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Gorgon Project
Terrestrial and Subterranean Environment Monitoring Program

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1 Introduction

1.1 Proponent

Chevron Australia Pty Ltd (CAPL) is the proponent and the person taking the action for the Gorgon Gas Development 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 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, 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 tankers from a jetty and then transported to international markets. Gas for domestic use is exported by pipeline from Barrow Island to the domestic gas collection and distribution network on the WA mainland.

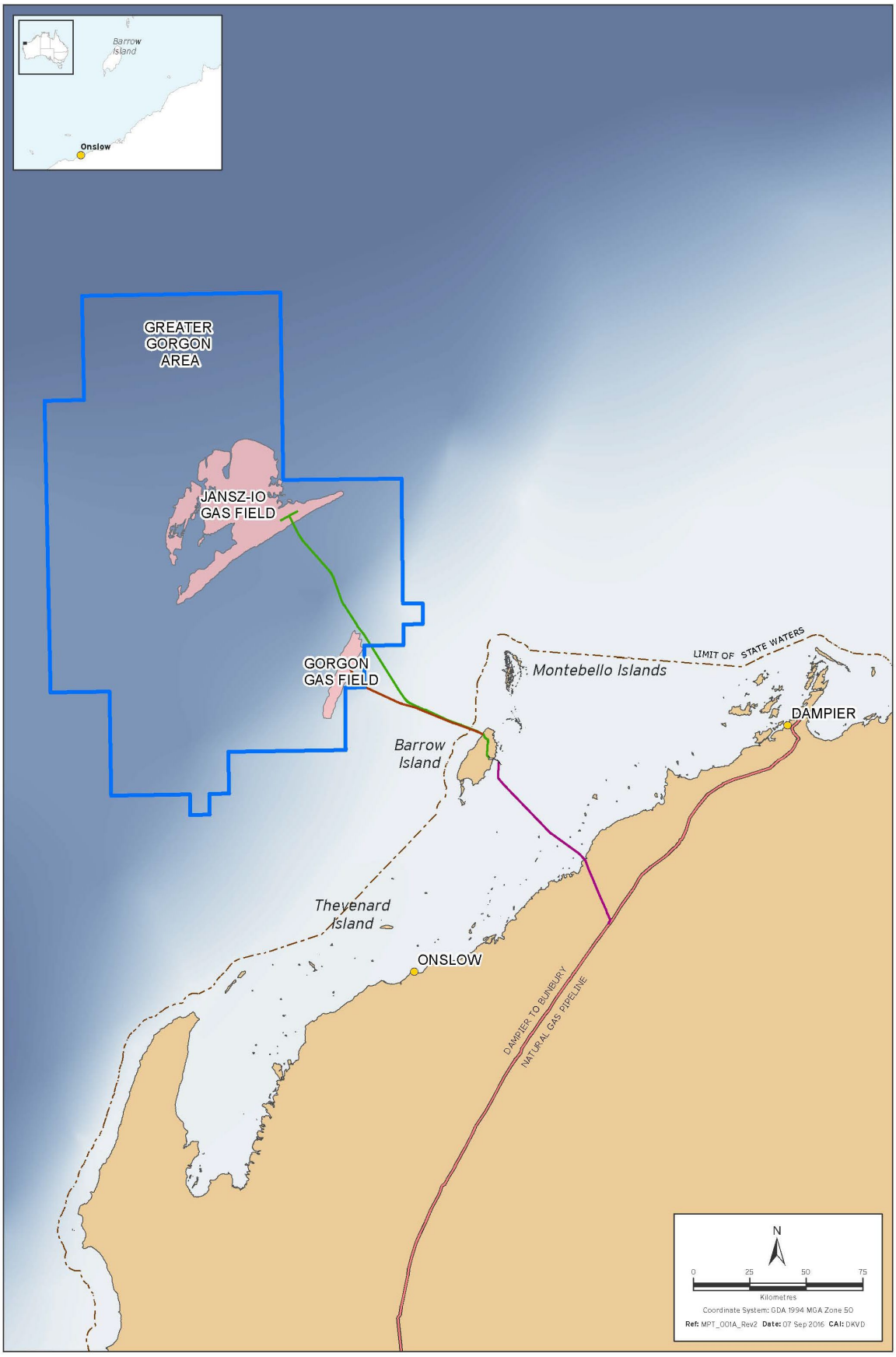

Figure 1-1: Location of Barrow Island and the Greater Gorgon Area

1.3 Environmental Approvals

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

These approvals, and projects as 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 (Ref. 4). 6 September 2007	Initial Gorgon Gas Development comprising two LNG Trains – EPBC Reference: 2003/1294 (Ref. 6). 3 October 2007
Revised and Expanded Gorgon Gas Development (3 LNG Trains)	MS 800 (Ref. 4) provides approval for both the initial Gorgon Gas Development and the Revised and Expanded Gorgon Gas Development (compromising three LNG Trains, which together are known as the Gorgon Gas Development). This statement supersedes MS 748. 10 August 2009	The Revised and Expanded Gorgon Gas Development (EPBC Reference: 2008/4178 [Ref. 5]) was approved, and the conditions for the initial Gorgon Gas Development (EPBC Reference: 2003/1294 [Ref. 6]) 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. 6]).and for the Revised and Expanded Gorgon Gas Development (EPBC Reference: 2008/4178 [Ref. 5]) 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. 12 May 2016 (Ref. 25).

[1] This Monitoring Program applies to the Fourth Train Expansion once this scope commences.

1.4 Purpose of this Monitoring Program

1.1.1 Requirement for this Monitoring Program

1.1.1.1 State Environmental Approval Requirement

This Monitoring Program is required under Condition 8.1 of MS 800 and MS 769:

> *Prior to the commencement of construction of the terrestrial facilities listed in Condition 6.3 the Proponent shall prepare and submit a Terrestrial and Subterranean Environment Monitoring Program (the Program) to the Minister that meets the objectives set out in Condition 8.3 and the requirements of Condition 8.4 as determined by the Minister, unless otherwise allowed in Condition 8.2*

This Monitoring Program is also required under Condition 26.3 of MS 800:

> *Prior to the commencement of operation of the Carbon Dioxide Injection System infrastructure, the Proponent shall prepare and submit to the Minister a monitoring program which sets out how the annual reporting requirements for the performance of the Carbon Dioxide Injection System as required by Condition 5.2.vi and Schedule 3.6 will be met.*

1.1.1.2 Commonwealth Environmental Approval Requirement

This Monitoring Program satisfies the requirements of Condition 7.1 of EPBC Reference: 2003/1294 and 2008/4178:

> *Prior to commencement of construction of the terrestrial facilities listed in Condition 5.2 the person taking the action must prepare and submit a Terrestrial and Subterranean Environment Monitoring Program (the Program) to the Minister for approval that meets the objective set out in Condition 7.3 and the requirements of Condition 7.4 as determined by the Minister, unless otherwise allowed in Condition 7.2*

This Monitoring Program is also required under Condition 19.1 of EPBC Reference: 2003/1294 and 2008/4178:

> *Prior to the commencement of operation of the Carbon Dioxide Injection System infrastructure, the person taking the action must prepare and submit to the Minister, for approval, a monitoring program which sets out how the annual reporting requirements for the performance of the Carbon Dioxide Injection System will be met in respect of monitoring any seepage of injected carbon dioxide to the surface or near surface environments, including those which may support subterranean fauna, including the blind gudgeon Milyeringa verita.*

1.1.2 Other Legislation

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 Monitoring Program 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 Monitoring Program is approved under the Commonwealth *Environmental Protection and Biodiversity Conservation Act 1999*

(EPBC Act) and 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 Monitoring Program are summarised in Table 1-2.

Table 1-2: Interfaces with other Regulatory Plans

Scope	Legislative Requirement	Regulatory Plan
Defines and maps the pre-development baseline state of ecological elements including details of the methodology used to survey, collect, and collate information. Analyses data and information gaps associated with the baseline data for the identified ecological elements, and describes procedures to address these gaps. Defines the Terrestrial Disturbance Footprint (TDF) and reviews the results of qualitative ecological risk assessments.	Condition 6 of MS 800 and MS 769 Condition 5 of EPBC Reference: 2003/1294 and 2008/4178	Terrestrial and Subterranean Baseline State and Environmental Impact Report (TSBSEIR; Ref. 10)
Details the management measures proposed to reduce adverse impacts from construction and operation, including procedures for limiting impacts to fauna during monitoring.	Condition 7 of MS 800 and MS 769 Condition 6 of EPBC Reference: 2003/1294 and 2008/4178	Terrestrial and Subterranean Environment Protection Plan (TSEPP; Ref. 11)
Details the monitoring of marine turtles.	Condition 16 of MS 800 Condition 12 of EPBC Reference: 2003/1294 and 2008/4178	Long-term Marine Turtle Management Plan (Ref. 13)
Details the monitoring of short-range endemic (SRE) terrestrial fauna that are restricted to the GTP site, and SRE subterranean fauna that are restricted to the GTP site and Additional Support Area.	Condition 11 of MS 800	Short Range Endemics and Subterranean Fauna Monitoring Plan (Ref. 14)
Details the monitoring of coastal foredunes, which are identified as a significant physical landform.	Condition 25 of MS 800 Condition 18 of EPBC Reference: 2003/1294 and 2008/4178	Coastal Stability Management and Monitoring Plan (Ref. 15)
Details the reservoir management measures for the underground disposal of carbon dioxide (CO_2) including a monitoring program for the detection of unexpected migration of injected CO_2 outside the injection zone.	Condition 5 of the Approval to Dispose of CO_2 by Injection into Subsurface Formation granted under the *Barrow Island Act 2003* (WA)	Carbon Dioxide Disposal Management Plan (Ref. 16)

1.1.3 Objectives of this Monitoring Program

The stated objective of this Monitoring Program in Condition 8.3 of MS 800 and MS 769, and Condition 7.3 of EPBC Reference: 2003/1294 and 2008/4178, is to:

> *Establish a statistically valid ecological monitoring program to detect any Material or Serious Environmental Harm to the ecological elements outside the Terrestrial Disturbance Footprint.*

1.1.4 Content of this Monitoring Program

Table 1-3 lists the State and Commonwealth Condition requirements of this Monitoring Program and the sections within this document that fulfil them. A Compliance Reporting Table is provided in Appendix A.

Note: This requirements text is based on MS 800. Additional words in these requirements from MS 769 are contained in [square brackets]; additional words in the requirements from EPBC Reference: 2003/1294 and EPBC Reference: 2008/4178 are contained in (parentheses), except when they are abbreviations.

Table 1-3: Condition Requirements Addressed in this Monitoring Program

Approval Decision	Condition No.	Condition Requirement	Section in this Program
MS 800 MS 769 EPBC Reference: 2003/1294 and 2008/4178		The Program shall include:	
MS 800 MS 769	8.4 i	Indicators, parameters and [/or] criteria to be used in measuring changes on the ecological elements identified in Condition 6.1 (5.1) that are at risk of Material or Serious Environmental Harm due to construction and operation of terrestrial facilities listed in [as identified in] Condition 6.3 (5.2).	Table 3-1
EPBC Reference: 2003/1294 and 2008/4178	7.4 I		
MS 800 MS 769	8.4 ii	Protocols for ongoing reporting of adverse changes to the ecological elements listed [identified] in Condition 6.1 (5.1);	Section 5
EPBC Reference: 2003/1294 and 2008/4178	7.4 II		
MS 800	8.4 iii	Management Triggers;	Section 4
EPBC Reference: 2003/1294 and 2008/4178	7.4 III		
MS 800	8.4 iv	Protocols for identifying additional areas not originally identified that are at risk of sustaining Material or Serious Environmental Harm from the Proposal, and for adding monitoring sites to include these additional locations, if required;	Section 1.1.5
MS 769	8.4 iii		
EPBC Reference: 2003/1294 and 2008/4178	7.4 IV		
MS 800	8.4 v	Establishing an ecological monitoring program with the ability to detect at a statistical power of 0.8 or greater, or an alternative statistical power as determined by the (WA) Minister, any environmental harm to the ecological elements listed in Condition 6.1 (5.1);	Section 3.5
MS 769	8.4 iv		
EPBC Reference: 2003/1294 and 2008/4178	7.4 V		
MS 800	8.4 vi	Location of monitoring sites in areas that are at risk of Material or Serious Environmental Harm due to construction and operation of terrestrial facilities listed in Condition 6.3 (5.2); and	Figure 3-1, Figure 3-2, Figure 3-3, Figure 3-4, Figure 3-5, Figure 3-6, Figure 3-7, Figure 3-8
MS 769	8.4 v		
EPBC Reference: 2003/1294 and 2008/4178	7.4 VI		
MS 800	8.4 vii	Location of reference sites (see Condition 6.4 iii [Condition 6.4 iv] (Condition 5.3 iii)).	
MS 769	8.4 vi		

