Santos GLNG Project

Lot 55 FTY1153

Vegetation Management Zones Ecological Assessment Report

February 2014

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1. Introduction

1.1 Background

Lot 55 FTY1153 (herein referred to as Lot 55) is located within the southern portion of the Fairview Gas Field. Power line, gas and water pipeline right of ways (RoWs) and wellpads are undergoing construction or have already been constructed within Lot 55 as part of the Phase 1 expansion. In addition to the clearing extents associated with the above mentioned RoWs, 20 vegetation management zones have been identified where additional clearing widths are required for construction. The 20 vegetation management zones are located immediately adjacent to the following RoWs: 29P, 35, 39/41/42, 42P, 45, 49, 45P, 47, 48, 43, 4BP, 35BP, 28CP, 29BP, 36B, 48P, 5A and 42PA. This report presents the results of an ecological assessment of the 20 vegetation management zones within Lot 55 (Figure 1).

All desktop and field assessments were undertaken in accordance with the Santos GLNG Upstream Methodology for Undertaking Environmental Assessments (Santos document number: 6300-650-SPE-0002, Rev 1 dated 16/08/2013) (Santos Methodology). Field surveys were undertaken by four Department of the Environment (DotE) approved ecologists from 10–14 December 2013. Further details of the methods used are provided in Appendix A.

1.2 Report layout

Section 2 of this report provides, for each vegetation management zone (refer Figure 1), a summary of the following environmental features:

- Regional Ecosystems (REs)
- Environmentally Sensitive Areas (ESAs)
- Threatened Ecological Communities (TECs)
- Essential habitat
- Vegetation community and habitat values
- Threatened species
- Fauna habitat features
- Watercourses
- Wetlands, lakes and springs.

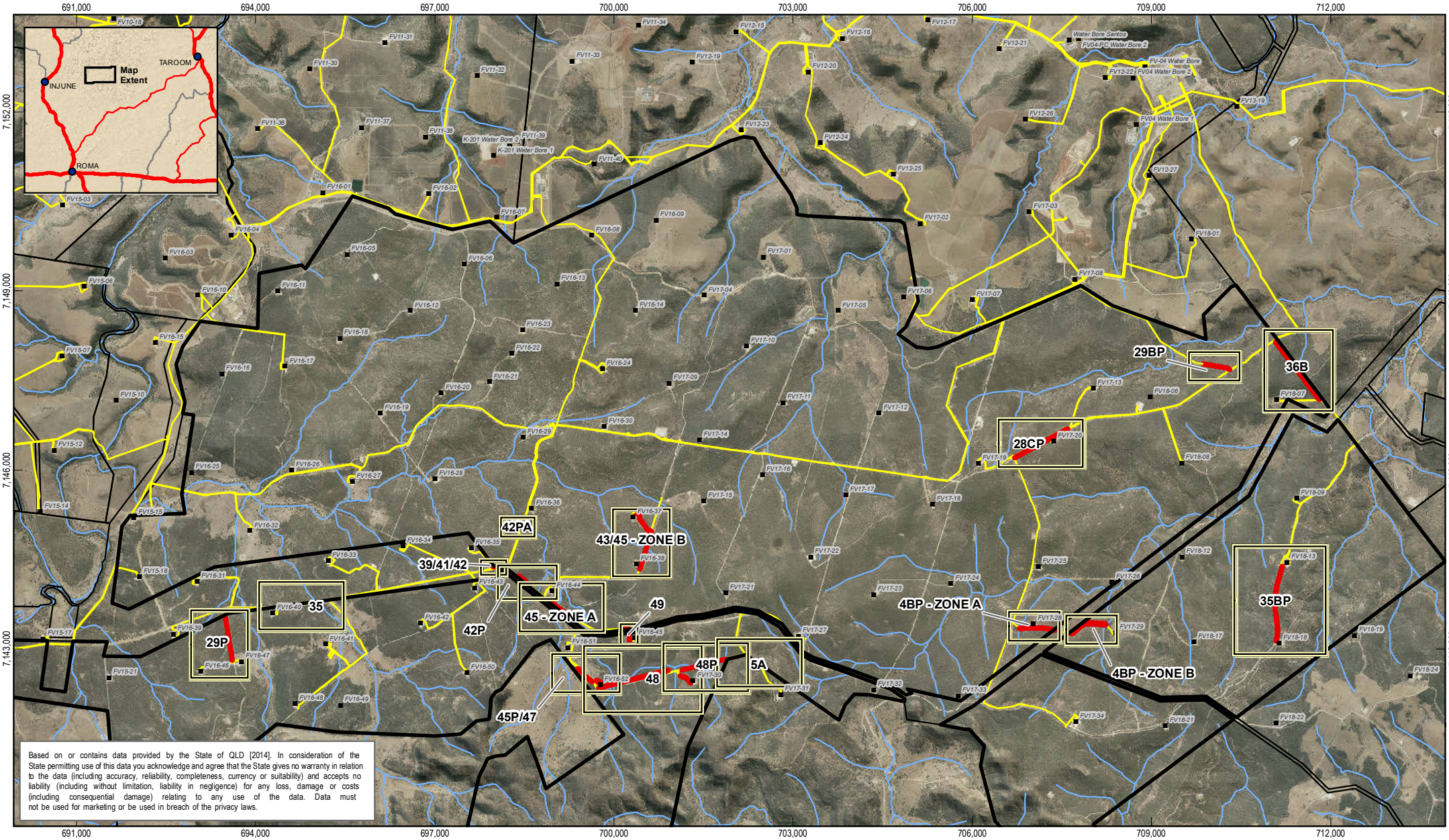
Section 1 provides information on threatened species relevant to the vegetation management zones, including habitat mapping and habitat clearing calculations.

Further detail, including definitions, RE field verification results, species lists and data sheets are provided in the appendices.

1.3 Limitations

Ecological field assessment and reporting is limited to the 20 vegetation management zones and appropriate assessment buffers within Lot 55. Buffers were determined in accordance with Santos Methodology. Ecological values within Lot 55 that are outside of these areas were not assessed as part of this scope of works. The locations of the 20 assessed vegetation management zones were provided by pdf maps from Santos and represent the following Fluor drawing numbers:

- 6399-500-926-01
- 6399-500-927-01 to 6399-500-927-17
- 6399-500-928-01



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0 1 2 3

Kilometers

Map Projection: Universal Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

LEGEND

- Well Pad
- Watercourse
- Fairview Lot 55 FTY1153
- Cadastre
- Clearing Limit
- Vegetation Management Area

Santos GLNG
Lot 55 Fairview Ecological Assessment

Job Number	41-27125
Revision	0
Date	05 Feb 2014

Lot 55 FTY1153 Overview

Figure 1

G:\41\27125\GIS\Fairview 2\GIS\MAPS\MXD\41_27125_001_LOT55FAIRVIEW_Overview_Rev0.mxd

145 Ann St Brisbane QLD 4000 Australia T 61 7 3316 3000 F 61 7 3316 3333 E bnemail@ghd.com W www.ghd.com

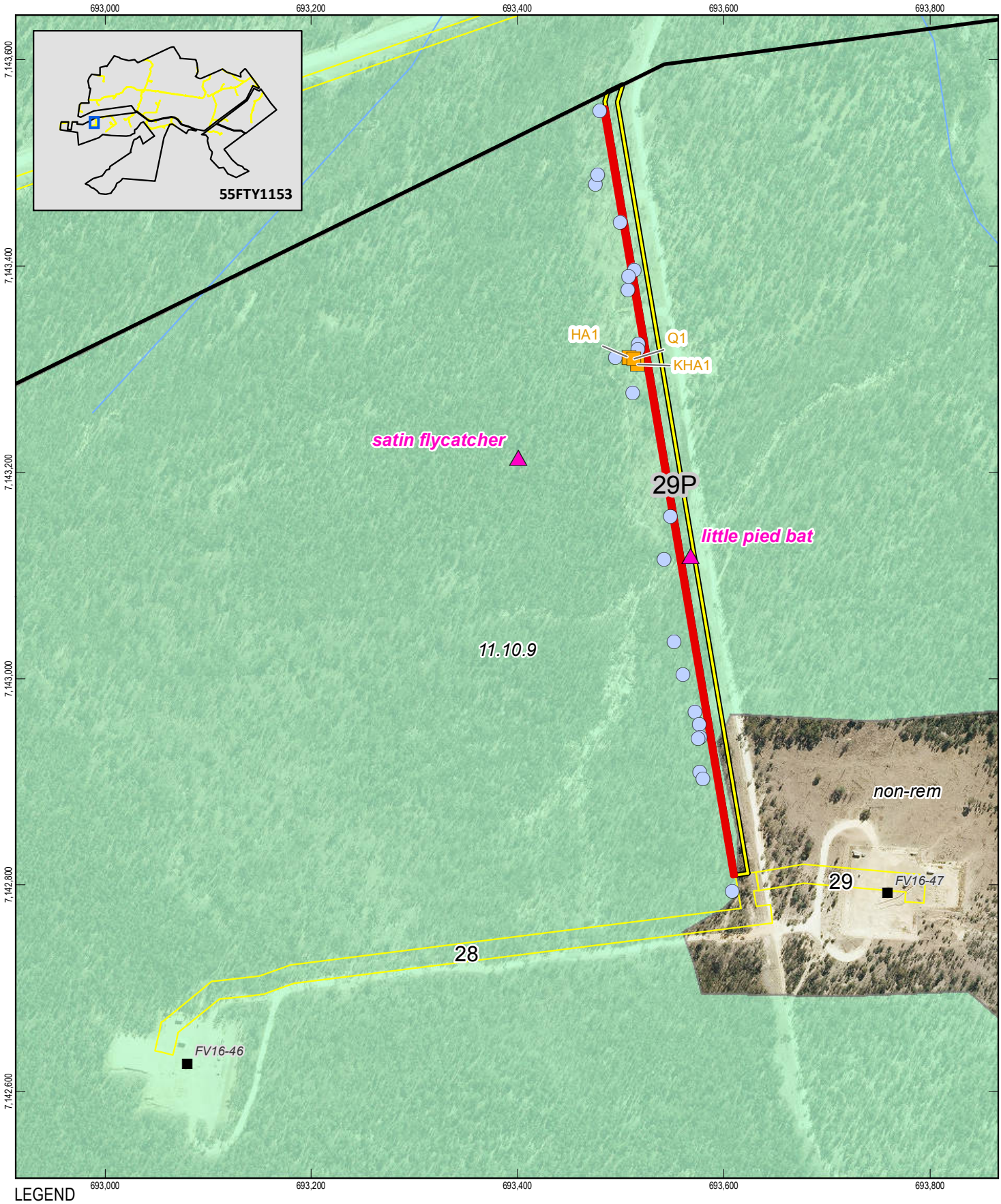
Data source: Santos: Well Pad, Cadastre, Imagery, Vegetation Management Area, Clearing Limit/Supplied October 2013; DNRM: Ordered Drainage, Physical Road Network/2010; ESRI: Hillshade/2008; Geoscience Australia: Populated Places/2007. Created by: AF

2. Ecological assessment results

2.1 Overview

The results of the ecological assessments of the 20 vegetation management zones within Lot 55 are presented in this report based on their association with adjacent RoWs. Some vegetation management zones are located adjacent to the same RoW numbers. Where these vegetation management zones require separate identification, the letters A and B have been used. The vegetation management zones are discussed in the following sections as follows:

- Section 2.2: RoW 29P vegetation management zone
- Section 2.3: RoW 35 vegetation management zone
- Section 2.4: RoW 39/41/42 vegetation management zone
- Section 2.5: RoW 42P vegetation management zone
- Section 2.6: RoW 45 vegetation management zones A and B
- Section 2.7: RoW 43 and 45 B vegetation management zones
- Section 2.8: RoW 49 vegetation management zone
- Section 2.9: RoW 45P and RoW 47 vegetation management zones
- Section 2.10: RoW 48 vegetation management zone
- Section 2.11: RoW 4BP vegetation management zone A
- Section 2.12 RoW 4BP vegetation management zone B
- Section 2.13: RoW 28CP vegetation management zone
- Section 2.14: RoW 29BP vegetation management zone
- Section 2.15: RoW 36B vegetation management zone
- Section 2.16: RoW 35BP vegetation management zone
- Section 2.17: RoW 48P vegetation management zone
- Section 2.18: RoW 5A vegetation management zone
- Section 2.19: RoW 42PA vegetation management zone



LEGEND

- Well Pad
- Flora Assessment Site
- Fauna Habitat
- Notable Fauna Species
- Watercourse
- Fairview Lot 55 FTY1153
- Cadastre
- RoW 29P
- Vegetation Management Area
- Clearing Limit
- Regional Ecosystem v7 (Biodiversity)
- Not of Concern

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0 50 100 150 200
Metres
Map Projection: Universal Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

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Santos GLNG Project

Santos GLNG
Lot 55 Fairview Ecological Assessment

Job Number 41-27125
Revision 0
Date 05 Feb 2014

RoW 29P
Vegetation Management Zone

Figure 2

G:\41\27125\GIS\Fairview 2\GIS\MAPS\MXD\41_27125_002_LOT55FAIRVIEW_ROW29P_Rev0.mxd 145 Ann St Brisbane QLD 4000 Australia T 61 7 3316 3000 F 61 7 3316 3333 E bnemail@ghd.com W www.ghd.com

Data source: Santos: Well Pad, Cadastre, Clearing Limit, Vegetation Management Area, Remnant Vegetation v7, Imagery/Supplied October 2013; DNRM: Ordered Drainage/2010; GHD: Assessment Sites, Fauna Habitat, Notable Fauna Species/Dec 2013. Created by: AF

2.2 RoW 29P vegetation management zone

2.2.1 Approvals and actions summary for RoW 29P vegetation management zone

Item	Approval/further action required*	Item	Approval/further action required*
REs	Yes	**Threatened species**	Yes
ESAs	No	**Fauna habitat features**	Yes
TECs	No	**Watercourses**	No
Essential habitat	No	**Wetlands**	No
Vegetation community/ habitat values	No		

* - refer to the 'Approval requirement or further action' section for each item identified as yes above

2.2.2 Regional ecosystems

Regional ecosystems mapped

One RE 11.10.9 polygon, status no concern at present, intersects with this vegetation management zone (Figure 2). RE 11.10.9 and non-remnant vegetation is also mapped within the 200 m buffer of the vegetation management zone. The RE short description is as follows:

- 11.10.9: *Callitris glaucophylla* woodland on coarse-grained sedimentary rocks

Regional ecosystems field verification

Field verification of the mapped no concern at present RE polygon of 11.10.9 determined that the vegetation composition is consistent with the RE mapping.

Field verification points are shown on Figure 2 (Q 1). Refer to Appendix C for RE field verification results and proposed RE mapping amendments for Lot 55.

Approval requirement or further action

Although there are no changes to the RE mapping required from field verification within this vegetation management zone, RE mapping changes for Lot 55 as a whole would require lodgement of field verification RE mapping amendments (Appendix C) with the Department of Environment Heritage Protection (DEHP) to change the existing RE mapping prior to construction commencing. This would be in the form of a Property Map of Assessable Vegetation (PMAV) application or RE mapping modification request for Lot 55.

2.2.3 Environmentally sensitive areas

Environmentally sensitive areas mapped

- Category A ESA
  - None mapped within the vegetation management zone or within a 1 km buffer
- Category B ESA
  - None mapped within the vegetation management zone or within a 1 km buffer
- Category C ESA

– Lot 55 FTY1153 is tenured as State Forest, within which the vegetation management zone is contained

Environmentally sensitive areas field verification

Not applicable

Approval requirement or further action

None

2.2.4 Threatened ecological communities

Threatened ecological communities mapped

No TECs are mapped within the vegetation management zone or within the 300 m buffer.

Threatened ecological communities field verification

Not applicable

Approval requirement or further action

None

2.2.5 Essential habitat

Essential habitat mapped

No essential habitat mapped under the *Vegetation Management Act 1999* (VM Act) is present within the vegetation management zone or within the 200 m buffer of the vegetation management zone.

Low value essential habitat mapped under the Biodiversity Planning Assessment (BPA) mapping is located within the vegetation management zone. This mapping is associated with the mapped RE polygon 11.10.9 discussed in Section 2.2.2.

Essential habitat field verification

No field verification of essential habitat was undertaken.

Approval requirement or further action

None

2.2.6 Vegetation community and habitat values

The following vegetation community occurs over the vegetation management zone:

- *Callitris glaucophylla* woodland to open-forest on coarse grained sediments on gently undulating to rolling hills

Descriptions of the vegetation communities and habitat values are contained within Appendix B. Field verification points for vegetation communities and habitat values are shown on Figure 2 (Q 1, HA 1, KHA 1).

Approval requirement or further action

None, however, rehabilitation activities, to be undertaken after construction, are to be in accordance with the GLNG Project Remediation, Rehabilitation, Recovery and Monitoring Plan, Coal Seam Gas Fields (RPS 2011) (Document number: 0020-GLNG-4.1.3-0012) (RRRMP).

2.2.7 Threatened species

Threatened species field verification

No threatened flora species listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and/or the *Nature Conservation Act 1992* (NC Act) were recorded from the vegetation management zone during field assessments. A likelihood of occurrence assessment for flora species with the potential to occur within Lot 55, as identified in desktop searches, is presented in Appendix E, Table 4-5.

One NC Act listed fauna species and one migratory fauna species listed under the EPBC Act were recorded from field assessments of the vegetation management zone and surrounding area:

- Little pied bat, *Chalinolobus picatus*; (NC Act near threatened)
- Satin flycatcher, *Myiagra cyanoleuca*; (EPBC Act migratory)

Further information relating to the threatened species records is contained within Section 3. Lists of all flora and fauna species recorded from field assessments are contained within Appendix F.

Threatened species habitat mapping

Potential habitat for fauna species listed under the EPBC Act and/or NC Act has been mapped over the vegetation management zone (see Section 3.2). Calculations of the extent of species habitat within the assessed vegetation management zones within Lot 55 are presented in Section 3.1.

Approval requirement or further action

Management actions listed within the following approved GLNG Project documents are to be followed for the threatened fauna species that have been identified as having potential habitat within the vegetation management zones to protect threatened fauna species during pre-construction, construction and operation:

- GLNG Project CSG Fields Significant Species Management Plan (RPS 2012) (document number: 0020-GLNG-4-1.3-0003) (SSMP)
- Roma, Arcadia and Fairview CSG Fields Species Management Plan (Aurecon 2012) (document number: STO-FL-T2GS-L-32)1(SMP)
- GLNG Gas Transmission Pipeline Species Management Plan (document number: 3380-GLNG-3-1.3-0036) (GTP SMP)

2.2.8 Fauna habitat features

Fauna habitat features that have potential to be fauna breeding places for least concern and threatened fauna species listed under the EPBC Act and/or NC Act were recorded within the vegetation management zone. Fauna habitat features recorded included hollow bearing trees, hollow stag trees and hollow logs. Locations of these features are mapped on Figure 2 and are presented in Appendix D.

Approval requirement or further action

Management actions listed within the SSMP, SMP and GTP SMP documents are to be followed to protect fauna habitat features and the fauna that might utilise such features during pre-construction, construction and operation.

2.2.9 Watercourses

Watercourses mapped

No mapped watercourses are located within the vegetation management zone or within the 100 m buffer.

Watercourses field verification

No field verification undertaken or required.

Approval requirement or further action

None

2.2.10 Wetlands, lakes and springs

Wetlands, lakes and springs mapped

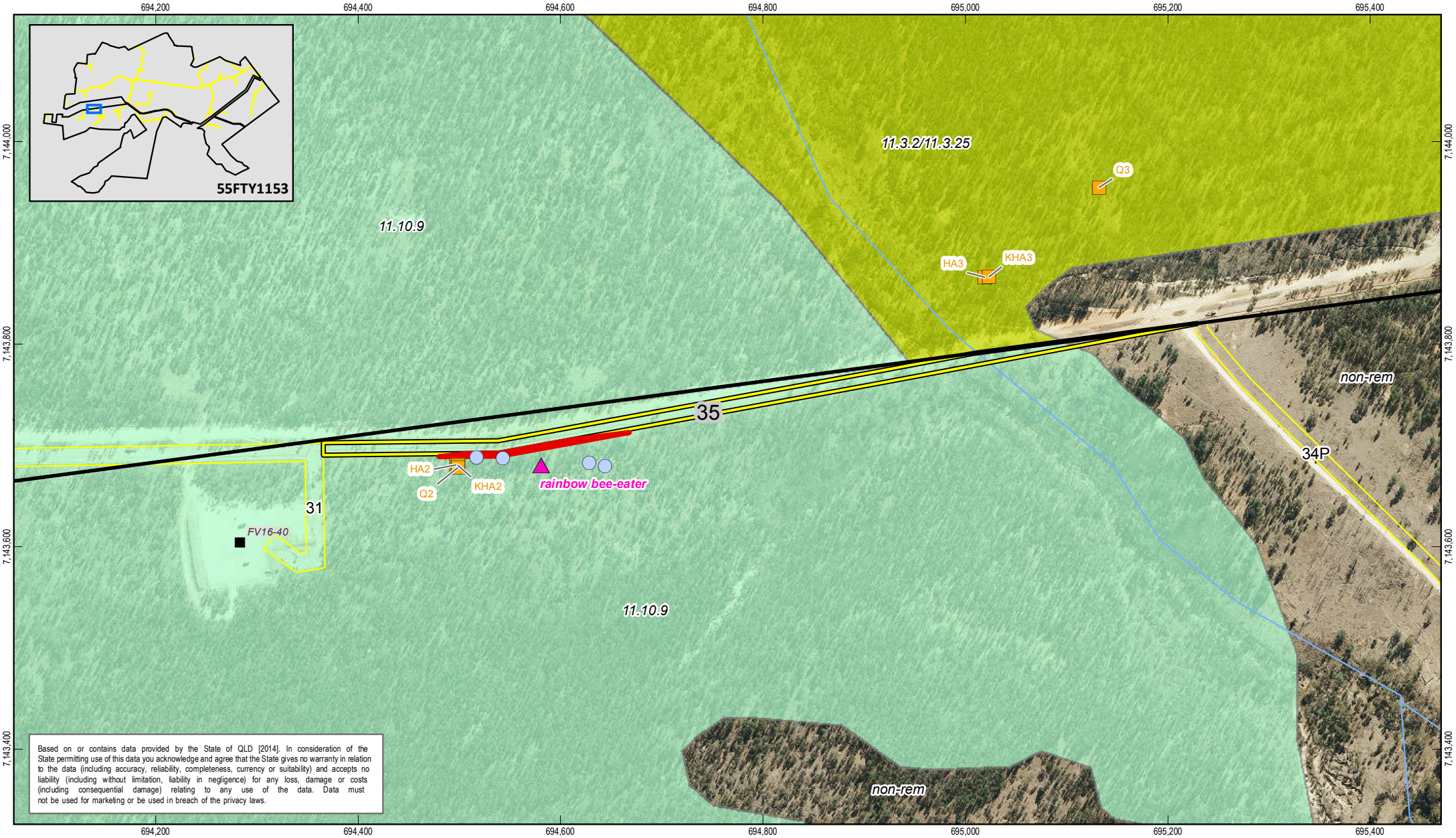
No wetlands, lakes or springs are shown on the Map of Referable Wetlands within the vegetation management zone or within the 300 m buffer.

Wetlands, lakes and springs field verification

No field verification undertaken or required.

Approval requirement or further action

None



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Metres

Map Projection: Universal Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

LEGEND

- Well Pad
- Flora Assessment Site
- Fauna Habitat
- Notable Fauna Species
- Watercourse
- Fairview Lot 55 FTY1153
- Cadastre
- RoW 35
- Vegetation Management Area
- Clearing Limit

Regional Ecosystem v7 (Biodiversity)

- Of Concern dominant
- Not of Concern

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Lot 55 Fairview Ecological Assessment

Job Number 41-27125
Revision 0
Date 05 Feb 2014

RoW 35
Vegetation Management Zone

Figure 3

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145 Ann St Brisbane QLD 4000 Australia T 61 7 3316 3000 F 61 7 3316 3333 E bnemail@ghd.com W www.ghd.com

Data source: Santos: Well Pad, Cadastre, Clearing Limit, Vegetation Management Area, Remnant Vegetation v7, Imagery/Supplied October 2013; DNRM: Ordered Drainage/2010; GHD: Assessment Sites, Fauna Habitat, Notable Fauna Species/Dec 2013. Created by: AF

2.3 RoW 35 vegetation management zone

2.3.1 Approvals and actions summary for RoW 35 vegetation management zone

Item	Approval/further action required*	Item	Approval/further action required*
REs	Yes	**Threatened species**	No
ESAs	No	**Fauna habitat features**	Yes
TECs	No	**Watercourses**	No
Essential habitat	No	**Wetlands**	No
Vegetation community/ habitat values	No		

* - refer to the 'Approval requirement or further action' section for each item identified as yes above

2.3.2 Regional ecosystems

Regional ecosystems mapped

One RE 11.10.9 polygon, status no concern at present, intersects with this vegetation management zone. RE 11.10.9 is also mapped within the 200 m buffer of the vegetation management zone (Figure 3). The RE short description is as follows:

- 11.10.9: *Callitris glaucophylla* woodland on coarse-grained sedimentary rocks

Regional ecosystems field verification

Field verification of the mapped no concern at present RE polygon of 11.10.9 determined that the vegetation composition is consistent with the RE mapping.

Field verification points are shown on Figure 3 (Q 2). Refer to Appendix C for RE field verification results and proposed RE mapping amendments for Lot 55.

Approval requirement or further action

Although there are no changes to the RE mapping required from field verification within this vegetation management zone, RE mapping changes for Lot 55 as a whole would require lodgement of field verification RE mapping amendments (Appendix C) with the DEHP to change the existing RE mapping prior to construction commencing. This would be in the form of a PMAV application or RE mapping modification request for Lot 55.

2.3.3 Environmentally sensitive areas

Environmentally sensitive areas mapped

- Category A ESA
  - None mapped within the vegetation management zone or within a 1 km buffer
- Category B ESA
  - None mapped within the vegetation management zone or within a 1 km buffer
- Category C ESA

– Lot 55 FTY1153 is tenured as State Forest within which the vegetation management zone is contained
– Of concern RE: 11.3.2/11.3.25 is mapped within 1 km of the vegetation management zone

Environmentally sensitive areas field verification

Field verification of the mapped of concern RE polygon (Category C ESA) within 1 km of the vegetation management zone was undertaken at site Q 3, shown on Figure 3. The mapped RE polygon containing of concern RE 11.3.2/11.3.25 was field verified to be more consistent with no concern at present RE 11.10.9. Thus, the of concern RE, and therefore the Category C ESA, is not considered to exist within 1 km of RoW 35 vegetation management zone. Field verification mapping amendments has remapped relevant areas as not being representative of a Category C ESA, containing an of concern RE. Refer to Appendix C for RE field verification results and proposed RE mapping amendments.

Approval requirement or further action

None

2.3.4 Threatened ecological communities

Threatened ecological communities mapped

No TECs are mapped within the vegetation management zone or within the 300 m buffer.

Threatened ecological communities field verification

Not applicable

Approval requirement or further action

None

2.3.5 Essential habitat

Essential habitat mapped

No essential habitat mapped under the VM Act is present within the vegetation management zone or within the 200 m buffer of the vegetation management zone.

Low value essential habitat mapped under the BPA mapping is located within the vegetation management zone. This mapping is associated with the mapped RE polygon 11.10.9 discussed in Section 2.3.2.

Essential habitat field verification

No field verification of essential habitat was undertaken.

Approval requirement or further action

None

2.3.6 Vegetation community and habitat values

The following vegetation community occurs over the vegetation management zone:

- *Callitris glaucophylla* woodland to open-forest on coarse grained sediments on gently undulating to rolling hills

Descriptions of the vegetation communities and habitat values are contained within Appendix B. Field verification points for vegetation communities and habitat values are shown on Figure 3 (Q 2, HA 2, KHA 2).

Approval requirement or further action

None, however, rehabilitation activities, to be undertaken after construction, are to be in accordance with the GLNG Project RRRMP.

2.3.7 Threatened species

Threatened species field verification

No threatened flora species listed under the EPBC and/or NC Act were recorded from the vegetation management zone during field assessments. A likelihood of occurrence assessment for flora species with the potential to occur within Lot 55, as identified in desktop searches is presented in Appendix E, Table 4-5.

One migratory fauna species, the rainbow bee-eater, *Merops ornatus* (EPBC Act migratory) was recorded from field assessments of the vegetation management zone and surrounding area. The little pied bat was also recorded at a farm dam adjacent to RoW 35 approximately 750 m to the west of the vegetation management zone.

Further information relating to threatened species records from the field assessment is contained within Section 3. Lists of all flora and fauna species recorded from field assessments are contained within Appendix F.

Threatened species habitat mapping

Potential habitat for fauna species listed under the EPBC Act and/or the NC Act has been mapped over the vegetation management zone (see Section 3.2). Calculations of the extent of species habitat within the assessed vegetation management zones within Lot 55 are presented in Section 3.1.

Approval requirement or further action

Management actions listed within the approved GLNG Project documents, SSMP, SMP and GTP SMP are to be followed for the threatened fauna species that have been identified as having potential habitat within the vegetation management zones to protect threatened fauna species during pre-construction, construction and operation.

2.3.8 Fauna habitat features

Fauna habitat features that have potential to be fauna breeding places for least concern and threatened fauna species listed under the EPBC Act and/or NC Act were recorded within the vegetation management zone. Fauna habitat features recorded included hollow bearing trees, hollow stag trees and hollow logs. Locations of these features are mapped on Figure 3 and are presented in Appendix D.

Approval requirement or further action

Management actions listed within the SSMP, SMP and GTP SMP documents are to be followed to protect fauna habitat features and the fauna that might utilise such features during pre-construction, construction and operation.

2.3.9 Watercourses

Watercourses mapped

No mapped watercourses are located within the vegetation management zone or within the 100 m buffer.

Watercourses field verification

No field verification undertaken or required.

Approval requirement or further action

None

2.3.10 Wetlands, lakes and springs

Wetlands, lakes and springs mapped

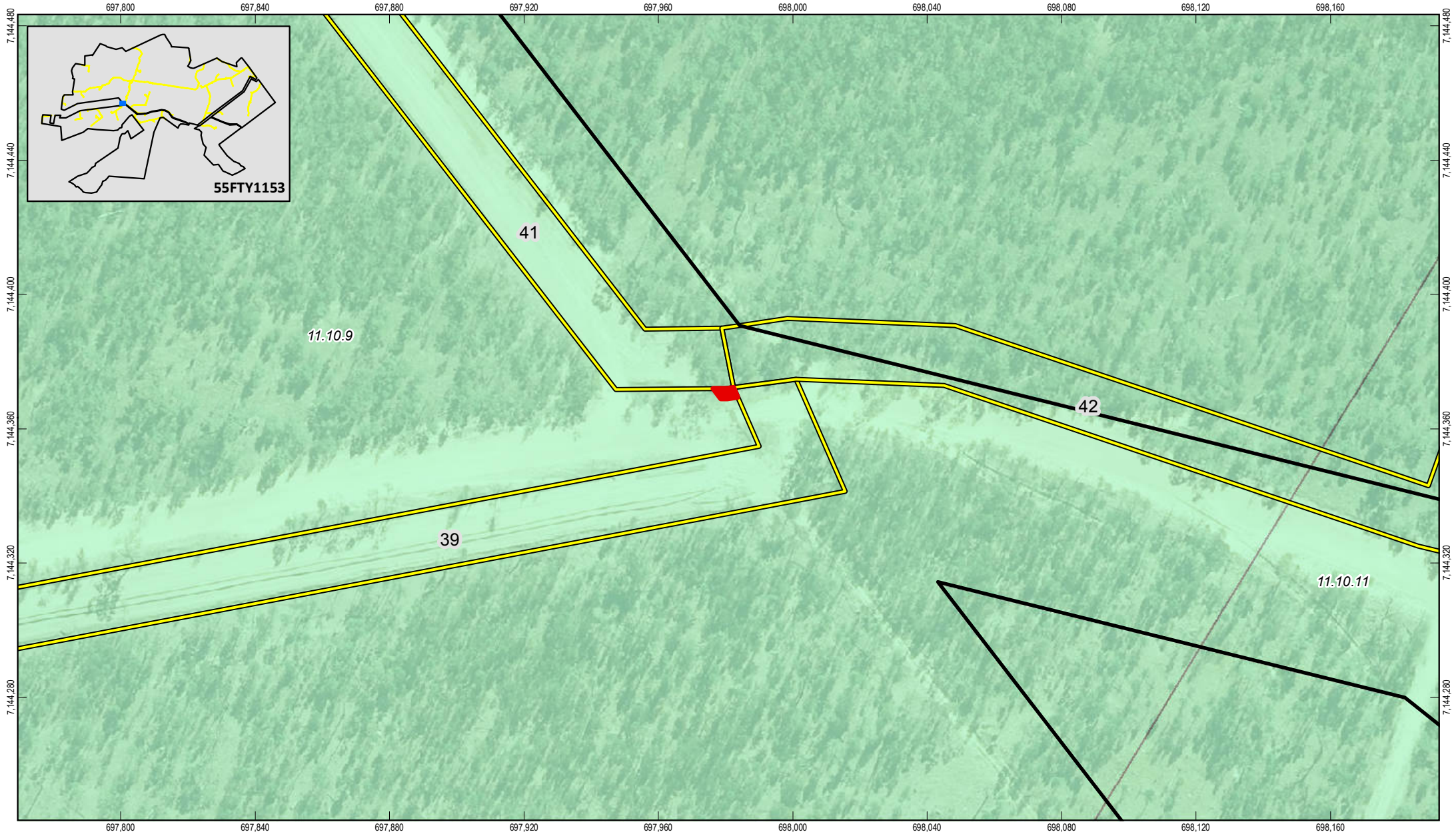
No wetlands, lakes or springs are shown on the Map of Referable Wetlands within the vegetation management zone or within the 300 m buffer.

Wetlands, lakes and springs field verification

No field verification undertaken or required.

Approval requirement or further action

None



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0 10 20 40

Metres

Map Projection: Universal Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

LEGEND

- Fairview Lot 55 FTY1153
- Vegetation Management Area
- RoW 39/41/42

Regional Ecosystem v7 (Biodiversity)

- Not of Concern

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Lot 55 Fairview Ecological Assessment

Job Number 41-27125
Revision 0
Date 05 Feb 2014

RoW 39/41/42 Vegetation Management Zone

Figure 4

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145 Ann St Brisbane QLD 4000 Australia T 61 7 3316 3000 F 61 7 3316 3333 E bnemail@ghd.com W www.ghd.com

Data source: Santos: Cadastre, Clearing Limit, Vegetation Management Area, Remnant Vegetation v7, Imagery/Supplied October 2013. Created by: AF

2.4 RoW 39/41/42 vegetation management zone

2.4.1 Approvals and actions summary for RoW 39/41/42 vegetation management zone

Item	Approval/further action required*	Item	Approval/further action required*
REs	Yes	**Threatened species**	No
ESAs	No	**Fauna habitat features**	No
TECs	No	**Watercourses**	No
Essential habitat	No	**Wetlands**	No
Vegetation community/ habitat values	No		

* - refer to the 'Approval requirement or further action' section for each item identified as yes above

2.4.2 Regional ecosystems

Regional ecosystems mapped

One RE 11.10.9 polygon, status no concern at present, intersects with this vegetation management zone. RE 11.10.9 is also mapped within the 200 m buffer of the vegetation management zone (Figure 4). The RE short description is as follows:

- 11.10.9: *Callitris glaucophylla* woodland on coarse-grained sedimentary rocks

Regional ecosystems field verification

A visual inspection of the vegetation within the RoWs was undertaken, given the small size of proposed infrastructure, which was too small for a full assessment.

Field verification of the mapped no concern at present RE polygon of 11.10.9 determined that the vegetation composition is consistent with the RE mapping. Refer to Appendix C for RE field verification results and proposed RE mapping amendments for Lot 55.

Approval requirement or further action

Although there are no changes to the RE mapping required from field verification within this vegetation management zone, RE mapping changes for Lot 55 as a whole would require lodgement of field verification RE mapping amendments (Appendix C) with the DEHP to change the existing RE mapping prior to construction commencing. This would be in the form of a PMAV application or RE mapping modification request for Lot 55.

2.4.3 Environmentally sensitive areas

Environmentally sensitive areas mapped

- Category A ESA
  - None mapped within the vegetation management zone or within a 1 km buffer
- Category B ESA
  - None mapped within the vegetation management zone or within a 1 km buffer

- Category C ESA
  - None mapped within the vegetation management zone and it is mapped within an easement
  - Lot 55 FTY1153 is tenured as State Forest and occurs within 1 km of the vegetation management zone

Environmentally sensitive areas field verification

Not applicable

Approval requirement or further action

None

2.4.4 Threatened ecological communities

Threatened ecological communities mapped

No TECs are mapped within the vegetation management zone or within the 300 m buffer.

Threatened ecological communities field verification

Not applicable

Approval requirement or further action

None

2.4.5 Essential habitat

Essential habitat mapped

No essential habitat mapped under the VM Act is present within the vegetation management zone or within the 200 m buffer of the vegetation management zone.

Low value essential habitat mapped under the BPA mapping is located within the vegetation management zone. This mapping is associated with the mapped RE polygon 11.10.9 discussed in Section 2.4.2.

Essential habitat field verification

No field verification of essential habitat was undertaken.

Approval requirement or further action

None

2.4.6 Vegetation community and habitat values

The following vegetation community occurs over the vegetation management zone:

- *Callitris glaucophylla* woodland to open-forest on coarse grained sediments on gently undulating to rolling hills

Descriptions of the vegetation communities and habitat values are contained within Appendix B.

Approval requirement or further action

None, however, rehabilitation activities, to be undertaken after construction, are to be in accordance with the GLNG Project RRRMP.

2.4.7 Threatened species

Threatened species field verification

No threatened flora species listed under the EPBC Act and/or NC Act were recorded from the vegetation management zone during field assessments. A likelihood of occurrence assessment for flora species with the potential to occur within Lot 55, as identified in desktop searches is presented in Appendix E, Table 4-5.

No threatened fauna species listed under the EPBC Act and/or NC Act or migratory fauna species listed under the EPBC Act were recorded from field assessments of the vegetation management zone and surrounding area.

Further information relating to threatened species records from the field assessment is contained within Section 3. Lists of all flora and fauna species recorded from field assessments are contained within Appendix F.

Threatened species habitat mapping

Potential habitat for fauna species listed under the EPBC Act and/or the NC Act is mapped over the vegetation management zone (see Section 3.2). Calculations of the extent of species habitat within the assessed vegetation management zones are presented in Section 3.1.

Approval requirement or further action

Management actions listed within the approved GLNG Project documents, SSMP, SMP and GTP SMP are to be followed for the threatened fauna species that have been identified as having potential habitat within the vegetation management zones to protect threatened fauna species during pre-construction, construction and operation.

2.4.8 Fauna habitat features

No fauna habitat features were recorded within the vegetation management zone.

Approval requirement or further action

None

2.4.9 Watercourses

Watercourses mapped

No mapped watercourses occur within the vegetation management zone or in the 100 m buffer.

Watercourses field verification

No field verification undertaken or required.

Approval requirement or further action

None

2.4.10 Wetlands, lakes and springs

Wetlands, lakes and springs mapped

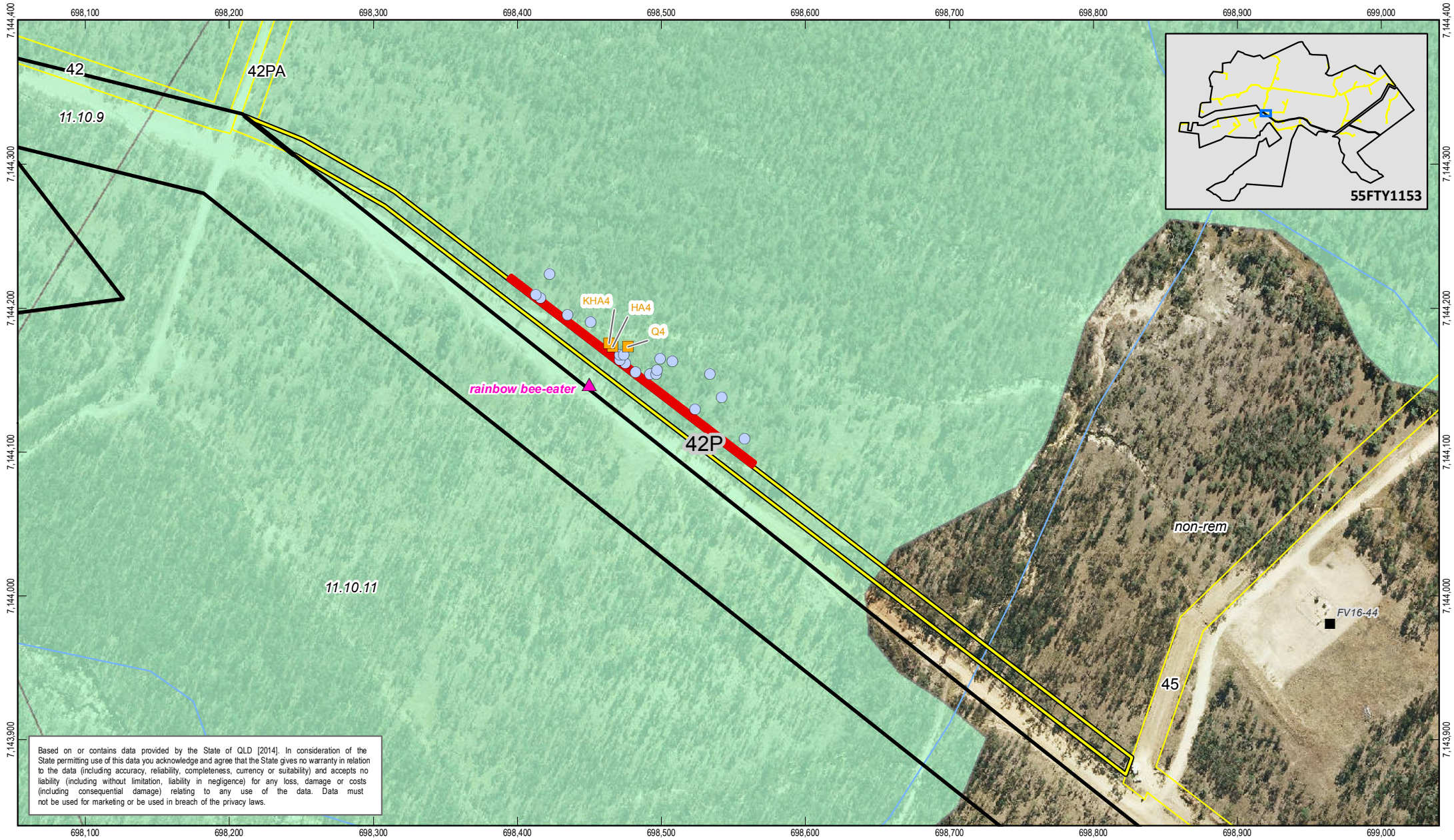
No wetlands, lakes or springs are shown on the Map of Referable Wetlands within the vegetation management zone or within the 300 m buffer.

Wetlands, lakes and springs field verification

No field verification undertaken or required.

Approval requirement or further action

None



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0 20 40 60 80 100

Metres

Map Projection: Universal Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

LEGEND

- Well Pad
- Flora Assessment Site
- Fauna Habitat
- Notable Fauna Species
- Watercourse
- Fairview Lot 55 FTY1153
- Cadastre
- RoW 42P
- Vegetation Management Area
- Clearing Limit
- Regional Ecosystem v7 (Biodiversity)
- Not of Concern

GHD

Santos GLNG Project

Santos GLNG
Lot 55 Fairview Ecological Assessment

Job Number 41-27125
Revision 0
Date 05 Feb 2014

RoW 42P
Vegetation Management Area

Figure 5

G:\41\27125\GIS\Fairview 2\GIS\MAPS\MXD\41_27125_005_LOT55FAIRVIEW_ROW42P_Rev0.mxd

145 Ann St Brisbane QLD 4000 Australia T 61 7 3316 3000 F 61 7 3316 3333 E bnemail@ghd.com W www.ghd.com

Data source: Santos: Well Pad, Cadastre, Clearing Limit, Vegetation Management Area, Remnant Vegetation v7, Imagery/Supplied October 2013; DNRM: Ordered Drainage/2010; GHD: Assessment Sites, Fauna Habitat, Notable Fauna Species/Dec 2013. Created by: AF

2.5 RoW 42P vegetation management zone

2.5.1 Approvals and actions summary for RoW 42P vegetation management zone

Item	Approval/further action required*	Item	Approval/further action required*
REs	Yes	**Threatened species**	No
ESAs	No	**Fauna habitat features**	Yes
TECs	No	**Watercourses**	No
Essential habitat	No	**Wetlands**	No
Vegetation community/ habitat values	No		

* - refer to the 'Approval requirement or further action' section for each item identified as yes above

2.5.2 Regional ecosystems

Regional ecosystems mapped

One RE 11.10.11 polygon, status no concern at present, intersects with this vegetation management zone. RE 11.10.11, 11.10.9, high value regrowth and non-remnant vegetation are also mapped within the 200 m buffer of the vegetation management zone (Figure 5). The RE short descriptions are as follows:

- 11.10.11: *Eucalyptus populnea, E. melanophloia +/- Callitris glaucophylla* woodland on coarse-grained sedimentary rocks
- 11.10.9: *Callitris glaucophylla* woodland on coarse-grained sedimentary rocks

Regional ecosystems field verification

Field verification of the mapped no concern at present RE polygons of 11.10.9 and 11.10.11 determined that the vegetation composition is consistent with the RE mapping.

Field verification points are shown on Figure 5 (Q 5). Refer to Appendix C for RE field verification results and proposed RE mapping amendments for Lot 55.

Approval requirement or further action

Although there are no changes to the RE mapping required from field verification within this vegetation management zone, RE mapping changes for Lot 55 as a whole would require lodgement of field verification RE mapping amendments (Appendix C) with the DEHP to change the existing RE mapping prior to construction commencing. This would be in the form of a PMAV application or RE mapping modification request for Lot 55.

2.5.3 Environmentally sensitive areas

Environmentally sensitive areas mapped

- Category A ESA
  - None mapped within the vegetation management zone or within a 1 km buffer

- Category B ESA
  - None mapped within the vegetation management zone or within a 1 km buffer
- Category C ESA
  - Lot 55 FTY1153 is tenured as State Forest within which the vegetation management zone is contained

Environmentally sensitive areas field verification

Not applicable

Approval requirement or further action

None

2.5.4 Threatened ecological communities

Threatened ecological communities mapped

No TECs are mapped within the vegetation management zone or within the 300 m buffer.

Threatened ecological communities field verification

Not applicable

Approval requirement or further action

None

2.5.5 Essential habitat

Essential habitat mapped

No essential habitat mapped under the VM Act is present within the vegetation management zone or within the 200 m buffer of the vegetation management zone.

Medium and low value essential habitat mapped under the BPA mapping is located within the vegetation management zone. This mapping is associated with the mapped RE polygon 11.10.11 discussed in Section 2.5.2.

Essential habitat field verification

No field verification of essential habitat was undertaken.

Approval requirement or further action

None

2.5.6 Vegetation community and habitat values

The following vegetation community occurs over the vegetation management zone:

- *Eucalyptus populnea* woodland on sandy soils on gently undulating to rolling hills

Descriptions of the vegetation communities and habitat values are contained within Appendix B. Field verification points for vegetation communities and habitat values are shown on Figure 5 (Q 4, HA 4, KHA 4).

Approval requirement or further action

None, however, rehabilitation activities, to be undertaken after construction, are to be in accordance with the GLNG Project RRRMP.

2.5.7 Threatened species

Threatened species field verification

No threatened flora species listed under the EPBC Act and/or NC Act were recorded from the vegetation management zone during field assessments. A likelihood of occurrence assessment for flora species with the potential to occur within Lot 55, as identified in desktop searches is presented in Appendix E, Table 4-5.

One migratory fauna species, the rainbow bee-eater (EPBC Act migratory) was recorded from field assessments of the vegetation management zone and surrounding area. Further information relating to threatened species records from the field assessment is contained within Section 3. Lists of all flora and fauna species recorded from field assessments are contained within Appendix F.

Threatened species habitat mapping

Potential habitat for fauna species listed under the EPBC Act and/or the NC Act has been mapped over the vegetation management zone (see Section 3.2). Calculations of the extent of species habitat within the assessed vegetation management zones within Lot 55 are presented in Section 3.1.

Approval requirement or further action

Management actions listed within the approved GLNG Project documents, SSMP, SMP and GTP SMP are to be followed for the threatened fauna species that have been identified as having potential habitat within the vegetation management zones to protect threatened fauna species during pre-construction, construction and operation.

2.5.8 Fauna habitat features

Fauna habitat features that have potential to be fauna breeding places for least concern and threatened fauna species listed under the EPBC Act and/or NC Act were recorded within the vegetation management zone. Fauna habitat features recorded included hollow bearing trees, hollow stag trees, termite mounds and hollow logs. Locations of these features are mapped on Figure 5 and are presented in Appendix D.

Approval requirement or further action

Management actions listed within the SSMP, SMP and GTP SMP documents are to be followed to protect fauna habitat features and the fauna that might utilise such features during pre-construction, construction and operation.

2.5.9 Watercourses

Watercourses mapped

No mapped watercourses are located within the vegetation management zone or within the 100 m buffer.

Watercourses field verification

No field verification undertaken or required.

