



Imperial Oil and Gas

EP 187

Appendix 03

Rehabilitation Plan

IMP 5-1

Document Control

Date	Rev	Description	Author(s)	Reviewed	Approved
05/02/24	1	Issued as an Appendix of EMP IMP 5-1	Trent S.	Vic F., Peter S., Jon B., Nick F., Kelvin W., Rachel L.	Robin P.

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1 Introduction

This Activity-specific Carpentaria Pilot Project Rehabilitation Plan (CPPRP) has been developed in accordance with the *Code of Practice: Onshore Petroleum Activities in the Northern Territory (the Code)* (Section A.3.9) [DENR 2019] using the *Rehabilitation Plan Guide for Surface Disturbance: Onshore Petroleum Disturbance* [DEPWS, 2020].

2 Scope

The CPPRP applies to the land disturbance associated with the Activity under IMP 5-1 within the CPP Area (**Figure 2—1**). Including:

- New well pads constructed, and those previously constructed (Carpentaria 1, 2/3; Carpentaria 4) under IMP 2-6 and 4-3 (including impact monitoring and control monitoring bores).
- New ground water extraction bores and those previously constructed under IMP 4-3.
- New gravel pits and those previously constructed under IMP4-3.
- Access tracks, gas, and water flowlines.
- Carpentaria Gas Plant (including communication satellite dish).
- Water Handling Station.
- Campsite.
- Pipelines/Pipe Works.

