



human energy®

Gorgon Gas Development and Jansz Feed Gas Pipeline Post-Construction Rehabilitation Plan

Document ID:	G1-NT-PLNX0000303
Revision ID:	3.0
Revision Date:	7 May 2019
Next Revision Due	As required
Information Sensitivity:	Public

Contents

1	Introduction	5
1.1	Proponent	5
1.2	Project	5
1.3	Location	5
1.4	Purpose of this Plan.....	7
1.4.1	Legislative Requirements	7
1.4.2	Objectives of this Plan.....	8
1.4.3	Requirements.....	8
1.4.4	Related Documentation.....	9
1.4.5	Stakeholder Consultation	11
2	Relevant Facilities and Activities	13
2.1	Terrestrial Facilities.....	13
3	Risk Assessment	15
3.1	Overview.....	15
3.2	Methodology	15
3.3	Rehabilitation Risks	16
4	Management of Rehabilitation.....	18
4.1	Key Management Elements.....	18
4.1.1	Vegetation Management	18
4.1.2	Topsoil and Soil Management Strategies	19
4.1.3	Management of Weeds	20
4.1.4	Managing Surface Drainage.....	21
4.2	Rehabilitation Tasks.....	21
4.3	Fire and Rehabilitation	25
4.4	Integration with Island-wide Management.....	25
4.5	Monitoring and Adaptive Management.....	25
4.5.1	Monitoring of Soils.....	26
4.5.2	Monitoring of Vegetation.....	26
4.5.3	Monitoring of Fauna Recolonisation	26
4.5.4	Adaptation to Climate Change.....	27
4.6	Identification of Knowledge Gaps.....	27
4.6.1	Recalcitrance of Plant Species	28
4.6.2	Return of Fauna Habitat	28
4.6.3	Recolonisation of Invertebrate Fauna.....	29
4.6.4	Recolonisation of Mycorrhizal Fungi.....	29

5	Objectives, Performance Standards, and Relevant Documentation	30
5.1	Overview.....	30
5.2	Objectives.....	30
5.3	Performance Standards	31
5.4	Relevant Documentation.....	31
5.5	Completion Criteria	31
6	Acronyms and Abbreviations.....	37
7	References	41
Appendix A	Chevron Integrated Risk Prioritization Matrix.....	45
Appendix B	Compliance Reporting Table	46
Appendix C	Rehabilitation Task Sheet Example for the Gorgon Gas Development.....	52
Appendix D	Framework for Net Environmental Benefit Analysis.....	54

Tables

Table 1-1:	State and Commonwealth Approvals	7
Table 1-2:	Requirements of this Plan	8
Table 1-3:	Interfaces with other Regulatory Plans	10
Table 3-1:	Risk Assessments Relevant to this Plan	15
Table 4-1:	Summary Management Measures for Rehabilitation	22
Table 5-1:	Objectives, Performance Standards, and Relevant Documentation.....	32
Table 5-2:	Rehabilitation Objectives, Completion Criteria, and Performance Targets.....	34
Table 6-1:	Acronyms and Abbreviations.....	37
Table 7-1:	References.....	41

Figures

Figure 1-1:	Location of Barrow Island and the Greater Gorgon Area.....	6
Figure 2-1:	Gorgon Gas Development Terrestrial Facilities on Barrow Island	14

1 Introduction

1.1 Proponent

Chevron Australia Pty Ltd (CAPL) is the proponent and the person taking the action for the Gorgon Gas Development and Jansz Feed Gas Pipeline on behalf of the following companies (collectively known as the Gorgon Joint Venturers):

- Chevron Australia Pty Ltd
- Chevron (TAPL) Pty Ltd
- Shell Development (Australia) Pty Ltd
- Mobil Australia Resources Company Pty Limited
- Osaka Gas Gorgon Pty Ltd
- Tokyo Gas Gorgon Pty Ltd
- JERA Gorgon Pty Ltd

1.2 Project

CAPL is developing the gas reserves of the Greater Gorgon Area. The gas will be processed in a Gas Treatment Plant (GTP) on Barrow Island, which is located off the Pilbara coast 85 km north-north-east of Onslow in Western Australia (WA) (Figure 1-1).

Subsea gathering systems and pipelines deliver feed gas from the Gorgon and Jansz–Io gas fields to the west coast of Barrow Island. The underground feed gas pipeline system then traverses Barrow Island to the east coast where the GTP is located. The GTP includes natural gas trains that produce liquefied natural gas (LNG) as well as condensate and domestic gas. Carbon dioxide (CO₂), which occurs naturally in the feed gas, is separated during the production process and injected into deep rock formations below Barrow Island. The LNG and condensate is loaded onto ships from a jetty and then transported to international markets. Gas for domestic use is exported by pipeline from Barrow Island to the domestic gas (DomGas) collection and distribution network on the WA mainland.

1.3 Location

The Gorgon gas field is located approximately 130 km and the Jansz–Io field approximately 200 km off the north-west coast of Western Australia. Barrow Island is located off the Pilbara coast 85 km north-north-east of the town of Onslow and 140 km west of Karratha. The Island is approximately 25 km long and 10 km wide and covers approximately 23 500 ha. It is the largest of a group of islands, including the Montebello and Lowendal Islands.

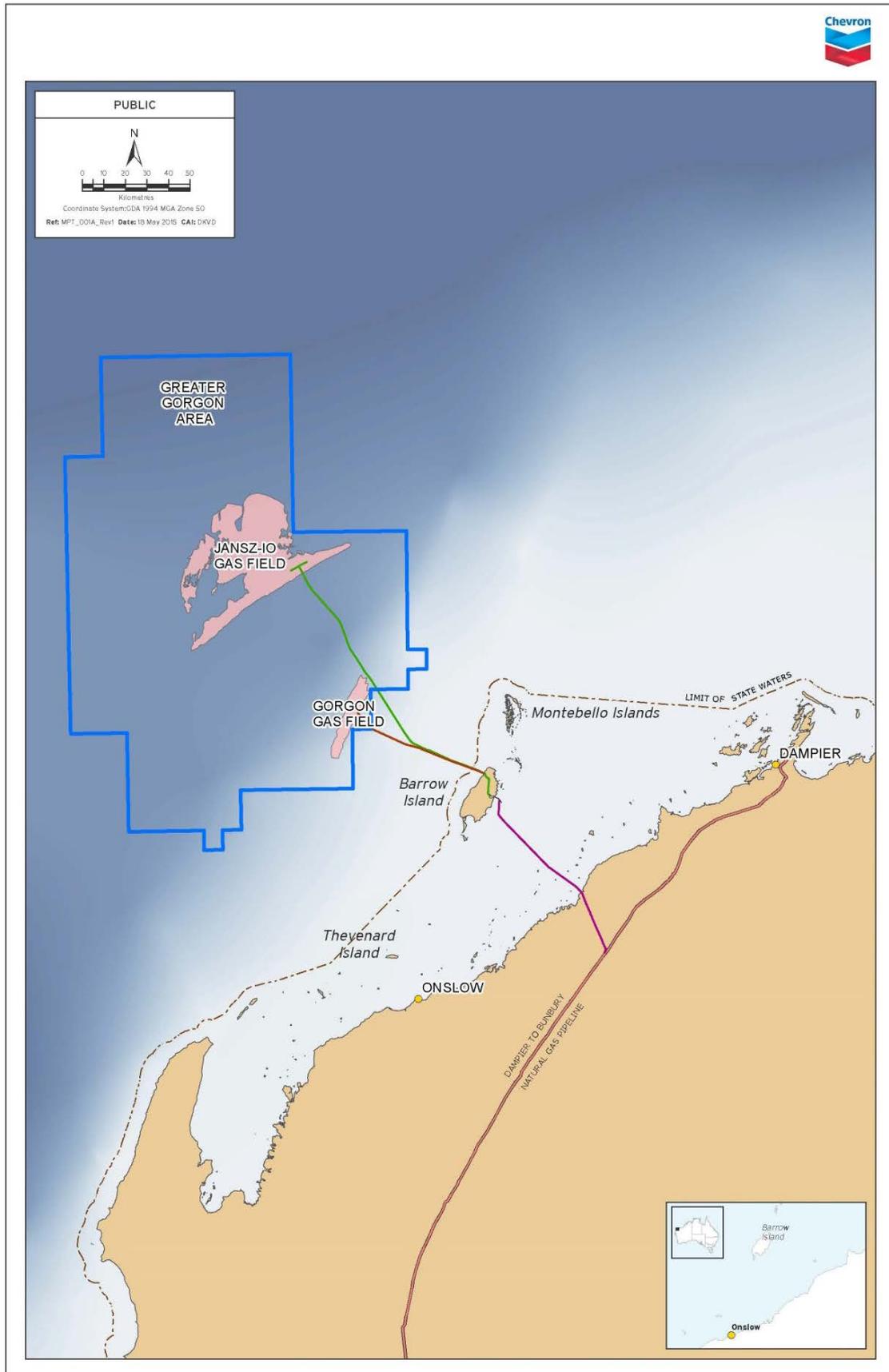


Figure 1-1: Location of Barrow Island and the Greater Gorgon Area

1.1 Environmental Approvals

Table 1-1 describes State (WA) and Commonwealth (Cth) approvals for the components of the Gorgon Gas Development.

These approvals, and projects approved under these approvals, have been and may continue to be amended (or replaced) from time to time.

Table 1-1: State and Commonwealth Approvals

Project Approval Stage	State	Commonwealth
Jansz Feed Gas Pipeline	Ministerial Statement (MS) 769 (Ref. 1) 28 May 2008	EPBC Reference: 2005/2184 (Ref. 2). 22 March 2006
Initial Gorgon Gas Development (2 LNG trains)	Initial Gorgon Gas Development comprising two LNG trains – MS 748 (Ref. 3). This was superseded by MS 800. 6 September 2007	Initial Gorgon Gas Development comprising two LNG trains – EPBC Reference: 2003/1294 (Ref. 4). 3 October 2007
Revised and Expanded Gorgon Gas Development (3 LNG trains)	MS 800 (Ref. 5) provides approval for both the initial Gorgon Gas Development and the Revised and Expanded Gorgon Gas Development (comprising three LNG trains). This statement supersedes MS 748. 10 August 2009	The Revised and Expanded Gorgon Gas Development (EPBC Reference: 2008/4178 [Ref. 6]) was approved, and the conditions for the initial Gorgon Gas Development (EPBC Reference: 2003/1294 [Ref. 4]) were varied. 26 August 2009
Dredging Amendment	MS 865 (Ref. 7) provides approval to establish a restart mechanism in the event of a Project-attributable coral health management trigger. This statement is an amendment to Conditions 18, 20, and 21 of MS 800. 8 June 2011	Not applicable (N/A)
Additional Support Area	MS 965 (Ref. 8) applies the conditions of MS 800 to an Additional Support Area. 2 April 2014	The conditions for the initial Gorgon Gas Development (EPBC Reference: 2003/1294 [Ref. 4]), and for the Revised and Expanded Gorgon Gas Development (EPBC Reference: 2008/4178 [Ref. 6]) were varied. 15 April 2014
Gorgon Gas Development Fourth Train Expansion ¹	MS 1002 (Ref. 9) applies the conditions of MS 800 to the Fourth Train Expansion, and has additional conditions. 30 April 2015	EPBC Reference: 2011/5942 (Ref. 10). 12 May 2016

1.4 Purpose of this Plan

1.4.1 Legislative Requirements

This Plan is required under Condition 32.1 of MS 800, which is quoted below:

32.1) Prior to commencement of construction of Terrestrial Facilities listed in Condition 6.3, the Proponent shall submit to the Minister a Post-Construction Rehabilitation Plan (the Plan) to cover those areas that will be disturbed as part of construction and areas that are part of the Terrestrial Disturbance

¹ This Plan will apply to the Fourth Train Expansion once this scope commences.

Footprint, but which are not required for the future construction and operation of the Proposal that meets the objectives set in Condition 32.4 and the requirements of Condition 32.5 as determined by the Minister, unless otherwise allowed in Condition 32.2.

1.4.2 Objectives of this Plan

The objectives of this Plan, as stated in Condition 32 of MS 800, are to:

- ensure that the rehabilitation of terrestrial areas following construction is properly planned in a manner which promotes self-sustaining ecosystems able to be managed as part of their surroundings consistent with the conservation objectives of a Class 'A' Nature Reserve
- design rehabilitation of native vegetation to ultimately develop into viable ecological systems which are comparable and compatible with surrounding native vegetation and its land uses, and restores as closely as practicable the pre-disturbance biodiversity and ecosystem functional values
- ensure planning, implementation, monitoring, and reporting on rehabilitation is carried out consistent with industry best practice
- ensure management of rehabilitation continues until affected areas are self-sustaining
- better inform any ongoing rehabilitation and post-closure rehabilitation.

1.4.3 Requirements

The requirements of this Plan, as stated in Condition 32 of Statement No. 800, are listed in Table 1-2, which also identifies where they are addressed in this Plan.

Table 1-2: Requirements of this Plan

Ministerial Document	Condition No.	Requirement	Section Reference in this Plan
MS 800	32.3	In preparing the Post-Construction Rehabilitation Plan, the Proponent shall consult with the Department of Environment and Conservation (DEC; now Department of Biodiversity, Conservation and Attractions [DBCA] and Department of Water and Environmental Regulation [DWER]) and Department of Mines and Petroleum (DMP; now Department of Mines, Industry Regulation and Safety [DMIRS]).	Section 1.4.5
MS 800	32.5 i	The Plan shall identify those sites that will be disturbed for construction but are not required for the future construction and operation of the Proposal.	Section 2
MS 800	32.5 ii	The Plan shall identify those areas that are part of the Terrestrial Disturbance Footprint not required for the future construction and operation of the Proposal that can be rehabilitated.	Section 2
MS 800	32.5 iii	The Plan shall include objectives for rehabilitation, including any site-specific variation.	Section 5, Table 5-1
MS 800	32.5 iv	The Plan shall include plans for topsoil management.	Section 4.1.2
MS 800	32.5 v	The Plan shall include targets for completion criteria including nutrient cycling and self-sustainability of ecosystems agreed with DEC (now DBCA).	Section 5, Table 5-2

Ministerial Document	Condition No.	Requirement	Section Reference in this Plan
MS 800	32.5 vi	The Plan shall include targets for flora and fauna recruitment, including specific targets for: <ol style="list-style-type: none"> the return of recalcitrant species the return of key fauna habitat the translocation of viable specimens of long-lived species required for fauna habitat the recolonisation of invertebrate fauna the recolonisation of mycorrhizal fungi. 	Sections 4.6 and 5, Table 5-2
MS 800	32.5 vii	The Plan shall include plans to restore hydrological function.	Section 4.1.4
MS 800	32.5 viii	The Plan shall include integration with Island-wide management.	Section 4.4
MS 800	32.5 ix	The Plan shall include monitoring, and adaptive management including adaptation to climate change.	Section 4.5
MS 800	32.5 x	The Plan shall include identification of knowledge gaps and ongoing studies to address lack of knowledge.	Section 4.6
MS 800	32.5 xi	The Plan shall include plans for appropriate plant species composition including consideration of species vulnerability to and dependence on fire.	Table 5-1, Section 4.3
MS 800	32.5 xii	The Plan shall include rehabilitation following Proposal-attributable fires.	Section 4.3
MS 800	32.5 xiii	The Plan shall include reporting protocols including peer review.	Sections 1.1.1 and 1.1
MS 800	32.5 xiv	The Plan shall include completion criteria agreed with the DEC (now DBCA).	Section 5, Table 5-1, Table 5-2
MS 800	32.6	The Proponent shall implement the Post-Construction Rehabilitation Plan.	Sections 1 and 1
MS 800	32.7	The Proponent shall revise as required and submit to the Minister a revised Post-Construction Rehabilitation Plan in response to the results of the monitoring program and results of any ongoing studies. In revising the Plan the Proponent shall consult with the DEC (now DBCA).	Section 1.1
MS 800	32.8	The Proponent shall also implement the Plan for other areas requiring rehabilitation prior to final project closure but not identified in Condition 32.5	Sections 1 and 1

Any matter specified in this Plan is relevant to the Gorgon Gas Development or Jansz Feed Gas Pipeline only if that matter relates to the specific activities or facilities associated with that particular development.

