



Gorgon Gas Development and Jansz Feed Gas Pipeline Topsoil Management Plan

Document No:	G1-NT-PLNX0000769	Revision:	3
Revision Date:	15 April 2014	Copy No:	
IP Security:	Public		

Table of Contents

Terminology, Definitions and Abbreviations	6
1.0 Introduction	7
2.0 Topsoil Strategy	7
3.0 Topsoil Recovery, Direct Lay, and Topsoil Storage	8
3.1 Topsoil Recovery	8
3.2 Direct Lay of Topsoil	8
3.3 Management of Stored Topsoil	8
4.0 Performance Measurement	12
5.0 Reporting	12
6.0 References	13
Appendix 1 Compliance Reporting Table	14

List of Tables

Table 3-1 Topsoil Storage Sites, Soil Type, Volumes, and Source	9
---	---

List of Figures

Figure 3-1 Topsoil Storage Locations, Soil Type, and Source	11
---	----

Terminology, Definitions and Abbreviations

Additional Support Area	Gorgon Gas Development Additional Construction, Laydown, and Operations Support Area
BWIJV	Barrow Island Joint Venture
DEC	Former Western Australian Department of Environment and Conservation (now DPaW and/or Department of Environment Regulation [DER])
DMP	Western Australian Department of Mines and Petroleum
DPaW	Western Australian Department of Parks and Wildlife (formerly DEC)
ha	Hectare
LNG	Liquefied Natural Gas
m	Metre
m ³	Cubic metre
mm	Millimetre

1.0 Introduction

This Plan provides detailed guidance and direction for the management and use of topsoil recovered from the Construction Village, Gas Treatment Plant, and Additional Support Area sites, which are part of the Gorgon Gas Development on Barrow Island. This Plan complements the Post-Construction Rehabilitation Plan (Chevron Australia 2009a).

This Plan addresses the stripping, transport, and re-use of recovered topsoil from the Construction Village, Gas Treatment Plant, and Additional Support Area sites, either as direct lay or stockpiled for future use. This Plan identifies the different sources and volumes of topsoil that may be recovered during construction, and identifies the locations where this soil can be stockpiled. It also identifies the monitoring program to be undertaken to measure ongoing topsoil viability.

2.0 Topsoil Strategy

Chevron Australia's strategy for the management and use of topsoil is based on gaining maximum benefit from the biological values of topsoil recovered from the Gas Treatment Plant, Construction Village, and Additional Support Area sites for the improvement of rehabilitation on Barrow Island.

The elements of the strategy are:

- Optimise the recovery of biologically active and weed-free topsoil from the Gorgon Gas Development footprint on Barrow Island.
- Where practicable, immediately transfer topsoil from topsoil stripping sites to suitable rehabilitation sites (direct lay). Rehabilitation sites are comprised of Barrow Island Joint Venture (BWIJV) oilfield sites that require rehabilitation and that are available at the time of stripping operations.
- Where direct lay is not possible, store recovered topsoil for later use on BWIJV rehabilitation sites.
- Store sufficient topsoil to aid the rehabilitation of the Gorgon Gas Development footprint on Barrow Island.
- Undertake a review of the current knowledge and experience in the management and use of topsoil on Barrow Island and apply lessons learnt to future rehabilitation works.
- Develop and enhance the knowledge of topsoil management and use on Barrow Island through the application of trials of topsoil use and management techniques.
- Monitor topsoil stockpiles for stability, floristic diversity, and seed viability annually, or at some other agreed interval.
- Use the outcomes of the monitoring program to determine the topsoil stockpile maintenance strategy.
- Develop and apply success criteria for topsoil stockpile management performance to ensure maximum value to Barrow Island rehabilitation.