Approval Decision	Condition No.	Condition Requirement	Section in this Program
EPBC Reference: 2003/1294 and 2008/4178	7.4 VII		
EPBC Reference: 2003/1294 and 2008/4178	3.2	All plans, reports, programs or systems (however described) required under this approval must include the following elements:	
EPBC Reference: 2003/1294 and 2008/4178	3.2.1	a description of the EPBC listed species and their habitat likely to be impacted by the components of the action which are the subject of that plan, report, program or system (however described);	Appendix D
EPBC Reference: 2003/1294 and 2008/4178	3.2.2	an assessment of the risk to these species from the components of the action the subject of that plan, relevant to that plan, report, program or system (however described);	Appendix D
EPBC Reference: 2003/1294 and 2008/4178	3.2.4	details of monitoring proposed for that species if it is a requirement of the condition requiring that plan, report, program or system (however described);	Section 3.5 Table 3-1
EPBC Reference: 2003/1294 and 2008/4178	3.2.6	management triggers in relation to that species if it is a requirement of the condition requiring that plan, report, program or system (however described); and	Section 4
EPBC Reference: 2003/1294 and 2008/4178	3.2.7	protocols for reporting to the Department, impacts detected by the monitoring programs described in 3.2.4, on EPBC listed species, whether or not the impact is caused by the action. To avoid any doubt, these protocols may allow for reports provided under Plans required by these Conditions to be provided as a single document with the corresponding reports provided under Plans required by the Conditions attached to the (EPBC 2003/1294) Approval. Such a report does not need to identify to which approval an impact on a species relates.	Section 5
MS 800	26.3	Prior to the commencement of operation of the Carbon Dioxide Injection System infrastructure, the Proponent shall prepare and submit to the (WA) Minister a monitoring program which sets out how the annual reporting requirements for the performance of the Carbon Dioxide Injection System as required by Condition 5.2.vi and Schedule 3.6 will be met.	Section 3.5.5 Appendix C
EPBC Reference: 2003/1294 and 2008/4178	19.1	Prior to the commencement of operation of the Carbon Dioxide Injection System infrastructure, the person taking the action must prepare and submit to the (Commonwealth) Minister, for approval, a monitoring program which sets out how the annual reporting requirements for the performance of the Carbon Dioxide Injection System will be met in respect of monitoring any seepage of injected carbon dioxide to the surface or near surface environments, including those which may support subterranean fauna, including the blind gudgeon *Milyeringa verita*.	Section 3.5.5 Appendix C

Any matter specified in this Monitoring Program 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.

The sections in this Monitoring Program listed in Table 1-3 to meet the conditions of EPBC Reference: 2003/1294 and 2008/4178 shall be read and interpreted as

only requiring implementation under EPBC Reference: 2003/1294 and 2008/4178 for managing the impacts of the Gorgon Gas Development on, or protecting, EPBC Act matters (Appendix D). The implementation of matters required only to meet the requirements of MS 800 and MS 769 are not the subject of EPBC Reference: 2003/1294 and 2008/4178.

2 Relevant Facilities and Activities

This document describes a Monitoring Program for the terrestrial and subterranean environment associated with construction and operational activities falling under MS 800, MS 769, and EPBC Reference: 2003/1294 and 2008/417 environmental approvals.

This Monitoring Program applies to the Terrestrial Facilities of the Gorgon Gas Development and the Terrestrial Facilities of the Jansz Feed Gas Pipeline, which are shown in Figure 2-1. The Gorgon Gas Development Terrestrial Facilities are defined in Condition 6.3 of MS 800 and Condition 5.2 of EPBC Reference: 2003/1294 and 2008/4178 as the:

- GTP
- 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.

Terrestrial Facilities also include those defined in Schedule 1 of MS 965 (the Additional Support Area) (Ref. 8).

2.1 Terrestrial Disturbance Footprint

Terrestrial Disturbance Footprints (TDFs) are defined in the TSBSEIR (Ref. 10), as amended from time to time. TDFs include the Gorgon Gas Development and Jansz Feed Gas Pipeline and a zone beyond these footprints that may be disturbed by activities associated with the Terrestrial Facilities (Table 2-1).

Table 2-1: Relevant TDFs for Ecological Elements

Activities	Horizontal Dimension[1]	Above Ground[2]	Below Ground[3]
Construction, Simultaneous Construction and Operations (SIMOPS)[4]	100 m Non-mobile elements (flora, vegetation, surface water landforms)	100 m	1 m
	200 m Groundwater	N/A	N/A
	1000 m Mobile elements (fauna)	100 m	1 m
Surface Seismic	5 m	N/A	N/A
Subsurface Seismic	40 m	N/A	40 m

Notes:

1 *Distance is from the external periphery of the Gorgon Gas Development and Jansz Feed Gas Pipeline footprints.*

2 *Above ground surface, or above top of infrastructure, whichever is higher at that point.*
3 *Below disturbed surfaces (i.e. earthworks and excavation), even if the finished surface is above any temporarily disturbed surfaces such as excavations.*
4 *Relevant TDFs may be reviewed on completion of construction activities (i.e. following SIMOPS).*

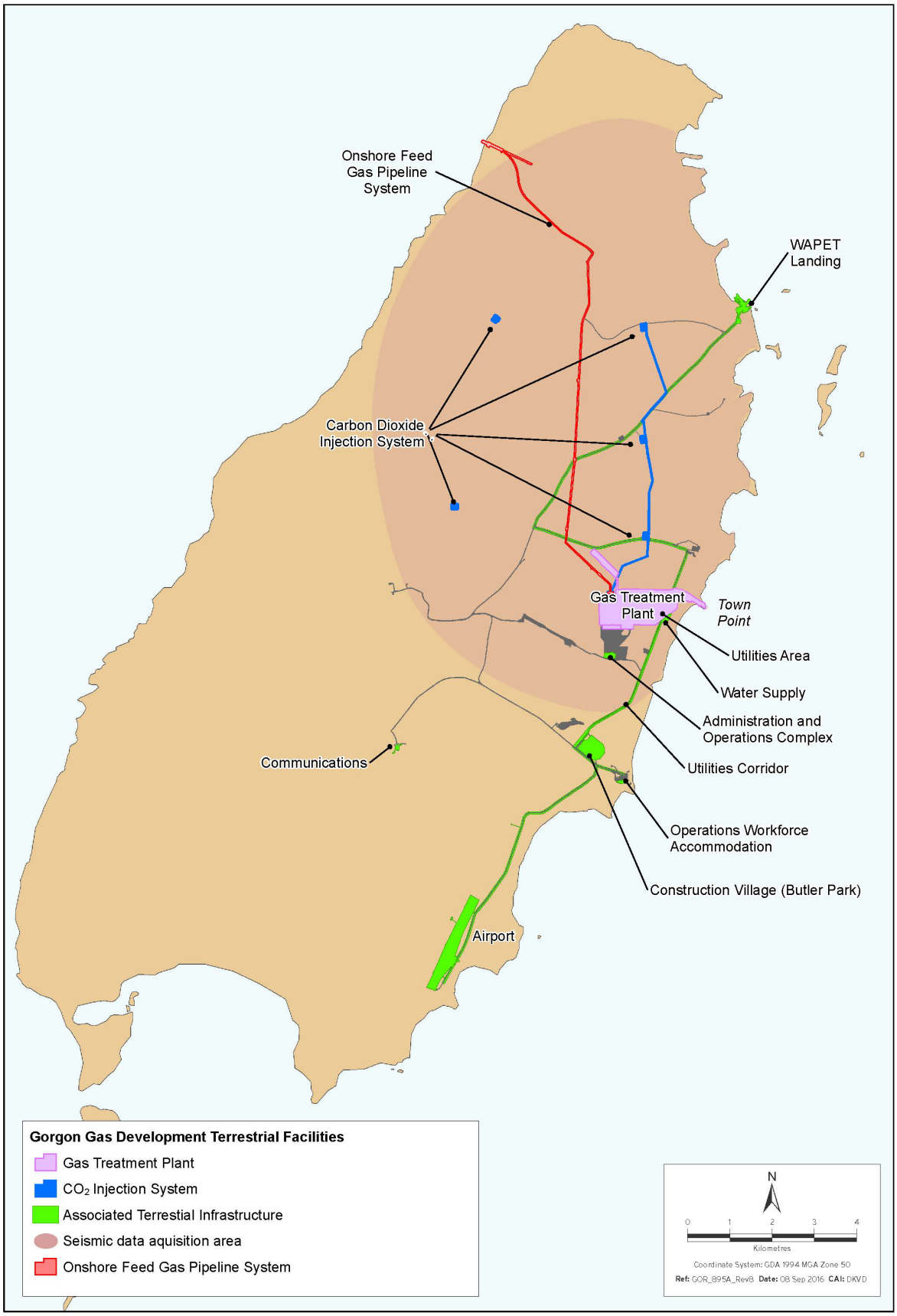

Figure 2-1: Gorgon Gas Development Terrestrial Facilities on Barrow Island

3 Monitoring Program

3.1 Ecological Elements

Ecological elements are listed in Condition 6.1 of MS 800 and MS 769, and Condition 5.1 of EPBC Reference: 2003/1294 2008/4178 and are described in detail in the TSBSEIR (Ref. 10). The listed ecological elements are:

- Flora
- Vegetation
- Fauna (including subterranean fauna and SREs)
- Habitat
- Ecological Communities
- Groundwater
- Surface Water Landforms
- Physical Landforms.

3.2 Significant Taxa and Features

As described in the TSBSEIR (Ref. 10), ecological elements were characterised to the degree practicable, with the environmental impact assessment focusing on those taxa and features identified as significant and in need of protection in areas near the Gorgon Gas Development. Therefore, to appropriately manage and monitor the environment on Barrow Island, CAPL considers that significant taxa and features include those that are:

- listed as vulnerable, threatened, rare, or endangered in State and Commonwealth legislation or formal lists
- restricted in distribution within Barrow Island
- critical to ecological processes on Barrow Island
- vulnerable to disturbance (neither resistant or resilient to disturbance and very slow to recover/self-regenerate after disturbance ceases), or
- disproportionately located in the TDF.
- A detailed definition and description of these taxa and features, which include relevant Matters of National Environmental Significance (NES), is contained in the TSBSEIR (Ref. 10), the Draft Environmental Impact Statement / Environmental Review and Management Programme (Ref. 12), and the Public Environmental Review (Ref. 17).

These taxa and features are the focus of the Monitoring Program and are prioritised for monitoring based on their level of risk.

3.3 Risk Assessment

Risk is the combination of the potential consequences arising from an environmental stressor together with the likelihood of the stressor occurring and resulting in the consequence. The outcome of risk assessments undertaken for the terrestrial and subterranean environment as it relates to the Gorgon Gas Development and Jansz Feed Gas Pipeline is documented in the TSEPP

(Ref. 11). The TSEPP also describes measures developed to manage these risks. An assessment of the risk to EPBC listed species is outlined in (Appendix D).

The status of ecological elements at risk will be revised if the boundaries of the areas identified as being at risk are modified, or if the data collected indicates actual, or high likelihood of, impacts to ecological elements not previously identified as being at risk.

An ecological element, taxa, or feature may be determined not to be at risk (or no longer at risk) following a formal risk assessment if the results of monitoring indicate no impact has occurred or is likely to occur, or if the relevant stressor is no longer present. Historical monitoring of ecological elements previously assessed to be at risk, or of undetermined risk status, are described in Appendix B.

3.4 Monitoring Sites

The location of monitoring sites considers the relative level of risk from the Gorgon Gas Development and Jansz Feed Gas Pipeline, historical sites where baseline data were collected, access to the sites, and maintaining similarity in habitats and landforms between sites, where reasonably practicable.

At Risk Sites on Barrow Island are those located within the relevant TDF that are predicted to be impacted by the Gorgon Gas Development and Jansz Feed Gas Pipeline. Reference Sites are those located outside the relevant TDF that represent specific areas of the environment that are not at risk and that can be used to determine the natural state, including natural variability, of environmental attributes. The exceptions to monitoring At Risk and Reference Sites based on the TDF are described in Sections 3.5.1, 3.5.2, and 3.5.3.

The locations of indicative monitoring sites for each ecological element are shown in Figure 3-1 to Figure 3-8. Note: The TDF layers shown in these figures are indicative – the TDF boundaries are defined in the TSBSEIR (Ref. 10), as amended from time to time. For some ecological elements (e.g. fauna), specific site locations may vary year-to-year to allow for accuracy and precision to be factored into population modelling.

1.1.5 Reviewing Status or Location of Monitoring Sites

The status or location of monitoring sites may change if a relevant TDF is redefined due to a change in terrestrial activities, such that those activities no longer present a credible risk at that location.

The number and placement of monitoring sites may also be altered if:

- there are changes to the Gorgon Gas Development and Jansz Feed Gas Pipeline footprint
- sites are subject to degradation not attributable to the Gorgon Gas Development and Jansz Feed Gas Pipeline (such as from fire resulting from lightning strikes)
- the statistical robustness, or sensitivity of monitoring, varies substantially from that suggested in this Program
- taxa or features are either added to or eliminated from the list of ecological elements monitored through the Monitoring Program
- additional areas are identified that were not originally identified as being at risk

- the management response to incidents requires further monitoring of that ecological element (e.g. monitoring a hydrocarbon plume in the groundwater)
- monitoring sites become not fit for purpose, are damaged, decommissioned, inaccessible, and/or are unsafe to access.
- two years of direct field inspections of sites under the Surface Water Landform Monitoring (SWLM) program (Section 3.5.3) do not identify any Project-related impact, and no additional Project activities that could impact surface water landforms are planned for that area, allowing for their removal from the program.