MS 965 requires the implementation of this plan, in respect of the Additional Support Area and the Gorgon Gas Development, to be carried out on a joint basis.

1.4.4 Related Documentation

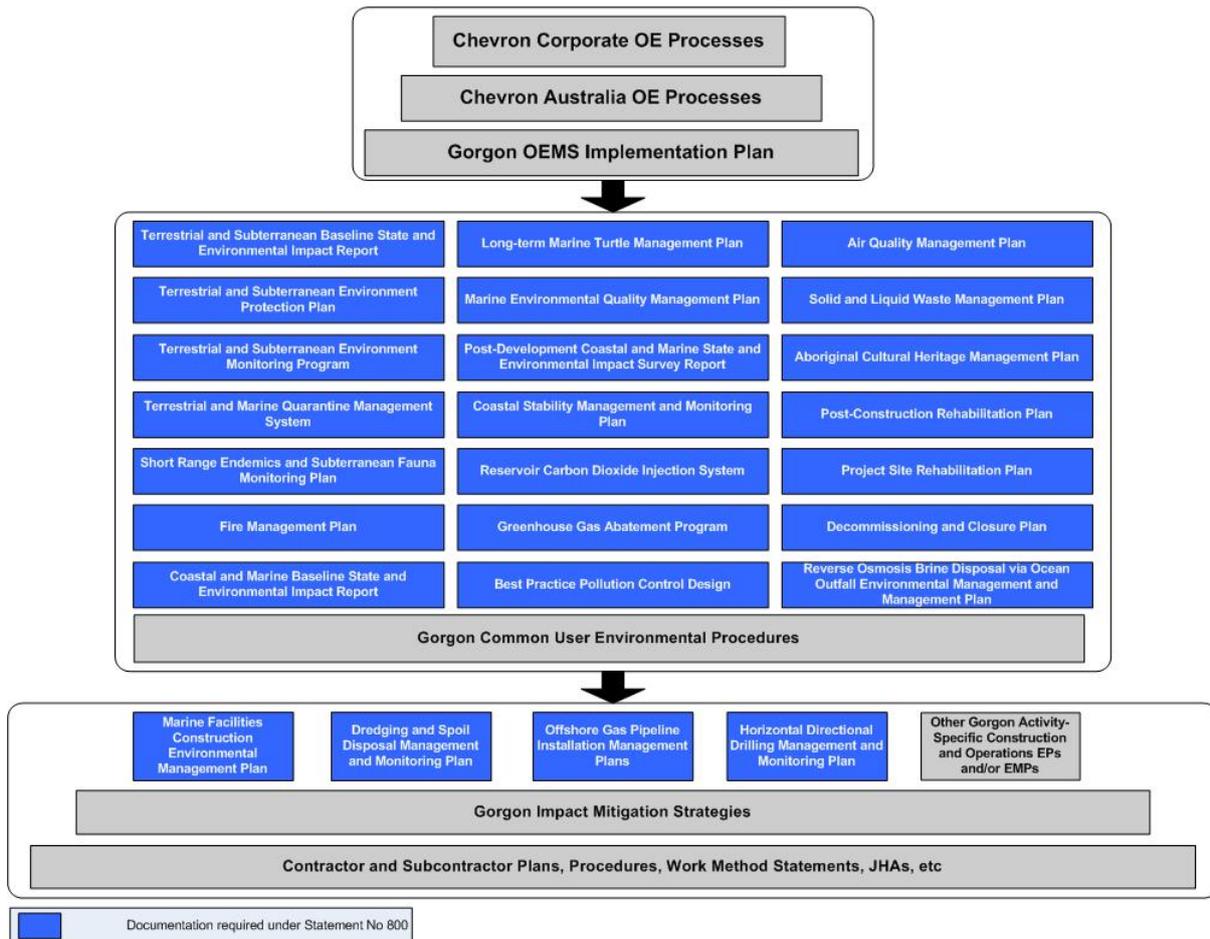
Other legislative requirements include a range of secondary approvals such as works approvals, licences, and registrations under Part V of the *Environmental Protection Act 1986 (WA)* (EP Act). Although every effort has been or will be made to ensure consistency, if there are any differences or ambiguity between the management measures and commitments contained in this Plan and that of other related approval documentation and/or licences required, then the management

measures and commitments contained in this Monitoring Program shall take precedence. This Plan is approved under the State EP Act and as such, takes precedence over inconsistent requirements in any secondary approval (e.g. a State works approval or licence).

Other regulatory plans that relate to this Plan are summarised in Table 1-3.

Table 1-3: Interfaces with other Regulatory Plans

Scope	Legislative Requirement	Regulatory Plan
<p>Defines and maps the pre-development baseline state of ecological elements including details of the methodology used to survey, collect, and collate information.</p> <p>Analyses data and information gaps associated with the baseline data for the identified ecological elements, and describes procedures to address these gaps.</p> <p>Defines the Terrestrial Disturbance Footprint (TDF) and reviews the results of qualitative ecological risk assessments.</p>	<p>Condition 6 of MS 800 and MS 769</p> <p>Condition 5 of EPBC Reference: 2003/1294 and 2008/4178</p>	<p>Terrestrial and Subterranean Baseline State and Environmental Impact Report (TSBSEIR; Ref. 30)</p>
<p>Details the management measures proposed to reduce adverse impacts from construction and operation of terrestrial facilities, including:</p> <ul style="list-style-type: none"> • procedures to determine the extent of clearing and rehabilitation on an annual basis 	<p>Condition 7 of MS 800 and MS 769</p> <p>Condition 6 of EPBC Reference: 2003/1294 and 2008/4178</p>	<p>Terrestrial and Subterranean Environment Protection Plan (TSEPP; Ref. 48)</p>
<ul style="list-style-type: none"> • procedures for avoiding secondary impacts to fauna, and for capturing, relocating, handling, caring for threatened or listed fauna; 		<p>Vegetation Clearing and Audit Common User Procedure (Ref. 51)</p>
<ul style="list-style-type: none"> • procedures for avoiding secondary impacts to fauna such as vehicle strike. 		<p>Fauna Handling and Management Common User Procedure (Ref. 50)</p> <p>Traffic Management Common User Procedure (Ref. 52)</p>
<p>Details the statistically valid ecological monitoring program to detect any Material or Serious Harm to ecological elements outside the TDF.</p>	<p>Condition 8 of MS 800</p> <p>Condition 7 of EPBC Reference: 2003/1294 and 2008/4178</p>	<p>Terrestrial and Subterranean Environment Monitoring Program (Ref. 53)</p>
<p>Details management of infrastructure and incident control systems/arrangements for fire prevention, suppression, and management.</p>	<p>Condition 12 of MS 800</p> <p>Condition 9 of EPBC Reference: 2003/1294 and 2008/4178</p>	<p>Fire Management Plan (Ref. 32)</p>
<p>Details weed management procedures, as part of the Quarantine Management System.</p>	<p>Condition 10 of MS 800</p> <p>Condition 6 of EPBC Reference: 2003/1294 and 2008/4178</p>	<p>Barrow Island Weed Hygiene Common User Procedure (Ref. 35)</p>



1.4.5 Stakeholder Consultation

Consultation with stakeholders has been undertaken by CAPL on a regular basis throughout the development of environmental impact assessment management documentation for the Gorgon Gas Development. This has included engagement with the community, government departments, industry operators, and contractors to CAPL via planning workshops, risk assessments, meetings, teleconferences, and the Public Environmental Review (PER; Ref. 16), Environmental Impact Statement/Environmental Review and Management Programme (EIS/ERMP; Ref. 17) and Additional Support Area Environmental Review (Ref. 18) formal approval processes.

Condition 32.3 of MS 800 specifically requires CAPL to consult with the DEC (now DBCA) and DMP (now DMIRS).

This document was prepared with input from:

- David Tongway (Landscape Ecologist): David Tongway independently reviewed this Plan prior to its submission to Government agencies and his comments were incorporated or otherwise resolved.
- The DEC (now DBCA): Workshops and meetings were held involving the DEC and CAPL personnel to discuss the scope and content of this Plan during its development. The DEC reviewed draft revisions of this Plan along with the feedback of the independent reviewers. The DEC's comments were incorporated or otherwise resolved.

- The DEWHA (now Department of the Environment and Energy [DotEE]): The DEWHA reviewed draft revisions of this Plan along with the feedback of the independent reviewers. The DEWHA's comments were incorporated or otherwise resolved.
- The Western Australian Department of Mines and Petroleum (DMP) (now DMIRS): Consultation with the DMP is required under Condition 32.3 of MS 800. The DMP reviewed draft revisions of this Plan along with the feedback of the independent reviewers. The DMP's comments were provided via the DEC and were incorporated or otherwise resolved.
- CAPL (existing oilfield operations personnel): Consulted in relation to existing rehabilitation strategies and performance criteria, and implications for Island-wide management on Barrow Island.

2 Relevant Facilities and Activities

2.1 Terrestrial Facilities

This Plan addresses issues associated with the Terrestrial Facilities of the Gorgon Gas Development, which are shown in Figure 2-1. The Gorgon Gas Development Terrestrial Facilities are defined in Condition 6.3 of MS 800 as the:

- Gas Treatment Plant
- Carbon Dioxide Injection System
- Associated Terrestrial Infrastructure forming part of this Proposal
- Areas impacted for seismic data acquisition
- Onshore Feed Gas Pipeline System and terrestrial component of the shore crossing.

Terrestrial Facilities also include those defined in Condition 6.3 of MS 769 (the Onshore Feed Gas pipeline system and the terrestrial component of the Shore Crossing) and Schedule 1 of MS 965 (the Additional Support Area).

Additional details on the Terrestrial Facilities can be found in the Draft EIS/ERMP (Ref. 19), the section 45C approval (Ref. 3), the PER (Ref. 16) and the Environmental Review (Ref. 18).

Condition 32.1 of MS 800 requires CAPL (as the Proponent) to submit a Post-Construction Rehabilitation Plan that addresses disturbed areas that may become available for rehabilitation on completion of construction. Condition 32.5(i) requires CAPL to identify those sites that will be disturbed for construction but are not required for the future construction and operation of the Proposal. Based on existing plans for the Gorgon Gas Development, the areas or parts of these areas may become available for rehabilitation on completion of construction:

- hardstand and laydown areas
- drill pads
- pipeline construction easements
- access tracks
- gravel/rock pits.

Condition 32.5(ii) requires CAPL to identify those areas that are part of the Terrestrial Disturbance Footprint not required for the future construction and operation of the proposal that can be rehabilitated. It is not intended to disturb any area outside the planned Gorgon Gas Development Footprint within the Terrestrial Disturbance Footprint. However, should disturbance take place, and it is not required for future construction or operation, then it will be rehabilitated according to this plan.

Hardstand and laydown areas are known to involve the use of subsurface fixtures such as rock anchors or concrete footings. These have been installed to provide for tie-down of infrastructure in the event of inclement weather. Removal of these fixtures has been demonstrated to be problematic in some instances.

Subsurface fixtures may be left in-situ if the Net Environmental Benefit Analysis (NEBA) process in Appendix D is documented; and CAPL determines that

removal of the fixtures has the potential to cause a greater environmental impact than leaving them in-situ, in consultation with DBCA.

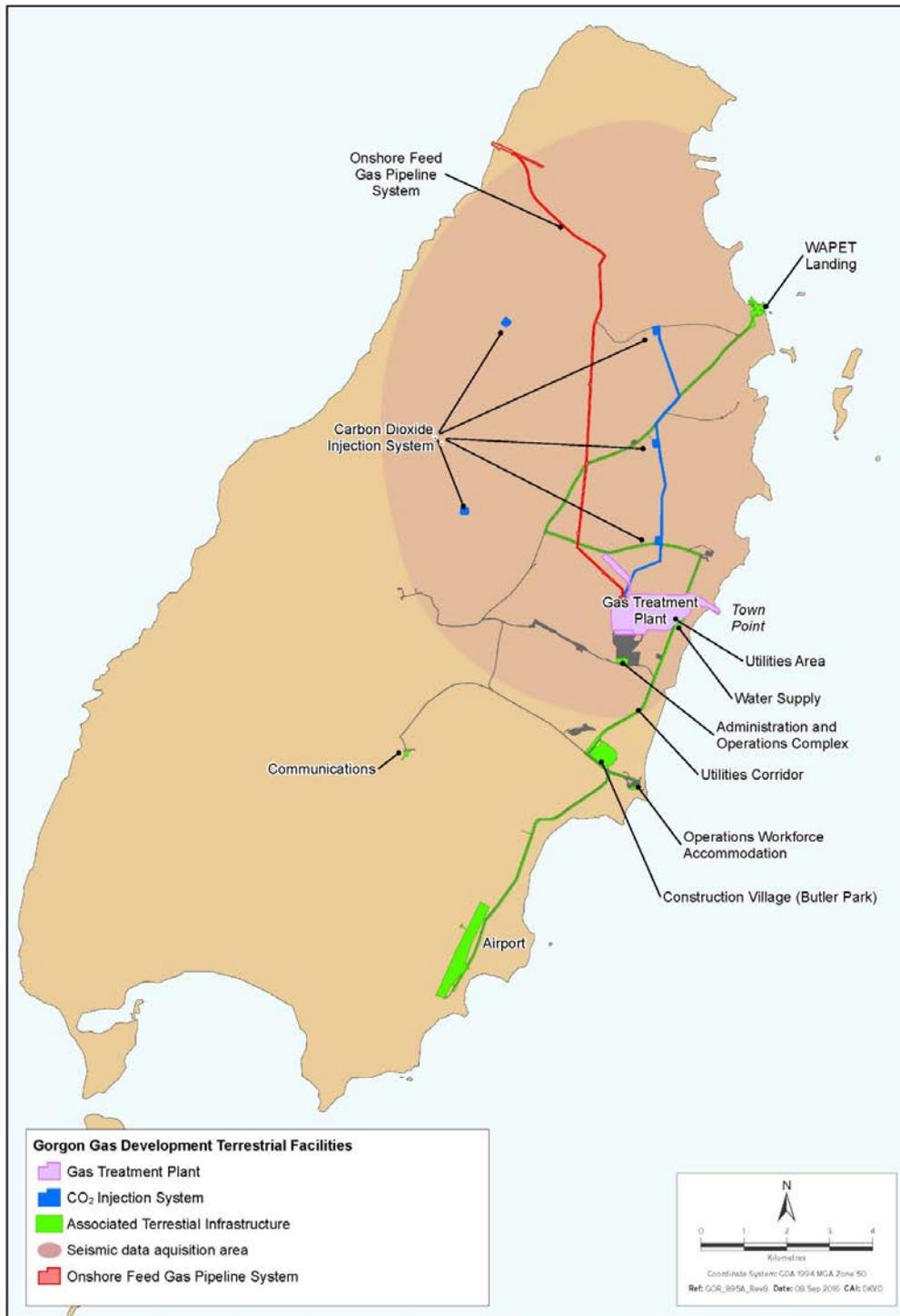


Figure 2-1: Gorgon Gas Development Terrestrial Facilities on Barrow Island

3 Risk Assessment

3.1 Overview

CAPL has prepared the HES Risk Management: ASBU – Standardized OE Process (Ref. 20) to assess and manage HES risks, which it internally requires its employees, contractors, etc. to comply with.

A number of environmental risk assessments have been completed for the Gorgon Gas Development. A strategic risk assessment was undertaken during the preparation of the Draft EIS/ERMP to determine the environmental acceptability of the Development, and identify key areas of risk requiring mitigation (Ref. 19).

This original assessment was reviewed as part of the development of the Gorgon Gas Development Revised and Expanded Proposal PER (Ref. 16), in light of the changes to the Gorgon Gas Development (described in Section 1.1). The outcomes of these assessments have been reviewed and considered during the preparation of this Plan.

More detailed risk assessments have been undertaken for specific scopes of work prior to the commencement of construction. The risk assessments for quarantine are described in the Terrestrial and Marine Quarantine Management System (required under Condition 10 of MS 800 and Condition 1 of EPBC Reference: 2003/1294).

Additional detailed risk assessments have been undertaken for specific scopes of work, using Chevron’s RiskMan2 Procedure (Ref. 21).

A summary of the risk assessments that have been undertaken to date, and which have provided input into this Plan, are provided in Table 3-1.