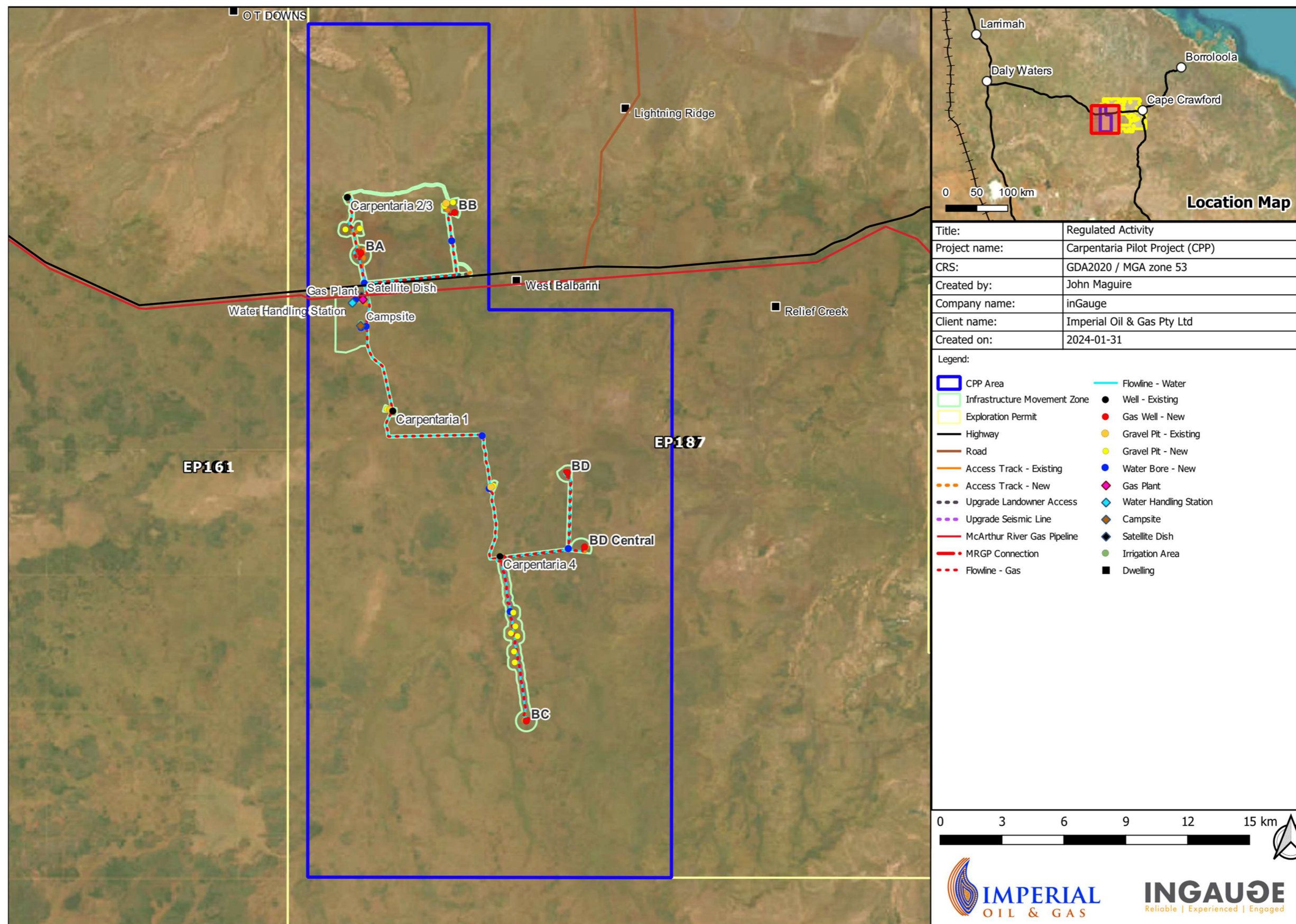


Figure 2—1 CPP Area and Location of Activity

3 Environmental Description and Risks

The Description of the Environment (EMP - **Section 4**) provides a detailed description and assessment of the CPP Area and environs. The CPP is located north of the 600 mm continental rainfall contour in Australian tropical savannah grassland. This system extends from the Gulf of Carpentaria in north Queensland, across the northern half of the Northern Territory and encompasses the Beetaloo basin. This is a tropical arid to semi-arid savannah biome of almost 2 million km², and it experiences one of the most seasonal of the world's savannah climates, with 90–95% of rainfall between November and April [M Hill et al., 2010].

The CPP Area is located on the eastern boundary of the Sturt Plateau bioregion on a land system of lateritic plains and rises characterised by high erosional stability and gently undulating plains and rises, with soils being predominantly neutral sandy clay red and yellow earths dominated by deep Red Kandosols, the iconic soil type in the Northern Territory [DEPWS, 2022]. Red Kandosol is the key soil that supports the vast savannah tussock grassland of the Sturt Plateau.

The soils are the result of prolonged, intense, deep weathering of parent rock material high in iron and/or aluminium oxides and kaolin clays, which gives them their characteristic profile Red Kandosol colour. This soil profile has primarily occurred as substrate weathering of laterites and sedimentation caused by overland flow and deposition of coarse bedload and finer colloids.

Savannah tussock grassland dominates the understorey vegetation in the Sturt Plateau bioregion, including at the CPP Area [DEPWS, 2022]. This vegetation is characterised by large perennial tussock grasses, broad-leaved and lilioid herbs in the inter tussock spaces and sparse presence of woody plants. In localised areas of higher soil moisture, forbs may dominate over tussock grasses [DEPWS, 2022].

Savannah tussock grasses are considered resilient perennial vegetation that is relatively unproblematic to rehabilitate in CPP deep loam clay sand Red Kandosol soil, provided erosion control is managed. This is evidenced by Sturt Plateau savannah recovery after drought, fire, and overgrazing effects; as well as evidenced by the ongoing monitoring of the Imperial EP187 seismic line rehabilitation [Imperial, 2023]. On average 6 - 8% of the Sturt Plateau bioregion area 98,500 km²) is burned each year (EMP - **Section 4.1.9**).

The Carpentaria Highway bisects the CPP Area from east to west and is aligned generally following a topographic high point in the landscape, known locally as the Favenc Range, on the northern side of the Carpentaria Highway. Within the CPP Area, key CPP sites are in an elevation bandwidth from approximately 230 m to 265 m AHD; the latter elevation is the peak of the Favenc Range. The highest stream order (3) in the CPP Area occurs at the headwaters of Relief Creek and reflects the general site elevation at the top of two catchments, coinciding with the crest of the Favenc Range. CPP well pads and infrastructure facilities have been located above the 1/100-year flood inundation level (EMP - **Section 4**).