Approval requirement or further action

None

2.5.10 Wetlands, lakes and springs

Wetlands, lakes and springs mapped

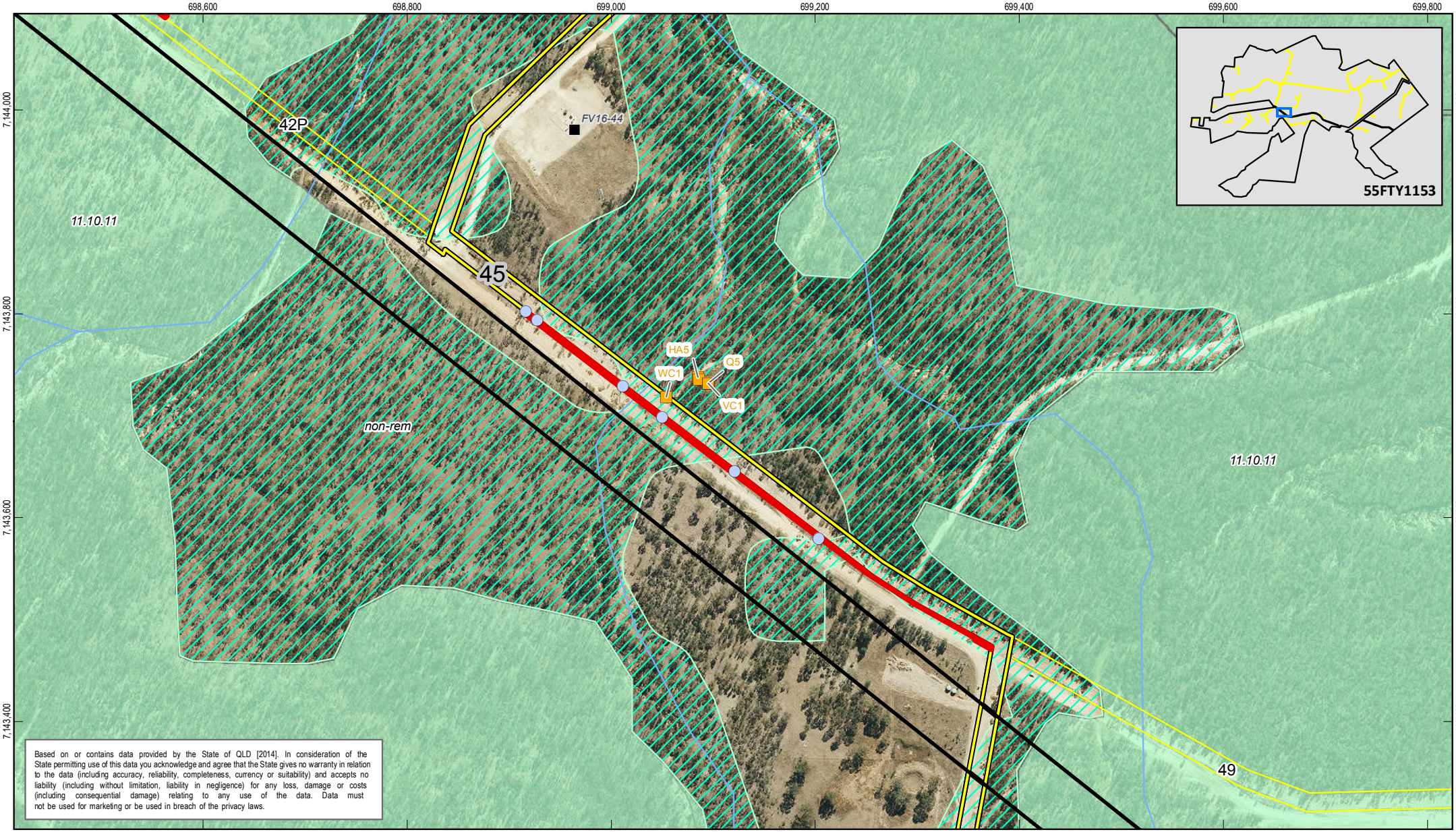
No wetlands, lakes or springs are shown on the Map of Referable Wetlands within the vegetation management zone or within the 300 m buffer.

Wetlands, lakes and springs field verification

No field verification undertaken or required.

Approval requirement or further action

None



1:5,000 (@ A4)

0 50 100 150 200

Metres

Map Projection: Universal Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

LEGEND

- Well Pad
- Flora Assessment Site
- Fauna Habitat
- Watercourse
- Fairview Lot 55 FTY1153
- Cadastre
- RoW 45
- Vegetation Management Area
- Clearing Limit
- Regional Ecosystem v7 (Biodiversity)
- Not of Concern
- High Value Regrowth
- Is a Least Concern regional ecosystem

GHD

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Revision 0
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RoW 45
Vegetation Management Zone A

Figure 6

G:\41\27125\GIS\Fairview 2\GIS\MAPS\MXD\41_27125_006_LOT55FAIRVIEW_ROW45_ZONEA_Rev0.mxd

145 Ann St Brisbane QLD 4000 Australia T 61 7 3316 3000 F 61 7 3316 3333 E bnemail@ghd.com W www.ghd.com

Data source: Santos: Well Pad, Cadastre, Clearing Limit, Vegetation Management Area, Remnant Vegetation v7, High Value Regrowth, Imagery/Supplied October 2013; DNRM: Ordered Drainage/2010; GHD: Assessment Sites, Fauna Habitat/Dec 2013. Created by: AF

2.6 RoW 45 vegetation management zone A

2.6.1 Approvals and actions summary for RoW 45 vegetation management zone A

Item	Approval/further action required*	Item	Approval/further action required*
REs	Yes	**Threatened species**	No
ESAs	No	**Fauna habitat features**	Yes
TECs	No	**Watercourses**	No
Essential habitat	No	**Wetlands**	No
Vegetation community/ habitat values	No		

* - refer to the 'Approval requirement or further action' section for each item identified as yes above

2.6.2 Regional ecosystems

Regional ecosystems mapped

Mapped high value regrowth and non-remnant vegetation intersect with this vegetation management zone. RE 11.10.11, is also mapped within the 200 m buffer of the vegetation management zone (Figure 6). The RE short description is as follows:

- 11.10.11: *Eucalyptus populnea, E. melanophloia +/- Callitris glaucophylla* woodland on coarse-grained sedimentary rocks

Regional ecosystems field verification

Field verification of the mapped no concern at present RE polygons of 11.10.9 and 11.10.11 determined that the vegetation composition is consistent with the RE mapping.

Field verification points are shown on Figure 6 (Q 5, VC 1). Refer to Appendix C for RE field verification results and proposed RE mapping amendments for Lot 55.

Approval requirement or further action

Although there are no changes to the RE mapping required from field verification within this vegetation management zone, RE mapping changes for Lot 55 as a whole would require lodgement of field verification RE mapping amendments (Appendix C) with the DEHP to change the existing RE mapping prior to construction commencing. This would be in the form of a PMAV application or RE mapping modification request for Lot 55.

2.6.3 Environmentally sensitive areas

Environmentally sensitive areas mapped

- Category A ESA
  - None mapped within the vegetation management zone or within a 1 km buffer
- Category B ESA
  - None mapped within the vegetation management zone or within a 1 km buffer

- Category C ESA
  - Lot 55 FTY1153 is tenured as State Forest within which the vegetation management zone is contained

Environmentally sensitive areas field verification

Not applicable

Approval requirement or further action

None

2.6.4 Threatened ecological communities

Threatened ecological communities mapped

No TECs are mapped within the vegetation management zone or within the 300 m buffer.

Threatened ecological communities field verification

Not applicable

Approval requirement or further action

None

2.6.5 Essential habitat

Essential habitat mapped

No essential habitat mapped under the VM Act is present within the vegetation management zone or within the 200 m buffer of the vegetation management zone.

No essential habitat mapped under the BPA mapping is located within the vegetation management zone.

Essential habitat field verification

No field verification of essential habitat was undertaken.

Approval requirement or further action

None

2.6.6 Vegetation community and habitat values

The following vegetation community occurs over the vegetation management zone:

- Non-remnant low regrowth woodland

Descriptions of the vegetation communities and habitat values are contained within Appendix B. Field verification points for vegetation communities and habitat values are shown on Figure 6 (Q 5, VC 1, HA 5, KHA 5).

Approval requirement or further action

None, however, rehabilitation activities, to be undertaken after construction, are to be in accordance with the GLNG Project RRRMP.

2.6.7 Threatened species

Threatened species field verification

No threatened flora species listed under the EPBC Act and/or NC Act were recorded from the vegetation management zone during field assessments. A likelihood of occurrence assessment for flora species with the potential to occur within Lot 55, as identified in desktop searches is presented in Appendix E, Table 4-5.

No threatened fauna species listed under the EPBC Act and/or NC Act or migratory fauna species listed under the EPBC Act were recorded from field assessments of the vegetation management zone and surrounding area. Further information relating to threatened species records from the field assessment is contained within Section 3. Lists of all flora and fauna species recorded from field assessments are contained within Appendix F.

Threatened species habitat mapping

Potential habitat for fauna species listed under the EPBC Act and/or the NC Act has been mapped over the vegetation management zone (see Section 3.2). Calculations of the extent of species habitat within the assessed vegetation management zones within Lot 55 are presented in Section 3.1.

Approval requirement or further action

Management actions listed within the approved GLNG Project documents, SSMP, SMP and GTP SMP are to be followed for the threatened fauna species that have been identified as having potential habitat within the vegetation management zones to protect threatened fauna species during pre-construction, construction and operation.

2.6.8 Fauna habitat features

Fauna habitat features that have potential to be fauna breeding places for least concern and threatened fauna species listed under the EPBC Act and/or NC Act were recorded within the vegetation management zone. Fauna habitat features recorded included hollow bearing trees, hollow stag trees, nests in trees and hollow logs. Locations of these features are mapped on Figure 6 and are presented in Appendix D.

Approval requirement or further action

Management actions listed within the SSMP, SMP and GTP SMP documents are to be followed to protect fauna habitat features and the fauna that might utilise such features during pre-construction, construction and operation.

2.6.9 Watercourses

Watercourses mapped

A single mapped stream order 2 watercourse intersects the vegetation management zone. No other mapped watercourses are located within the 100 m buffer of the vegetation management zone.

Watercourses field verification

Field verification of the watercourse determined it to be a drainage feature under the *Water Act 2000*. The watercourse assessment location is shown at site WC 1 on Figure 6. A summary of results is presented in Table 2-1, watercourse assessments are presented in Appendix G.

Table 2-1 Watercourse assessment RoW 45 vegetation management zone A

Watercourse reference	Location (easting, northing)		Assessment outcome	Reason
WC 1	699054	7143718	Drainage feature (*Water Act 2000*)	No extended or permanent period of flow – only carries water flow for a short duration after a rainfall event Lacks sufficient flow adequacy to sustain basic ecological processes and support riverine species Lacks continuous and defined bed and banks and the presence of in-stream islands, benches or bars

Approval requirement or further action

None

2.6.10 Wetlands, lakes and springs

Wetlands, lakes and springs mapped

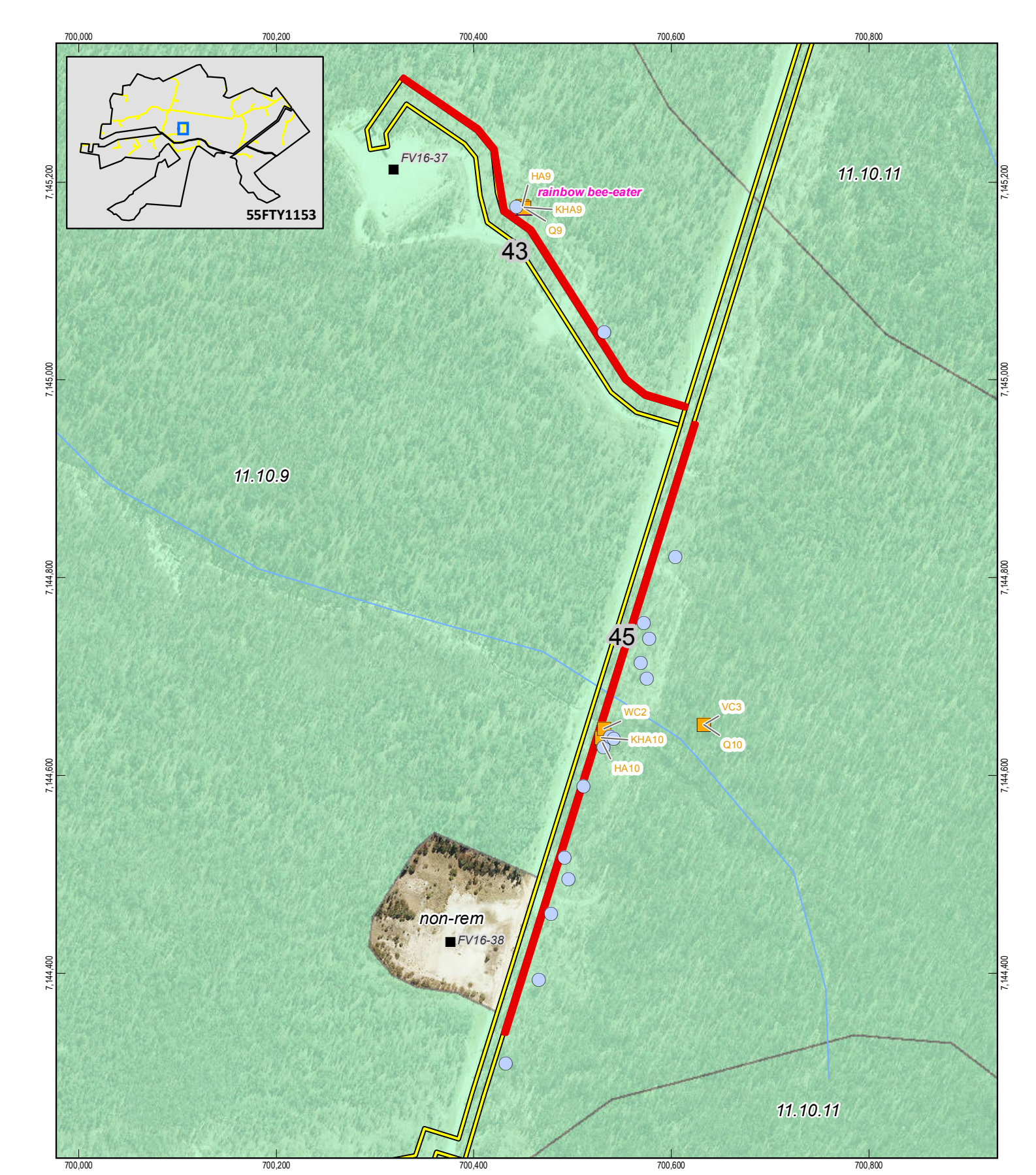
No wetlands, lakes or springs are shown on the Map of Referable Wetlands within the vegetation management zone or within the 300 m buffer.

Wetlands, lakes and springs field verification

No field verification undertaken or required.

Approval requirement or further action

None



LEGEND

- Well Pad
- Flora Assessment Site
- Fauna Habitat
- Notable Fauna Species
- Watercourse
- Fairview Lot 55 FTY1153
- Cadastre
- RoW 43 and RoW 45
- Vegetation Management Area
- Clearing Limit
- Regional Ecosystem v7 (Biodiversity)
- Not of Concern

1:5,000 (@ A4)
0 50 100 150 200
Metres
Map Projection: Universal Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

GHD

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Revision 0
Date 05 Feb 2014

RoW 43 and RoW 45 B Vegetation Management Zones

Figure 7

G:\41\27125\GIS\Fairview 2\GIS\MAPS\MXD\41_27125_007_LOT55FAIRVIEW_ROW43_ROW45_ZONEB__Rev0.mxd
145 Ann St Brisbane QLD 4000 Australia T 61 7 3316 3000 F 61 7 3316 3333 E bnemail@ghd.com W www.ghd.com

Data source: Santos: Well Pad, Cadastre, Clearing Limit, Vegetation Management Area, Remnant Vegetation v7, Imagery/Supplied October 2013; DNRM: Ordered Drainage/2010; GHD: Assessment Sites, Fauna Habitat, Notable Fauna Species/Dec 2013. Created by: AF

2.7 RoW 43 and RoW 45 B vegetation management zones

2.7.1 Approvals and actions summary for RoW 43 and RoW 45 B vegetation management zones

Item	Approval/further action required*	Item	Approval/further action required*
REs	Yes	**Threatened species**	No
ESAs	No	**Fauna habitat features**	Yes
TECs	No	**Watercourses**	No
Essential habitat	No	**Wetlands**	No
Vegetation community/ habitat values	No		

* - refer to the 'Approval requirement or further action' section for each item identified as yes above

2.7.2 Regional ecosystems

Regional ecosystems mapped

One RE polygon, the no concern at present RE 11.10.9, intersects with the vegetation management zones. RE 11.10.11 and non-remnant vegetation is also mapped within the 200 m buffer of the vegetation management zones (Figure 7). The RE short descriptions are as follows:

- 11.10.9: *Callitris glaucophylla* woodland on coarse-grained sedimentary rocks
- 11.10.11: *Eucalyptus populnea, E. melanophloia +/- Callitris glaucophylla* woodland on coarse-grained sedimentary rocks

Regional ecosystems field verification

Field verification of the mapped no concern at present RE polygons of 11.10.9 and 11.10.11 determined that the vegetation composition is consistent with the RE mapping.

Field verification points are shown on Figure 7 (Q 9, Q 10). Refer to Appendix C for RE field verification results and proposed RE mapping amendments for Lot 55.

Approval requirement or further action

Although there are no changes to the RE mapping required from field verification within these vegetation management zones, RE mapping changes for Lot 55 as a whole would require lodgement of field verification RE mapping amendments (Appendix C) with the DEHP to change the existing RE mapping prior to construction commencing. This would be in the form of a PMAV application or RE mapping modification request for Lot 55.

2.7.3 Environmentally sensitive areas

Environmentally sensitive areas mapped

- Category A ESA
  - None mapped within the vegetation management zones or within a 1 km buffer

- Category B ESA
  - None mapped within the vegetation management zones or within a 1 km buffer
- Category C ESA
  - Lot 55 FTY1153 is tenured as State Forest within which the vegetation management zones is contained

Environmentally sensitive areas field verification

Not applicable

Approval requirement or further action

None

2.7.4 Threatened ecological communities

Threatened ecological communities mapped

No TECs are mapped within the vegetation management zones or within the 300 m buffer.

Threatened ecological communities field verification

Not applicable

Approval requirement or further action

None

2.7.5 Essential habitat

Essential habitat mapped

No essential habitat mapped under the VM Act is present within the vegetation management zones or within the 200 m buffer of the vegetation management zone.

Medium value essential habitat mapped under the BPA mapping is located within the vegetation management zones. This mapping is associated with the mapped RE polygon 11.10.9 discussed in Section 2.7.2.

Essential habitat field verification

No field verification of essential habitat was undertaken.

Approval requirement or further action

None

2.7.6 Vegetation community and habitat values

The following vegetation community occurs over the vegetation management zones:

- *Eucalyptus populnea* woodland on sandy soils on gently undulating to rolling hills

Descriptions of the vegetation communities and habitat values are contained within Appendix B. Field verification points for vegetation communities and habitat values are shown on Figure 7 (RoW 43: Q 9, HA 9, KHA 9; RoW 45 B Q 10, VC 3, HA 10, KHA 10, WC 2).

Approval requirement or further action

None, however, rehabilitation activities, to be undertaken after construction, are to be in accordance with the GLNG Project RRRMP.

2.7.7 Threatened species

Threatened species field verification

No threatened flora species listed under the EPBC Act and/or NC Act were recorded from the vegetation management zones during field assessments. A likelihood of occurrence assessment for flora species with the potential to occur within Lot 55, as identified in desktop searches is presented in Appendix E, Table 4-5.

One migratory fauna species, the rainbow bee-eater (EPBC Act migratory) was recorded from field assessments of the RoW 43 vegetation management zone and surrounding area. Further information relating to threatened species records from the field assessment is contained within Section 3. Lists of all flora and fauna species recorded from field assessments are contained within Appendix F.

Threatened species habitat mapping

Potential habitat for fauna species listed under the EPBC Act and/or the NC Act has been mapped over the vegetation management zones (see Section 3.2). Calculations of the extent of species habitat within the assessed vegetation management zones within Lot 55 are presented in Section 3.1.

Approval requirement or further action

Management actions listed within the approved GLNG Project documents, SSMP, SMP and GTP SMP are to be followed for the threatened fauna species that have been identified as having potential habitat within the vegetation management zones to protect threatened fauna species during pre-construction, construction and operation.

2.7.8 Fauna habitat features

Fauna habitat features that have potential to be fauna breeding places for least concern and threatened fauna species listed under the EPBC Act and/or NC Act were recorded within the vegetation management zones. Fauna habitat features recorded included hollow bearing trees, hollow stag trees, nests in trees and hollow logs. Locations of these features are mapped on Figure 7 and are presented in Appendix D.

Approval requirement or further action

Management actions listed within the SSMP, SMP and GTP SMP documents are to be followed to protect fauna habitat features and the fauna that might utilise such features during pre-construction, construction and operation.

2.7.9 Watercourses

Watercourses mapped

A single mapped stream order 2 watercourse intersects the RoW 45 B vegetation management zone. No other mapped watercourses are located within the 100 m buffer of the vegetation management zones.

Watercourses field verification

Field verification of the watercourse determined it to be a drainage feature under the *Water Act 2000*. The watercourse assessment location is shown at site WC 2 on Figure 7. A summary of results is presented in Table 2-2, watercourse assessments are presented in Appendix G.

Table 2-2 Watercourse assessment RoW 45 B vegetation management zone

Watercourse reference	Location (easting, northing)		Assessment outcome	Reason
WC 2	700531	7144651	Drainage feature (*Water Act 2000*)	No extended or permanent period of flow – only carries water flow for a short duration after a rainfall event Lacks sufficient flow adequacy to sustain basic ecological processes and support riverine species Lacks continuous and defined bed and banks and the presence of in-stream islands, benches or bars

Approval requirement or further action

None

2.7.10 Wetlands, lakes and springs

Wetlands, lakes and springs mapped

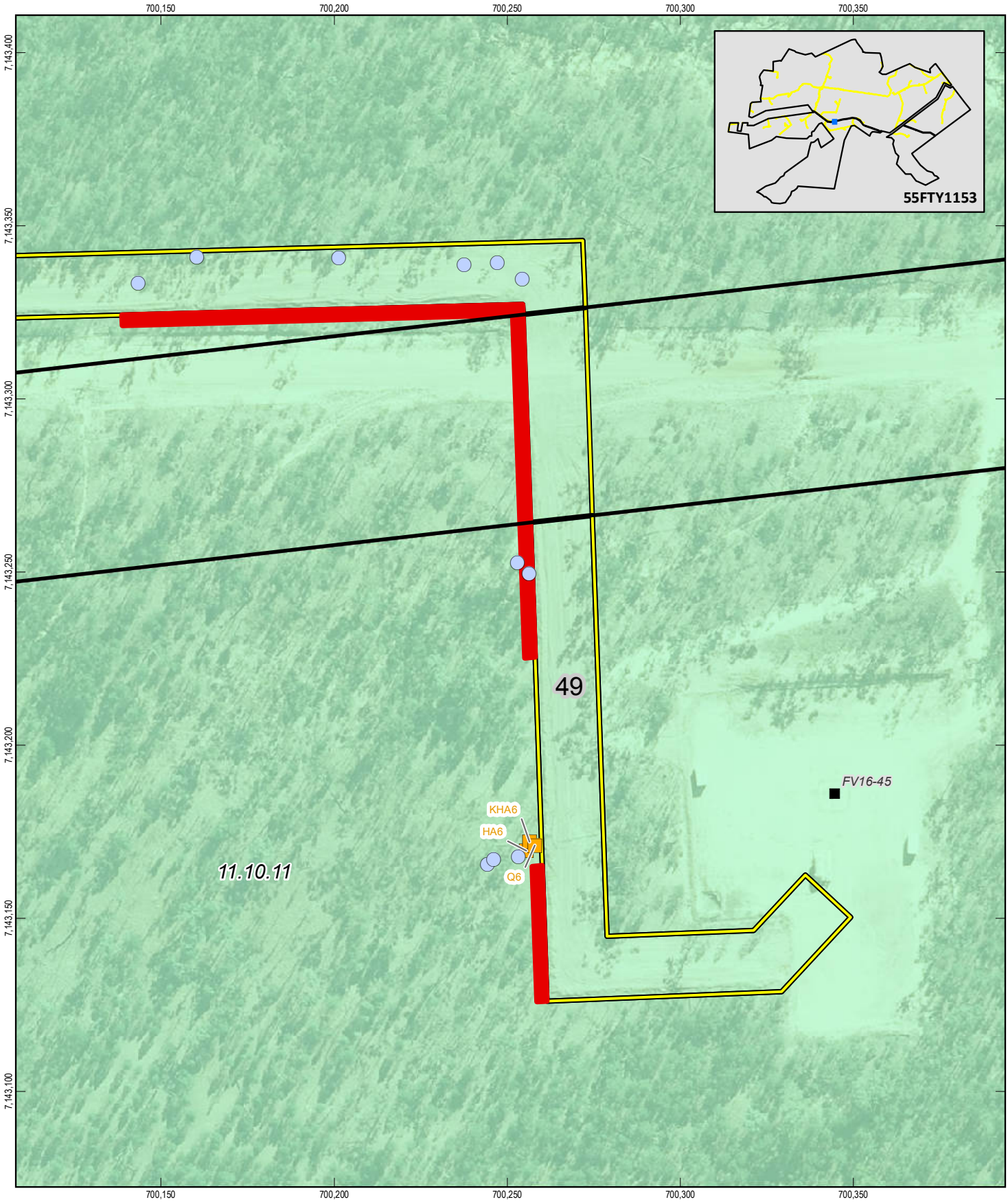
No wetlands, lakes or springs are shown on the Map of Referable Wetlands within the vegetation management zone or within the 300 m buffer.

Wetlands, lakes and springs field verification

No field verification undertaken or required.

Approval requirement or further action

None



LEGEND

- Well Pad
- Flora Assessment Site
- Fauna Habitat
- Fairview Lot 55 FTY1153
- Cadastre
- RoW 49
- Vegetation Management Area
- Regional Ecosystem v7 (Biodiversity)
- Not of Concern

1:1,500 (@ A4)

0 10 20 30 40 50

Metres

Map Projection: Universal Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

GHD

Santos GLNG Project

Santos GLNG
Lot 55 Fairview Ecological Assessment

Job Number	41-27125
Revision	0
Date	05 Feb 2014

RoW 49
Vegetation Management Zone

Figure 8

G:\41\27125\GIS\Fairview 2\GIS\MAPS\MXD\41_27125_008_LOT55FAIRVIEW_ROW49_Rev0.mxd 145 Ann St Brisbane QLD 4000 Australia **T** 61 7 3316 3000 **F** 61 7 3316 3333 **E** bnemail@ghd.com **W** www.ghd.com

Data source: Santos: Well Pad, Cadastre, Clearing Limit, Vegetation Management Area, Remnant Vegetation v7, Imagery/Supplied October 2013; GHD: Assessment Sites, Fauna Habitat/Dec 2013. Created by: AF

2.8 RoW 49 vegetation management zone

2.8.1 Approvals and actions summary for RoW 49 vegetation management zone A

Item	Approval/further action required*	Item	Approval/further action required*
REs	Yes	**Threatened species**	No
ESAs	No	**Fauna habitat features**	Yes
TECs	No	**Watercourses**	No
Essential habitat	No	**Wetlands**	No
Vegetation community/ habitat values	No		

* - refer to the 'Approval requirement or further action' section for each item identified as yes above

2.8.2 Regional ecosystems

Regional ecosystems mapped

One RE polygon, the no concern at present RE 11.10.11, intersects with the vegetation management zone (Figure 8). The RE short description is as follows:

- 11.10.11: *Eucalyptus populnea, E. melanophloia* +/- *Callitris glaucophylla* woodland on coarse-grained sedimentary rocks

Regional ecosystems field verification

Field verification of the mapped no concern at present RE polygon 11.10.11 determined that the vegetation composition is consistent with the RE mapping.

Field verification points are shown on Figure 8 (Q 6). Refer to Appendix C for RE field verification results and proposed RE mapping amendments for Lot 55.

Approval requirement or further action

Although there are no changes to the RE mapping required from field verification within this vegetation management zone, RE mapping changes for Lot 55 as a whole would require lodgement of field verification RE mapping amendments (Appendix C) with the DEHP to change the existing RE mapping prior to construction commencing. This would be in the form of a PMAV application or RE mapping modification request for Lot 55.

2.8.3 Environmentally sensitive areas

Environmentally sensitive areas mapped

- Category A ESA
  - None mapped within the vegetation management zone or within a 1 km buffer
- Category B ESA
  - None mapped within the vegetation management zone or within a 1 km buffer
- Category C ESA

– Lot 55 FTY1153 is tenured as State Forest within which the vegetation management zone is contained

Environmentally sensitive areas field verification

Not applicable

Approval requirement or further action

None

2.8.4 Threatened ecological communities

Threatened ecological communities mapped

No TECs are mapped within the vegetation management zone or within the 300 m buffer.

Threatened ecological communities field verification

Not applicable

Approval requirement or further action

None

2.8.5 Essential habitat

Essential habitat mapped

No essential habitat mapped under the VM Act is present within the vegetation management zone or within the 200 m buffer of the vegetation management zone.

Medium value essential habitat mapped under the BPA mapping is located within the vegetation management zone. This mapping is associated with the mapped RE polygon 11.10.11 discussed in Section 2.8.2.

Essential habitat field verification

No field verification of essential habitat was undertaken.

Approval requirement or further action

None

2.8.6 Vegetation community and habitat values

The following vegetation community occurs over the vegetation management zone:

- *Eucalyptus populnea* woodland on sandy soils on gently undulating to rolling hills

Descriptions of the vegetation communities and habitat values are contained within Appendix B. Field verification points for vegetation communities and habitat values are shown on Figure 8 (Q 6, HA 6, KHA 6).

Approval requirement or further action

None, however, rehabilitation activities, to be undertaken after construction, are to be in accordance with the GLNG Project RRRMP.

2.8.7 Threatened species

Threatened species field verification

No threatened flora species listed under the EPBC Act and/or NC Act were recorded from the vegetation management zone during field assessments. A likelihood of occurrence assessment for flora species with the potential to occur within Lot 55, as identified in desktop searches is presented in Appendix E, Table 4-5.

No threatened fauna species listed under the EPBC Act and/or NC Act or migratory fauna species listed under the EPBC Act were recorded from field assessments of the vegetation management zone and surrounding area. Further information relating to threatened species records from the field assessment is contained within Section 3. Lists of all flora and fauna species recorded from field assessments are contained within Appendix F.

Threatened species habitat mapping

Potential habitat for fauna species listed under the EPBC Act and/or the NC Act has been mapped over the vegetation management zone (see Section 3.2). Calculations of the extent of species habitat within the assessed vegetation management zones within Lot 55 are presented in Section 3.1.

Approval requirement or further action

Management actions listed within the approved GLNG Project documents, SSMP, SMP and GTP SMP are to be followed for the threatened fauna species that have been identified as having potential habitat within the vegetation management zones to protect threatened fauna species during pre-construction, construction and operation.

2.8.8 Fauna habitat features

Fauna habitat features that have potential to be fauna breeding places for least concern and threatened fauna species listed under the EPBC Act and/or NC Act were recorded within the vegetation management zone. Fauna habitat features recorded included hollow bearing trees, hollow stag trees and hollow logs. Locations of these features are mapped on Figure 6 and are presented in Appendix D.

Approval requirement or further action

Management actions listed within the SSMP, SMP and GTP SMP documents are to be followed to protect fauna habitat features and the fauna that might utilise such features during pre-construction, construction and operation.

2.8.9 Watercourses

Watercourses mapped

No mapped watercourses are located within the vegetation management zone or within the 100 m buffer.

Watercourses field verification

No field verification undertaken or required.

Approval requirement or further action

None

2.8.10 Wetlands, lakes and springs

Wetlands, lakes and springs mapped

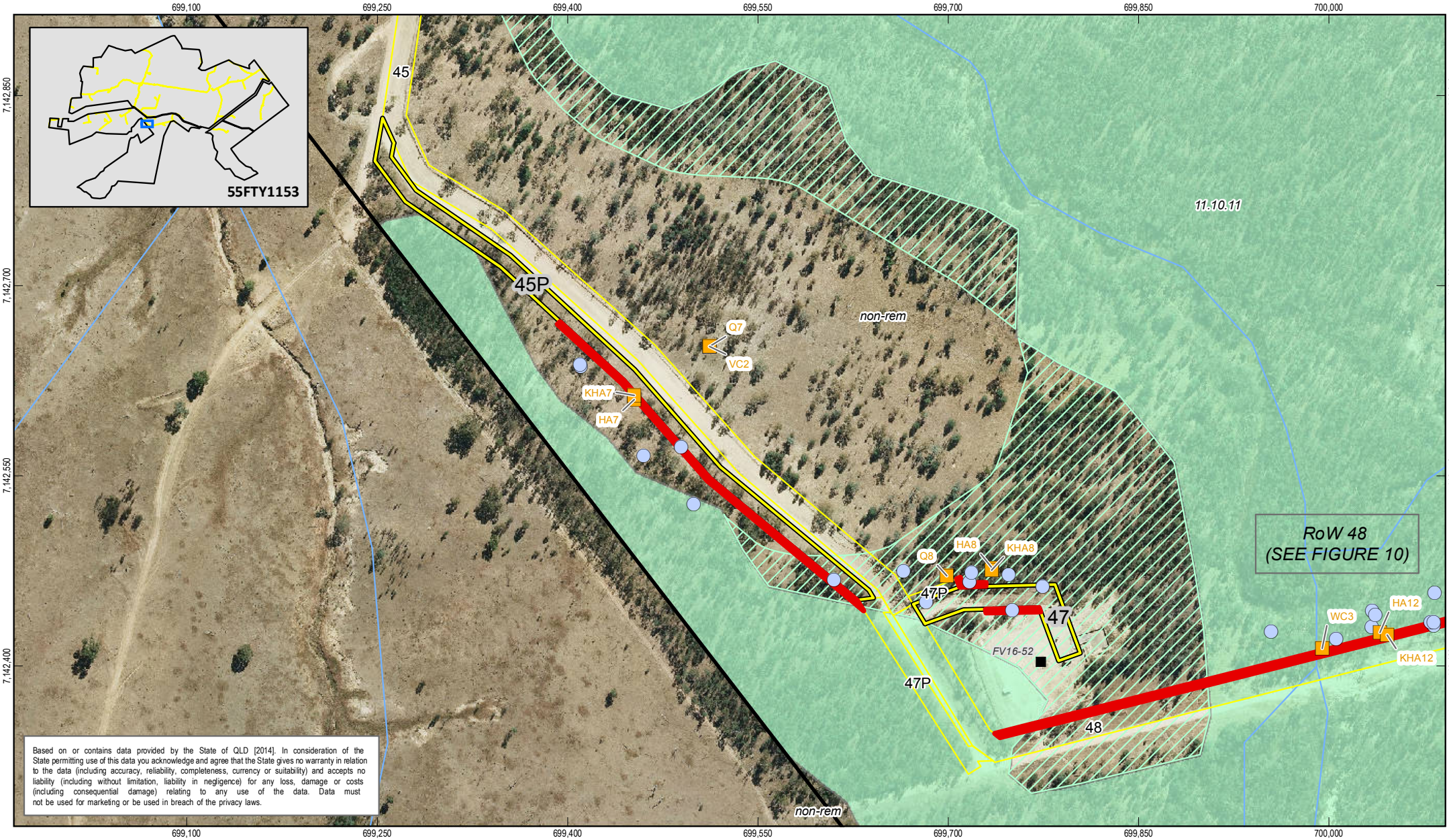
No wetlands, lakes or springs are shown on the Map of Referable Wetlands within the vegetation management zone or within the 300 m buffer.

Wetlands, lakes and springs field verification

No field verification undertaken or required.

Approval requirement or further action

None



1:4,000 (@ A4)

0 50 100 150

Metres

Map Projection: Universal Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

LEGEND

- Well Pad
- Flora Assessment Site
- Fauna Habitat
- Watercourse
- Fairview Lot 55 FTY1153
- Cadastre
- RoW 45P and RoW 47
- Vegetation Management Area
- Clearing Limit
- Regional Ecosystem v7 (Biodiversity)
- Not of Concern
- High Value Regrowth
- Is a Least Concern regional ecosystem

GHD

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Revision 0
Date 05 Feb 2014

RoW 45P and RoW 47 Vegetation Management Zones

Figure 9

G:\41\27125\GIS\Fairview 2\GIS\MAPS\MXD\41_27125_009_LOT55FAIRVIEW_ROW45P_RoW47_Rev0.mxd

145 Ann St Brisbane QLD 4000 Australia T 61 7 3316 3000 F 61 7 3316 3333 E bnemail@ghd.com W www.ghd.com

Data source: Santos: Well Pad, Cadastre, Clearing Limit, Vegetation Management Area, Remnant Vegetation v7, High Value Regrowth, Imagery/Supplied October 2013; DNRM: Ordered Drainage/2010; GHD: Assessment Sites, Fauna Habitat, Notable Fauna Species/Dec 2013. Created by: AF

2.9 RoW 45P and RoW 47 vegetation management zones

2.9.1 Approvals and actions summary for RoW 45P and RoW 47 vegetation management zones

Item	Approval/further action required*	Item	Approval/further action required*
REs	Yes	**Threatened species**	No
ESAs	No	**Fauna habitat features**	Yes
TECs	No	**Watercourses**	No
Essential habitat	No	**Wetlands**	No
Vegetation community/ habitat values	No		

* - refer to the 'Approval requirement or further action' section for each item identified as yes above

2.9.2 Regional ecosystems

Regional ecosystems mapped

Mapped high value regrowth and non-remnant vegetation intersect with this vegetation management zone. RE 11.10.11, is also mapped within the 200 m buffer of the vegetation management zone (Figure 9). The RE short description is as follows:

- 11.10.11: *Eucalyptus populnea, E. melanophloia +/- Callitris glaucophylla* woodland on coarse-grained sedimentary rocks

Regional ecosystems field verification

Field verification of the mapped RE polygon 11.10.11, high value regrowth and non-remnant vegetation determined that the vegetation composition is consistent with the RE mapping.

Field verification points are shown on Figure 9 (Q 7, Q 8, VC 2). Refer to Appendix C for RE field verification results and proposed RE mapping amendments for Lot 55.

Approval requirement or further action

Although there are no changes to the RE mapping required from field verification within these vegetation management zones, RE mapping changes for Lot 55 as a whole would require lodgement of field verification RE mapping amendments (Appendix C) with the DEHP to change the existing RE mapping prior to construction commencing. This would be in the form of a PMAV application or RE mapping modification request for Lot 55.

2.9.3 Environmentally sensitive areas

Environmentally sensitive areas mapped

- Category A ESA
  - None mapped within the vegetation management zones or within a 1 km buffer
- Category B ESA
  - None mapped within the vegetation management zones or within a 1 km buffer

- Category C ESA
  - Lot 55 FTY1153 is tenured as State Forest within which the vegetation management zones is contained

Environmentally sensitive areas field verification

Not applicable

Approval requirement or further action

None

2.9.4 Threatened ecological communities

Threatened ecological communities mapped

No TECs are mapped within the vegetation management zones or within the 300 m buffer.

Threatened ecological communities field verification

Not applicable

Approval requirement or further action

None

2.9.5 Essential habitat

Essential habitat mapped

No essential habitat mapped under the VM Act is present within the vegetation management zones or within the 200 m buffer of the vegetation management zone.

A minor area of medium value essential habitat mapped under the BPA mapping is located within the vegetation management zones. This mapping is associated with the mapped RE polygon 11.10.11 discussed in Section 2.9.2.

Essential habitat field verification

No field verification of essential habitat was undertaken.

Approval requirement or further action

None

2.9.6 Vegetation community and habitat values

The following vegetation communities occur over the vegetation management zones:

- *Eucalyptus populnea* woodland on sandy soils on gently undulating to rolling hills
- Non-remnant low regrowth woodland

Descriptions of the vegetation communities and habitat values are contained within Appendix B. Field verification points for vegetation communities and habitat values are shown on Figure 9 (Q 7, Q 8, VC 2, HA 7, KHA 7, HA 8, KHA 8).

Approval requirement or further action

None, however, rehabilitation activities, to be undertaken after construction, are to be in accordance with the GLNG Project RRRMP.

2.9.7 Threatened species

Threatened species field verification

No threatened flora species listed under the EPBC Act and/or NC Act were recorded from the vegetation management zones during field assessments. A likelihood of occurrence assessment for flora species with the potential to occur within Lot 55, as identified in desktop searches is presented in Appendix E, Table 4-5.

No threatened fauna species listed under the EPBC Act and/or NC Act or migratory fauna species listed under the EPBC Act were recorded from field assessments of the vegetation management zone and surrounding area. Further information relating to threatened species records from the field assessment is contained within Section 3. Lists of all flora and fauna species recorded from field assessments are contained within Appendix F.

Threatened species habitat mapping

Potential habitat for fauna species listed under the EPBC Act and/or the NC Act has been mapped over the vegetation management zones (see Section 3.2). Calculations of the extent of species habitat within the assessed vegetation management zones within Lot 55 are presented in Section 3.1.

Approval requirement or further action

Management actions listed within the approved GLNG Project documents, SSMP, SMP and GTP SMP are to be followed for the threatened fauna species that have been identified as having potential habitat within the vegetation management zones to protect threatened fauna species during pre-construction, construction and operation.

2.9.8 Fauna habitat features

Fauna habitat features that have potential to be fauna breeding places for least concern and threatened fauna species listed under the EPBC Act and/or NC Act were recorded within the vegetation management zones. Fauna habitat features recorded included hollow stag trees, nests in trees, hollow logs and peeling bark. Locations of these features are mapped on Figure 9 and are presented in Appendix D.

Approval requirement or further action

Management actions listed within the SSMP, SMP and GTP SMP documents are to be followed to protect fauna habitat features and the fauna that might utilise such features during pre-construction, construction and operation.

2.9.9 Watercourses

Watercourses mapped

No mapped watercourses are located within the vegetation management zone or within the 100 m buffer.

Watercourses field verification

No field verification undertaken or required.

Approval requirement or further action

None

2.9.10 Wetlands, lakes and springs

Wetlands, lakes and springs mapped

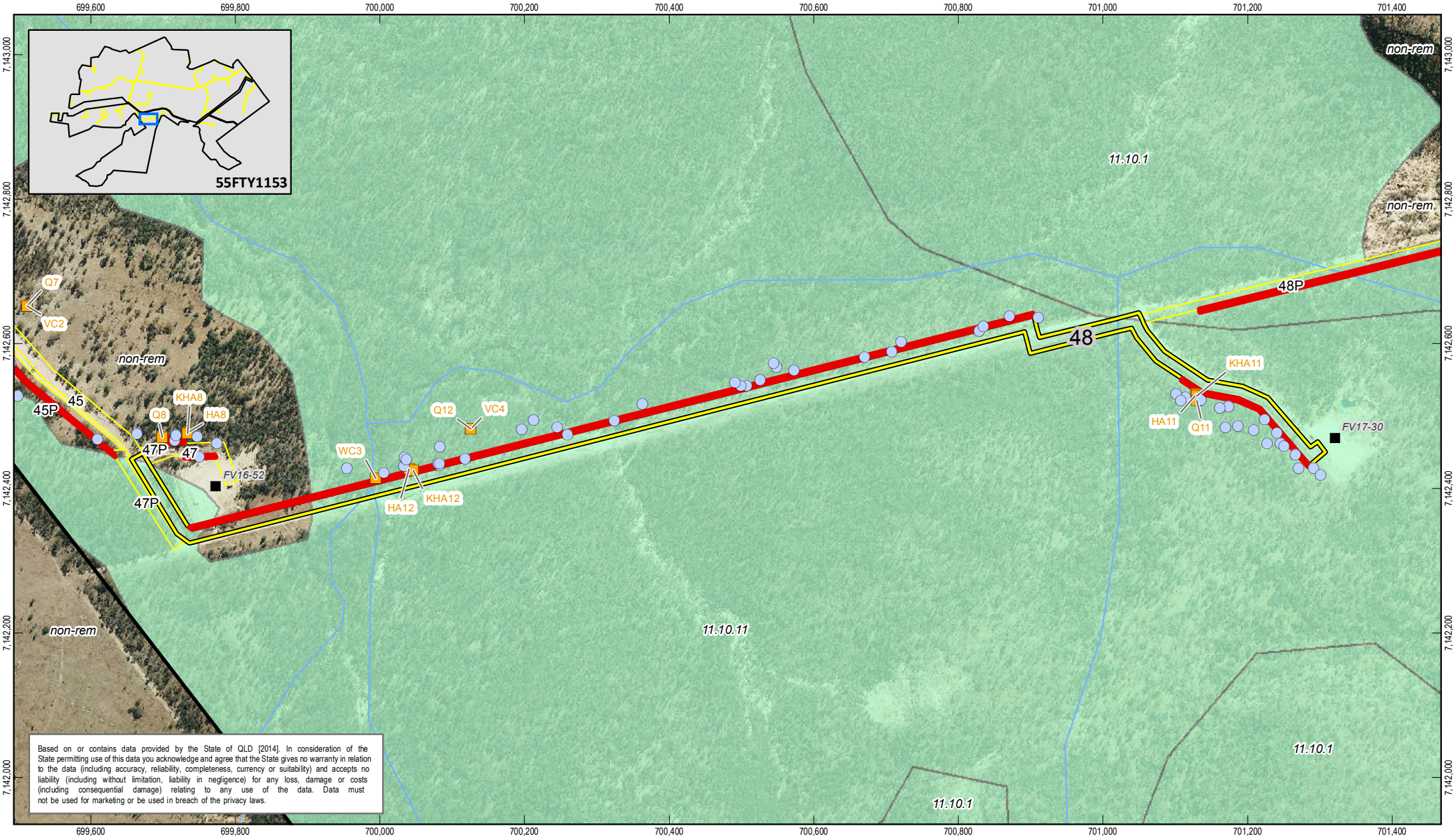
No wetlands, lakes or springs are shown on the Map of Referable Wetlands within the vegetation management zone or within the 300 m buffer.

Wetlands, lakes and springs field verification

No field verification undertaken or required.

Approval requirement or further action

None



Based on or contains data provided by the State of QLD [2014]. In consideration of the State permitting use of this data you acknowledge and agree that the State gives no warranty in relation to the data (including accuracy, reliability, completeness, currency or suitability) and accepts no liability (including without limitation, liability in negligence) for any loss, damage or costs (including consequential damage) relating to any use of the data. Data must not be used for marketing or be used in breach of the privacy laws.

1:7,000 (@ A4)

0 50 100 150 200

Metres

Map Projection: Universal Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

LEGEND

- Well Pad
- Flora Assessment Site
- Fauna Habitat
- Watercourse
- Fairview Lot 55 FTY1153
- Cadastre
- RoW 48
- Vegetation Management Area
- Clearing Limit
- Regional Ecosystem v7 (Biodiversity)
- Not of Concern

GHD

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RoW 48
Vegetation Management Zone

Figure 10

G:\41\27125\GIS\Fairview 2\GIS\MAPS\MXD\41_27125_010_LOT55FAIRVIEW_ROW48_Rev0.mxd

145 Ann St Brisbane QLD 4000 Australia T 61 7 3316 3000 F 61 7 3316 3333 E bnemail@ghd.com W www.ghd.com

Data source: Santos: Well Pad, Cadastre, Clearing Limit, Vegetation Management Area, Remnant Vegetation v7, Imagery/Supplied October 2013; DNRM: Ordered Drainage/2010; GHD: Assessment Sites, Fauna Habitat/Dec 2013. Created by: AF

2.10 RoW 48 vegetation management zone

2.10.1 Approvals and actions summary for RoW 48 vegetation management zone

Item	Approval/further action required*	Item	Approval/further action required*
REs	Yes	**Threatened species**	No
ESAs	No	**Fauna habitat features**	Yes
TECs	No	**Watercourses**	No
Essential habitat	No	**Wetlands**	No
Vegetation community/ habitat values	No		

* - refer to the 'Approval requirement or further action' section for each item identified as yes above

2.10.2 Regional ecosystems

Regional ecosystems mapped

One RE polygon, the no concern at present RE 11.10.11, along with high value regrowth vegetation intersects with this vegetation management zone (Figure 10). The RE short description is as follows:

- 11.10.11: *Eucalyptus populnea, E. melanophloia +/- Callitris glaucophylla* woodland on coarse-grained sedimentary rocks

Regional ecosystems field verification

Field verification of the mapped no concern at present RE polygons 11.10.11 and high value regrowth vegetation determined that the vegetation composition is consistent with the RE mapping.

Field verification points are shown on Figure 10 (Q 8, Q 11, Q 12, VC 4). Refer to Appendix C for RE field verification results and proposed RE mapping amendments for Lot 55.

Approval requirement or further action

Although there are no changes to the RE mapping required from field verification within this vegetation management zone, RE mapping changes for Lot 55 as a whole would require lodgement of field verification RE mapping amendments (Appendix C) with the DEHP to change the existing RE mapping prior to construction commencing. This would be in the form of a PMAV application or RE mapping modification request for Lot 55.

2.10.3 Environmentally sensitive areas

Environmentally sensitive areas mapped

- Category A ESA
  - None mapped within the vegetation management zone or within a 1 km buffer
- Category B ESA

  - None mapped within the vegetation management zone or within a 1 km buffer
- Category C ESA
  - Lot 55 FTY1153 is tenured as State Forest within which the vegetation management zone is contained

Environmentally sensitive areas field verification

Not applicable

Approval requirement or further action

None

2.10.4 Threatened ecological communities

Threatened ecological communities mapped

No TECs are mapped within the vegetation management zone or within the 300 m buffer.

Threatened ecological communities field verification

Not applicable

Approval requirement or further action

None

2.10.5 Essential habitat

Essential habitat mapped

No essential habitat mapped under the VM Act is present within the vegetation management zone or within the 200 m buffer of the vegetation management zone.

Medium value essential habitat mapped under the BPA mapping is located within the majority of the vegetation management zone. This mapping is associated with the mapped RE polygon 11.10.11 discussed in Section 2.10.2.

Essential habitat field verification

No field verification of essential habitat was undertaken.

Approval requirement or further action

None

2.10.6 Vegetation community and habitat values

The following vegetation communities occur over the vegetation management zone:

- *Eucalyptus populnea* woodland on sandy soils gently undulating to rolling hills
- Non-remnant low regrowth woodland

Descriptions of the vegetation communities and habitat values are contained within Appendix B. Field verification points for vegetation communities and habitat values are shown on Figure 10 (Q 8, Q 11, Q 12, VC 4, HA 8, KHA 8, HA 11, KHA 11, HA 12, KHA 12).

Approval requirement or further action

None, however, rehabilitation activities, to be undertaken after construction, are to be in accordance with the GLNG Project RRRMP.

2.10.7 Threatened species

Threatened species field verification

No threatened flora species listed under the EPBC Act and/or NC Act were recorded from the vegetation management zone during field assessments. A likelihood of occurrence assessment for flora species with the potential to occur within Lot 55, as identified in desktop searches is presented in Appendix E, Table 4-5.

No threatened fauna species listed under the EPBC Act and/or NC Act or migratory fauna species listed under the EPBC Act were recorded from field assessments of the vegetation management zone and surrounding area. Further information relating to threatened species records from the field assessment is contained within Section 3. Lists of all flora and fauna species recorded from field assessments are contained within Appendix F.

Threatened species habitat mapping

Potential habitat for fauna species listed under the EPBC Act and/or the NC Act has been mapped over the vegetation management zone (see Section 3.2). Calculations of the extent of species habitat within the assessed vegetation management zones within Lot 55 are presented in Section 3.1.

Approval requirement or further action

Management actions listed within the approved GLNG Project documents, SSMP, SMP and GTP SMP are to be followed for the threatened fauna species that have been identified as having potential habitat within the vegetation management zones to protect threatened fauna species during pre-construction, construction and operation.

2.10.8 Fauna habitat features

Fauna habitat features that have potential to be fauna breeding places for least concern and threatened fauna species listed under the EPBC Act and/or NC Act were recorded within the vegetation management zone. Fauna habitat features recorded included hollow bearing trees, hollow stag trees, peeling bark and hollow logs. Locations of these features are mapped on Figure 10 and are presented in Appendix D.