3.0 Topsoil Recovery, Direct Lay, and Topsoil Storage

3.1 Topsoil Recovery

The top 50 mm of topsoil will be recovered, where practicable. This represents best practice topsoil management under favourable conditions in the Pilbara. Experience indicates that actual recovery will be in the range of 50 to 100 mm; this reflects limitations in the ability of machinery to recover a shallower layer of soil rather than the true biological value. The true biological values lay mainly in the top 10 to 15 mm of the soil profile. Taking into account the rocky nature of the surface, topsoil recovery has been estimated to be between 69 000 and 90 000 m³. The inclusion of rocky material in the topsoil will be avoided in the stripping and recovery process as much as possible, as rocky material can compromise the quality of topsoil and will compete for storage space.

Stripping of topsoil has been divided into two community categories—Limestone and Flats—based on flora and vegetation data from the Terrestrial and Subterranean Baseline State and Environment Report (Chevron Australia 2012a).

Flats communities tend to be less rocky and are expected to yield greater volumes of topsoil from the area stripped. Limestone communities have a lower yield of topsoil due to more outcropping limestone.

3.2 Direct Lay of Topsoil

The preferred use for recovered topsoil is to transport fresh topsoil directly to suitable BWIJV sites that have been prepared and are ready for rehabilitation. This topsoil can then be directly laid at the site to enhance rehabilitation. The BWIJV has identified a number of sites that can be rehabilitated over the time that topsoil stripping will take place on Gorgon Gas Development sites. Gorgon personnel will work with BWIJV personnel to schedule and coordinate this activity and to ensure that sites are prepared in time to receive the newly stripped topsoil. Gorgon personnel will transport the required volume of topsoil to the site for BWIJV personnel to spread and complete rehabilitation. Topsoil will be provided that suits the characteristics of the rehabilitation site.

3.3 Management of Stored Topsoil

Of the eight sites identified for the storage of topsoil, only six have been used for topsoil storage. The location of each storage site is shown in Figure 3-1, with details of the soil type, volume, and source of soil stored at each site shown in Table 3-1. Details of preparation and management of each storage location is recorded.

Table 3-1 Topsoil Storage Sites, Soil Type, Volumes, and Source

Topsoil Storage Area	Available Storage Area (ha)	Soil Type (Vegetation Community)	Source of Topsoil	Total Volume Stockpiled (m ³)
A28W	0.94	Flats	Gas Treatment Plant Site	7483
X62J	2.33	Flats	Gas Treatment Plant Site	19652
P13	1.41	Flats	Construction Village and Gas Treatment Plant Site	13316
Q31	1.0	Flats	Gas Treatment Plant Site	9850
Perentie II	0.53	Limestone	Gas Treatment Plant Site	9463
R Station	0.46	Flats	Gas Treatment Plant Site	3481
Additional Land	0.2	Flats	Additional Support Area	277
Additional Land	1.8	Limestone	Additional Support Area	9378
TOTAL	8.67			72900¹

Topsoil will be stored and managed according to these parameters and principles:

- To date, approximately 70 000 m³ has been recovered; however, this does not include the volume of topsoil that will be used for direct rehabilitation and volumes that are to be transferred to BWIJV sites for use.
- Remove topsoil from storage sites with the highest risk of erosion or loss of viability.
- Manage weeds according to the Weed Hygiene Common User Procedure (Chevron Australia 2012b). Eradicate weeds identified on topsoil stockpiles in accordance with Quarantine Non-Indigenous Species Management Procedure (Chevron Australia 2009b) prior to using the soil in rehabilitation.
- When all topsoil has been removed from a storage location (refer to Figure 3-1), rehabilitation shall be carried out according to the Post-Construction Rehabilitation Plan (Chevron Australia 2009a).
- To enable an annual reconciliation of topsoil volumes recovered, stored and re-used, develop and maintain a register to collect data on:
 - the volumes and source of topsoil recovered from the Gas Treatment Plant, Construction Village, and Additional Support Area sites
 - stockpile locations and soil type
 - topsoil provided directly to BWIJV for direct lay
 - topsoil recovered from stockpiles for rehabilitation.
- Report topsoil usage and topsoil balances in the Annual Environmental Performance Report prepared by Chevron Australia
- Review historical topsoil storage and use on Barrow Island to inform the use and storage of topsoil sourced from the Gorgon Gas Development.