Table 3-1: Risk Assessments Relevant to this Plan

Scope of Risk Assessment	Method	Documentation	Year
Entire Scope of the Approved Development	AS/NZS 4360:2004	Draft EIS/ERMP (Ref. 19)	2005
Entire Scope of the Revised and Expanded Proposal	AS/NZS 4360:2004	Gorgon Gas Development PER (Ref. 16)	2008
Upstream Feed Gas Pipeline Construction	RiskMan2	Gorgon Upstream Joint Venture (GUJV) Onshore Construction Environmental Risk Assessment Report (Ref. 22) Shore Crossing Construction Environmental Risk Assessment Report (Ref. 23)	2006
Downstream Construction	RiskMan2	Kellogg Joint Venture Gorgon (KJVG) Downstream Environmental Risk Register (Ref. 24)	2008

3.2 Methodology

The methodology for the environmental risk assessments undertaken during the EIS/ERMP assessment process is documented in Chapter 9 of the Draft EIS/ERMP (Ref. 19).

The risk assessments were undertaken in accordance with these standards:

- AS/NZS 4360:2004 Risk management (Ref. 25)

- AS/NZS Handbook 203:2006 Environmental Risk Management – Principles and Process (Ref. 26)
- AS/NZS 3931:1998 Risk Analysis of Technological Systems – Application Guide (Ref. 27).

The main components of the RiskMan2 (Ref. 21) methodology include:

- **Hazard Identification:** Identifying potential hazards that are applicable to Gorgon Gas Development activities and determining the hazardous events to be evaluated.
- **Hazard Analysis:** Determining the possible causes that could lead to the hazardous events identified; the consequences of the hazardous events; and the safeguards and controls currently in place to mitigate the events and/or the consequences.
- **Risk Evaluation:** Evaluating the risks using the Chevron Integrated Risk Prioritization Matrix (Appendix A). The risk ranking is determined by a combination of the expected frequency of the hazard occurring (likelihood) and the consequence of its occurrence. Note that when assessing the consequence no credit is given to the hazard controls; hazard controls are taken into account in determining the likelihood of the event.
- **Residual Risk Treatment:** Reviewing the proposed management controls for each of the risks identified and proposing additional controls or making recommendations, if required.

Using the Chevron Integrated Risk Prioritization Matrix (Appendix A), identified risks are categorised into four groups that determine the level of response and effort in managing the risks. The risk-ranking categories have been used in the development of this Plan to determine whether the residual risks were acceptable or whether further mitigation was required.

3.3 Rehabilitation Risks

The rehabilitation strategies included in this Plan focus on the key risks to successful rehabilitation. These key risks have been identified as:

- appropriate surface hydrology and soil surface stability are not re-established, leading to potential flooding or a loss of resources through erosion
- loss of topsoil or vegetation viability and values due to inappropriate handling, storage, and contamination
- soil properties (physical and chemical) are not appropriate for the target vegetation community or habitat for soil-inhabiting fauna
- introduction and spread of weeds
- target vegetation community fails to establish adequately due to:
 - loss of topsoil viability and structure
 - inadequate seed resources
 - presence and/or competition from weeds
 - presence of seed of inappropriate species
 - grazing by fauna
 - altered hydrology

- lack of understanding of the germination/establishment requirements of species in the rehabilitation of a disturbed landscape.

4 Management of Rehabilitation

4.1 Key Management Elements

Key elements to the success of this Plan are:

- weed hygiene
- the appropriate management of topsoil
- restructure of soil profiles
- the identification of target vegetation communities including their ecosystem function, structure and composition and condition
- management of weeds and
- management of surface water drainage.

These elements are considered to be the critical foundations for the development of an appropriate ecosystem, including fauna habitat. Tasks required to achieve this outcome are detailed in Table 4-1.

The focus on topsoil management reflects its critical importance as a source of seed, nutrients, and beneficial soil organisms (Ref. 28). The selection of a target vegetation community for rehabilitation in each area will be based on position in the landscape.

The broad vegetation assemblages present on Barrow Island are described by Mattiske and Associates (Ref. 29). Relevant 'target vegetation landscape communities' will be:

- 'Coastal' communities (C vegetation types)
- 'Drainage and creek line' communities (D vegetation types)
- 'Flats' communities (F vegetation types)
- 'Limestone' communities (L vegetation types)
- 'Valley slopes and escarpments' communities (V vegetation types).

Further detail on species composition, and their vulnerability to and dependence on fire, is presented in the Terrestrial and Subterranean Baseline State and Environmental Impact Report (Ref. 30).

4.1.1 Vegetation Management

In general, vegetative material from areas to be disturbed can be a source of seed, organic matter, and litter-inhabiting organisms. However, for areas referred to in this Plan, the overwhelming majority of the vegetative material will be Spinifex plants (*Triodia* spp.), which could be expected to be bulky and contain little canopy-stored seed. Experience of WA Oil (Ref. 31) in their rehabilitation programs has shown that excessive spinifex material in topsoil reduces seed germination and seedling establishment of all species included in rehabilitation. Therefore, in large areas to be cleared (e.g. the Gas Treatment Plant site), where spinifex forms the majority of the vegetation, where practicable, this material will be burnt before topsoil is removed. Burning will be carried out according to the Fire Management Plan (Ref. 32) and the Prescribed Fire Plans.

If vegetation consists of woody species that carry their seed in the canopy and this vegetation is not burnt, or if there are significant safety risks associated with

burning vegetation (e.g. along Pipeline routes), then the following practices will be adopted where this is practicable:

- salvage vegetation from areas to be cleared
- only retain vegetation that is free of weeds
- record relevant information regarding the cleared vegetation
- respread stockpiled vegetation on similar landforms and soil types from which it was stripped

Where this is not practicable, vegetation material will be burnt elsewhere or disposed of.

4.1.2 Topsoil and Soil Management Strategies

The following practices will be adopted where reasonable and practicable to do so for stripping, stockpiling, reusing, and management of topsoil from the Gorgon Gas Development:

- Identify the boundaries of distinct vegetation communities to allow the soil from each area to be stripped, stockpiled, and respread separately.
- Weed infestations will be mapped and segregated with an appropriate buffer. A site specific weed hygiene management program will be developed and implemented.
- For the installation of the Onshore Feed Gas Pipeline vegetation and topsoil will be stored in windrows along the edge of the right of way. Reinstatement will involve direct recovery of topsoil and spreading of the vegetation.
- For all other areas strip topsoil using the least aggressive methods, preferably by pushing up the soil with a dozer or grader and loading into a truck, rather than using machines such as elevating scrapers.
- Strip topsoil to an approximate depth of 5 cm where practicable.
- Direct-return topsoil to areas that are ready to be rehabilitated and that are suitable for the vegetation community originally associated with the soil.
- If stockpiling is necessary, identify sites that:
 - are not going to be disturbed in future operations
 - are remote from known weed occurrences and sources
 - do not lie in areas likely to receive surface water flow
 - have surrounding vegetation consistent with the original vegetation from the stripped area.
- Store topsoil stockpiles in low-profile dumps that shall not exceed two metres in height.
- If available, spread vegetation mulch over topsoil stockpiles as soon as is practicable after constructed.
- Topsoil stockpiles formed by paddock dumping are being considered to maximise the surface area of the stockpile and promote biological development.

- Record relevant information regarding the soil in each stockpile, including vegetation unit, date of stripping, method of stripping, soil volumes, and seed mix (if any).
- Consider seeding topsoil stockpiles where soil-stored seed levels are low or vegetation establishment is poor.
- Use appropriate signage to clearly identify stockpiles and discourage vehicle access; record stockpile locations on site maps.
- Monitor topsoil stockpiles for stability, vegetation establishment, and weeds, eradicate any weed occurrences.
- Investigate methods to recover stockpiled topsoil while maintaining or building the biological value of the remaining stockpiled material.
- Where topsoil is limited, limit respreading to be a thickness sufficient to 'inoculate' the rehabilitation site with the topsoil properties.

The strategy for the use and distribution of topsoil will be developed in consultation with and to the satisfaction of DBCA prior to the commencement of works that involve the removal of topsoil.

These practices have been taken from a review undertaken by Outback Ecology Services (Ref. 28) for CAPL specifically dealing with the soils of Barrow Island in relation to soils of the Pilbara, and general principles in regard to the values of topsoil and factors influencing topsoil from the Australian Soil and Land Survey Field Handbook (Ref. 33).

4.1.3 Management of Weeds

Activities during the construction period of the Gorgon Gas Development on Barrow Island have the potential to introduce weeds or spread weeds on the Island with increased vehicle movements, land disturbance, movement of soils and rehabilitation activities. CAPL acknowledges the potential impact that the introduction of weed species could have on the vegetation communities on the island. A sophisticated and extensive Quarantine Management System (QMS) will be implemented to minimise the introduction of new weeds species and programs are in place on the Island to prevent the spread of existing weed infestations. This QMS includes the NIS Management Procedure (Ref. 34), which is supported by the Barrow Island Weed Hygiene Common User Procedure (Ref. 35) and the WA Oil Asset (Barrow and Thevenard Island) Weed Management Plan (Ref. 36). The management measures detailed in these documents focus on minimising the potential for the spread of weeds during the rehabilitation process and methodology to eradicate weeds when identified. Actions include:

- Areas to be disturbed will be surveyed for weed infestation and if present will be mapped and segregated by appropriate buffers.
- Where weeds are present prior to disturbance vegetation and topsoil from these areas will not be retained or stockpiled.
- Where weeds are present detailed soil, plant, and vehicle hygiene procedures will be implemented.
- Movement of weed infested soils will be under strict hygiene control to designated areas where they will either be buried within the infected area of the construction site to prevent further spread or removed from the island in sealed containers for appropriate disposal.

- Monitor topsoil stockpiles and rehabilitation in accordance with the agreed surveillance plan in the QMS.
- Topsoil will be replaced from where it was sourced, wherever possible.
- Induction and education programs will be implemented to ensure all staff, contractors, carriers, and fabricators are aware of the importance of preventing the introduction and spread of weeds on the island and the potential impacts these could have on island vegetation.

Equipment and staff moving between off-Barrow Island operations and Barrow Island operations will undergo strict quarantine control to minimise the potential for movement of weeds onto the Island.

4.1.4 Managing Surface Drainage

Surface drainage features are described in the Terrestrial and Subterranean Baseline State and Environmental Impact Report (Ref. 30). Surface drainage patterns (hydrology) will be rehabilitated on all disturbed areas to reduce erosion from surface water flow. Practices to achieve this will include:

- recording the surface topography of the area prior to disturbance using standard survey techniques, consideration will be given to the use of remote sensing if it can achieve adequate resolution, include information on surface stability, soil structure, and estimates of overland surface water flows
- rehabilitating a surface profile with properties that exhibit similar infiltration and water-retention characteristics for the targeted vegetation outcome to analogue sites
- unless inappropriate for the targeted vegetation outcome, encouraging local retention and infiltration of rainfall on rehabilitated areas by creating surface roughness through light cultivation on the contour, as required, and spreading vegetation mulch where available on the contour to restrict surface run-off and reduce erosion
- installing banks or other appropriate earthworks, if required, to direct and control surface water flow at a local scale discharging on to undisturbed stable ground where practicable
- reviewing and repairing gullies (>30 cm deep) on a case-by-case basis when they occur
- monitoring using LFA or similar to measure water infiltration and retention.

4.2 Rehabilitation Tasks

The overriding strategy for the rehabilitation of areas disturbed for construction is based on the collection and management of topsoil, management of weeds, and management of vegetation resources at the time of clearing. A Task Sheet showing an example of the sort of information collected is shown in Appendix C. Doing this will ensure that resources are returned to the appropriate site during the rehabilitation process to maximise rehabilitation success and prevent the introduction of NIS and weeds. Management of surface water flows is also critical to successful rehabilitation. The focus for water management will be to reduce flow velocity and volumes to limit erosion of soil and loss of biological resources.

The activities required to achieve these outcomes have been separated into individual tasks. These are described in Table 4-1. The tasks identified in this Plan focus on the key risks to successful rehabilitation, as identified in Section 3.

Table 4-1: Summary Management Measures for Rehabilitation

Activity	Summary of Management Measures	Responsibility	Timing
1 General			
1.1 Commun-ications	This Plan shall be communicated to relevant Gorgon Gas Development personnel.	CAPL	From commencement of construction
1.2 Contracts	The requirements of this Plan will be specified in relevant instructions to contractors.	CAPL	From commencement of construction
1.3 Monitoring and Performance	The Plan will be revised in response to the results of the monitoring program and results of any ongoing studies in consultation with DBCA.	CAPL	From commencement of construction
1.4 Data Collection	Pre-disturbance data will be collected to identify any specific rehabilitation requirements necessary for each area to meet the objectives of this Plan.	CAPL	From commencement of construction
2 Site or Project Area Development			
2.1 Pre-clearing	The following tasks shall be completed prior to clearing taking place:		
	<ul style="list-style-type: none"> Boundaries of each area will be surveyed and marked, the perimeters recorded and mapped in the Gorgon Geographic Information System (GIS) and provided to all appropriate contractors. 	CAPL	Before site disturbance
	<ul style="list-style-type: none"> Map and segregate NIS and weed infestations with an appropriate buffer; identify specific management requirements. 	CAPL	Before site disturbance
	<ul style="list-style-type: none"> An internal Ground Disturbance Certificate will be obtained. 	CAPL	Before site disturbance
	<ul style="list-style-type: none"> Surface topography, hydrological and soils information will be recorded for each site including: <ul style="list-style-type: none"> physical and topographical groundwater fauna and flora (including ecological communities, significant habitats) topsoil properties storage location. This information will be used for vegetation and soil management and to inform reconstruction of the landform during rehabilitation. 	CAPL	Before site disturbance
<ul style="list-style-type: none"> If more than one vegetation community was identified on the site in initial surveys, then the boundaries of vegetation communities will be identified. 	CAPL	Before site disturbance	

Activity	Summary of Management Measures	Responsibility	Timing
	<ul style="list-style-type: none"> If seed or fruits are present on the vegetation to be cleared, then where practicable these should be collected and stored appropriately. 	CAPL	Before site disturbance
2.2 Clearing and stripping	<p>During clearing and stripping of each area the sequence of tasks will be:</p> <ul style="list-style-type: none"> Vegetative material will be either burnt (in accordance with the Fire Management Plan [Ref. 32] and Prescribed Fire Plans, or cleared and stockpiled for future burning or disposal in an appropriate area. Dust from soil stripping and earthworks will be managed where practicable, Non-saline water will be used for dust suppression, if required. Topsoil will be stripped as close to the construction date as practicable. Where practicable topsoil from the area of each vegetation community will be stripped to an approximate depth of 5 cm. Where practicable recovered topsoil will be used for direct lay or stockpiled separately on a suitable storage site for later rehabilitation Soil and vegetation stockpiles will be placed so as to avoid the need for any further disturbance until required for rehabilitation. Topsoil will be stored in low-profile dumps less than 2 m in height to avoid compaction, and assist with maintenance of viable seed, soil microorganisms, and soil nutrients. Topsoil stockpiles will be identified with appropriate signage. Subsoil or rock material may be used for construction The stockpiled soils will be respread as soon as practicable to reduce the loss of soil biological components. 	CAPL	Duration of site clearing and preparation activities
3 Rehabilitation			
3.1 Rehabilitation	<p>When the disturbed area is available for rehabilitation, then the following tasks will be completed:</p> <ul style="list-style-type: none"> Depending on the characteristics of the target vegetation and desired substrate the surface of the area to be rehabilitated will be ripped on the contour to the depth of any machinery-induced compaction. Surface drainage patterns will be re-established to be consistent with that occurring prior to disturbance. Topsoil from a similar vegetation community will be respread at no greater depth than originally removed; if required, 	CAPL	After construction

