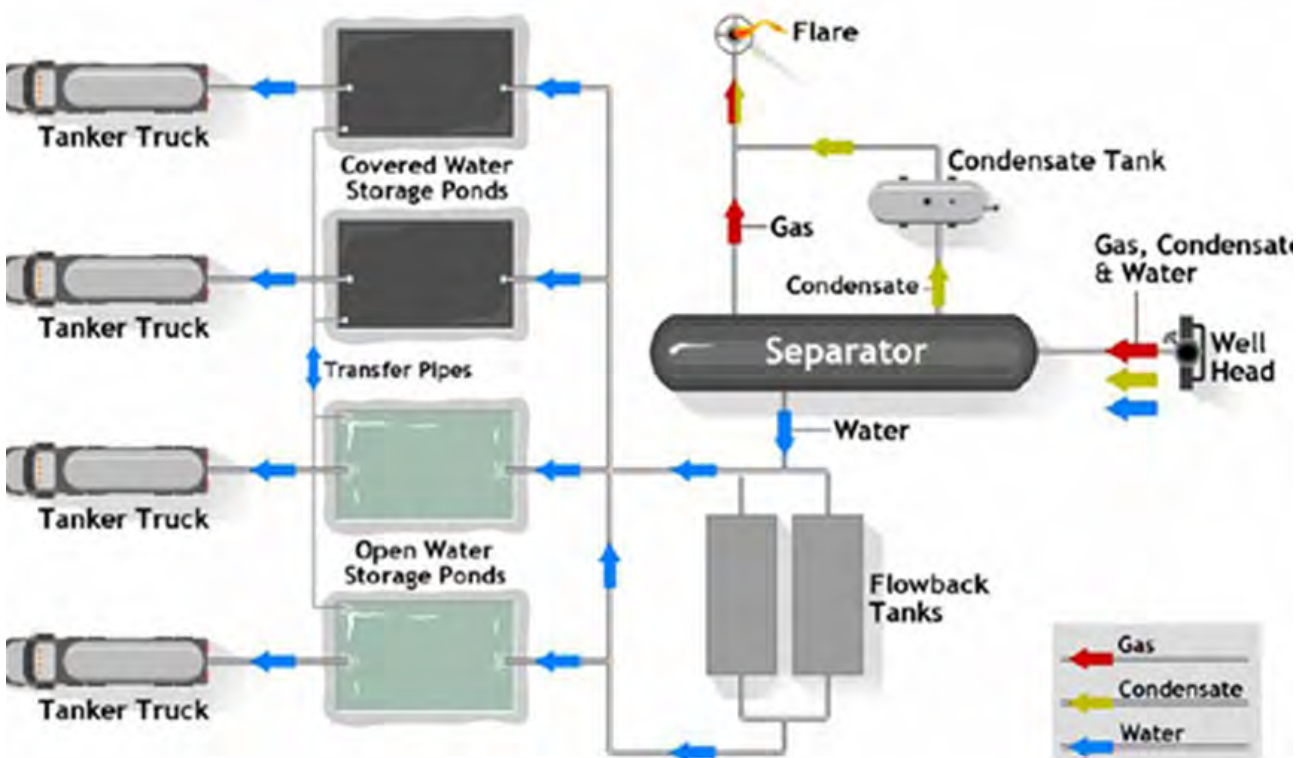


Diagram: Example EPT schematic

## WATER/WASTEWATER FLOWLINE NETWORK

Imperial will construct, operate and maintain a low-pressure polyethylene water/wastewater flowline network to provide safe and efficient transfer of high volumes of fluids between well pads and the water/wastewater facility as part of the Carpentaria Pilot Project.

Fluids transferred in the water/wastewater flowline network may include groundwater, flowback fluids, and produced formation water.