Approval requirement or further action

Management actions listed within the SSMP, SMP and GTP SMP documents are to be followed to protect fauna habitat features and the fauna that might utilise such features during pre-construction, construction and operation.

2.10.9 Watercourses

Watercourses mapped

A single mapped stream order 2 watercourse intersects the vegetation management zone. No other mapped watercourses are located within the 100 m buffer of the vegetation management zone.

Watercourses field verification

Field verification of the watercourse determined it to be a drainage feature under the *Water Act 2000*. The watercourse assessment location is shown at site WC 3 on Figure 10. A summary of results is presented in Table 2-3, watercourse assessments are presented in Appendix G.

Table 2-3 Watercourse assessment RoW 48 vegetation management zone

Watercourse reference	Location (easting, northing)		Assessment outcome	Reason
WC 3	6990993	7142410	Drainage feature (*Water Act 2000*)	No extended or permanent period of flow – only carries water flow for a short duration after a rainfall event Lacks sufficient flow adequacy to sustain basic ecological processes and support riverine species Lacks continuous and defined bed and banks and the presence of in-stream islands, benches or bars

Approval requirement or further action

None

2.10.10 Wetlands, lakes and springs

Wetlands, lakes and springs mapped

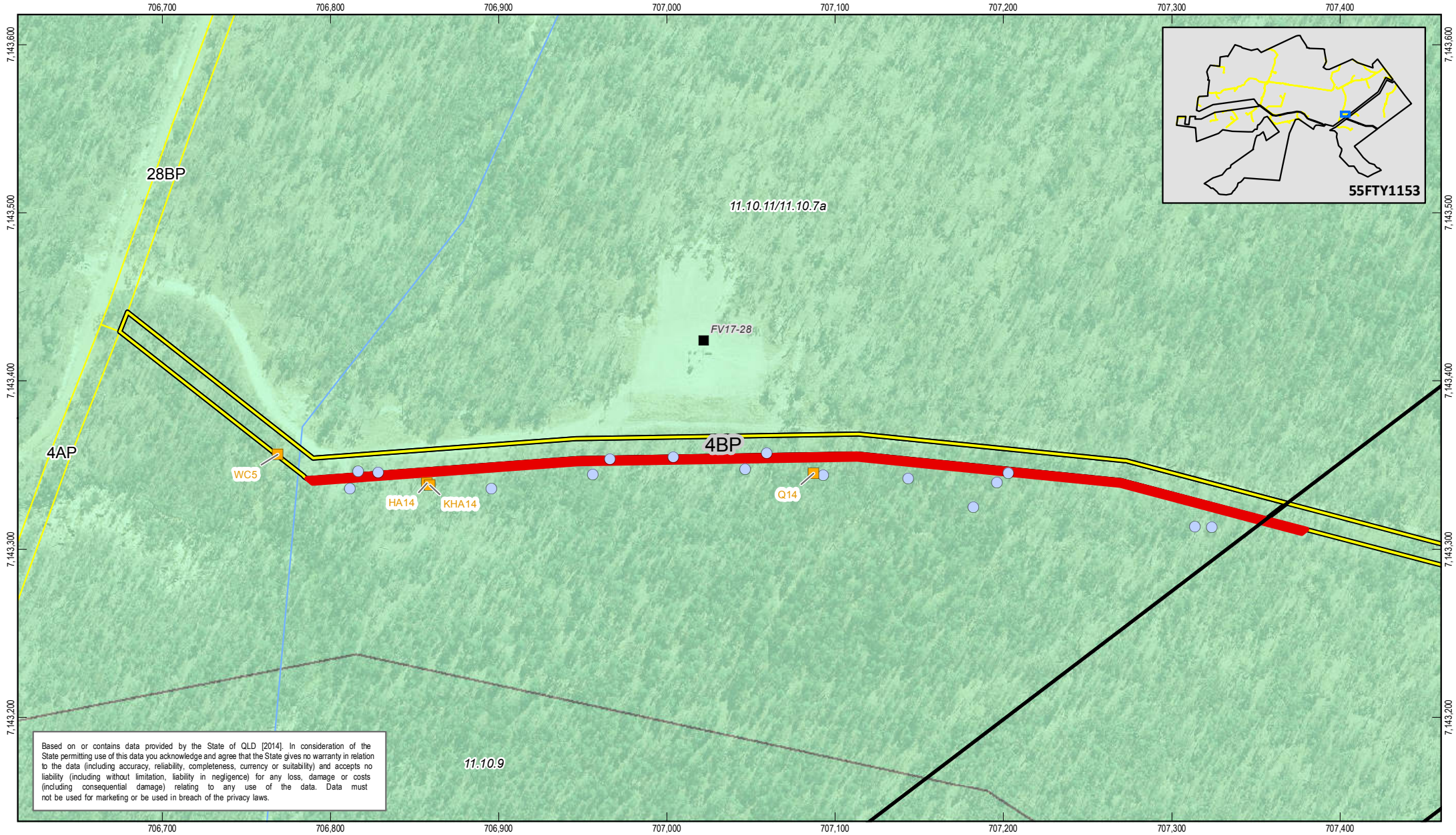
No wetlands, lakes or springs are shown on the Map of Referable Wetlands within the vegetation management zone or within the 300 m buffer.

Wetlands, lakes and springs field verification

No field verification undertaken or required.

Approval requirement or further action

None



1:3,000 (@ A4)

0 20 40 60 80 100

Metres

Map Projection: Universal Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

LEGEND

- Well Pad
- Flora Assessment Site
- Fauna Habitat
- Watercourse
- Fairview Lot 55 FTY1153
- Cadastre
- RoW 4BP
- Vegetation Management Area
- Clearing Limit
- Regional Ecosystem v7 (Biodiversity)
- Not of Concern

GHD

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Revision 0
Date 05 Feb 2014

RoW 4BP
Vegetation Management Zone A

Figure 11

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145 Ann St Brisbane QLD 4000 Australia T 61 7 3316 3000 F 61 7 3316 3333 E bnemail@ghd.com W www.ghd.com

Data source: Santos: Well Pad, Cadastre, Clearing Limit, Vegetation Management Area, Remnant Vegetation v7, Imagery/Supplied October 2013; DNRM: Ordered Drainage/2010; GHD: Assessment Sites, Fauna Habitat/Dec 2013. Created by: AF

2.11 RoW 4BP vegetation management zone A

2.11.1 Approvals and actions summary for RoW 4BP vegetation management zone A

Item	Approval/further action required*	Item	Approval/further action required*
REs	Yes	**Threatened species**	Yes
ESAs	No	**Fauna habitat features**	Yes
TECs	No	**Watercourses**	No
Essential habitat	No	**Wetlands**	No
Vegetation community/ habitat values	No		

* - refer to the 'Approval requirement or further action' section for each item identified as yes above

2.11.2 Regional ecosystems

Regional ecosystems mapped

One mixed RE polygon, no concern at present RE 11.10.11/11.10.7a, intersects with this vegetation management zone (Figure 11). The RE short descriptions are as follows:

- 11.10.11: *Eucalyptus populnea, E. melanophloia* +/- *Callitris glaucophylla* woodland on coarse-grained sedimentary rocks
- 11.10.7a: *Eucalyptus crebra* +/- *Callitris glaucophylla* +/- *Angophora leiocarpa* +/- Eucalyptus spp. woodland on medium to coarse grained sedimentary rocks

Regional ecosystems field verification

Field verification of the mapped no concern at present RE polygon 11.10.11/11.10.7a determined that the vegetation composition is consistent with the RE mapping, however, 11.10.7a was not observed within the RoW.

Field verification points are shown on Figure 11 (Q 14). Refer to Appendix C for RE field verification results and proposed RE mapping amendments for Lot 55.

Approval requirement or further action

Although there are no changes to the RE mapping required from field verification within this vegetation management zone, RE mapping changes for Lot 55 as a whole would require lodgement of field verification RE mapping amendments (Appendix C) with the DEHP to change the existing RE mapping prior to construction commencing. This would be in the form of a PMAV application or RE mapping modification request for Lot 55.

2.11.3 Environmentally sensitive areas

Environmentally sensitive areas mapped

- Category A ESA
  - None mapped within the vegetation management zone or within a 1 km buffer

- Category B ESA
  - None mapped within the vegetation management zone or within a 1 km buffer
- Category C ESA
  - Lot 55 FTY1153 is tenured as State Forest within which the vegetation management zone is contained

Environmentally sensitive areas field verification

Not applicable

Approval requirement or further action

None

2.11.4 Threatened ecological communities

Threatened ecological communities mapped

No TECs are mapped within the vegetation management zone or within the 300 m buffer.

Threatened ecological communities field verification

Not applicable

Approval requirement or further action

None

2.11.5 Essential habitat

Essential habitat mapped

No essential habitat mapped under the VM Act is present within the vegetation management zone or within the 200 m buffer of the vegetation management zone.

Medium value essential habitat mapped under the BPA mapping is located within the vegetation management zone. This mapping is associated with the mapped RE polygon 11.10.11/11.10.7a discussed in Section 2.11.2.

Essential habitat field verification

No field verification of essential habitat was undertaken.

Approval requirement or further action

None

2.11.6 Vegetation community and habitat values

The following vegetation community occurs over the vegetation management zone:

- *Eucalyptus populnea* woodland on sandy soils gently undulating to rolling hills

Descriptions of the vegetation communities and habitat values are contained within Appendix B. Field verification points for vegetation communities and habitat values are shown on Figure 11 (Q 14, HA 14, KHA 14).

Approval requirement or further action

None, however, rehabilitation activities, to be undertaken after construction, are to be in accordance with the GLNG Project RRRMP.

2.11.7 Threatened species

Threatened species field verification

No threatened flora species listed under the EPBC Act and/or NC Act were recorded from the vegetation management zone during field assessments. A likelihood of occurrence assessment for flora species with the potential to occur within Lot 55, as identified in desktop searches is presented in Appendix E, Table 4-5.

One threatened fauna species, the little pied bat (NC Act near threatened) was recorded from field assessments of the RoW 4BP vegetation management zone and surrounding area. Further information relating to threatened species records from the field assessment is contained within Section 3. Lists of all flora and fauna species recorded from field assessments are contained within Appendix F.

Threatened species habitat mapping

Potential habitat for fauna species listed under the EPBC Act and/or the NC Act has been mapped over the vegetation management zone (see Section 3.2). Calculations of the extent of species habitat within the assessed vegetation management zones within Lot 55 are presented in Section 3.1.

Approval requirement or further action

Management actions listed within the approved GLNG Project documents, SSMP, SMP and GTP SMP are to be followed for the threatened fauna species that have been identified as having potential habitat within the vegetation management zones to protect threatened fauna species during pre-construction, construction and operation.

2.11.8 Fauna habitat features

Fauna habitat features that have potential to be fauna breeding places for least concern and threatened fauna species listed under the EPBC Act and/or NC Act were recorded within the vegetation management zone. Fauna habitat features recorded included hollow bearing trees, hollow stag trees, peeling bark and hollow logs. Locations of these features are mapped on Figure 11 and are presented in Appendix D.

Approval requirement or further action

Management actions listed within the SSMP, SMP and GTP SMP documents are to be followed to protect fauna habitat features and the fauna that might utilise such features during pre-construction, construction and operation.

2.11.9 Watercourses

Watercourses mapped

A single mapped stream order 1 watercourse occurs within the 100 m buffer of the vegetation management zone.

Watercourses field verification

Field verification of the watercourse determined it to be a drainage feature under the *Water Act 2000*. The watercourse assessment location is shown at site WC 5 on Figure 11. A summary of results is presented in Table 2-4, watercourse assessments are presented in Appendix G.

Table 2-4 Watercourse assessment RoW 4BP vegetation management zone A

Watercourse reference	Location (easting, northing)		Assessment outcome	Reason
WC 5	706768	7143155	Drainage feature (*Water Act 2000*)	No extended or permanent period of flow – only carries water flow for a short duration after a rainfall event Lacks sufficient flow adequacy to sustain basic ecological processes and support riverine species Lacks continuous and defined bed and banks and the presence of in-stream islands, benches or bars

Approval requirement or further action

None

2.11.10 Wetlands, lakes and springs

Wetlands, lakes and springs mapped

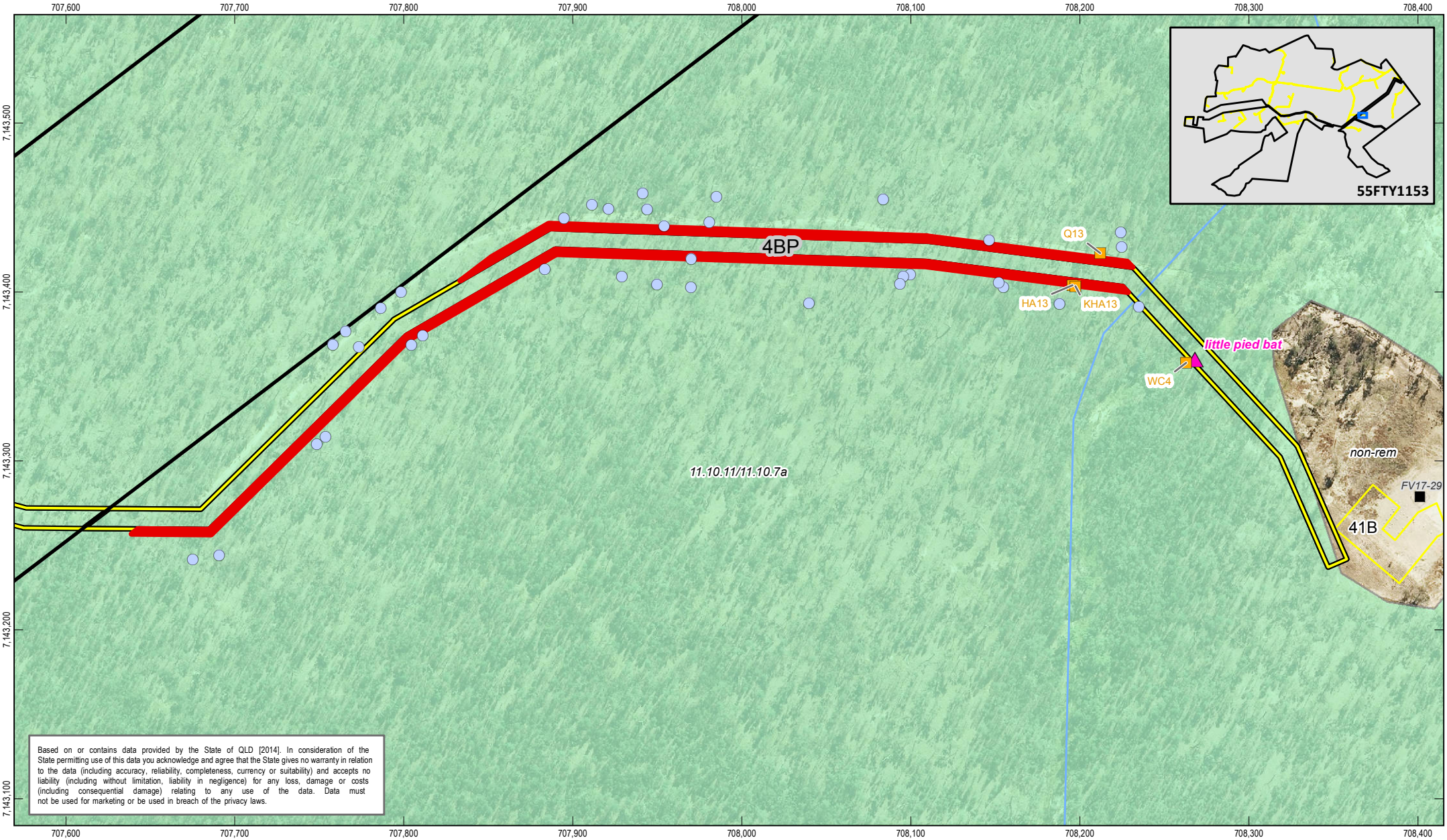
No wetlands, lakes or springs are shown on the Map of Referable Wetlands within the vegetation management zone or within the 300 m buffer.

Wetlands, lakes and springs field verification

No field verification undertaken or required.

Approval requirement or further action

None



1:3,000 (@ A4)

0 20 40 60 80 100

Metres

Map Projection: Universal Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

LEGEND

- Well Pad
- Flora Assessment Site
- Fauna Habitat
- Notable Fauna Species
- Watercourse
- Fairview Lot 55 FTY1153
- Cadastre
- RoW 4BP
- Vegetation Management Area
- Clearing Limit
- Regional Ecosystem v7 (Biodiversity)
- Not of Concern

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Santos GLNG
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Job Number 41-27125
Revision 0
Date 05 Feb 2014

RoW 4BP
Vegetation Management Zone B

Figure 12

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145 Ann St Brisbane QLD 4000 Australia T 61 7 3316 3000 F 61 7 3316 3333 E bnemail@ghd.com W www.ghd.com

Data source: Santos: Well Pad, Cadastre, Clearing Limit, Vegetation Management Area, Remnant Vegetation v7, Imagery/Supplied October 2013; DNRM: Ordered Drainage/2010; GHD: Assessment Sites, Fauna Habitat, Notable Fauna Species/Dec 2013. Created by: AF

2.12 RoW 4BP vegetation management zone B

2.12.1 Approvals and actions summary for RoW 4BP vegetation management zone B

Item	Approval/further action required*	Item	Approval/further action required*
REs	Yes	**Threatened species**	Yes
ESAs	No	**Fauna habitat features**	Yes
TECs	No	**Watercourses**	No
Essential habitat	No	**Wetlands**	No
Vegetation community/ habitat values	No		

* - refer to the 'Approval requirement or further action' section for each item identified as yes above

2.12.2 Regional ecosystems

Regional ecosystems mapped

One mixed RE polygon, no concern at present RE 11.10.11/11.10.7a, intersects with this vegetation management zone (Figure 12). The RE short descriptions are as follows:

- 11.10.11: *Eucalyptus populnea, E. melanophloia* +/- *Callitris glaucophylla* woodland on coarse-grained sedimentary rocks
- 11.10.7a: *Eucalyptus crebra* +/- *Callitris glaucophylla* +/- *Angophora leiocarpa* +/- Eucalyptus spp. woodland on medium to coarse grained sedimentary rocks

Regional ecosystems field verification

Field verification of the mapped no concern at present RE polygon 11.10.11/11.10.7a determined that the vegetation composition is consistent with the RE mapping, however, 11.10.7a was not observed within the RoW.

Field verification points are shown on Figure 12 (Q 13). Refer to Appendix C for RE field verification results and proposed RE mapping amendments for Lot 55.

Approval requirement or further action

Although there are no changes to the RE mapping required from field verification within this vegetation management zone, RE mapping changes for Lot 55 as a whole would require lodgement of field verification RE mapping amendments (Appendix C) with the DEHP to change the existing RE mapping prior to construction commencing. This would be in the form of a PMAV application or RE mapping modification request for Lot 55.

2.12.3 Environmentally sensitive areas

Environmentally sensitive areas mapped

- Category A ESA
  - None mapped within the vegetation management zone or within a 1 km buffer

- Category B ESA
  - None mapped within the vegetation management zone or within a 1 km buffer
- Category C ESA
  - Lot 55 FTY1153 is tenured as State Forest within which the vegetation management zone is contained

Environmentally sensitive areas field verification

Not applicable

Approval requirement or further action

None

2.12.4 Threatened ecological communities

Threatened ecological communities mapped

No TECs are mapped within the vegetation management zone or within the 300 m buffer.

Threatened ecological communities field verification

Not applicable

Approval requirement or further action

None

2.12.5 Essential habitat

Essential habitat mapped

No essential habitat mapped under the VM Act is present within the vegetation management zone or within the 200 m buffer of the vegetation management zone.

The vegetation management zone intersects with both low and medium value essential habitat mapped under the BPA mapping. This mapping is associated with the mapped RE polygon 11.10.11/11.10.7a discussed in Section 2.12.2.

Essential habitat field verification

No field verification of essential habitat was undertaken.

Approval requirement or further action

None

2.12.6 Vegetation community and habitat values

The following vegetation community occurs over the vegetation management zone:

- *Eucalyptus populnea* woodland on sandy soils gently undulating to rolling hills

Descriptions of the vegetation communities and habitat values are contained within Appendix B. Field verification points for vegetation communities and habitat values are shown on Figure 12 (Q 13, HA 13, KHA 13).

Approval requirement or further action

None, however, rehabilitation activities, to be undertaken after construction, are to be in accordance with the GLNG Project RRRMP.

2.12.7 Threatened species

Threatened species field verification

No threatened flora species listed under the EPBC Act and/or NC Act were recorded from the vegetation management zone during field assessments. A likelihood of occurrence assessment for flora species with the potential to occur within Lot 55, as identified in desktop searches is presented in Appendix E, Table 4-5.

One threatened fauna species, the little pied bat (NC Act near threatened) was recorded from field assessments of the RoW 4BP vegetation management zone and surrounding area. Further information relating to threatened species records from the field assessment is contained within Section 3. Lists of all flora and fauna species recorded from field assessments are contained within Appendix F.

Threatened species habitat mapping

Potential habitat for fauna species listed under the EPBC Act and/or the NC Act has been mapped over the vegetation management zone (see Section 3.2). Calculations of the extent of species habitat within the assessed vegetation management zones within Lot 55 are presented in Section 3.1.

Approval requirement or further action

Management actions listed within the approved GLNG Project documents, SSMP, SMP and GTP SMP are to be followed for the threatened fauna species that have been identified as having potential habitat within the vegetation management zones to protect threatened fauna species during pre-construction, construction and operation.

2.12.8 Fauna habitat features

Fauna habitat features that have potential to be fauna breeding places for least concern and threatened fauna species listed under the EPBC Act and/or NC Act were recorded within the vegetation management zone. Fauna habitat features recorded included hollow bearing trees, hollow stag trees, hollow logs and termite mounds. Locations of these features are mapped on Figure 12 and are presented in Appendix D.

Approval requirement or further action

Management actions listed within the SSMP, SMP and GTP SMP documents are to be followed to protect fauna habitat features and the fauna that might utilise such features during pre-construction, construction and operation.

2.12.9 Watercourses

Watercourses mapped

A single mapped stream order 2 watercourse occurs within the 100 m buffer of the vegetation management zone.

Watercourses field verification

Field verification of the watercourse determined it to be a drainage feature under the *Water Act 2000*. The watercourse assessment location is shown at site WC 4 on Figure 12. A summary of results is presented in Table 2-5, watercourse assessments are presented in Appendix G.

Table 2-5 Watercourse assessment RoW 4BP vegetation management zone B

Watercourse reference	Location (easting, northing)		Assessment outcome	Reason
WC 4	708264	7143358	Drainage feature (*Water Act 2000*)	No extended or permanent period of flow – only carries water flow for a short duration after a rainfall event Lacks sufficient flow adequacy to sustain basic ecological processes and support riverine species Lacks continuous and defined bed and banks and the presence of in-stream islands, benches or bars

Approval requirement or further action

None

2.12.10 Wetlands, lakes and springs

Wetlands, lakes and springs mapped

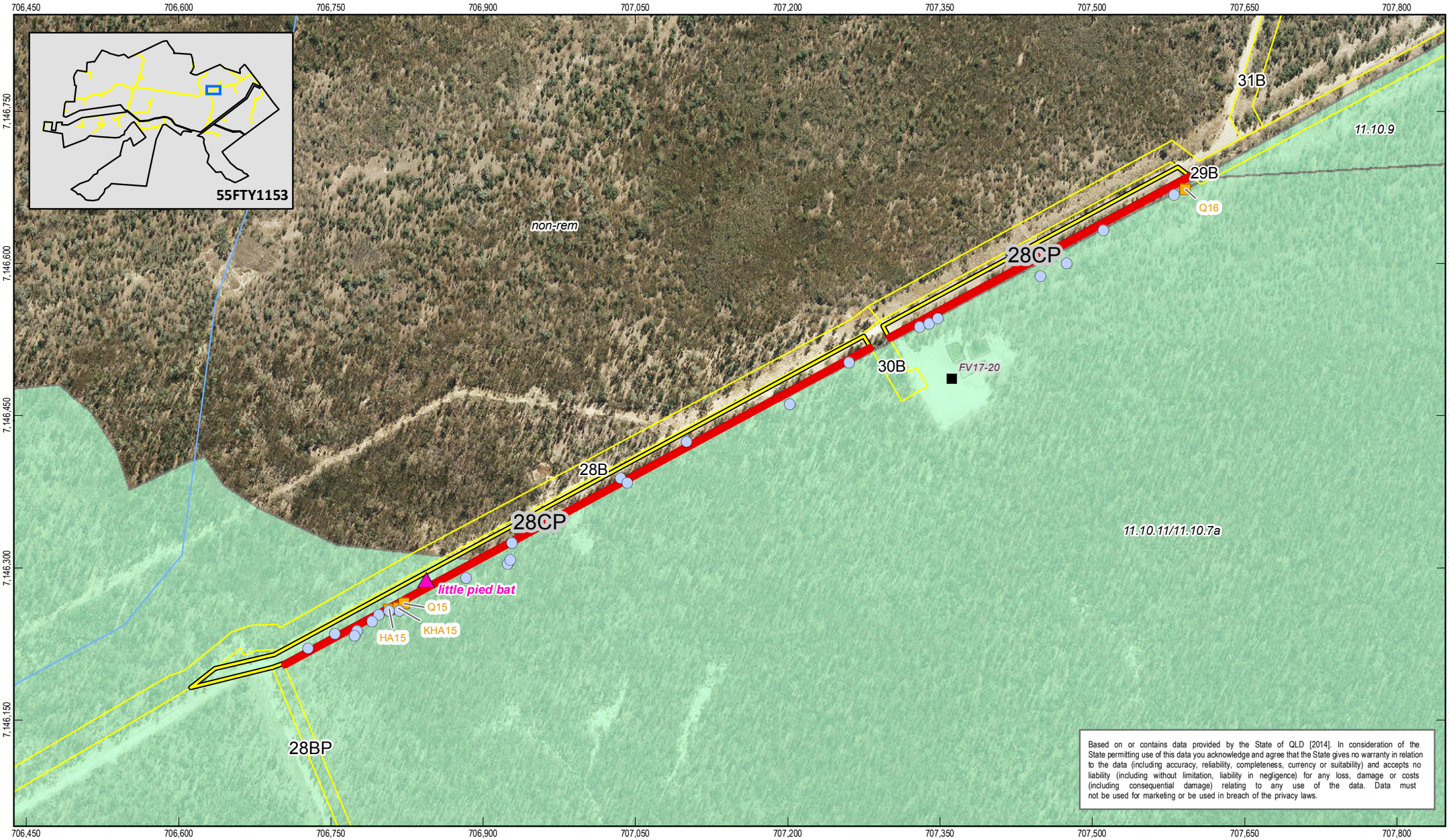
No wetlands, lakes or springs are shown on the Map of Referable Wetlands within the vegetation management zone or within the 300 m buffer.

Wetlands, lakes and springs field verification

No field verification undertaken or required.

Approval requirement or further action

None



1:5,000 (@ A4)

0 50 100 150

Metres

Map Projection: Universal Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

LEGEND

- Well Pad
- Fauna Habitat
- Flora Assessment Site
- Notable Fauna Species
- Watercourse
- Fairview Lot 55 FTY1153
- Cadastre
- RoW 28CP
- Vegetation Management Area
- Clearing Limit
- Regional Ecosystem v7 (Biodiversity)
- Not of Concern

GHD

Santos GLNG Project

Santos GLNG
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Job Number 41-27125
Revision 0
Date 07 Feb 2014

RoW 28CP
Vegetation Management Zone

Figure 13

G:\41\27125\GIS\Fairview 2\GIS\MAPS\MXD\41_27125_013_LOT55FAIRVIEW_ROW28CP_Rev0.mxd

145 Ann St Brisbane QLD 4000 Australia T 61 7 3316 3000 F 61 7 3316 3333 E bnemail@ghd.com W www.ghd.com

Data source: Santos: Well Pad, Cadastre, Clearing Limit, Vegetation Management Area, Remnant Vegetation v7, Imagery/Supplied October 2013; DNRM: Ordered Drainage/2010; GHD: Assessment Sites, Fauna Habitat, Notable Fauna Species/Dec 2013. Created by: AF

2.13 RoW 28CP vegetation management zone

2.13.1 Approvals and actions summary for RoW 28CP vegetation management zone

Item	Approval/further action required*	Item	Approval/further action required*
REs	Yes	**Threatened species**	Yes
ESAs	No	**Fauna habitat features**	Yes
TECs	No	**Watercourses**	No
Essential habitat	No	**Wetlands**	No
Vegetation community/ habitat values	No		

* - refer to the 'Approval requirement or further action' section for each item identified as yes above

2.13.2 Regional ecosystems

Regional ecosystems mapped

One mixed RE polygon, the no concern at present RE 11.10.11/11.10.7a, along with non-remnant vegetation intersects with this vegetation management zone (Figure 13). The RE short descriptions are as follows:

- 11.10.11: *Eucalyptus populnea, E. melanophloia* +/- *Callitris glaucophylla* woodland on coarse-grained sedimentary rocks
- 11.10.7a: *Eucalyptus crebra* +/- *Callitris glaucophylla* +/- *Angophora leiocarpa* +/- Eucalyptus spp. woodland on medium to coarse grained sedimentary rocks

Regional ecosystems field verification

Field verification of the mapped no concern at present RE polygon 11.10.11/11.10.7a determined that the vegetation composition is consistent with the RE mapping, however, 11.10.7a was not observed within the RoW.

Field verification points are shown on Figure 13 (Q 15, Q 16). Refer to Appendix C for RE field verification results and proposed RE mapping amendments for Lot 55.

Approval requirement or further action

Although there are no changes to the RE mapping required from field verification within this vegetation management zone, RE mapping changes for Lot 55 as a whole would require lodgement of field verification RE mapping amendments (Appendix C) with the DEHP to change the existing RE mapping prior to construction commencing. This would be in the form of a PMAV application or RE mapping modification request for Lot 55.

2.13.3 Environmentally sensitive areas

Environmentally sensitive areas mapped

- Category A ESA
  - None mapped within the vegetation management zone or within a 1 km buffer

- Category B ESA
  - None mapped within the vegetation management zone or within a 1 km buffer
- Category C ESA
  - Lot 55 FTY1153 is tenured as State Forest within which the vegetation management zone is contained

Environmentally sensitive areas field verification

Not applicable

Approval requirement or further action

None

2.13.4 Threatened ecological communities

Threatened ecological communities mapped

No TECs are mapped within the vegetation management zone or within the 300 m buffer.

Threatened ecological communities field verification

Not applicable

Approval requirement or further action

None

2.13.5 Essential habitat

Essential habitat mapped

No essential habitat mapped under the VM Act is present within the vegetation management zone or within the 200 m buffer of the vegetation management zone.

Low value essential habitat mapped under the BPA mapping is located within the vegetation management zone. This mapping is associated with the mapped RE polygon 11.10.11/11.10.7a discussed in Section 2.13.2.

Essential habitat field verification

No field verification of essential habitat was undertaken.

Approval requirement or further action

None

2.13.6 Vegetation community and habitat values

The following vegetation communities occur over the vegetation management zone:

- *Eucalyptus populnea* woodland on sandy soils gently undulating to rolling hills
- Non-remnant low regrowth woodland

Descriptions of the vegetation communities and habitat values are contained within Appendix B. Field verification points for vegetation communities and habitat values are shown on Figure 13 (Q 15, Q 16, HA 15, KHA 15).

Approval requirement or further action

None, however, rehabilitation activities, to be undertaken after construction, are to be in accordance with the GLNG Project RRRMP.

2.13.7 Threatened species

Threatened species field verification

No threatened flora species listed under the EPBC Act and/or NC Act were recorded from the vegetation management zone during field assessments. A likelihood of occurrence assessment for flora species with the potential to occur within Lot 55, as identified in desktop searches is presented in Appendix E, Table 4-5.

One threatened fauna species, the little pied bat (NC Act near threatened) was recorded from field assessments of the RoW 28CP vegetation management zone and surrounding area. Further information relating to threatened species records from the field assessment is contained within Section 3. Lists of all flora and fauna species recorded from field assessments are contained within Appendix F.

Threatened species habitat mapping

Potential habitat for fauna species listed under the EPBC Act and/or the NC Act has been mapped over the vegetation management zone (see Section 3.2). Calculations of the extent of species habitat within the assessed vegetation management zones within Lot 55 are presented in Section 3.1.

Approval requirement or further action

Management actions listed within the approved GLNG Project documents, SSMP, SMP and GTP SMP are to be followed for the threatened fauna species that have been identified as having potential habitat within the vegetation management zones to protect threatened fauna species during pre-construction, construction and operation.

2.13.8 Fauna habitat features

Fauna habitat features that have potential to be fauna breeding places for least concern and threatened fauna species listed under the EPBC Act and/or NC Act were recorded within the vegetation management zone. Fauna habitat features recorded included hollow bearing trees, hollow stag trees, hollow logs and peeling bark. Locations of these features are mapped on Figure 13 and are presented in Appendix D.

Approval requirement or further action

Management actions listed within the SSMP, SMP and GTP SMP documents are to be followed to protect fauna habitat features and the fauna that might utilise such features during pre-construction, construction and operation.

2.13.9 Watercourses

Watercourses mapped

No mapped watercourses are located within the vegetation management zone or within the 100 m buffer.

Watercourses field verification

No field verification undertaken or required.

Approval requirement or further action

None

2.13.10 Wetlands, lakes and springs

Wetlands, lakes and springs mapped

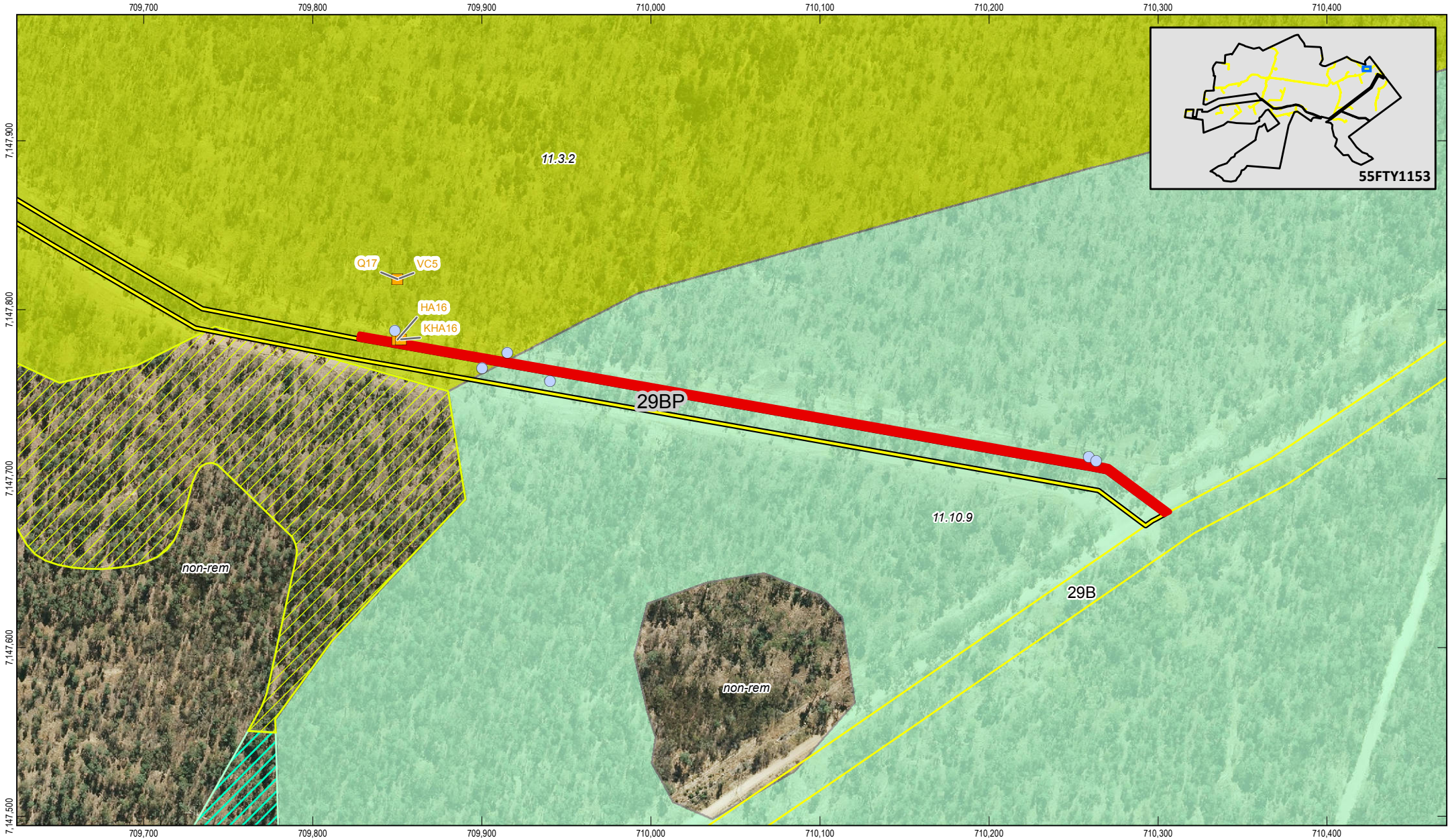
No wetlands, lakes or springs are shown on the Map of Referable Wetlands within the vegetation management zone or within the 300 m buffer.

Wetlands, lakes and springs field verification

No field verification undertaken or required.

Approval requirement or further action

None



1:3,000 (@ A4)

0 20 40 60 80 100

Metres

Map Projection: Universal Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

LEGEND

- Well Pad
- Flora Assessment Site
- Fauna Habitat
- Fairview Lot 55 FTY1153
- Cadastre
- RoW 29BP
- Vegetation Management Area
- Clearing Limit

Regional Ecosystem v7 (Biodiversity)

- Of Concern dominant
- Not of Concern

High Value Regrowth

- Containing Of Concern regional ecosystems
- Is a Least Concern regional ecosystem

GHD

Santos GLNG Project

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Revision 0
Date 05 Feb 2014

RoW 29BP
Vegetation Management Area

Figure 14

G:\41\27125\GIS\Fairview 2\GIS\MAPS\MXD\41_27125_014_LOT55FAIRVIEW_ROW29BP_Rev0.mxd

145 Ann St Brisbane QLD 4000 Australia T 61 7 3316 3000 F 61 7 3316 3333 E bnemail@ghd.com W www.ghd.com

Data source: Santos: Well Pad, Cadastre, Clearing Limit, Vegetation Management Area, Remnant Vegetation v7, Imagery/Supplied October 2013; GHD: Assessment Sites, Fauna Habitat/Dec 2013. Created by: AF

2.14 RoW 29BP vegetation management zone

2.14.1 Approvals and actions summary for RoW 29BP vegetation management zone

Item	Approval/further action required*	Item	Approval/further action required*
REs	Yes	**Threatened species**	No
ESAs	No	**Fauna habitat features**	Yes
TECs	No	**Watercourses**	No
Essential habitat	No	**Wetlands**	No
Vegetation community/ habitat values	No		

* - refer to the 'Approval requirement or further action' section for each item identified as yes above

2.14.2 Regional ecosystems

Regional ecosystems mapped

Two RE polygons intersect with this vegetation management zone. The majority of the RoW intersects with the not of concern RE polygon 11.10.9, and a small portion intersects with the of concern RE polygon 11.3.2 (Figure 14). The RE short descriptions are as follows:

- 11.10.9: *Callitris glaucophylla* woodland on coarse-grained sedimentary rocks
- 11.3.2: Eucalyptus populnea woodland to open-woodland on Cainozoic alluvial plains

Regional ecosystems field verification

Field verification of the mapped no concern at present RE polygon 11.10.9 determined that the vegetation composition is consistent with the RE mapping. However, field verification of the RE polygon 11.3.2 found the vegetation to be more consistent with the RE 11.10.11.

Field verification points are shown on Figure 14 (Q 17, VC 5). Refer to Appendix C for RE field verification results and proposed RE mapping amendments for Lot 55.

Approval requirement or further action

Lodgement of field verification RE mapping amendments (Appendix C) with the DEHP would be required to change the existing RE mapping in this location. This would be in the form of a PMAV application or RE mapping modification request for Lot 55.

2.14.3 Environmentally sensitive areas

Environmentally sensitive areas mapped

- Category A ESA
  - None mapped within the vegetation management zone or within a 1 km buffer
- Category B ESA
  - None mapped within the vegetation management zone or within a 1 km buffer
- Category C ESA

– Lot 55 FTY1153 is tenured as State Forest within which the vegetation management zone is contained
– Of concern RE: 11.3.2 is mapped within RoW and within 1 km of the vegetation management zone

Environmentally sensitive areas field verification

Field verification of the mapped of concern RE polygon (Category C ESA) within the vegetation management zone was undertaken at site Q 17, shown on Figure 14. The mapped RE polygon containing of concern RE 11.3.2 was field verified to be more consistent with no concern at present RE 11.10.11. Thus, the of concern RE, and therefore the Category C ESA, is not considered to exist within the RoW 29BP vegetation management zone, nor within 1 km of the management zone. Field verification mapping amendments has remapped relevant areas as not being representative of a Category C ESA containing an of concern RE. Refer to Appendix C for RE field verification results and proposed RE mapping amendments.

Approval requirement or further action

None

2.14.4 Threatened ecological communities

Threatened ecological communities mapped

No TECs are mapped within the vegetation management zone or within the 300 m buffer.

Threatened ecological communities field verification

Not applicable

Approval requirement or further action

None

2.14.5 Essential habitat

Essential habitat mapped

No essential habitat mapped under the VM Act is present within the vegetation management zone or within the 200 m buffer of the vegetation management zone.

Low value essential habitat mapped under the BPA mapping is located within the vegetation management zone. This mapping is associated with the mapped RE polygon 11.10.9 and 11.3.2 discussed in Section 2.14.2.

Essential habitat field verification

No field verification of essential habitat was undertaken.

Approval requirement or further action

None

2.14.6 Vegetation community and habitat values

The following vegetation community occurs over the vegetation management zone:

- *Eucalyptus populnea* woodland on sandy soils gently undulating to rolling hills

Descriptions of the vegetation communities and habitat values are contained within Appendix B. Field verification points for vegetation communities and habitat values are shown on Figure 14 (Q 17, VC 5, HA 16, KHA 16).

Approval requirement or further action

None, however, rehabilitation activities, to be undertaken after construction, are to be in accordance with the GLNG Project RRRMP.

2.14.7 Threatened species

Threatened species field verification

No threatened flora species listed under the EPBC Act and/or NC Act were recorded from the vegetation management zone during field assessments. A likelihood of occurrence assessment for flora species with the potential to occur within Lot 55, as identified in desktop searches is presented in Appendix E, Table 4-5.

No threatened fauna species listed under the EPBC Act and/or NC Act or migratory fauna species listed under the EPBC Act were recorded from field assessments of the vegetation management zone and surrounding area. Further information relating to threatened species records from the field assessment is contained within Section 3. Lists of all flora and fauna species recorded from field assessments are contained within Appendix F.

Threatened species habitat mapping

Potential habitat for fauna species listed under the EPBC Act and/or the NC Act has been mapped over the vegetation management zone (see Section 3.2). Calculations of the extent of species habitat within the assessed vegetation management zones within Lot 55 are presented in Section 3.1.

Approval requirement or further action

Management actions listed within the approved GLNG Project documents, SSMP, SMP and GTP SMP are to be followed for the threatened fauna species that have been identified as having potential habitat within the vegetation management zones to protect threatened fauna species during pre-construction, construction and operation.

2.14.8 Fauna habitat features

Fauna habitat features that have potential to be fauna breeding places for least concern and threatened fauna species listed under the EPBC Act and/or NC Act were recorded within the vegetation management zone. Fauna habitat features recorded included hollow bearing trees, hollow stag trees and hollow logs. Locations of these features are mapped on Figure 14 and are presented in Appendix D.

Approval requirement or further action

Management actions listed within the SSMP, SMP and GTP SMP documents are to be followed to protect fauna habitat features and the fauna that might utilise such features during pre-construction, construction and operation.

2.14.9 Watercourses

Watercourses mapped

No mapped watercourses are located within the vegetation management zone or within the 100 m buffer.

Watercourses field verification

No field verification undertaken or required.

Approval requirement or further action

None

2.14.10 Wetlands, lakes and springs

Wetlands, lakes and springs mapped

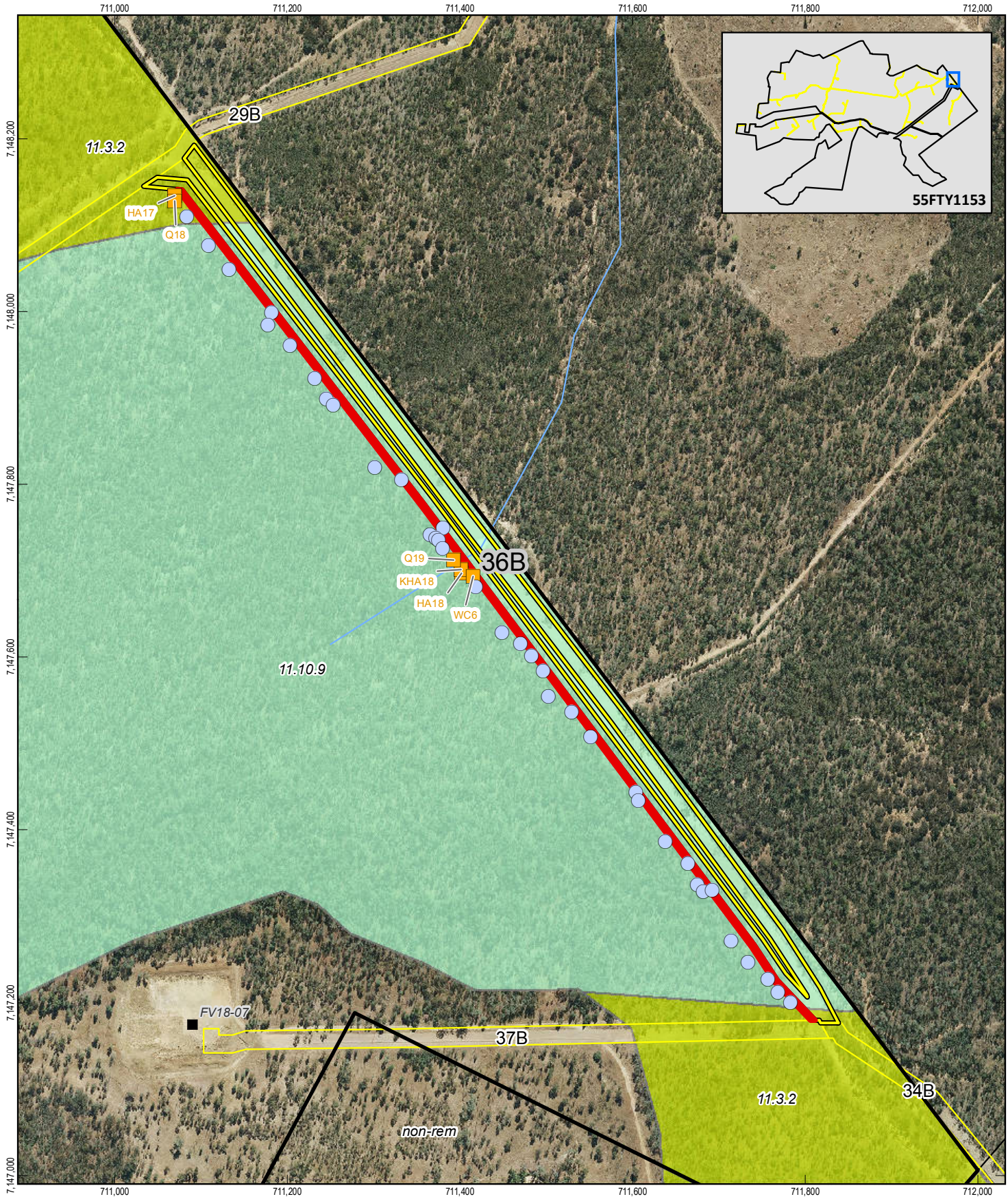
No wetlands, lakes or springs are shown on the Map of Referable Wetlands within the vegetation management zone or within the 300 m buffer.

Wetlands, lakes and springs field verification

No field verification undertaken or required.

Approval requirement or further action

None



LEGEND

- Well Pad
- Fauna Habitat
- Flora Assessment Site
- Watercourse
- Fairview Lot 55 FTY1153
- Cadastre
- RoW 36B
- Vegetation Management Area
- Clearing Limit
- Regional Ecosystem v7 (Biodiversity)
- Of Concern dominant
- Not of Concern

1:6,000 (@ A4)
0 50 100 150 200
Metres
Map Projection: Universal Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

GHD

Santos GLNG Project

Santos GLNG
Lot 55 Fairview Ecological Assessment

Job Number	41-27125
Revision	0
Date	07 Feb 2014

RoW 36B
Vegetation Management Zone

Figure 15

G:\41\27125\GIS\Fairview 2\GIS\MAPS\MXD\41_27125_015_LOT55FAIRVIEW_ROW36B_Rev0.mxd
145 Ann St Brisbane QLD 4000 Australia T 61 7 3316 3000 F 61 7 3316 3333 E bnemail@ghd.com W www.ghd.com

Data source: Santos: Well Pad, Cadastre, Clearing Limit, Vegetation Management Area, Remnant Vegetation v7, Imagery/Supplied October 2013; DNRM: Ordered Drainage/2010; GHD: Assessment Sites, Fauna Habitat, Notable Fauna Species/Dec 2013. Created by: AF

2.15 RoW 36B vegetation management zone

2.15.1 Approvals and actions summary for RoW 36B vegetation management zone

Item	Approval/further action required*	Item	Approval/further action required*
REs	Yes	**Threatened species**	No
ESAs	No	**Fauna habitat features**	Yes
TECs	No	**Watercourses**	No
Essential habitat	No	**Wetlands**	No
Vegetation community/ habitat values	No		

* - refer to the 'Approval requirement or further action' section for each item identified as yes above

2.15.2 Regional ecosystems

Regional ecosystems mapped

Two RE polygons intersect with this vegetation management zone. The majority of the RoW intersects with the not of concern RE polygon 11.10.9, and a small portion intersects with the of concern RE polygon 11.3.2 (Figure 15). The RE short descriptions are as follows:

- 11.10.9: *Callitris glaucophylla* woodland on coarse-grained sedimentary rocks
- 11.3.2: *Eucalyptus populnea* woodland to open-woodland on Cainozoic alluvial plains

Regional ecosystems field verification

Field verification of the mapped no concern at present RE polygon 11.10.9 determined that the vegetation composition is consistent with the RE mapping. However, field verification of the RE polygon 11.3.2 found the vegetation to be more consistent with the RE 11.10.11.

Field verification points are shown on Figure 15 (Q 18, Q 19). Refer to Appendix C for RE field verification results and proposed RE mapping amendments for Lot 55.