CAPL reviews the number, location, and status of monitoring sites. Condition 5.1 of MS 800 and MS 769, and Condition 4.1 of EPBC Reference: 2003/1294 and 2008/4178, require that any changes to monitoring sites are documented in Environmental Performance Reports.

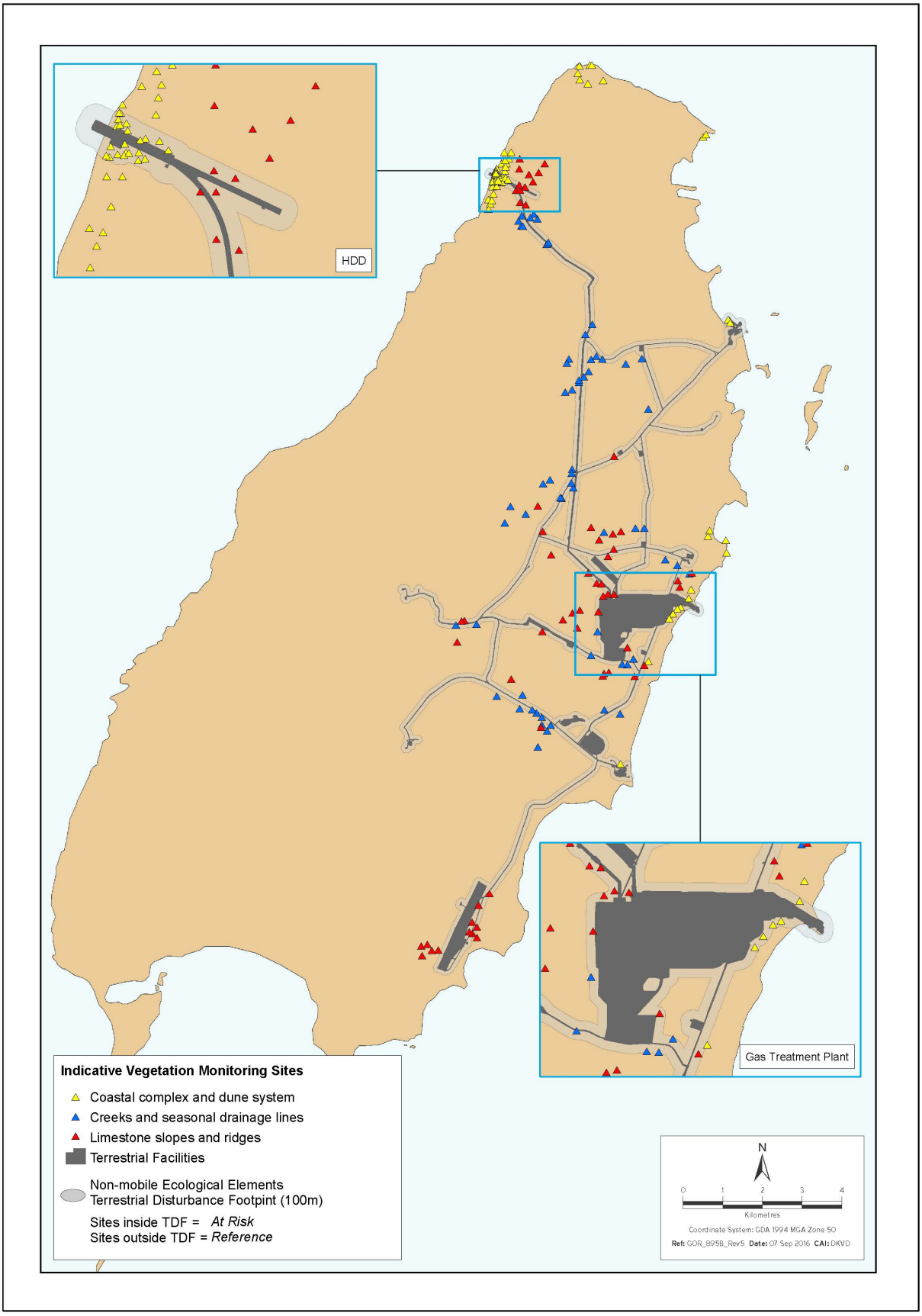

Figure 3-1: Indicative Barrow Island Vegetation Monitoring Sites

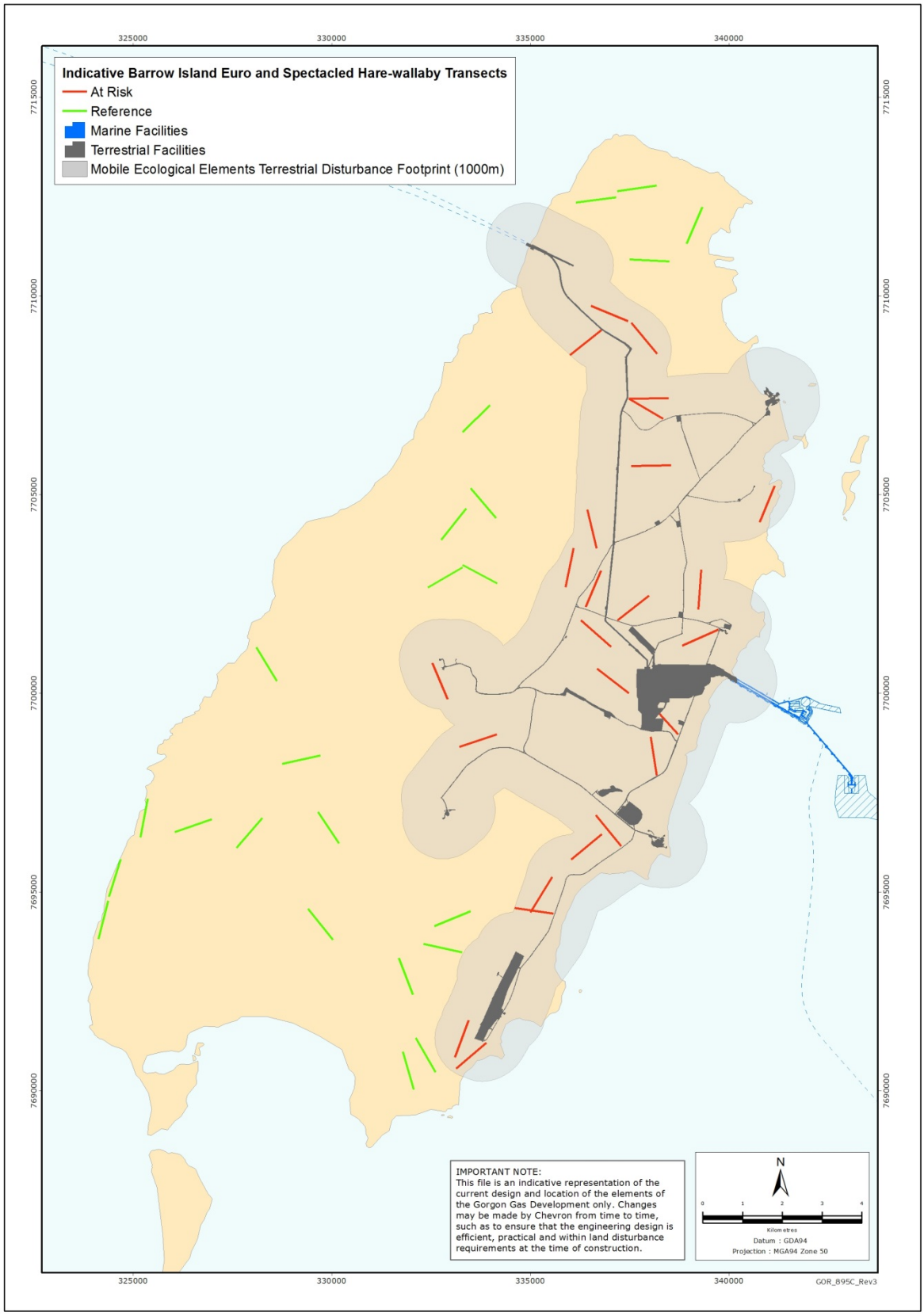

Figure 3-2: Indicative Barrow Island Euro and Spectacled Hare-wallaby Monitoring Sites