Activity	Summary of Management Measures	Responsibility	Timing
	<p>topsoil may be spread more thinly.</p> <ul style="list-style-type: none"> If seeds of species in the target vegetation communities are available they should be respread. Should monitoring indicate that grazing is significantly impeding rehabilitation recovery, then the perimeter of rehabilitation areas may be fenced to exclude grazing fauna. The fence will be maintained until such time the vegetation is sufficiently established to withstand grazing pressure. 		
4 Monitoring and Maintenance			
4.1 Monitoring	<p>Monitoring of rehabilitated and related areas will:</p> <ul style="list-style-type: none"> use techniques that demonstrate the performance of rehabilitation commence on completion of rehabilitation continue until completion criteria are met or discontinued by agreement with DBCA focus on physical aspects of the rehabilitated landscape, vegetation establishment, ecosystem function, resource retention, and re-establishment of fauna habitat establish permanent photo points provide information that will be used for rehabilitation management. <p>Monitoring outcomes will be reported annually.</p>	CAPL	Post rehabilitation
4.2 Maintenance	<p>Where monitoring indicates that an area of rehabilitation is failing to meet closure standards (Table 5-1), it will be investigated and a maintenance or remediation strategy developed.</p> <p>Where weeds are identified, they will be eradicated.</p>	CAPL	During the monitoring period
5 Specific Requirements for Drill Pads			
5.1 Site assessment	<p>For all drill pads:</p> <ul style="list-style-type: none"> drill cuttings will be assessed, and, if considered hostile for plant growth, will be removed contaminated soil from drilling activities will be remediated or removed. 	CAPL	After construction and prior to rehabilitation
5.2 Site rehabilitation	<p>For drill pads where no topsoil was recovered, then if available, topsoil will be spread to 'inoculate' the area with seed and other biological values.</p>	CAPL	After site assessment
6 Specific Requirements for Buried Gas Pipelines			
6.1 Reinstatement and rehabilitation	<p>After bedding and padding of pipelines in the trenches has been completed, the following steps will be undertaken:</p> <ul style="list-style-type: none"> Trenches will be filled, compacted and 	CAPL	Completion of pipeline installation

Activity	Summary of Management Measures	Responsibility	Timing
	<p>covered with a crowned profile.</p> <ul style="list-style-type: none"> • Drainage will be re-established by creating breaks in the crown. • Topsoil and vegetation will be respread across the pipeline easement. 		
7 Specific Requirements for Tracks (includes Seismic Source Lines)			
7.1 Clearing	<p>Where practicable:</p> <ul style="list-style-type: none"> • temporary tracks will be cleared using techniques that leave the soil intact • vegetation will not be cleared on areas with high risk of erosion. 	CAPL	Prior to related activity
7.2 Restricted access	After authorised use is completed, vehicle access will be restricted.	CAPL	Ongoing
7.3 Monitoring	Rehabilitated tracks will be monitored using visual assessment.	CAPL	Ongoing

4.3 Fire and Rehabilitation

The mature natural vegetation on Barrow Island is well-adapted to fire events. Information on species vulnerability and dependence on fire is contained in the Terrestrial and Subterranean Baseline Environmental Impact Report (Ref. 30). However, where it is determined (from rehabilitation monitoring) that recovery from fire is inadequate under natural conditions, then, in consultation with DBCA and Conservation Commission, the rehabilitation practices described in this Plan could be applied (Condition 12.8 of MS 800 and 11.8 of MS 769).

Rehabilitated areas are unlikely to carry a fire until they are well into maturity and have developed substantial biomass. It is expected that the vegetation will have also reached reproductive maturity by this stage and a soil seed bank will have been established.

4.4 Integration with Island-wide Management

The rehabilitation strategies, framework for monitoring, performance standards, and completion criteria set out in this Plan are based broadly on those already developed for the existing oilfield operations on Barrow Island, and are therefore consistent with Island-wide strategies. CAPL is committed to the improvement of rehabilitation knowledge practices through a program of monitoring, application of lessons learnt, and targeted studies consistent with industry leading practice. This knowledge will be developed and shared with the other stakeholders on the Island.

4.5 Monitoring and Adaptive Management

The focus of rehabilitation monitoring will be to compare the performance of rehabilitation sites against natural undisturbed 'analogue' or reference sites in similar vegetation associations and landform positions as the rehabilitation. The analogue sites will provide the real time values for each aspect against which rehabilitation performance can be compared.

Monitoring of rehabilitation in relation to meeting the objectives and performance standards (Table 5-1) and completion criteria (Table 5-2) described in this Plan will be undertaken as follows:

- Monitoring will commence from the completion of earthworks.
- Monitoring will continue until such time as data indicates the rehabilitation objectives and criteria have been met.
- In consultation with DBCA, the frequency and intensity of ongoing monitoring of biological aspects will be varied over the life of the Gorgon Gas Development driven by trends in ecosystem development.
- Monitoring is likely to be more intensive in the first three years of rehabilitation, but will decrease as the rehabilitated ecosystem matures and performance trends are positive.
- Benchmarking of monitoring results against equivalent 'best practice sites' on Barrow island to enable a comparison of performance and inform if there is a need for intervention.

A key aspect of the monitoring program is the use of tools, such as Landscape Function Analysis (LFA) or Ecosystem Function Analysis (EFA), which provide information that enables management decisions such as the need for intervention to be made promptly and effectively. This is consistent with the adoption of an adaptive management approach focussed on continuously improving rehabilitation practice on Barrow Island. Where the need for change is identified this will be done in consultation with DBCA and subject matter experts consistent with Condition 32.4 of MS 800.

4.5.1 Monitoring of Soils

Soils will be monitored using LFA (Ref. 37) or a similar system that collects data on the stability, structure, rainfall infiltration, and nutrient recycling of the reinstated soils on rehabilitation sites. Soil indices produced from this data enable evaluation of trends in soil performance on each of these factors over time.

4.5.2 Monitoring of Vegetation

Vegetation will be monitored using a combination of visual observation, quantitative vegetation monitoring, and Ecosystem Function Analysis (EFA) (Ref. 37) or equivalent. Vegetation monitoring provides information on species diversity and density following seedling emergence and early establishment. EFA measures rehabilitation performance over time through the measurement of development of ecosystem complexity, habitat establishment, and ecosystem function (the provision of increasing environmental goods and services to the developing ecosystem). Regular EFA monitoring provides information on performance trends, alerting management to the need for intervention should performance not meet the agreed outcomes. Should weeds be identified during monitoring they will be managed under the Quarantine Management System.

4.5.3 Monitoring of Fauna Recolonisation

Monitoring for fauna recolonisation is based on the successful return of habitat measured by vegetation monitoring and LFA/EFA. As rehabilitation progresses and habitat re-establishes, targeted fauna monitoring will be undertaken to measure fauna activity.

Monitoring for fauna re-establishment includes ants as indicator species. It is expected that fauna such as ants will recolonise immediately, although diversity will change with time as rehabilitation progresses. Observations during EFA

monitoring can also indicate fauna activity by identifying the presence of tracks, scats, scratchings, and burrowing activities.

Areas will be considered to be rehabilitated when the completion criteria have been met and accepted by DBCA and the areas demonstrate that they provide appropriate habitat for fauna or when terrestrial invertebrate diversity is within the range of values of analogue sites in the targeted vegetation communities.

Where monitoring indicates fauna recolonisation does not reflect the level of activity in analogue sites the causes will be investigated and mitigation measures developed and implemented in consultation with DBCA.

4.5.4 Adaptation to Climate Change

Ecosystems on Barrow Island are adapted to a climate of episodic rainfall events, which may be substantial, alternating with long periods of extreme dryness. Within the context of this extreme climatic variability, variation due specifically to climate change is not considered to be a factor that can be anticipated in this Plan. However, this Plan is based on an adaptive management approach—outcomes from the monitoring program will be reviewed annually and will form the basis for management decisions.

4.6 Identification of Knowledge Gaps

CAPL is committed to ongoing review of rehabilitation outcomes. Investigations and studies will be undertaken as required to fill gaps in knowledge, and rehabilitation methodology adapted accordingly. CAPL will consider undertaking studies into a number of aspects early in the development of the Gorgon Gas Development. Current gaps in knowledge or uncertainty of outcomes appear to be:

- apparent recalcitrance of some plant species due to edaphic or other environmental constraints
- return of fauna habitat, including long-lived plant species required for habitat
- recolonisation of invertebrate fauna
- recolonisation of mycorrhizal fungi
- role of exclusion fencing to rehabilitate species
- species vulnerability and dependence on fire
- effect of reconstructed soil properties on vegetation composition and structure.

Although identified as knowledge gaps, each of these aspects may reflect the limited documented information on rehabilitation performance on the Island in regard to these specific aspects. The following have been taken into consideration:

- Experience elsewhere in the Pilbara indicates that the return of fauna and soil-borne fungi takes place as an integral part of well-managed and successful rehabilitation programs.
- The monitoring program will identify the success in re-establishing these aspects.
- Where monitoring shows rehabilitation has been unsuccessful, the investigation and quest for solutions will form the basis of ongoing study programs.

- These programs will be developed in consultation with DBCA and subject matter experts in each particular field.

This is integral to the adaptive management approach to be undertaken by CAPL.

4.6.1 Recalcitrance of Plant Species

Although some plants have been termed as recalcitrant (Ref. 19), the use of this term may have been incorrect and misleading. Review of flora and vegetation data collected on Barrow Island indicate that of the 302 species identified, there is some uncertainty about 18 species that have not been identified in rehabilitation to date. This gap will form the basis of a collaborative study program. Early observations indicate this may be due to selective grazing in rehabilitated areas or lack of fire.

- An investigation of grazing impact is currently planned for Barrow Island, should this indicate grazing is affecting these species then exclusion fencing will be considered (refer to Table 4-1)
- Should any fires take place on the Island then CAPL will collaborate with DBCA to develop a program to monitor vegetation recovery to expand knowledge on the role of fire in the ecology of island vegetation
- Should monitoring of rehabilitation performance indicate the failure of keystone species to re-establish, then the causes of this failure will be investigated.
- priority will be given to keystone species that contribute the key functional aspects of the vegetation communities
- species contributing known services will be the next priority.

Some initial investigations have been undertaken on germination and propagation in the island nursery, this facility will be used for ongoing investigations into seed viability and propagation techniques.

4.6.2 Return of Fauna Habitat

Dominant components of fauna habitat, including long-lived species' habitat, are:

- soil – for digging and burrowing by vertebrates and invertebrates
- vegetation – a source of shelter and food.

Therefore, returning appropriate soils and vegetation are key parts of rehabilitation management to develop suitable habitat over time; these are dealt with specifically in Table 4-1.

Other more specific habitat features include Boodie warrens, termite mounds, cliffs and gorges, caves, and raptor nests. Of these, only termite mounds will be affected by the activities described in this Plan.

Termite mounds are important physical habitat features for a diversity of fauna, including reptiles, birds, and mammals. They are not uniformly distributed, being absent from red sand dunes and limestone ridges, only occurring where there is sufficient clay material in the soil to support mound construction. There are indications that the use of mounds by fauna only relates to the presence of the termites. Termites will construct new mounds and will not reuse old mounds. Experience on Barrow Island indicates new mounds are formed early in the rehabilitation process and have achieved visible proportions within ten years (Ref. 38). The retention of termite mound material in the topsoil will provide

suitable material for the construction of new mounds that may promote the recolonisation of rehabilitated areas by termites.

Vegetation dominated by *Triodia* spp. is the most important vegetative habitat for fauna on Barrow Island. However, species such as *Ficus platypoda* can be locally important for some fauna. Direct translocation of shrubs or trees, such as *F. platypoda*, has not been attempted to date on Barrow Island, and is likely to be difficult due to their habitat and the harsh climate. *Ficus* has germinated well in greenhouse trials on Barrow Island, and most successfully from green stem cutting (Ref. 31). However, factors limiting its field establishment are yet to be categorically defined (Ref. 31). On sites where *Ficus* occurred, natural recruitment of this slow-growing species will be monitored to understand whether this species will self-establish, or whether intervention should occur.

Areas that become available for rehabilitation following construction that will be the subject of this Plan will be linear (as in the case of pipeline construction), or small in area (as in the case of laydown and construction areas). As a result, undisturbed fauna habitat will be in close proximity to these areas and will facilitate recolonisation as the rehabilitation develops and matures. Translocation of viable specimens of long-lived species has therefore not been considered as a rehabilitation requirement in this Plan.

4.6.3 Recolonisation of Invertebrate Fauna

The most important factor in the re-establishment of invertebrates in rehabilitated areas will be the extent to which appropriate habitat is re-established and the development of a similar ecosystem. The most important factors contributing to the recolonisation and re-establishment of invertebrates will be the return of viable topsoil (Ref. 28), re-establishment of native plant species at appropriate densities and species richness, the accumulation of organic matter through respreading of stored vegetation material from clearing, and the minimisation of loss of organic matter through erosion.

4.6.4 Recolonisation of Mycorrhizal Fungi

Little is known about mycorrhizal fungi on Barrow Island. If targets were to be established for their return, then a program of work to understand their occurrence would first be required. At a more general level, the impact of disturbance and the pattern of recovery of mycorrhizal fungi have been studied in a range of other environments. Reflecting the outcomes from such work, re-establishing these fungi will largely be achieved by returning fresh topsoil, where practicable, and re-establishing native plant species at an appropriate density and species richness (Ref. 28).

Techniques such as bringing surface soil material in from the edges of rehabilitation sites (soil inoculation) can assist in the inoculation of rehabilitation soils with viable mycorrhizal material. Recolonisation and grazing of rehabilitated areas by fauna is also known to contribute to the introduction and spread of mycorrhizal fungi. It is considered that rehabilitated sites will be recolonised with mycorrhizal fungi by natural processes over time.

5 Objectives, Performance Standards, and Relevant Documentation

5.1 Overview

This section summarises the environmental objectives, performance standards, and relevant documentation that have been developed as part of a systematic approach to the management of environmental risks. Specific performance indicators, targets, and criteria will be used to assess the overall environmental performance for the Gorgon Gas Development against the stated environmental objectives.

Table 5-1 contains the objectives, performance standards, and documentation that relate to this Plan. These will provide input into the Environmental Performance Reports that are required under Condition 5 of MS 800.

Table 5-2 identifies a set of targets and completion criteria based on these objectives; the criteria have been designed to capture the key rehabilitation outcomes of this Plan:

- equivalent landform
- stable soils
- representative vegetation
- self-sustaining and functioning ecosystems
- effective fauna habitat
- minimal ongoing management.

5.2 Objectives

CAPL is committed to conducting activities associated with the Gorgon Gas Development in an environmentally responsible manner; and aims to implement best practice environmental management as part of a program of continual improvement. To meet this commitment, objectives have been defined that relate to the management of the identified environmental risks for the Development. These objectives are those in Condition 32 of MS 800, and, where necessary, additional, more specific objectives have been developed.

The objective of this Plan is to achieve the following outcomes:

- ensure that the rehabilitation of terrestrial areas following construction is properly planned in a manner which promotes self-sustaining ecosystems able to be managed as part of their surroundings consistent with the conservation objectives of a Class 'A' Nature Reserve
- design rehabilitation of native vegetation to ultimately develop into viable ecological systems which are comparable and compatible with surrounding native vegetation and its land uses, and restores as closely as practicable the pre-disturbance biodiversity and functional values
- ensure planning, implementation, monitoring, and reporting on rehabilitation is carried out in a manner consistent with industry best practice
- ensure management of rehabilitation continues until affected areas are self-sustaining

- better inform any ongoing rehabilitation and post-closure rehabilitation.

Table 5-1 details the objectives specific to this Plan.

5.3 Performance Standards

Performance standards are the measures CAPL will use to assess whether or not it is meeting its objectives. For each objective and element of each objective, CAPL has described a matter ('description') that will be measured, and a quantitative target or, where there is no practicable quantitative target, a qualitative target, which is to be measured against when assessing whether the objective has been met. These targets have been developed specifically for assessing performance, not compliance, and so failure to meet the target does not represent a breach of this Plan. Rather, it indicates that an objective may not have been met and there may be a need for management action or review of this Plan.

The performance standards specific to this Plan are detailed in Table 5-1.

5.4 Relevant Documentation

CAPL has defined the relevant documentation that contains information about whether the performance standards have been met.

Relevant documentation specific to this Plan is detailed in Table 5-1.

5.5 Completion Criteria

A set of interim completion criteria have been developed (Table 5-2) from the objectives in MS 800. The criteria set out the objectives for rehabilitation and identify the performance outcomes targeted for the rehabilitation program. The completion criteria in Table 5-2 identify the targets required in Condition 32.5(iii), (v), (vi), (vii), (xi), (xiv) of MS 800. Matters requiring the agreement of DBCA (Conditions 32.5(v) and 32.5(xiv)) have been agreed with DBCA during the course of the development of this Plan. It is proposed to refine these criteria through experience gained in implementing this Plan and through studies and trials undertaken in the lead up to implementing this Plan.