Approval requirement or further action

Lodgement of field verification RE mapping amendments (Appendix C) with the DEHP would be required to change the existing RE mapping in this location. This would be in the form of a PMAV application or RE mapping modification request for Lot 55.

2.15.3 Environmentally sensitive areas

Environmentally sensitive areas mapped

- Category A ESA
  - None mapped within the vegetation management zone or within a 1 km buffer
- Category B ESA
  - None mapped within the vegetation management zone or within a 1 km buffer
- Category C ESA

- Lot 55 FTY1153 is tenured as State Forest within which the vegetation management zone is contained
- Of concern RE: 11.3.2 is mapped within RoW and within 1 km of the vegetation management zone

Environmentally sensitive areas field verification

Field verification of the mapped of concern RE polygon (Category C ESA) within the vegetation management zone was undertaken at site Q 18, shown on Figure 15. The mapped RE polygon containing of concern RE 11.3.2 was field verified to be more consistent with no concern at present RE 11.10.11. Thus, the of concern RE, and therefore the Category C ESA, is not considered to exist within the RoW 36B vegetation management zone, nor within 1 km of the management zone. Field verification mapping amendments has remapped relevant areas as not being representative of a Category C ESA containing an of concern RE. Refer to Appendix C for RE field verification results and proposed RE mapping amendments.

Approval requirement or further action

None

2.15.4 Threatened ecological communities

Threatened ecological communities mapped

No TECs are mapped within the vegetation management zone or within the 300 m buffer.

Threatened ecological communities field verification

Not applicable

Approval requirement or further action

None

2.15.5 Essential habitat

Essential habitat mapped

No essential habitat mapped under the VM Act is present within the vegetation management zone or within the 200 m buffer of the vegetation management zone.

Low value essential habitat mapped under the BPA mapping is located within the vegetation management zone. This mapping is associated with the mapped RE polygon 11.10.9 and 11.3.2 discussed in Section 2.15.2.

Essential habitat field verification

No field verification of essential habitat was undertaken.

Approval requirement or further action

None

2.15.6 Vegetation community and habitat values

The following vegetation community occurs over the vegetation management zone:

- *Callitris glaucophylla* woodland to open-forest on coarse grained sediments on gently undulating to rolling hills

Descriptions of the vegetation communities and habitat values are contained within Appendix B. Field verification points for vegetation communities and habitat values are shown on Figure 15 (Q 18, Q 19, HA 17, KHA 17, HA 18, KHA 18).

Approval requirement or further action

None, however, rehabilitation activities, to be undertaken after construction, are to be in accordance with the GLNG Project RRRMP.

2.15.7 Threatened species

Threatened species field verification

No threatened flora species listed under the EPBC Act and/or NC Act were recorded from the vegetation management zone during field assessments. A likelihood of occurrence assessment for flora species with the potential to occur within Lot 55, as identified in desktop searches is presented in Appendix E, Table 4-5.

No threatened fauna species listed under the EPBC Act and/or NC Act or migratory fauna species listed under the EPBC Act were recorded from field assessments of the vegetation management zone and surrounding area. Further information relating to threatened species records from the field assessment is contained within Section 3. Lists of all flora and fauna species recorded from field assessments are contained within Appendix F.

Threatened species habitat mapping

Potential habitat for fauna species listed under the EPBC Act and/or the NC Act has been mapped over the vegetation management zone (see Section 3.2). Calculations of the extent of species habitat within the assessed vegetation management zones within Lot 55 are presented in Section 3.1.

Approval requirement or further action

Management actions listed within the approved GLNG Project documents, SSMP, SMP and GTP SMP are to be followed for the threatened fauna species that have been identified as having potential habitat within the vegetation management zones to protect threatened fauna species during pre-construction, construction and operation.

2.15.8 Fauna habitat features

Fauna habitat features that have potential to be fauna breeding places for least concern and threatened fauna species listed under the EPBC Act and/or NC Act were recorded within the vegetation management zone. Fauna habitat features recorded included hollow bearing trees, hollow stag trees, hollow logs and termite mounds. Locations of these features are mapped on Figure 15 and are presented in Appendix D.

Approval requirement or further action

Management actions listed within the SSMP, SMP and GTP SMP documents are to be followed to protect fauna habitat features and the fauna that might utilise such features during pre-construction, construction and operation.

2.15.9 Watercourses

Watercourses mapped

A single mapped stream order 1 watercourse intersects the vegetation management zone. No other mapped watercourses are located within the 100 m buffer of the vegetation management zone.

Watercourses field verification

Field verification of the watercourse determined it to be a drainage feature under the *Water Act 2000*. The watercourse assessment location is shown as site WC 6 on Figure 15. A summary of results is presented in Table 2-6, watercourse assessments are presented in Appendix G.

Table 2-6 Watercourse assessment RoW 36B vegetation management zone A

Watercourse reference	Location (easting, northing)		Assessment outcome	Reason
WC 6	711413	7147700	Drainage feature (*Water Act 2000*)	No extended or permanent period of flow – only carries water flow for a short duration after a rainfall event Lacks sufficient flow adequacy to sustain basic ecological processes and support riverine species Lacks continuous and defined bed and banks and the presence of in-stream islands, benches or bars

Approval requirement or further action

None

2.15.10 Wetlands, lakes and springs

Wetlands, lakes and springs mapped

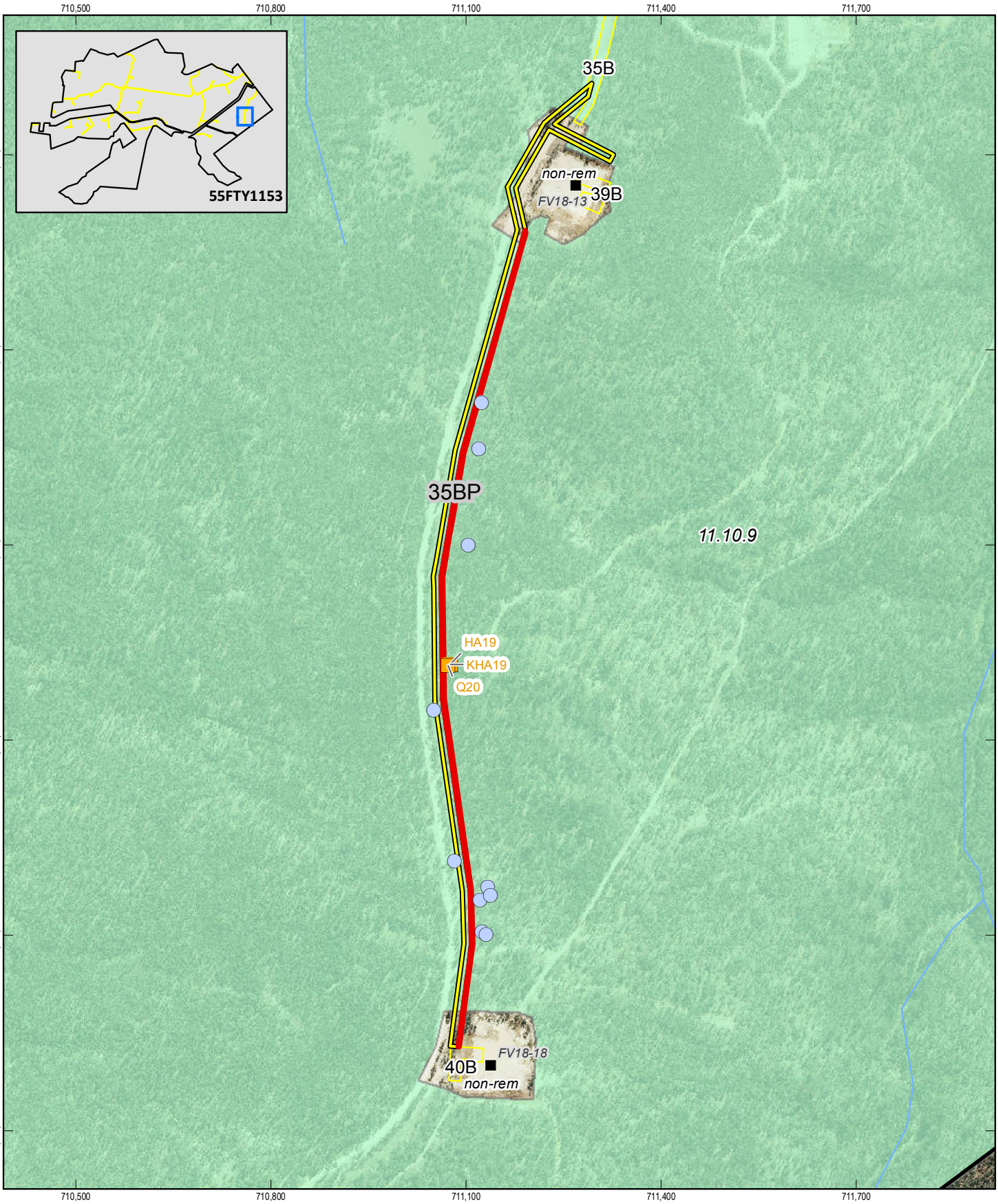
No wetlands, lakes or springs are shown on the Map of Referable Wetlands within the vegetation management zone or within the 300 m buffer.

Wetlands, lakes and springs field verification

No field verification undertaken or required.

Approval requirement or further action

None



LEGEND

- Well Pad
- Fauna Habitat
- Flora Assessment Site
- Watercourse
- Fairview Lot 55 FTY1153
- Cadastre
- RoW 35BP
- Vegetation Management Area
- Clearing Limit
- Regional Ecosystem v7 (Biodiversity)
- Not of Concern

1:8,000 (@ A4)
0 100 200 300
Metres
Map Projection: Universal Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

GHD

Santos GLNG Project

Santos GLNG
Lot 55 Fairview Ecological Assessment

Job Number 41-27125
Revision 0
Date 07 Feb 2014

RoW 35BP
Vegetation Management Zone

Figure 16

145 Ann St Brisbane QLD 4000 Australia T 61 7 3316 3000 F 61 7 3316 3333 E bnemail@ghd.com W www.ghd.com

Data source: Santos: Well Pad, Cadastre, Clearing Limit, Vegetation Management Area, Remnant Vegetation v7, Imagery/Supplied October 2013; DNRM: Ordered Drainage/2010; GHD: Assessment Sites, Fauna Habitat/Dec 2013. Created by: AF

2.16 RoW 35BP vegetation management zone

2.16.1 Approvals and actions summary for RoW 35BP vegetation management zone

Item	Approval/further action required*	Item	Approval/further action required*
REs	Yes	**Threatened species**	No
ESAs	No	**Fauna habitat features**	Yes
TECs	No	**Watercourses**	No
Essential habitat	No	**Wetlands**	No
Vegetation community/ habitat values	No		

* - refer to the 'Approval requirement or further action' section for each item identified as yes above

2.16.2 Regional ecosystems

Regional ecosystems mapped

One RE polygon, no concern at present RE 11.10.9, intersects with this vegetation management zone (Figure 16). The RE short descriptions are as follows:

- 11.10.9: *Callitris glaucophylla* woodland on coarse-grained sedimentary rocks

Regional ecosystems field verification

Field verification of the mapped no concern at present RE polygon 11.10.9 determined that the vegetation composition is consistent with the RE mapping.

Field verification points are shown on Figure 16 (Q 20). Refer to Appendix C for RE field verification results and proposed RE mapping amendments for Lot 55.

Approval requirement or further action

Although there are no changes to the RE mapping required from field verification within this vegetation management zone, RE mapping changes for Lot 55 as a whole would require lodgement of field verification RE mapping amendments (Appendix C) with the DEHP to change the existing RE mapping prior to construction commencing. This would be in the form of a PMAV application or RE mapping modification request for Lot 55.

2.16.3 Environmentally sensitive areas

Environmentally sensitive areas mapped

- Category A ESA
  - None mapped within the vegetation management zone or within a 1 km buffer
- Category B ESA
  - None mapped within the vegetation management zone or within a 1 km buffer
- Category C ESA

– Lot 55 FTY1153 is tenured as State Forest within which the vegetation management zone is contained

Environmentally sensitive areas field verification

Not applicable

Approval requirement or further action

None

2.16.4 Threatened ecological communities

Threatened ecological communities mapped

No TECs are mapped within the vegetation management zone or within the 300 m buffer.

Threatened ecological communities field verification

Not applicable

Approval requirement or further action

None

2.16.5 Essential habitat

Essential habitat mapped

No essential habitat mapped under the VM Act is present within the vegetation management zone or within the 200 m buffer of the vegetation management zone.

Low value essential habitat mapped under the BPA mapping is located within the vegetation management zone. This mapping is associated with the mapped RE polygon 11.10.9 discussed in Section 2.16.2.

Essential habitat field verification

No field verification of essential habitat was undertaken.

Approval requirement or further action

None

2.16.6 Vegetation community and habitat values

The following vegetation community occurs over the vegetation management zone:

- *Callitris glaucophylla* woodland to open-forest on coarse grained sediments on gently undulating to rolling hills

Descriptions of the vegetation communities and habitat values are contained within Appendix B. Field verification points for vegetation communities and habitat values are shown on Figure 16 (Q 20, HA 19, KHA 19).

Approval requirement or further action

None, however, rehabilitation activities, to be undertaken after construction, are to be in accordance with the GLNG Project RRRMP.

2.16.7 Threatened species

Threatened species field verification

No threatened flora species listed under the EPBC Act and/or NC Act were recorded from the vegetation management zone during field assessments. A likelihood of occurrence assessment for flora species with the potential to occur within Lot 55, as identified in desktop searches is presented in Appendix E, Table 4-5.

No threatened fauna species listed under the EPBC Act and/or NC Act or migratory fauna species listed under the EPBC Act were recorded from field assessments of the vegetation management zone and surrounding area. Further information relating to threatened species records from the field assessment is contained within Section 3. Lists of all flora and fauna species recorded from field assessments are contained within Appendix F.

Threatened species habitat mapping

Potential habitat for fauna species listed under the EPBC Act and/or the NC Act has been mapped over the vegetation management zone (see Section 3.2). Calculations of the extent of species habitat within the assessed vegetation management zones in Lot 55 are presented in Section 3.1.

Approval requirement or further action

Management actions listed within the approved GLNG Project documents, SSMP, SMP and GTP SMP are to be followed for the threatened fauna species that have been identified as having potential habitat within the vegetation management zones to protect threatened fauna species during pre-construction, construction and operation.

2.16.8 Fauna habitat features

Fauna habitat features that have potential to be fauna breeding places for least concern and threatened fauna species listed under the EPBC Act and/or NC Act were recorded within the vegetation management zone. Fauna habitat features recorded included hollow bearing trees, hollow stag trees and hollow logs. Locations of these features are mapped on Figure 16 and are presented in Appendix D.

Approval requirement or further action

Management actions listed within the SSMP, SMP and GTP SMP documents are to be followed to protect fauna habitat features and the fauna that might utilise such features during pre-construction, construction and operation.

2.16.9 Watercourses

Watercourses mapped

No mapped watercourses are located within the vegetation management zone or within the 100 m buffer.

Watercourses field verification

No field verification undertaken or required.

Approval requirement or further action

None

2.16.10 Wetlands, lakes and springs

Wetlands, lakes and springs mapped

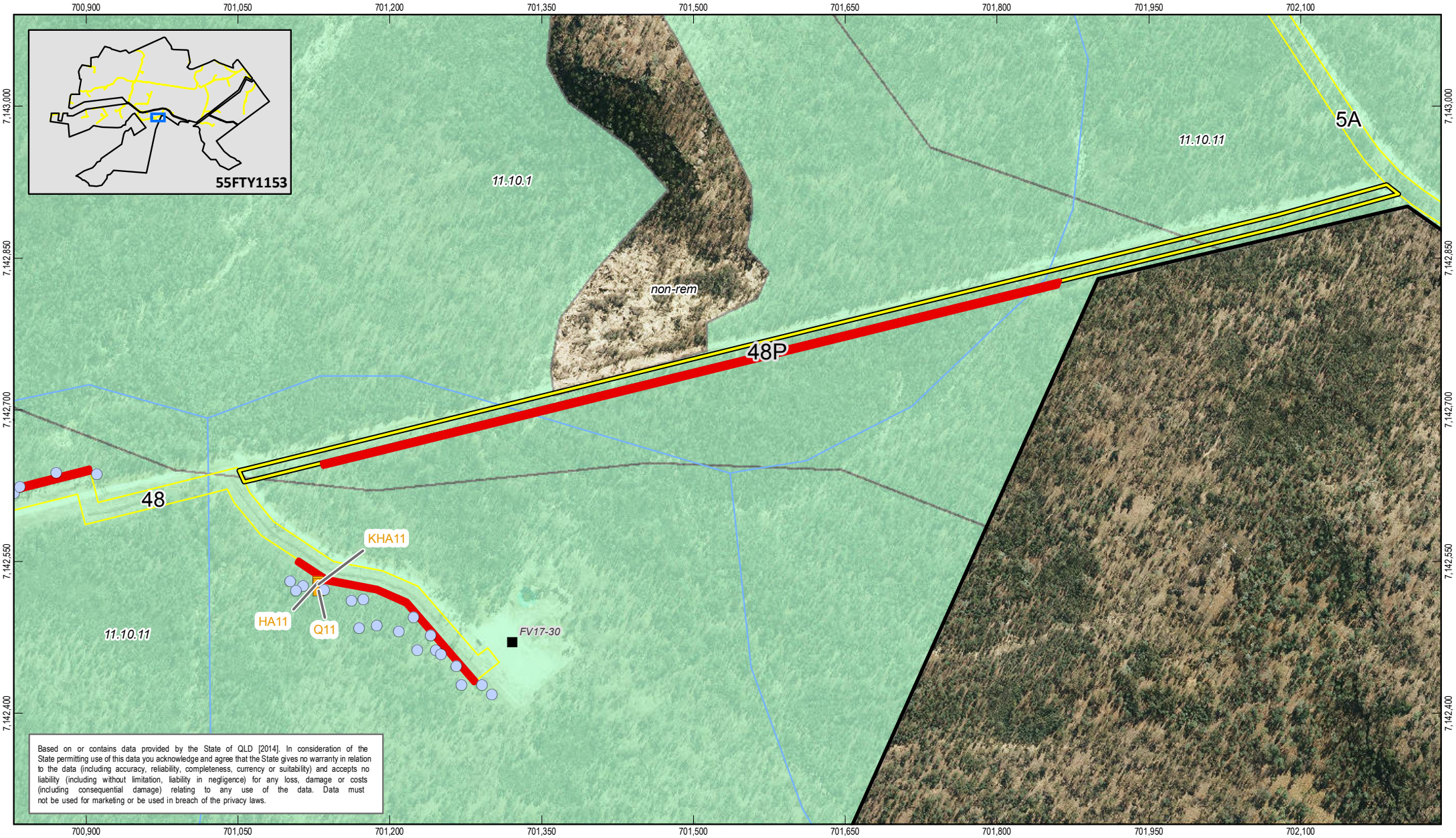
No wetlands, lakes or springs are shown on the Map of Referable Wetlands within the vegetation management zone or within the 300 m buffer.

Wetlands, lakes and springs field verification

No field verification undertaken or required.

Approval requirement or further action

None



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0 50 100 150

Metres

Map Projection: Universal Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

LEGEND

- Well Pad
- Flora Assessment Site
- Fauna Habitat
- Watercourse
- Fairview Lot 55 FTY1153
- Cadastre
- RoW 48P
- Vegetation Management Area
- Clearing Limit
- Regional Ecosystem v7 (Biodiversity)
- Not of Concern

Santos GLNG
Lot 55 Fairview Ecological Assessment

Job Number 41-27125
Revision 0
Date 07 Feb 2014

RoW 48P
Vegetation Management Zone

Figure 17

G:\41\27125\GIS\Fairview 2\GIS\MAPS\MXD\41_27125_017_LOT55FAIRVIEW_ROW48P_Rev0.mxd

145 Ann St Brisbane QLD 4000 Australia T 61 7 3316 3000 F 61 7 3316 3333 E bnemail@ghd.com W www.ghd.com

Data source: Santos: Well Pad, Cadastre, Clearing Limit, Vegetation Management Area, Remnant Vegetation v7, Imagery/Supplied October 2013; DNRM: Ordered Drainage/2010; GHD: Assessment Sites, Fauna Habitat/Dec 2013. Created by: AF

2.17 RoW 48P vegetation management zone

2.17.1 Approvals and actions summary for RoW 48P vegetation management zone

Item	Approval/further action required*	Item	Approval/further action required*
REs	No	**Threatened species**	Potential
ESAs	No	**Fauna habitat features**	Potential
TECs	No	**Watercourses**	Potential
Essential habitat	No	**Wetlands**	No
Vegetation community/ habitat values	No		

* - refer to the 'Approval requirement or further action' section for each item identified as yes above

2.17.2 Regional ecosystems

Regional ecosystems mapped

One RE polygon, the no concern at present RE 11.10.1, intersects with this vegetation management zone. Non remnant vegetation and no concern at present RE 11.10.11 is also mapped within the 200 m buffer (Figure 17). The RE short descriptions are as follows:

- 11.10.1: *Corymbia citriodora* woodland on coarse-grained sedimentary rocks
- 11.10.11: *Eucalyptus populnea, E. melanophloia +/- Callitris glaucophylla* woodland on coarse-grained sedimentary rocks

Regional ecosystems field verification

Field verification of the mapped RE polygons associated with the vegetation management zone has not been undertaken.

Approval requirement or further action

No changes to the RE mapping within this vegetation management zone are proposed as field verification has not been undertaken. RE mapping changes for Lot 55 as a whole would require lodgement of field verification RE mapping amendments (Appendix C) with the DEHP to change the existing RE mapping prior to construction commencing. This would be in the form of a PMAV application or RE mapping modification request for Lot 55.

2.17.3 Environmentally sensitive areas

Environmentally sensitive areas mapped

- Category A ESA
  - None mapped within the vegetation management zone or within a 1 km buffer
- Category B ESA
  - None mapped within the vegetation management zone or within a 1 km buffer
- Category C ESA

– Lot 55 FTY1153 is tenured as State Forest within which the vegetation management zone is contained

Environmentally sensitive areas field verification

Not applicable

Approval requirement or further action

None

2.17.4 Threatened ecological communities

Threatened ecological communities mapped

No TECs are mapped within the vegetation management zone or within the 300 m buffer.

Threatened ecological communities field verification

Not applicable

Approval requirement or further action

None

2.17.5 Essential habitat

Essential habitat mapped

No essential habitat mapped under the VM Act is present within the vegetation management zone or within the 200 m buffer of the vegetation management zone.

Medium value essential habitat mapped under the BPA mapping is located within the vegetation management zone.

Essential habitat field verification

No field verification of essential habitat was undertaken.

Approval requirement or further action

None

2.17.6 Vegetation community and habitat values

Vegetation communities and habitat values occurring within this vegetation management zone have not been field verified. From an extrapolation of field survey data associated with mapped REs, the vegetation community and habitat values present are considered likely to be similar to the vegetation community *Eucalyptus populnea* woodland on sandy soils gently undulating to rolling hills.

Descriptions of the vegetation community and habitat values are contained within Appendix B. No field verification points are associated with this vegetation management zone (Figure 17).

Approval requirement or further action

None, however, rehabilitation activities, to be undertaken after construction, are to be in accordance with the GLNG Project RRRMP.

2.17.7 Threatened species

Threatened species field verification

Field verification for the occurrence of threatened flora and fauna species listed under the EPBC Act and/or NC Act has not been undertaken at the location of this vegetation management zone.

Threatened species habitat mapping

Potential habitat for fauna species listed under the EPBC Act and/or the NC Act has been mapped over the vegetation management zone (see Section 3.2). Calculations of the extent of species habitat within the assessed vegetation management zones within Lot 55 are presented in Section 3.1.

Approval requirement or further action

Management actions listed within the approved GLNG Project documents, SSMP, SMP and GTP SMP are to be followed for the threatened fauna species that have been identified as having potential habitat within the vegetation management zones to protect the potential for threatened fauna species occurring during pre-construction, construction and operation.

2.17.8 Fauna habitat features

Field verification for the occurrence of fauna habitat features has not been undertaken at the location of this vegetation management zone.

Approval requirement or further action

Management actions listed within the SSMP, SMP and GTP SMP documents are to be followed to protect any potential fauna habitat features present and the fauna that might utilise such features during pre-construction, construction and operation.

2.17.9 Watercourses

Watercourses mapped

A mapped stream order 2 watercourse and a mapped stream order 1 watercourse intersect the vegetation management zone at the following approximate locations (easting; northing):

- Stream order 2: 701316; 7142705
- Stream order 1: 701850; 7142835

No other mapped watercourses are located within the 100 m buffer of the vegetation management zone.

Watercourses field verification

Field verification of the watercourse has not been undertaken.

Approval requirement or further action

As field verification of the watercourse has not been completed, there is a potential that approvals may be required. However, given the ephemeral nature of similar sized mapped watercourses within the area that have undergone assessment, the requirement for approvals relating to this watercourse are considered unlikely.

2.17.10 Wetlands, lakes and springs

Wetlands, lakes and springs mapped

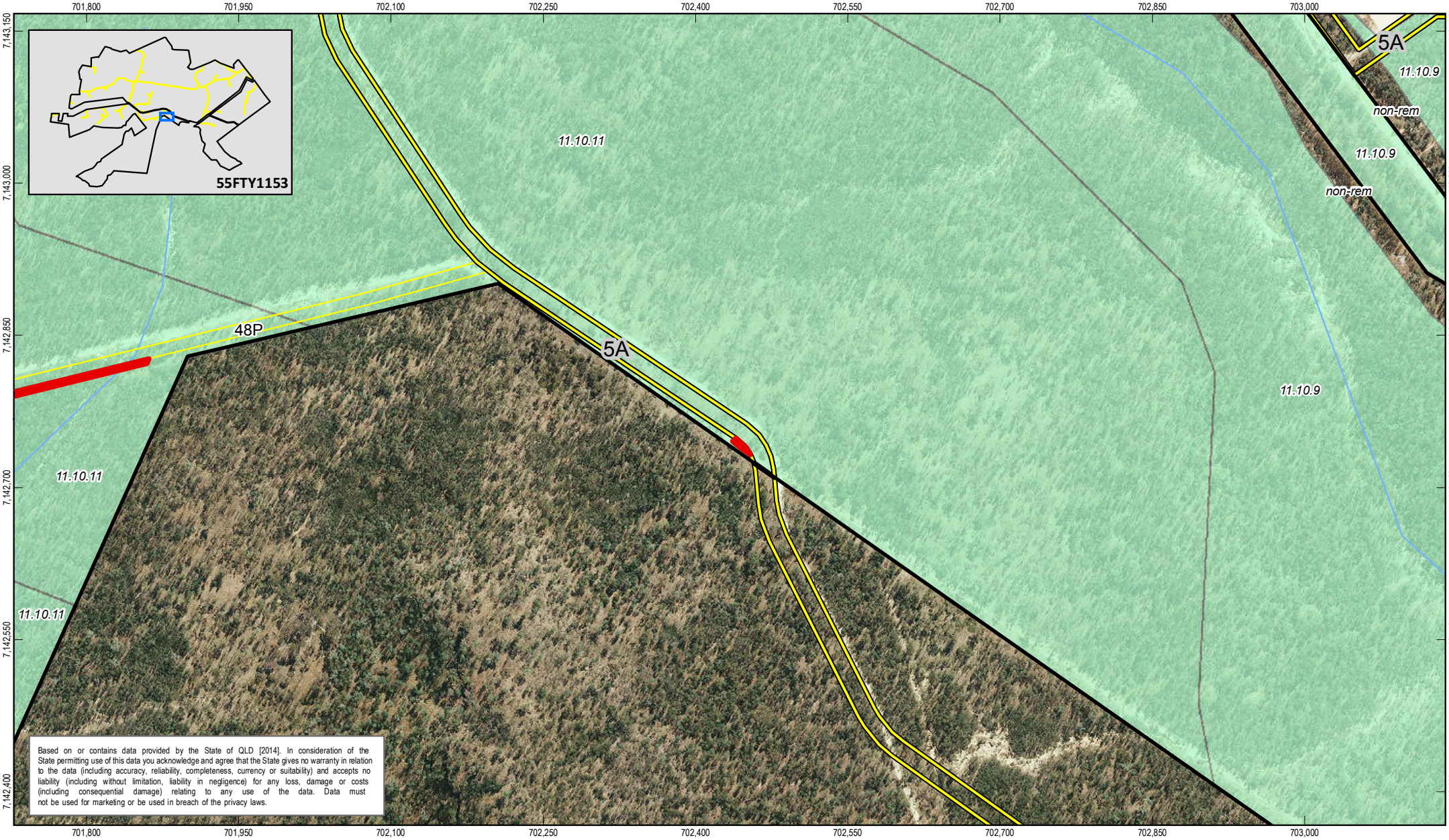
No wetlands, lakes or springs are shown on the Map of Referable Wetlands within the vegetation management zone or within the 300 m buffer.

Wetlands, lakes and springs field verification

No field verification undertaken or required.

Approval requirement or further action

None



1:5,000 (@ A4)

0 50 100 150

Metres

Map Projection: Universal Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

LEGEND

- Watercourse
- Fairview Lot 55 FTY1153
- Cadastre
- RoW 5A
- Vegetation Management Area
- Clearing Limit
- Regional Ecosystem v7 (Biodiversity)
- Not of Concern

GHD

Santos GLNG Project

Santos GLNG
Lot 55 Fairview Ecological Assessment

Job Number 41-27125
Revision 0
Date 07 Feb 2014

RoW 5A
Vegetation Management Zone

Figure 18

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145 Ann St Brisbane QLD 4000 Australia T 61 7 3316 3000 F 61 7 3316 3333 E bnemail@ghd.com W www.ghd.com

Data source: Santos: Cadastre, Clearing Limit, Vegetation Management Area, Remnant Vegetation v7, Imagery/Supplied October 2013; DNRM: Ordered Drainage/2010. Created by: AF

2.18 RoW 5A vegetation management zone

2.18.1 Approvals and actions summary for RoW 5A vegetation management zone

Item	Approval/further action required*	Item	Approval/further action required*
REs	No	**Threatened species**	Potential
ESAs	No	**Fauna habitat features**	Potential
TECs	No	**Watercourses**	No
Essential habitat	No	**Wetlands**	No
Vegetation community/ habitat values	No		

* - refer to the 'Approval requirement or further action' section for each item identified as yes above

2.18.2 Regional ecosystems

Regional ecosystems mapped

One RE polygon, the no concern at present RE 11.10.11, intersects with this vegetation management zone. No concern at present RE 11.10.1 is also mapped within the 200 m buffer (Figure 18). The RE short descriptions are as follows:

- 11.10.1: *Corymbia citriodora* woodland on coarse-grained sedimentary rocks
- 11.10.11: *Eucalyptus populnea, E. melanophloia +/- Callitris glaucophylla* woodland on coarse-grained sedimentary rocks

Regional ecosystems field verification

Field verification of the mapped RE polygons associated with the vegetation management zone has not been undertaken.

Approval requirement or further action

No changes to the RE mapping within this vegetation management zone are proposed as field verification has not been undertaken. RE mapping changes for Lot 55 as a whole would require lodgement of field verification RE mapping amendments (Appendix C) with the DEHP to change the existing RE mapping prior to construction commencing. This would be in the form of a PMAV application or RE mapping modification request for Lot 55.

2.18.3 Environmentally sensitive areas

Environmentally sensitive areas mapped

- Category A ESA
  - None mapped within the vegetation management zone or within a 1 km buffer
- Category B ESA
  - None mapped within the vegetation management zone or within a 1 km buffer
- Category C ESA

– Lot 55 FTY1153 is tenured as State Forest within which the vegetation management zone is contained

Environmentally sensitive areas field verification

Not applicable

Approval requirement or further action

None

2.18.4 Threatened ecological communities

Threatened ecological communities mapped

No TECs are mapped within the vegetation management zone or within the 300 m buffer.

Threatened ecological communities field verification

Not applicable

Approval requirement or further action

None

2.18.5 Essential habitat

Essential habitat mapped

No essential habitat mapped under the VM Act is present within the vegetation management zone or within the 200 m buffer of the vegetation management zone.

Medium value essential habitat mapped under the BPA mapping is located within the vegetation management zone.

Essential habitat field verification

No field verification of essential habitat was undertaken.

Approval requirement or further action

None

2.18.6 Vegetation community and habitat values

Vegetation communities and habitat values occurring within this vegetation management zone have not been field verified. From an extrapolation of field survey data associated with mapped REs, the vegetation community and habitat values present are considered likely to be similar to the vegetation community *Eucalyptus populnea* woodland on sandy soils gently undulating to rolling hills.

Descriptions of the vegetation community and habitat values are contained within Appendix B. No field verification points are associated with this vegetation management zone (Figure 18).

Approval requirement or further action

None, however, rehabilitation activities, to be undertaken after construction, are to be in accordance with the GLNG Project RRRMP.

2.18.7 Threatened species

Threatened species field verification

Field verification for the occurrence of threatened flora and fauna species listed under the EPBC Act and/or NC Act has not been undertaken at the location of this vegetation management zone.

Threatened species habitat mapping

Potential habitat for fauna species listed under the EPBC Act and/or the NC Act has been mapped over the vegetation management zone (see Section 3.2). Calculations of the extent of species habitat within the assessed vegetation management zones within Lot 55 are presented in Section 3.1.

Approval requirement or further action

Management actions listed within the approved GLNG Project documents, SSMP, SMP and GTP SMP are to be followed for the threatened fauna species that have been identified as having potential habitat within the vegetation management zones to protect the potential for threatened fauna species occurring during pre-construction, construction and operation.

2.18.8 Fauna habitat features

Field verification for the occurrence of fauna habitat features has not been undertaken at the location of this vegetation management zone.

Approval requirement or further action

Management actions listed within the SSMP, SMP and GTP SMP documents are to be followed to protect any potential fauna habitat features present and the fauna that might utilise such features during pre-construction, construction and operation.

2.18.9 Watercourses

Watercourses mapped

No mapped watercourses are located within the vegetation management zone or within the 100 m buffer.

Watercourses field verification

No field verification of the watercourse has been undertaken or is required.

Approval requirement or further action

None

2.18.10 Wetlands, lakes and springs

Wetlands, lakes and springs mapped

No wetlands, lakes or springs are shown on the Map of Referable Wetlands within the vegetation management zone or within the 300 m buffer.

Wetlands, lakes and springs field verification

No field verification undertaken or required.

Approval requirement or further action

None

Based on or contains data provided by the State of QLD [2014]. In consideration of the State permitting use of this data you acknowledge and agree that the State gives no warranty in relation to the data (including accuracy, reliability, completeness, currency or suitability) and accepts no liability (including without limitation, liability in negligence) for any loss, damage or costs (including consequential damage) relating to any use of the data. Data must not be used for marketing or be used in breach of the privacy laws.

1:2,000 (@ A4)

0 10 20 30 40 50

Metres

Map Projection: Universal Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

LEGEND

- Watercourse
- Fairview Lot 55 FTY1153
- Cadastre
- RoW 42PA
- Vegetation Management Area
- Clearing Limit

Regional Ecosystem v7 (Biodiversity)

- Not of Concern

GHD

Santos GLNG Project

Santos GLNG
Lot 55 Fairview Ecological Assessment

Job Number 41-27125
Revision 0
Date 06 Feb 2014

RoW 42PA
Vegetation Management Area

Figure 19

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145 Ann St Brisbane QLD 4000 Australia T 61 7 3316 3000 F 61 7 3316 3333 E bnemail@ghd.com W www.ghd.com

Data source: Santos: Cadastre, Clearing Limit, Vegetation Management Area, Remnant Vegetation v7, Imagery/Supplied October 2013; DNRM: Ordered Drainage/2010. Created by: AF

2.19 RoW 42PA vegetation management zone

2.19.1 Approvals and actions summary for RoW 42PA vegetation management zone

Item	Approval/further action required*	Item	Approval/further action required*
REs	No	**Threatened species**	Potential
ESAs	No	**Fauna habitat features**	Potential
TECs	No	**Watercourses**	Potential
Essential habitat	No	**Wetlands**	No
Vegetation community/ habitat values	No		

* - refer to the 'Approval requirement or further action' section for each item identified as yes above

2.19.2 Regional ecosystems

Regional ecosystems mapped

One RE polygon, the no concern at present RE 11.10.11, intersects with this vegetation management zone. No other RE types are mapped within the 200 m buffer (Figure 19). The RE short descriptions are as follows:

- 11.10.11: *Eucalyptus populnea, E. melanophloia +/- Callitris glaucophylla* woodland on coarse-grained sedimentary rocks

Regional ecosystems field verification

Field verification of the mapped RE polygon associated with the vegetation management zone has not been undertaken.

Approval requirement or further action

No changes to the RE mapping within this vegetation management zone are proposed as field verification has not been undertaken. RE mapping changes for Lot 55 as a whole would require lodgement of field verification RE mapping amendments (Appendix C) with the DEHP to change the existing RE mapping prior to construction commencing. This would be in the form of a PMAV application or RE mapping modification request for Lot 55.

2.19.3 Environmentally sensitive areas

Environmentally sensitive areas mapped

- Category A ESA
  - None mapped within the vegetation management zone or within a 1 km buffer
- Category B ESA
  - None mapped within the vegetation management zone or within a 1 km buffer
- Category C ESA

– Lot 55 FTY1153 is tenured as State Forest within which the vegetation management zone is contained

Environmentally sensitive areas field verification

Not applicable

Approval requirement or further action

None

2.19.4 Threatened ecological communities

Threatened ecological communities mapped

No TECs are mapped within the vegetation management zone or within the 300 m buffer.

Threatened ecological communities field verification

Not applicable

Approval requirement or further action

None

2.19.5 Essential habitat

Essential habitat mapped

No essential habitat mapped under the VM Act is present within the vegetation management zone or within the 200 m buffer of the vegetation management zone.

Medium value essential habitat mapped under the BPA mapping is located within the vegetation management zone.

Essential habitat field verification

No field verification of essential habitat was undertaken.

Approval requirement or further action

None

2.19.6 Vegetation community and habitat values

Vegetation communities and habitat values occurring within this vegetation management zone have not been field verified. From an extrapolation of field survey data associated with mapped REs, the vegetation community and habitat values present are considered likely to be similar to the vegetation community *Eucalyptus populnea* woodland on sandy soils gently undulating to rolling hills.

Descriptions of the vegetation community and habitat values are contained within Appendix B. No field verification points are associated with this vegetation management zone (Figure 19).

Approval requirement or further action

None, however, rehabilitation activities, to be undertaken after construction, are to be in accordance with the GLNG Project RRRMP.

2.19.7 Threatened species

Threatened species field verification

Field verification for the occurrence of threatened flora and fauna species listed under the EPBC Act and/or NC Act has not been undertaken at the location of this vegetation management zone.

Threatened species habitat mapping

Potential habitat for fauna species listed under the EPBC Act and/or the NC Act has been mapped over the vegetation management zone (see Section 3.2). Calculations of the extent of species habitat within the assessed vegetation management zones within Lot 55 are presented in Section 3.1.

Approval requirement or further action

Management actions listed within the approved GLNG Project documents, SSMP, SMP and GTP SMP are to be followed for the threatened fauna species that have been identified as having potential habitat within the vegetation management zones to protect the potential for threatened fauna species occurring during pre-construction, construction and operation.

2.19.8 Fauna habitat features

Field verification for the occurrence of fauna habitat features has not been undertaken at the location of this vegetation management zone.

Approval requirement or further action

Management actions listed within the SSMP, SMP and GTP SMP documents are to be followed to protect any potential fauna habitat features present and the fauna that might utilise such features during pre-construction, construction and operation.

2.19.9 Watercourses

Watercourses mapped

No mapped watercourses intersect the vegetation management zone. A mapped stream order 3 watercourse is located within the 100 m buffer at the following approximate location (easting; northing):

- Stream order 3: 698410; 7145120

Watercourses field verification

Field verification of the watercourse has not been undertaken.

Approval requirement or further action

As field verification of the watercourse has not been completed, there is a potential that approvals may be required. However, given the ephemeral nature of similar sized mapped watercourses within the area that have undergone assessment, the requirement for approvals relating to this watercourse are considered unlikely.

2.19.10 Wetlands, lakes and springs

Wetlands, lakes and springs mapped

No wetlands, lakes or springs are shown on the Map of Referable Wetlands within the vegetation management zone or within the 300 m buffer.

Wetlands, lakes and springs field verification

No field verification undertaken or required.

Approval requirement or further action

None

3. Threatened species

3.1 Threatened fauna species habitat clearing extents

Table 3-1 contains the areas of potential habitat assessed within the Lot 55 vegetation management zones for threatened fauna species of relevance, as listed under the EPBC Act and/or the NC Act. Further detail and maps regarding threatened species habitat mapping for the vegetation management zones to which these areas pertain is provided in Section 3.2.

Table 3-1 Threatened fauna species habitat and TEC clearing extents within the vegetation management zones within Lot 55

Species	EPBC Act / NC Act status	Habitat within Lot 55 to be cleared for construction*
Brigalow scaly-foot (*Paradelma orientalis*)	Not listed / Vulnerable	1.44 ha
Collared delma (*Delma torquata*)	Vulnerable / Vulnerable	0 ha
Dunmall's snake (*Furina dunmalli*)	Vulnerable / Vulnerable	0 ha
Fitzroy River turtle (*Rheodytes leukops*)	Vulnerable / Vulnerable	0 ha
Golden-tailed gecko (*Strophurus taenicauda*)	Not listed / Near threatened	2.99 ha
Ornamental snake (*Denisonia maculata*)	Vulnerable / Vulnerable	0 ha
Woma (*Aspidites ramsayi*)	Not listed / Vulnerable	2.99 ha
Yakka skink (*Egernia rugosa*)	Vulnerable / Vulnerable	1.43 ha
Koala (*Phascolarctos cinereus*)	Vulnerable / Special least concern	1.28 ha
Large-eared pied bat (*Chalinolobus dwyeri*)	Vulnerable / Vulnerable	0 ha
Little pied bat (*Chalinolobus picatus*)	Not listed / Near threatened	2.42 ha
Northern quoll (*Dasyurus hallucatus*)	Vulnerable / Least concern	0 ha
South-eastern long-eared bat (*Nyctophilus corbeni*)	Vulnerable / Vulnerable	2.42 ha
Australian painted snipe (*Rostratula australis*)	Vulnerable, Migratory / Vulnerable	0 ha
Black-breasted button quail (*Turnix melanogaster*)	Vulnerable / Vulnerable	0 ha
Glossy black-cockatoo (*Calyptorhynchus lathami*)	Not listed / Vulnerable	0 ha
Powerful owl (*Ninox strenua*)	Not listed / Vulnerable	2.43 ha
Red goshawk (*Erythrotriorchis radiatus*)	Vulnerable / Endangered	0 ha
Square-tailed kite (*Lophoictinia isura*)	Not listed / Near threatened	1.34 ha
Squatter pigeon (*Geophaps scripta scripta*)	Vulnerable / Vulnerable	3.52 ha
Star finch (*Neochmia ruficauda ruficauda*)	Endangered / Endangered	0 ha
Rainbow bee-eater (*Merops ornatus*)	Migratory / Special least concern	2.65 ha
Satin flycatcher (*Myiagra cyanoleuca*)	Migratory / Special least concern	0.23 ha
Rough collared frog (*Cyclorana verrucosa*)	Not listed / Near threatened	0 ha
Semi-evergreen vine thicket TEC	Endangered	0 ha
Brigalow TEC	Endangered	0 ha

*Where habitat calculations are 0 ha, no suitable habitat for the species has been identified within Lot 55 or occurs within the assessed vegetation management zones within Lot 55. Refer to Section 3.2 for further detail on species habitat mapping within Lot 55.

3.2 Threatened fauna species habitat mapping

A review of available published literature, GLNG Project approvals and management plans, existing ecological reports and relevant database searches during the desktop assessment identified 24 fauna species and 4 flora species listed under the EPBC Act or NC Act which required further assessment to determine their likelihood of occurrence and map potential habitat within Lot 55. Potential habitat for 12 threatened fauna species has been identified and mapped within the assessed vegetation management zones. Habitat mapping for fauna species identified as unlikely to occur within the vegetation management zones has not been undertaken. Table 3-2 identifies potential habitat within the vegetation management zones for threatened fauna species using the habitat hierarchy described in the Santos Methodology. This table also contains reference to figures of mapped potential habitat for each species as appropriate. Threatened fauna species survey effort and results from field assessments of the vegetation management zones within Lot 55 are presented in Appendix E.

Potential habitat mapping for threatened flora species is not a requirement of the Santos Methodology; therefore, habitats for threatened flora species of relevance to Lot 55 are not included further in this section. A brief discussion on threatened flora potential habitat within the vegetation management areas and results of the field survey is contained within Appendix E.