The Ecological Assessment (**Appendix 01**) has a complete description of the land types, relevant bioregions, and environmental features within the Project Area.

Environmental Risks, and Mitigation Measures (EMP - **Section 6**) provides details of the results of the environmental risk analysis for the EMP. Environmental Performance Standards (EPS) were developed to address the key environmental factors and risk sources. Measurement criteria supported by record-keeping have been developed for each EPS.

Success criteria, detailed below in **Section 6**, have been developed for the CPP Area. The Environmental Risks, Controls and Mitigation Actions associated with rehabilitation are presented in **Table 3—1**.

Table 3—1 Environmental Risks, Controls and Mitigation Actions

Site-specific Environmental Risks	Controls and Mitigation Actions
Removed Topsoil Washed Away	<ul style="list-style-type: none"> Removed topsoil (~ 100 mm) will be stockpiled away from water flow paths, unless used as a diversion bund.
Removed Topsoil Does Not Maintain Seedbank	<ul style="list-style-type: none"> Topsoil stockpiled in berms to be < 1.5 m in height to maintain a seed bank and high cation exchange capacity soil.
Presence of Weeds of Concern	<ul style="list-style-type: none"> Baseline weed survey conducted in October 2023 (Appendix 04) did not identify any declared or priority weeds within the project area. Annual post-wet season weed surveys of access tracks, flowlines, well pads and facilities will determine whether any subsequent weed introductions have occurred. All personnel and contractors will be made aware of any identified weed infestations and to avoid travelling through infested areas until weeds have been treated. Vehicles are required to complete weed self-declarations upon entering CPP area. Vehicles will stay on cleared/formed access tracks, post-civil construction works. Identified weeds will be controlled in line with the <i>Northern Territory Weed Management Handbook</i> [Northern Territory Government, 2021].
Cattle Grazing (Post reinstatement of topsoil and disbursement of seed)	<ul style="list-style-type: none"> At the time of rehabilitation, the CPP well pads and other CPP infrastructure areas (excluding access tracks, flowlines, pipelines, water bore pads, and gravel pits) will be fenced until vegetation is established.
Soil Compaction (From vehicle and machinery movements on access tracks and well pads as well as facility placement)	<ul style="list-style-type: none"> At the time of rehabilitation, areas of compaction will be alleviated by mechanical means (ripping, scarifying, harrowing) to assist in vegetation regrowth.
Subsidence (From buried flowlines)	<ul style="list-style-type: none"> Abandonment of flowlines in situ (left in trenches).
Erosion Risk (New clearing and exposed soil)	<ul style="list-style-type: none"> The creation and implementation of a site-specific Erosion and Sediment Control Plan (ESC) (Appendix 05) that includes controls to divert water flow around the well pads and other infrastructure sites and control stormwater run-off.

Site-specific Environmental Risks	Controls and Mitigation Actions
	<ul style="list-style-type: none"> Monitoring and maintenance of ESC measures until final rehabilitation is complete.
Contamination Risk	<ul style="list-style-type: none"> Controls in place in accordance with the Spill Management Plan (Appendix 07) to minimise risk of spills and contamination to the environment. If contamination occurs, remediation will commence immediately, if safe and feasible.
Bush Fire Risk	<ul style="list-style-type: none"> Controls in place in accordance with the Bush Fire Management Plan (Appendix 12).

4 Final Land Use

Progressive rehabilitation of significantly disturbed land, which is not required for the ongoing conduct of the Activity or future Activity, will commence no later than 12 months following the cessation of Activity on the land and progress until the Minister is satisfied the environmental outcomes and obligations under the EMP have been met.

Significantly disturbed land is defined as: a) contaminated land; or b) has been disturbed and requires human intervention to rehabilitate it to the condition it was in immediately before the disturbance (e.g., land which is now more susceptible to erosion, reduced land use capability or reduced water quality downstream of the land).

Subject to the consideration in **Section 9** below, all significantly disturbed land that is not required for ongoing or future Activity will be rehabilitated through assisted regeneration to a state as close as practicable to its pre-disturbed condition, consistent with final land use and ecological values compared to analogue sites.