The rehabilitation objectives for the completion criteria are:

- The rehabilitated land surface is consistent with the surrounding topography; soils are stable and resistant to erosion.
- Soil quality is maintained during storage and replaced in an appropriate position in the landform.
- Species diversity in revegetation will have similar values to surrounding undisturbed vegetation.
- Species present in the revegetation will have a similar ecological function and resilience as the surrounding natural system.
- Rehabilitation areas will provide appropriate habitat for fauna and fauna recruitment as the soil structure and vegetation develop over time.
- Rehabilitation areas will be free of weed species.
- The rehabilitated areas can be managed in the same way as the surrounding landscape in the long term.

Table 5-1: Objectives, Performance Standards, and Relevant Documentation

Objectives	Performance Standards		Evidence/Relevant Documentation
	Description	Target	
<p>1. Ensure that the rehabilitation of terrestrial areas following construction is properly planned in a manner which promotes self-sustaining ecosystems able to be managed as part of their surroundings consistent with the conservation objectives of a Class 'A' Nature Reserve</p>	<p>Planning commences with the collection of baseline information</p> <ul style="list-style-type: none"> • Terrestrial baseline fauna and flora • Landform • Soils • Ecological function <p>Collection and storage of resources</p> <ul style="list-style-type: none"> • Seed • Topsoil <p>Rehabilitation of post construction areas based on baseline information and stored resources.</p> <ul style="list-style-type: none"> • Landform design and rehabilitation • Topsoil replacement • Soil surface preparation • Surface water management • Seeding if appropriate • Weed control <p>Monitoring and active management based on monitoring results</p>	<ul style="list-style-type: none"> • Baseline data collected prior to disturbance • Resources recovered and stored prior to disturbance • Landforms rehabilitated and resources replaced on completion of construction • Ongoing monitoring and management until completion criteria met 	<ul style="list-style-type: none"> • Terrestrial and Subterranean Baseline State and Environmental Impact Report (Ref. 30) • Managing Topsoil from the Gorgon Project, Assessment of soil resources within the Gorgon Project area (Ref. 39) • Post-Construction Rehabilitation Plan (this Plan) • Ecological Monitoring Common User Procedures (Ref. 1) • Gorgon Gas Development Rehabilitation Task Sheets • Audit reports

Objectives	Performance Standards		Evidence/Relevant Documentation
	Description	Target	
2. Design rehabilitation of native vegetation to ultimately develop into viable ecological systems which are comparable and compatible with surrounding native vegetation and its land uses, and restores as closely as practicable the pre-disturbance biodiversity and functional values	<ul style="list-style-type: none"> Design rehabilitation landform to be consistent with surrounding landform Identify and allocate appropriate topsoil and seed resources for the landform Develop a program to deal with recalcitrant vegetation if required and practicable Design surface structures to manage and control run-off and erosion Design weed management program Design a monitoring program to measure performance against completion criteria 	<ul style="list-style-type: none"> Landform design prepared for each area which includes surface preparation and surface water control Appropriate topsoil identified and allocated for each area Monitoring program developed prior to rehabilitation commencing Effective weed management program in place 	<ul style="list-style-type: none"> Terrestrial and Subterranean Baseline State and Environmental Impact Report (Ref. 30) Post-Construction Rehabilitation Plan (this Plan) Managing Topsoil from the Gorgon Project, Draft Assessment of Soil Resources within the Gorgon Project area (Ref. 39) Ecological Monitoring Common User Procedure (Ref. 1) Barrow Island Weed Hygiene Common User Procedure (Ref. 35)
3. Ensure planning, implementation, monitoring, and reporting on rehabilitation is carried out in a manner consistent with industry best practice	<ul style="list-style-type: none"> Use competent and experienced consultants, specialists, and personnel Consult with industry leaders across the Pilbara Attend rehabilitation conferences and forums Consult with DBCA and DMIRS Benchmark post-construction rehabilitation against best practice Barrow Island rehabilitation 	<ul style="list-style-type: none"> Staff and contractors are competent and suitably experienced to undertake the design and implementation of the rehabilitation tasks Review rehabilitation practices in the Pilbara prior to finalising post-construction rehabilitation plan DBCA and DMIRS consulted during development of the Post Construction Rehabilitation Plan (this Plan) Achieve post-construction rehabilitation performance equivalent to or better than best practice Barrow Island rehabilitation 	<ul style="list-style-type: none"> Post Construction Rehabilitation Plan (this Plan) Managing Topsoil from the Gorgon Project, Review of Topsoil Management Practices (Ref. 28) Contractor capability statements and staff CVs Annual Environmental Performance Report
4. Ensure management of rehabilitation continues until affected areas are self-sustaining	Monitoring and active management programs will be maintained until completion criteria are met and the affected areas are self-sustaining	Rehabilitation monitoring and active management until monitoring demonstrates the affected areas are self-sustaining	<ul style="list-style-type: none"> Post Construction Rehabilitation Plan (this Plan) Annual Environmental Performance Report

Objectives	Performance Standards		Evidence/Relevant Documentation
	Description	Target	
5. Better inform any ongoing rehabilitation and post-closure rehabilitation	Experience and information will inform future rehabilitation and ultimate closure and rehabilitation of Gorgon activities on Barrow Island	Post-Construction Rehabilitation Plan will be reviewed and updated as necessary based on field experience and monitoring results	<ul style="list-style-type: none"> Compliance with Condition 32.7 of MS 800 Annual Environmental Performance Report

Table 5-2: Rehabilitation Objectives, Completion Criteria, and Performance Targets

Rehabilitation Objectives	Completion Criteria		Measurement and Documentation
	Description	Performance Target	
<p>1. The rehabilitated land surface and soil properties are appropriate to support the target ecosystem</p> <ul style="list-style-type: none"> Appropriate topsoil replaced Key fauna habitat returned Recolonisation by invertebrate fauna Recolonisation by mycorrhizal fungi 	<ul style="list-style-type: none"> Landform and surface hydrology are consistent with, and complementary to, the overall landscape Soil surface has similar stability as surrounding soil surfaces in the target ecosystem Soil physical and chemical properties will be consistent with those of the target ecosystem. 	<ul style="list-style-type: none"> Rehabilitated landforms will be consistent with adjacent landforms Soils are returned to the correct place in the landscape Soil profiles will be consistent with adjacent soil profiles Topsoil will be replaced from where it came, where practicable, or to a similar landform Surface soil is sufficiently rough and appropriately contoured to reduce erosion, encourage infiltration of rainfall, and trap seed and other resources Rates of erosion will be consistent with adjacent landforms Measure of soil stability falls within the range of values from analogue sites in the target vegetation community Measure of infiltration is within the range of values from analogue sites in the target vegetation community 	<p>Objectives measured by the following techniques and reported in the Annual Environmental Performance Report:</p> <ul style="list-style-type: none"> Rehabilitation Task Sheets Topsoil Records Visual and monitoring assessment Visual inspection for erosion Soil Tests LFA indices are similar for analogue and rehabilitated soils As defined in the Ecological Monitoring Common User Procedure (Ref. 1) Managing Topsoil from the Gorgon Project, Review of Topsoil Management Practices (Ref. 28) Managing Topsoil from the Gorgon Project, Draft Assessment of Soil Resources within the Gorgon Project area (Ref. 39)

Rehabilitation Objectives	Completion Criteria		Measurement and Documentation
	Description	Performance Target	
<p>2. Vegetation in rehabilitated areas will have equivalent values as surrounding natural ecosystems</p> <ul style="list-style-type: none"> Return of recalcitrant species Return of key fauna habitat 	<p>Plant species diversity, density, plant cover, floristic composition and functional structure at rehabilitated sites representative of the target ecosystem.</p>	<ul style="list-style-type: none"> Plant species are local provenance Ground cover of <i>Triodia</i> spp. for sites rehabilitated on Barrow Island is within the range of values from analogue sites in the target vegetation community Plant species diversity, density, cover and height, floristic composition, and functional structure for sites rehabilitated will be consistent with the target vegetation community (analogue site) No weed species present in rehabilitation on Barrow Island 	<p>Objectives measured by the following techniques and reported in the Annual Environmental Performance Report</p> <ul style="list-style-type: none"> Quantitative vegetation monitoring Ecosystem Function Analysis (EFA) or similar As defined in the Ecological Monitoring Common User Procedures (Ref. 1) Species composition for the different vegetation associations as described in the Terrestrial and Subterranean Baseline State and Environmental Impact Report (Ref. 30) Barrow Island Weed Hygiene Common User Procedure (Ref. 35)
<p>3. The rehabilitated ecosystem has equivalent functions and resilience as the target ecosystem</p> <ul style="list-style-type: none"> Can be integrated with Island-wide management Key fauna habitat returned Recolonisation by invertebrate fauna Recolonisation by mycorrhizal fungi Nutrients are cycling Ecosystem is self-sustaining 	<ul style="list-style-type: none"> The capacity to retain water and retain and recycle nutrient resources is equivalent to target ecosystems. Seed reserves are equivalent to target ecosystems. There will be no loss of ecosystem function. Rehabilitated ecosystems will be self-sustaining. 	<ul style="list-style-type: none"> Measure of infiltration is within the range of values from analogue sites in the target vegetation community Measure of nutrient cycling is within the range of values from analogue sites in the target vegetation community Seed reserves are within the range of values from analogue sites in the target community 	<p>Objectives measured by the following techniques and reported in the Annual Environmental Performance Report.</p> <ul style="list-style-type: none"> Ecosystem Function Analysis (EFA) or similar Monitoring for intergenerational succession, using quantitative vegetation monitoring and EFA, or similar, for long-term sustainability and function As defined in the Ecological Monitoring Common User Procedures (Ref. 1)

Rehabilitation Objectives	Completion Criteria		Measurement and Documentation
	Description	Performance Target	
<p>4. Rehabilitated areas provide appropriate habitat for fauna and fauna recruitment including EPBC Act (Cth) listed species</p> <ul style="list-style-type: none"> • Key fauna habitat returned • Recolonisation by invertebrate fauna • Recolonisation by mycorrhizal fungi • Nutrient cycling • Self-sustaining 	<ul style="list-style-type: none"> • Soil physical and chemical properties will be consistent with those of the surrounding landscape and provide equivalent habitat values. • Vegetation and flora at the rehabilitated sites are representative of the target ecosystem and provide equivalent habitat values. • Terrestrial invertebrate fauna diversity is representative of the target ecosystem. 	<ul style="list-style-type: none"> • Soils are returned to the correct place in the landscape • Measure of nutrient cycling is within the range of values from analogue sites in the target vegetation community • Plant species diversity, density, cover and height, floristic composition, and functional structure for sites rehabilitated will be consistent with the target vegetation community (analogue site) • Invertebrate fauna diversity for sites rehabilitated on Barrow Island is within the range of values for analogue sites in the target vegetation community 	<p>Objectives measured by the following techniques and reported in the Annual Environmental Performance Report</p> <ul style="list-style-type: none"> • Rehabilitation Task Sheets • Quantitative vegetation monitoring • Ecosystem Function Analysis (EFA) or similar • Terrestrial invertebrate monitoring • Terrestrial fauna monitoring • As defined in the Ecological Monitoring Common User Procedures (Ref. 1).
<p>5. The rehabilitated area should be able to be managed in the same way as surrounding land</p> <ul style="list-style-type: none"> • Can be integrated with Island-wide management 	<ul style="list-style-type: none"> • Topography and surface drainage are consistent with, and complimentary to, the overall landscape. • Flora species at the rehabilitated sites are representative of the target ecosystem. • Weed species are not present in rehabilitation on Barrow Island. • No unauthorised vehicle access to rehabilitated areas. 	<ul style="list-style-type: none"> • Rehabilitated landforms will be consistent with adjacent landforms • Plant species diversity, density, cover and height, floristic composition, and functional structure for sites rehabilitated will be consistent with the target vegetation community (analogue site) • Absence of weed species for sites rehabilitated on Barrow Island • No unauthorised vehicle access to rehabilitated areas 	<p>Objectives measured by the following techniques and reported in the Annual Environmental Performance Report</p> <ul style="list-style-type: none"> • Visual and survey assessment • Quantitative vegetation monitoring • Site inspection, Permit to Work records, and incident reports • As defined in the Ecological Monitoring Common User Procedures (Ref. 1).

6 Acronyms and Abbreviations

Table 6-1 defines the acronyms and abbreviations used in this document.

Terms, definitions, and abbreviations used in this document are listed below. These align with the terms, definitions, and abbreviations defined in Schedule 2 of the Western Australian Gorgon Gas Development Ministerial Statement 800 (MS 800).

Table 6-1: Acronyms and Abbreviations

Acronym/ Abbreviation	Definition
ABU	Australian Business Unit
Additional Support Area	Gorgon Gas Development Additional Construction, Laydown, and Operations Support Area
APPEA	Australian Petroleum Production and Exploration Association
ARI	Assessment on Referral Information (for the proposed Jansz Feed Gas Pipeline dated September 2007) as amended or supplemented from time to time.
AS/NZS	Australian Standard/New Zealand Standard
ASBU	Australasia Strategic Business Unit
CAPL	Chevron Australia Pty Ltd
Carbon Dioxide (CO ₂) Injection System	The mechanical components required to be constructed to enable the injection of reservoir carbon dioxide, including but not limited to compressors, pipelines and wells.
CO ₂	Carbon dioxide
Construction	Construction includes any Proposal-related (or action-related) construction and commissioning activities within the Terrestrial and Marine Disturbance Footprints, excluding investigatory works such as, but not limited to, geotechnical, geophysical, biological and cultural heritage surveys, baseline monitoring surveys and technology trials.
Construction Period	The period from the date on which the Gorgon Joint Venturers first commence construction of the Proposal until the date on which the Gorgon Joint Venturers issue a notice of acceptance of work under the EPCM, or equivalent contract entered into in respect of the second LNG train of the Gas Treatment Plant.
Cth	Commonwealth of Australia
DBCA	Department of Biodiversity, Conservation and Attractions
DBNGP	Dampier to Bunbury Natural Gas Pipeline
DEC	Former Western Australian Department of Environment and Conservation, then split into Department of Environment Regulation and Department of Parks and Wildlife. Now Department of Biodiversity, Conservation, and Attractions (DBCA; from 1 July 2017) and Department of Water and Environmental Regulation (DWER; from 1 July 2017). (DEC dates: 1 Jul 2006 to 30 Jun 2013; was an amalgamation of Department of the Environment and Department of Conservation and Land Management)
DEWHA	Former Commonwealth Department of the Environment, Water, Heritage and the Arts (now Department of the Environment and Energy [DotEE]) (DEWHA dates: from 3 Dec 2007 to 14 Sep 2010)
DMIRS	Western Australian Department of Mines, Industry Regulation and Safety (from 1 July 2017 to [ongoing]; formerly Department of Mines and Petroleum [DMP] and Department of Commerce)
DMP	Former Western Australian Department of Mines and Petroleum (formerly Western