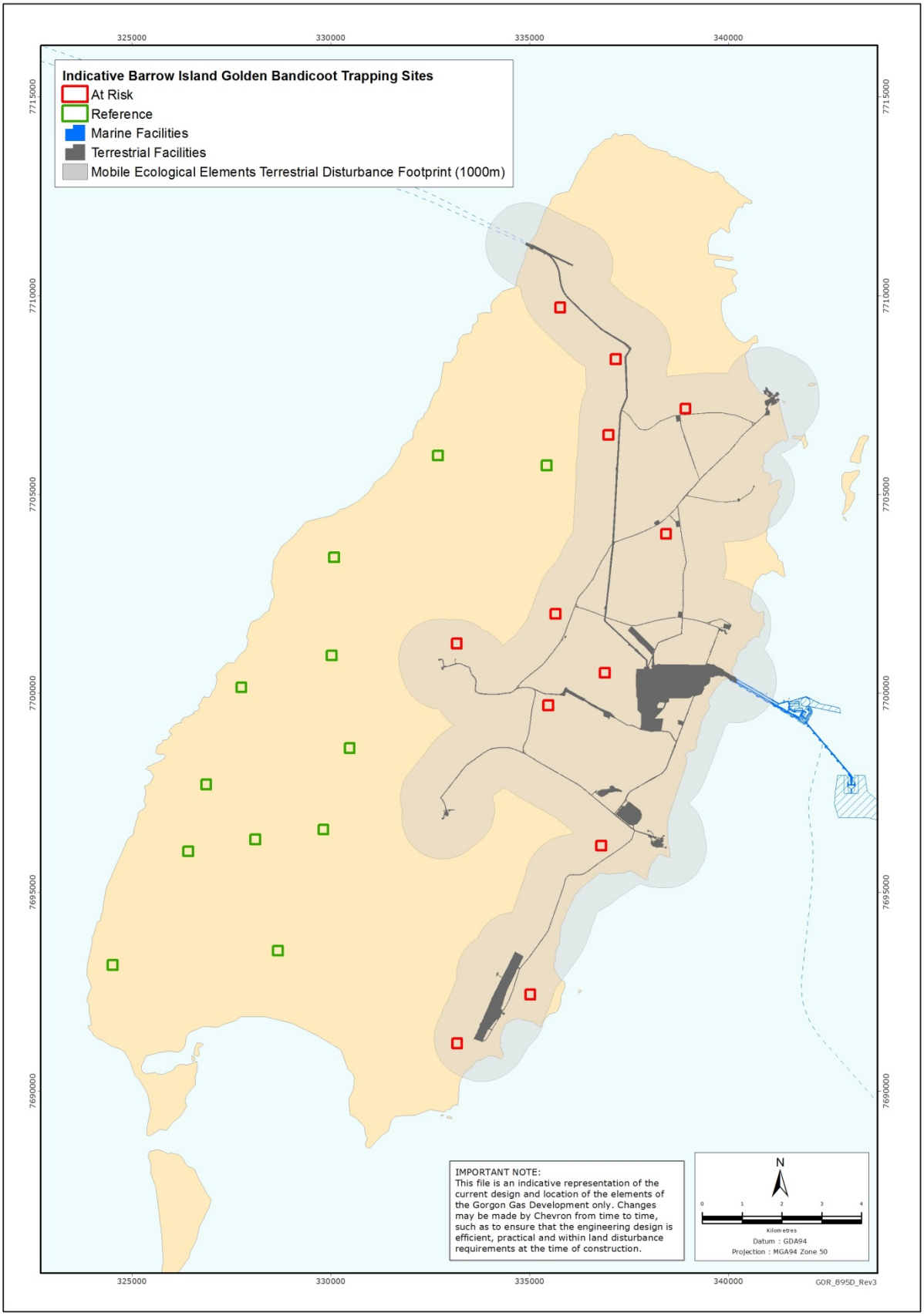

Figure 3-3: Indicative Barrow Island Golden Bandicoot Monitoring Sites

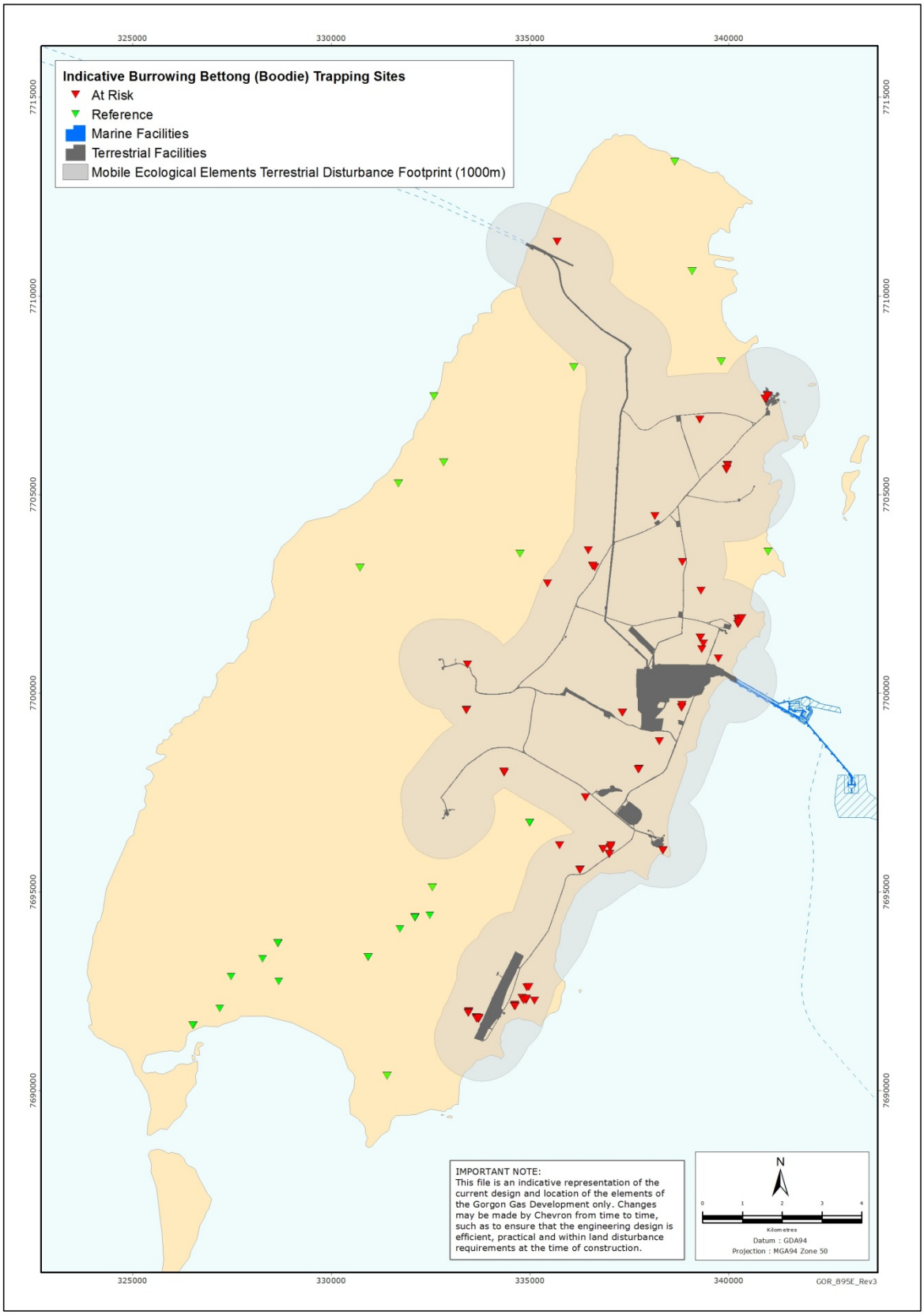

Figure 3-4: Indicative Barrow Island Burrowing Bettong (Boodie) Monitoring Sites

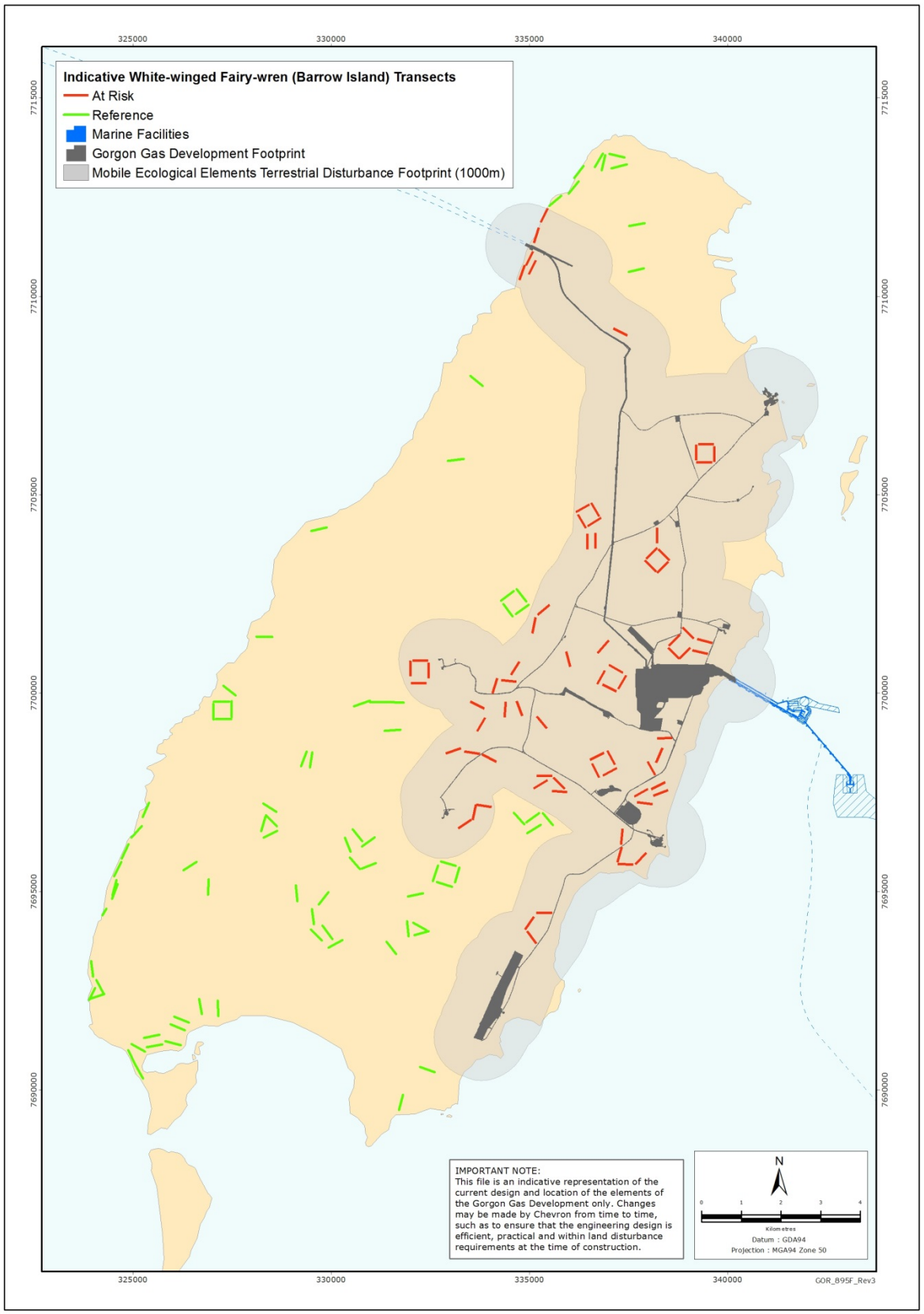

Figure 3-5: Indicative Barrow Island White-winged Fairy-wren (Barrow Island) Monitoring Sites

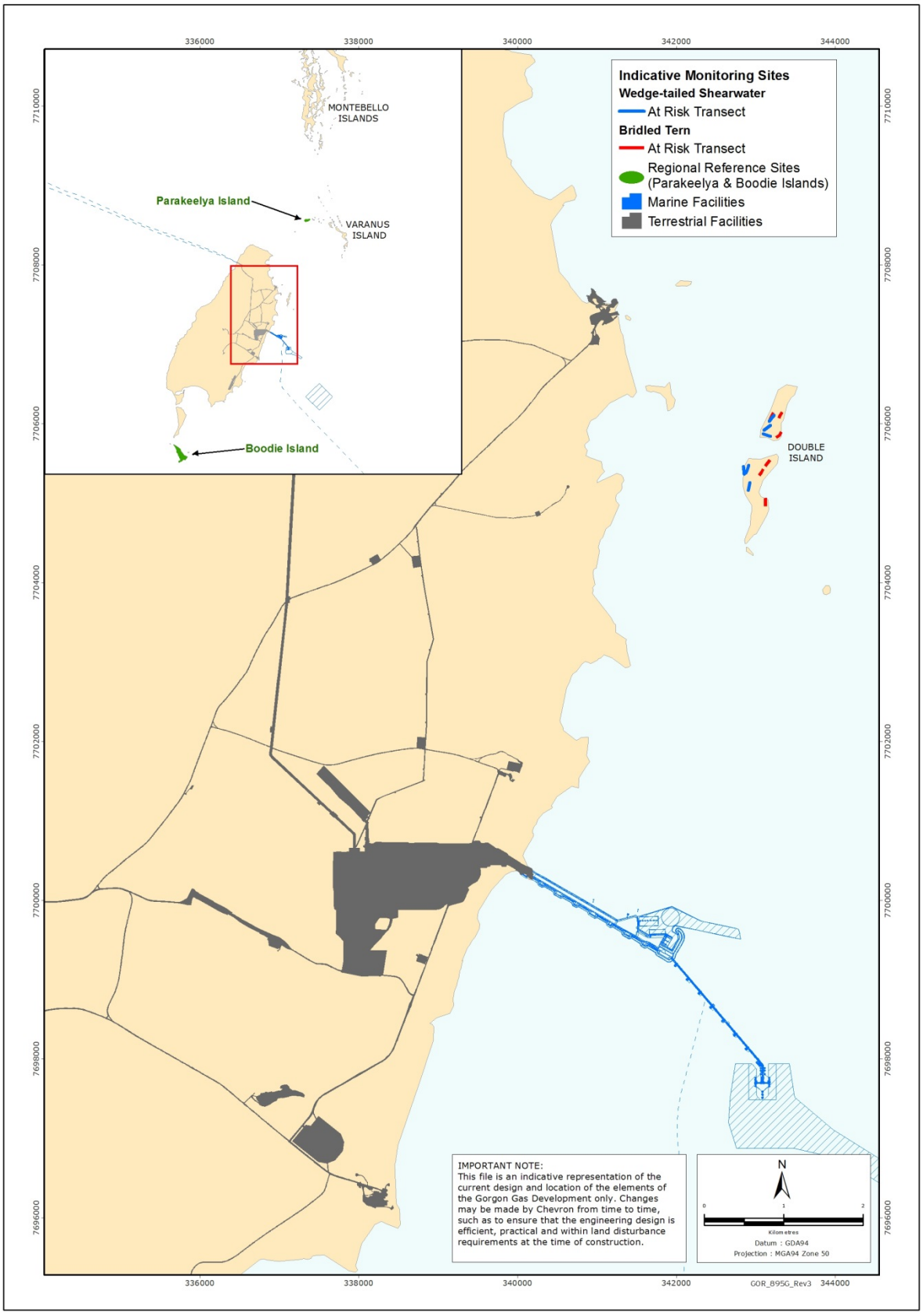

Figure 3-6: Indicative Barrow Island Bridled Tern and Wedge-tailed Shearwater Monitoring Sites