¹ Figure as at January 2014. Changes to volume of soil stockpiled as a result of rehabilitation or clearing activities are reported in the Annual Environmental Performance Report.

As topsoil will be stored for many years (10 to 15 years in stockpiles set aside for the BWIJV, and up to 60 years for rehabilitation of the Gorgon Gas Development area), Chevron Australia will undertake monitoring and active management of stored topsoil to maintain the floristic diversity and viability of the topsoil resource. Activities will include:

- Fence topsoil storage locations to exclude grazing and burrowing mammals, except for those locations required to be left unfenced for monitoring purposes.
- Conduct a trial to determine if fencing is a valid topsoil stockpile management measure.
- Apply selective stockpile stripping practices during recovery programs to maintain maximum surface area and stimulate regeneration of the remaining topsoil. Recovery of topsoil from stockpiles will be spaced over time to enable recovery of soil stability and regeneration of vegetation and soil viability.
- Investigate and develop management and maintenance programs to increase topsoil viability should monitoring indicate a decline. Use the outcomes from monitoring to develop indicative time frames for maintenance activities. Maintenance techniques to be considered may include: mechanical disturbance; aeration; use of fire; reduction of stockpile depth; and selective stripping.
- Consult with the Western Australian Department of Parks and Wildlife (DPaW) and the Department of Mines and Petroleum (DMP) in developing the monitoring and management programs. Review the results informally annually, with a formal review every five years, until monitoring trends indicate this is no longer required.