Acronym/ Abbreviation	Definition
	Australia Department of Industry and Resources; now Department of Mines, Industry Regulation and Safety [DMIRS] [from 1 July 2017]; DMP dates: 1 January 2009 to 1 July 2017)
DotE	Former Commonwealth Department of the Environment (formerly Department of the Environment and Water; Department of the Environment, Water, Heritage and the Arts [DEWHA]; and Department of Sustainability, Environment, Water, Population and Communities; now Department of the Environment and Energy [DotEE]) (DotE dates: from Oct 1997 to Oct 1998; then from 18 Sep 2013 to 19 Jul 2016)
DotEE	Commonwealth Department of the Environment and Energy (formerly Department of the Environment and Water; Department of the Environment, Water, Heritage and the Arts [DEWHA]; and Department of Sustainability, Environment, Water, Population and Communities; and Department of the Environment [DotE]) (DotEE dates: from 19 Jul 2016 to [ongoing])
DPaW	Former Western Australian Department of Parks and Wildlife (previously DEC; now DBCA [from 1 July 2017]) (Parks and Wildlife dates: 1 July 2013 to 30 June 2017)
DWER	Western Australian Department of Water and Environmental Regulation (formerly Department of Environment Regulation and Office of the [WA] Environmental Protection Authority [OEPA]) (from 1 July 2017 to [ongoing])
Edaphic	Produced or influenced by the soil
EFA	Ecosystem Function Analysis
EIS/ERMP	Environmental Impact Statement/Environmental Review and Management Programme (for the Proposed Gorgon Development dated September 2005) as amended or supplemented from time to time.
EMP	Environmental Management Plan
EP Act	Western Australian <i>Environmental Protection Act 1986</i>
EPA	Western Australian Environmental Protection Authority
EPBC Act	Commonwealth <i>Environment Protection and Biodiversity Conservation Act 1999</i>
EPBC Reference: 2003/1294	Commonwealth Ministerial Approval (for the Gorgon Gas Development) as amended or replaced from time to time
EPBC Reference: 2005/2184	Commonwealth Ministerial Approval (for the Jansz Feed Gas Pipeline) as amended or replaced from time to time.
EPBC Reference: 2008/4178	Commonwealth Ministerial Approval (for the Revised Gorgon Gas Development) as amended or replaced from time to time.
EPBC Reference: 2011/5942	Commonwealth Ministerial Approval (for the Fourth Train Expansion) as amended or replaced from time to time.
EPCM	Engineering, Procurement and Construction Management
GIS	Geographic Information System
Gorgon Gas Development	The Gorgon Gas Development as approved under MS 800 and MS 965, and EPBC References: 2003/1294 and 2008/4178 (as varied by the Commonwealth Environment Minister), as amended or replaced from time to time.
Gorgon Gas Development Footprint	Consists of the cleared areas and uncleared areas approved to be cleared on Barrow Island used for the construction and operation of the Gorgon Gas Development and Jansz Feed Gas Pipeline.
GUJV	Gorgon Upstream Joint Venture
Ha	Hectare
HDD	Horizontal Directional Drilling
HES	Health, Environment, and Safety

Acronym/ Abbreviation	Definition
IMS	Impact Mitigation Strategy
ISO	International Standards Organization
Jansz Feed Gas Pipeline	The Jansz Feed Gas Pipeline as approved in MS 769 and EPBC Reference: 2005/2184, as amended or replaced from time to time.
KJVG	Kellogg Joint Venture Gorgon
LFA	Landscape Function Analysis
LNG	Liquefied Natural Gas
MOF	Materials Offloading Facility
MS	(Western Australian) Ministerial Statement
MS 1002	Western Australian Ministerial Statement 1002, issued for the Gorgon Gas Development Fourth Train Expansion Proposal, as amended from time to time.
MS 748	Western Australian Ministerial Statement No. 748 (for the Gorgon Gas Development), [superseded by MS 800].
MS 769	Western Australian Ministerial Statement No. 769 (for the Jansz Feed Gas Pipeline), as amended from time to time.
MS 800	Western Australian Ministerial Statement No. 800, issued for the Revised and Expanded Gas Development, as amended from time to time. MS 800 supersedes the Gorgon Gas Development as originally approved by MS 748. The conditions of MS 800 also apply to the Additional Support Area under MS 965.
MS 865	Western Australian Ministerial Statement No. 865 (for the Gorgon Gas Development) as amended from time to time.
MS 965	Western Australian Ministerial Statement No. 965 (for the Gorgon Gas Development), as amended from time to time. MS 965 applies the conditions of MS 800 to the Additional Support Area.
MTPA	Million tonnes per annum
NIS	Non Indigenous Species
OE	Operational Excellence
OEMS	Operational Excellence Management System
OEPA	Former Office of the (Western Australian) Environmental Protection Authority (now Department of Water and Environmental Regulation [DWER] [from 1 July 2017])
Operations (Gorgon Gas Development)	In relation to MS 800, for the respective LNG trains, this is the period from the date on which the Gorgon Joint Venturers issue a notice of acceptance of work under the Engineering, Procurement and Construction Management (EPCM) contract, or equivalent contract entered into in respect of that LNG train of the Gas Treatment Plant; until the date on which the Gorgon Joint Venturers commence decommissioning of that LNG train.
PER	Public Environmental Review for the Gorgon Gas Development Revised and Expanded Proposal dated September 2008, as amended or supplemented from time to time.
Performance Standards	Are matters which are developed for assessing performance, not compliance, and are quantitative targets or where that is demonstrated to be not practicable, qualitative targets, against which progress towards achievement of the objectives of conditions can be measured.
Practicable	For the purposes of MS 800 means reasonably practicable having regard to, among other things, local conditions and circumstances (including costs), and the current state of technical knowledge.
QMS	Quarantine Management System

Acronym/ Abbreviation	Definition
Revised Proposal	Proposal comprising potential changes to the Gorgon Gas Development as described in the Gorgon Gas Development Revised and Expanded Proposal PER.
ROW	Right of Way
TDF	See Terrestrial Disturbance Footprint
Terrestrial Disturbance Footprint	The area to be disturbed by construction or operations activities associated with the Terrestrial Facilities listed in Condition 6.3 of MS 800, including the Additional Support Area approved by MS 965, and set out in the Terrestrial and Subterranean Baseline State and Environmental Impact Report required under Condition 6.1 of MS 800.
Terrestrial Facilities	<p>In relation to MS 800, the terrestrial facilities are the:</p> <ul style="list-style-type: none"> • Gas Treatment Plant • Carbon Dioxide Injection System • Associated Terrestrial Infrastructure forming part of the Proposal • Areas impacted for seismic data acquisition • Onshore Feed Gas Pipeline System and terrestrial component of the Shore Crossing. <p>Terrestrial Facilities also include those defined in Condition 6.3 of MS 769 (the Onshore Feed Gas pipeline system and the terrestrial component of the Shore Crossing) and Schedule 1 of MS 965 (the Additional Support Area).</p>
WA	Western Australia
WAPET	West Australian Petroleum Pty Ltd
WAPET Landing	Proper name referring to the site of the barge landing existing on the east coast of Barrow Island prior to the date of MS 800.

7 References

The following documentation is either directly referenced in this document or is a recommended source of background information.

Table 7-1: References

Ref. No.	Description	Document ID
1.	Government of Western Australia, Minister for the Environment, David Templeman MLA. 2008. <i>Statement that a Proposal may be Implemented – Jansz Feed Gas Pipeline: Barrow Island Nature Reserve (Ministerial Statement 769)</i> , 28 May 2008. Perth, Western Australia. Available from: http://www.epa.wa.gov.au/sites/default/files/Ministerial_Statement/00769.pdf [Accessed 21 Dec 2017]	
2.	Commonwealth Government of Australia, Assistant Secretary Environmental Assessment Branch, Anne-Marie Delahunt. 2006. <i>Decision to Approve the taking of an Action – Jansz Feed Gas Pipeline (EPBC Reference: 2005/2184)</i> , 22 March 2006. Canberra, Australian Capital Territory.	
3.	Government of Western Australia, Minister for the Environment, David Templeman MLA, 2007. <i>Statement that a Proposal may be Implemented – Gorgon Gas Development: Barrow Island Nature Reserve (Ministerial Statement No. 748)</i> , 6 September 2007. Perth, Western Australia. Available from: http://www.epa.wa.gov.au/sites/default/files/1MINSTAT/000748.pdf [Accessed 21 Dec 2017]	
4.	Commonwealth Government of Australia, Minister for the Environment and Water Resources, Malcolm Turnbull. 2007. <i>Approval – Gorgon Gas Development (EPBC Reference: 2003/1294)</i> , 3 October 2007. Canberra, Australian Capital Territory.	
5.	Government of Western Australia, Minister for the Environment, Youth, Donna Faragher JP MLC. 2009. <i>Statement that a Proposal may be Implemented – Gorgon Gas Development Revised and Expanded Proposal: Barrow Island Nature Reserve (Ministerial Statement 800)</i> , 10 August 2009. Perth, Western Australia. Available from: http://www.epa.wa.gov.au/sites/default/files/1MINSTAT/00800.pdf [Accessed 28 Nov 2017]	
6.	Commonwealth Government of Australia, Minister for the Environment, Water, Heritage and the Arts, Peter Garrett. 2009. <i>Approval – Gorgon Gas Development (EPBC Reference: 2008/4178)</i> , 26 August 2009. Canberra, Australian Capital Territory. Available from: https://australia.chevron.com/-/media/australia/our-businesses/documents/epbc_reference_2008_4178___2003_1294.pdf [Accessed 24 Jul 2018]	
7.	Government of Western Australia, Minister for the Environment; Water, Hon Bill Marmion MLA. 2011. <i>Statement to Amend Conditions Applying to a Proposal – Gorgon Gas Development Revised and Expanded Proposal: Barrow Island Nature Reserve (Ministerial Statement 865)</i> , 8 June 2011. Perth, Western Australia. Available from: http://www.epa.wa.gov.au/sites/default/files/Ministerial_Statement/Statement%20No.%20865_0.pdf [Accessed 24 Jul 2018]	
8.	Government of Western Australia, Minister for the Environment; Heritage. Albert P. Jacob JP MLA. 2014. <i>Statement that a Proposal may be Implemented – Gorgon Gas Development Additional Construction Laydown and Operations Support Area (Ministerial Statement 965)</i> , 2 April 2014. Perth, Western Australia. Available from: http://www.epa.wa.gov.au/sites/default/files/1MINSTAT/Statement%20No.%20965.pdf [Accessed 24 Jul 2018] . Perth, Western Australia.	
9.	Government of Western Australia, Minister for the Environment; Heritage. Albert Jacob MLA. 2015. <i>Statement that a Proposal may be Implemented – Gorgon Gas Development Fourth Train Expansion Proposal (Ministerial Statement 1002)</i> , 30 April 2015. Perth, Western Australia. Available from: http://www.epa.wa.gov.au/sites/default/files/1MINSTAT/Statement%20No.%201002.pdf [Accessed 24 Jul 2018]	

Ref. No.	Description	Document ID
10.	Commonwealth Government of Australia. 2016. Assistant Secretary Assessment (WA, SA, NT) and Air Branch. <i>Approval – Gorgon Gas Development – Fourth Train Expansion (EPBC 2011/5942)</i> , 12 May 2016. Canberra, Australian Capital Territory.	
11.	Environmental Protection Authority. 2006. <i>Guidance for the Assessment of Environmental Factors Western Australia (in accordance with the Environmental Protection Act 1986) – Rehabilitation of Terrestrial Ecosystems, No. 6</i> . Government of Western Australia, Environmental Protection Authority, Perth, Western Australia. Available from: http://www.epa.wa.gov.au/sites/default/files/Policies_and_Guidance/GS6-Rehab-Terrestrial-Ecosystems-260606.pdf [Accessed 28 Nov 2017]	
12.	Australian Petroleum Production and Exploration Association. 2008. <i>Code of Environmental Practice</i> . Australian Petroleum Production and Exploration Association, Canberra, Australian Capital Territory. Prepared by RPS Ecos Pty Ltd, Perth, Western Australia. Available from: https://www.appea.com.au/wp-content/uploads/2013/05/Code_of_Environmental_Practice.pdf [Accessed 29 Nov 2017]	
13.	Department of Industry, Tourism and Resources. 2006. <i>Mine Rehabilitation Handbook: Leading Practice Sustainable Development Program for the Mining Industry</i> . Department of Industry, Tourism and Resources, Canberra, Australian Capital Territory. Available from: http://www.minerals.org.au/file_upload/files/resources/enduring_value/mine_rehab.pdf [Accessed 20 Dec 2017]	
14.	Department of Industry, Innovation and Science. 2016. <i>Mine Closure: Leading Practice Sustainable Development Program for the Mining Industry</i> . Department of Industry, Tourism and Resources, Canberra, Australian Capital Territory. Available from: https://www.industry.gov.au/resource/Documents/LPSDP/LPSDP-MineClosureCompletionHandbook.pdf [Accessed 20 Dec 2017]	
15.	Australian and New Zealand Minerals and Energy Council and the Minerals Council of Australia. 2000. <i>Strategic Framework for Mine Closure</i> . Commonwealth of Australia, Canberra, Australian Capital Territory.	
16.	Chevron Australia. 2008. <i>Gorgon Gas Development: Revised and Expanded Proposal: Public Environmental Review</i> . Chevron Australia, Perth, Western Australia. Available from: https://australia.chevron.com/-/media/australia/our-businesses/documents/gorgon_revised_proposal_per_final_main_report_20080909.pdf [Accessed 24 Jul 2018]	
17.	Chevron Australia. 2006. <i>Final Environmental Impact Statement/Environmental Review and Management Programme for the Gorgon Gas Development</i> . Chevron Australia, Perth, Western Australia.	
18.	Chevron Australia. 2013. <i>Gorgon Gas Development, Additional Construction Laydown and Operations Support Area. Environmental Review</i> . Chevron Australia, Perth, Western Australia.	
19.	Chevron Australia. 2005. <i>Draft Environmental Impact Statement/Environmental Review and Management Programme for the Proposed Gorgon Development</i> . Chevron Australia, Perth, Western Australia. Available from: https://australia.chevron.com/-/media/australia/our-businesses/documents/Draft-EIS-ERMP_full-report.pdf [Accessed 24 Jul 2018]	
20.	Chevron Australia. 2016. <i>Health, Environment, and Safety (HES) Risk Management Process</i> . Chevron Australia, Perth, Western Australia.	OE-03.01.01
21.	Chevron Corporation. 2008. <i>Corporate RiskMan2 Procedure</i> . Chevron Corporation, San Ramon, California.	OE-03.01.13
22.	Gorgon Upstream Joint Venture. 2006. <i>Onshore Construction Environmental Risk Assessment Report</i> . Rev. 1. Gorgon Upstream Joint Venture, Perth, Western Australia.	G1-TE-H-UG00-REP0021
23.	Gorgon Upstream Joint Venture. 2006. <i>Shore Crossing Construction Environmental Risk Assessment Report</i> . Gorgon Upstream Joint Venture, Perth, Western Australia.	G1-TE-H-UX00-REP0003

Ref. No.	Description	Document ID
24.	Kellogg Joint Venture Gorgon. 2012. <i>Downstream Environmental Aspect Register for the Gorgon Project Barrow Island LNG Plant</i> . Rev. 3. Prepared for Chevron Australia by Kellogg Joint Venture Gorgon, Perth, Western Australia.	G1-NT-LISKH150008
25.	Standards Australia/Standards New Zealand. 2009. <i>AS/NZS ISO 31000:2009 Risk management – Principles and guidelines</i> . Sydney, Australia/Wellington, New Zealand.	
26.	Standards Australia/Standards New Zealand. 2012. <i>HB 203:2012 Managing environment-related risk</i> . Sydney, Australia/Wellington, New Zealand.	
27.	Standards Australia/Standards New Zealand. 1998. <i>AS/NZS 3931:1998 Risk Analysis of Technological Systems – Application Guide</i> . Sydney, Australia/Wellington, New Zealand.	
28.	Outback Ecology Services. 2009. <i>Managing topsoil from the Gorgon Project: Review of topsoil management practices</i> . Report prepared for Chevron Australia, June 2009, Perth, Western Australia. Job No. CGO-SS-1208	
29.	Mattiske, E.M. and Associates. 1993. <i>Flora and Vegetation, Barrow Island</i> . Unpublished report prepared for West Australian Petroleum Pty Limited, Perth, Western Australia.	
30.	Chevron Australia. 2014. <i>Gorgon Gas Development and Jansz Feed Gas Pipeline: Terrestrial and Subterranean Baseline State and Environmental Impact Report</i> . Rev. 3, Amendment 1. Chevron Australia, Perth, Western Australia. Available from: https://australia.chevron.com/-/media/australia/our-businesses/documents/gorgon-emp-terrestrial-and-subterranean-baseline-state-and-environmental-impact-report.pdf [Accessed 24 Jul 2018]	G1-TE-H-0000-REPX027
31.	Fee, C.H. 2009. Environmental Specialist – Barrow Island Joint Venture. Personal communication (March 2009).	
32.	Chevron Australia. 2015. <i>Gorgon Gas Development and Jansz Feed Gas Pipeline: Fire Management Plan</i> . Rev. 1.0. Chevron Australia, Perth, Western Australia. Available from: https://australia.chevron.com/-/media/australia/our-businesses/documents/gorgon-emp-fire-management-plan.pdf [Accessed 24 Jul 2018]	GOR-COP-01238
33.	McDonald, R.C., Isbell, R.F., Speight, J.G., Walker, J. and Hopkins, M.S. 1990. <i>Australian Soil and Land Survey Field Handbook</i> . 2 nd ed. Department of Primary Industry and Energy and CSIRO, Canberra, Australian Capital Territory. Inkata Press, Melbourne, Victoria.	
34.	Chevron Australia. 2009. <i>Gorgon Gas Development and Jansz Feed Gas Pipeline: Non-indigenous Species Management Procedure</i> . Rev. 0. Chevron Australia, Perth, Western Australia.	G1-PP-QRT-POL-0001
35.	Chevron Australia. 2014. <i>Gorgon Gas Development and Jansz Feed Gas Pipeline: Barrow Island Weed Hygiene Common User Procedure</i> . Chevron Australia, Perth, Western Australia.	G1-PP-HES-PRC-0016
36.	Astron Environmental Services. 2007. <i>WA Oil Asset (Barrow and Thevenard Islands) Weed Management Plan</i> . Astron Environmental Services, Perth, Western Australia.	
37.	Tongway, D. and Hindley, N. 2004. <i>Landscape Function Analysis: Procedures for monitoring and Assessing Landscapes with special reference to Minesites and Rangelands</i> . CSIRO Sustainable Ecosystems, Canberra, Australian Capital Territory. Available from: https://www.researchgate.net/profile/David_Tongway/publication/238748160_Landscape_Function_Analysis_Procedures_for_Monitoring_and_Assessing_Landscapes_-_with_Special_Reference_to_Minesites_and_Rangelands/links/0deec52c915ae0139e000000/Landscape-Function-Analysis-Procedures-for-Monitoring-and-Assessing-Landscapes-with-Special-Reference-to-Minesites-and-Rangelands.pdf [Accessed 24 Jan 2018]	
38.	Butler, W.H. 2008. Conservation Consultant. Personal communication (September 2008).	