5 Rehabilitation Works

To facilitate achieving rehabilitation success, the following works will be carried out:

- Analogue sites will be identified and surveyed adjacent to cleared areas.
- Photo monitoring points (may include drone use) will be established and images captured at the clearing area and at the analogue site.
- Where vegetation is cleared, it will be stockpiled and stored separately to topsoil stockpiles or mulched and used as an ESC measure.
- Where topsoil stripping is required, topsoil will be stockpiled in piles no higher than 1.5 m to ensure that topsoil and the existing seed bank are maintained for rehabilitation.
- Where required, excavated subsoils are to be stockpiled separately from topsoil material.
- Topsoil stockpiles will be located away from water flow paths (unless used as water diversion bunds).
- To maintain a stable landform, ESC measures will be installed and maintained ESC Plan (**Appendix 05**).
- Identify and remediate any spills that may require action in addition to the initial spill response. **Appendix 07** (Spill Management Plan) applies.
- Stockpiled soil (where applicable) will be respread to return the site to contours similar to the surrounding area.
- Where cut and fill activities have been carried out material will be respread to return the site to contours like the surrounding area.

- After backfilling of flowline trenches, the excavation will be reinstated as soon as practicable, including pulling stockpiled timber back over the ROW to aid as a barrier for vehicle access.
- The extent of disturbance post or during clearing will be captured geospatially to help depict areas cleared.
- In the case of gravel pits, batters will be flattened slightly without increasing the disturbed area. Washed separated sand or other fill may be used to assist with contour management during the rehabilitation.
- Disturbed area will be scarified across the contour to a depth of at least 50 mm prior to topsoil placement.
- Topsoil will be spread over the rehabilitated area to encourage natural regeneration.
- Topsoil to be left with a rough surface finish, e.g. track rolled up/down contours.
- To maintain a stable landform, ESC measures will be installed and maintained as per the ESC Plan (**Appendix 05**) until removal is deemed appropriate.
- Where available stockpiled timber will be spread across the rehabilitated area.
- Visual inspections for ESC maintenance and weed control will occur annually at the end of the wet season until the Minister is satisfied the environmental outcomes and obligations under the EMP have been met.

5.1 Well Suspension and Decommissioning

Well heads removed at the time of abandonment and site left safe and free from contaminants.

5.2 Dismantling / Removal of Facilities

Infrastructure at the Carpentaria Gas Plant and Water Handling Station will be removed, and the site left safe and free of contaminants.

5.3 Flowline Abandonment

Decommissioned water/HF flowback or gas networks will be disconnected from all fluid sources including tanks and other pipes and flushed up to two times the pipeline volume. Any fluid in the lines or used to flush will be disposed of in accordance with the Waste and Wastewater Management Plan (**Appendix 06**).

Flowlines will be left in situ to prevent subsidence of the excavated trench and re-disturbance of the ground.

When a network is abandoned, the following work will be completed:

- The cutting and removal of all sections of buried lines that come to the surface:
 - At a minimum of 750 mm below the natural surface, or
 - At the line depth, whichever is the lesser.
- The removal of all surface equipment.
- The removal of all signage associated with the network on completion of the rehabilitation.

Upon completion of the flowline abandonment, records identifying and locating sections of the abandoned network shall be prepared as part of the final rehabilitation report. These records will be made publicly available (e.g. dial before you dig) to prevent possible mistakes in identifying an abandoned flowline as an operational flowline.

6 Rehabilitation Success Criteria

To assess rehabilitation progress in areas which have been decommissioned, rehabilitated, and closed, annual ground and aerial survey imagery will be compared to analogue monitoring sites adjoining disturbance areas. Analogue sites chosen are adjoining or adjacent to cleared land that are representative of the landforms being rehabilitated.

Rehabilitation site success is determined by comparing the rehabilitated areas, with information obtained from pre-disturbance land condition assessment surveys, to adjacent vegetation communities (analogue sites). This comparison exercise will be done by a combination of ground assessment and analysis of images from photo monitoring.