Table 3-2 Threatened fauna habitat descriptions within Lot 55

Species	Likelihood of occurrence*	Potential habitat within Lot 55	Figure reference
Brigalow scaly-foot (*Paradelma orientalis*)	Potential to occur	**General habitat:** The majority of Lot 55 contains RE that might be suitable for the species (REs on landzone 9 and 10). However, habitat areas with suitable microhabitat features, as determined from field surveys, are only located within certain locations in the assessed vegetation management zones in Lot 55. Areas containing suitable microhabitat features has been mapped as general habitat for the species, these include: • Eucalypt woodlands with a mixed shrub layer of acacias and *Callitris sp*. that may exude tree sap • Microhabitat features to shelter under during the day, including rock slabs, logs, peeling bark **Unlikely habitat:** The remaining vegetation management zones within Lot 55 are mapped within similar landzones and REs suitable for the species however do not display suitable microhabitat features that the species might use as shelter. Habitats within these areas were generally lacking any logs or woody/leafy debris and/or have sparse to absent shrub layers. However, severe fire within the past year may have destroyed such microhabitat features in these areas.	Figure 20
Collared delma (*Delma torquata*)	Unlikely to occur	**Unlikely habitat:** Habitat requirements for this species include eucalypt woodlands within rocky areas or on alluvial plains that contain dense microhabitat features including: rocks, logs, bark and other coarse woody debris, mats of leaf litter are an essential requirement in habitats where the collared delma is found. These	N/A

Species	Likelihood of occurrence*	Potential habitat within Lot 55	Figure reference
		microhabitat features are generally lacking within the assessed vegetation management zones and are therefore considered unlikely habitat for the species.	
Dunmall's snake (*Furina dunmalli*)	Unlikely to occur	**Unlikely habitat:** Broadly, all regional ecosystems on landzone 10 may provide habitat for the species. However, the areas associated with the assessed vegetation management zones within Lot 55 are considered unlikely to contain enough suitable microhabitat features such as fallen timber and ground litter to support the species. Furthermore these areas been disturbed by fire and logging and are therefore considered unlikely habitat for the species.	N/A
Fitzroy River turtle (*Rheodytes leukops*)	Unlikely to occur	**Unlikely habitat:** Suitable habitat in the form of permanent, deep pools and flowing water associated with tributaries of the Dawson River is not present within Lot 55.	N/A
Golden-tail gecko (*Strophurus taenicauda*)	Potential to occur	**General habitat:** All woodland environments within Lot 55 particularly associated with peeling bark from trees, stags or logs that are marked as fauna habitat features. **Unlikely habitat:** Areas of non-remnant vegetation.	Figure 21
Ornamental snake (*Denisonia maculata*)	Unlikely to occur	**Unlikely habitat:** Suitable habitats in the form of gilgais or cracking clay soils are not present within the assessed vegetation management zones.	N/A
Woma (*Aspidites ramsayi*)	Potential to occur	**General habitat:** Lot 55 is considered to be on the eastern extent of this species range. Although no records for this species are present within Lot 55 or the surrounding region, potential habitat may exist within areas with a sandy substrate that contain old mammal or reptile burrows that are used for shelter by the woma. **Unlikely habitat:** Eucalypt woodlands and non-remnant vegetation where shelter habitat is not present.	Figure 22
Yakka skink (*Egernia rugosa*)	Potential to occur	**General habitat:** The majority of Lot 55 contains RE that might be suitable for the species (REs on landzone 9 and 10). However, habitat areas with suitable microhabitat features, as determined from field surveys, are only located within certain locations in the assessed vegetation management zones in Lot 55. Areas containing suitable microhabitat features has been mapped as general habitat for the species, these include: • Eucalypt woodlands with a mixed shrub layer of acacias and Callitris sp. that may exude tree sap • Microhabitat features to shelter under during the day, including rock slabs, logs, peeling bark **Unlikely habitat:** The remaining vegetation management zones within	Figure 23

Species	Likelihood of occurrence*	Potential habitat within Lot 55	Figure reference
		Lot 55 are mapped within similar landzones and REs suitable for the species however do not display suitable microhabitat features that the species might use as shelter. Habitats within these areas were generally lacking any logs or woody/leafy debris and/or have sparse to absent shrub layers. However, severe fire within the past year may have destroyed such microhabitat features in these areas.	
Koala (*Phascolarctos cinereus*)	Potential to occur	**General habitat:** Woodlands and forests dominated by eucalypt species that occur in conjunction with areas considered to have more fertile soils that contains higher soil moisture levels i.e. in association with watercourses. **Unlikely habitat:** Preferred koala food and shelter trees are located in other vegetation communities within Lot 55, however these communities are often dominated by *Callitris glaucophylla* which is not considered a suitable koala food or habitat tree, therefore limiting the potential for koala habitat.	Figure 24
Large-eared pied bat (*Chalinolobus dwyeri*)	Unlikely to occur	**Unlikely habitat:** The large-eared pied bat is generally restricted to the interface of sandstone escarpments and adjacent relatively fertile valleys, for roosting and foraging habitats respectively. The species may also forage for a few kilometres along watercourses and linear remnants of vegetation leading away from roosting sites. Potential suitable roosting habitat and associated nearby foraging habitat is considered not present within and adjacent to the assessed vegetation management zones in Lot 55.	N/A
Little pied bat (*Chalinolobus picatus*)	Confirmed present	**General habitat:** Although previously not recorded within the area, this species has potential to occur in any woodland environment within Lot 55 particularly in association with tree hollows that may be used for roosting. Although not present in association with the assessed vegetation management zones, water sources, including pools and farm dams within Lot 55, are also considered foraging habitat for the species. This species was recorded in Lot 55 during field surveys however due to the broad nature of habitats occupied by the species, the locations where the little pied bat was recorded in during field surveys are not considered to represent core or essential habitat areas as the species is likely widespread throughout Lot 55. **Unlikely habitat:** Areas where hollow bearing trees are not as abundant were identified during field surveys as unlikely habitat for the species.	Figure 25
Northern quoll (*Dasyurus hallucatus*)	Unlikely to occur	**Unlikely habitat:** Potential suitable habitat for the species includes rocky escarpments and gorges for potential	N/A

Species	Likelihood of occurrence*	Potential habitat within Lot 55	Figure reference
		denning/shelter habitat. Also remnant vegetation within 2 km of rocky areas are considered potential foraging or dispersal habitat. No rocky areas are located within 2 km of the assessed vegetation management zones, therefore the species is considered unlikely to occur in these areas.	
South-eastern long-eared bat (*Nyctophilus corbeni*)	Potential to occur	**General habitat:** Habitat mapped for this species within the assessed vegetation management zones within Lot 55 represents areas containing large eucalypt species some which contained large hollows or areas with a generally higher concentration of tree hollows. Large hollow bearing trees may be used as roosting sites for the species. Habitat areas for this species also include water sources within Lot 55 that are of importance for foraging. **Unlikely habitat:** Areas where hollow bearing trees are not as abundant were identified during field surveys as unlikely habitat for the species. **Recommendation:** The echolocation call of the south-eastern long-eared bat is unable to be differentiated from calls of other species within the *Nyctophilus* genus. Calls from *Nyctophilus sp*. were identified from anabat data analysis from field surveys however cannot be identified to a species level. As a result the south-eastern long-eared bat may be present within Lot 55 and it is recommended that further targeted microbat surveys using harp trapping be undertaken to try to confirm the presence of this species within Lot 55.	Figure 26
Australian Painted Snipe (*Rostratula australis*)	Unlikely to occur	**Unlikely habitat:** Suitable habitat in the form of wetlands with surrounding aquatic vegetation is not present within Lot 55.	N/A
Black-breasted button quail (*Turnix melanogaster*)	Unlikely to occur	**Unlikely habitat:** Suitable habitat including semi-evergreen vine thicket, where deep leaf litter is present does not occur within the assessed vegetation management zones. Therefore the vegetation within the assessed areas, eucalypt and callitris dominated woodlands and non-remnant areas, are considered unlikely habitat for the species.	N/A
Glossy black-cockatoo (*Calyptorhynchus lathami*)	Unlikely to occur	**Unlikely habitat:** Suitable habitat in the form of stands of *Casuarina sp.* and *Allocasuarina sp.* species is not present within the assessed vegetation management zones. Individual trees are present within and surrounding the vegetation management zones but is not likely to be in high enough densities to support the species.	N/A
Powerful owl (*Ninox strenua*)	Potential to occur	**General habitat:** Although previously not recorded in association with the assessed vegetation management zones, this species has potential to occur within woodland environments particularly where old growth trees are present that may be used for nesting. The species	Figure 27

Species	Likelihood of occurrence*	Potential habitat within Lot 55	Figure reference
		hunts larger arboreal mammals such as greater gliders which are more likely to be present in areas with a higher density of tree hollows. **Unlikely habitat:** Areas of non-remnant vegetation and *Callitris glaucophylla* dominated vegetation communities.	
Red goshawk (*Erythrotriorchis radiatus*)	Unlikely to occur	**Unlikely habitat:** Suitable habitat for this species is not present within the assessment area e.g. tall trees within 1 km of permanent water for nesting. The forest and/or woodland within and adjacent to the vegetation management zones does not necessarily contain a mosaic of vegetation types or support a high level of biodiversity suitable for the species.	N/A
Square-tailed kite (*Lophoictinia isura*)	Potential to occur	**General habitat:** Eucalypt dominated woodlands that are structurally diverse, have a broken canopy and/or are in association with treed watercourses where a range of passerine bird species are present. **Unlikely habitat:** Homogenous woodlands, including areas dominated by *Callitris glaucophylla*, with a limited abundance of bird species.	Figure 28
Squatter pigeon (*Geophaps scripta scripta*)	Potential to occur	**General habitat:** Areas of remnant, regrowth or modified communities, including non-remnant areas within 3 km of mapped watercourses or water bodies. Although squatter pigeons were not recorded confirmed present during field surveys of the vegetation management zones, previous field surveys have recorded the species as present in a number of locations within Lot 55. The squatter pigeon is considered to have broad and general habitat requirements, as a result the habitats in which individuals have been historically found are not considered to represent core or essential habitat areas for the species. **Unlikely habitat:** Areas greater than 3 km from watercourses or waterbodies.	Figure 29
Star finch (*Neochmia ruficauda ruficauda*)	Unlikely to occur	**Unlikely habitat:** Populations of this species are considered extremely limited or potentially extinct. Potential suitable habitats, being grasslands or grassy woodlands near permanent bodies of water, are not present within or adjacent to the assessed vegetation management zones.	N/A
Rainbow bee-eater (*Merops ornatus*)	Confirmed present	**General habitat:** General habitat for the species includes open forests and woodlands, shrublands, and various cleared or semi-cleared habitats, usually dominated by eucalypts. **Unlikely habitat:** Areas dominated by *Callitris glaucophylla*.	Figure 30

Species	Likelihood of occurrence*	Potential habitat within Lot 55	Figure reference
Satin flycatcher (*Myiagra cyanoleuca*)	Confirmed present	**General habitat:** Eucalypt woodlands with open understorey and grass ground cover **Unlikely habitat:** Non-remnant areas or areas dominated by *Callitris glaucophylla.*	Figure 31
Rough collared frog (*Cyclorana verrucosa*)	Unlikely to occur	**Unlikely habitat:** Farm dams and/or pools of water that act as temporary/permanent water sources are not present within or adjacent to the assessed vegetation management zones.	N/A

*Likelihood of occurrence criteria:

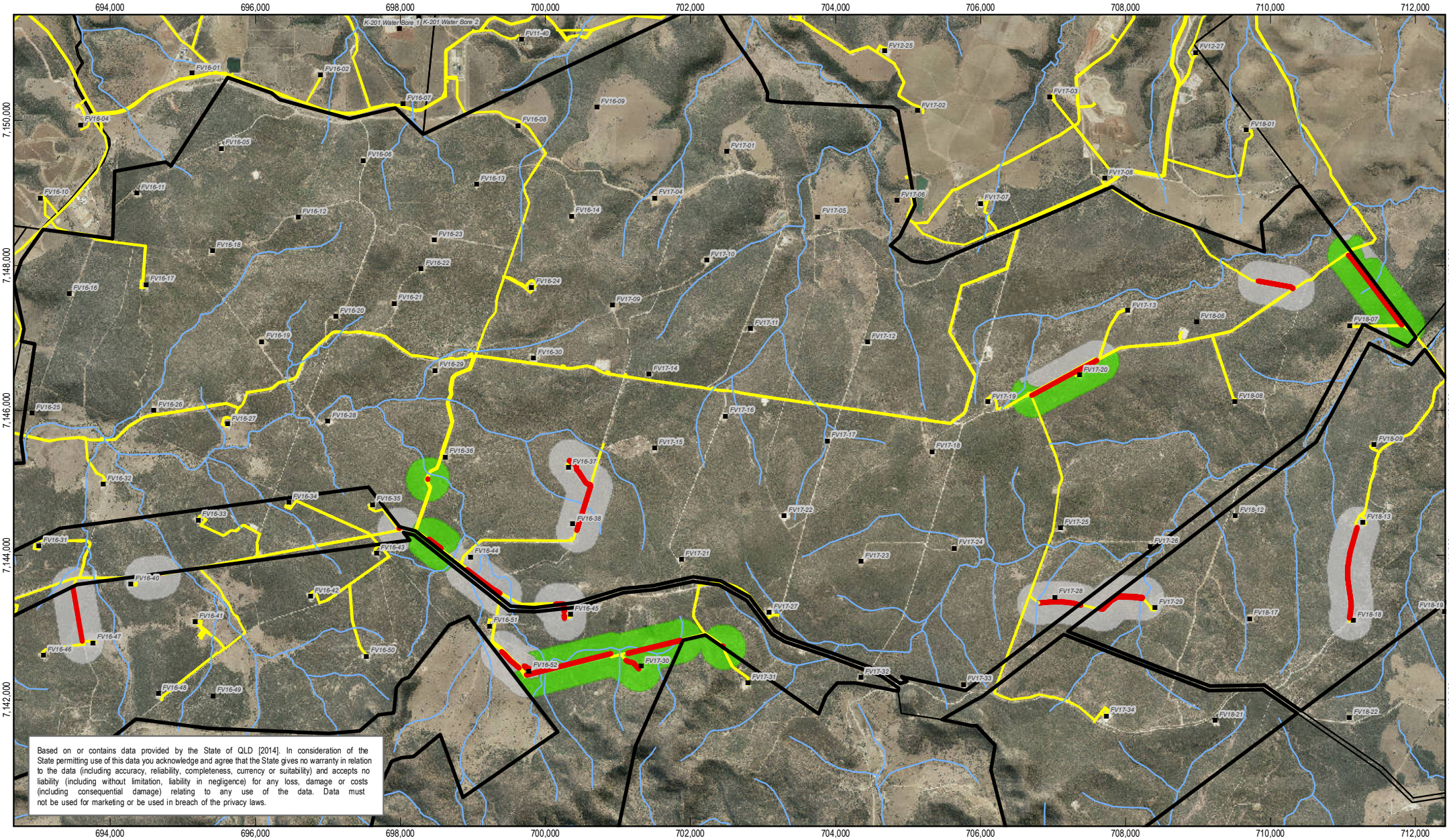
Confirmed present – species was recorded during field surveys of Lot 55 undertaken in December 2013

Potential to occur – suitable habitat requirements are present within Lot 55, even if the species has not been recorded from field surveys

Unlikely to occur – habitat requirements for the species are not present within Lot 55

3.3 Threatened flora species

No threatened flora species listed under the NC Act or EPBC Act was identified during surveys of the vegetation management zones within Lot 55. A likelihood of occurrence assessment has been undertaken for listed flora species identified as having the potential to occur within Lot 55. The results are presented in Appendix E.



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Kilometers

Map Projection: Universal Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

LEGEND

- Well Pad
- Watercourse
- Fairview Lot 55 FTY1153
- Cadastre
- Clearing Limit
- Vegetation Management Area

Habitat Classification

- General
- Unlikely

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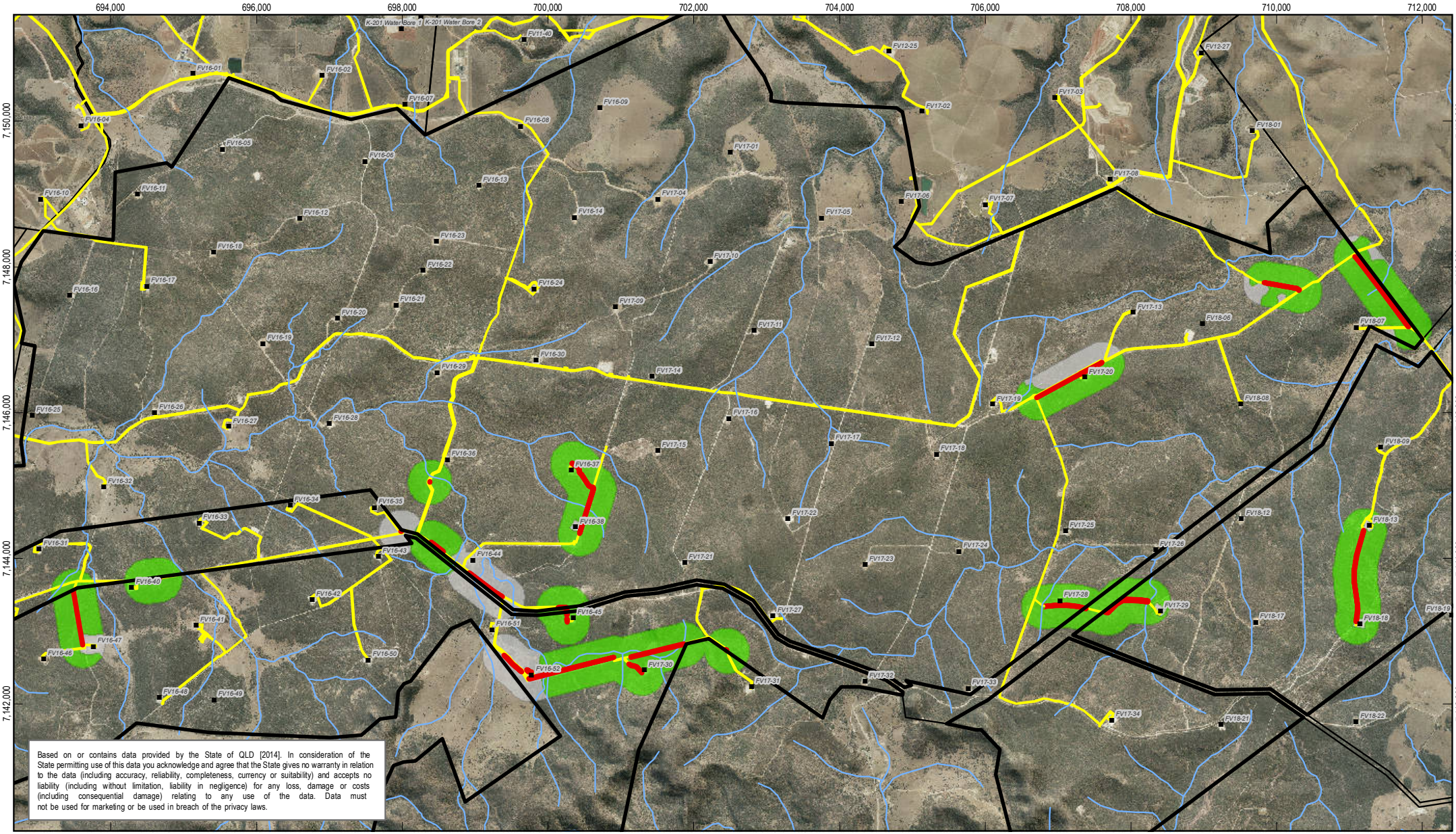
Brigalow Scaly-foot *(Paradelma orientalis)* Habitat

Figure 20

G:\41\27125\GIS\Fairview 2\GIS\MAPS\MXD\41_27125_020_LOT55FAIRVIEW_BrigalowScalyFoot_Rev0.mxd

145 Ann St Brisbane QLD 4000 Australia T 61 7 3316 3000 F 61 7 3316 3333 E bnemail@ghd.com W www.ghd.com

Data source: Santos: Well Pad Locations, Cadastre, Clearing Limit, Vegetation Management Area, Imagery/Supplied October 2013; DNRM: Ordered Drainage/2010; GHD: Habitat Classification/2013; ESRI: Hillshade/2008. Created by: AF



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Kilometers

Map Projection: Universal Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

LEGEND

- Well Pad
- Watercourse
- Fairview Lot 55 FTY1153
- Cadastre
- Clearing Limit
- Vegetation Management Area

Habitat Classification

- General
- Unlikely

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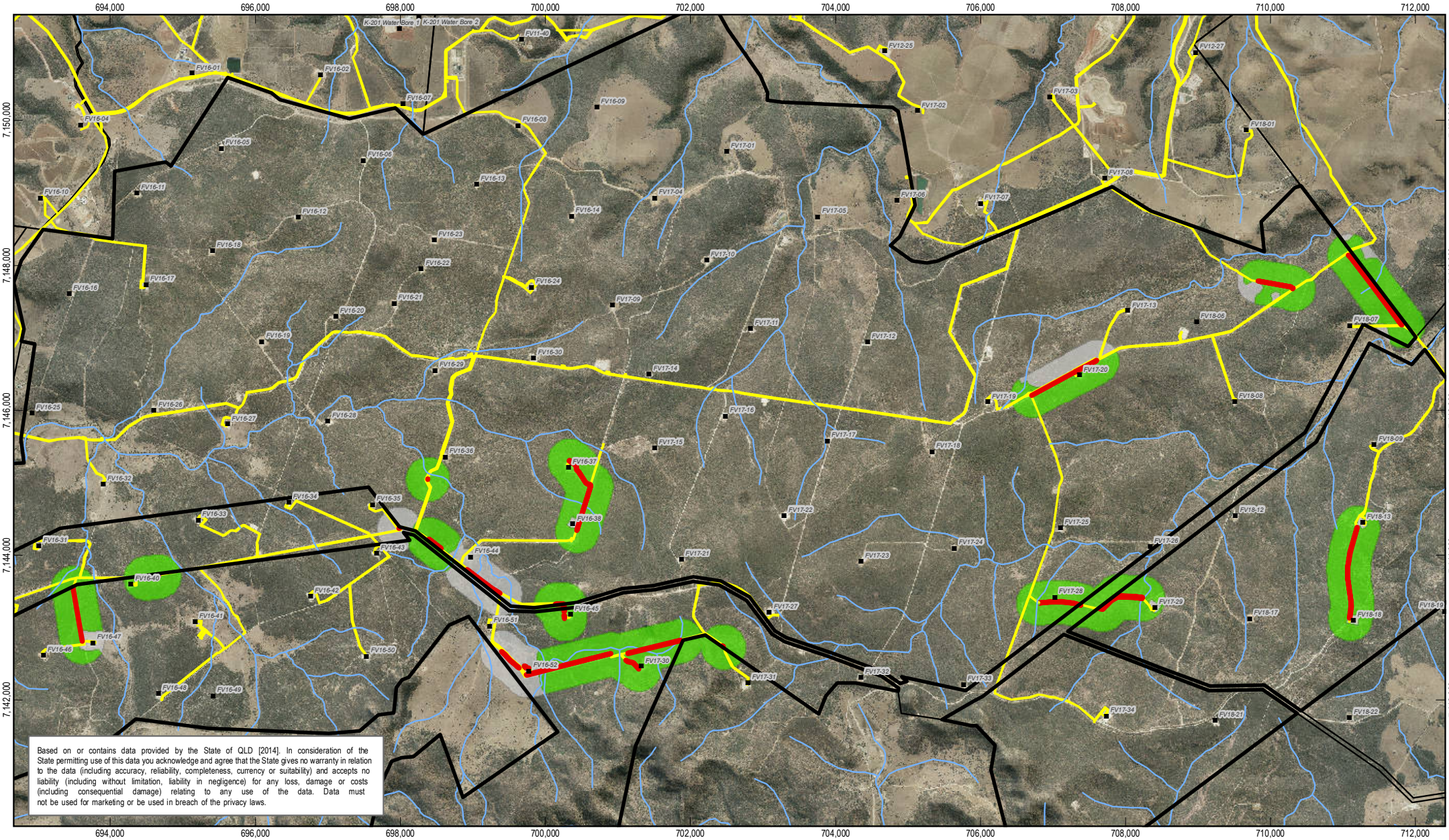
Golden-tail gecko *(Strophurus taenicauda)* Habitat

Figure 21

G:\41\27125\GIS\Fairview 2\GIS\MAPS\MXD\41_27125_021_LOT55FAIRVIEW_GoldenTailGecko_Rev0.mxd

145 Ann St Brisbane QLD 4000 Australia T 61 7 3316 3000 F 61 7 3316 3333 E bnemail@ghd.com W www.ghd.com

Data source: Santos: Well Pad Locations, Cadastre, Clearing Limit, Vegetation Management Area, Imagery/Supplied October 2013; DNRM: Ordered Drainage/2010; GHD: Habitat Classification/2013; ESRI: Hillshade/2008. Created by: AF



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Kilometers

Map Projection: Universal Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

LEGEND

- Well Pad
- Watercourse
- Fairview Lot 55 FTY1153
- Cadastre
- Clearing Limit
- Vegetation Management Area

Habitat Classification

- General
- Unlikely

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Date 07 Feb 2014

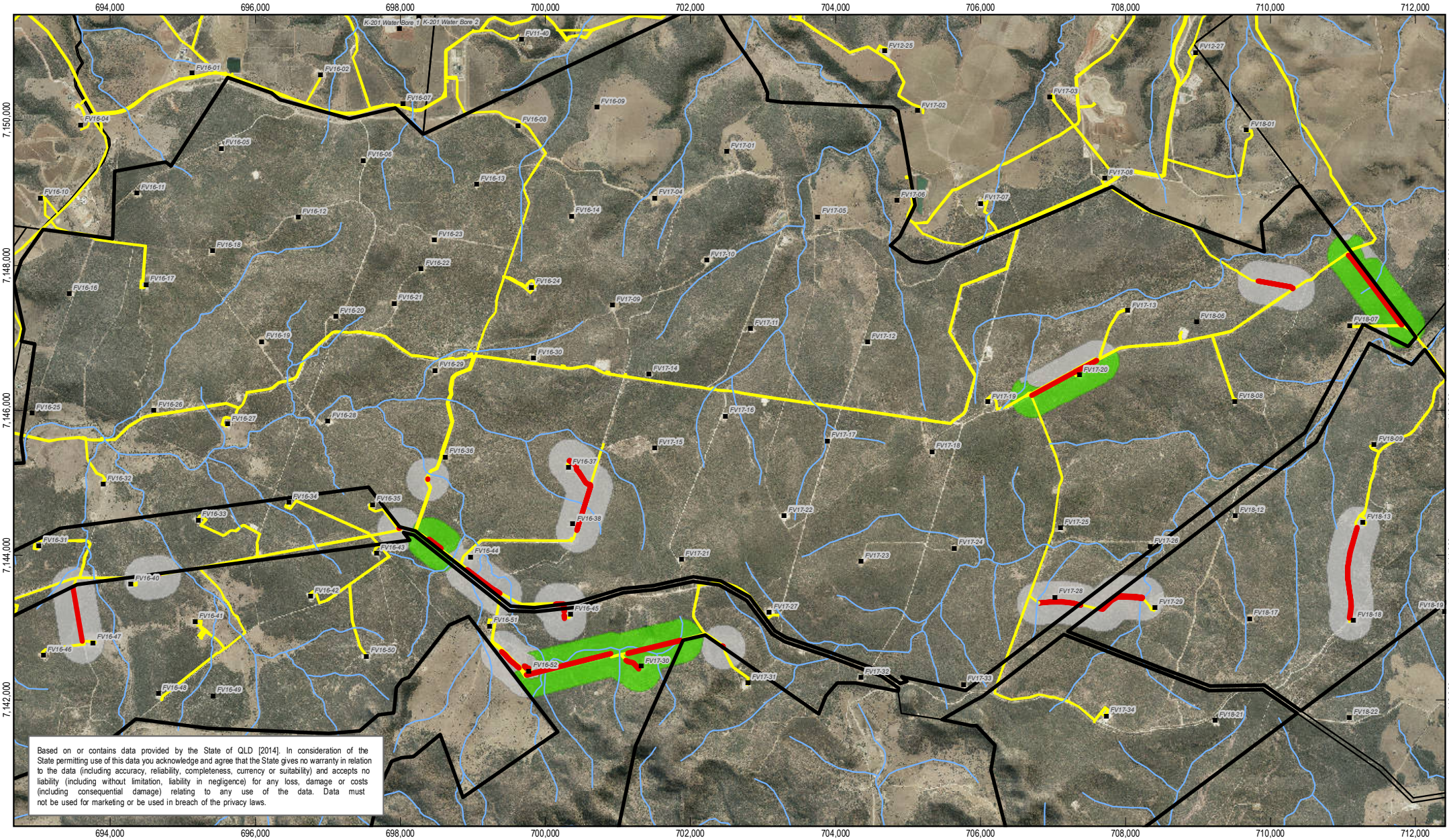
Woma
(Aspidites ramsayi) Habitat

Figure 22

G:\41\27125\GIS\Fairview 2\GIS\MAPS\MXD\41_27125_022_LOT55FAIRVIEW_Woma_Rev0.mxd

145 Ann St Brisbane QLD 4000 Australia T 61 7 3316 3000 F 61 7 3316 3333 E bnemail@ghd.com W www.ghd.com

Data source: Santos: Well Pad Locations, Cadastre, Clearing Limit, Vegetation Management Area, Imagery/Supplied October 2013; DNRM: Ordered Drainage/2010; GHD: Habitat Classification/2013; ESRI: Hillshade/2008. Created by: AF



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Kilometers

Map Projection: Universal Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

LEGEND

- Well Pad
- Watercourse
- Fairview Lot 55 FTY1153
- Cadastre
- Clearing Limit
- Vegetation Management Area

Habitat Classification

- General
- Unlikely

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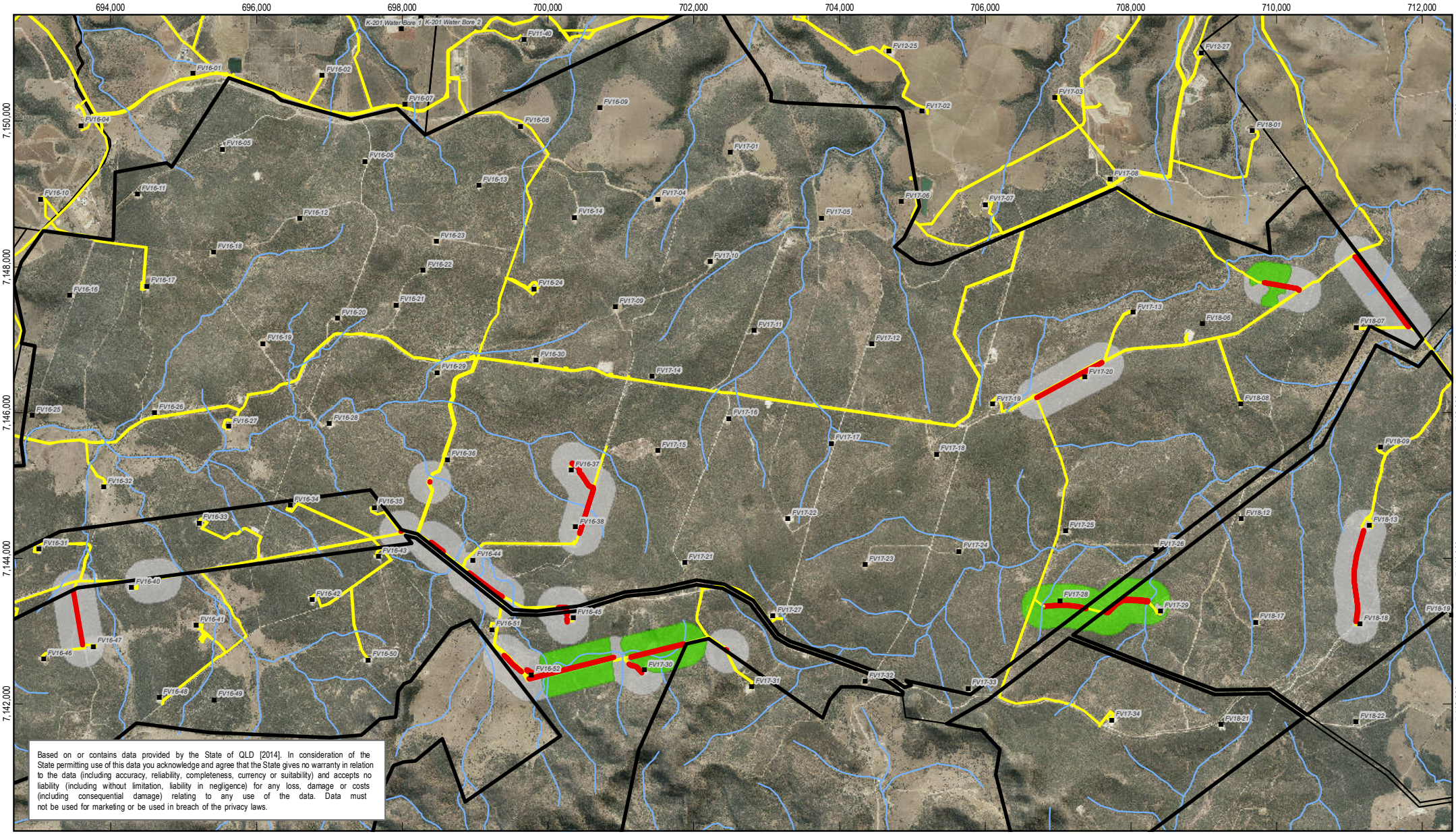
Yakka Skink *(Egernia rugosa)* Habitat

Figure 23

G:\41\27125\GIS\Fairview 2\GIS\MAPS\MXD\41_27125_023_LOT55FAIRVIEW_YakkaSkink_Rev0.mxd

145 Ann St Brisbane QLD 4000 Australia T 61 7 3316 3000 F 61 7 3316 3333 E bnemail@ghd.com W www.ghd.com

Data source: Santos: Well Pad Locations, Cadastre, Clearing Limit, Vegetation Management Area, Imagery/Supplied October 2013; DNRM: Ordered Drainage/2010; GHD: Habitat Classification/2013; ESRI: Hillshade/2008. Created by: AF



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Kilometers

Map Projection: Universal Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

LEGEND

- Well Pad
- Watercourse
- Fairview Lot 55 FTY1153
- Cadastre
- Clearing Limit
- Vegetation Management Area

Habitat Classification

- General
- Unlikely

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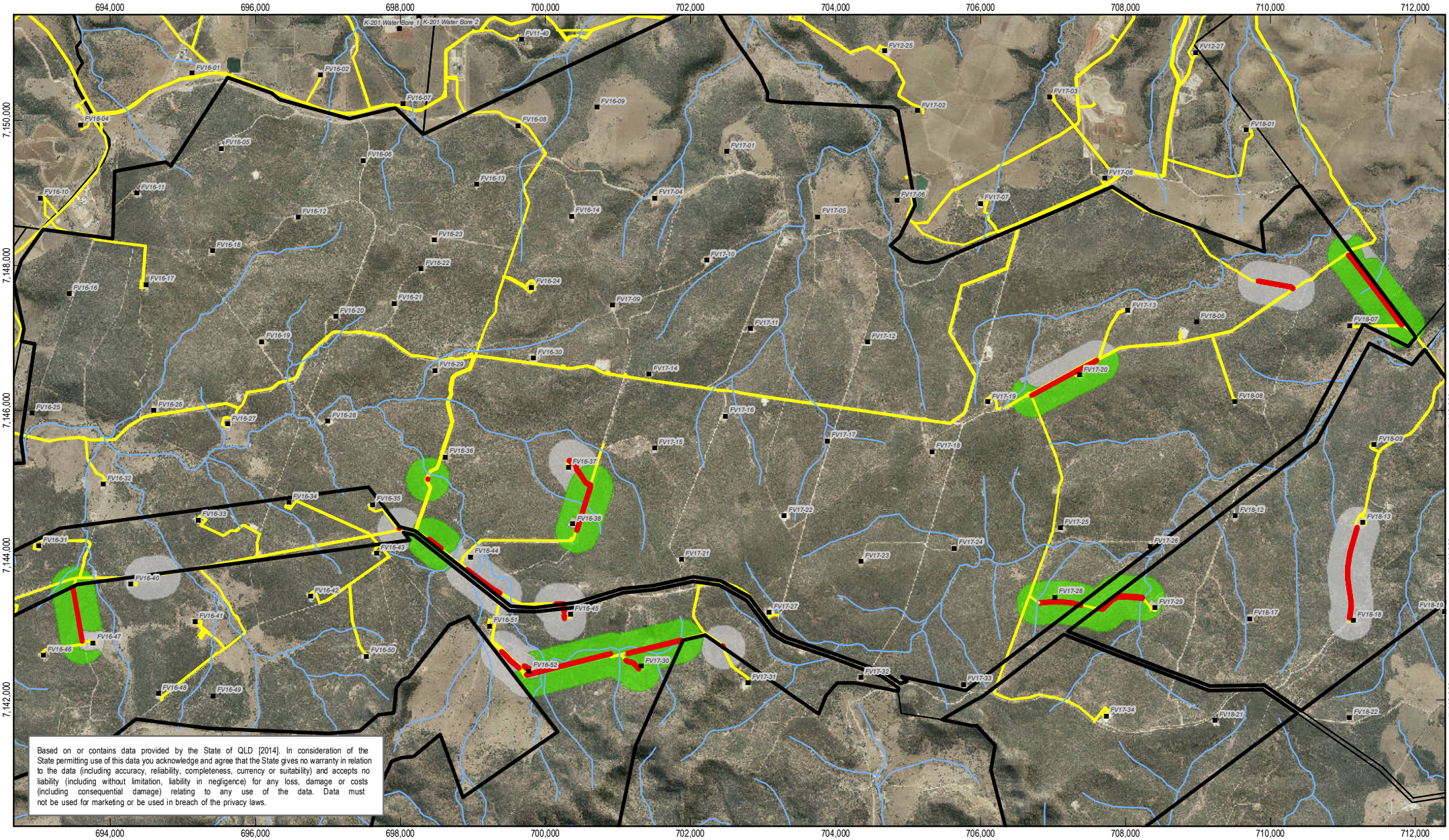
Koala *(Phascolarctos cinereus)* Habitat

Figure 24

G:\41\27125\GIS\Fairview 2\GIS\MAPS\MXD\41_27125_024_LOT55FAIRVIEW_Koala_Rev0.mxd

145 Ann St Brisbane QLD 4000 Australia T 61 7 3316 3000 F 61 7 3316 3333 E bnemail@ghd.com W www.ghd.com

Data source: Santos: Well Pad Locations, Cadastre, Clearing Limit, Vegetation Management Area, Imagery/Supplied October 2013; DNRM: Ordered Drainage/2010; GHD: Habitat Classification/2013; ESRI: Hillshade/2008. Created by: AF



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Kilometers

Map Projection: Universal Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

LEGEND

- Well Pad
- Watercourse
- Fairview Lot 55 FTY1153
- Cadastre
- Clearing Limit
- Vegetation Management Area

Habitat Classification

- General
- Unlikely

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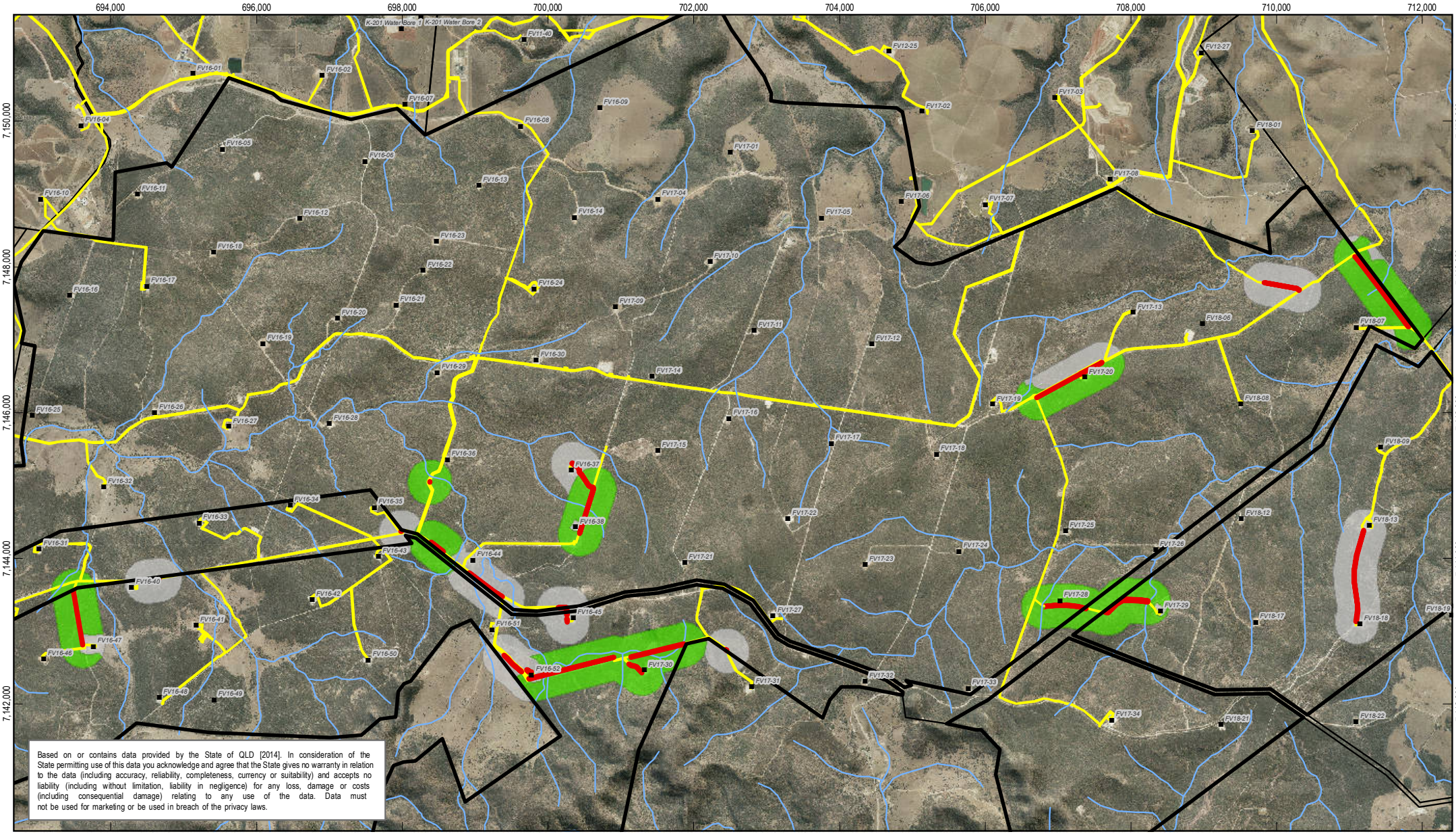
Little Pied Bat *(Chalinolobus picatus)* Habitat

Figure 25

G:\41\27125\GIS\Fairview 2\GIS\MAPS\MXD\41_27125_025_LOT55FAIRVIEW_LittlePiedBat_Rev0.mxd

145 Ann St Brisbane QLD 4000 Australia T 61 7 3316 3000 F 61 7 3316 3333 E bnemail@ghd.com W www.ghd.com

Data source: Santos: Well Pad Locations, Cadastre, Clearing Limit, Vegetation Management Area, Imagery/Supplied October 2013; DNRM: Ordered Drainage/2010; GHD: Habitat Classification/2013; ESRI: Hillshade/2008. Created by: AF



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Kilometers

Map Projection: Universal Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

LEGEND

- Well Pad
- Watercourse
- Fairview Lot 55 FTY1153
- Cadastre
- Clearing Limit
- Vegetation Management Area

Habitat Classification

- General
- Unlikely

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Date 07 Feb 2014

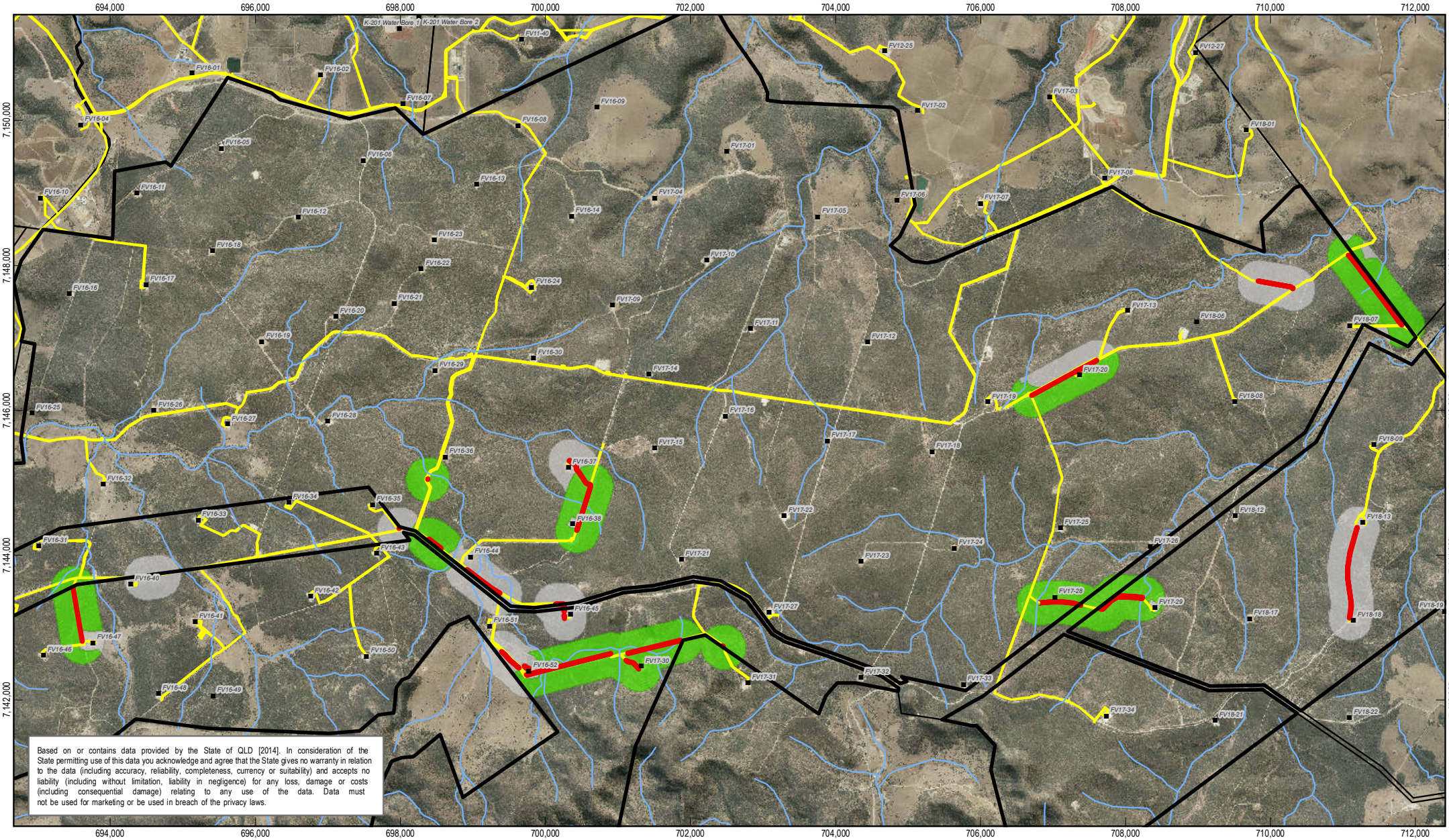
South-eastern Long-eared Bat *(Nyctophilus corbeni)* Habitat

Figure 26

G:\41\27125\GIS\Fairview 2\GIS\MAPS\MXD\41_27125_026_LOT55FAIRVIEW_SouthEasternLongEaredBat_Rev0.mxd

145 Ann St Brisbane QLD 4000 Australia T 61 7 3316 3000 F 61 7 3316 3333 E bnemail@ghd.com W www.ghd.com

Data source: Santos: Well Pad Locations, Cadastre, Clearing Limit, Vegetation Management Area, Imagery/Supplied October 2013; DNRM: Ordered Drainage/2010; GHD: Habitat Classification/2013; ESRI: Hillshade/2008. Created by: AF



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Kilometers

Map Projection: Universal Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

LEGEND

- Well Pad
- Watercourse
- Fairview Lot 55 FTY1153
- Cadastre
- Clearing Limit
- Vegetation Management Area

Habitat Classification

- General
- Unlikely

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Date 07 Feb 2014

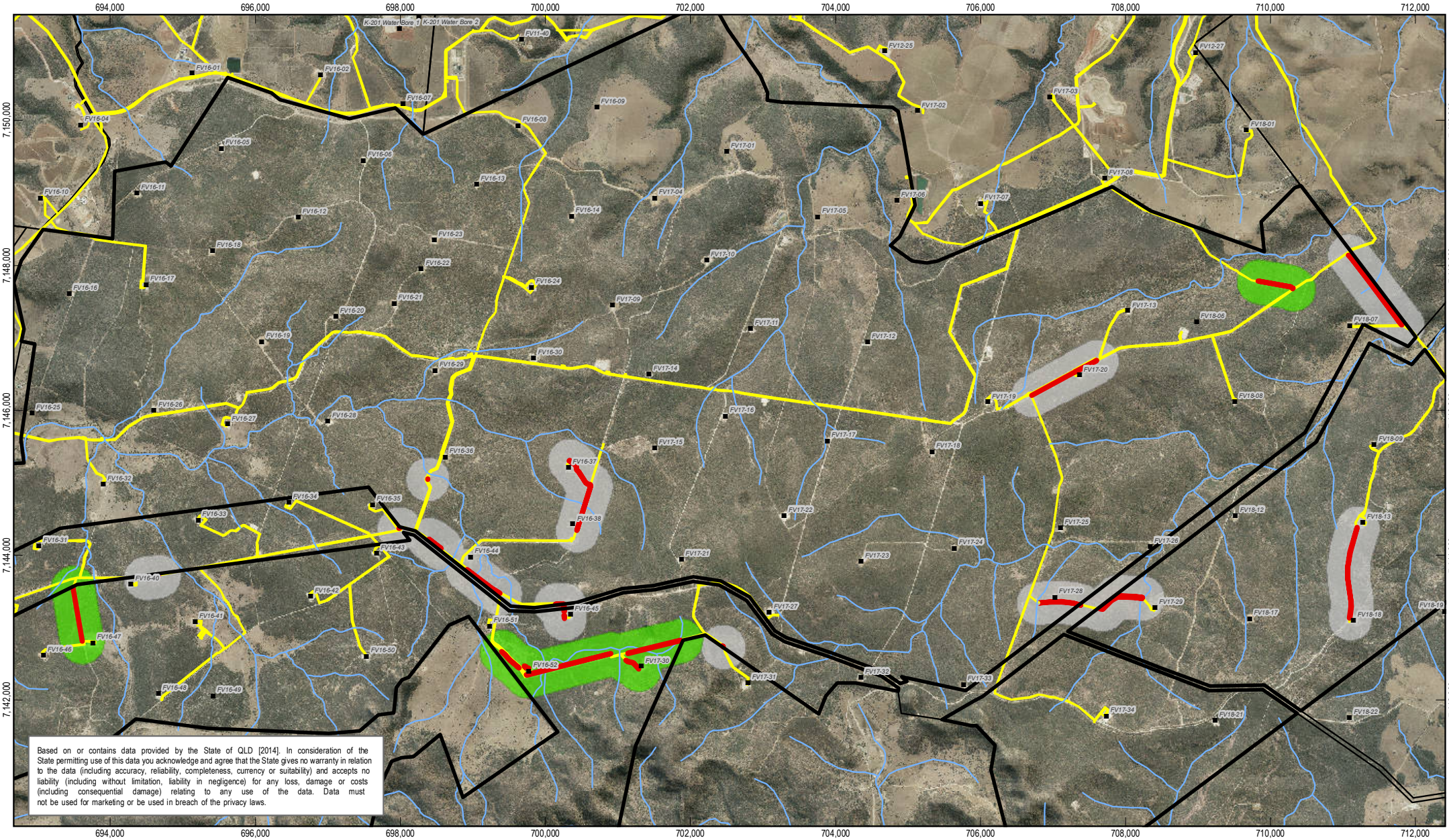
Powerful Owl *(Ninox strenua)* Habitat

Figure 27

G:\41\27125\GIS\Fairview 2\GIS\MAPS\MXD\41_27125_027_LOT55FAIRVIEW_PowerfulOwl_Rev0.mxd

145 Ann St Brisbane QLD 4000 Australia T 61 7 3316 3000 F 61 7 3316 3333 E bnemail@ghd.com W www.ghd.com

Data source: Santos: Well Pad Locations, Cadastre, Clearing Limit, Vegetation Management Area, Imagery/Supplied October 2013; DNRM: Ordered Drainage/2010; GHD: Habitat Classification/2013; ESRI: Hillshade/2008. Created by: AF



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Kilometers

Map Projection: Universal Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

LEGEND

- Well Pad
- Watercourse
- Fairview Lot 55 FTY1153
- Cadastre
- Clearing Limit
- Vegetation Management Area

Habitat Classification

- General
- Unlikely

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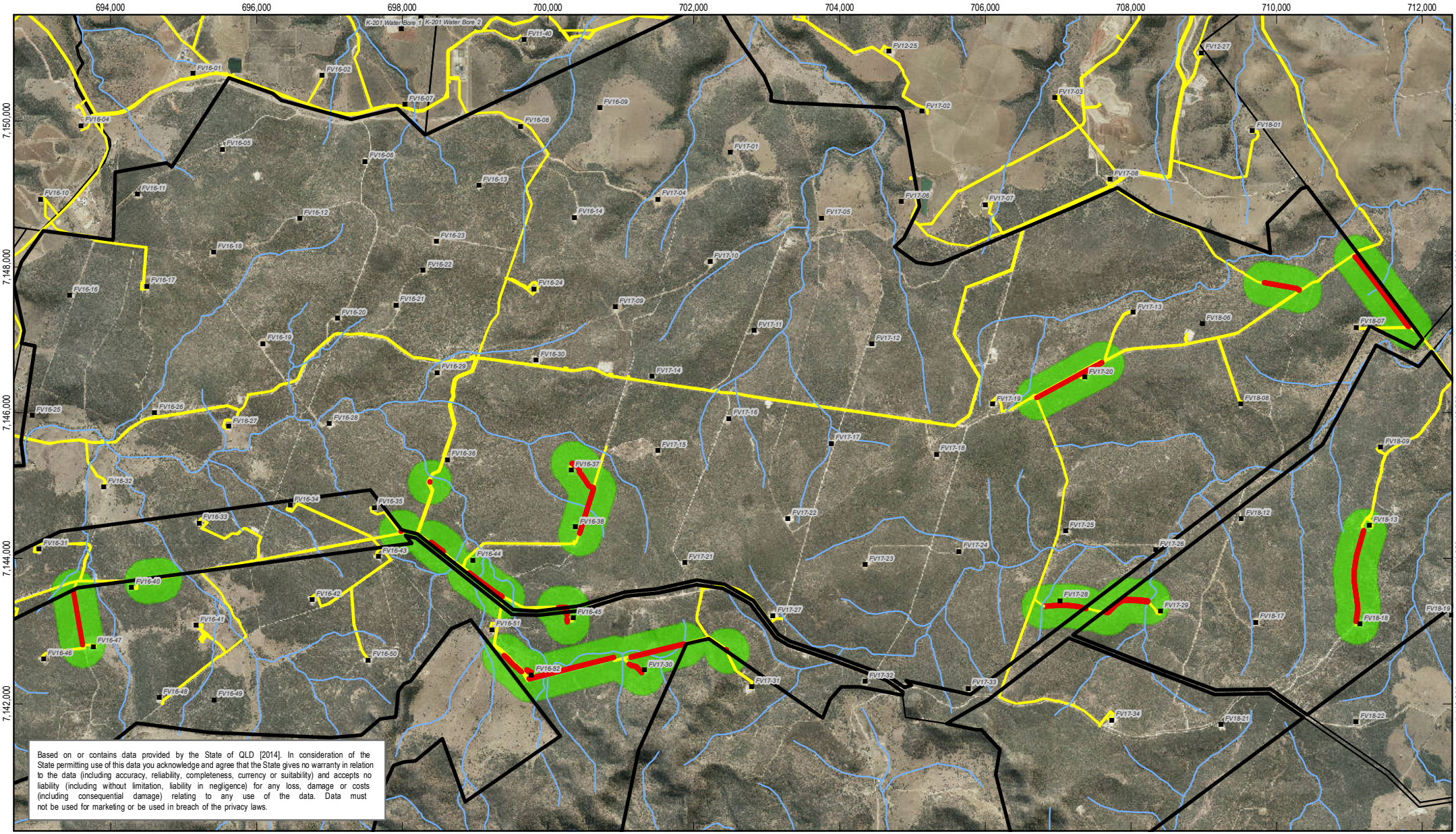
Square-tailed Kite *(Lophoictinia isura)* Habitat

Figure 28

G:\41\27125\GIS\Fairview 2\GIS\MAPS\MXD\41_27125_028_LOT55FAIRVIEW_SquareTailedKite_Rev0.mxd