Ref. No.	Description	Document ID
39.	Outback Ecology Services. 2009. <i>Managing Topsoil from the Gorgon Project: Assessment of soil resources within the Gorgon Project area</i> . Report prepared for Chevron Australia, May 2009, Perth, Western Australia. Job No. CGO-SS-1208	G1-NT-REPX0002183
40.	Chevron Australia. 2016. <i>Environmental Stewardship – Standardised Operational Excellence (OE) Process</i> . Chevron Australia, Perth, Western Australia.	OE-07.01
41.	Standards Australia/Standards New Zealand. 2016. <i>AS/NZS ISO 14001:2016 Environmental management systems – Requirements with guidance for use</i> . Sydney, Australia/Wellington, New Zealand.	
42.	Chevron Australia. 2013. <i>Management of Change for Facilities and Operations: ABU Standardised OE Process</i> . Chevron Australia, Perth, Western Australia.	OE-04.00.01
43.	Chevron Australia. 2017. <i>ABU Corporate OE Process: Contractor Health, Environment & Safety Management (CHESM)</i> . Rev. 11.0. Chevron Australia, Perth Western Australia.	OE-06.00.01
44.	Chevron Australia. 2012. <i>Competency Development: ABU – Standardized OE Process</i> . Chevron Australia, Perth, Western Australia.	OE-03.13.01
45.	Chevron Australia. 2018. <i>ABU upstream and midstream incident investigation and reporting process</i> . Rev. 16. Chevron Australia, Perth, Western Australia.	OE-09.00.01
46.	Chevron Australia. 2012. <i>Emergency Management Process</i> . Chevron Australia, Perth, Western Australia.	OE-11.01.01
47.	Chevron Australia. 2012. <i>ABU – Compliance Assurance Process</i> . Chevron Australia, Perth, Western Australia.	OE-12.01.01
48.	Chevron Australia. 2014. <i>Gorgon Gas Development and Jansz Feed Gas Pipeline: Terrestrial and Subterranean Environment Protection Plan</i> . Rev. 3. Chevron Australia, Perth, Western Australia. Available from: https://australia.chevron.com/-/media/australia/our-businesses/documents/gorgon-emp-terrestrial-and-subterranean-environment-protection-plan.pdf [Accessed 24 Jul 2018]	G1-NT-PLNX0000294
49.	Chevron Australia. 2016. <i>Gorgon Project: Terrestrial and Subterranean Environment Monitoring Program</i> . Rev. 1.0. Chevron Australia, Perth, Western Australia. Available from: https://australia.chevron.com/-/media/australia/our-businesses/documents/gorgon-terrestrial-and-subterranean-environment-monitoring-program.pdf [Accessed 24 Jul 2018]	GOR-COP-01696
50.	Chevron Australia. 2012. <i>Gorgon Gas Development and Jansz Feed Gas Pipeline: Fauna Handling and Management Common User Procedure</i> . Chevron Australia, Perth, Western Australia.	G1-PP-HES-PRC-0009
51.	Chevron Australia. 2014. <i>Gorgon Gas Development and Jansz Feed Gas Pipeline: Vegetation Clearing and Audit Common User Procedure</i> . Rev. 3. Chevron Australia, Perth, Western Australia.	G1-PP-HES-PRC-0012
52.	Chevron Australia. 2014. <i>Gorgon Gas Development and Jansz Feed Gas Pipeline: Traffic Management Common User Procedure</i> . Rev. 3. Chevron Australia, Perth, Western Australia.	G1-PP-HES-PRC-0010
53.	Chevron Australia. 2016. <i>Gorgon Gas Development and Jansz Feed Gas Pipeline: Terrestrial and Subterranean Environmental Monitoring Plan</i> . Rev. 1. Chevron Australia, Perth, Western Australia. Available from: https://australia.chevron.com/-/media/australia/our-businesses/documents/gorgon-terrestrial-and-subterranean-environment-monitoring-program.pdf [Accessed 13 Sep 2018]	GOR-COP-01696

Appendix A Chevron Integrated Risk Prioritization Matrix

Likelihood Descriptions & Index (with confirmed safeguards)		Legend						
Likelihood Descriptions	Likelihood Indices	Legend applies to identified HES risks (see guidance documents for additional explanations)						
		1, 2, 3, 4 - Short-term, interim risk reduction required. Long term risk reduction plan must be developed and implemented. 5 - Additional long term risk reduction required. If no further action can be reasonably taken, SBU management approval must be sought to continue the activity. 6 - Risk is tolerable if reasonable safeguards / management systems are confirmed to be in place and consistent with relevant requirements of the Risk Mitigation Closure Guidelines. 7, 8, 9, 10 - Manage risk. No further risk reduction required. Risk reduction at management / team discretion.						
Consequence can reasonably be expected to occur in life of facility	1 Likely	Decreasing Likelihood	6	5	4	3	2	1
Conditions may allow the consequence to occur at the facility during its lifetime, or the event has occurred within the Business Unit	2 Occasional		7	6	5	4	3	2
Exceptional conditions may allow consequences to occur within the facility lifetime, or has occurred within the OPCO	3 Seldom		8	7	6	5	4	3
Reasonable to expect that the consequence will not occur at this facility. Has occurred several times in industry, but not in OPCO	4 Unlikely		9	8	7	6	5	4
Has occurred once or twice within industry	5 Remote		10	9	8	7	6	5
Rare or unheard of	6 Rare		10	10	9	8	7	6
Consequence Descriptions & Index (without safeguards)	Consequence Indices		Decreasing Consequence/Impact					
	Consequence Descriptions	Safety	6	5	4	3	2	1
			Incidental	Minor	Moderate	Major	Severe	Catastrophic
			Workforce: Minor injury such as a first-aid AND Public: No impact	Workforce: One or more injuries, not severe. OR Public: One or more minor injuries such as a first-aid.	Workforce: One or more severe injuries including permanently disabling injuries. OR Public: One or more injuries, not severe.	Workforce: (1-4) Fatalities OR Public: One or more severe injuries including permanently disabling injuries.	Workforce: Multiple fatalities (5-50) OR Public: multiple fatalities (1-10)	Workforce: Multiple fatalities (>50) OR Public: multiple fatalities (>10)
Health (Adverse effects resulting from chronic chemical or physical exposures or exposure to biological agents)	Workforce: Minor illness or effect with limited or no impacts on ability to function and treatment is very limited or not necessary AND Public: No impact	Workforce: Mild to moderate illness or effect with some treatment and/or functional impairment but is medically manageable OR Public: Illness or adverse effect with limited or no impacts on ability to function and medical treatment is limited or not necessary.	Workforce: Serious illness or severe adverse health effect requiring a high level of medical treatment or management OR Public: Illness or adverse effects with mild to moderate functional impairment requiring medical treatment.	Workforce: (1-4) Serious illness or chronic exposure resulting in fatality or significant life shortening effects OR Public: Serious illness or severe adverse health effect requiring a high level of medical treatment or management.	Workforce: (5-50) Serious illness or chronic exposure resulting in fatality or significant life shortening effects OR Public: (1-10) Serious illness or chronic exposure resulting in fatality or significant life shortening effects.	Workforce (>50) Serious illness or chronic exposure resulting in fatality or significant life shortening effects OR Public (>10) Serious illness or chronic exposure resulting in fatality or significant life shortening effects.		
Environment	Impacts such as localized or short term effects on habitat, species or environmental media.	Impacts such as localized, long term degradation of sensitive habitat or widespread, short-term impacts to habitat, species or environmental media	Impacts such as localized but irreversible habitat loss or widespread, long-term effects on habitat, species or environmental media	Impacts such as significant, widespread and persistent changes in habitat, species or environmental media (e.g. widespread habitat degradation).	Impacts such as persistent reduction in ecosystem function on a landscape scale or significant disruption of a sensitive species.	Loss of a significant portion of a valued species or loss of effective ecosystem function on a landscape scale.		
The above legend applies only to HES risks, where risk levels 1-6 are actionable and mandatory. For risks that may result in facility damage, business interruption, loss of product, the "Assets" category below should be used. Asset risk reduction is at the discretion of management. Under no circumstances may a direct or indirect translation of Asset loss to HES consequences, or between any discrete categories of HES consequences be inferred.								
Consequence Descriptions & Index (without safeguards)	Consequence Indices		6	5	4	3	2	1
	Consequence Descriptions	Assets (Facility Damage, Business Interruption, Loss of Product)	Incidental	Minor	Moderate	Major	Severe	Catastrophic
Minimal damage. Negligible down time or asset loss. Costs < \$100,000.			Some asset loss, damage and/or downtime. Costs \$100,000 to \$1 Million.	Serious asset loss, damage to facility and/or downtime. Costs of \$1-10Million.	Major asset loss, damage to facility and/or downtime. Cost >\$10 Million but <\$100 Million	Severe asset loss or damage to facility. Significant downtime, with appreciable economic impact. Cost >\$100MM but <\$1billion.	Total destruction or damage. Potential for permanent loss of production. Costs >\$1billion	
This matrix is endorsed for use across the Company. It is not a substitute for, and does not override any relevant legal obligations. Under no circumstances should any part of this matrix be changed or modified, adapted or customized. This matrix identifies health, safety, environmental and asset risks and is to be used only by qualified and competent personnel. Where applicable it is to be used within the Riskman2 structure and governance of an OE Risk Management Process. If applied outside of these Processes, it is also mandatory to manage identified intolerable risks and comply with the Risk Mitigation Closure Guidelines.								

Appendix B Compliance Reporting Table

Section No.	Actions	Timing
2	Should disturbance take place, and it is not required for future construction or operation, then it will be rehabilitated according to this plan.	Construction
4.1	The selection of a target vegetation community for rehabilitation in each area will be based on position in the landscape.	Construction
4.1	Relevant 'target vegetation landscape communities' will be: <ul style="list-style-type: none"> • 'Coastal' communities (C vegetation types) • 'Drainage and creek line' communities (D vegetation types) • 'Flats' communities (F Vegetation types) • 'Limestone' communities (L vegetation types) • 'Valley slopes and escarpments' communities (V vegetation types). 	All Phases
4.1.1	In large areas to be cleared (e.g. the Gas Treatment Plant site), where spinifex forms the majority of the vegetation, where practicable, this material will be burnt before topsoil is removed	All Phases
4.1.1	Burning will be carried out according to the Fire Management Plan and the Prescribed Fire Plans	All Phases
4.1.1	If vegetation consists of woody species that carry their seed in the canopy and this vegetation is not burnt, or if there are significant safety risks associated with burning vegetation (e.g. along Pipeline routes), then the following practices will be adopted where this is practicable: <ul style="list-style-type: none"> • salvage vegetation from areas to be cleared • only retain vegetation that is free of weeds • record relevant information regarding the cleared vegetation • respread stockpiled vegetation on similar landforms and soil types from which it was stripped • where this is not practicable vegetation material will be burnt elsewhere or disposed of. 	Before clearing
4.1.2	The following practices will be adopted where reasonable and practicable to do so for stripping, stockpiling, reusing and management of topsoil from the Gorgon Gas Development area on Barrow Island and the mainland: <ul style="list-style-type: none"> • Identify the boundaries of distinct vegetation communities to allow the soil from each area to be stripped, stockpiled and respread separately • Weed infestations will be mapped and segregated with an appropriate buffer. A site-specific weed hygiene management program will be developed and implemented. • For the installation of the Onshore Feed Gas Pipeline and the Mainland component of the Domestic Gas Pipeline, vegetation and topsoil will be stored in windrows along the edge of the right of way. Reinstatement will involve direct recovery of topsoil and spreading of the vegetation. • For all other areas strip topsoil using the least aggressive methods, preferably by pushing up the soil with a dozer or grader and loading into a truck, rather than using machines such as elevating scrapers. • Strip topsoil to an approximate depth of 5 cm where practicable. • Direct-return topsoil to areas that are ready to be rehabilitated, and that are suitable for the vegetation community originally associated with the soil. • If stockpiling is necessary, identify sites that: <ul style="list-style-type: none"> – are not going to be disturbed in future operations – are remote from known weed occurrences and sources 	Construction

Section No.	Actions	Timing
	<ul style="list-style-type: none"> – do not lie in areas likely to receive surface water flow – have surrounding vegetation consistent with the original vegetation from the stripped area. • Store topsoil stockpiles in low profile dumps that shall not exceed two metres in height. • If available, spread vegetation mulch over topsoil stockpiles as soon as is practicable after constructed. • Topsoil stockpiles formed by paddock dumping are being considered to maximise the surface area of the stockpile and promote biological development. • Record relevant information regarding the soil in each stockpile, including vegetation unit, date of stripping, method of stripping, soil volumes, and seed mix (if any). • Consider seeding topsoil stockpiles where soil-stored seed levels are low or vegetation establishment is poor. • Use appropriate signage to clearly identify stockpiles and discourage vehicle access; record stockpile locations on site maps. • Monitor topsoil stockpiles for stability, vegetation establishment and weeds, eradicate any weed occurrences. • Investigate methods to recover stockpiled topsoil while maintaining or building the biological value of the remaining stockpiled material. • Where topsoil is limited, limit respreading to be a thickness sufficient to 'inoculate' the rehabilitation site with the topsoil properties. 	
4.1.2	The strategy for the use and distribution of topsoil will be developed in consultation with and to the satisfaction of DBCA prior to the commencement of works that involve the removal of topsoil	All Phases
4.1.3	Equipment and staff moving between off Barrow Island operations and Barrow Island operations will undergo strict quarantine control to minimise the potential for movement of weeds onto the Island.	All Phases
4.1.4	<p>Surface drainage patterns (hydrology) will be rehabilitated on all disturbed areas to reduce erosion from surface water flow. Practices to achieve this will include:</p> <ul style="list-style-type: none"> • recording the surface topography of the area prior to disturbance using standard survey techniques, consideration will be given to the use of remote sensing if it can achieve adequate resolution, include information on surface stability, soil structure and estimates of overland surface water flows • rehabilitating a surface profile with properties that exhibit similar infiltration and water retention characteristics for the targeted vegetation outcome to analogue sites • unless inappropriate for the targeted vegetation outcome, encouraging local retention and infiltration of rainfall on rehabilitated areas by creating surface roughness through light cultivation on the contour, as required, and spreading vegetation mulch where available on the contour to restrict surface runoff and reduce erosion • installing banks or other appropriate earthworks, if required, to direct and control surface water flow at a local scale discharging on to undisturbed stable ground where practicable • reviewing and repairing gullies (>30 cm deep) on a case-by-case basis when they occur • monitoring using LFA or similar to measure water infiltration and retention. 	Prior to construction and Onwards
Table 4-1	This Plan shall be communicated to relevant Gorgon Gas Development personnel.	Construction onwards