Rehabilitation success measures are presented in **Table 6—1**.

Table 6—1 Rehabilitation Success Criteria

Objectives	Success Criteria
<ul style="list-style-type: none"> • Areas used for the Activity are rehabilitated consistent with surrounding land uses and ecological values as compared to analogue sites. 	<ul style="list-style-type: none"> • Final assessment report demonstrates that perennial groundcover and canopy-cover vegetation, as assessed between analogue sites and adjacent cleared area, is on trajectory to be the equivalent of 70% of the adjacent vegetation cover.
<ul style="list-style-type: none"> • No priority or declared weeds in areas being rehabilitated. 	<ul style="list-style-type: none"> • Final assessment report demonstrates that no priority or declared weeds are present.

Objectives	Success Criteria
<ul style="list-style-type: none"> No ongoing erosion from cleared areas used during the Activity. 	<ul style="list-style-type: none"> Inspection reports demonstrate that identified erosion issues are being remediated and sediment control measures in place; and Negligible erosion present on access tracks and cleared areas. Final assessment report demonstrates no significant erosion attributable to the Activity.
<ul style="list-style-type: none"> Rehabilitated areas are safe for continued land use. 	<ul style="list-style-type: none"> Inspection and final assessment reports demonstrate no subsidence associated with flowlines; and Wells suspended and decommissioned. All above ground equipment removed. No visible contamination.

7 Monitoring and Maintenance Program

Imperial will inspect and maintain areas being progressively rehabilitated in line with **Table 7—1** (Inspection, Maintenance, and Reporting). All rehabilitation monitoring works are scheduled around the defined wet season; re-entry to the CPP will be subject to weather/road conditions.

A suitably qualified person will conduct the final rehabilitation assessment and prepare a report for inclusion with the submission to the Minister for approval.

A suitably qualified person is “A person who has professional qualifications, training or skills or experience relevant to the nominated subject matters or tasks and can give authoritative assessment, advice and analysis about performance relevant to the subject matters using relevant protocols, standards, methods or literature or conduct tasks in accordance with requirements” (p.118 of *the Code*).

Table 7—1 Inspection Maintenance and Reporting

Rehabilitation Phases	Rehabilitation Survey	Method	Measurable Attributes	Corrective Actions	Maintenance	Reporting
Planning and Design: No more than 12 months prior to construction	<ul style="list-style-type: none"> Identify analogue sites and establish photo monitoring points. Survey vegetation ground cover and canopy height at analogue sites for cleared areas 	<ul style="list-style-type: none"> Desktop assessment geospatial assessment. Ground and drone/aerial survey. 	<ul style="list-style-type: none"> Ground cover (%) Canopy cover (%) Erosion (qualitative – photo evidence of scarring, rill/sheet erosion). 	N/A	N/A	<ul style="list-style-type: none"> Pre-clearing baseline assessment report.
Stabilisation and Maintenance: Ongoing	<ul style="list-style-type: none"> Inspect / monitor cleared areas and/or areas being progressively rehabilitated. 	<ul style="list-style-type: none"> Visual inspection of ESC measures and weed growth on access tracks, and locations of infrastructure and facilities. 	<ul style="list-style-type: none"> Any erosion is controlled, and site is stable. No priority or declared weeds present. 	<ul style="list-style-type: none"> ESC measures cleaned / remediated. Weed management conducted. 	<ul style="list-style-type: none"> Remove the sediment from fences/traps and re-contour banks. Repair and reinstate ESC measures. Remove or spray weeds. 	<ul style="list-style-type: none"> ESC and Weed inspection reports. Incident reports.
Progressive Rehabilitation: Ongoing Annual/Post Local Wet Season Inspections Until Success Criteria are met	<ul style="list-style-type: none"> Inspect areas being progressively rehabilitated annually at the end of the defined wet season. Assessments of fire frequency and intensity. 	<ul style="list-style-type: none"> Inspect ESC measures and weed growth. Inspect for subsidence of flowline. Survey (ground, air or drone imagery) to inspect re-growth in comparison to analogue sites if cleared land being rehabilitated. Photo monitoring, drone/aerial imagery. Desktop assessment for fire management. 	<ul style="list-style-type: none"> Any erosion is controlled, and site is stable No priority or declared weeds present. Re-growth on trajectory to meet 70% ground and vegetation cover at analogue site. 	<ul style="list-style-type: none"> ESC measures cleaned / remediated. Weed management conducted. Additional seeding. Soil amelioration. 	<ul style="list-style-type: none"> Remove the sediment from fences/traps and re-contour banks. Repair and reinstate ESC measures. Remove or spray weeds. 	<ul style="list-style-type: none"> Annual inspection report. Annual fire mapping.
Annual Rehabilitation Inspections: Starting twelve months after rehabilitation commences until Minister satisfied with rehabilitation outcomes.	<ul style="list-style-type: none"> Inspections by a suitably qualified person (SQP). 	<ul style="list-style-type: none"> Survey (ground, air or drone imagery) in comparison to analogue sites if cleared land being rehabilitated. Photo monitoring, drone/aerial imagery. Weed inspections. 	<ul style="list-style-type: none"> Re-growth on trajectory to meet 70% ground and vegetation cover analogue site. No priority or declared weeds present. 	<ul style="list-style-type: none"> Weed management conducted. Additional seeding. Soil amelioration. 	<ul style="list-style-type: none"> Remove or spray weeds. 	<ul style="list-style-type: none"> Annual inspection report.