145 Ann St Brisbane QLD 4000 Australia T 61 7 3316 3000 F 61 7 3316 3333 E bnemail@ghd.com W www.ghd.com

Data source: Santos: Well Pad Locations, Cadastre, Clearing Limit, Vegetation Management Area, Imagery/Supplied October 2013; DNRM: Ordered Drainage/2010; GHD: Habitat Classification/2013; ESRI: Hillshade/2008. Created by: AF



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0 0.5 1 1.5 2

Kilometers

Map Projection: Universal Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

LEGEND

- Well Pad
- Watercourse
- Fairview Lot 55 FTY1153
- Cadastre
- Clearing Limit
- Vegetation Management Area

Habitat Classification

- General

GHD

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Lot 55 Fairview Ecological Assessment

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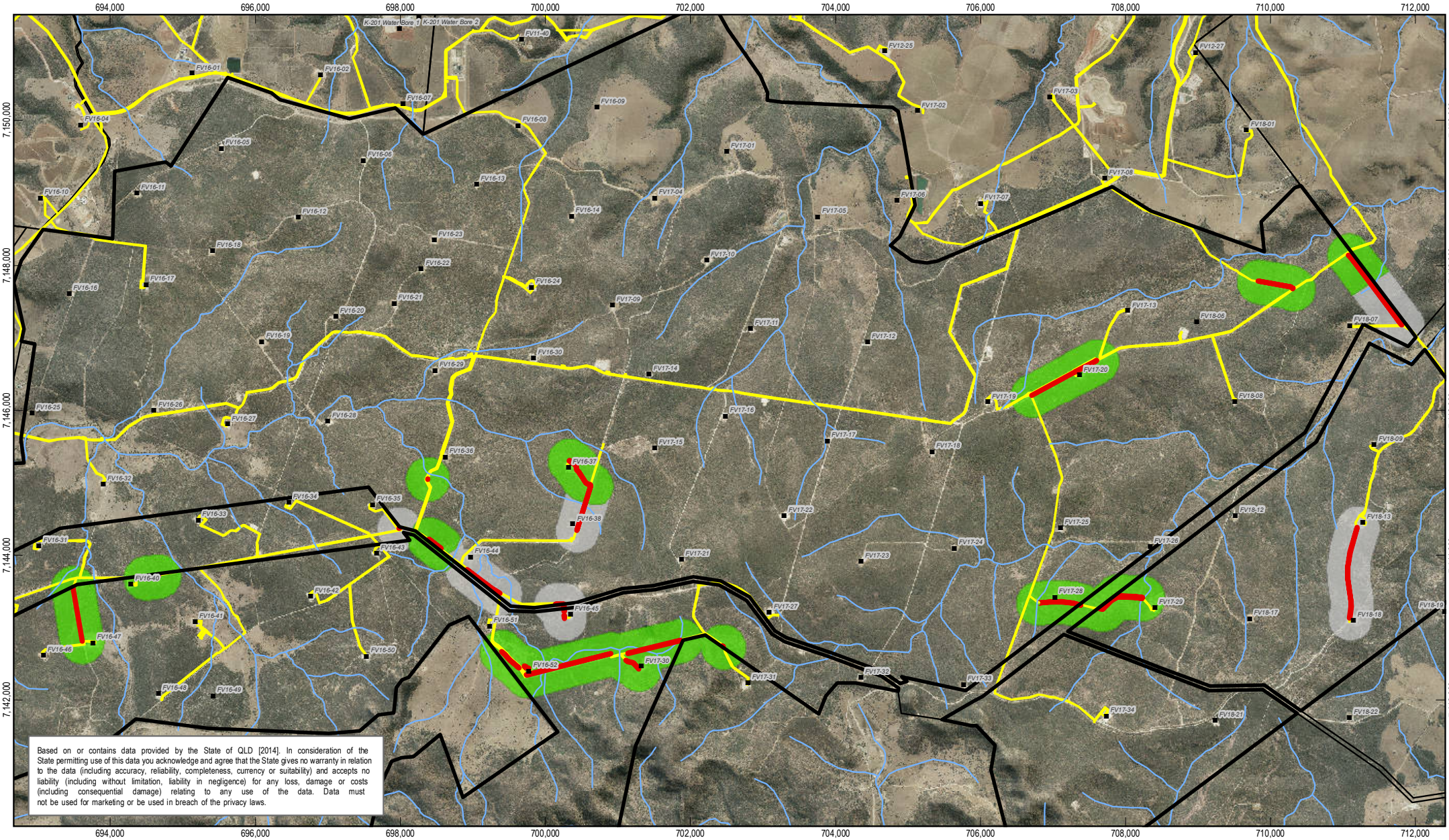
Squatter Pigeon *(Geophaps scripta scripta)* Habitat

Figure 29

G:\41\27125\GIS\Fairview 2\GIS\MAPS\MXD\41_27125_029_LOT55FAIRVIEW_SquatterPigeon_Rev0.mxd

145 Ann St Brisbane QLD 4000 Australia T 61 7 3316 3000 F 61 7 3316 3333 E bnemail@ghd.com W www.ghd.com

Data source: Santos: Well Pad Locations, Cadastre, Clearing Limit, Vegetation Management Area, Imagery/Supplied October 2013; DNRM: Ordered Drainage/2010; GHD: Habitat Classification/2013; ESRI: Hillshade/2008. Created by: AF



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0 0.5 1 1.5 2

Kilometers

Map Projection: Universal Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

LEGEND

- Well Pad
- Watercourse
- Fairview Lot 55 FTY1153
- Cadastre
- Clearing Limit
- Vegetation Management Area

Habitat Classification

- General
- Unlikely

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Lot 55 Fairview Ecological Assessment

Job Number 41-27125
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Date 07 Feb 2014

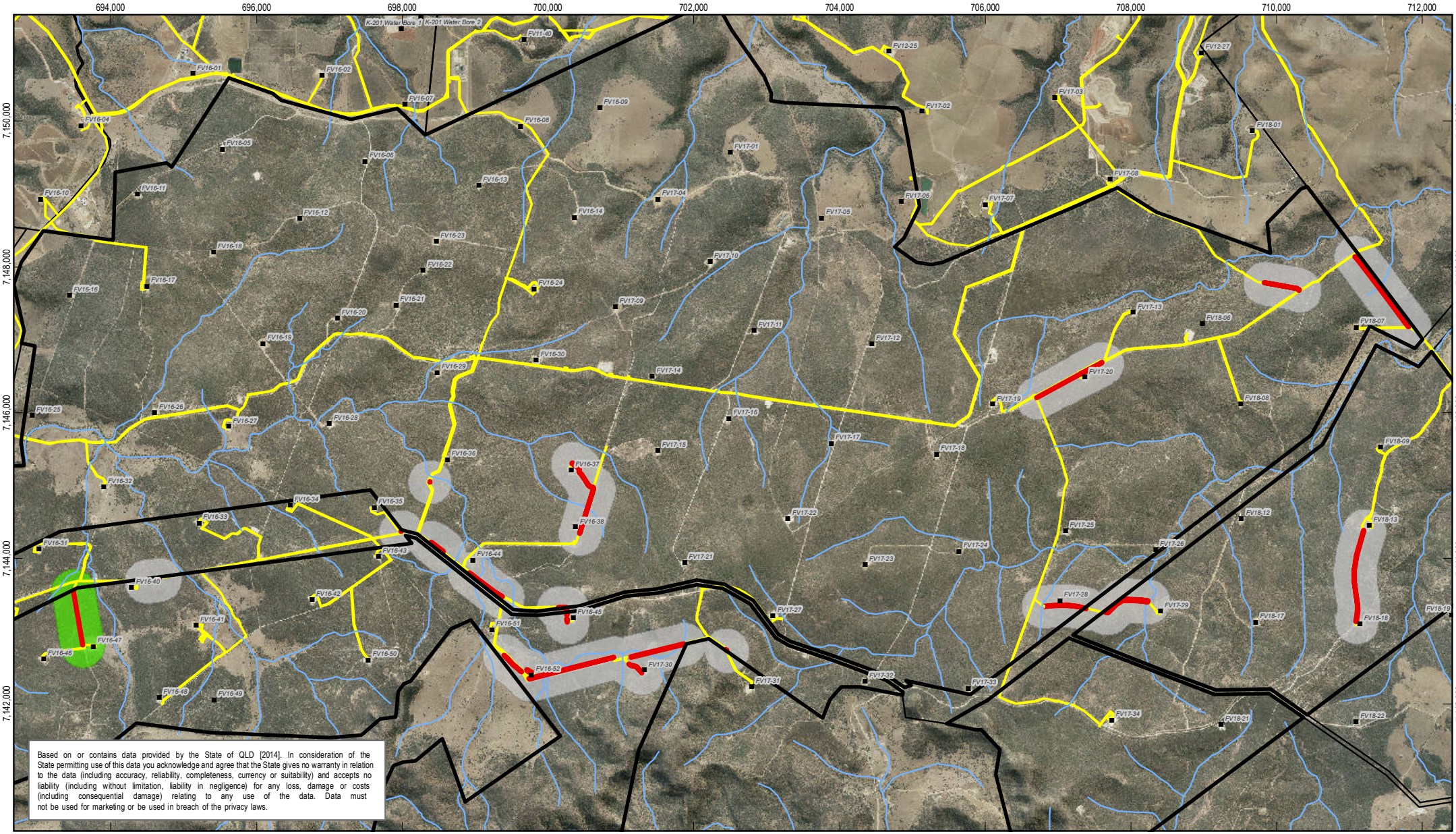
Rainbow Bee-eater *(Merops ornatus)* Habitat

Figure 30

G:\41\27125\GIS\Fairview 2\GIS\MAPS\MXD\41_27125_030_LOT55FAIRVIEW_RainbowBeeEater_Rev0.mxd

145 Ann St Brisbane QLD 4000 Australia T 61 7 3316 3000 F 61 7 3316 3333 E bnemail@ghd.com W www.ghd.com

Data source: Santos: Well Pad Locations, Cadastre, Clearing Limit, Vegetation Management Area, Imagery/Supplied October 2013; DNRM: Ordered Drainage/2010; GHD: Habitat Classification/2013; ESRI: Hillshade/2008. Created by: AF



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Kilometers

Map Projection: Universal Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

LEGEND

- Well Pad
- Watercourse
- Fairview Lot 55 FTY1153
- Cadastre
- Clearing Limit
- Vegetation Management Area

Habitat Classification

- General
- Unlikely

Santos GLNG
Lot 55 Fairview Ecological Assessment

Job Number 41-27125
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Date 07 Feb 2014

Satin Flycatcher *(Myiagra cyanoleuca)* Habitat

Figure 31

G:\41\27125\GIS\Fairview 2\GIS\MAPS\MXD\41_27125_031_LOT55FAIRVIEW_SatinFlycatcher_Rev0.mxd

145 Ann St Brisbane QLD 4000 Australia T 61 7 3316 3000 F 61 7 3316 3333 E bnemail@ghd.com W www.ghd.com

Data source: Santos: Well Pad Locations, Cadastre, Clearing Limit, Vegetation Management Area, Imagery/Supplied October 2013; DNRM: Ordered Drainage/2010; GHD: Habitat Classification/2013; ESRI: Hillshade/2008. Created by: AF

4. References

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Neldner, V, Wilson, B, Thompson, E, Dillewaard, H, A, 2012, *Methodology for Survey and Mapping of Regional Ecosystems and Vegetation Communities in Queensland*, retrieved November 12, 2013, from http://www.ehp.qld.gov.au/plants/herbarium/publications/pdf/herbarium_mapping_methodology.pdf.

Phillips, S, and Callaghan, J 2011, '*The Spot Assessment Technique: a tool for determining localised levels of habitat use by Koalas Phascolarctos cinereus*', Australian Zoologist, vol 35, pp 774–780.

RPS 2011, GLNG Project: Remediation, Rehabilitation, Recovery and Monitoring Plan, Coal Seam Gas Fields, Rev 4 (Document number 0020-GLNG-4.1.3-0012), Fortitude Valley, RPS Australia East Pty Ltd.

Appendices

Appendix A – Methods

Desktop and field ecological assessments of vegetation management zones and associated assessment buffers within Lot 55 were undertaken in accordance with the Santos Methodology.

Ecological features assessed under the Santos Methodology and types of assessments undertaken within Lot 55 included:

- Environmentally sensitive areas – assessed within 1 km of vegetation management zone footprints by quaternary vegetation assessments (Neldner *et al*. 2012)
- Regional ecosystems – assessed within 200 m of vegetation management zone footprints by quaternary vegetation assessments (Neldner *et al*. 2012)
- Threatened Ecological Community assessments - assessed within 300 m of vegetation management zone footprints by quaternary vegetation assessments (Neldner *et al*. 2012)
- Vegetation community assessments – assessed for each broad vegetation community within Lot 55 from criteria defined in the Fairview Environmental Authority (EPPG00928713), Schedule D – Land
- Mapped watercourses – assessed within 100 m of vegetation management zone footprints by the Works Within a Watercourse Assessment Checklist and Fluor/Santos Works Within a Watercourse Assessment and Approvals manual (document number: 6300-110-PRC-10104-FLR02-GENL Rev B)
- Wetlands, lakes and springs – assessed within 300 m of vegetation management zone footprints by the Wetland Rapid Assessment Checklist and the Procedure for Conducting Wetlands Assessments (document number: 3301-GLNG-4-1.3-0016) and Guideline for Conducting Wetlands Assessments (document number: 3301-GLNG-4-1.3-0017)
- General fauna habitat assessments – assessed within 200 m of vegetation management zone footprints by habitat and condition assessments (Eyre *et al*. 2012)
- Essential habitat (mapped under the *Vegetation Management Act 1999*) – assessed within 200 m of vegetation management zone footprints by targeted species searches
- Fauna habitat features and potential breeding places – type and location recorded within each vegetation management zone footprint
- Targeted threatened species searches – assessed within 300 m of vegetation management zone footprints for flora and fauna species listed as endangered, vulnerable or, near threatened (EVNT) under the EPBC Act and NC Act. Survey methods undertaken were appropriate for each targeted flora and fauna species as identified within relevant species survey guidelines published by the Department of the Environment (DOE) and/or DEHP including:
  - Random meander transects (Cropper 1993)for threatened flora species
  - Diurnal active searches
  - Anabat deployment
  - Diurnal bird surveys
  - Spotlighting – driving and walking transects
  - Call playback
  - Incidental species observations
- Koala habitat assessments and surveys– presence/absence of koala habitat assessed within 200 m of vegetation management zone footprints by collecting information on koala

population and habitat information outlined in Interim koala referral advice for proponents (DSEWPaC 2012), including:

– Koala habitat assessment: determining habitat critical to the survival of the koala including lists of primary and secondary food tree species.
– Koala survey: undertaking koala surveys using the techniques outlined in Policy 4 (page 72) of the *Nature Conservation (koala) Conservation Plan 2006 and Management Program 2006-2016* and for koala utilisation and frequency (faecal pellet surveys) using the spot assessment technique (Phillips & Callaghan 2011)

Appendix B – Vegetation communities and habitat values

- Vegetation community descriptions
- Benchmarks for representative ecosystems

Vegetation community descriptions

<table>
<tr><th>Community name</th><th>REs</th><th>Community characteristics</th><th>Fauna habitat value</th><th>Photo</th></tr>
<tr>
<td>Callitris glaucophylla woodland to open-forest on coarse grained sediments on gently undulating to rolling hills (Callitris glaucophylla woodland)</td>
<td>11.10.9</td>
<td>This community occurs across much of Lot 55, in well-connected patches adjacent to RE 11.10.11.

This community comprises a woodland to open-forest community on gently undulating plains on deep sands, formed from medium to coarse-grained sediments, and is characterised by Callitris glaucophylla and Eucalyptus populnea. Other species such as Eucalyptus melanophloia, Angophora leiocarpa and Eucalyptus chloroclada are also present in the canopy.

The vegetation cover is typically moderately dense (40 to 50 per cent), including the sub canopy layer. The shrub layer is typically moderately dense (20 to 40 per cent) and the ground layer is mostly sparse (20 to 30 per cent). Species composition in all strata consists of mainly native species.

This community is in good condition across its distribution (VAST level 1-2) with low levels of weed infestation and moderate to severe edge effects due to clearing of remnant vegetation. Weeds occur predominately in the ground layer and included Opuntia tomentosa, Opuntia stricta and Cenchrus ciliaris. Opuntia spp. is the most commonly observed weed and was recorded at low densities at most sites within this vegetation community.</td>
<td>
Survey sites: HA 1, HA 2, HA 3, HA 9, HA 10, HA 17, HA 18, HA 19 (n=8)
<table>
<tr><th>Trees with hollows</th><th>(Average per ha)</th></tr>
<tr><td>No. of trees containing hollows < 10 cm diameter</td><td>3.75 trees</td></tr>
<tr><td>Total number of hollows < 10 cm diameter</td><td>5.25 hollows</td></tr>
<tr><td>No. of trees containing hollows > 10 cm diameter</td><td>3.25 trees</td></tr>
<tr><td>Total number of hollows > 10 cm diameter</td><td>5 hollows</td></tr>
<tr><th>Hollow bearing logs</th><th>(Average per ha)</th></tr>
<tr><td>Number of logs with hollows > 10 cm diameter</td><td>2.25 logs</td></tr>
<tr><td>Total number of logs with hollows</td><td>3.25 logs</td></tr>
<tr><th>Fallen woody material</th><th>(Average per ha)</th></tr>
<tr><td>Total length of logs > 10 cm diameter</td><td>1082.5 m</td></tr>
<tr><td>Total number of logs</td><td>247.5 logs</td></tr>
<tr><th colspan="2">Abundance of other habitat characteristics</th></tr>
<tr><th>Characteristic</th><th>Abundance (0-7)^ (average per ha)</th></tr>
<tr><td>Decorticating bark</td><td>3</td></tr>
<tr><td>Course leaf litter (> 2 cm diameter)</td><td>1.5</td></tr>
<tr><td>Fine leaf litter (< 2 cm diameter)</td><td>1.5</td></tr>
<tr><td>Bare ground</td><td>4</td></tr>
<tr><td>Grass</td><td>5</td></tr>
<tr><td>Soil cracks</td><td>0</td></tr>
<tr><td>Stones (20–60 cm)</td><td>0</td></tr>
<tr><td>Boulders (61 cm – 2 m)</td><td>0.1</td></tr>
<tr><td>Large boulders (> 2 m)</td><td>0</td></tr>
<tr><td>Rock crevices</td><td>0</td></tr>
<tr><td>Exfoliating rock</td><td>0</td></tr>
<tr><td colspan="2">^Abundance key: 0 = None, 1 = Rare, 2 = Rare to occasional, 3 = Occasional, 4 = Occasional to common, 5 = common, 6 = common to abundant, 7 = Abundant</td></tr>
</table>
</td>
<td>

Representative photo: Site Q 20

Survey sites: Q1; Q2, Q3, Q9, Q10, Q18, Q19, Q20, VC3
</td>
</tr>
</table>

<table>
<tr><th>Community name</th><th>REs</th><th>Community characteristics</th><th>Fauna habitat value</th><th>Photo</th></tr>
<tr>
<td>Eucalyptus populnea woodland on sandy soils on gently undulating to rolling hills (Eucalypt woodland)</td>
<td>11.10.11, 11.10.9</td>
<td>This community occurs across the majority of Lot 55, in well-connected patches adjacent to RE 11.10.9.

This woodland community occurs on gently undulating plains on deep sands, over strongly alkaline to acidic, yellow clayey subsoils, and is characterised by Eucalyptus populnea, Eucalyptus melanophloia and Callitris glaucophylla. Eucalyptus chloroclada, Allocasuarina luehmannii and Corymbia trachyphloia are also present in the canopy.

The vegetation cover is typically sparse to moderately-dense (20 to 60 per cent), including the sub canopy layer. The shrub layer is typically of moderate to sparse density (10 to 30 per cent) and the ground layer is mostly sparse (20 to 30 per cent). Species composition in all strata consists of mainly native species

This community is in good condition across its distribution (VAST level 2) with low levels of weed infestation and some areas impacted by edge effects as a result of vegetation clearing. Some sites had been recently burnt and vegetation was regenerating. Weeds occurred predominately in the ground layer and included Opuntia spp., Cenchrus ciliaris and Verbena aristigera. Opuntia spp. was the most commonly observed weeds and were recorded at low densities at most sites within this vegetation community.</td>
<td>
Survey sites: HA 4, HA 6, HA 11, HA 12, HA 13, HA 14, HA 15, HA 16 (n=8)
<table>
<tr><th>Trees with hollows</th><th>(Average per ha)</th></tr>
<tr><td>No. of trees containing hollows < 10 cm diameter</td><td>5.25 trees</td></tr>
<tr><td>Total number of hollows < 10 cm diameter</td><td>8 hollows</td></tr>
<tr><td>No. of trees containing hollows > 10 cm diameter</td><td>3.5 trees</td></tr>
<tr><td>Total number of hollows > 10 cm diameter</td><td>4.25 hollows</td></tr>
<tr><th>Hollow bearing logs</th><th>(Average per ha)</th></tr>
<tr><td>Number of logs with hollows > 10 cm diameter</td><td>2.25 logs</td></tr>
<tr><td>Total number of logs with hollows</td><td>4.5 logs</td></tr>
<tr><th>Fallen woody material</th><th>(Average per ha)</th></tr>
<tr><td>Total length of logs > 10 cm diameter</td><td>885 m</td></tr>
<tr><td>Total number of logs</td><td>277.5 logs</td></tr>
<tr><th colspan="2">Abundance of other habitat characteristics</th></tr>
<tr><th>Characteristic</th><th>Abundance (0-7)^ (average per ha)</th></tr>
<tr><td>Decorticating bark</td><td>2.5</td></tr>
<tr><td>Course leaf litter (> 2 cm diameter)</td><td>2.25</td></tr>
<tr><td>Fine leaf litter (< 2 cm diameter)</td><td>2.1</td></tr>
<tr><td>Bare ground</td><td>4.5</td></tr>
<tr><td>Grass</td><td>4.5</td></tr>
<tr><td>Soil cracks</td><td>0</td></tr>
<tr><td>Stones (20–60 cm)</td><td>0</td></tr>
<tr><td>Boulders (61 cm – 2 m)</td><td>0</td></tr>
<tr><td>Large boulders (> 2 m)</td><td>0</td></tr>
<tr><td>Rock crevices</td><td>0</td></tr>
<tr><td>Exfoliating rock</td><td>0</td></tr>
<tr><td colspan="2">^Abundance key: 0 = None, 1 = Rare, 2 = Rare to occasional, 3 = Occasional, 4 = Occasional to common, 5 = common, 6 = common to abundant, 7 = Abundant</td></tr>
</table>
</td>
<td> 
Representative photo: Site Q 15

Survey sites: Q4; Q6, Q11, Q12, Q13, Q14, Q15, Q17, VC4, VC5</td>
</tr>
</table>

<table>
<tr><th>Community name</th><th>REs</th><th>Community characteristics</th><th>Fauna habitat value</th><th>Photo</th></tr>
<tr>
<td>Non-remnant low regrowth woodland (Non-remnant)</td>
<td>Non-remnant</td>
<td>
This community was surveyed at six sites across Lot 55.

This community ranges from low, moderately-dense regrowth Eucalyptus populnea and Callitris glaucophylla. All representative sites for this community occurred on flat to gently undulating land. Characteristic species include Eucalyptus populnea, Eucalyptus melanophloia, Callitris glaucophylla, Allocasuarina luehmannii and Petalostigma pubescens.

The vegetation cover ranged from sparse to moderately-dense (10 to 50 per cent), including the sub canopy layer. The shrub layer was typically sparse (10 to 40 per cent) and the ground layer was mostly moderately-sparse (20 to 50 per cent). Species composition in all strata consisted of mainly native species.

This community was in moderate condition across its distribution (VAST level 3) with low levels of weed infestation. Weeds occurred predominately in the ground layer at low densities and included Opuntia tomentosa, Cenchrus ciliaris and Melinis repens. Opuntia tomentosa was the most commonly observed weed and were recorded at low densities at most sites within this vegetation community.
</td>
<td>
Survey sites: HA 5, HA 7, HA 8 (n=3)
<table>
<tr><th>Trees with hollows</th><th>(Average per ha)</th></tr>
<tr><td>No. of trees containing hollows < 10 cm diameter</td><td>2.66 trees</td></tr>
<tr><td>Total number of hollows < 10 cm diameter</td><td>4 hollows</td></tr>
<tr><td>No. of trees containing hollows > 10 cm diameter</td><td>1.33 trees</td></tr>
<tr><td>Total number of hollows > 10 cm diameter</td><td>1.33 hollows</td></tr>
<tr><th>Hollow bearing logs</th><th>(Average per ha)</th></tr>
<tr><td>Number of logs with hollows > 10 cm diameter</td><td>3.33 logs</td></tr>
<tr><td>Total number of logs with hollows</td><td>5.33 logs</td></tr>
<tr><th>Fallen woody material</th><th>(Average per ha)</th></tr>
<tr><td>Total length of logs > 10 cm diameter</td><td>347 m</td></tr>
<tr><td>Total number of logs</td><td>87 logs</td></tr>
<tr><th colspan="2">Abundance of other habitat characteristics</th></tr>
<tr><th>Characteristic</th><th>Abundance (0-7)^ (average per ha)</th></tr>
<tr><td>Decorticating bark</td><td>2</td></tr>
<tr><td>Course leaf litter (> 2 cm diameter)</td><td>1.33</td></tr>
<tr><td>Fine leaf litter (< 2 cm diameter)</td><td>2</td></tr>
<tr><td>Bare ground</td><td>4</td></tr>
<tr><td>Grass</td><td>4.33</td></tr>
<tr><td>Soil cracks</td><td>0</td></tr>
<tr><td>Stones (20–60 cm)</td><td>0.66</td></tr>
<tr><td>Boulders (61 cm – 2 m)</td><td>0</td></tr>
<tr><td>Large boulders (> 2 m)</td><td>0.66</td></tr>
<tr><td>Rock crevices</td><td>0</td></tr>
<tr><td>Exfoliating rock</td><td>0</td></tr>
<tr><td colspan="2">^Abundance key: 0 = None, 1 = Rare, 2 = Rare to occasional, 3 = Occasional, 4 = Occasional to common, 5 = common, 6 = common to abundant, 7 = Abundant</td></tr>
</table>
</td>
<td>

Representative photo: Site Q 16

Survey sites: Q5, Q7, Q8, Q16, VC1, VC2
</td>
</tr>
</table>

Benchmarks for representative ecosystems

Benchmark 1: *Callitris glaucophylla* open-forest

Fairview, RE 11.10.9

Representative ecosystem	Brigalow open-forest
Site vegetation description	• *Callitris glaucophylla* woodland to open-forest often associated with *Eucalyptus melanophloia* in the tree canopy and a sparse ground layer
Regional ecosystems sampled	11.10.9 (RPS[1] and GHD[2])
Available DEHP benchmarks	None available
Site assessment information	GHD (2013) sites[2] RE: 11.10.9. Site VC 3. Property: Lot 55 FTY1153 Location: 700633, 7144651 RPS (2011) sites[1] RE: 11.10.9. Property: Springwater. Location: 148.955175, -25.762183

[1]CSG Gas Fields (Fairview, Roma and Arcadia Valley Project Areas) Remediation, Rehabilitation, Recovery and Monitoring Plan (RPS, 2011).

[2]GHD ecological surveys undertaken in December 2013

Native species richness			
Strata	Average species richness (RPS)[1]	Average species richness (GHD)[2]	Benchmark value[3]
Trees	4	4	N/A
Shrubs	4	3	N/A
Herbs and forbs	5	5	N/A
Grasses	7	3	N/A

[1]Data taken from the description of benchmark community 2 in Appendix 2, CSG Gas Fields (Fairview, Roma and Arcadia Valley Project Areas) Remediation, Rehabilitation, Recovery and Monitoring Plan (RPS, 2011).

[2]Data recorded and averaged (where applicable) for vegetation communities surveyed by GHD during ecological surveys in December 2013

[3]Published benchmarks from the Department of Environment and Heritage Protection – not available for 11.10.9

Species list		
Species recorded in disturbance area (GHD)[2]		Included in RPS indicative species list for community[1]
Scientific name	**Common name**	
Tree species		
*Callitris glaucophylla**	White cypress pine	✓
Eucalyptus populnea	poplar box	
Allocasuarina luehmannii	bulloak	
Eucalyptus melanophloia	silver-leaved ironbark	✓
Shrub species		

Species list		
Species recorded in disturbance area (GHD)[2]		Included in RPS indicative species list for community[1]
Callitris glaucophylla	white cypress pine	
Acacia leiocalyx	early black wattle	
Allocasuarina luehmannii	bulloak	
Herb and forb species		
Laxmannia gracilis	slender wire-lily	
Murdannia graminea	grass lily	
Fimbristylis dichotoma	common finger rush	✓
Lomandra leucocephala	woolly mat rush	
Cheilanthes sieberi subsp. *sieberi*	Rock fern	✓
Grass species		
*Eragrostis sororia**	woodland lovegrass	✓
Eragrostis setifolia	bristly lovegrass	
Aristida calycina	dark wiregrass	✓
Common weed species		
Opuntia tomentosa (LPA Class 2)	Velvety tree pear	
Cenchrus ciliaris	buffel grass	
NOTE: See Benchmark 2, Appendix 2 in the CSG Gas Fields (Fairview, Roma and Arcadia Valley Project Areas) Remediation, Rehabilitation, Recovery and Monitoring Plan (RPS 2011) for additional species for this vegetation community		
[1]Data taken from the description of benchmark community 2 in Appendix 2, CSG Gas Fields (Fairview, Roma and Arcadia Valley Project Areas) Remediation, Rehabilitation, Recovery and Monitoring Plan (RPS, 2011). [2]Data recorded and averaged (where applicable) for vegetation communities surveyed by GHD during ecological surveys in December 2013 *Key species of broad ecosystem group (RPS 2011)		

Ground cover					
Type	Average cover (%)			Range (%)	
	RPS (2011)[1]	**GHD (2013)[2]**	**Benchmark value[3]**	**RPS (2011)[1]**	**GHD (2013)[2]**
Native grass	27	13.4	N/A	25-29	2-20
Native herbs and forbs	25	3		22-28	0-10
Native shrubs	1	0		1-3	0
Litter (<10 cm diameter)	14	65.4	N/A	14	50-82
Coarse woody debris (> 10 cm diameter)		1.6			0-8
Rock	0	4		0	0-20
Bare ground	30	12.6		29-31	0-30
Non-native species	1	0		0-1	0
[1]Data taken from the description of benchmark community 2 in Appendix 2, CSG Gas Fields (Fairview, Roma and Arcadia Valley Project Areas) Remediation, Rehabilitation, Recovery and Monitoring Plan (RPS, 2011). [2]Data recorded and averaged (where applicable) for vegetation communities surveyed by GHD during ecological surveys in December 2013 [3]Published benchmarks the from Department of Environment and Heritage Protection – not available for 11.10.9					

Trees and shrubs data									
Strata	Average cover (%)			Height range (m)		Median height (m)		Average stem count (per ha)[2]	
	RPS (2011)[1]	**GHD (2013)[2]**	**Benchmark value[3]**	**RPS (2011)[1]**	**GHD (2013)[2]**	**GHD (2013)[2]**	**Benchmark value[3]**	**Canopy species (>20 cm DBH)**	**Shrub species**
T1		24.2	N/A		11-18	14	N/A	88	
T2		7.7	N/A		7-10	7.5	N/A	58	
S1		4.3			1-6	4			660
S2		N/A			N/A	N/A			N/A
Trees (total)		31.9						146	
Shrubs (total)	4.0	4.3	N/A						660
Eucalypts	87.0	0.0		10				0	0
Non-eucalypts		31.9		13				146	660

[1]Data taken from the description of benchmark community 2 in Appendix 2, CSG Gas Fields (Fairview, Roma and Arcadia Valley Project Areas) Remediation, Rehabilitation, Recovery and Monitoring Plan (RPS, 2011).

[2]Data recorded and averaged (where applicable) for vegetation communities surveyed by GHD during ecological surveys in December 2013

[3]Published benchmarks the from Department of Environment and Heritage Protection – not available for 11.10.9

Benchmarks for representative ecosystems

Benchmark 2: Eucalypt woodland

Fairview, RE 11.10.9 and 11.10.11

Representative ecosystem	Brigalow open-forest
Site vegetation description	• *Eucalyptus populnea*, *E. melanophloia* +/- *Callitris glaucophylla* woodland. • *Callitris glaucophylla* woodland to open-forest often associated with *Eucalyptus melanophloia* in the tree canopy and a sparse ground layer
Regional ecosystems sampled	11.10.7a (RPS[1]), 11.10.9 (GHD[2]), 11.10.11 (RPS[1] and GHD[2])
Available DEHP benchmarks	None available
Site assessment information	GHD (2013) sites[2] RE: 11.10.11. Site VC 5. Property: Lot 55 FTY1153 Location: 709850, 7147818 RE: 11.10.11. Site VC 4. Property: Lot 55 FTY1153 Location: 700126, 7142482 RPS (2011) sites[1] RE: 11.10.7a. Property: Fairview Location: 148.970158, -25.641712 RE: 11.10.11. Property: Coxen Creek Location: 149.114793, -26.367161

[1]CSG Gas Fields (Fairview, Roma and Arcadia Valley Project Areas) Remediation, Rehabilitation, Recovery and Monitoring Plan (RPS, 2011).

[2]GHD ecological surveys undertaken in December 2013

Native species richness			
Strata	Average species richness (RPS)[1]	Average species richness (GHD)[2]	Benchmark value[3]
Trees	4	4.5	N/A
Shrubs	7	7	N/A
Herbs and forbs	7	2.5	N/A
Grasses	6	7.5	N/A

[1]Data taken from the description of benchmark community 5 in Appendix 2, CSG Gas Fields (Fairview, Roma and Arcadia Valley Project Areas) Remediation, Rehabilitation, Recovery and Monitoring Plan (RPS, 2011).

[2]Data recorded and averaged (where applicable) for vegetation communities surveyed by GHD during ecological surveys in December 2013

[3]Published benchmarks from the Department of Environment and Heritage Protection – not available for 11.10.9 or 11.10.11

Species list		
Species recorded in disturbance area (GHD)[2]		Included in RPS indicative species list for community[1]
Scientific name	**Common name**	
Tree species		
Callitris glaucophylla	White cypress pine	✓
*Eucalyptus populnea**	poplar box	✓
Allocasuarina luehmannii	bulloak	
*Eucalyptus melanophloia**	silver-leaved ironbark	✓
Brachychiton populneus	kurrajong	
Acacia salicina	sally wattle	
Eremophila mitchellii	false sandalwood	
Shrub species		
Brachychiton populneus	kurrajong	
Cymbidium canaliculatum	black orchid	
Eremophila mitchellii	false sandalwood	✓
Acacia leiocalyx	early black wattle	✓
Allocasuarina luehmannii	bulloak	
Callitris glaucophylla	white cypress pine	
Dodonaea viscosa subsp. *spatulata*	sticky hopbush	✓
Geijera parviflora	wilga	
Grewia latifolia	dog's balls	
Dodonaea heteromorpha	hopbush	
Parsonsia eucalyptophylla	monkey vine	
Herb and forb species		
Lomandra leucocephala	woolly mat rush	
Lomandra filiformis	wattle mat rush	
Fimbristylis dichotoma	common finger rush	✓
Cheilanthes sieberi subsp. *sieberi*	rock fern	✓
Murdannia graminea	grass lily	
Grass species		
Chrysopogon fallax	golden beard	
Cymbopogon refractus	barbed wire grass	✓
Themeda triandra	kangaroo grass	
Eragrostis setifolia	bristly lovegrass	
Heteropogon contortus	black spear grass	✓
Aristida caput-medusae	many-headed wiregrass	
Sporobolus creber	Western rat's tail grass	
Enneapogon nigricans	bottle washers	
Bothriochloa decipiens var. *decipiens*	pitted bluegrass	✓
Enteropogon ramosus	twirly windmill grass	
Common weed species		
Opuntia tomentosa (LPA Class 2)	Velvety tree pear	
Cenchrus ciliaris	buffel grass	
NOTE: See Benchmark 5, Appendix 2 in the CSG Gas Fields (Fairview, Roma and Arcadia Valley Project Areas) Remediation, Rehabilitation, Recovery and Monitoring Plan (RPS 2011) for additional species for this vegetation community		
[1]Data taken from the description of benchmark community 5 in Appendix 2, CSG Gas Fields (Fairview, Roma and Arcadia Valley Project Areas) Remediation, Rehabilitation, Recovery and Monitoring Plan (RPS, 2011).		
[2]Data recorded and averaged (where applicable) for vegetation communities surveyed by GHD during ecological surveys in December 2013		
*Key species of broad ecosystem group (RPS 2011)		

Ground cover					
Type	Average cover (%)			Range (%)	
	RPS (2011)[1]	**GHD (2013)[2]**	**Benchmark value[3]**	**RPS (2011)[1]**	**GHD (2013)[2]**
Native grass	75	34.4	N/A	64-80	25-65
Native herbs and forbs	6	3.1		2-15	0-15
Native shrubs	1	0.5		0-5	0-5
Litter (<10 cm diameter)	8	33.4	N/A	3-15	0-50
Coarse woody debris (> 10 cm diameter)		3			0-20
Rock	0	0		0	0
Bare ground	4	25.1		0-10	5-45
Non-native species	5.5	0.5		2-10	0-5

[1]Data taken from the description of benchmark community 5 in Appendix 2, CSG Gas Fields (Fairview, Roma and Arcadia Valley Project Areas) Remediation, Rehabilitation, Recovery and Monitoring Plan (RPS, 2011).

[2]Data recorded and averaged (where applicable) for vegetation communities surveyed by GHD during ecological surveys in December 2013

[3]Published benchmarks the from Department of Environment and Heritage Protection – not available for 11.10.9 or 11.10.11

Trees and shrubs data									
Strata	Average cover (%)			Height range (m)		Median height (m)		Average stem count (per ha)[2]	
	RPS (2011)[1]	**GHD (2013)[2]**	**Benchmark value[3]**	**RPS (2011)[1]**	**GHD (2013)[2]**	**GHD (2013)[2]**	**Benchmark value[3]**	**Canopy species (>20 cm DBH)**	**Shrub species**
T1		23.4	N/A		11-17	14	N/A	48	
T2		11.2	N/A		7-10	8.5	N/A	26	
S1		8.3			4-6	5			810
S2		0.0			1.3	1.5			580
Trees (total)		34.6						74	
Shrubs (total)	11.0	8.3	N/A						1390
Eucalypts	51.0	23.0		15				56	30
Non-eucalypts		22.3		N/A				20	1070

[1]Data taken from the description of benchmark community 5 in Appendix 2, CSG Gas Fields (Fairview, Roma and Arcadia Valley Project Areas) Remediation, Rehabilitation, Recovery and Monitoring Plan (RPS, 2011).

[2]Data recorded and averaged (where applicable) for vegetation communities surveyed by GHD during ecological surveys in December 2013

[3]Published benchmarks the from Department of Environment and Heritage Protection – not available for 11.10.9 or 11.10.11

Benchmarks for representative ecosystems

Benchmark 3: Non-remnant

Fairview, non-remnant

Representative ecosystem	Brigalow open-forest
Site vegetation description	• Cleared areas with very sparse mature eucalypts and *Callitris glaucophylla* • Low regrowth eucalypts and *Callitris glaucophylla* open-forest to woodland
Regional ecosystems sampled	Non-remnant No equivalent sites were sampled by RPS[1]
Available DEHP benchmarks	Not applicable
Site assessment information	GHD (2013) sites[2] RE: Non-remnant. Site VC 2. Property: Lot 55 FTY1153 Location: 699512. 7142652 RE: Non-remnant. Site VC 1. Property: Lot 55 FTY1153 Location: 699095, 7143732 RPS (2011) Sites No equivalent sites were sampled by RPS[1]

[1]CSG Gas Fields (Fairview, Roma and Arcadia Valley Project Areas) Remediation, Rehabilitation, Recovery and Monitoring Plan (RPS, 2011).

[2]GHD ecological surveys undertaken in December 2013

Native species richness			
Strata	Average species richness (RPS)[1]	Average species richness (GHD)[2]	Benchmark value[3]
Trees	N/A	3.5	N/A
Shrubs	N/A	3.5	N/A
Herbs and forbs	N/A	3	N/A
Grasses	N/A	6	N/A

[1]CSG Gas Fields (Fairview, Roma and Arcadia Valley Project Areas) Remediation, Rehabilitation, Recovery and Monitoring Plan (RPS, 2011).

[2]Data recorded and averaged (where applicable) for vegetation communities surveyed by GHD during ecological surveys in December 2013

[3]Published benchmarks from the Department of Environment and Heritage Protection – not applicable to non-remnant vegetation

Species list		
Species recorded in disturbance area (GHD)[2]		Included in RPS indicative species list for community[1]
Scientific name	**Common name**	
Tree species		
Eucalyptus populnea	poplar box	
Eucalyptus melanophloia	silver-leaved ironbark	
Allocasuarina luehmannii	bulloak	
Callitris glaucophylla	white cypress pine	
Shrub species		
Eucalyptus chloroclada	Baradine gum	
Callitris glaucophylla	white cypress pine	
Allocasuarina luehmannii	bulloak	
Eucalyptus populnea	poplar box	
Petalostigma pubescens	quinine berry bush	
Herb and forb species		
Juncus usitatus	common rush	
Fimbristylis dichotoma	common finger rush	
Spermacoce multicaulis		
Chrysocephalum apiculatum	billy buttons	
Eremophila debilis	winter apple	
Abutilon fraseri	dwarf lantern flower	
Grass species		
Chrysopogon fallax	golden beard	
Cymbopogon refractus	barbed wire grass	
Themeda triandra	kangaroo grass	
Eragrostis sororia	woodland lovegrass	
Heteropogon contortus	black spear grass	
Aristida caput-medusae	many-headed wiregrass	
Sporobolus creber	Western rat's tail grass	
Eragrostis leptostachya	paddock lovegrass	
Aristida lignosa		
Aristida calycina	dark wiregrass	
Common weed species		
Opuntia aurantiaca (LPA Class 2)	tiger pear	
Opuntia tomentosa (LPA Class 2)	velvety tree pear	
Cenchrus ciliaris	buffel grass	
Melinis repens	red natal grass	
Verbena aristigera	Mayne's pest	

[1]CSG Gas Fields (Fairview, Roma and Arcadia Valley Project Areas) Remediation, Rehabilitation, Recovery and Monitoring Plan (RPS, 2011).

[2]Data recorded and averaged (where applicable) for vegetation communities surveyed by GHD during ecological surveys in December 2013

*Key species of broad ecosystem group (RPS 2011)

Ground cover					
Type	Average cover (%)			Range (%)	
	RPS (2011)[1]	**GHD (2013)[2]**	**Benchmark value[3]**	**RPS (2011)[1]**	**GHD (2013)[2]**
Native grass	N/A	33	N/A	N/A	0-60
Native herbs and forbs	N/A	1.1		N/A	0-6
Native shrubs	N/A	0.0		N/A	0
Litter (<10 cm diameter)	N/A	18.8	N/A	N/A	5-68
Coarse woody debris (> 10 cm diameter)		8.5			0-25
Rock	N/A	0.0		N/A	0
Bare ground	N/A	37		N/A	0-90
Non-native species	N/A	1.6		N/A	0-8

[1]CSG Gas Fields (Fairview, Roma and Arcadia Valley Project Areas) Remediation, Rehabilitation, Recovery and Monitoring Plan (RPS, 2011).

[2]Data recorded and averaged (where applicable) for vegetation communities surveyed by GHD during ecological surveys in December 2013

[3]Published benchmarks the from Department of Environment and Heritage Protection – not applicable to non-remnant vegetation

Trees and shrubs data									
Strata	**Average cover (%)**			**Height range (m)**		**Median height (m)**		**Average stem count (per ha)[2]**	
	RPS (2011)[1]	**GHD (2013)[2]**	**Benchmark value[3]**	**RPS (2011)[1]**	**GHD (2013)[2]**	**GHD (2013)[2]**	**Benchmark value[3]**	**Canopy species (>20 cm DBH)**	**Shrub species**
T1		9.7	N/A		8-13	10	N/A	17	
T2		29.9	N/A		7-8	7	N/A	8	
S1		5.0			5-7	4.7			320
S2		0.0			1-4	2			110
Trees (total)		39.6						25	
Shrubs (total)	N/A	5.0	N/A						430
Eucalypts	N/A	19.8		N/A				23	240
Non-eucalypts		4.9		N/A				2	170

[1]CSG Gas Fields (Fairview, Roma and Arcadia Valley Project Areas) Remediation, Rehabilitation, Recovery and Monitoring Plan (RPS, 2011).
[2]Data recorded and averaged (where applicable) for vegetation communities surveyed by GHD during ecological surveys in December 2013
[3]Published benchmarks the from Department of Environment and Heritage Protection – not applicable to non-remnant vegetation

Appendix C – Regional ecosystem field verification results

Methodology

A combination of desktop assessments and detailed field assessments were used to accurately map and define vegetation communities within Lot 55 on FTY1153 (Lot 55), based on vegetation categories defined by the Queensland Herbarium.

Desktop Assessment

Prior to surveys, a desktop assessment was undertaken to assist with the determination of vegetation community boundaries within Lot 55. The following information sources were reviewed:

- Current certified RE mapping Version 7.1.
- Queensland Herbarium mapping and methodology procedures outlined in Neldner *et al*., (2012).
- High resolution aerial imagery.

Field Assessments

Field verification of Department of Environment and Heritage Protection (DEHP) mapped Regional Ecosystems (REs) (Version 7.1) were carried out by GHD ecologists between the 10th and 14th of December 2013. Sites were assessed within Lot 55 using the quaternary method described by the Queensland Herbarium's *Methodology for Survey and Mapping of Regional Ecosystems and Vegetation Communities in Queensland* (Neldner *et al*., 2012). In brief, a quaternary level of assessment involves collection of data regarding the structure and composition of strata comprising the vegetation community.

A combination of high resolution aerial imagery, previous ecological surveys and field traverses (using hand held GPS) were used to delineate between RE boundaries.

Site Landform and Geology

The regional geology is dominated by undulating to rolling hills, comprising lower to middle Jurassic sandstones, from approximately 170 to 145 million years ago (Willmott, 2006). The key geological units underlying much of Lot 55 comprises the Hutton Sandstone formation, consisting of argillaceous sublabile sandstone and quartoze sandstone, and the Westgrove Ironstone Member, consisting of chamositic ironstone, pelletal, or oolite, cropping out as concretionary or oolitic limonite (Geoscience Australia, 2013). Soils on these rolling hills are characterised as shallow to moderately deep sandy (Tenosals, Rudosols, Sodosols and Chromosols) formed in-situ on the bedrock. (CSIRO, 2010).

Minor watercourses and drainage lines transect the project area, feeding into the Hutton Creek to the north-west and Dawson River to the north-east. Within the region, remnant vegetation exhibits a high degree of connectivity in association with State forests and Expedition National Park, located to the north of Lot 55. Minor areas of lot 55 have been largely cleared for livestock grazing.

Existing Certified RE Mapping

The current certified RE mapping (Version 7.1) identified Lot 55 as supporting predominantly remnant vegetation containing least concern RE 11.10.9, 11.10.1, and 11.10.7a on undulating plains. Small areas located throughout the lot are mapped as containing alluvial woodland REs 11.3.2 and 11.3.25). The description of these REs, sourced from the Queensland Herbarium's

Regional Ecosystem Description Database (REDD) is provide below in Table 4-1. The certified RE mapping for Lot 55 is provided in Figure 32.

Field Verified Vegetation Mapping

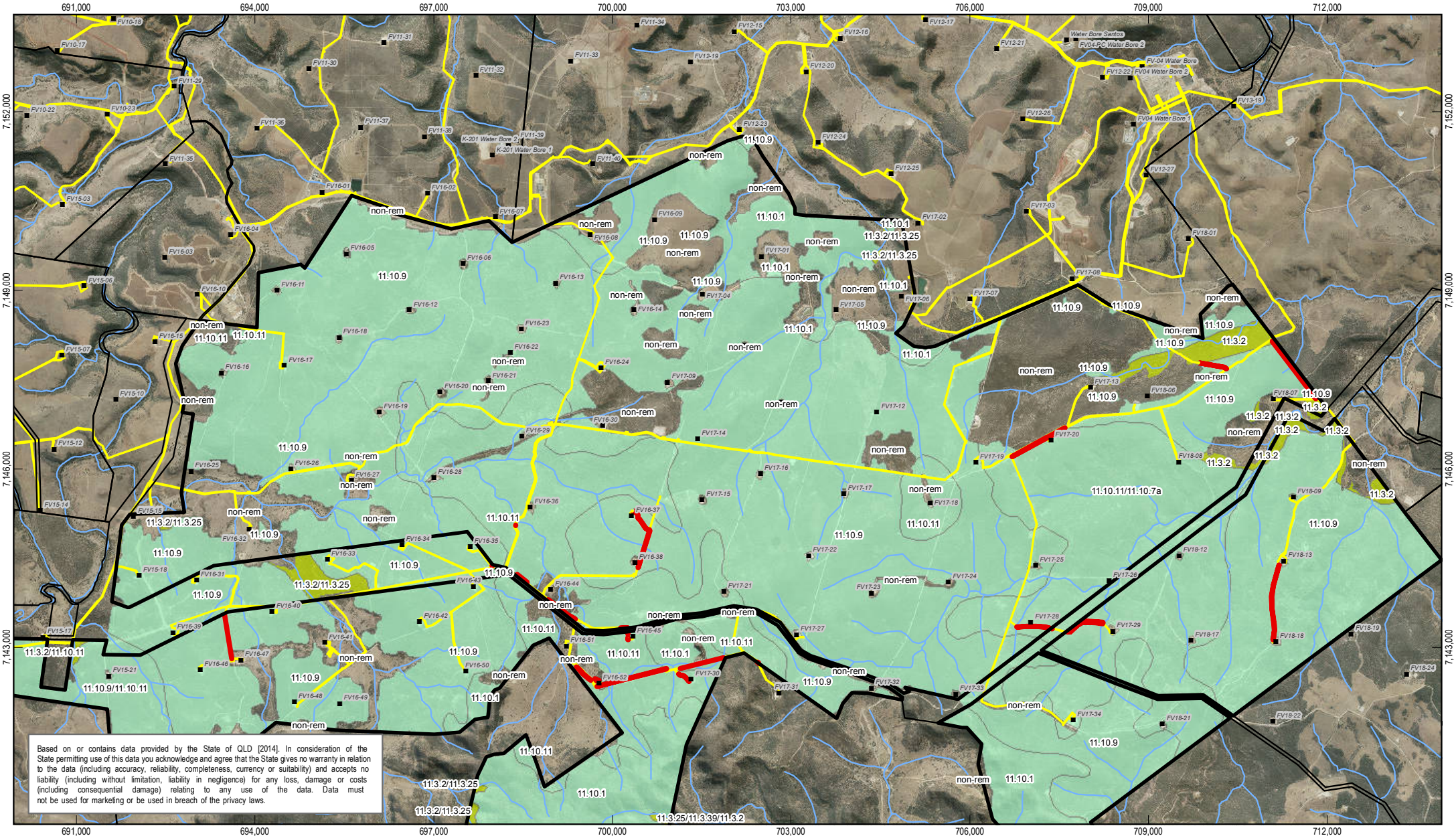
A total of two REs were observed within the Lot 55 during field surveys. A large proportion of the Lot was found to contain mixed Eucalypt woodland comprising Least Concern REs 11.10.9 and 11.10.11. No alluvial floodplain ecosystems (land zone 3) previously mapped by DEHP were observed within the Lot 55.