Section No.	Actions	Timing
Table 4-1	The requirements of this Plan will be specified in relevant instructions to contractors.	Construction onwards
Table 4-1	<p>The following tasks shall be completed prior to clearing taking place:</p> <ul style="list-style-type: none"> • Boundaries of each area will be surveyed and marked, the perimeters recorded and mapped in the Gorgon Geographic Information System and provided to all appropriate contractors. • Map and segregate NIS and weed infestations with an appropriate buffer; identify specific management requirements. • An internal Ground Disturbance Certificate will be obtained. • Surface topography, hydrological and soils information will be recorded for each site including: <ul style="list-style-type: none"> – physical and topographical – groundwater – fauna and flora (including ecological communities, significant habitats) – topsoil properties – storage location. <p>This information will be used for vegetation and soil management and to inform reconstruction of the landform during rehabilitation.</p> <ul style="list-style-type: none"> • If more than one vegetation community was identified on the site in initial surveys, then the boundaries of vegetation communities will be identified. • If seed or fruits are present on the vegetation to be cleared, then where practicable these should be collected and stored appropriately. 	Before site disturbance
Table 4-1	<p>During clearing and stripping of each area the sequence of tasks will be:</p> <ul style="list-style-type: none"> • Vegetative material will be either burnt (in accordance with the Fire Management Plan and Prescribed Fire Plans), or cleared and stockpiled for future burning or disposal in an appropriate area. • Dust from soil stripping and earthworks will be managed where practicable, if required non saline water will be used for dust suppression during stripping of topsoil. • Topsoil will be stripped as close to the construction date as practicable. • Where practicable topsoil from the area of each vegetation community will be stripped to an approximate depth of 5 cm. • Where practicable recovered topsoil will be used for direct lay or stockpiled separately on a suitable storage site for later rehabilitation • Soil and vegetation stockpiles will be placed so as to avoid the need for any further disturbance until required for rehabilitation. • Topsoil will be stored in low-profile dumps less than 2 m in height to avoid compaction, and assist with maintenance of viable seed, soil micro-organisms and soil nutrients. • Topsoil stockpiles will be identified with appropriate signage. • Subsoil or rock material may be used for construction • The stockpiled soils will be respread as soon as practicable to reduce the loss of soil biological components. 	Duration of site clearing and preparation activities
Table 4-1	<p>When the disturbed area is available for rehabilitation, then the following tasks will be completed:</p> <ul style="list-style-type: none"> • Depending on the characteristics of the target vegetation and desired substrate the surface of the area to be rehabilitated will be ripped on the contour to the depth of any machinery-induced compaction. • Surface drainage patterns will be re-established to be consistent with that occurring prior to disturbance. • Topsoil from a similar vegetation community will be respread at no 	After Construction

Section No.	Actions	Timing
	<p>greater depth than originally removed; if required, topsoil may be spread more thinly.</p> <ul style="list-style-type: none"> • If seeds of species in the target vegetation communities are available they should be respread. • Should monitoring indicate that grazing is significantly impeding rehabilitation recovery, then the perimeter of rehabilitation areas may be fenced to exclude grazing fauna. The fence will be maintained until such time the vegetation is sufficiently established to withstand grazing pressure. 	
Table 4-1	<p>Monitoring of rehabilitated and related areas will:</p> <ul style="list-style-type: none"> • use techniques that demonstrate the performance of rehabilitation • commence on completion of rehabilitation • continue until completion criteria are met or discontinued by agreement with DBCA • focus on physical aspects of the rehabilitated landscape, vegetation establishment, ecosystem function, resource retention and re-establishment of fauna habitat. • establish permanent photo points • provide information that will be used for rehabilitation management • monitoring outcomes will be reported annually. 	Post Rehabilitation
Table 4-1	<p>Where monitoring indicates that an area of rehabilitation is failing to meet closure standards, it will be investigated and a maintenance or remediation strategy developed.</p> <p>Where weeds are identified they will be eradicated</p>	During the monitoring period
Table 4-1	<p>For all drill pads:</p> <ul style="list-style-type: none"> • drill cuttings will be assessed, and, if considered hostile for plant growth will be removed. • contaminated soil from drilling activities will be remediated or removed. 	After construction and prior to rehabilitation
Table 4-1	<p>For drill pads where no topsoil was recovered, then if available, topsoil will be spread to 'inoculate' the area with seed and other biological values</p>	After site assessment
Table 4-1	<p>After bedding and padding of pipelines in the trenches has been completed, the following steps will be undertaken:</p> <ul style="list-style-type: none"> • Trenches will be filled, compacted and covered with a crowned profile. • Drainage will be re-established by creating breaks in the crown <p>Topsoil and vegetation will be respread across the pipeline easement.</p>	Completion of pipeline installation
Table 4-1	<p>Where practicable:</p> <ul style="list-style-type: none"> • temporary tracks will be cleared using techniques that leave the soil intact. • vegetation will not be cleared on areas with high risk of erosion. 	Prior to related activity
Table 4-1	<p>After authorised use (of tracks) is completed, vehicle access will be restricted.</p>	Ongoing
Table 4-1	<p>Rehabilitated tracks will be monitored using visual assessment.</p>	Ongoing
4.4	<p>CAPL is committed to the improvement of rehabilitation knowledge practices through a program of monitoring, application of lessons learnt and targeted studies consistent with industry leading practice. This knowledge will be developed and shared with the other stakeholders on the Island.</p>	Ongoing after rehabilitation

Section No.	Actions	Timing
4.5	<p>Monitoring of rehabilitation in relation to meeting the objectives and performance standards and completion criteria described in this Plan will be undertaken as follows:</p> <ul style="list-style-type: none"> • Monitoring will commence from the completion of earthworks. • Monitoring will continue until such time as data indicates the rehabilitation objectives and criteria have been met. • In consultation with DBCA, the frequency and intensity of ongoing monitoring of biological aspects will be varied over the life of the Gorgon Gas Development driven by trends in ecosystem development. • Monitoring is likely to be more intensive in the first three years of rehabilitation, but will decrease as the rehabilitated ecosystem matures and performance trends are positive. • Benchmarking of monitoring results against equivalent 'best practice sites' on Barrow Island to enable a comparison of performance and inform if there is a need for intervention. 	Ongoing after rehabilitation
4.5.1	Soils will be monitored using LFA or a similar system that collects data on the stability, structure, rainfall infiltration and nutrient recycling of the reinstated soils on rehabilitation sites.	Ongoing after rehabilitation
4.5.2	Vegetation will be monitored using a combination of visual observation, quantitative Vegetation Monitoring and Ecosystem Function Analysis (EFA) (Ref. 37; Tongway 2004) or equivalent.	Ongoing after rehabilitation
4.5.2	Should weeds be identified during monitoring they will be managed under the Quarantine Management System.	Ongoing after rehabilitation
4.5.3	As rehabilitation progresses and habitat re-establishes, targeted fauna monitoring will be undertaken to measure fauna activity.	Ongoing after rehabilitation
4.5.3	Areas will be considered to be rehabilitated when the completion criteria have been met and accepted by DBCA and the areas demonstrate that they provide appropriate habitat for fauna or when terrestrial invertebrate diversity is within the range of values of analogue sites in the targeted vegetation communities.	Ongoing after rehabilitation
4.5.3	Where monitoring indicates fauna recolonisation does not reflect the level of activity in analogue sites the causes will be investigated and mitigation measures developed and implemented in consultation with DBCA.	Ongoing after rehabilitation
4.6	Investigations and studies will be undertaken as required to fill gaps in knowledge and rehabilitation methodology adapted accordingly.	Ongoing
4.6.1	Review of flora and vegetation data collected on Barrow Island indicate that of the 302 species identified, there is some uncertainty about 18 species that have not been identified in rehabilitation to date. This gap will form the basis of a collaborative study program.	Ongoing after rehabilitation
4.6.1	An investigation of grazing impact is currently planned for Barrow Island should this indicate grazing is affecting these species then exclusion fencing will be considered.	Ongoing after rehabilitation
4.6.1	Should any fires take place on the island then CAPL will collaborate with DBCA to develop a program to monitor vegetation recovery to expand knowledge on the role of fire in the ecology of island vegetation.	Ongoing after rehabilitation
4.6.1	Should monitoring of rehabilitation performance indicate the failure of keystone species to re-establish, then the causes of this failure will be investigated. Priority will be given to keystone species that contribute the key functional aspects of the vegetation communities. Species contributing known services will be the next priority.	Ongoing after rehabilitation

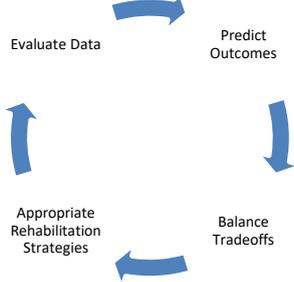
Section No.	Actions	Timing
4.6.1	Some initial investigations have been undertaken on germination and propagation in the island nursery, this facility will be used for ongoing investigations into seed viability and propagation techniques.	Ongoing after rehabilitation
4.6.2	On sites where Ficus occurred, natural recruitment of this slow growing species will be monitored to understand whether this species will self-establish, or whether intervention should occur.	Ongoing after rehabilitation

Appendix C Rehabilitation Task Sheet Example for the Gorgon Gas Development

Chevron: Gorgon Topsoil Worksheet						
Project Area:	P13	Location (GDA94):	334383 E	7702031 N	Date Assigned:	Inspected By: CH, DJ & Peter Doig
		GIS Plan Ref.				
Feature:	Old Welding Yard	Task Ref. No.			Responsibility Delegated To:	Environmental Specialist Sign:
		Disturbance Area (ha)				
Present Status	<p>The site has been cleared for use by the DEC (29/05/2009).</p> <p>The site used to be a welding yard and there are pipe welding rods and other scrap that requires removal. An electric cable also runs through the centre of the site. The site was deeply ripped in 1979. The access tracks were partially rehabilitated 4 years ago by taking off the top, breaking the compaction and pushing windrows over the track.</p> <p>The area is quite rocky in parts and there is lots of vegetation (predominantly ribbon grass). A small area of better regrowth divides the site approximately in half. A small creek runs along the north of the site.</p> <p>Access would be via 2 access tracks, one to the north and one to the south. Both contain a similar level of vegetation (less than the site). The site itself is quite narrow and may prove difficult for turning and manoeuvring a truck. The site is separated into two portions by a vegetated area in the middle. The eastern portion is long and narrow and directly accessible from the access tracks. The western portion of the site is larger, wider and better for trucks, however there is no direct access to this area.</p> <p>Access for the western area is through the vegetated portion of the site (cleared by the DEC (29/05/2009)).</p>					
Performance Criteria	Topsoil is subject to minimal erosion and is above any known flood levels. Any sediment eroding off the topsoil is contained and does not flow into waterways. Topsoil is recoverable and stored in such a manner as to minimise deterioration of quality.					
Scheduled Completion Date	Responsible Delegate Sign	Date Task Completed	Environment Dep Sign	Criteria Met: Yes / No		
Tasks Identified			Photo Ref #	Delegated Responsibility	Sign-Off Date	
1)	Confirm the area to be used for topsoil storage taking into consideration the vegetated central portion of the site and the creek running along the north of the site. Topsoil should be dumped a suitable distance from this creek as to minimise any effects from flooding.		-			
2)	Create a map with the final storage area displayed. Determine the volume of soil that can be stored at this site.		-			
3)	Mark out the area to be used. This will minimise the risk of extra ground being reclaimed during earthworks and topsoil dumping.		-			
4)	Ensure access roads are suitable for machinery and trucks. Check both access tracks as both may be used.		1			
5)	Process pipelines that run across the southern access track need to be buried to a predetermined depth (if southern access track is to be used).		2			

Tasks Identified		Photo Ref #	Delegated Responsibility	Sign-Off Date
6)	Remove any large rocks from the eastern portion of the site.	3		
7)	Create a drivable surface for machinery to access the vegetated central portion of the site.	4		
8)	Create a path through the vegetated portion in the centre of the site (see Map sheet). Ensure the track is positioned such that it minimises the amount of clearing.	5		
9)	Bury electric cable to predetermined depth.	6		
10)	Remove any large rocks from the western portion of the site. These could be placed to delineate the creek to prevent topsoil being dumped too close.	-		
11)	Remove any scrap including old corroded pipe and pipe welding rods.	7		
12)	Ensure surface is accessible for machinery including but not limited to loaders and trucks.	8		
Possible Topsoil Dumping Approach				
1)	If ground surface is not suitable for trucks to drive on then a drivable surface should be created by dumping topsoil, which should be spread progressively by a loader.	-		
2)	Topsoil dumped in the eastern section of the site will likely have to be dumped off the road and moved with a loader.	-		
	HES / Planning Considerations:			
	Lessons Learnt: <i>Comments to be added during works and following final inspection of completed works. Feedback is to be logged in the environmental database and used as a tool for continual improvement of processes on Barrow Island.</i>			

Appendix D Framework for Net Environmental Benefit Analysis

<p>Purpose of NEBA:</p>	<p>Assess and compare the benefits and risks to the environment associated with rectification options for rehabilitated areas.</p>
<p>Objectives of NEBA process:</p>	<ul style="list-style-type: none"> • Confirm that planned rehabilitation strategies will achieve an improved rehabilitation outcome • Determine whether the planned rehabilitation strategies may have negative environmental consequences that outweigh the potential benefits • Inform the selection and prioritization of rehabilitation options • Focus rehabilitation activities to areas where net environmental benefits are highest
<p>Key steps in NEBA and rehabilitation prioritization process:</p>  <pre> graph TD A[Evaluate Data] --> B[Predict Outcomes] B --> C[Balance Tradeoffs] C --> D[Appropriate Rehabilitation Strategies] D --> A </pre>	
<p>1. Before an area is identified as performing below expectation¹: Compile information and data to support NEBA decision-making.</p>	<p>Evaluate data: Assemble and collate data on ecosystem development in rehabilitated areas, in the context of both the Barrow Island environment and agreed completion criteria for rehabilitation.</p> <p>Predict outcomes: Review and compare previous rectification projects and other available data to understand likely outcomes for different rehabilitation options.</p> <p>Balance trade-offs: Identify likely environmental impacts to inform optimal rectification activities.</p> <p>Select options: Develop generic plans for preferred options.</p>
<p>2. When a rehabilitated area has been identified as performing below expectation²: Apply NEBA to site specifics.</p>	<p>Evaluate data: Assess specific attributes of poor rehabilitation performance, in the context of prior climatic conditions, local site conditions, and ease of site access, to determine most appropriate rehabilitation options, which include allowing more time for vegetation development rather than intervention.</p> <p>Predict outcomes: Confirm effectiveness and feasibility of rehabilitation options, to achieve optimal outcomes.</p> <p>Balance trade-offs: Re-evaluate likely environmental impacts to inform the most appropriate rehabilitation options.</p> <p>Select options: Determine if intervention is appropriate and if so, develop and implement a targeted rectification plan based on data evaluation.</p>
<p>3. After rectification work is complete and outcomes have been evaluated: Review lessons from rectification works and update information in rectification plans.</p>	<p>Evaluate data: Gather lessons learned and best practices to understand environmental impacts resulting from intervention.</p> <p>Predict outcomes: Review accuracy of predicted outcomes and refine decision-making tools as appropriate.</p> <p>Balance trade-offs: Re-evaluate environmental impacts to inform future decisions about trade-offs.</p> <p>Select options: Inform decision-making and future implementation of rectification activities by updating plans and decision-making tools.</p>

- ¹ Including the presence of any subsurface fixtures, where removal may cause environmental impact
- ² Applies to an assessment of potential environmental impact caused by removal (such as disturbance area due to excavation; and other potential impacts such as substrate integrity); and the evaluation against potential environmental impact caused by leaving any fixtures in situ (such as potential concrete leachate).