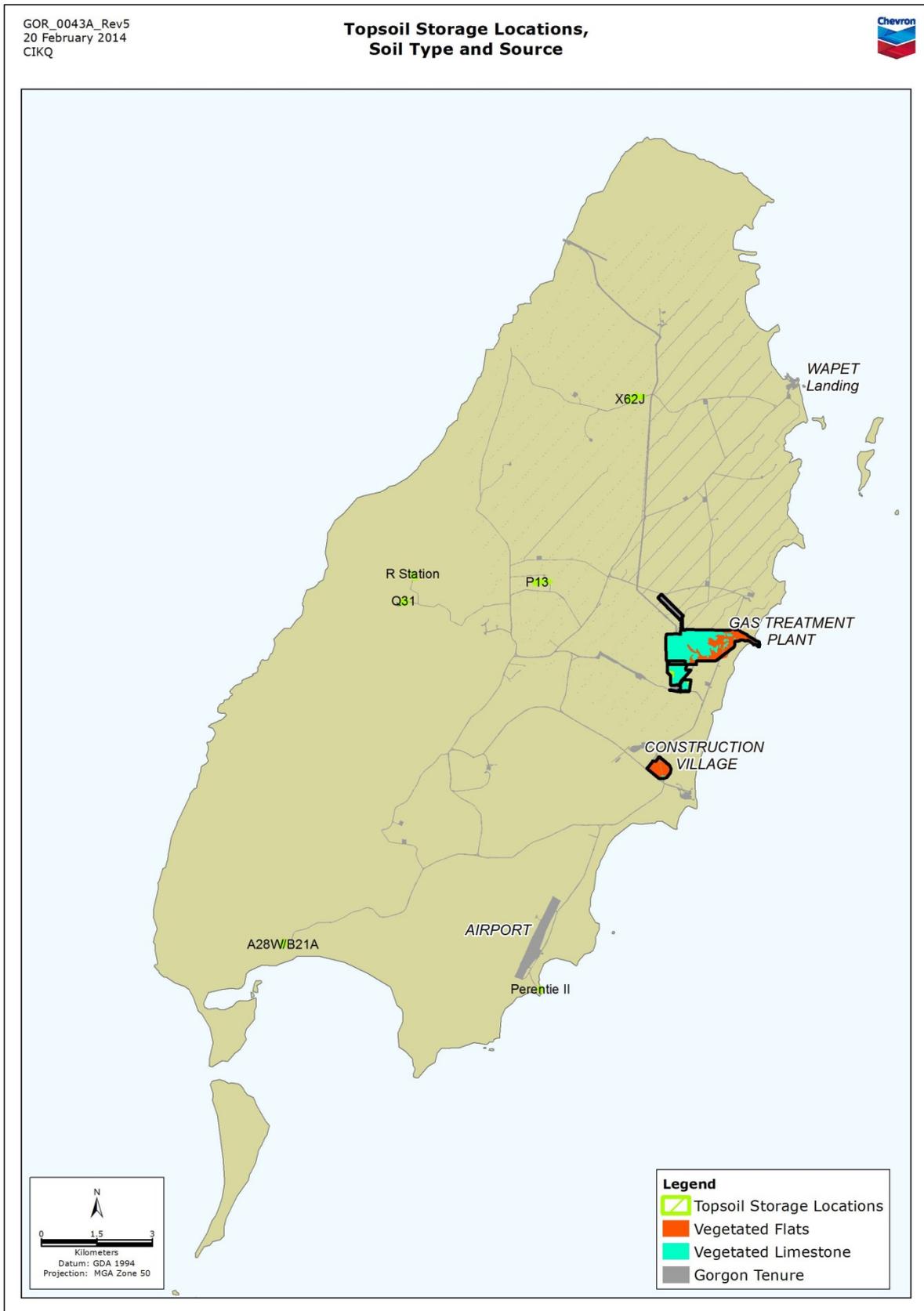


Figure 3-1 Topsoil Storage Locations, Soil Type, and Source

4.0 Performance Measurement

Topsoil performance will be measured by the topsoil monitoring program and will include soil and stockpile stability, vegetation establishment, weeds and ecosystem establishment. Monitoring will include measures of topsoil viability and floristic diversity, which may include measurement of microbial activity, soil respiration rate, and invertebrate activity.

5.0 Reporting

The results of the monitoring program, topsoil performance reviews and topsoil volume reconciliation will be reported in the Annual Environmental Performance Report produced by Chevron Australia (Government of Western Australia 2009).

Condition 4 of Statement No. 800 requires Chevron Australia to submit an annual Compliance Assessment Report to address the previous 12-month period. A compliance reporting table is provided in Appendix 1 to assist with auditing for compliance with this Plan for Statement No. 800. In accordance with Conditions 2-1 and 2-2 of Statement No.965, compliance assessment and compliance reporting will be carried out on a joint basis with Statement No.800.

6.0 Review

Changes made to this Plan will be made in consultation with, and to the satisfaction of, DPaW.