The motivation to install and operate the water/wastewater flowline network is to:

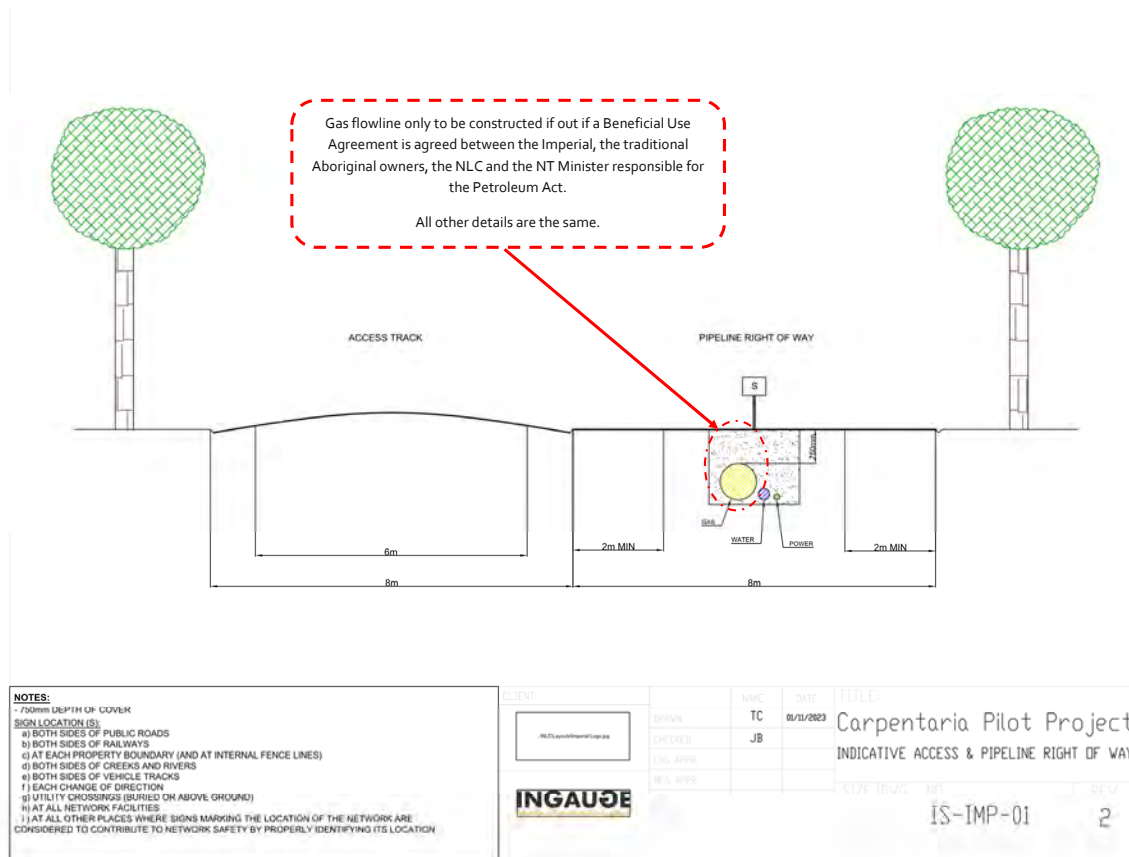
- reduce the land clearing requirements for storage tanks at each well site
- provide the capability for recycling and reuse of fluids between well sites
- optimise in-field flowback fluid and wastewater treatment to a centralised location
- reduce trucking requirements
- reduce the amount of wastewater for final disposal
- operate the well site to minimise the potential for contaminant releases to the environment and any potential impacts of such releases.

The water/wastewater and flowline network will be constructed, operated, maintained, and abandoned per the *Code of Practice for Upstream PE Gathering Lines in the CSG Industry and Companion Papers*<sup>7</sup>.

Imperial will bury any flowlines outside wellpad fences to protect them from fire, flood, and livestock and human activity damage. Flowlines will be installed with a 750mm depth of cover, except where the flowline crosses an access track or watercourse, where it will have a depth of cover of no less than 1,200mm.

The flowlines will follow the disturbance footprint of access tracks or other disturbed areas where practicable to reduce the amount of land clearing required and allow efficient construction, operation, and maintenance.