Rehabilitation Phases	Rehabilitation Survey	Method	Measurable Attributes	Corrective Actions	Maintenance	Reporting
Completion of Rehabilitation Subject to Minister being satisfied with rehabilitation outcomes	<ul style="list-style-type: none"> Final inspection by SQP. 	<ul style="list-style-type: none"> Site inspection by a third-party SQP. 	<ul style="list-style-type: none"> Ground and perennial cover on the trajectory to be the equivalent to 70% of the analogue site. Negligible erosion present on rehabilitated land. No subsidence associated flowlines. No established priority or declared weeds identified during monitoring events. 	<ul style="list-style-type: none"> Dependent upon a third-party report recommendation. 	<ul style="list-style-type: none"> Dependent upon a third-party report recommendations. 	<ul style="list-style-type: none"> Final report for Minister review and approval.

8 Relinquishment and Transfer of Liability to Landholders

The transfer of infrastructure to landholders should only be considered once all remediation and rehabilitation works have been carried out and the long-term stability of the infrastructure can be adequately demonstrated. If a landholder(s) requests access tracks or groundwater bores to be left on EP 187, several matters must be resolved, including:

- Written and signed evidence from the landholder, outlining the access tracks and/or groundwater bores to be transferred (including maps of specific infrastructure), noting the landholder is required to accept liability for future management of transferred infrastructure.
- Evidence that any infrastructure intended for transfer to a landholder is acceptable to the Pastoral Land Board.
- Evidence demonstrating that tracks are in a suitable location and appropriately constructed to remain open, noting erosion and sediment controls may be required in some locations and evidence of installation of control measures to provide for long term stability.

Note: at the time of drafting this plan it is mandatory, under the Code to rehabilitate all areas not required for future use (in the conduct of a (future) regulated activity).

9 Annual Review

This CPPRP should be reviewed and updated annually, based on progressive rehabilitation activities, identification of reference sites or changes to the disturbance footprint that may have occurred during the previous year – for example, new disturbances (sites/linear infrastructure, erosion, fire or weed coverage).

This CPPRP may also be updated as risks change (e.g. additional land clearing, spill incidents requiring remediation, gravel pits or access tracks that are no longer required).

Performance against commitments made in this CPPRP is to be included as a component of the Annual Environment Performance Report for the EMP.

Annual reviews will cease once the Minister is satisfied with the rehabilitation outcomes.

10 Plan on a page

Imperial has drafted an indicative one-page Rehabilitation Management Plan, shown in **Table 10—1**, to provide a quick reference summary of the Plan.