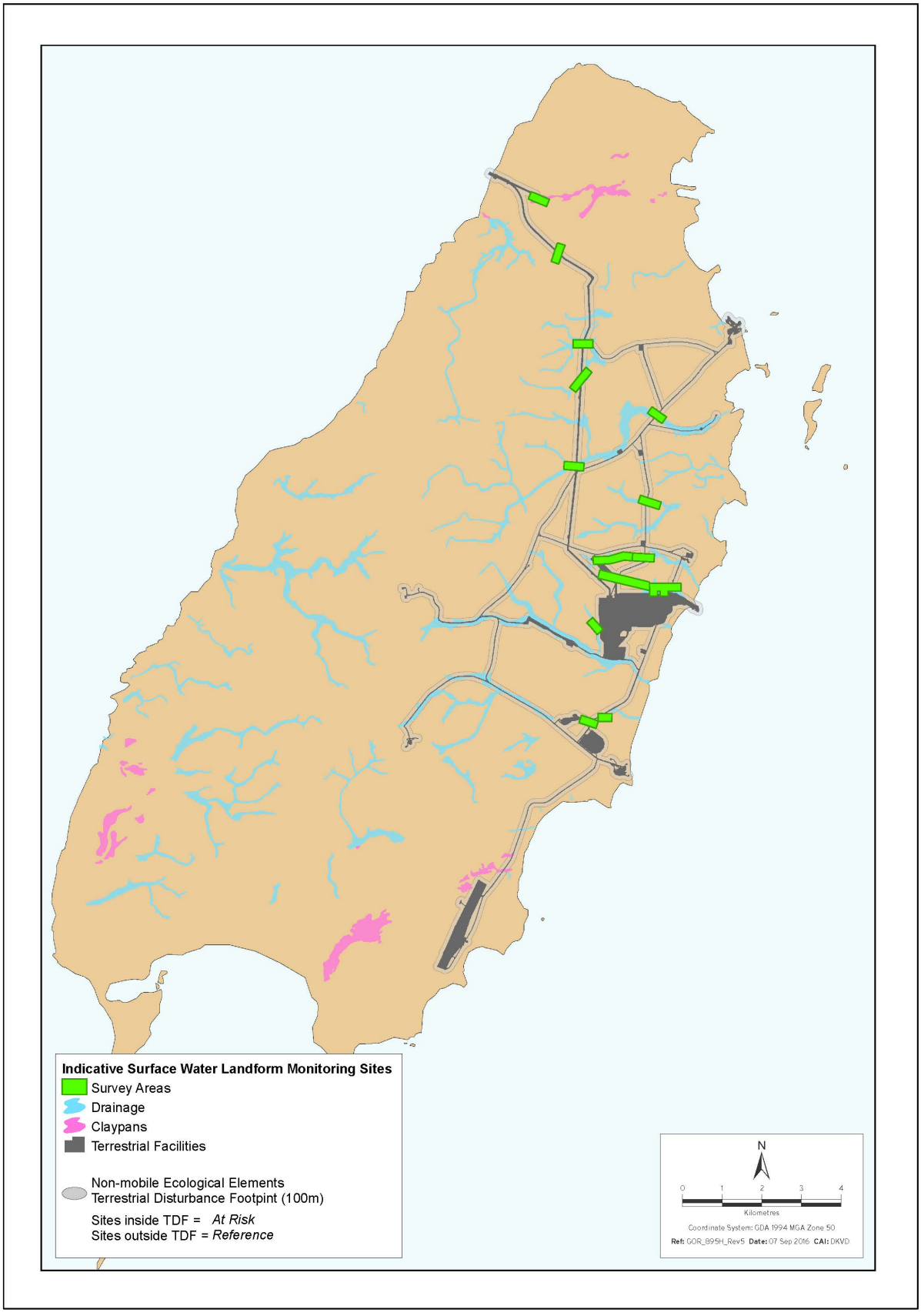

Figure 3-7: Indicative Barrow Island Surface Water Landform Monitoring Sites

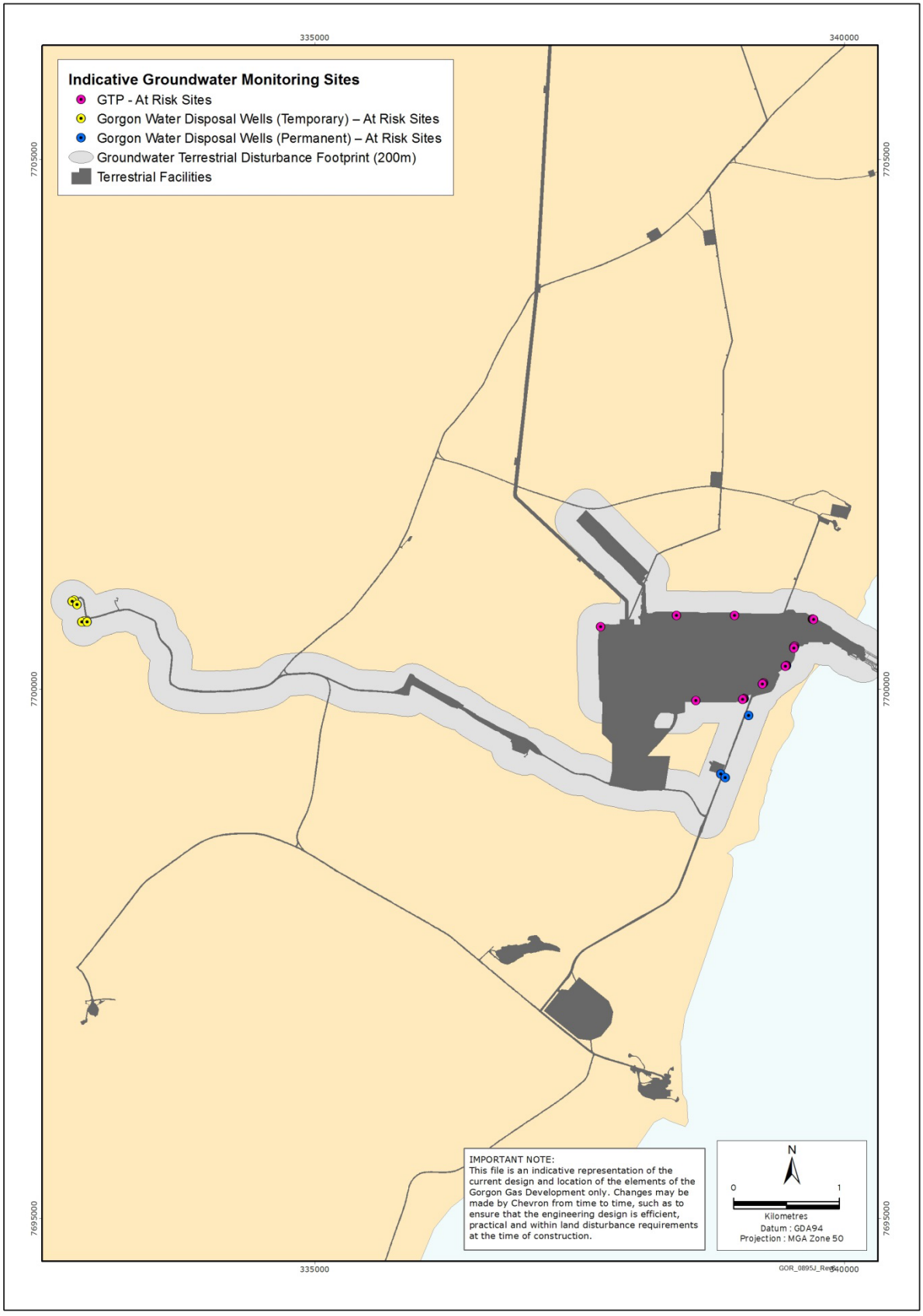

Figure 3-8: Indicative Barrow Island Groundwater Monitoring Sites

3.5 Program Design

Various factors were considered in the design of this Monitoring Program, including timing, frequency, and availability of replicate sites, as well as parameters, indicators, and criteria suitable for monitoring.

Considerations for data collection include, but are not limited to:

- meeting statistically valid program design
- applying a risk-based approach to determine the quantity and frequency of monitoring
- limiting land clearing and disturbance to vegetation within monitoring sites
- limiting fauna handling
- using indicators, where appropriate.

CAPL uses statistical decision-aiding tools to diagnose trends between At Risk and Reference Sites in the abundance and diversity of fauna or flora species on Barrow Island (Section 3.5.1), and other analytical approaches to detect and address changes over time in measured chemical and physical parameters (Sections 3.5.2 and 3.5.3).

Time-series control charts offer a robust approach to understanding trends in a parameter over time and are applied to the vegetation and fauna monitoring programs. With control charts, narrow confidence bands (such as ± 1 standard deviation [SD]) of a measured parameter approximate an 80% power metric (Ref. 19; Ref. 24); therefore, power will be reflected in the deviation of a measured parameter from its baseline mean or appropriate Reference Site. Further details about this statistical method can be found in Ref. 18, Ref. 20, and Ref. 21.

CAPL will implement the proposed monitoring program for ecological elements on Barrow Island summarised in Table 3-1. Ecological elements have been consolidated so that elements not considered to be at risk are combined with representative elements:

- Flora and Vegetation: Previous flora surveys focused on species considered at risk or of uncertain taxonomy (for example, *Erythrina* species, *Acacia* species). These surveys have concluded that the Erythrina populations are not at risk from project activities, and that Acacia taxonomy has been established. Specific Flora monitoring is therefore no longer required, with general flora considered within the biennial flora and vegetation monitoring program.
- Fauna and Habitat: The only fauna habitat considered within this program is Burrowing Bettong (Boodie) warren systems, which are the focal point for monitoring Burrowing Bettongs. The habitat itself is not considered to be at risk from project activities but they are mapped and activity levels captured as part of the monitoring program.
- Groundwater and Ecological Communities: The only listed Ecological community is subterranean fauna which is managed under the Short Range Endemics and Subterranean Fauna Monitoring Plan (Ref. 14). Groundwater is considered a proxy habitat indicator for this species.
- Surface Water Landforms and Physical Landforms: The only landforms considered to be at risk are the Surface Water Landforms, which are monitored on an annual basis to assess project attributable changes outside of the TDF. No other Physical Landforms are considered to be at risk.

If for whatever reason it is not possible to implement or complete one or more programs (e.g. cyclone, safety concerns), CAPL will take measures and/or reprioritise its monitoring programs to meet program objectives.

Management triggers for each element are described in Section 4.

Natural factors such as rainfall, temperature, fire, tide phase, and regional oceanographic conditions (e.g. El Niño-Southern Oscillation) are known to drive natural variation in the parameters measured for selected ecological elements. These factors would be considered as part of data analysis, where required.

3.5.1 Vegetation and Fauna

Changes to the abundance and demographics of fauna, and measures of health and diversity of vegetation are determined by the degree of variation observed between At Risk and Reference Sites (Figure 3-1). However, seabirds (Wedge-tailed Shearwaters and Bridled Terns) do not breed on Barrow Island and therefore the TDF concept does not apply to these species; At Risk and Reference Sites are located within colonies on nearby islands (Figure 3-6).

Time-series control charts are used, which may trigger alert, review, and action triggers based on ± 1, 2, and 3 SDs (Section 4).

3.5.2 Groundwater

All groundwater monitoring sites are located within the relevant TDF and are considered At Risk Sites. Change to groundwater is detected by sampling and analysis, and is based on these criteria:

- published water quality criteria guidelines (Ref. 22; Ref. 23)
- Limits of Reporting (LORs) for analytes not detected above the LORs during baseline monitoring
- maximum recorded baseline values for analytes detected above the LORs during baseline monitoring, which do not have published water quality criteria guidelines.

3.5.3 Surface Water Landforms

Detecting changes to surface water landforms at risk of erosion or sedimentation is undertaken annually using remote sensing and/or direct field inspection of Reference Sites (upstream of the disturbance; e.g. road, pipeline right-of-way); and At Risk Sites (downstream of the disturbance) or by direct field inspection following heavy or cyclonic rainfall (Figure 3-7).

Remote sensing technology (e.g. light detection and ranging or LiDAR) provides surface elevation data that forms the foundation for desktop analysis that complements direct field inspection. Early detection of surface water landform change is based on these criteria:

- assessment of vertical displacement within 1 m cells that exceeds an established statistical significance threshold (±0.25 m) is considered to reflect change
- clusters of adjoining cells with consistent vertical shift are calculated as a horizontal spatial extent (m^2). Areas of classified change exceeding a percentage of the total Reference Site (both within and between time periods) are identified for additional review

- field inspections used to validate remote sensing or quantify landform change assessment.

Sites included in the remote sensing survey of the SWLM program may be transitioned to direct field inspection if:

- a site is compromised by a significant natural event (e.g. fire caused by lightning strike) that renders the site unsuitable for an objective assessment of Project-related influence; and/or
- two or more years have elapsed since clearing or earthworks have occurred at a monitoring site and remote sensing or direct field inspection has not identified any Project-related impact, and no additional Project activities that could impact surface water landforms are planned for that area.

3.5.4 Other Stressors

Environmental stressors identified and evaluated in the TSBSEIR (Ref. 10) and managed through the TSEPP (Ref. 11) are monitored to:

- validate modelling undertaken for routine/planned emissions (e.g. noise)
- record incidents such as leaks, spills, unauthorised clearing, Project-attributable fire, and road mortalities of fauna should they occur
- support the interpretation of trends in measured parameters of ecological elements.

Monitoring of stressors will be implemented to allow operational flexibility such that abnormal events (e.g. extreme weather events), including those beyond CAPL's control, can be accommodated.

Noise emissions were monitored for approximately three months each year during construction, and this monitoring will continue through SIMOPS. The Noise Monitoring Program includes measuring sound pressure levels at various locations within and outside the TDF at frequencies audible to receptors such as the White-winged Fairy-wren (Barrow Island) and mammals.

Silver Gulls (*Chroicocephalus novaehollandiae*) were historically monitored as a biological stressor with potential to increase in abundance due to poor waste and surface water management (see Appendix B). Although this formal monitoring program has ceased, monitoring of Silver Gull abundance and nesting distribution will be undertaken as a study to assess the impact of altered light emissions associated with the transition to operations. The study will focus on monitoring east coast areas during the marine turtle nesting season, and opportunistically on islands monitored for migratory seabird nesting. Monitoring of Silver Gulls may also be undertaken opportunistically through other ecological monitoring programs.

Light monitoring is not undertaken for sensitive terrestrial receptors such as nocturnal mammals and avifauna; however, annual monitoring via the Long-term Marine Turtle Management Plan (Ref. 13) has been undertaken for marine turtles using nesting beaches on the east coast of Barrow Island.

3.5.5 CO_2 Monitoring

MS 800 Schedule 3 Condition 6 (i) and EPBC Reference: 2003/1294 and 2008/4178 Schedule 3 Condition 5 (i) requires the Annual Performance Report to contain information on the volume of reservoir CO_2 and other acid gases removed

from the incoming natural gas stream and available for injection. The monitoring of the volume of reservoir CO_2 and other acid gases available for injection is determined using online analysers located on the exit of the Acid Gas Removal Units.