Marker signs will be installed to alert people of the water/wastewater flowlines network's presence and, if they plan to carry out work nearby, of the possible consequences of inflicting unintended damage. Markers instruct those intending to work near the flowline network to contact the nominated network operator and provide relevant contact details.



<sup>7</sup> <https://www.apga.org.au/code-practice-upstream-pe-gathering-lines-csg-industry>

## WATER/WASTEWATER FACILITY

A water/wastewater facility will be constructed and operated as part of the Carpentaria Pilot Project to enable the safe and efficient handling, storage, and use of water, flowback fluid, and produced water. The water/wastewater facility will be fenced to prevent livestock and unauthorised personnel entry and be bunded to prevent overland flow around the tanks during large rainfall events.

Wastewater will be stored in engineered lined tank/s fitted with leak detection and secondary bunding. Wastewater tanks will be built on bases constructed and compacted to the tank suppliers' specifications, including drainage away from the outside of the tank to prevent rainwater ponding at the tank's base during rainfall events.

The wastewater tank/s may be covered or uncovered, depending on operational requirements. If the wastewater tank/s are covered, a freeboard of 500mm will be maintained at all times. If the wastewater tank/s are not covered, a freeboard adequate to contain a 1 in 1000-year rainfall event will be maintained during the local wet season, and a freeboard of 500mm will be maintained during the local dry season.

Water/wastewater will primarily be delivered to the water/wastewater facility tanks from the water/

wastewater flowline network from water bores, wellpads, and the compressor station. Water/wastewater will be delivered to wellpads for use in Hydraulic Fracturing operations via the same water/wastewater flowline network. Trucking may also be utilised for delivery from the same sources due to operational requirements. Residues may be removed from the water/wastewater facility from time to time for off-site disposal.

It is intended that wastewater will be blended with fresh water from bores and used for Hydraulic Fracturing without further treatment. If blending with fresh water from bores does not bring the wastewater to a make-up suitable for hydraulic fracturing, further treatment may be required, such as chemical treatment, filtering, osmosis, or distillation. If this treatment is required, it will be carried out at the water/wastewater facility, and residues from this processing will be removed from the water/wastewater facility for re-use or off-site disposal.

It is expected that 40% of the water used for hydraulic fracturing will be recovered during flowback operations and re-used on subsequent hydraulic fracturing operations, thereby reducing the groundwater water required for the Carpentaria Pilot Project.