Table 10—1 Draft Rehabilitation Management Plan One-pager

Draft One-pager Rehabilitation Plan (RP) 2024	Contact Details		Project Area Details																																													
<p>Pre-disturbance Land Condition Summary, Land Uses, Rehabilitation Objectives and Risk</p> <p>Pre-disturbance land condition summary: Imperial has conducted exploration in the CPP Area since 2019. The CPP Area is situated in the Australian tropical savannah grassland, features a landscape of lateritic plains and high erosional stability soils, primarily deep Red Kandosol. This region, part of the Sturt Plateau bioregion, is characterized by its seasonal climate and resilient savannah tussock grassland. The vegetation, adapted to recover from environmental stresses like drought and fire, thrives in this unique ecological setting influenced by the local topography, including the Favenc Range.</p> <p>Land Uses:</p> <ul style="list-style-type: none"> Cattle grazing and gas exploration. <p>Rehabilitation Objectives:</p> <ul style="list-style-type: none"> Areas used for the Activity are rehabilitated consistent with surrounding land uses and ecological values as compared to analogue sites. No priority or declared weeds in areas being rehabilitated. No ongoing erosion from cleared areas used during the Activity. Rehabilitated areas are safe for continued land use. <p>Rehabilitation Risks:</p> <ul style="list-style-type: none"> Soil compaction caused by vehicle traffic Increased weed proliferation and heightened fire intensity due to exposed land surfaces, potentially hampering revegetation efforts. Damage to immature vegetation or regeneration processes from extreme weather events such as floods, fires, cyclones, and droughts. Grazing by fauna on seedlings, which could impede the success of rehabilitation efforts 	Rehabilitation Management Zones		Estimated Potential Disturbance Areas																																													
	<p>The CPP Area is shown in the below figure. Due to the spread of infrastructure and the flexibility in site selection, the rehabilitation management zones are based on the proportional presence of vegetation and soil types within the Infrastructure Movement Zone (IMZ). The below table provides a summary of the vegetation and soil that make up the area that could potentially be disturbed by the Activity.</p>		<table border="1"> <thead> <tr> <th>Infrastructure</th> <th>Estimated Max Disturbance (ha)</th> </tr> </thead> <tbody> <tr><td>Well pads (new and expansions)</td><td>62.1</td></tr> <tr><td>Access Tracks</td><td>24.2</td></tr> <tr><td>Flowlines</td><td>60</td></tr> <tr><td>Pipeline</td><td>3.2</td></tr> <tr><td>Campsite</td><td>1.2</td></tr> <tr><td>Gravel pits</td><td>56.7</td></tr> <tr><td>Water Bore Pads</td><td>1.1</td></tr> <tr><td>Comms. Sat. Dish</td><td>0.3</td></tr> <tr><td>Compressor station</td><td>5.7</td></tr> <tr><td>Water handling station</td><td>10.6</td></tr> <tr><td>Existing disturbance being re-utilised</td><td>43.4</td></tr> </tbody> </table>		Infrastructure	Estimated Max Disturbance (ha)	Well pads (new and expansions)	62.1	Access Tracks	24.2	Flowlines	60	Pipeline	3.2	Campsite	1.2	Gravel pits	56.7	Water Bore Pads	1.1	Comms. Sat. Dish	0.3	Compressor station	5.7	Water handling station	10.6	Existing disturbance being re-utilised	43.4																				
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Other Vegetation	2																																															
	Rehabilitation Success Criteria <ul style="list-style-type: none"> Final assessment report demonstrates that perennial groundcover and canopy-cover vegetation, as assessed between analogue sites and adjacent cleared area, is on trajectory to be the equivalent of 70% of the adjacent vegetation cover. Final assessment report demonstrates that no priority or declared weeds are present. Inspection reports demonstrate that identified erosion issues are being remediated and sediment control measures in place; and Negligible erosion present on access tracks and cleared areas. Final assessment report demonstrates no significant erosion attributable to the Activity. Inspection and final assessment reports demonstrate no subsidence associated with flowlines; and Wells suspended and decommissioned. All above ground equipment removed. No visible contamination. 																																															
	Rehabilitation Plan Prepared by: Trent Smith (HSE & Compliance Manager)																																															

11 References

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