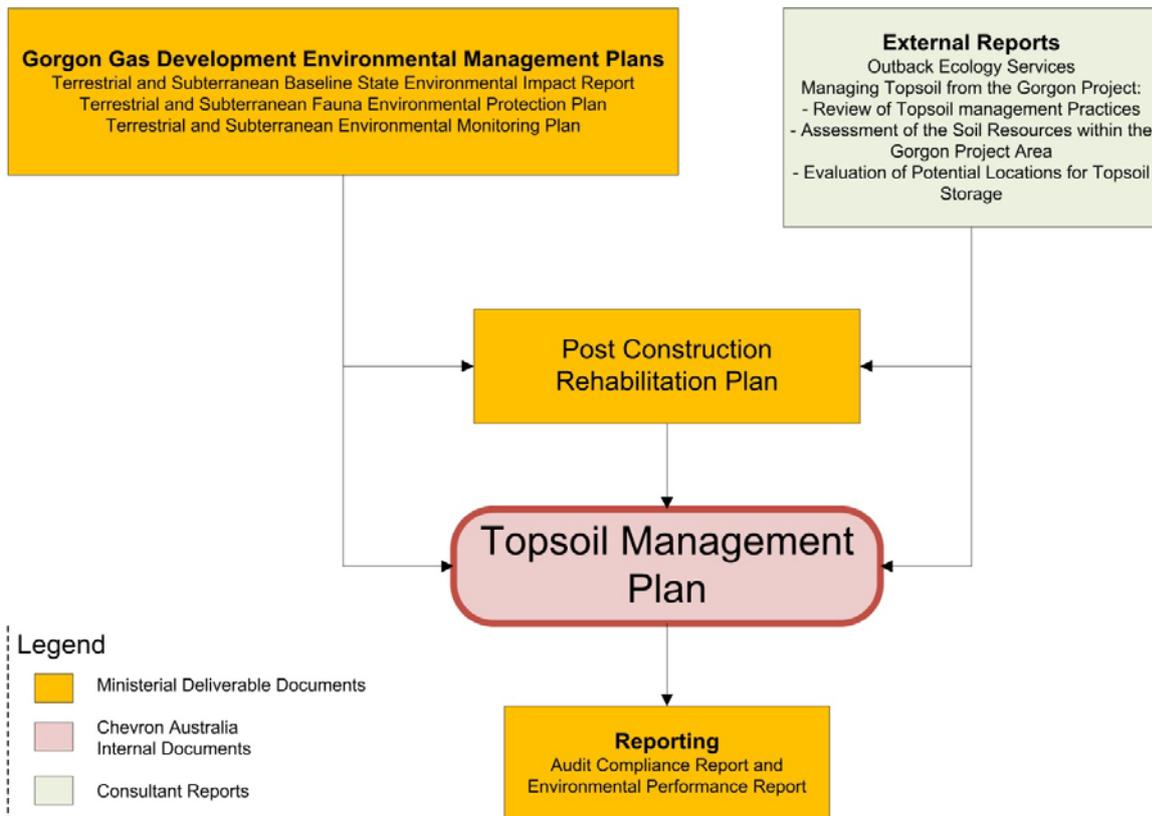


Figure 6-1 Relationship of this Plan to Other Gorgon Documents

7.0 References

Chevron Australia. 2009a. *Gorgon Gas Development and Jansz Feed Gas Pipeline: Post-Construction Rehabilitation Plan*. Chevron Australia, Perth, Western Australia (G1-NT-PLNX0000303).

Chevron Australia. 2009b. *Gorgon Gas Development and Jansz Feed Gas Pipeline: Non-Indigenous Species Management Procedure*. Chevron Australia, Perth, Western Australia (G1-PP-QRT-POL-0001).

Chevron Australia. 2012a. *Gorgon Gas Development and Jansz Feed Gas Pipeline: Terrestrial and Subterranean Baseline State and Environmental Impact Report*. Chevron Australia, Perth, Western Australia (G1-TE-H-0000-REPX027).

Chevron Australia. 2012b. *Gorgon Gas Development and Jansz Feed Gas Pipeline: Weed Hygiene Common User Procedure*. Chevron Australia, Perth, Western Australia (G1-PP-HES-PRC-0016).

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 No. 800), 10 August 2009*. Perth, Western Australia.

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 No. 965), 2 April 2014*. Perth, Western Australia.