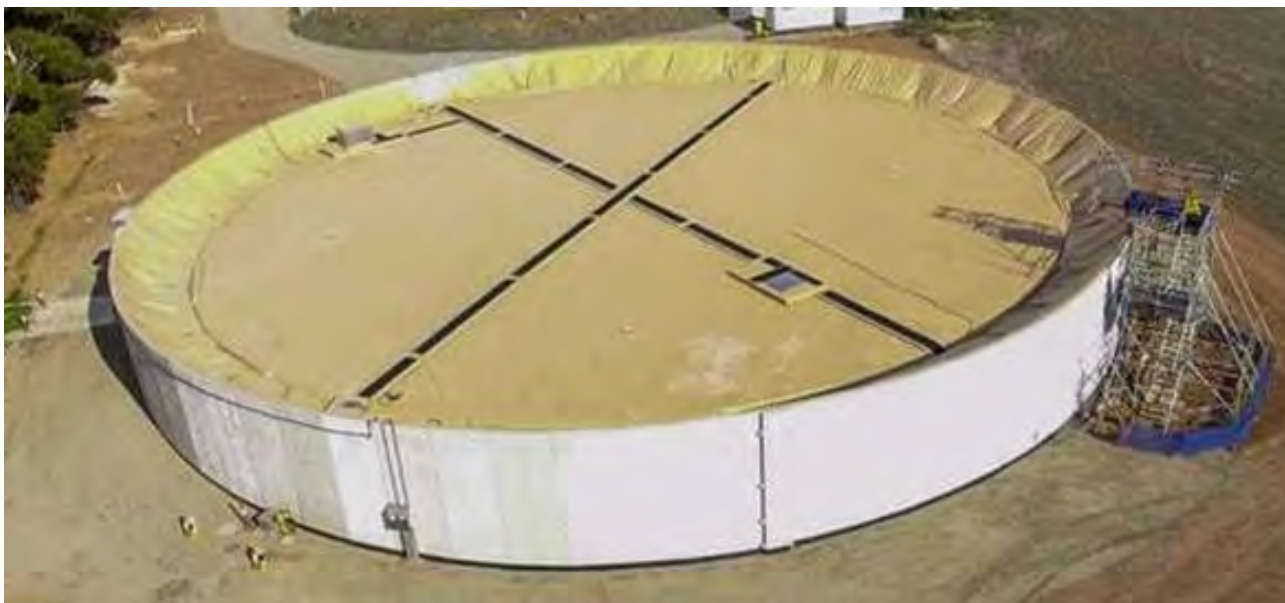


Image: Water/wastewater tank on wellpad with fitted cover

## GAS COMPRESSOR STATION

If the necessary approvals and agreements are obtained for appraisal gas, a gas compressor station will be installed and operated as part of the Carpentaria Pilot Project. The compressor station will take gas from the low-pressure gas gathering network, condition it and increase the gas pressure for discharge into the high-pressure sales gas pipeline, then into the Daly Waters to McArthur River Gas Pipeline. The compressor station will run 24 hours per day, seven days per week. A high-level process flow of the Project compressor station includes the following stages:

- water removal upstream of compression
- gas compression
- water removal and gas dehydration downstream of compression
- metering and composition analysis of sales gas
- fuel gas and flare systems.

### Water removal upstream of compression

Gas from the field gathering network will first enter a separator to capture any potential water that may enter the compression station from the gas gathering network. Water collected in the separator drains to the wastewater system. Downstream of the slug catcher, filter/coalescer vessels further remove water from the gas stream.

### Gas compression

Gas from the filter/coalescer vessel/s will be compressed to a typical pressure of 7500kPag via compressor packages. Each package comprises a gas-powered compressor to raise the gas pressure, and a fin-fan cooler to reduce the gas temperature after compression. The figure opposite shows an indicative compressor package, including the compressor (right of the image) and fin fan cooler (left of the image) There will be multiple of these compressor packages at the Project compressor station.

### Water removal and gas dehydration downstream of compression

The cooled gas leaving the compressor packages will pass through a scrubber vessel, where any condensed water/lube oil will be removed from the gas stream. The gas from the scrubber vessel will be sent to a Tri-Ethylene Glycol (TEG) dehydration unit to remove moisture from the gas to meet the sales gas specifications. The key equipment items comprising the TEG dehydration unit are the contactor, reboiler, and TEG pumps. TEG liquid is constantly pumped through the contactor, where water vapour transfers from the gas to the TEG liquid; the TEG liquid flows from the contactor to the reboiler, where the water is removed from the TEG by heating the TEG above the boiling point of water, the TEG is then cooled before returning to the contactor.

### Metering and composition analysis of sales gas

Gas from the TEG dehydration unit will be directed to the Sales Gas Metering Skid, where a gas chromatograph unit/s to measure gas composition and a custody transfer flowmeter to measure the sales gas flow volumes.

### Fuel gas and flare

The compressor station will use produced gas taken as fuel gas for the power generator, compressor engine driver, TEG reboiler burner and flare pilot.

A horizontal ground flare system will be used to dispose of gas during compressor station upsets or abnormal conditions safely. The flare will be equipped with a pilot and ignition system. A barrier wall will be installed to protect the surroundings from heat radiation.

### Booster compression

A booster compressor unit may be installed downstream of the sales gas metering skid to achieve the required delivery pressure into the Daly Waters to McArthur River Gas Pipeline at the EP187 tie-in location. If fitted, the booster compression unit will contain similar equipment as the gas compression units described in the section above.