MS 800 Schedule 3 Condition 6 (ii) and EPBC Reference: 2003/1294 and 2008/4178 Schedule 3 Condition 5 (ii) requires the Annual Performance Report to contain information on the volume of reservoir CO_2 and other gases injected. The volume of reservoir gas and other gases injected is determined using the data obtained from the online analysers located on the exit of the Acid Gas Removal Units and mass flow meters located on the drill centres.

MS 800 Schedule 3 Condition 6 (iii) and EPBC Reference: 2003/1294 and 2008/4178 Schedule 3 Condition 5 (iii) requires the Annual Performance Report to contain information on the results of environmental monitoring and identified Material or Serious Environmental Harm, if any, resulting from the seepage of injected CO_2 to the surface or near surface environments including those which may support subterranean fauna (including the Blind Gudgeon (*Milyeringa verita*). The approval to dispose of CO_2 by injection under the *Barrow Island Act 2003* (WA) requires the development and approval of a Carbon Dioxide Disposal Management Plan (Ref. 16). The Carbon Dioxide Disposal Management Plan was approved by the WA Minister for State Development.

The Carbon Dioxide Disposal Management Plan (Ref. 16) describes the monitoring program to assess the subsurface distribution of injected CO_2. The monitoring program will provide for the early detection of unexpected migration of injected CO_2 outside the injection zone (Dupuy Formation). Monitoring methods include:

- Repeat Surface Seismic
- Repeat Vertical Seismic Profiles
- Passive Microseismic
- Interferometric Synthetic Aperture Radar (InSAR)
- Injection system well monitoring
- Surface/near-surface monitoring (Groundwater, soil gas and remote sensing).

Under the above-mentioned *Barrow Island Act 2003* (WA) approval to dispose of CO_2 by injection, the conditions include a requirement to:

- implement the Carbon Dioxide Disposal Management Plan (Ref. 16)
- review the Carbon Dioxide Disposal Management Plan (Ref. 16) at specific periods during the project life
- notify the Minister responsible for the Barrow Island Act 2003 (WA) of any unplanned migration of injected CO2 out of the injection zone.

In the event that unplanned migration of injected CO_2 occurs outside of the injection zone, migration of the CO_2 to the surface or near-surface environments is not expected to occur. If CO_2 migration detected through the Carbon Dioxide Disposal Management Plan (Ref. 16) monitoring program indicates an increased risk to the surface or near-surface environment, the Terrestrial and Subterranean Environment Monitoring Program (TSEMP) and/or other relevant plans (e.g. Short Range Endemic and Subterranean Fauna Monitoring Plan; Ref. 14) will be

reviewed to ensure that it has the ability to detect Material or Serious Environmental Harm in the areas at risk.

Table 3-1: Terrestrial and Subterranean Environment Monitoring Program

Ecological Element	Taxon, Feature, or Species	Objectives	Indicators, Parameters, and Criteria	Monitoring Frequency[1]
Flora / Vegetation	Coastal complex and dune system Creeks and seasonal drainage lines Limestone slopes and ridges	To detect loss of diversity—attributable to the Gorgon Gas Development and Jansz Feed Gas Pipeline—over time	• Percent foliage cover • Total species richness • Known, suspected, or potential non-indigenous species • Plant health	Every two years
Fauna / Habitat	Barrow Island Euro Spectacled Hare-wallaby	To detect variation in abundance—attributable to the Gorgon Gas Development and Jansz Feed Gas Pipeline—over time	Measures of abundance	Annual
	Burrowing Bettong (Boodie)	To detect variation in abundance—attributable to the Gorgon Gas Development and Jansz Feed Gas Pipeline—over time	Measures of abundance and demographics (sex ratio and reproductive status)	Annual
	Golden Bandicoot	To detect variation in abundance—attributable to the Gorgon Gas Development and Jansz Feed Gas Pipeline—over time	Measures of abundance and demographics (sex ratio and reproductive status)	Annual (SIMOPS) At least every five years or in response to three consecutive years of above or below average annual rainfall (Operations)
	Wedge-tailed Shearwater Bridled Tern	To detect variation in abundance and demographics—attributable to the Gorgon Gas Development and Jansz Feed Gas Pipeline—over time	Measures of abundance and demographics (breeding participation and fledgling success)	Annual
	White-winged Fairy-wren (Barrow Island)	To detect variation in abundance—attributable to the Gorgon Gas Development and Jansz Feed Gas Pipeline—over time	Measures of abundance	Annual

Ecological Element	Taxon, Feature, or Species	Objectives	Indicators, Parameters, and Criteria	Monitoring Frequency[1]
Groundwater / Ecological Communities	Superficial aquifer Subterranean fauna	To detect variation in groundwater parameters—attributable to the Gorgon Gas Development and Jansz Feed Gas Pipeline—over time	Measurement suites are tailored to the GTP and Disposal Well locations based on risk assessment and include: • selected physical parameters • selected metals • selected nutrients; and/or • selected contaminants of concern	Twice yearly
Surface Water Landforms	Geomorphological profile of drainage lines and claypans	To detect impacts to surface water landforms—attributable to the Gorgon Gas Development and Jansz Feed Gas Pipeline—over time	Extent of erosion or sedimentation	Annual

1 *Refer to Section 3.6 (Further Studies). If the implementation of a particular study is believed to impact data quality obtained during regular monitoring, the monitoring program of certain taxa may be temporarily suspended while that specific study is carried out.*

3.6 Further Studies

Knowledge gaps about the risks of Gorgon Gas Development stressors on ecological elements are outlined in the TSBSEIR (Ref. 10). Potential further studies are summarised in Table 3-2. These studies aim to inform and improve the long-term management of potential impacts to ecological elements and may be implemented during existing monitoring programs or as stand-alone research projects in consultation with the Western Australian Department of Biodiversity, Conservation and Attractions (DBCA; formerly Parks and Wildlife) and the Commonwealth Department of Agriculture, Water and the Environment (DAWE; formerly of Environment and Energy). This approach applies to additional stressors that may appear in future; therefore, studies not currently listed in Table 3-2 may also be considered. If the implementation of a particular study might impact data quality obtained during regular monitoring, the impacted monitoring program may be suspended temporarily while that specific study is carried out.

Table 3-2: Potential Further Studies

Taxa	Synopsis
Vegetation	Determine the heat tolerance of vegetation in the area susceptible to impact from the Ground Flare.
Perentie	Estimate Perentie (*Varanus giganteus*) abundance or activity levels on Barrow Island.
Burrowing Bettong (Boodie)	Investigate the social structure and connectivity of Burrowing Bettong (Boodie) warrens on Barrow Island.
Wedge-tailed Shearwater and/or Bridled Tern	Investigate dispersal of fledglings as they leave burrows on Double Islands, to further understand the potential impacts of light emissions from the Gorgon Gas Development on these species.
White-winged Fairy-wren (Barrow Island)	Investigate noise thresholds and/or behavioural responses of White-winged Fairy-wrens on Barrow Island in conjunction with habitat selection and social group structure.
Silver Gulls	Assess the impact of altered light emissions associated with the transition to operations on Silver Gull abundance and nesting distribution, focussing on east coast areas during the marine turtle nesting season, and opportunistically on islands monitored for migratory seabird nesting.

4 Environmental Management Triggers

Management triggers are established to identify and report if a deviation in a measured parameter or indicator may be outside the bounds of what might be expected, given the natural temporal variability measured across At Risk Sites and Reference Sites.

Upper and lower management triggers can alert managers when actions should be taken. These triggers may include statistical deviations, such as standard deviations about a mean, recorded values above or below baseline information or published criteria, or site-based observations. If an environmental management trigger is exceeded, appropriate responses will be considered, including measures to investigate and establish the significance of any Project-attributable adverse impacts.

CAPL uses management triggers based on a tiered structure of alert, review, and action to guide the response strategy to mitigate Material or Serious Environmental Harm from manifesting outside the TDF.

Decision rules differ for management triggers associated with vegetation and fauna, groundwater, and surface water landforms. CAPL will implement the approach used for each of these elements as described in Figure 4-1, Figure 4-2, and Figure 4-3, where appropriate.

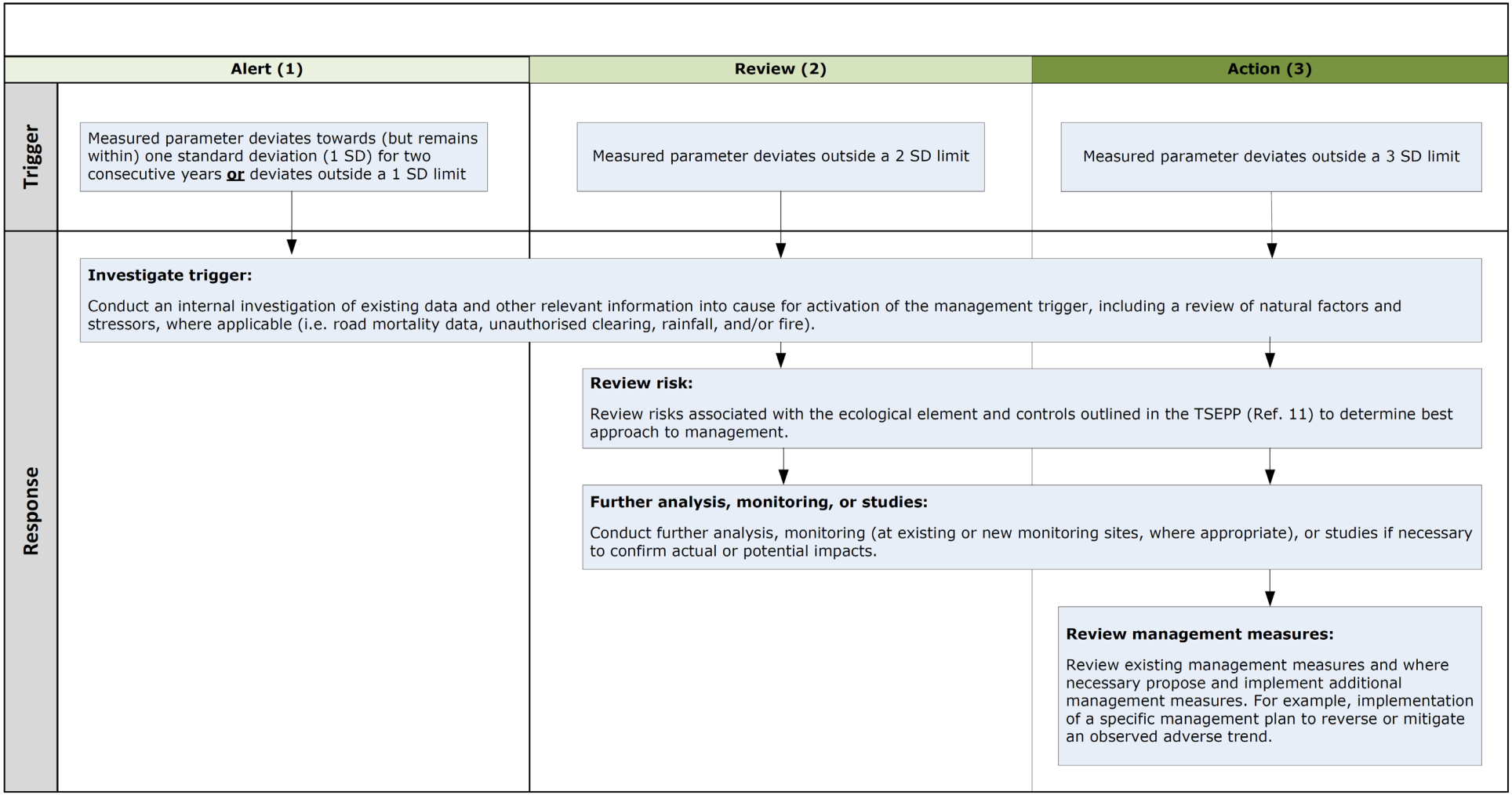

Figure 4-1: Management Triggers and Response Actions for Vegetation and Fauna, Ecological Communities and Habitat