Appendix 1 Compliance Reporting Table

No.	Actions	Timing
3.1	The top 50 mm of topsoil will be recovered, where practicable.	Construction and Operations
3.1	The inclusion of rocky material in the topsoil will be avoided in the stripping and recovery process as much as possible, as rocky material can compromise the quality of the topsoil and will compete for storage space	Construction and Operations
3.2	The BWIJV has identified a number of sites that can be rehabilitated over the time that topsoil stripping will take place on Gorgon Gas Development sites. Gorgon personnel will work with BWIJV personnel to schedule and coordinate this activity and to ensure that sites are prepared in time to receive the newly stripped topsoil. Gorgon personnel will transport the required volume of topsoil to the site for BWIJV personnel to spread and complete rehabilitation. Topsoil will be provided that suits the characteristics of the rehabilitation site.	Construction and Operations
3.3	<p>Topsoil will be stored and managed according to these parameters and principles:</p> <ul style="list-style-type: none"> • Approximately 70 000 m³ of topsoil has been recovered, however this does not include the volume of topsoil that will be used for direct rehabilitation and volumes that are to be transferred to BWJV sites for use. • Remove topsoil from storage sites with the highest risk of erosion or loss of viability. • Manage weeds according to the Weed Hygiene Common User Procedure. Eradicate weeds identified on topsoil stockpiles in accordance with Quarantine Non-Indigenous Species Management Procedure prior to using the soil in rehabilitation. • When all topsoil has been removed from a storage location (refer to Figure 3-1), rehabilitation shall be carried out according to the Post-Construction Rehabilitation Plan. • To enable an annual reconciliation of topsoil volumes recovered, stored and re-used, develop and maintain a register to collect data on: <ul style="list-style-type: none"> ○ the volumes and source of topsoil recovered from the Gas Treatment Plant, Construction Village and Additional Support Area sites ○ stockpile locations and soil type ○ topsoil provided directly to BWIJV for direct lay ○ topsoil recovered from stockpiles for rehabilitation. • Report topsoil usage and topsoil balances in the Annual Environmental Performance Report prepared by Chevron Australia. • Review historical topsoil storage and use on Barrow Island to inform the use and storage of topsoil sourced from the Gorgon Gas Development Project. 	Construction and Operations
3.3	<p>As topsoil will be stored for many years (10 to 15 years in stockpiles set aside for the BWIJV, and up to 60 years for rehabilitation of the Gorgon Gas Development area), Chevron Australia will undertake monitoring and active management of stored topsoil to maintain the floristic diversity and viability of the topsoil resource. Activities will include:</p> <ul style="list-style-type: none"> • Fence topsoil locations to exclude grazing and burrowing mammals, except for those locations required to be left unfenced for monitoring purposes. • Conduct a trial to determine if fencing is a valid topsoil stockpile 	Construction and Operations

No.	Actions	Timing
	<p>management measure.</p> <ul style="list-style-type: none"> • Apply selective stockpile stripping practices during recovery programs to maintain maximum surface area and stimulate regeneration of the remaining topsoil. Recovery of topsoil from stockpiles will be spaced over time to enable recovery of soil stability and regeneration of vegetation and soil viability. • Investigate and develop management and maintenance programs to increase topsoil viability should monitoring indicate a decline. Using the outcomes from monitoring, develop indicative time frames for maintenance activities. Maintenance techniques to be considered may include: mechanical disturbance; aeration; use of fire; reduction of stockpile depth; and selective stripping. • Consult with the Western Australian Department of Parks and Wildlife (DPaW) and the Department of Mines and Petroleum (DMP) in developing the monitoring and management programs. Review the results informally annually, with a formal review every five years, until monitoring trends indicate this is no longer required. 	
4.0	<p>Topsoil performance will be measured by the topsoil monitoring program and will include soil and stockpile stability, vegetation establishment, weeds and ecosystem establishment. Monitoring will include measures of topsoil viability and floristic diversity, which may include measurement of microbial activity, soil respiration rate, and invertebrate activity.</p>	<p>Construction and Operations</p>
5.0	<p>The results of the monitoring program, topsoil performance reviews and topsoil volume reconciliation will be reported in the Annual Environmental Performance Report produced by Chevron Australia.</p>	<p>Construction and Operations</p>
4.4	<p>Changes made to this Plan will be made in consultation with, and to the satisfaction of, DPaW.</p>	<p>Construction and Operations</p>