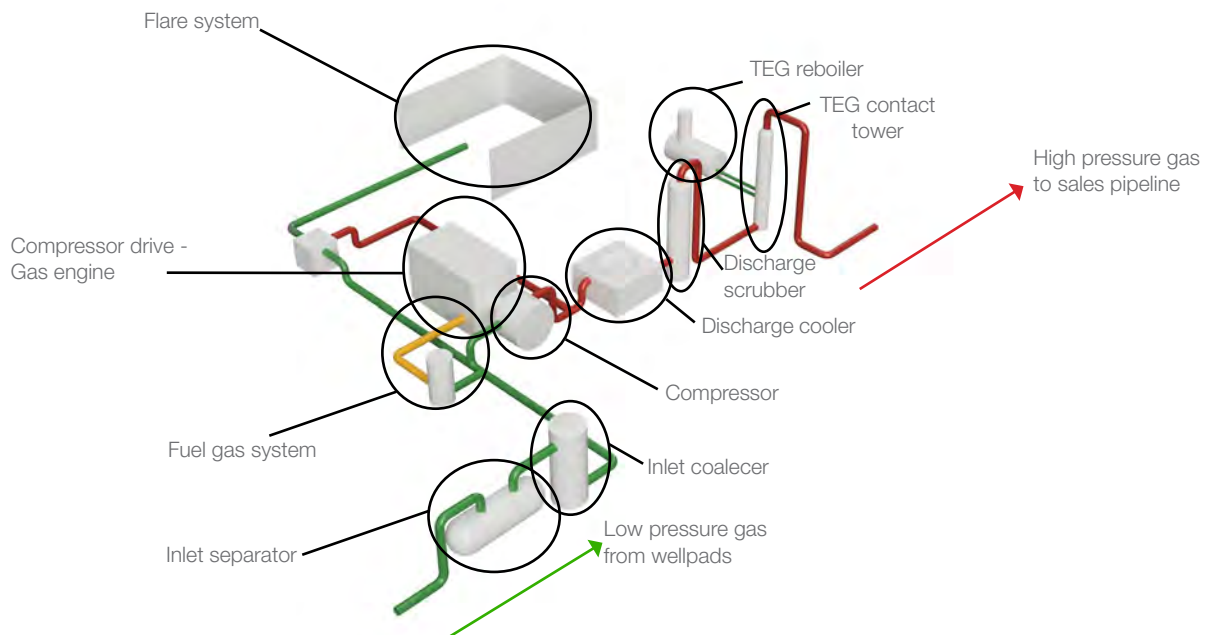


Diagram: Example compressor and components

## GAS GATHERING NETWORK FLOWLINE

If the necessary approvals and agreements are obtained for appraisal gas, a gas gathering network will be installed, operated and maintained to gather gas from wellpads to the Carpentaria Pilot Project compressor station. The gas gathering flowline network will be constructed, operated, maintained, and abandoned per the *Code of Practice for Upstream PE Gathering Lines in the CSG Industry and Companion Papers*<sup>7</sup>.

Imperial will bury any flowlines outside well pad fences to protect them from fire, flood, and livestock and human activity damage. Flowlines will be installed with a 750mm depth of cover, except where the flowline crosses an access track or watercourse, where it will have a depth of cover of no less than 1,200mm. The flowlines will follow the disturbance footprint of access tracks or other disturbed areas where practicable to reduce the amount of land clearing required and allow efficient construction, operation, and maintenance. Gas gathering flowlines will be installed in the same trench as the water/wastewater flowlines where practicable, requiring little to no extra land disturbance.

Marker signs will be installed to alert people of the water/wastewater flowlines network's presence and,

if they plan to carry out work nearby, of the possible consequences of inflicting unintended damage. Markers instruct those intending to work near the flowline network to contact the nominated network operator and provide relevant contact details.

## GAS SALES PIPELINE

To enable any appraisal gas to be transported to market it is proposed that a high-pressure sales gas pipeline will be constructed, operated and maintained from the compressor station to a tie-in point on the Daly Waters to McArthur River Gas Pipeline.