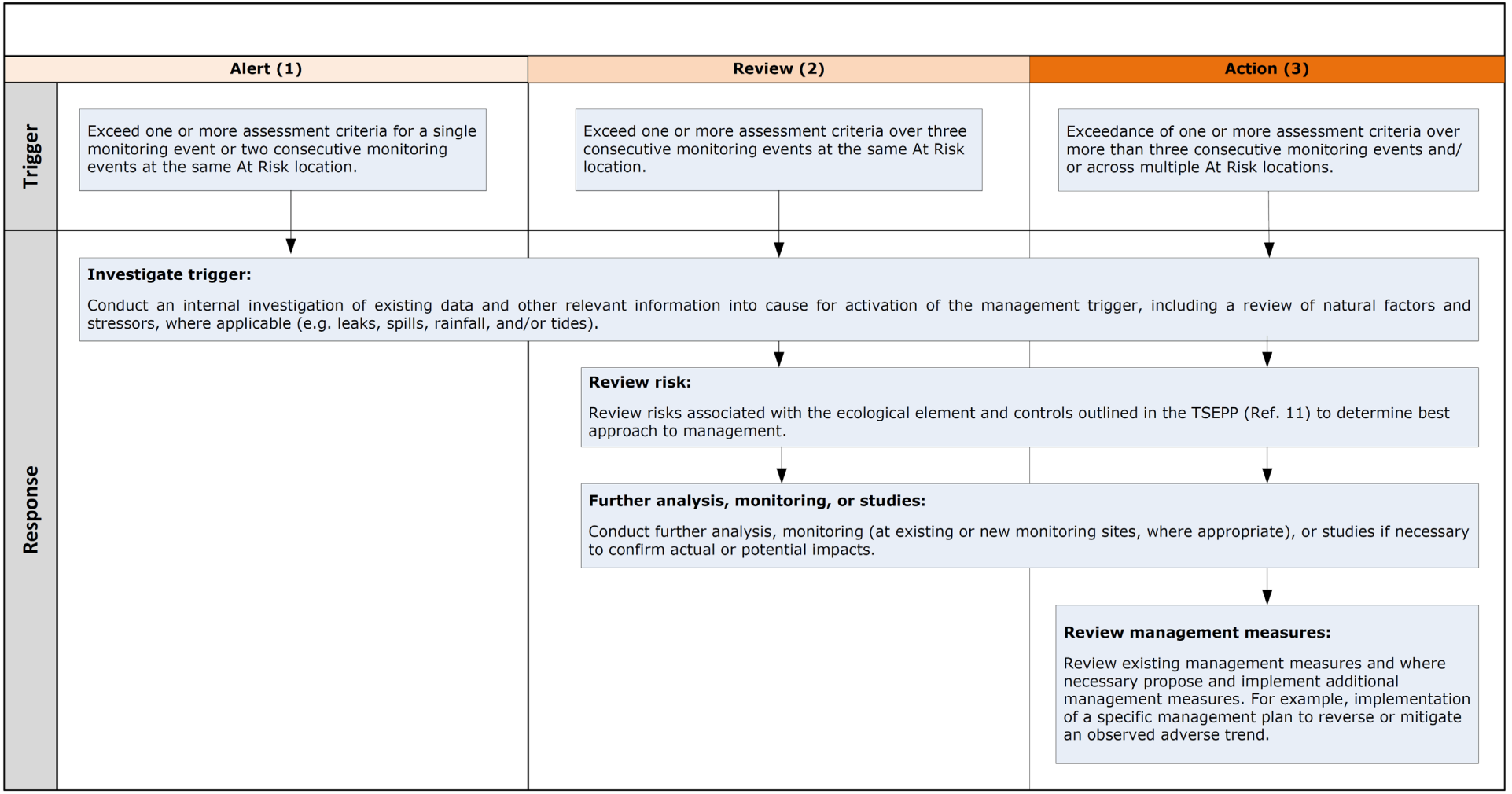

Figure 4-2: Management Triggers and Response Actions for Groundwater

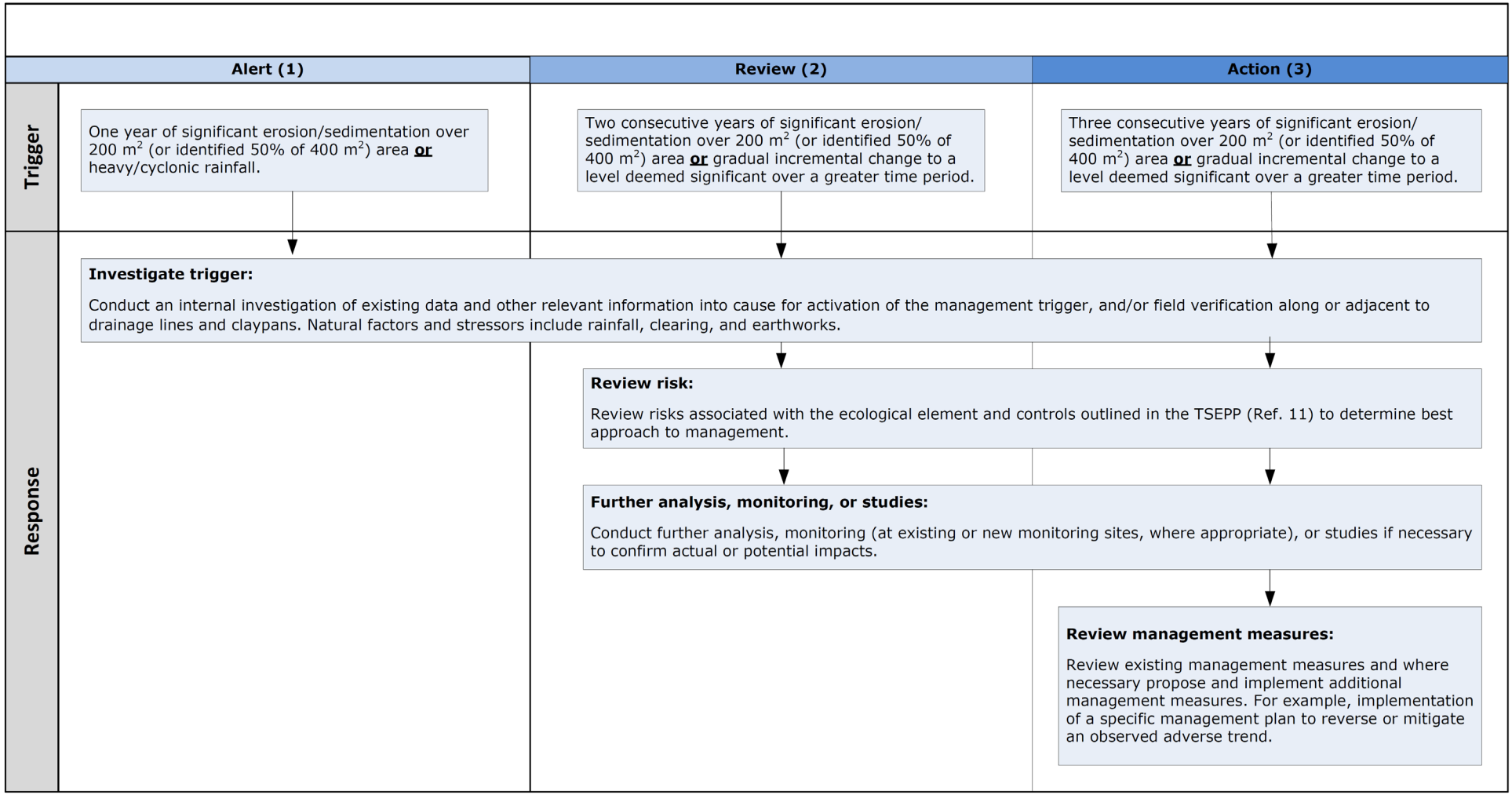

Figure 4-3: Management Triggers and Response Actions for Surface Water Landforms

5 External Reporting

Condition 5.1 of MS 800 and MS 769, and Condition 4 of EPBC Reference: 2003/1294 and 2008/4178 require that monitoring results indicating natural or Project-attributable changes to the ecological elements listed in Section 3.1 are reported via Environment Performance Reports.

Note: Under Condition 3.2.7 of EPBC Reference: 2003/1294 and 2008/4178, reports will be made in respect of impacts to EPBC listed species detected by the monitoring programs under this Program, whether or not the impact is caused by the Gorgon Gas Development and Jansz Feed Gas Pipeline.

Specific reporting protocols are listed in Table 5-1.

Table 5-1: Reporting Protocols

Ecological Change	Report to	Timing[1]
Adverse changes detected[1] through the ecological monitoring program[2] attributable to the Gorgon Gas Development and Jansz Feed Gas Pipeline	DAWE and Department of Water and Environmental Regulation (DWER)	Within 10 business days of verified detection of Management Trigger Level 3
Impacts detected by the monitoring program for matters of NES	DAWE	Within 5 business days of detection

1 *Detection of ecological change may only become apparent following receipt of final monitoring data analysis.*

2 *The ecological monitoring program is outlined in Table 3-1.*

6 Acronyms and Abbreviations

Table 6-1 defines the acronyms and abbreviations used in this document. These terms align with those defined in:

- Schedule 2 of MS 800
- Schedule 2 of MS 769
- EPBC Reference: 2003/1294 and 2008/4178.

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
At risk	Being at risk of Material Environmental Harm or Serious Environmental Harm and/or, for the purposes of the EPBC Act relevant listed threatened species, threatened ecological communities, and listed migratory species, at risk of Material Environmental Harm or Serious Environmental Harm.
Carbon Dioxide 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	Gases consisting predominantly of carbon dioxide recovered during gas processing on Barrow Island
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.
DAWE	Commonwealth Department of Agriculture, Water and the Environment (formerly Environment and Energy)
DBCA	Western Australia Department of Biodiversity, Conservation and Attractions (formerly Parks and Wildlife)
DWER	Western Australian Department of Water and Environmental Regulation (formerly Office of the Environmental Protection Authority)
Environmental Harm	Has the meaning given by Part 3A of the *Environmental Protection Act 1986* (WA)
Environmental Performance Report	Environment Performance Report required by Schedule 3 of MS 800, EPBC Reference: 2008/4178 and EPBC Reference: 2003/1294
Environmental Stressor	A physical, chemical, or biological action, agent, or condition that affects the structure, function or health of a biological system or ecosystem. Environmental stressors may be natural or anthropogenic in origin.
EP Act	Western Australian *Environmental Protection Act 1986*
EPBC Act	Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*
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.

Acronym / Abbreviation	Definition
EPBC Reference: 2011/5942	Commonwealth Ministerial Approval (for the Gorgon Gas Development Fourth Train Expansion Proposal) as amended or replaced from time to time.
Gorgon Gas Development	The Gorgon Gas Development as approved under MS 800 and MS 965 and under EPBC Reference: 2003/1294 and 2008/4178 (as varied by the Commonwealth Environment Minister), as amended or replaced from time to time.
GTP	Gas Treatment Plant
HDD	Horizontal Directional Drilling
InSAR	Interferometric Synthetic Aperture Radar
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.
km	Kilometre
LiDAR	Light Detection and Ranging
LNG	Liquefied Natural Gas
LOR	Limit of Reporting
m	Metre
Management Triggers	Quantitative, or where this is demonstrated to be not practicable, qualitative matters above or below which relevant additional management measures must be considered.
Material Environmental Harm	Environmental harm that is neither trivial nor negligible.
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 748. Initial Gorgon Gas Development comprising two LNG Trains. This was superseded by MS 800.
MS 769	Western Australian Ministerial Statement 769 (for the Jansz Feed Gas Pipeline) as amended from time to time.
MS 800	Western Australian Ministerial Statement 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, and the Fourth Train Expansion Proposal under MS 1002.
MS 865	Western Australian Ministerial Statement 865, issued to establish a restart mechanism for dredging, as amended from time to time.
MS 965	Western Australian Ministerial Statement 965, issued for the Additional Support Area, as amended from time to time.
N/A	Not Applicable
NES	[Matters of] National Environmental Significance, as defined in Part 3, Division 1 of the EPBC Act.
OEPA	Office of the [Western Australian] Environmental Protection Authority
Operations (Gorgon Gas Development)	In relation to MS 800 and EPBC Reference: 2003/1294 and 2008/4178, 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 contract, or equivalent contract entered into in respect of that LNG train of the GTP, until the date on which the Gorgon Joint Venturers commence decommissioning that LNG train.