A description of REs observed is provided below in Table 1-2 and field verified RE mapping is presented in Figure 33. The polygons represented in Figure 33 refine the present certified RE mapping across the lot by proposing more accurate mapping based on aerial photography interpretation coupled with field survey data using a method consistent with the Queensland Herbarium procedure for ground-truthing REs (Neldner *et al*., 2012).

Table 4-1 Regional ecosystem descriptions

Regional Ecosystem	Biodiversity Status	REDD Description	Comments
11.3.2	Of Concern	*Eucalyptus populnea* woodland to open-woodland. *E. melanophloia* may be present and locally dominant. Occurs on Cainozoic alluvial plains with variable soil types including texture contrast, deep uniform clays, massive earths and sometimes cracking clays.	Mapped as occurring within Lot 55 by DEHP certified mapping (version 7.1) but not observed during field surveys.
11.3.25	Of Concern	*Eucalyptus camaldulensis* or *E. tereticornis* open-forest to woodland. Other tree species such as *Casuarina cunninghamiana*, *E. coolabah*, *Melaleuca bracteata*, *Melaleuca viminalis*, *Livistona* spp. (in north), *Melaleuca* spp. and *Angophora floribunda* are commonly present and may be locally dominant. Occurs on fringing levees and banks of major rivers and drainage lines of alluvial plains throughout the region. Soils are very deep, alluvial, grey and brown cracking clays with or without some texture contrast. These are usually moderately deep to deep, soft or firm, acid, neutral or alkaline brown sands, loams or black cracking or non-cracking clays, and may be sodic at depth	Mapped as occurring within Lot 55 by DEHP certified mapping (version 7.1) but not observed during field surveys.
11.10.7a	No Concern at Present	*Eucalyptus crebra* +/- *Callitris glaucophylla* +/- *Angophora leiocarpa* +/- *Eucalyptus* spp. woodland. *Eucalyptus crebra* predominates and forms a distinct but discontinuous canopy (16-20 m high). In places, *Angophora leiocarpa* forms part of the canopy. The low tree layer (12-16 m high) is dominated by *Callitris glaucophylla*. Scattered tall and low shrubs may be present. Occurs on the lower slopes of scarp retreats, associated with dissected tablelands. Occurs on the lower slopes of scarp retreats, associated with dissected tablelands. Associated soils are generally moderately deep, acidic, sandy, yellow earths and sandy-surfaced texture contrast soils formed from medium to coarse-grained sediments	Mapped but not surveyed within Lot 55.
11.10.9	No Concern at Present	*Callitris glaucophylla* woodland to open-forest often associated with *Eucalyptus melanophloia* in the tree canopy and a sparse ground layer. Various other tree species may be present including *Corymbia* clarksoniana, *Eucalyptus populnea*, *C. tessellaris*, *E. chloroclada* and *Angophora leiocarpa* which may form mono-specific open-woodland in places. Occurs on deep uniform sandy and deep texture contrast soils on coarse grained sediments.	Mapped as occurring within Lot 55 by DEHP certified mapping (version 7.1) and confirmed present during field surveys.

Regional Ecosystem	Biodiversity Status	REDD Description	Comments
11.10.11	No Concern at Present	*Eucalyptus populnea* predominates forming a discontinuous canopy (13-18 m high). *E.* melanophloia is often present in the canopy, and occasionally *E. chloroclada* trees occur. *Eucalyptus moluccana* or *E. microcarpa* may dominate localised areas. *Callitris glaucophylla* forms a lower tree layer (10-13 m high) of varying density. *Allocasuarina luehmannii* is prominent in this layer in places. Occurs on undulating to rolling hills. The soils are predominantly deep texture contrast soils with sandy surface horizons (up to 70 cm deep), over strongly alkaline, yellow clayey subsoils.	Mapped as occurring within Lot 55 by DEHP certified mapping (version 7.1) and confirmed present during field surveys.



1:85,000 (@ A4)

0 1 2 3

Kilometers

Map Projection: Universal Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

LEGEND

- Well Pad
- Watercourse
- Fairview Lot 55 FTY1153
- Cadastre
- Vegetation Management Area
- Clearing Limit

Regional Ecosystem v7 (Biodiversity)

- Of Concern dominant
- Not of Concern

GHD

Santos GLNG Project

Santos GLNG
Lot 55 Fairview Ecological Assessment

Job Number 41-27125
Revision 0
Date 07 Feb 2014

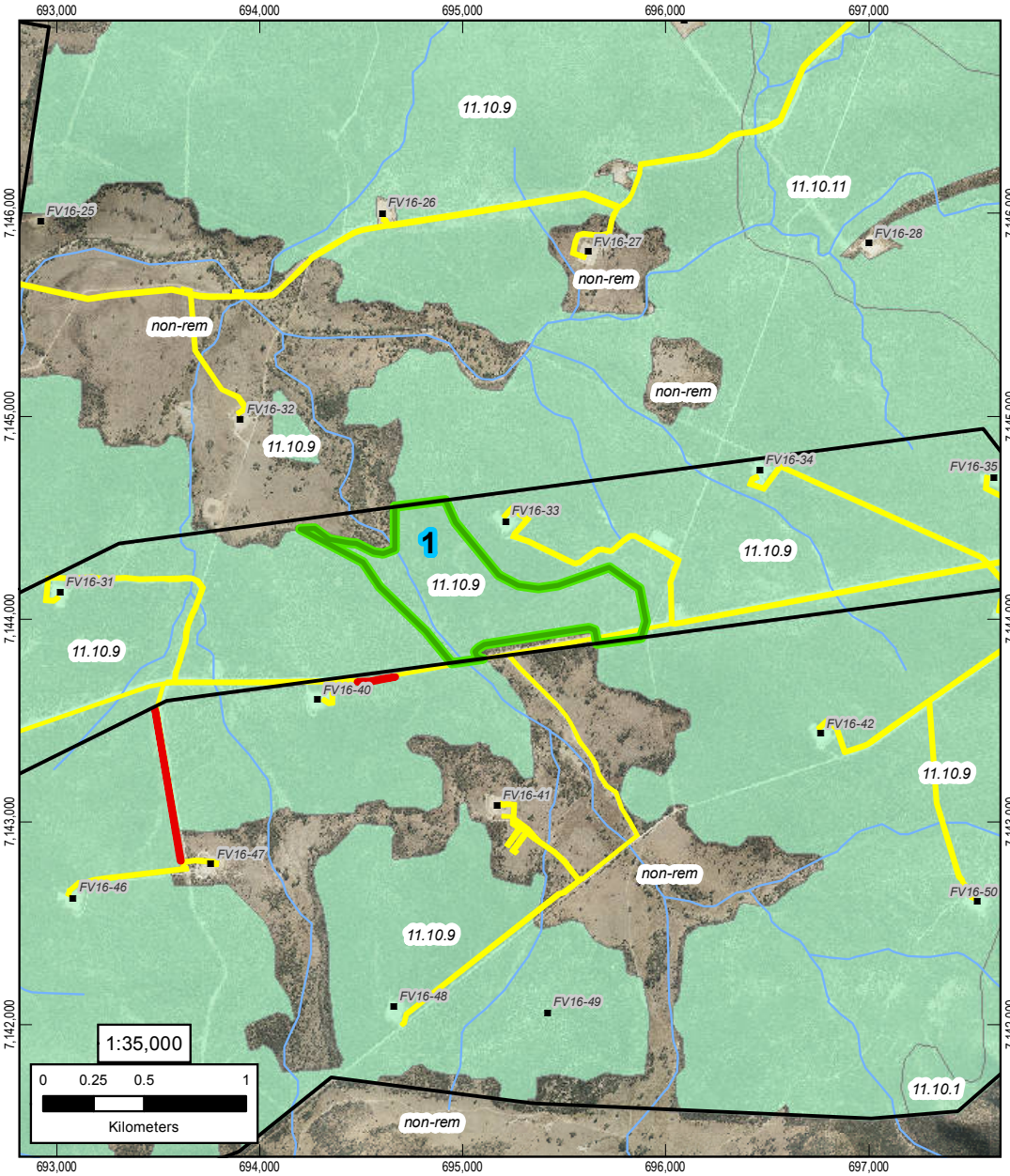
DEHP Certified Regional Ecosystem Mapping (v7)

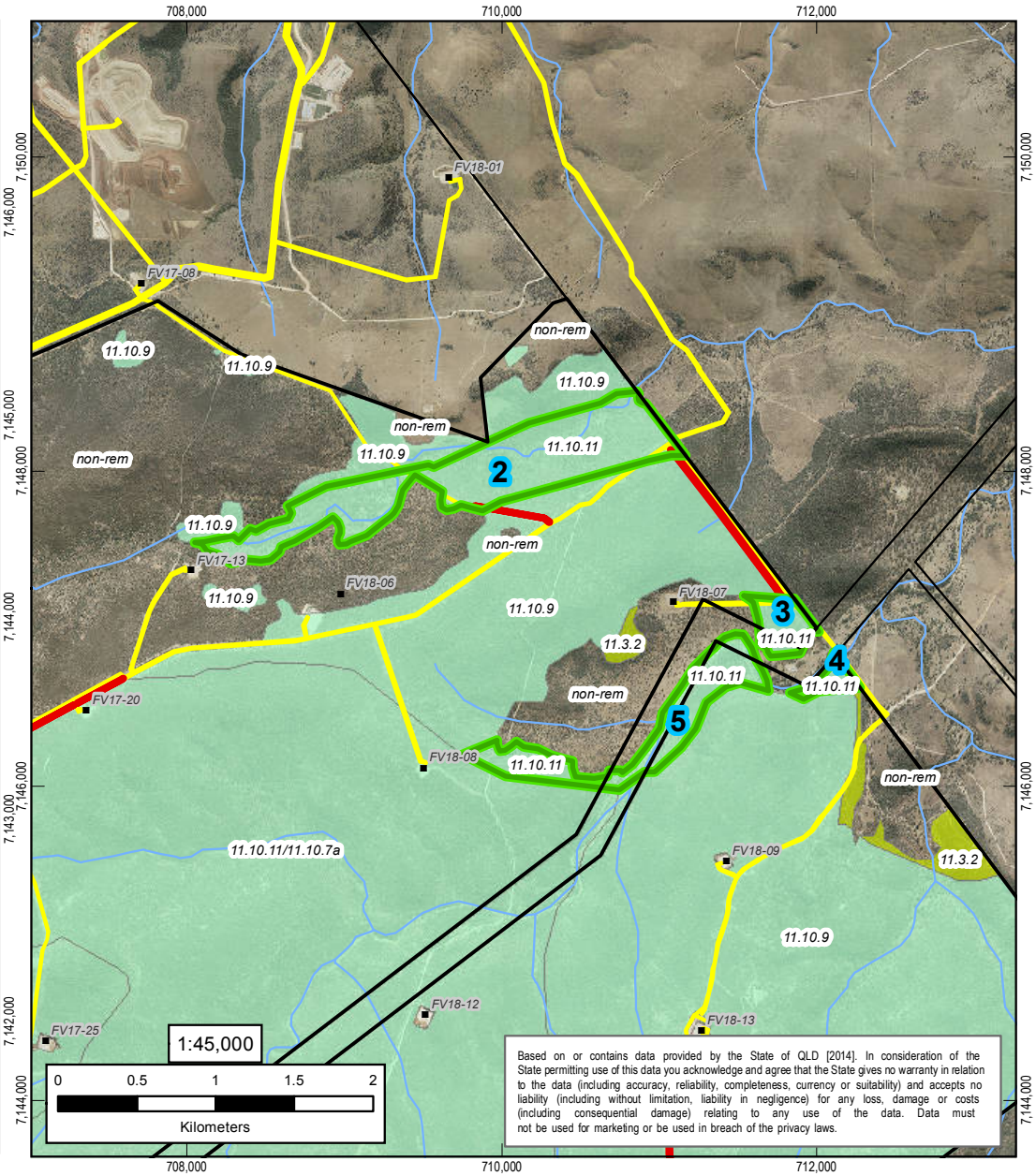
Figure 32

G:\41\27125\GIS\Fairview 2\GIS\MAPS\MXD\41_27125_032_LOT55FAIRVIEW_CertifiedRE_Rev0.mxd

145 Ann St Brisbane QLD 4000 Australia T 61 7 3316 3000 F 61 7 3316 3333 E bnemail@ghd.com W www.ghd.com

Data source: Santos: Well Pad, Remnant Vegetation v7, Cadastre, Vegetation Management Area, Clearing Limit, Imagery/Supplied October 2013; DNRM: Ordered Drainage/2010; ESRI: Hillshade/2008. Created by: AF





Map Projection: Universal Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

LEGEND

- Well Pad
- Watercourse
- Fairview Lot 55 FTY1153
- Cadastre
- Vegetation Management Area
- Clearing Limit
- Field Validated Regional Ecosystem Boundary (Edited)
- Certified Regional Ecosystem v7 Boundary

Field Validated Regional Ecosystem (Biodiversity)

- Of Concern dominant
- Not of Concern

GHD

Santos GLNG Project

Santos GLNG
Lot 55 Fairview Ecological Assessment

Job Number	41-27125
Revision	0
Date	07 Feb 2014

Field Validated Regional Ecosystem Mapping

Figure 33

G:\41\27125\GIS\Fairview 2\GIS\MAPS\MXD\41_27125_033_LOT55FAIRVIEW_FieldValidatedRE_Rev0.mxd

145 Ann St Brisbane QLD 4000 Australia T 61 7 3316 3000 F 61 7 3316 3333 E bnemail@ghd.com W www.ghd.com

Data source: Santos: Well Pad, Cadastre, Vegetation Management Area, Clearing Limit, Remnant Vegetation v7, Imagery/Supplied October 2013; DNRM: Ordered Drainage/2010; ESRI: Hillshade/2008; GHD: Field Validated Regional Ecosystems/2014. Created by: AF

Table 1-2 Descriptions of field verified RE polygons located within Lot 55 on FTY1153

Polygon	Mapped RE	Observed RE	Community Description	Representative Photo
1	11.3.2/11.3.25	11.10.11	This polygon is located in the western extent of Lot 55. **Land zone**: Occurs on landforms derived from coarse-grained sediments with little or no deformation, including Jurassic argillaceous sublabile sandstone and quartoze sandstones, consistent with land zones 9 or 10. Landforms are derived from the Hutton Sandstone formation. **Tree layers**: Field surveys found this area to contain a polygon of open forest (10–14 m) dominated by *Callitris glaucophylla* and *Eucalyptus populnea.* Other associated tree species observed includes *E. melanophloia, E. chloroclada* and *Angophora floribunda.* **Shrub Layers**: The shrub layer was not species-diverse and was dominated by *Callitris glaucophylla* with *Allocasuarina luehmannii* occurring as the only other associated species in this layer. **Ground Layer:** The groundcover consisted primarily of native grasses (sparse to moderately dense) including *Aristida caput-medusae*, *Cymbopogon refractus* and *Enneapogon nigricans*, with *Arundinella nepalensis* and *Imperata cylindrica* dominating the banks of an ephemeral watercourse present within the polygon.	 

Polygon	Mapped RE	Observed RE	Community Description	Representative Photo
2	11.3.2	11.10.11	This polygon is located in the north-eastern extent of Lot 55. **Land zone**: Occurs on landforms derived from coarse-grained sediments with little or no deformation, including Jurassic chamositic ironstone, pelletal, or oolite cropping out as concretionary or oolitic limonite, consistent with land zones 9 or 10. Landforms are derived from the Westgrove Ironstone Member formation. **Tree layers**: Field surveys found this area to contain a woodland polygon (10–14 m) dominated by *Eucalyptus populnea.* Other associated tree species observed includes *E. melanophloia* and *Eremophila mitchellii.* **Shrub Layers**: The shrub layer was dominated by *Eremophila mitchellii*. Other shrub species included *Geijera parviflora*, *Callitris glaucophylla, Acacia leiocalyx* and *Grewia latifolia*. **Ground Layer:** The groundcover consisted primarily of native grasses (sparse to moderately dense) including *Themeda triandra*, *Chrysopogon fallax*, *Sporobolus creber*, *Cymbopogon refractus, Enteropogon refractus and Aristida* sp.	 

Polygon	Mapped RE	Observed RE	Community Description	Representative Photo
3	11.3.2	11.10.11	This polygon is located in the north-eastern extent of Lot 55. **Land zone**: Occurs on landforms derived from coarse-grained sediments with little or no deformation, including Jurassic chamositic ironstone, pelletal, or oolite cropping out as concretionary or oolitic limonite, consistent with land zones 9 or 10. Landforms are derived from the Westgrove Ironstone Member formation. **Tree layers**: Field surveys found this area to contain a woodland polygon (10–14 m) dominated by *Eucalyptus populnea.* Other associated tree species observed includes *Brachychiton populneus*, *Callitris glaucophylla* and *Atalaya hemiglauca*. **Shrub Layers**: The shrub layer was dominated by *Callitris glaucophylla* with *Eremophila mitchellii* occurring as a sub-dominant in this layer. Other shrub species included *Geijera parviflora*, *Dodonaea viscosa*, *Carissa ovata*, *Acacia decora, Acacia excelsa* subsp. *excelsa*. **Ground Layer:** The groundcover consisted primarily of native grasses (sparse to moderately dense) including *Aristida caput-medusae*, *Cymbopogon refractus* and *Eragrostis setifolia.*	 
4	11.3.2	11.10.11	Refer to **polygon 3**	
5	11.3.2	11.10.11	Refer to **polygon 3**	

References

Commonwealth Scientific and Industrial Research Organisation (CSIRO) (2010) *Australian Soil Resource Information System (ASRIS)*. Available from http://www.asris.csiro.au/mapping/viewer.htm?theme=2. Accessed 20 November 2013.

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Neldner, V.J., Wilson, B.A., Thompson, E.J. and Dillewaard, H.A. (2012) *Methodology for Survey and Mapping of Regional Ecosystems and Vegetation Communities in Queensland*. Version 3.2. Department of Science, Information Technology, Innovation and the Arts, Brisbane.

Willmott, W. (2006) Rocks and landscapes of the national parks of central Queensland. Geological Society of Australia Inc., Brisbane.

Appendix D – Fauna habitat features

Fauna habitat features locations

Habitat Feature	Habitat Feature Other	Easting	Northing	Infrastructure ID	Comments
Hollow in Tree		693517	7143324	RoW 29	Large hollow in smooth bark
Nest in Tree		693517	7143319	RoW 29	Not confirmed active. In smooth gum
Hollow Log		693495	7143312	RoW 29	Old decomposing log
Other	Stag	693507	7143377	RoW 29	Old stag with hollow branches
Hollow Log		693513	7143396	RoW 29	Old with hollow and flakey bark
Hollow Log		693508	7143390	RoW 29	Old with hollow and flakey bark plus burrow under it
Other	Stag	693500	7143442	RoW 29	Tree stump only
Hollow in Tree	Stag	693475	7143479	RoW 29	Narrow hollows in branches
Hollow Log		693477	7143488	RoW 29	Two logs, decaying
Other	Stag	693479	7143550	RoW 29	Ironbark, flakey bark
Other	Stag	693512	7143277	RoW 29	Trunk only with thick shedding bark
Other	Stag	693548	7143157	RoW 29	Trunk only with thick shedding bark
Other	Stag	693542	7143116	RoW 29	Hollow branches. Trunk with thin shedding bark
Other	Stag	693552	7143036	RoW 29	Old hollow stag
Hollow Log		693560	7143004	RoW 29	Old
Hollow in Tree		693572	7142968	RoW 29	*Eucalyptus populnea* with narrow hollow branches
Hollow in Tree		693576	7142955	RoW 29	*Eucalyptus populnea* with narrow hollow branches
Other	Stag	693577	7142943	RoW 29	Two, old, trunk only
Hollow Log		693575	7142942	RoW 29	Old log with large hollow
Hollow Log		693577	7142910	RoW 29	Two old logs with large hollows
Other	Stag	693580	7142903	RoW 29	Old stag with narrow hollow branches
Other	Stag	693608	7142794	RoW 29	Old stag with narrow hollow branches
Hollow in Tree		694517	7143688	RoW 35	Spotted gum, hollow branches
Hollow in Tree		694543	7143687	RoW 35	Spotted gum, hollow branches
Hollow in Tree	Stag	694628	7143683	RoW 35	Hollow branches
Hollow Log		694644	7143680	RoW 35	
Hollow in Tree		698534	7144154	RoW 42P	*Eucalyptus populnea* with hollow branches
Hollow in Tree		698508	7144163	RoW 42P	*Eucalyptus populnea* with hollow branches
Hollow in Tree		698499	7144165	RoW 42P	*Eucalyptus populnea* with hollow branches
Hollow in Tree		698474	7144168	RoW 42P	*Eucalyptus populnea* with hollow branches
Hollow in Tree		698451	7144190	RoW 42P	*Eucalyptus populnea* with hollow branches
Other	Stag	698435	7144195	RoW 42P	Old no bark
Other	Stag	698422	7144224	RoW 42P	Old no bark
Hollow in Tree		698558	7144109	RoW 42P	*Eucalyptus melanophloia*
Hollow in Tree		698542	7144138	RoW 42P	*Eucalyptus populnea*
Hollow in Tree		698523	7144130	RoW 42P	*Eucalyptus populnea*

Hollow in Tree		698492	7144154	RoW 42P	*Eucalyptus populnea*
Hollow in Tree		698497	7144154	RoW 42P	*Eucalyptus populnea*
Other	Stag	698497	7144157	RoW 42P	
Other	Stag	698482	7144156	RoW 42P	
Hollow Log		698475	7144162	RoW 42P	Cut from hollow tree
Hollow in Tree		698471	7144164	RoW 42P	*Eucalyptus populnea*
Hollow Log		698471	7144167	RoW 42P	
Hollow Log		698416	7144207	RoW 42P	Includes woody debris
Termite Mounds		698413	7144209	RoW 42P	Not hollow on ground
Hollow Log		700253	7143168	RoW 49	
Other	Stag	700256	7143249	RoW 49	
Hollow Log		700254	7143335	RoW 49	
Hollow Log	Stag	700244	7143166	RoW 49	
Hollow Log		700246	7143167	RoW 49	
Other	Stag	700253	7143253	RoW 49	Old Trunk only
Hollow Log		700247	7143339	RoW 49	Old log
Hollow Log		700238	7143339	RoW 49	Old log
Other	Stag	700201	7143341	RoW 49	Old Trunk only
Hollow in Tree	Stag	700160	7143341	RoW 49	*Eucalyptus populnea* with narrow hollow branches
Hollow Log		700143	7143333	RoW 49	Old log
Hollow in Tree		698917	7143803	RoW 45 a	*Eucalyptus populnea*
Hollow Log		698928	7143794	RoW 45 a	
Hollow in Tree		699011	7143729	RoW 45 a	*Eucalyptus populnea,* some hollows have been cut previously
Other	Stag	699050	7143699	RoW 45 a	
Other	Stag	699121	7143645	RoW 45 a	
Nest in Tree		699203	7143580	RoW 45 a	*Callitris glaucophylla*
Hollow Log		699410	7142636	RoW 45P	
Other	Stag	699410	7142638	RoW 45P	
Other	Stag	699489	7142573	RoW 45P	
Other	Stag	699460	7142566	RoW 45P	
Hollow Log		699499	7142528	RoW 45P	
Hollow Log		699610	7142468	RoW 45P	
Hollow Log		699664	7142475	RoW 47	
Hollow Log		699683	7142450	RoW 47	
Other	Stag	699717	7142466	RoW 47	Dead tree with peeling bark
Nest in Tree		699718	7142474	RoW 47	
Hollow Log		699750	7142444	RoW 47	Includes woody debris
Hollow Log		699774	7142463	RoW 47	
Other	Stag	699748	7142472	RoW 47	
Nest in Tree		700443	7145175	RoW 43	Finch nest in *Petalostigma pubescens* shrub
Other	Stag	700532	7145048	RoW 43	
Hollow in Tree	Stag	700531	7144629	RoW 45 b	
Hollow in Tree	Stag	700511	7144589	RoW 45 b	

Hollow Log		700492	7144517	RoW 45 b	
Other	Stag	700496	7144495	RoW 45 b	With hollows
Other	Stag	700478	7144460	RoW 45 b	With hollows
Hollow in Tree		700466	7144393	RoW 45 b	*Eucalyptus melanophloia*
Hollow in Tree		700432	7144309	RoW 45 b	*Eucalyptus melanophloia*
Hollow in Tree		700538	7144639	RoW 45 b	*Eucalyptus melanophloia*
Other	Stag	700542	7144637	RoW 45 b	With hollows
Other	Stag	700575	7144698	RoW 45 b	With hollows
Other	Stag	700569	7144714	RoW 45 b	With hollows
Other	Stag	700577	7144739	RoW 45 b	With hollows
Other	Stag	700572	7144754	RoW 45 b	With hollows
Hollow in Tree		700604	7144821	RoW 45 b	*Eucalyptus melanophloia*
Nest in Tree		701115	7142526	RoW 48 b	
Other	Stag	701102	7142531	RoW 48 b	With hollows
Nest in Tree		701108	7142521	RoW 48 b	
Nest in Tree		701174	7142513	RoW 48 b	
Other	Stag	701224	7142495	RoW 48 b	With hollows
Hollow in Tree		701241	7142477	RoW 48 b	Large hollow bearing tree, fenced off
Hollow in Tree		701246	7142462	RoW 48 b	Large hollow bearing tree
Hollow in Tree		701251	7142458	RoW 48 b	Large hollow bearing tree
Hollow in Tree		701266	7142447	RoW 48 b	*Eucalyptus populnea*
Hollow Log		701291	7142428	RoW 48 b	
Hollow in Tree		701136	7142522	RoW 48 b	With narrow hollow branches
Hollow Log		701162	7142511	RoW 48 b	Old
Other	Stag	701170	7142485	RoW 48 b	Old
Other	Stag	701187	7142486	RoW 48 b	Old, large hollows
Other	Stag	701209	7142481	RoW 48 b	Old, large hollows
Other	Stag	701228	7142462	RoW 48 b	Old
Other	Stag	701271	7142428	RoW 48 b	Old, large hollows
Other	Stag	701301	7142418	RoW 48 b	Old *Eucalyptus populnea* with large hollows
Hollow Log		700034	7142431	RoW 48 a	
Hollow in Tree		700034	7142443	RoW 48 a	
Hollow Log		700083	7142432	RoW 48 a	
Hollow Log		700080	7142435	RoW 48 a	
Other	Stag	700118	7142441	RoW 48 a	With peeling bark
Other	Stag	700196	7142481	RoW 48 a	With hollows
Hollow Log		700213	7142494	RoW 48 a	
Other	Stag	700245	7142484	RoW 48 a	
Other	Stag	700259	7142474	RoW 48 a	
Hollow Log		700325	7142494	RoW 48 a	
Other	Stag	700363	7142517	RoW 48 a	With hollows
Other	Stag	700508	7142542	RoW 48 a	With hollows
Hollow in Tree		700499	7142542	RoW 48 a	*Eucalyptus melanophloia*
Hollow in Tree		700492	7142546	RoW 48 a	*Eucalyptus populnea*

Other	Stag	700526	7142550	RoW 48 a	With hollows
Other	Stag	700549	7142568	RoW 48 a	With hollows
Hollow Log		700545	7142573	RoW 48 a	
Other	Stag	700573	7142563	RoW 48 a	With hollows
Other	Stag	700670	7142582	RoW 48 a	With hollows
Hollow Log		700708	7142589	RoW 48 a	
Hollow Log		700721	7142603	RoW 48 a	
Hollow Log		700829	7142618	RoW 48 a	
Hollow in Tree		700835	7142624	RoW 48 a	*Eucalyptus populnea*
Other	Stag	700871	7142638	RoW 48 a	Stag with hollows
Other	Stag	700911	7142636	RoW 48 a	Stag with hollows
Hollow log		700082	7142435	RoW 48 a	
Hollow log		700083	7142458	RoW 48 a	
Other	Stag	700037	7142440	RoW 48 a	Stag with hollows
Other	Ephemeral creek	700006	7142421	RoW 48 a	
Hollow in Tree	Stag	699955	7142427	RoW 48 a	Stag with hollows
Hollow in Tree		708235	7143391	RoW 4BP b	*Eucalyptus populnea*
Other	Stag	708188	7143393	RoW 4BP b	Stag with hollows
Other	Stag	708155	7143403	RoW 4BP b	Stag with hollows
Other	Stag	708152	7143406	RoW 4BP b	Stag with hollows
Hollow in Tree		708100	7143410	RoW 4BP b	*Eucalyptus populnea*
Hollow in Tree		708096	7143409	RoW 4BP b	*Eucalyptus populnea*
Hollow in Tree		708093	7143405	RoW 4BP b	*Eucalyptus populnea*
Hollow in Tree		708040	7143394	RoW 4BP b	*Eucalyptus populnea*
Hollow in Tree		707970	7143420	RoW 4BP b	*Eucalyptus populnea*
Hollow in Tree		707970	7143403	RoW 4BP b	*Eucalyptus populnea*
Hollow in Tree		707950	7143405	RoW 4BP b	*Eucalyptus populnea*
Hollow in Tree		707929	7143409	RoW 4BP b	*Eucalyptus populnea*
Hollow in Tree		707883	7143414	RoW 4BP b	*Eucalyptus populnea*
Hollow in Tree		707811	7143374	RoW 4BP b	*Eucalyptus populnea*
Termite Mounds		707805	7143369	RoW 4BP b	not hollowed out
Hollow in Tree		707754	7143314	RoW 4BP b	*Eucalyptus populnea*
Hollow in Tree		708225	7143427	RoW 4BP b	
Hollow in Tree		708224	7143435	RoW 4BP b	*Eucalyptus populnea*
Hollow in Tree		708146	7143431	RoW 4BP b	*Eucalyptus populnea*
Hollow in Tree		708084	7143455	RoW 4BP b	*Eucalyptus populnea*
Other	Stag	707985	7143456	RoW 4BP b	With hollows
Hollow in Tree		707981	7143441	RoW 4BP b	*Eucalyptus populnea*
Other	Stag	707954	7143439	RoW 4BP b	With hollows
Other	Stag	707944	7143449	RoW 4BP b	With hollows
Other	Stag	707941	7143458	RoW 4BP b	With hollows
Other	Stag	707921	7143449	RoW 4BP b	With hollows
Hollow in Tree		707911	7143452	RoW 4BP b	*Eucalyptus populnea*
Termite Mounds		707895	7143444	RoW 4BP b	

Hollow in Tree		707798	7143400	RoW 4BP b	*Eucalyptus populnea*
Hollow Log		707786	7143390	RoW 4BP b	
Hollow in Tree		707766	7143377	RoW 4BP b	*Eucalyptus populnea*
Hollow Log		707773	7143367	RoW 4BP b	
Hollow Log		707758	7143369	RoW 4BP b	
Other	Stag	707675	7143242	RoW 4BP b	With hollows
Hollow in Tree		707691	7143244	RoW 4BP b	*Eucalyptus populnea*
Other	Stag	707749	7143310	RoW 4BP b	With hollows
Hollow in Tree	Stag	707093	7143344	RoW 4BP b	*Eucalyptus populnea,* with hollows
Hollow in Tree	Stag	707144	7143342	RoW 4BP a	With hollows
Hollow in Tree	Stag	707182	7143325	RoW 4BP a	With hollows
Hollow Log		707196	7143339	RoW 4BP a	
Hollow in Tree	Stag	707203	7143345	RoW 4BP a	With hollows
Hollow in Tree	Stag	707314	7143313	RoW 4BP a	With hollows
Hollow in Tree	Stag	707324	7143313	RoW 4BP a	With hollows
Other	Stag	707059	7143357	RoW 4BP a	With hollows
Hollow in Tree		707046	7143347	RoW 4BP a	*Eucalyptus populnea*
Hollow Log		707004	7143355	RoW 4BP a	
Hollow in Tree		706966	7143354	RoW 4BP a	
Hollow in Tree		706956	7143344	RoW 4BP a	
Other	Stag	706896	7143336	RoW 4BP a	
Other	Stag	706828	7143346	RoW 4BP a	With peeling bark
Hollow Log		706816	7143346	RoW 4BP a	
Hollow in Tree		706812	7143336	RoW 4BP a	
Other	Stag	706818	7146258	RoW 28CP	With narrow hollow branches
Hollow in Tree		706808	7146258	RoW 28CP	With small narrow hollow branches
Other	Stag	706798	7146254	RoW 28CP	With narrow hollow branches
Other	Stag	706791	7146247	RoW 28CP	With narrow hollow branches
Hollow in Tree		706776	7146238	RoW 28CP	*Eucalyptus populnea* with hollow branches and flaky bark
Other	Stag	706773	7146233	RoW 28CP	With flaky bark
Hollow Log		706754	7146235	RoW 28CP	With narrow hollow
Hollow in Tree		706728	7146221	RoW 28CP	*Eucalyptus populnea* with narrow hollow branches
Hollow in Tree		706928	7146324	RoW 28CP	
Hollow in Tree		706966	7146344	RoW 28CP	
Hollow in Tree		707036	7146388	RoW 28CP	
Other	Stag	707042	7146384	RoW 28CP	With hollows
Other	Stag	707100	7146424	RoW 28CP	With hollows
Other	Stag	707202	7146461	RoW 28CP	With hollows
Hollow in Tree		707261	7146503	RoW 28CP	*Eucalyptus melanophloia*
Hollow in Tree		707330	7146538	RoW 28CP	*Eucalyptus populnea*
Hollow in Tree	Stag	707339	7146540	RoW 28CP	
Hollow in Tree	Stag	707348	7146545	RoW 28CP	
Other	Stag	707511	7146633	RoW 28CP	

Hollow in Tree		707581	7146668	RoW 28CP	*Eucalyptus populnea* with narrow hollow branches
Hollow in Tree	Stag	707475	7146600	RoW 28CP	With hollows
Hollow in Tree	Stag	707449	7146587	RoW 28CP	With hollows
Hollow in Tree		706883	7146290	RoW 28CP	
Other	Stag	706924	7146304	RoW 28CP	With hollows
Hollow Log		706927	7146308	RoW 28CP	
Other	Stag	709848	7147788	RoW 29BP	
Other	Stag	709900	7147765	RoW 29BP	
Hollow in Tree		709915	7147774	RoW 29BP	*Eucalyptus populnea*
Hollow Log		709940	7147758	RoW 29BP	
Other	Stag	710259	7147713	RoW 29BP	With hollows
Hollow in Tree		710263	7147710	RoW 29BP	*Eucalyptus populnea*
Hollow Log		711084	7148109	RoW 36B	
Hollow in Tree	Stag	711109	7148076	RoW 36B	With hollows
Hollow Log		711133	7148048	RoW 36B	
Hollow Log		711182	7147999	RoW 36B	
Hollow in Tree	Stag	711177	7147985	RoW 36B	With hollows
Hollow Log		711203	7147961	RoW 36B	
Hollow in Tree		711232	7147923	RoW 36B	*Eucalyptus populnea*
Hollow Log		711245	7147899	RoW 36B	
Hollow in Tree	Stag	711253	7147892	RoW 36B	With hollows
Hollow in Tree	Stag	711301	7147819	RoW 36B	With hollows
Hollow Log		711332	7147805	RoW 36B	
Hollow in Tree	Stag	711365	7147741	RoW 36B	With hollows
Hollow in Tree	Stag	711381	7147749	RoW 36B	With hollows
Hollow in Tree	Stag	711372	7147738	RoW 36B	With hollows
Hollow Log		711375	7147735	RoW 36B	
Hollow in Tree		711380	7147725	RoW 36B	
Other	Ephemeral creek	711418	7147681	RoW 36B	
Hollow in Tree	Stag	711449	7147629	RoW 36B	With hollows
Hollow in Tree	Stag	711470	7147615	RoW 36B	With hollows
Hollow in Tree	Stag	711483	7147602	RoW 36B	With hollows
Hollow in Tree	Stag	711496	7147584	RoW 36B	With hollows
Hollow in Tree	Stag	711503	7147554	RoW 36B	With hollows
Hollow in Tree	Stag	711529	7147537	RoW 36B	With hollows
Hollow in Tree		711551	7147507	RoW 36B	Spotted gum
Hollow Log		711604	7147444	RoW 36B	
Termite Mounds		711606	7147434	RoW 36B	
Hollow in Tree		711638	7147387	RoW 36B	*Eucalyptus populnea*
Hollow in Tree	Stag	711664	7147361	RoW 36B	With hollows
Hollow in Tree	Stag	711675	7147337	RoW 36B	With hollows
Hollow in Tree		711682	7147329	RoW 36B	*Eucalyptus populnea*
Hollow Log		711692	7147330	RoW 36B	

Hollow in Tree		711714	7147272	RoW 36B	
Hollow Log		711733	7147246	RoW 36B	
Hollow in Tree	Stag	711757	7147227	RoW 36B	With hollows
Hollow Log		711768	7147212	RoW 36B	
Hollow Log		711783	7147200	RoW 36B	
Hollow Log		711123	7144119	RoW 35BP	
Hollow in Tree	Stag	711119	7144048	RoW 35BP	With hollows
Hollow in Tree	Stag	711103	7143900	RoW 35BP	With hollows
Hollow in Tree	Stag	711050	7143646	RoW 35BP	With hollows
Hollow in Tree		711082	7143414	RoW 35BP	*Eucalyptus populnea*
Hollow in Tree	Stag	711121	7143355	RoW 35BP	With hollows
Hollow in Tree		711133	7143375	RoW 35BP	*Eucalyptus populnea*
Hollow in Tree	Stag	711137	7143362	RoW 35BP	With hollows
Hollow in Tree	Stag	711124	7143305	RoW 35BP	With hollows
Hollow in Tree		711131	7143301	RoW 35BP	*Eucalyptus melanophloia*

Appendix E – Threatened species survey results

Targeted threatened species survey effort

During the December 2013 field surveys of Lot 55, threatened species searches were undertaken targeting the 24 threatened fauna species listed under the EPBC Act or NC Act with potential to occur. Additionally, four listed threatened flora species identified as having the potential to occur were targeted during surveys of Lot 55. Survey methods undertaken were appropriate for each species as identified within relevant species survey guidelines published by DOE and/or DEHP. These methods are listed in Appendix A. Table 1-3 outlines the survey effort undertaken for each targeted method employed during field surveys.

Table 1-3 Survey effort

Survey method/technique	Survey effort
Active search, bird surveys, targeted fauna surveys	25 person hours
Spotlighting (walking and driving transects)	16 person hours
Call playback	0.75 person hours
Attended anabat survey - walking transects	4 person hours
Unattended anabat survey - overnight	2 nights

Lot 55 threatened species field survey results

Field surveys undertaken in Lot 55 during December 2013 recorded the following species, which are protected under the EPBC Act and/or NC Act:

- Little pied bat – not listed EPBC Act, near threatened NC Act
- Rainbow bee-eater – migratory (JAMBA) EPBC Act, special least concern NC Act
- Satin flycatcher - marine/migratory (Bonn) EPBC Act; special least concern NC Act

Echolocation calls from *Nyctophilus sp.* (potentially *N. corbeni,* south-eastern long-eared bat) were also identified from anabat data recorded during field surveys. The echolocation call of the south-eastern long-eared bat is unable to be differentiated from calls of other species within the *Nyctophilus* genus. The south-eastern long-eared bat may be present within Lot 55. Threatened fauna species recorded from field surveys are detailed in Table 1-4.

No threatened flora species were recorded during field surveys. A likelihood of occurrence assessment for threatened flora species identified during the desktop assessment process is presented in Table 4-5.

Table 1-4 Threatened fauna species records

Species name	Location (easting, northing)		Date, Time	Number	Activity	Habitat type
	Easting	Northing				
Rainbow bee-eater	700392	7145164	13/12/2013 8:49 am	4	Seen in flight and perching	Callitris woodland with emergent eucalypts
Rainbow bee-eater	698450	7144512	11/12/2013 8:04 am	1	Calls heard	Callitris woodland with emergent eucalypts
Rainbow bee-eater	694582	7143678	10/12/2013 01:06 pm	1	Calls heard	Callitris woodland with emergent eucalypts
Satin flycatcher	693402	7143219	10/12/2013 9:23 am	3	Seen in flight and perching	Callitris woodland with emergent eucalypts
Little pied bat	693568	74209048	10/12/2013 No time data	Multiple	Echolocation calls recorded on anabat device at RoW 29P	Callitris woodland with emergent eucalypts
Little pied bat	693848	7143730	10/12/2013 No time data	Multiple	Echolocation calls recorded on anabat device at farm dam 750 m from RoW 35	Farm dam
Little pied bat	708268	7143360	13/12/2013 No time data	Multiple	Echolocation calls recorded on anabat device at RoW 4BP	Eucalypt woodland
Little pied bat	706844	7146288	14/12/2013 No time data	Multiple	Echolocation calls recorded on anabat device at RoW 28CP	Callitris and eucalypt woodland
Nyctophilus sp. (potential for *N. corbeni*)	693848	7143730	10/12/2013 No time data	Multiple	Echolocation calls recorded on anabat device at RoW 35	Farm dam
Nyctophilus sp. (potential for *N. corbeni*)	708268	7143360	13/12/2013 No time data	Multiple	Echolocation calls recorded on anabat device at RoW 4BP	Eucalypt woodland

Table 4-5 Threatened flora likelihood of occurrence assessment

Species	EPBC Act/NC Act status	Records*	Habitat requirements	Habitat available on Lot 55 and likelihood of occurrence	
				Eucalypt woodland	Callitris glaucophylla open-forest
Cadellia pentastylis ooline	vulnerable/ vulnerable	PMST	Occurs in a range of vegetation types including semi-evergreen vine thicket, brigalow-belah, poplar box and bendee communities. Often occurs on the edges of sandstone and basalt escarpments.	No suitable habitat was observed within and directly adjacent to the infrastructure on Lot 55 **Unlikely to occur**	
Sannantha brachypoda	not listed/near threatened	WO	Known from a few sites on sandstone gullies or on the sandy alluvials adjacent to sandstone ridges.	REs 11.10.7, 11.10.9 and 11.10.11 provide woodland habitat formed on sandstone with sandy soils.	REs 11.10.9 provide open forest habitat formed on sandstone with sandy soils.
Tylophora linearis	not listed/near threatened	WO/ PMST	Grows in dry scrub and open-forest. Found in low-altitude sedimentary flats in dry woodlands of Eucalyptus fibrosa, E. sideroxylon, E. albens, Callitris glaucophylla and Allocasuarina luehmannii.	The majority of Lot 55 is mapped as containing these REs, and this large area of the Lot is considered to provide suitable habitat to a range of EVNT species. Suitable woodland habitat extends across the gently to rolling hills across the study area.	A large portion of Lot 55 is mapped as containing RE 11.10.9, and this large area of the Lot is considered to provide suitable habitat to a range of EVNT species. Suitable woodland habitat extends across the gently to rolling hills across the study area.
Wahlenbergia islensis	not listed/near threatened	WO/H	Found among crevices on or near vertical rock faces of sandstone cliffs, gorges and large boulders within woodlands dominated by ironbarks, spotted gum, inland white mahogany, budgeroo, thready she oak, cypress pine, smooth bark apple and bloodwoods. It is occasionally on boulders with sunny positions among semi-evergreen vine thicket.	Many of these listed species are found in association with species that have been recorded during surveys within Lot 55, including, cypress pine, bulloak and smooth-bark apple. Suitable habitat availability on Lot 55. **Potential to occur**	Many of these listed species are found in association with species that have been recorded during surveys within Lot 55, including, cypress pine, bulloak and smooth-bark apple. Suitable habitat availability on Lot 55. **Potential to occur**

*Desktop search sources: WO, Wildlife Online; H, Herbrecs; PMST, Protected Matters Search Tool; EH, essential habitat and species location occurs for the species within the search area

[1]Likelihood of occurrence criteria:

Confirmed present – species was recorded during field surveys of Lot 55 undertaken in December 2013

Potential to occur – suitable habitat requirements are present within Lot 55, even if the species has not been recorded from field surveys

Unlikely to occur – habitat requirements for the species are not present within Lot 55

Appendix F – Flora and fauna species list

Flora survey results

Family	Scientific name	Common name	NC Act status	EPBC Act status	LP Act status	Survey sites
Acanthaceae	*Rostellularia adscendens* var. *hispida*	pink tongues	LC			Q6
Adiantaceae	*Cheilanthes sieberi* subsp. *sieberi*	rock fern	LC			Q9, Q10, Q11, Q12, Q15, Q16, Q20, VC3, VC4
Allocasuarinaceae	*Allocasuarina luehmannii*	buloak	LC			Q1, Q3, Q4, Q5, Q6, Q7, Q9, Q10, Q12, Q13, Q14, Q15, Q16, VC1, VC2, VC3, VC4
Apocynaceae	*Alstonia constricta*	bitter bark	LC			Q11
Apocynaceae	*Carissa ovata*	currant bush	LC			Q11, Q14. Q15, Q18, Q20
Apocynaceae	*Parsonsia eucalyptophylla*	monkey vine	LC			Q17, Q20, VC5
Asteraceae	*Calotis cuneifolia*	purple burr-daisy	LC			Q1
Asteraceae	*Cassinia laevis*	wild rosemary	LC			Q2
Asteraceae	*Chrysocephalum apiculatum*	billy buttons	LC			Q2, Q4, Q5, Q6, VC1
Bignoniaceae	*Pandorea pandorana*	wonga wonga vine	LC			Q20
Cactaceae	*Opuntia aurantiaca*	tiger pear	I		Class 2	Q5
Cactaceae	*Opuntia stricta*	prickly pear	I		Class 2	Q9, Q11, Q13, Q20
Cactaceae	*Opuntia tomentosa*	velvety tree pear	I		Class 2	Q1, Q2, Q3, Q4, Q6, Q7, Q10, Q11, Q12, Q13, Q14, Q15, Q16, Q17, Q18, Q19, VC2, VC3, VC4, VC5
Campanulaceae	*Wahlenbergia queenslandica*	blue bells	LC			Q1
Capparaceae	*Capparis lasiantha*	wait-a-while	LC			Q18
Chenopodiaceae	*Einadia hastata*	berry saltbush	LC			Q1
Chenopodiaceae	*Maireana microphylla*	cotton bush	LC			Q1, Q2, Q14
Commelinaceae	*Commelina diffusa*	wandering jew	LC			Q20
Commelinaceae	*Murdannia graminea*	grass lily	LC			Q1, Q3, Q4
Convolvulaceae	*Evolvulus alsinoides*	tropical speedwell	LC			Q6

Family	Scientific name	Common name	NC Act status	EPBC Act status	LP Act status	Survey sites
Cupressaceae	*Callitris glaucophylla*	white cypress pine	LC			Q1, Q2, Q3, Q4, Q5, Q6, Q7, Q8, Q9, Q10, Q11, Q12, Q13, Q14, Q15, Q16, Q17, Q18, Q19, Q20, VC1, VC2, VC3, VC4, VC5
Cyperaceae	*Cyperus gracilis*	slender sedge	LC			Q9
Cyperaceae	*Fimbristylis dichotoma*	common finger rush	LC			Q7, Q10, Q12, Q13, Q13, VC2, VC3, VC4
Cyperaceae	*Fimbristylis nuda*	finger rush	LC			Q9
Fabaceae	*Rhynchosia minima*	rhynchosia	LC			Q1, Q2
Goodeniaceae	*Goodenia glabra*	goodenia	LC			Q1
Hemerocallidaceae	*Dianella caerulea*	flax lily	LC			Q4, Q15
Juncaceae	*Juncus usitatus*	common rush	LC			Q1, Q3, Q7, VC2
Lamiaceae	*Plectranthus parviflorus*	cockspur flower	LC			Q20
Laxmanniaceae	*Laxmannia gracilis*	slender wire lily	LC			Q1, Q2, Q3, Q4, Q9, Q10, VC3
Laxmanniaceae	*Lomandra filiformis*	wattle mat rush	LC			Q1, Q4
Laxmanniaceae	*Lomandra leucocephala*	wooly mat rush	LC			Q10, Q12, Q15, VC3, VC4
Malvaceae	*Abutilon fraseri*	dwarf lantern flower	LC			Q5, Q9, VC1
Meliaceae	*Owenia acidula*	emu berry	LC			Q14
Mimosaceae	*Acacia decora*	pretty wattle	LC			Q6, Q11, Q18
Mimosaceae	*Acacia excelsa* subsp. *excelsa*	ironwood	LC			Q11, Q13, Q14, Q15, Q18, Q19
Mimosaceae	*Acacia leiocalyx*	early black wattle	LC			Q1, Q4, Q6, Q9, Q10, Q11, Q12, Q16, Q17, Q19, VC3, VC4, VC5
Mimosaceae	*Acacia longispicata*		LC			Q20
Mimosaceae	*Acacia salicina*	sally wattle	LC			Q12, VC4
Myoporaceae	*Eremophila debilis*	winter apple	LC			Q3, Q4, Q5, Q14, VC1
Myoporaceae	*Eremophila mitchellii*	false sandalwood	LC			Q1, Q6, Q11, Q12, Q13, Q14, Q15, Q17, Q18, Q19, VC4, VC5
Myrtaceae	*Angophora floribunda*	rough-barked apple	LC			Q3
Myrtaceae	*Angophora leiocarpa*	smooth apple gum	LC			Q1