<sup>7</sup> <https://www.apga.org.au/code-practice-upstream-pe-gathering-lines-csg-industry>

## WELL ABANDONMENT AND REHABILITATION

Well abandonment is carried out when a gas well is no longer required; it is carried out to fully isolate the hydrocarbon-bearing formation from the environment and reinforce the isolation of aquifers that is put in place as part of the drilling operation. Wellpad rehabilitation is carried out when there are no gas wells on that wellpad that are not abandoned, and there is no plan to drill further gas wells on that pad in the foreseeable future. There are multiple stages of well abandonment and wellpad rehabilitation undertaken when a gas well is no longer required to be operational.

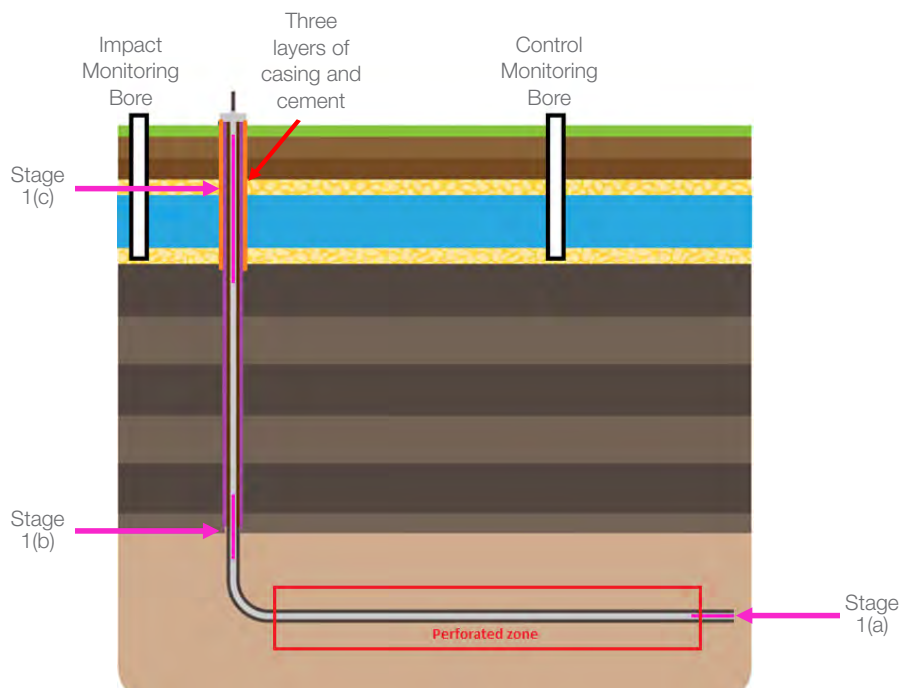


Diagram: Well abandonment process

### Stage 1:

- (a) An engineered cement plug is placed at the end of the horizontal well and the end of any perforated sections.
- (b) A mechanical plug is inserted at the top of the hydrocarbon bearing formation, then a 50m engineered cement plug is placed above it, isolating the hydrocarbon bearing formation from the well bore above the cement plug.
- (c) An engineered cement plug is placed from 50m below the bottom of the deepest aquifer present to 15m below the ground surface, reinforcing the multiple engineered cement and steel barriers that are isolating the aquifers present from the wellbore, hydrocarbon-bearing formations, other aquifers and from the surface.
- Wellpad surface rehabilitation is undertaken to recontour most of the wellpad to the natural contours and to return vegetation to the condition before the wellpad was built. All pits that were constructed as part of the wellpad are rehabilitated at this time and all infrastructure other than wellheads and external fencing is removed.

### Stage 2:

- After the initial stage one rehabilitation steps, verification must be provided, showing no pressure build up has been measured within the casing or annulus over 12 months, proving that the hydrocarbon bearing formations are isolated from the environment. The regulator must approve this before continuing with well abandonment operations.
- The wellhead is then removed 1.5m below the ground surface.
- The wellpad surface is then fully rehabilitated, leaving only a marker indicating the location of the well underneath the ground, wellpad fencing is left in place to assist with revegetation.
- Wellpad fencing is removed after vegetation is well established over the rehabilitated wellpad.