Acronym / Abbreviation	Definition
Parks and Wildlife	Former Western Australian Department of Parks and Wildlife (now DBCA)
Practicable	For the purposes of MS 769 and MS 800, means reasonably practicable having regard to, among other things, local conditions and circumstances (including costs) and to the current state of technical knowledge. For the purposes of EPBC Reference: 2003/1294 and 2008/4178, when considering whether the plan meets the requirements of these conditions, the Commonwealth Minister will determine what is 'practicable' having regard to local conditions and circumstances including but not limited to personnel safety, weather or geographic conditions, costs, environmental benefit, and the current state of scientific and technical knowledge.
Reference Sites	Specific areas of the environment that are not at risk of being affected by the proposal or existing developments, which can be used to determine the natural state, including natural variability, of environmental attributes such as coral health or water quality.
SD	Standard Deviation
Serious Environmental Harm	Environmental harm that is: • irreversible, of a high impact or on a wide scale; or • significant or in an area of high conservation value or special significance and is neither trivial nor negligible.
SIMOPS	Simultaneous construction and operations
SRE	Short-range Endemic
Stressor	*See* Environmental Stressor
SWLM	Surface Water Landform Monitoring
TAPL	Texaco Australia Pty Ltd
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, Condition 6.3 of MS 769, Schedule 1 of MS 965, and Condition 5.2 of EPBC Reference: 2003/1294 and 2008/4178.
Terrestrial Facilities	In relation to MS 800 and EPBC Reference: 2003/1294 and 2008/4178, the terrestrial facilities are the: • GTP • 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. Terrestrial Facilities also include those defined in Schedule 1 of MS 965 (the Additional Support Area).
TSBSEIR	Terrestrial and Subterranean Baseline State and Environmental Impact Report.
TSEMP	Terrestrial and Subterranean Environment Monitoring Program
TSEPP	Terrestrial and Subterranean Environmental Protection Plan
WA	Western Australia

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
1.	Government of Western Australia, Minister for the Environment, David Templeman MLA. 2008. *Statement that a Proposal may be Implemented – Jansz Feed Gas Pipeline: Barrow Island Nature Reserve (Ministerial Statement 769), 28 May 2008*. Perth, Western Australia.
2.	Commonwealth Government of Australia, Assistant Secretary Environmental Assessment Branch, Anne-Marie Delahunt. 2006. *Decision to Approve the taking of an Action – Jansz Feed Gas Pipeline (EPBC Reference: 2005/2184), 22 March 2006*. Canberra, Australian Capital Territory.
3.	Environmental Protection Authority. 2008. *Change to Gorgon Gas Development on Barrow Island Nature Reserve – Ministerial Statement 748. Approval under section 45C of the* Environmental Protection Act 1986*. Approval letter issued 21 May 2008, EPA Ref: DEC Doc 48104*. Perth, Western Australia.
4.	Government of Western Australia, Minister for the Environment, Youth, Donna Faragher JP MLC. 2009. *Statement that a Proposal may be Implemented – Gorgon Gas Development Revised and Expanded Proposal: Barrow Island Nature Reserve (Ministerial Statement 800), 10 August 2009.* Perth, Western Australia.
5.	Commonwealth Government of Australia, Minister for the Environment, Water, Heritage and the Arts, Peter Garrett. 2009. *Approval – Gorgon Gas Development (EPBC Reference: 2008/4178), 26 August 2009*. Canberra, Australian Capital Territory.
6.	Commonwealth Government of Australia, Minister for the Environment and Water Resources, Malcolm Turnbull. 2007. *Approval – Gorgon Gas Development (EPBC Reference: 2003/1294), 3 October 2007*. Canberra, Australian Capital Territory.
7.	Government of Western Australia, Minister for the Environment; Water, Hon Bill Marmion MLA. 2011. *Statement to Amend Conditions Applying to a Proposal – Gorgon Gas Development Revised and Expanded Proposal: Barrow Island Nature Reserve (Ministerial Statement 865), 8 June 2011.* Perth, Western Australia.
8.	Government of Western Australia, Minister for the Environment; Heritage. Albert P. Jacob JP MLA. 2014. *Statement that a Proposal may be Implemented – Gorgon Gas Development Additional Construction Laydown and Operations Support Area (Ministerial Statement 965)*. Perth, Western Australia.
9.	Government of Western Australia, Minister for the Environment; Heritage. Albert Jacob MLA. 2015. *Statement that a Proposal may be Implemented – Gorgon Gas Development Fourth Train Expansion Proposal (Ministerial Statement 1002)*. Perth, Western Australia.
10.	Chevron Australia. 2014. *Gorgon Gas Development and Jansz Feed Gas Pipeline: Terrestrial and Subterranean Baseline State and Environmental Impact Report*. Chevron Australia, Perth, Western Australia.
11.	Chevron Australia. 2014. *Gorgon Gas Development and Jansz Feed Gas Pipeline: Terrestrial and Subterranean Environment Protection Plan.* Chevron Australia, Perth, Western Australia. (G1-NT-PLNX0000294)
12.	Chevron Australia. 2005. *Draft Environmental Impact Statement/Environmental Review and Management Programme for the Proposed Gorgon Gas Development*. Chevron Australia, Perth, Western Australia.
13.	Chevron Australia. 2014. *Gorgon Gas Development and Jansz Feed Gas Pipeline: Long-term Marine Turtle Management Plan*. Chevron Australia, Perth, Western Australia. (G1-NT-PLNX0000296)
14.	Chevron Australia. 2014. *Gorgon Gas Development and Jansz Feed Gas Pipeline: Short Range Endemics and Subterranean Fauna Monitoring Plan*. Chevron Australia, Perth, Western Australia. (G1-NT-PLNX0000295)

Ref. No.	Description
15.	Chevron Australia. 2014. *Gorgon Gas Development and Jansz Feed Gas Pipeline: Coastal Stability Management and Monitoring Plan*. Chevron Australia, Perth, Western Australia. (G1-NT-PLNX0000300)
16.	Chevron Australia. 2015. *Gorgon Project: Carbon Dioxide Disposal Management Plan*. Chevron Australia, Perth, Western Australia. (G1-NT-REPX0001721)
17.	Chevron Australia. 2008. *Gorgon Gas Development Revised and Expanded Proposal Public Environmental Review.* Chevron Australia, Perth, Western Australia.
18.	Data Analysis Australia. 2008. *Power Analysis for Monitoring Ecological Elements on Barrow Island for the Gorgon Gas Development*. Unpublished report for Chevron Australia, Perth, Western Australia.
19.	Anderson, M.J. and Thompson, A.A. 2004. Multivariate control charts for ecological and environmental monitoring. *Ecological Applications,* 14: 1921–1935
20.	Manly, B.F.J. and Mackenzie, D. 2000. A cumulative sum type of method for environmental monitoring. *Environmetrics,* 11: 151–166
21.	Morrison, L.W. 2008. The use of control charts to interpret environmental monitoring data. *Natural Areas Journal,* 28: 66–73
22.	Department of Environmental Regulation. 2014. *Assessment and Management of Contaminated Sites, Contaminated Sites Guidelines*. Department of Environment Regulation, Perth, Western Australia.
23.	Hickey, C. 2002. *Technical Memorandum: Nitrate Guideline Values in ANZECC 2000*. National Institute of Water & Atmospheric Research Ltd, Hamilton, New Zealand.
24.	Chaloupka, M. 2009. *Defining measurable limits for monitoring long-term status and trend for the flatback marine turtle population that nests on Barrow Island, Western Australia*. Report for Chevron Australia, Perth, Western Australia.
25.	Commonwealth Government of Australia, Assistant Secretary Assessment (WA, SA, NT) and Air Branch, Bruce Edwards. 2016. *Approval – Gorgon Gas Development – Fourth Train Expansion (EPBC 2011/5942), 12 May 2016*. Canberra, Australian Capital Territory.

Appendix A Compliance Reporting Table

Section No.	Actions	Timing
3.3	The status of ecological elements at risk will be revised if the boundaries of the areas identified as being at risk are modified or if data collected incidentally indicates actual, or high likelihood of, impacts to ecological elements not previously identified as being at risk.	All phases
3.5	CAPL will implement the monitoring program for ecological elements on Barrow Island summarised in Table 3-1. If for whatever reason it is not possible to implement or complete one or more programs (e.g. cyclone, safety concerns), CAPL will take measures and/or reprioritise its monitoring programs to meet program objectives.	All phases
3.5.4	Noise emissions were monitored for approximately three months each year during construction and this monitoring will continue through SIMOPS.	All phases
3.5.4	Monitoring of Silver Gull abundance and nesting distribution will be undertaken as a study to assess the impact of altered light emissions associated with the transition to operations.	Construction
3.5.5	If CO_2 migration detected through the Carbon Dioxide Disposal Management Plan (Ref. 16) monitoring program indicates an increased risk to the surface or near-surface environment, the TSEMP and/or other relevant plans (e.g. Short Range Endemic and Subterranean Fauna Monitoring Plan; Ref. 14) will be reviewed to ensure that it has the ability to detect Material or Serious Environmental Harm in the areas at risk.	Operations
4	Decision rules differ for management triggers associated with vegetation and fauna, groundwater, and surface water landforms. CAPL will implement the approach used for each of these elements as described in Figure 4-1, Figure 4-2, and Figure 4-3, where appropriate.	All phases

Appendix B Historical Monitoring Programs on Barrow Island

Ecological Element	Program	Duration	Outcome Summary
Flora	Barrow Island Targeted Flora Monitoring Program	2011–2014	Surveys of *Acacia bivenosa* x *sclerosperma* subsp. s*clerosperma* or *Erythrina vespertilio* populations identified no adverse impacts from Gorgon Gas Development activities. This program ceased in 2015 after consultation with Parks and Wildlife (now DBCA) and the OEPA (now DWER).
Vegetation	Dust Impact Vegetation Monitoring Program	2009–2014	Vegetation monitoring indicated no significant impact to vegetation health from dust deposition that was distinguishable above natural variation due to rainfall. Therefore, it was determined that terrestrial flora and vegetation on Barrow Island are not at risk from dust generated by Gorgon Gas Development activities. This program ceased in 2015 after consultation with Parks and Wildlife (now DBCA) and the OEPA (now DWER).
Fauna	Silver Gull Monitoring Program	2009–2016	Monitoring results remained within control limits for At Risk Sites for all years monitored and CAPL has demonstrated ongoing management of waste, surface water, and light, which were identified as potential drivers for an increase in Silver Gull abundance. Silver Gulls have been identified for additional monitoring as a study under the Potential Further Studies initiative.
Fauna / Habitat	Barrow Island Raptor Monitoring Program	2009–2011	In 2009, a monitoring program was implemented to collect data relating to the location of raptor nest sites on Barrow Island and to identify which of these nest sites were active or inactive. This monitoring program was concluded on the basis of limitations such as the location of nests on elevated platforms or on offshore islands, meaning it was not possible to directly observe reproductive success. In addition, insufficient numbers of active nesting sites were recorded within and outside the TDF, and therefore the small sample size and annual variation in nest use that was observed resulted in an inability to detect changes with an appropriate degree of statistical confidence. This program ceased in 2011 after consultation with Parks and Wildlife (now DBCA). A review of road mortality records of raptors since 2009 further indicates that these species are not at high risk of vehicle strike, as previously assessed.

Appendix C Annual Reporting Requirements for the Performance of the Carbon Dioxide Injection System

Approval	Requirement	Reporting Method
MS 800 Schedule 3.6(i) EPBC Reference: 2003/1294 and 2008/4178 Schedule 3.5(i)	Volume of reservoir carbon dioxide and other acid gases removed from the incoming natural gas stream and available for injection. The monitoring of the volume of reservoir CO_2 and other acid gases available for injection is determined using online analysers located on the exit of the Acid Gas Removal Units.	Documented in the Environmental Performance Report. Measurement of total gas processed with composition monitoring to determine the volume of reservoir carbon dioxide and other acid gases available for injection.
MS 800 Schedule 3.6(ii) EPBC Reference: 2003/1294 and 2008/4178 Schedule 3.5(ii)	Volume of reservoir carbon dioxide and other gases injected. The volume of reservoir gas and other gases injected is determined using the data obtained from the online analysers located on the exit of the Acid Gas Removal Units and mass flow meters located on the drill centres.	Documented in the Environmental Performance Report. Measurement of reservoir carbon dioxide and other acid gases being injected.
MS 800 Schedule 3.6(iii) EPBC Reference: 2003/1294 and 2008/4178 Schedule 3.5(iii)	Results of environmental monitoring and identified Material or Serious Environmental Harm, if any, resulting from the seepage of injected carbon dioxide to the surface or near-surface environments including those which may support subterranean fauna (including the Blind Gudgeon (*Milyeringa verita*)	Documented in the Environmental Performance Report. Monitoring program under the Carbon Dioxide Disposal Management Plan (Ref. 16) includes measures to detect unplanned migration of injected carbon dioxide outside of the injection zone. If monitoring indicates an increased risk to the surface or near-surface environment, the TSEMP, and/or other relevant plans (e.g. Short Range Endemic and Subterranean Fauna Monitoring Plan; Ref. 14) will be reviewed to ensure that it has the ability to detect Material or Serious Environmental Harm in the areas at risk.
MS 800 Schedule 3.6(iv) EPBC Reference: 2003/1294 and 2008/4178 Schedule 3.5(iv)	Reasons for shortfall between the volume of reservoir carbon dioxide extracted and injected	Documented in the Environmental Performance Report, if required.
MS 800 Schedule 3.6(v) EPBC Reference: 2003/1294 and 2008/4178 Schedule 3.5(v)	In the event the amount of carbon dioxide injected falls significantly below the target levels set in Condition 26.2 the Proponent shall report on: measures that could be implemented that would ensure that target level set in Condition 26.2 is met or, if injection is not considered feasible for all or some of the gas, measures to otherwise offset which if any of these measures the Proponent intends to implement	Documented in the Environmental Performance Report, if required.
MS 800 Schedule 3.6(vi) EPBC Reference: 2003/1294 and	In the event that monitoring shows there is an elevated risk of Material or Serious Environmental Harm and/or risk to human health associated with the injection of reservoir carbon	Documented in the Environmental Performance Report. An elevated risk of Material or Serious Environmental Harm and/or risk to human

Approval	Requirement	Reporting Method
2008/4178 Schedule 3.5(vi)	dioxide, the Proponent shall report to the Minister on the efficacy of continuing to geo-sequester and alternative offsets considered instead of continuing injection of reservoir carbon dioxide.	health associated with injected carbon dioxide migration into surface or near-surface environments will be evaluated to assess the efficacy of continuing to geosequester carbon dioxide, including consideration of alternative offsets.

Appendix D Identification and Risk Assessment of Terrestrial Matters of National Environmental Significant (NES)