Before undertaking any exploration, appraisal or production activities, companies must pay a security bond to the Territory, which ensures that if rehabilitation has not been completed by the company, the Territory can undertake the required activities. This security bond is only returned to the company when restoration works are completed and verified.

# Managing Environmental Impacts

Before undertaking any work, Imperial must have an EMP approved by the Minister for Environment, Climate Change and Water Security. The Minister, assisted by the Northern Territory Department of Environment, Parks and Water Security (**Regulator**), must be satisfied that any potential environmental risks can be managed and mitigated to 'As Low As Reasonably Possible' (**ALARP**) and acceptable. The *Code of Practice: Onshore Petroleum Activities in the Northern Territory*<sup>8</sup>, the *Petroleum (Environment) Regulations 2016*<sup>9</sup>, and the *Schedule of Petroleum Onshore Requirements*<sup>10</sup> provide the minimum environmental standards that the onshore petroleum industry in the Northern Territory must adhere to.

During the compilation of an EMP, Imperial carries out on-site archaeological and ecological assessments for the full disturbance footprint. These assessments are carried out in conjunction with on-ground scouting operations to assist in choosing the least disturbance locations for well pads that will allow the drilling of wells into the target hydrocarbon-bearing formations and place other infrastructure in the least disturbance locations while meeting operational requirements. Where practicable, existing disturbances are used for access tracks and flowline right of ways linking wellpads and other infrastructure. All petroleum infrastructure, including wellpads, flowlines, pipelines and compressor stations, have a setback distance of at least 2km from an existing or proposed habitable dwelling. Wellpads are also not located within 1km of an existing water supply bore used for domestic or stock consumption.

A risk assessment is carried out as part of the EMP compilation process, identifying significant environmental risks for the Carpentaria Pilot Project and identifies how these risks can be managed. Controls aligned with the risk assessment are integrated into the EMP and on-ground practices.

EMPs are submitted to the Regulator for assessment, where environmental risks and controls are scrutinised. If the EMP is found to manage these environmental risks the EMP is approved by the Minister, EMPs are advertised for public comment during this assessment process. Approved EMPs can be found at <https://depws.nt.gov.au/onshore-gas/environment-management-plan/approved-emps>.

Imperial is required to comply with regular reporting requirements to the Regulator across multiple areas of activities. The Regulator may inspect the operations on-site at any time. Imperial has had multiple on-site audits of its regulated activities in the Northern Territory and no environmental damage has been found in these audits.

The Northern Territory has implemented their *Management of Greenhouse Gas Emissions from the Onshore Gas Industry*<sup>11</sup> Policy Statement outlining the minimum requirements for any company undertaking onshore petroleum production. This Policy Statement aligns with the Australian Government's reforms to the Safeguard Mechanism to manage greenhouse gas emissions from onshore gas production in the Northern Territory.

Imperial intends to obtain the necessary approvals and agreements for the sale of appraisal gas to greatly reduce the greenhouse gas emissions that would be generated if the gas was vented or flared. Therefore, the Carpentaria Pilot Project emissions will be well below the 100 000 tCO<sub>2</sub>-e scope 1 emissions threshold for appraisal and exploration activities in the *Large Emitters Policy*<sup>12</sup>, as stated in the *Management of Greenhouse Gas Emissions from the Onshore Gas Industry*<sup>11</sup> Policy Statement. A full analysis of the Carpentaria Pilot Project emissions will be included in the EMP submission and approval process.

<sup>8</sup>DEPWS, & DITT. (2019). *Code of Practice: Onshore Petroleum Activities in the Northern Territory*. Department of Environment, Parks and Water Security Retrieved from [https://depws.nt.gov.au/\\_\\_data/assets/pdf\\_file/0011/705890/code-of-practice-onshore-petroleum-activity-nt.pdf](https://depws.nt.gov.au/__data/assets/pdf_file/0011/705890/code-of-practice-onshore-petroleum-activity-nt.pdf),

<sup>9</sup> <https://legislation.nt.gov.au/en/Legislation/PETROLEUM-ENVIRONMENT-REGULATIONS-2016>

<sup>10</sup> [https://nt.gov.au/\\_\\_data/assets/pdf\\_file/0004/295906/schedule-of-petroleum-onshore-requirements.pdf](https://nt.gov.au/__data/assets/pdf_file/0004/295906/schedule-of-petroleum-onshore-requirements.pdf)

<sup>11</sup>DEPWS (2023) *Policy Statement Management of Greenhouse Gas Emissions from the Onshore Gas Industry*. Retrieved from [https://depws.nt.gov.au/\\_\\_data/assets/pdf\\_file/0014/1221035/policy-statement-management-of-greenhouse-gas-emissions-from-the-onshore-gas-industry.pdf](https://depws.nt.gov.au/__data/assets/pdf_file/0014/1221035/policy-statement-management-of-greenhouse-gas-emissions-from-the-onshore-gas-industry.pdf)

<sup>12</sup> [https://depws.nt.gov.au/\\_\\_data/assets/pdf\\_file/0008/1041938/ntg-large-and-expanding-emitters-policy-2021-version-1.1.pdf](https://depws.nt.gov.au/__data/assets/pdf_file/0008/1041938/ntg-large-and-expanding-emitters-policy-2021-version-1.1.pdf)

# Local business opportunities and engagement

Imperial regularly participates in industry forums in the Northern Territory to share information regarding our activities. Participation in conferences, industry briefings, networking events and community forums provides beneficial opportunities to continue to engage with local businesses and people.

To further promote opportunities for local businesses, Empire has recently launched a project Gateway page in collaboration with Industry Capability Network NT (**ICN NT**). Recognising the

need to connect businesses to be engaged with our projects, this portal will provide an enhanced platform for regular communications about upcoming opportunities and expressions of interest.

Imperial will collaborate with ICN NT and industry to facilitate additional briefings with businesses. For further information or to register your interest please visit the Empire Energy Gateway page:

[empireenergy.icn.org.au](http://empireenergy.icn.org.au)



*Image: Alex Underwood, Empire Energy Managing Director meeting with Leslie Rice at Carpentaria 2H site.*

# Stakeholder engagement

## WORKING WITH ABORIGINAL PEOPLE

Imperial recognises and respects the connection Aboriginal people have to country. Imperial has a strong track record of consultation with traditional Aboriginal owners and native title holders and has participated in more than 35 on-country meetings since 2011.

Archaeological and ecological assessments are carried out in the planning and approval stage of each on-ground activity. Cultural Heritage Managers are present during these on-ground assessments and for all first disturbance to help ensure the activities are planned and carried out in a way that minimizes impacts on cultural heritage.

Imperial has facilitated multiple field visits for Aboriginal people and their communities to provide opportunities to see activities on the ground while they are being undertaken. Feedback from people who have participated in site visits has been very positive, further helping to understand the scale and impact of the Carpentaria Pilot Project and potential activities that may proceed in future development scenarios.

## ENGAGING WITH STAKEHOLDERS

Imperial's relationships and continued engagement with stakeholders is essential to how Empire and Imperial work in the Northern Territory, now and in the future. Imperial is genuinely committed to early and ongoing stakeholder engagement across all phases of the project life cycle as a fundamental component of project development to ensure information about proposed activities is made available to interested parties and provides an opportunity for meaningful dialogue.

Early engagement will allow stakeholders an opportunity to communicate concerns and identify issues where their feedback can be considered. The feedback and communications from stakeholder consultation will be consolidated to assist with decision-making, where there is an opportunity to influence project decisions and determine processes to meet community expectations for ongoing communication.

The importance of sharing the potential benefits and impacts of project development provides a pathway for establishing community connection, building long-term relationships and understanding the views and issues of the community.

For further information regarding the Carpentaria Pilot Project, please visit the consultation hub on our website: [empireenergygroup.net/consultation](http://empireenergygroup.net/consultation)

**Scan here:**



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