Family	Scientific name	Common name	NC Act status	EPBC Act status	LP Act status	Survey sites
Myrtaceae	*Corymbia tessellaris*	Moreton Bay ash	LC			Q19
Myrtaceae	*Corymbia trachyphloia*	brown bloodwood	LC			Q6, Q16, Q20
Myrtaceae	*Eucalyptus chloroclada*	Baradine gum	LC			Q3, Q4, Q7, Q8, Q9, Q20, VC2
Myrtaceae	*Eucalyptus melanophloia*	silver-leaved ironbark	LC			Q1, Q2, Q3, Q4, Q5, Q6, Q7, Q8, Q9, Q10, Q12, Q13, Q16, Q17, Q18, VC1, VC2, VC4, VC5
Myrtaceae	*Eucalyptus populnea*	poplar box	LC			Q1, Q3, Q4, Q5, Q6, Q7, Q8, Q10, Q11, Q12, Q13, Q14, Q15, Q16, Q17, Q18, Q19, VC1, VC2, VC3, VC4, VC5
Orchidaceae	*Cymbidium canaliculatum*	black orchid	Type A			Q4, Q12, Q19, VC4
Picrodendraceae	*Petalostigma pubescens*	quinine berry bush	LC			Q7, Q9, Q13, Q15, Q16, Q19, Q20, VC2
Poaceae	*Alloteropsis semialata*	cockatoo grass	LC			Q4, Q9, Q11
Poaceae	*Ancistrachne uncinulata*	hooky grass	LC			Q1, Q2
Poaceae	*Aristida calycina*	dark wiregrass	LC			Q1, Q4, Q5, Q9, Q10, Q11, Q15, Q16, VC1
Poaceae	*Aristida caput-medusae*	many-headed wiregrass	LC			Q1, Q3, Q5, Q9, Q11, Q13, Q14, Q15, Q16, Q18, VC1
Poaceae	*Aristida holathera*	erect kerosene grass	LC			Q1
Poaceae	*Aristida lignosa*		LC			Q1, Q7, VC2
Poaceae	*Aristida psammophila*		LC			Q3, Q12, Q20
Poaceae	*Aristida ramosa*	purple wiregrass	LC			Q2
Poaceae	*Aristida sp.*	wiregrass	LC			Q17, VC5
Poaceae	*Arundinella nepalensis*	reed grass	LC			Q3, Q20
Poaceae	*Bothriochloa decipiens* var. *decipiens*	pitted bluegrass	LC			Q13, Q17, VC5
Poaceae	*Cenchrus ciliaris*	buffel grass	I			Q1, Q2, Q4, Q5, Q6, Q8, Q10, Q11, Q12, Q14, Q17, Q18, Q19, Q20, VC1, VC3, VC5
Poaceae	*Chloris divaricata*	slender chloris	LC			Q9, Q13

Family	Scientific name	Common name	NC Act status	EPBC Act status	LP Act status	Survey sites
Poaceae	*Chrysopogon fallax*	golden beard	LC			Q4, Q7, Q9, Q12, Q14, Q16, Q17, Q20, VC2, VC4, VC5
Poaceae	*Cymbopogon refractus*	barbed wire grass	LC			Q1, Q2, Q3, Q4, Q5, Q6, Q7, Q8, Q9, Q11, Q12, Q13, Q14, Q17, Q18, Q19, Q20, VC1, VC2, VC4, VC5
Poaceae	*Enneapogon nigricans*	bottle washers	LC			Q3, Q9, Q16, Q19
Poaceae	*Enteropogon ramosus*	twirly windmill grass	LC			Q14, Q17, Q19, VC5
Poaceae	*Eragrostis elongata*	clustered lovegrass	LC			Q4
Poaceae	*Eragrostis leptostachya*	paddock lovegrass	LC			Q7, VC2
Poaceae	*Eragrostis setifolia*	bristly lovegrass	LC			Q8, Q10, Q12, Q18, Q20, VC4
Poaceae	*Eragrostis sororia*	woodland lovegrass	LC			Q5, Q6, Q7, Q8, Q10, VC1, VC2, VC3
Poaceae	*Heteropogon contortus*	black spear grass	LC			Q6, Q7, Q8, Q13, VC2
Poaceae	*Imperata cylindrica*	blady grass	LC			Q3
Poaceae	*Melinis repens*	red natal grass	I			Q7, VC2
Poaceae	*Sporobolus creber*	Western rat's tail grass	LC			Q7, Q11, VC2
Poaceae	*Themeda triandra*	kangaroo grass	LC			Q5, Q11, Q12, Q13, Q17, VC4, VC5
Portulacaceae	*Calandrinia balonensis*	Parakeelya	LC			Q1
Portulacaceae	*Portulaca australis*		LC			Q1, Q8, Q14, Q16
Proteaceae	*Grevillea striata*	beefwood	LC			Q6, Q11, Q13, Q15, Q19
Proteaceae	*Hakea lorea*	bootlace oak	LC			Q11, Q20
Rhamnaceae	*Alphitonia excelsa*	red ash	LC			Q20
Rubiaceae	*Spermacoce multicaulis*		LC			Q5
Rutaceae	*Geijera parviflora*	wilga	LC			Q15, Q17, Q18, Q19, VC5
Sapindaceae	*Atalaya hemiglauca*	cattle bush	LC			Q14, Q18
Sapindaceae	*Dodonaea heteromorpha*	hopbush	LC			Q17, VC5
Sapindaceae	*Dodonaea viscosa* subsp. *spatulata*	sticky hopbush	LC			Q6, Q11, Q12, Q15, Q17, Q18, VC4, VC5
Sparrmanniaceae	*Grewia latifolia*	dog's balls	LC			Q17, VC5

Family	Scientific name	Common name	NC Act status	EPBC Act status	LP Act status	Survey sites
Sterculiaceae	*Brachychiton populneus*	kurrajong	Type A			Q9, Q12, Q18, Q19, VC4
Verbenaceae	*Verbena aristigera*	Mayne's pest	I			Q1, Q3, Q5, Q6, VC1

Fauna survey results

Group	Scientific name	Common name	EPBC Act status	NC Act status	Survey Site
Amphibians	*Limnodynastes terraereginae*	scarlet-sided pobblebonk	-	Least concern	RoW 29
Amphibians	*Litoria caerulea*	green tree frog	-	Least concern	RoW 29, 36BP, 43, spotlighting - RoW 4BP, 28CP
Amphibians	*Litoria inermis*	bumpy rocket frog	-	Least concern	RoW 35
Amphibians	*Litoria nasuta*	striped rocket frog	-	Least concern	RoW 35, 36BP
Amphibians	*Litoria rubella*	desert tree frog	-	Least concern	RoW 45 a, 35, 45
Amphibians	*Platyplectrum ornatum*	ornate burrowing frog	-	Least concern	RoW 29, 45 b, 48 b, spotlighting - RoW 4BP
Amphibians	*Rhinella marina*	cane toad	-	Introduced	RoW 29, 36B, 48, spotlighting - RoW 29, 35, 28CP
Birds	*Acanthiza chrysorrhoa*	yellow-rumped Thornbill	-	Least concern	42P
Birds	*Acanthiza nana*	yellow thornbill	-	Least concern	RoW 45 b
Birds	*Acanthiza reguloides*	buff-rumped thornbill	-	Least concern	RoW 28CP, 29, 35, 35 of concern RE, 42P, 43, 45 b, 35BP, 29BP
Birds	*Aegotheles cristatus*	Australian owlet-nightjar	-	Least concern	RoW 36BP, 48 b, spotlighting - RoW 4BP, 28CP
Birds	*Aprosmictus erythropterus*	red winged parrot	-	Least concern	45 b
Birds	*Chalcites basalis*	Horsfield's bronze-cuckoo	Marine	Least concern	RoW 43, 45 b
Birds	*Chalcites lucidus*	shining bronze-cuckoo	Marine	Least concern	RoW 29, 43, 45 b, 48 b
Birds	*Chthonicola sagittata*	speckled warbler	-	Least concern	RoW 35 of concern RE
Birds	*Colluricincla harmonica*	grey shrike-thrush	-	Least concern	RoW 28CP, 29, 29BP, 35, 42P, 43, 45 a, 45 b, 48 a, 48 b, 36B
Birds	*Coracina novaehollandiae*	black-faced cuckoo-shrike	-	Least concern	RoW 28CP, 45 b, 42P
Birds	*Coracina papuensis*	white-bellied cuckoo-shrike	Marine	Least concern	RoW 29
Birds	*Coracina tenuirostris*	cicadabird	Marine	Least concern	RoW 4BPA, 29, 43, 36B
Birds	*Corvus coronoides*	Australian raven	-	Least concern	RoW 4BPA, 29, 45 b, 45P, 48 b, 29BP, 36B
Birds	*Corvus orru*	Torresian crow	-	Least concern	RoW 48 b, 49, 45P, 35BP
Birds	*Cracticus nigrogularis*	pied butcherbird	-	Least concern	RoW 42P, 39/41/42, 45 a, 45P, 48 b, 4BP a, 28CP, 36B
Birds	*Cracticus tibicen*	Australian magpie	-	Least concern	RoW 4BP, 29, 28CP, 29BP
Birds	*Cracticus torquatus*	grey butcherbird	-	Least concern	RoW 28CP, 35, 39/41/42

Group	Scientific name	Common name	EPBC Act status	NC Act status	Survey Site
Birds	*Dacelo novaeguineae*	laughing kookaburra	-	Least concern	RoW 4BP, 29, 35 of concern RE, 42P, 48 a, 48 b, 36B, 29BP
Birds	*Daphoenositta chrysoptera*	varied sittella	-	Least concern	RoW 45 b
Birds	*Dicaeum hirundinaceum*	mistletoebird	-	Least concern	RoW 29, 45P
Birds	*Dicrurus bracteatus*	spangled drongo	Marine	Least concern	RoW 43, 45 b
Birds	*Entomyzon cyanotis*	blue-faced honeyeater	-	Least concern	RoW 45P
Birds	*Eopsaltria australis*	eastern yellow robin	-	Least concern	RoW 28CP, 48 a
Birds	*Eudynamys orientalis*	eastern koel	-	Least concern	RoW 45B
Birds	*Eurostopodus mystacalis*	white-throated nightjar	-	Least concern	RoW 36BP, 48 a
Birds	*Geopelia striata*	peaceful dove	-	Least concern	RoW 28CP, 35, 43, 48 a, 45P, 29, 45 a, 36B, 35BP
Birds	*Gerygone albogularis*	white-throated gerygone	-	Least concern	RoW 45 a, 42P
Birds	*Haliastur sphenurus*	whistling kite	-	Least concern	RoW 29
Birds	*Lalage sueurii*	white-winged triller	-	Least concern	RoW 43
Birds	*Lichenostomus leucotis*	white-eared honeyeater	-	Least concern	RoW 4BP a, 28CP, 29, 42P
Birds	*Lichmera indistincta*	brown honeyeater	-	Least concern	RoW 43
Birds	*Malurus melanocephalus*	red-backed fairy-wren	-	Least concern	RoW 29, 29BP, 45 a
Birds	*Manorina melanocephala*	noisy miner	-	Least concern	RoW 4BP a, 29, 29BP, 48 a, 45 a, 49, 45P, 45 b, 4BP b, 35BP, 28CP
Birds	*Melithreptus albogularis*	white-throated honeyeater	-	Least concern	RoW 28CP
Birds	*Merops ornatus*	rainbow bee-eater	Migratory, Marine	Least concern	RoW 35, 42P, 43
Birds	*Microeca fascinans*	jacky winter	-	Least concern	RoW 43, 45 b, 48 a
Birds	*Myiagra cyanoleuca*	satin flycatcher	Migratory, Marine	Least concern	RoW 29
Birds	*Myiagra inquieta*	restless flycatcher	-	Least concern	RoW 45 b, 29BP
Birds	*Myiagra rubecula*	leaden flycatcher	-	Least concern	RoW 29, 42P
Birds	*Oriolus sagittatus*	olive-backed oriole	-	Least concern	RoW 4BP, 29, 29BP, 42P, 45 a, 49, 39/41/42, 28CP
Birds	*Pachycephala rufiventris*	rufous whistler	-	Least concern	RoW 29, 29BP, 35, 35 of concern RE, 42P, 43, 48 b, 4BP a, 28CP, 36B

Group	Scientific name	Common name	EPBC Act status	NC Act status	Survey Site
Birds	*Pardalotus punctatus*	spotted pardalote	-	Least concern	RoW 29
Birds	*Pardalotus striatus*	striated pardalote	-	Least concern	RoW 4BP a, 4BP b, 29, 35 of concern RE, 45 a, 45 b, 48 b, 48 a, 29BP
Birds	*Petroica goodenovii*	red-capped robin	-	Least concern	RoW 43, 45 a, 45 b, 48 a, 35BP
Birds	*Philemon citreogularis*	little friarbird	-	Least concern	RoW 4BP a, 42P, 43, 48 a, 39/41/42, 45 b, 36B, 35BP
Birds	*Philemon corniculatus*	noisy friarbird	-	Least concern	RoW 42P, 43, 45 b, 48 b, 45 a, 45P, 48 a, 4BP, 29BP
Birds	*Platycercus adscitus*	pale-headed rosella	-	Least concern	RoW 28CP, 35, 42P, 45 a, 45 b, 45P
Birds	*Pomatostomus temporalis*	grey-crowned babbler	-	Least concern	RoW 28CP, 29, 29BP, 35, 42P, 45 a, 49, 45P, 36B
Birds	*Rhipidura albiscapa*	grey fantail	-	Least concern	RoW 29, 29BP, 35, 42P, 43, 35 of concern RE, 45 a
Birds	*Rhipidura leucophrys*	willie wagtail	-	Least concern	RoW 29, 43, 49
Birds	*Smicrornis brevirostris*	weebill	-	Least concern	RoW 4BP a, 4BP b, 28CP, 29, 29BP, 35, 35 of concern RE, 42P, 43, 45 a, 45 b, 48 a, 48 b, 49
Birds	*Strepera graculina*	pied currawong	-	Least concern	RoW 4BP a, 4BP b, 29, 42P, 43, 45 a, 45 b, 45P, 48 a, 49, 39/41/42, 28CP
Birds	*Struthidea cinerea*	apostlebird	-	Least concern	RoW 28CP, 35 of concern RE, 49, 45P
Birds	*Taeniopygia bichenovii*	double-barred finch	-	Least concern	RoW 28CP, 35, 43, 45 a, 45 b, 42P, 48 a, 29BP, 36B,
Birds	*Todiramphus macleayii*	forest kingfisher	Marine	Least concern	RoW 29, 35, 48 a
Birds	*Todiramphus pyrrhopygius*	red-backed kingfisher	-	Least concern	RoW 29BP
Birds	*Todiramphus sanctus*	sacred kingfisher	Marine	Least concern	RoW 29
Birds	*Trichoglossus haematodus*	rainbow lorikeet	-	Least concern	RoW 45 b, 45 a, 39/41/42, 48 a
Birds	*Zosterops lateralis*	silvereye	Marine	Least concern	RoW 28CP
Mammals	*Aepyprymnus rufescens*	rufous bettong	-	Least concern	Incidental
Mammals	*Austronomus australis*	white-striped freetail-bat	-	Least concern	RoW 29, 35, 4BP
Mammals	*Chaerephon jobensis*	northern freetail-bat	-	Least concern	RoW 29, 35, 4BP
Mammals	*Chalinolobus gouldii*	Gould's wattled bat	-	Least concern	RoW 29, 35, 4BP, 28CP
Mammals	*Chalinolobus picatus*	little pied bat	-	Near threatened	RoW 29, 35, 4BP, 28CP

Group	Scientific name	Common name	EPBC Act status	NC Act status	Survey Site
Mammals	*Isoodon macrourus*	northern brown bandicoot	-	Least concern	RoW 4BP a, 29BP
Mammals	*Macropus dorsalis*	black striped wallaby	-	Least concern	Spotlighting - driving, RoW 39/41/42
Mammals	*Macropus giganteus*	eastern grey kangaroo	-	Least concern	RoW 49, 4BP a, spotlighting - RoW 35, 28CP
Mammals	*Macropus rufogriseus*	red-necked wallaby	-	Least concern	RoW 29, 45 a, spotlighting RoW 4BP, 29CP
Mammals	*Mormopterus beccarii*	Beccari's freetail-bat	-	Least concern	RoW 29, 35, 4BP, 28CP
Mammals	*Mormopterus eleryi*	hairy-nosed freetail-bat	-	Least concern	RoW 29, 35, 4BP, 28CP
Mammals	*Mormopterus ridei*	eastern little free-tailed bat	-	Least concern	RoW 29, 35, 4BP
Mammals	*Mormopterus sp.*		-	-	RoW 29, 35, 28CP
Mammals	*Nyctophilus sp.*		-	-	RoW 29, 35, 4BP
Mammals	*Oryctolagus cuniculus*	rabbit	-	Introduced	RoW 4BP a, 29BP, 36BP, 45P, 48 a, 48 b, 45, 49
Mammals	*Saccolaimus flaviventris*	yellow-bellied sheath-tailed bat	-	Least concern	RoW 29, 35, 4BP, 28CP
Mammals	*Scotorepens balstoni*	inland broad-nosed bat	-	Least concern	RoW 29, 35, 4BP, 28CP
Mammals	*Scotorepens greyii*	little broad-nosed bat	-	Least concern	RoW 29, 35, 4BP, 28CP
Mammals	*Thylogale thetis*	red-necked pademelon		Least concern	RoW 36BP
Mammals	*Vespadelus baverstocki*	inland forest bat	-	Least concern	RoW 29, 35, 4BP, 28CP
Mammals	*Vespadelus troughtoni*	Eastern cave bat	-	Least concern	RoW 4BP
Reptiles	*Boiga irregularis*	brown tree snake	-	Least concern	RoW 48 b
Reptiles	*Carlia munda*	shaded-litter rainbow-skink	-	Least concern	RoW 29BP, 48 a
Reptiles	*Carlia pectoralis*	open-litter rainbow-skink	-	Least concern	RoW 4BP a, 29, 29BP, 42P, 43, 45 a, 45 b, 48 a, 48 b, 45P, 49,
Reptiles	*Carlia schmeltzii*	robust rainbow-skink	-	Least concern	48 a
Reptiles	*Ctenotus robustus*	eastern striped skink	-	Least concern	RoW 4BP b, 29BP, 28CP
Reptiles	*Ctenotus taeniolatus*	copper-tailed skink	-	Least concern	RoW 4BP a
Reptiles	*Gehyra dubia*	dubious dtella	-	Least concern	RoW 4BP a, 36BP
Reptiles	*Heteronotia binoei*	Bynoe's gecko	-	Least concern	RoW 29, 43
Reptiles	*Lerista fragilis*	eastern mulch-slider	-	Least concern	RoW 28CP, 45 b, 45P
Reptiles	*Morelia spilota*	carpet python	-	Least concern	RoW 29

Group	Scientific name	Common name	EPBC Act status	NC Act status	Survey Site
Reptiles	*Morethia boulengeri*	south-eastern morethia skink	-	Least concern	RoW 4BP b, 4BP a, 29BP, 45P
Reptiles	*Oedura rhombifer*	zigzag velvet gecko	-	Least concern	RoW 29
Reptiles	*Vermicella annulata*	bandy bandy	-	Least concern	Spotlighting - RoW 28CP

Appendix G – Field data sheets

Quaternary flora assessments

Vegetation community assessments

Fauna habitat assessments

Koala habitat assessments

Watercourse assessments

Microbat call identification report

Quaternary Site Form

Location

Site: Q1 **Recorder:** JN **Day/Date:** 10/12/2013

Project: Fairview Lot 55

Locality: RoW 29 Photos: N: 0173 E: 0172 S: 0175 W: 0174

Coordinates: Zone 55 6935137143307 **Datum:**

Vegetation structure

Median height of EDL is to be measured
Cover density is to be estimated
D = touching-overlap <0; M = touching-slight separation 0-0.25;
S = clearly separated 0.25-1; V = well separated 1-20

Stratum	Median height	Height interval	Est. cover density (D,M,S,V)
E		-	
T1	12	10-14	S
T2	10	8-10	M
T3		-	
S1	5	4-7	M
S2	2	1-3	S
G	0.6	0-0.7	M

Structural formation (including height):

Open-forest

Ecologically dominant layer: T1

Land form element[#] (40 m radius): Gently sloping

Land form pattern[#] (300 m radius): Gently undulating /

rolling hills

Soil and geology: Sandy, loamy sand. Light yellow-brown

Slope and aspect: West, 5º

Vast II

Mapped 11.10.9

Plant species

Record relative (numerical) dominance for each stratum;
d – dominant; ***c*** – codominant; ***s*** – subdominant; ***a*** – associated
* = exotic; [2] = class 2 declared weed; [3] = class 3 declared weed

Str.	Rel. dom.	Scientific Name
T1	s	*Angophora leiocarpa*
T1	d	*Callitris glaucophylla*
T1	a	*Eucalyptus populnea*
T2	a	*Eucalyptus melanophloia*
T2	d	*Callitris glaucophylla*
S1	a	*Eremophila mitchellii*
S1	a	*Allocasuarina luehmannii*
S1	d	*Callitris glaucophylla*
S1	a	*Eucalyptus melanophloia*
S2	a	*Acacia leiocalyx*
S2	d	*Callitris glaucophylla*
S2	a	*Opuntia tomentosa**
S2	a	*Maireana microphylla*
G	a	*Cymbopogon refractus*
G	a	*Ancistrachne uncinulata*
G	a	*Aristida holathera*
G	a	*Calotis cuneifolia*
G	d	*Aristida caput-medusa*
G	a	*Aristida lignosa*
G	a	*Laxmannia gracilis*
G	a	*Einadia hastata*
G	a	*Cenchrus ciliaris**
G	a	*Calandrinia balonensis*

	Str.	Rel. dom.	Scientific Name
	G	a	*Wahlenbergia queenslandica*
	G	a	*Verbena aristigera**
	G	a	*Lomandra filiformis*
	G	a	*Goodenia glabra*
	G	a	*Rhynchosia minima*
	G	a	*Murdannia graminea*
	G	a	*Juncus usitatus*
	G	a	*Portulaca australis*

Transect - crown cover measured *(transect intercept method)*

Coordinates: **Datum:** **Transect length:**

Start point Zone E 0 N

End point Zone E 0 N

Interval (metres)	Intercept	Str.	Height
-	m		
-	m		
-	m		
-	m		
-	m		
-	m		
-	m		
-	m		
-	m		
-	m		
-	m		
-	m		
-	m		
-	m		
-	m		
-	m		

Summary:

Minimum height of plants included in the transect table:	m
Intercept of EDL 0 - 50m:	m
Intercept of EDL 50 -100m:	m
Measured crown cover % of EDL 0 -100m:	%
Structural formation:	
Conclusions/notes:	

END

Quaternary Site Form

Location

Site: Q2 **Recorder:** JN **Day/Date:** 10/12/2013

Project: Fairview Lot 55

Locality: RoW 35 Photos: N: 0176 E: 0177 S: 0178 W: 0179

Coordinates: Zone 55 694499 7143678 **Datum:**

Vegetation structure

Median height of EDL is to be measured
Cover density is to be estimated
D = touching-overlap <0; M = touching-slight separation 0-0.25;
S = clearly separated 0.25-1; V = well separated 1-20

Stratum	Median height	Height interval	Est. cover density (D,M,S,V)
E		-	
T1	13	11-15	S
T2	8	7-10	M
T3		-	
S1	3	1-6	M
S2		-	
G	0.6	0-1	M

Structural formation (including height):

Open-forest

Ecologically dominant layer: T1

Land form element[#] (40 m radius): Gently sloping

Land form pattern[#] (300 m radius): Gently undulating / rolling hills

Soil and geology: Sandy, loamy sand. Light yellow-brown

Slope and aspect: West, 5º

Vast II

Mapped 11.10.9

Plant species

Record relative (numerical) dominance for each stratum;
d – dominant; ***c*** – codominant; ***s*** – subdominant; ***a*** – associated
* = exotic; [2] = class 2 declared weed; [3] = class 3 declared weed

Str.	Rel. dom.	Scientific Name
T1	c	*Angophora leiocarpa*
T1	c	*Callitris glaucophylla*
T2	a	*Eucalyptus melanophloia*
T2	d	*Callitris glaucophylla*
S1	d	*Callitris glaucophylla*
S1	a	*Angophora leiocarpa*
S1	a	*Opuntia tomentosa**
S1	a	*Cassinia laevis*
G	a	*Chrysocephalum apiculatum*
G	a	*Enneapogon nigricans*
G	a	*Maireana microphylla*
G	a	*Aristida ramosa*
G	a	*Cymbopogon refractus*
G	a	*Cenchrus ciliaris**
G	a	*Laxmannia gracilis*
G	a	*Rhynchosia minima*

Quaternary Site Form

Location

Site: Q3 **Recorder:** JN **Day/Date:** 10/12/2013

Project: Fairview Lot 55

Locality: Near RoW 35 Photos: N: 0180 E: 0181 S: 0182 W: 0183

Coordinates: Zone 55 6951321 7143955 **Datum:**

Vegetation structure

Median height of EDL is to be measured
Cover density is to be estimated
D = touching-overlap <0; M = touching-slight separation 0-0.25;
S = clearly separated 0.25-1; V = well separated 1-20

Stratum	Median height	Height interval	Est. cover density (D,M,S,V)
E		-	
T1	14	10-14	S
T2	9	7-9	M
T3		-	
S1	5	4-6	M
S2	2	1-3	S
G	0.7	0-0.8	M

Structural formation (including height):

Open-forest to woodland

Ecologically dominant layer: T1

Land form element[#] (40 m radius): Gently sloping

Land form pattern[#] (300 m radius): Gently undulating /

rolling hills

Soil and geology: Sandy, loamy sand. Light yellow-brown

Slope and aspect: South, 8º

Vast I

Incorrectly mapped as 11.3.2/11.3.25. More consistent

With 11.10.9

Plant species

Record relative (numerical) dominance for each stratum;
d – dominant; ***c*** – codominant; ***s*** – subdominant; ***a*** – associated
* = exotic; [2] = class 2 declared weed; [3] = class 3 declared weed

Str.	Rel. dom.	Scientific Name
T1	c	*Eucalyptus populnea*
T1	c	*Callitris glaucophylla*
T1	s	*Eucalyptus melanophloia*
T1	a	*Angophora floribunda*
T1	a	*Eucalyptus chloroclada*
T2	d	*Callitris glaucophylla*
T2	a	*Eucalyptus melanophloia*
T2	a	*Eucalyptus populnea*
S1	d	*Callitris glaucophylla*
S2	d	*Callitris glaucophylla*
S2	a	*Opuntia tomentosa**
S2	a	*Allocasuarina luehmannii*
G	a	*Aristida caput-medusa*
G	a	*Enneapogon nigricans*
G	a	*Cymbopogon refractus*
G	d	*Aristida psammophila*
G	a	*Imperata cylindrica*
G	a	*Arundinella nepalensis*
G	a	*Eremophila debilis*
G	a	*Laxmannia gracilis*
G	a	*Juncus usitatus*
G	a	*Verbena aristigera**
G	a	*Murdannia graminea*

Quaternary Site Form

Location

Site: Q4 **Recorder:** JN **Day/Date:** 11/12/2013

Project: Fairview Lot 55

Locality: RoW 42P Photos: N: 0188 E: 0189 S: 0190 W: 0191

Coordinates: Zone 55 6984777 7144173 **Datum:**

Vegetation structure

Median height of EDL is to be measured
Cover density is to be estimated
D = touching-overlap <0; M = touching-slight separation 0-0.25;
S = clearly separated 0.25-1; V = well separated 1-20

Stratum	Median height	Height interval	Est. cover density (D,M,S,V)
E		-	
T1	11	9-13	S
T2		-	
T3		-	
S1	7	5-8	M
S2	1.5	1-4	S
G	0.5	0-0.6	S

Structural formation (including height):

Low open-forest to woodland

Ecologically dominant layer: T1

Land form element# (40 m radius): Gently sloping

Land form pattern# (300 m radius): Gently undulating / rolling hills

Soil and geology: Sandy, loamy sand. Light brown

Slope and aspect: South, 8º

Vast II

Mapped 11.10.11

Plant species

Record relative (numerical) dominance for each stratum;
d – dominant; ***c*** – codominant; ***s*** – subdominant; ***a*** – associated
* = exotic; [2] = class 2 declared weed; [3] = class 3 declared weed

Str.	Rel. dom.	Scientific Name
T1	d	*Eucalyptus populnea*
T1	s	*Callitris glaucophylla*
T1	a	*Eucalyptus chloroclada*
T1	a	*Cymbidium canaliculatum*
S1	d	*Callitris glaucophylla*
S1	a	*Eucalyptus populnea*
S2	a	*Eucalyptus melanophloia*
S2	d	*Callitris glaucophylla*
S2	a	*Allocasuarina luehmannii*
S2	a	*Acacia leiocalyx*
S2	a	*Opuntia tomentosa**
G	a	*Aristida calycina*
G	a	*Chrysopogon fallax*
G	a	*Eremophila debilis*
G	a	*Alloteropsis semialata*
G	a	*Eragrostis elongata*
G	a	*Cymbopogon refractus*
G	a	*Murdannia graminea*
G	a	*Laxmannia gracilis*
G	a	*Lomandra filiformis*
G	a	*Cenchrus ciliaris**
G	a	*Chrysocephalum apiculatum*
G	a	*Dianella caerulea*

Quaternary Site Form

Location

Site: Q5/VC1 **Recorder:** JN **Day/Date:** 11/12/2013

Project: Fairview Lot 55

Locality: RoW 45a Photos: N: 0192 E: 0193 S: 0194 W: 0195

Coordinates: Zone 55 6990 95 7143732 **Datum:**

Vegetation structure

Median height of EDL is to be measured
Cover density is to be estimated
D = touching-overlap <0; M = touching-slight separation 0-0.25;
S = clearly separated 0.25-1; V = well separated 1-20

Stratum	Median height	Height interval	Est. cover density (D,M,S,V)
E		-	
T1	11	10-13	S
T2	7	7-9	M
T3		-	
S1	4	1-6	S
S2		-	
G	0.4	0-0.6	S

Structural formation (including height):

Low open-forest to woodland

Ecologically dominant layer: T1

Land form element# (40 m radius): Gently sloping

Land form pattern# (300 m radius): Gently undulating / rolling hills

Soil and geology: Sandy, loamy sand. Light brown

Slope and aspect: North, 5º

Vast III

Mapped High value regrowth (11.10.11)

Plant species

Record relative (numerical) dominance for each stratum;
d – dominant; ***c*** – codominant; ***s*** – subdominant; ***a*** – associated
* = exotic; [2] = class 2 declared weed; [3] = class 3 declared weed

Str.	Rel. dom.	Scientific Name
T1	d	*Eucalyptus populnea*
T1	s	*Eucalyptus melanophloia*
T2	d	*Callitris glaucophylla*
T2	s	*Eucalyptus populnea*
T2	a	*Eucalyptus melanophloia*
T2	a	*Allocasuarina luehmannii*
S1	d	*Callitris glaucophylla*
S1	A	*Allocasuarina luehmannii*
G	a	*Aristida calycina*
G	a	*Spermacoce multicaulis*
G	a	*Abutilon fraseri*
G	a	*Eremophila debilis*
G	a	*Verbena aristigera**
G	a	*Eragrostis sororia*
G	a	*Opuntia aurantiaca**
G	a	*Aristida caput-medusae*
G	a	*Themeda triandra*
G	a	*Cymbopogon refractus*
G	a	*Chrysocephalum apiculatum*
G	a	*Cenchrus ciliaris**
G	a	
G	a	
G	a	
G	a	

Quaternary Site Form

Location

Site: Q6 **Recorder:** JN **Day/Date:** 11/12/2013

Project: Fairview Lot 55

Locality: RoW 49 Photos: N: 0196 E: 0197 S: 0198 W: 0199

Coordinates: Zone 55 700258 7143171 **Datum:**

Vegetation structure

Median height of EDL is to be measured
Cover density is to be estimated
D = touching-overlap <0; M = touching-slight separation 0-0.25;
S = clearly separated 0.25-1; V = well separated 1-20

Stratum	Median height	Height interval	Est. cover density (D,M,S,V)
E		-	
T1	12	10-14	M
T2	7	7-9	M
T3		-	
S1	5	1-6	M
S2		-	
G	0.6	0-1	D

Structural formation (including height):

Low open-forest to woodland

Ecologically dominant layer: T1

Land form element[#] (40 m radius): Gently sloping

Land form pattern[#] (300 m radius): Gently undulating / rolling hills

Soil and geology: Sandy, loamy sand. Brown

Slope and aspect: West, 6º

Vast II

Mapped Regrowth 11.10.11

Plant species

Record relative (numerical) dominance for each stratum;
d – dominant; ***c*** – codominant; ***s*** – subdominant; ***a*** – associated
* = exotic; [2] = class 2 declared weed; [3] = class 3 declared weed

Str.	Rel. dom.	Scientific Name
T1	d	*Eucalyptus populnea*
T1	a	*Eucalyptus melanophloia*
T1	a	*Callitris glaucophylla*
T2	c	*Eucalyptus populnea*
T2	c	*Callitris glaucophylla*
T2	a	*Corymbia trachyphloia*
T2	a	*Eucalyptus melanophloia*
S1	d	*Callitris glaucophylla*
S1	a	*Allocasuarina luehmannii*
S1	a	*Eremophila mitchellii*
S1	a	*Acacia leiocalyx*
S1	a	*Acacia decora*
S1	a	*Opuntia tomentosa**
S1	a	*Grevillea striata*
S1	a	*Dodonaea viscosa* subsp. *spatulata*
G	a	*Rostellularia adscendens*
G	a	*Eragrostis sororia*
G	a	*Chrysocephalum apiculatum*
G	a	*Evolvulus alsinoides*
G	a	*Heteropogon contortus*
G	a	*Cymbopogon refractus*
G	a	*Cenchrus ciliaris**
G	a	*Verbena aristigera**
G	a	

Quaternary Site Form

Location

Site: Q7/VC2 **Recorder:** JN **Day/Date:** 11/12/2013

Project: Fairview Lot 55

Locality: RoW 45P Photos: N: 0200 E: 0201 S: 0202 W: 0203

Coordinates: Zone 55 | 6 9 9 5 1 2 | 7 1 4 2 6 5 2 **Datum:**

Vegetation structure

Median height of EDL is to be measured
Cover density is to be estimated
D = touching-overlap <0; M = touching-slight separation 0-0.25;
S = clearly separated 0.25-1; V = well separated 1-20

Stratum	Median height	Height interval	Est. cover density (D,M,S,V)
E		-	
T1	9	8-12	S
T2		-	
T3		-	
S1	5.5	5-7	S
S2	2	1-4	S
G	0.6	0-0.8	M

Structural formation (including height):

Non-Remnant, regrowth low open-woodland

Ecologically dominant layer: T1

Land form element[#] (40 m radius): Gently sloping

Land form pattern[#] (300 m radius): Gently undulating / rolling hills

Soil and geology: Sandy, loamy sand. Light brown

Slope and aspect: North, 5º

Vast III

Mapped non-remnant

Plant species

Record relative (numerical) dominance for each stratum;
d – dominant; ***c*** – codominant; ***s*** – subdominant; ***a*** – associated
* = exotic; [2] = class 2 declared weed; [3] = class 3 declared weed

Str.	Rel. dom.	Scientific Name
T1	d	*Eucalyptus populnea*
T1	s	*Eucalyptus melanophloia*
T1	a	*Allocasuarina luehmannii*
S1	a	*Eucalyptus chloroclada*
S1	d	*Callitris glaucophylla*
S1	a	*Allocasuarina luehmannii*
S1	a	*Eucalyptus populnea*
S2	a	*Petalostigma pubescens*
S2	a	*Allocasuarina luehmannii*
S2	a	*Opuntia tomentosa**
S2	a	*Eucalyptus populnea*
G	a	*Heteropogon contortus*
G	a	*Sporobolus creber*
G	a	*Juncus usitatus*
G	a	*Cymbopogon refractus*
G	a	*Eragrostis leptostachya*
G	a	*Melinis repens**
G	a	*Aristida lignosa*
G	a	*Eragrostis sororia*
G	a	*Chrysopogon fallax*
G	a	*Fimbristylis dichotoma*

Quaternary Site Form

Location

Site: Q8 **Recorder:** JN **Day/Date:** 11/12/2013

Project: Fairview Lot 55

Locality: RoW 47 Photos: N: 0204 E: 0205 S: 0206 W: 0207

Coordinates: Zone 55 6996996 7142471 **Datum:**

Vegetation structure

Median height of EDL is to be measured
Cover density is to be estimated
D = touching-overlap <0; M = touching-slight separation 0-0.25;
S = clearly separated 0.25-1; V = well separated 1-20

Stratum	Median height	Height interval	Est. cover density (D,M,S,V)
E		-	
T1	8	7-11	M
T2		-	
T3		-	
S1	5	1-6	M
S2		-	
G	0.5	0-0.6	M

Structural formation (including height):

Regrowth low open-forest

Ecologically dominant layer: T1

Land form element# (40 m radius): Gently sloping

Land form pattern# (300 m radius): Gently undulating / rolling hills

Soil and geology: Sandy, loamy sand. Light brown

Slope and aspect: North, 5º

Vast III

Mapped high-value regrowth (11.10.11)

Plant species

Record relative (numerical) dominance for each stratum;
d – dominant; ***c*** – codominant; ***s*** – subdominant; ***a*** – associated
* = exotic; [2] = class 2 declared weed; [3] = class 3 declared weed

Str.	Rel. dom.	Scientific Name
T1	a	*Eucalyptus populnea*
T1	a	*Eucalyptus melanophloia*
T1	d	*Callitris glaucophylla*
S1	a	*Eucalyptus chloroclada*
S1	d	*Callitris glaucophylla*
G	a	*Portulaca australis*
G	a	*Cenchrus ciliaris**
G	a	*Eragrostis setifolia*
G	a	*Heteropogon contortus*
G	a	*Cymbopogon refractus*
G	a	*Eragrostis sororia*

Quaternary Site Form

Location

Site: Q9 **Recorder:** JN **Day/Date:** 13/12/2013

Project: Fairview Lot 55

Locality: RoW 43 Photos: N: 0211 E: 0209 S: 0210 W: 0208

Coordinates: Zone 55 7004516 7145174 **Datum:**

Vegetation structure

Median height of EDL is to be measured
Cover density is to be estimated
D = touching-overlap <0; M = touching-slight separation 0-0.25;
S = clearly separated 0.25-1; V = well separated 1-20

Stratum	Median height	Height interval	Est. cover density (D,M,S,V)
E		-	
T1	11	9-13	M
T2		-	
T3		-	
S1	6	5-8	M
S2	3	1-4	S
G	0.6	0-1	M

Structural formation (including height):

Low open-forest

Ecologically dominant layer: T1

Land form element[#] (40 m radius): Gently sloping

Land form pattern[#] (300 m radius): Gently undulating / rolling hills

Soil and geology: Loamy sand. Light brown

Slope and aspect: West, <5º

Vast III

Mapped 11.10.9

Plant species

Record relative (numerical) dominance for each stratum;
d – dominant; ***c*** – codominant; ***s*** – subdominant; ***a*** – associated
* = exotic; [2] = class 2 declared weed; [3] = class 3 declared weed

Str.	Rel. dom.	Scientific Name
T1	a	*Eucalyptus chloroclada*
T1	a	*Eucalyptus melanophloia*
T1	d	*Callitris glaucophylla*
T1	a	*Brachychiton populneus*
S1	d	*Callitris glaucophylla*
S1	a	*Allocasuarina luehmannii*
S1	a	*Eucalyptus melanophloia*
S2	a	*Brachychiton populneus*
S2	a	*Allocasuarina luehmannii*
S2	a	*Acacia leiocalyx*
S2	a	*Petalostigma pubescens*
G	a	*Cyperus gracilis*
G	a	*Chrysopogon fallax*
G	a	*Opuntia stricta**
G	a	*Cheilanthes sieberi*
G	a	*Cymbopogon refractus*
G	a	*Chloris divaricate*
G	a	*Enneapogon nigricans*
G	a	*Laxmannia gracilis*
G	a	*Aristida calycina*
G	a	*Aristida caput-medusae*
G	a	*Alloteropsis semialata*
G	a	*Fimbristylis nuda*
G	a	*Abutilon fraseri*

	Str.	Rel. dom.	Scientific Name
	G	a	*Chrysocephalum apiculatum*
	G	a	*Stylidium eglandulosum*

Transect - crown cover measured *(transect intercept method)*

Coordinates: **Datum:** **Transect length:**

Start point Zone E 0 N

End point Zone E 0 N

Interval (metres)	Intercept	Str.	Height
-	m		
-	m		
-	m		
-	m		
-	m		
-	m		
-	m		
-	m		
-	m		
-	m		
-	m		
-	m		
-	m		
-	m		
-	m		
-	m		

Summary:

Minimum height of plants included in the transect table:	m
Intercept of EDL 0 - 50m:	m
Intercept of EDL 50 -100m:	m
Measured crown cover % of EDL 0 -100m:	%
Structural formation:	
Conclusions/notes:	

END

Quaternary Site Form

Location

Site: Q10/VC3 **Recorder:** JN **Day/Date:** 13/12/2013

Project: Fairview Lot 55

Locality: RoW 45b Photos: N: 0212 E: 0213 S: 0214 W: 0215

Coordinates: Zone 55 700633 7144651 **Datum:**

Vegetation structure

Median height of EDL is to be measured
Cover density is to be estimated
D = touching-overlap <0; M = touching-slight separation 0-0.25;
S = clearly separated 0.25-1; V = well separated 1-20

Stratum	Median height	Height interval	Est. cover density (D,M,S,V)
E		-	
T1	14	11-18	S
T2	7.5	7-10	M
T3		-	
S1	4	1-6	M
S2		-	
G	0.4	0-0.6	S

Structural formation (including height):

Open-forest

Ecologically dominant layer: T1

Land form element[#] (40 m radius): Gently sloping

Land form pattern[#] (300 m radius): Gently undulating / rolling hills

Soil and geology: Sand. Light brown

Slope and aspect: North, 3º

Vast II

Mapped 11.10.9

Plant species

Record relative (numerical) dominance for each stratum;
d – dominant; ***c*** – codominant; ***s*** – subdominant; ***a*** – associated
* = exotic; [2] = class 2 declared weed; [3] = class 3 declared weed

Str.	Rel. dom.	Scientific Name
T1	d	*Callitris glaucophylla*
T2	a	*Eucalyptus populnea*
T2	d	*Callitris glaucophylla*
T2	A	*Allocasuarina luehmannii*
T2	A	*Eucalyptus melanophloia*
S1	s	*Callitris glaucophylla*
S1	d	*Acacia leiocalyx*
S1	a	*Opuntia tomentosa**
S1	a	*Allocasuarina luehmannii*
G	a	*Eragrostis sororia*
G	a	*Laxmannia gracilis*
G	a	*Eragrostis setifolia*
G	a	*Cenchrus ciliaris**
G	a	*Fimbristylis dichotoma*
G	a	*Aristida calycina*
G	a	*Lomandra leucocephala*
G	a	*Cheilanthes sieberi*

Quaternary Site Form

Location

Site: Q11 **Recorder:** JN **Day/Date:** 13/12/2013

Project: Fairview Lot 55

Locality: RoW 48b Photos: N: 0216 E: 0217 S: 0218 W: 0219

Coordinates: Zone 55 7011306 7142521 **Datum:**

Vegetation structure

Median height of EDL is to be measured
Cover density is to be estimated
D = touching-overlap <0; M = touching-slight separation 0-0.25;
S = clearly separated 0.25-1; V = well separated 1-20

Stratum	Median height	Height interval	Est. cover density (D,M,S,V)
E		-	
T1	14	11-16	S
T2	8	7-10	M
T3		-	
S1	4	4-6	M
S2	2	1-3	S
G	0.4	0-0.9	S

Structural formation (including height):

Open-forest

Ecologically dominant layer: T1

Land form element[#] (40 m radius): Gently sloping

Land form pattern[#] (300 m radius): Gently undulating / rolling hills

Soil and geology: Loamy sand. Light brown

Slope and aspect: South, 4º

Vast II

Mapped 11.10.11

Plant species

Record relative (numerical) dominance for each stratum;
d – dominant; ***c*** – codominant; ***s*** – subdominant; ***a*** – associated
* = exotic; [2] = class 2 declared weed; [3] = class 3 declared weed

Str.	Rel. dom.	Scientific Name
T1	s	*Callitris glaucophylla*
T1	d	*Eucalyptus populnea*
T2	d	*Callitris glaucophylla*
T2	a	*Eucalyptus populnea*
S1	a	*Eremophila mitchellii*
S1	d	*Callitris glaucophylla*
S2	d	*Carissa ovata*
S2	a	*Grevillea striata*
S2	a	*Alstonia constricta*
S2	a	*Acacia excelsa* subsp. *excelsa*
S2	a	*Dodonaea viscosa* subsp. *spatulata*
S2	a	*Acacia leiocalyx*
S2	a	*Opuntia tomentosa**
S2	a	*Opuntia stricta**
S2	a	*Acacia decora*
S2	a	*Hakea lorea*
G	a	*Aristida caput-medusae*
G	a	*Themeda triandra*
G	a	*Alloteropsis semialata*
G	a	*Cheilanthes sieberi*
G	a	*Aristida calycina*
G	a	*Cenchrus ciliaris**
G	a	*Sporobolus creber*

Str.	Rel. dom.	Scientific Name
G	a	*Cymbopogon refractus*

Transect - crown cover measured *(transect intercept method)*

Coordinates: **Datum:** **Transect length:**

Start point Zone E 0 N

End point Zone E 0 N

Interval (metres)	Intercept	Str.	Height
-	m		
-	m		
-	m		
-	m		
-	m		
-	m		
-	m		
-	m		
-	m		
-	m		
-	m		
-	m		
-	m		
-	m		
-	m		
-	m		
-	m		

Summary:

Minimum height of plants included in the transect table:	m
Intercept of EDL 0 - 50m:	m
Intercept of EDL 50 -100m:	m
Measured crown cover % of EDL 0 -100m:	%
Structural formation:	
Conclusions/notes:	

END

Quaternary Site Form

Location

Site: Q12/VC4 **Recorder:** JN **Day/Date:** 13/12/2013

Project: Fairview Lot 55

Locality: RoW 48a Photos: N: 0220 E: 0221 S: 0222 W: 0223

Coordinates: Zone 55 700126 7142482 **Datum:**

Vegetation structure

Median height of EDL is to be measured
Cover density is to be estimated
D = touching-overlap <0; M = touching-slight separation 0-0.25;
S = clearly separated 0.25-1; V = well separated 1-20

Stratum	Median height	Height interval	Est. cover density (D,M,S,V)
E		-	
T1	15	11-17	S
T2	9	7-10	M
T3		-	
S1	4	1-6	M
S2		-	
G	0.5	0-1	M

Structural formation (including height):

Open-forest

Ecologically dominant layer: T1

Land form element[#] (40 m radius): Gently sloping

Land form pattern[#] (300 m radius): Gently undulating /

rolling hills

Soil and geology: Loamy sand. Light brown

Slope and aspect: North-east, 3º

Vast II

Mapped 11.10.11

Plant species

Record relative (numerical) dominance for each stratum;
d – dominant; ***c*** – codominant; ***s*** – subdominant; ***a*** – associated
* = exotic; [2] = class 2 declared weed; [3] = class 3 declared weed

Str.	Rel. dom.	Scientific Name
T1	s	*Callitris glaucophylla*
T1	d	*Eucalyptus populnea*
T1	a	*Eucalyptus melanophloia*
T1	a	*Brachychiton populneus*
T2	d	*Callitris glaucophylla*
T2	a	*Eucalyptus populnea*
T2	a	*Acacia salicina*
T2	a	*Allocasuarina luehmannii*
S1	a	*Brachychiton populneus*
S1	a	*Cymbidium canaliculatum*
S1	a	*Eremophila mitchellii*
S1	a	*Acacia leiocalyx*
S1	a	*Allocasuarina luehmannii*
S1	a	*Opuntia tomentosa**
S1	a	*Callitris glaucophylla*
S1	a	*Dodonaea viscosa* subsp. *spatulata*
S1	a	*Eucalyptus populnea*
G	a	*Lomandra leucocephala*
G	a	*Chrysopogon fallax*
G	a	*Cymbopogon refractus*
G	a	*Themeda triandra*
G	a	*Fimbristylis dichotoma*
G	a	*Eragrostis setifolia*
G	a	*Cheilanthes sieberi*

	Str.	Rel. dom.	Scientific Name
	G	a	*Heteropogon contortus*
	G	a	*Aristida caput-medusae*
	G	a	*Sporobolus creber*
	G	a	*Cenchrus ciliaris**
	G	a	*Murdannia graminea*
	G	a	*Enneapogon nigricans*

Transect - crown cover measured *(transect intercept method)*

Coordinates: **Datum:** **Transect length:**

Start point Zone E 0 N

End point Zone E 0 N

Interval (metres)	Intercept	Str.	Height
-	m		
-	m		
-	m		
-	m		
-	m		
-	m		
-	m		
-	m		
-	m		
-	m		
-	m		
-	m		
-	m		
-	m		
-	m		
-	m		

Summary:

Minimum height of plants included in the transect table:	m
Intercept of EDL 0 - 50m:	m
Intercept of EDL 50 -100m:	m
Measured crown cover % of EDL 0 -100m:	%
Structural formation:	
Conclusions/notes:	

END

Quaternary Site Form

Location

Site: Q13 **Recorder:** JN **Day/Date:** 13/12/2013

Project: Fairview Lot 55

Locality: RoW 48BPb Photos: N: 0224 E: 0225 S: 0226 W: 0227

Coordinates: Zone 55 708212 7143423 **Datum:**

Vegetation structure

Median height of EDL is to be measured
Cover density is to be estimated
D = touching-overlap <0; M = touching-slight separation 0-0.25;
S = clearly separated 0.25-1; V = well separated 1-20

Stratum	Median height	Height interval	Est. cover density (D,M,S,V)
E		-	
T1	12	11-15	S
T2	9	7-10	M
T3		-	
S1	5	1-6	S
S2		-	
G	0.6	0-1	D

Structural formation (including height):

Open-woodland

Ecologically dominant layer: T1

Land form element[#] (40 m radius): Gently sloping

Land form pattern[#] (300 m radius): Gently undulating / rolling hills

Soil and geology: Light yellow-brown, hard-packed sand

Slope and aspect: East, 5º

Vast II

Mapped 11.10.11/11.10.7a (Assessed 11.10.11)

Plant species

Record relative (numerical) dominance for each stratum;
d – dominant; ***c*** – codominant; ***s*** – subdominant; ***a*** – associated
* = exotic; [2] = class 2 declared weed; [3] = class 3 declared weed

Str.	Rel. dom.	Scientific Name
T1	s	*Callitris glaucophylla*
T1	d	*Eucalyptus populnea*
T2	a	*Eucalyptus melanophloia*
T2	a	*Eucalyptus populnea*
T2	d	*Callitris glaucophylla*
S1	d	*Callitris glaucophylla*
S1	a	*Opuntia tomentosa**
S1	a	*Allocasuarina luehmannii*
S1	a	*Eremophila mitchellii*
S1	a	*Grevillea striata*
S1	a	*Eucalyptus populnea*
S1	a	*Petalostigma pubescens*
G	c	*Cymbopogon refractus*
G	c	*Themeda triandra*
G	a	*Aristida caput-medusae*
G	a	*Opuntia stricta**
G	a	*Opuntia tomentosa**
G	a	*Fimbristylis dichotoma*
G	a	*Heteropogon contortus*
G	a	*Acacia excelsa* subsp. *excelsa*
G	a	*Chloris divaricata*
G	a	*Bothriochloa decipiens*
G	a	*Cenchrus ciliaris**
G	a	*Aristida psammophila*

Quaternary Site Form

Location

Site: Q14 **Recorder:** JN **Day/Date:** 14/12/2013

Project: Fairview Lot 55

Locality: RoW 48BPa Photos: N: 0228 E: 0229 S: 0230 W: 0231

Coordinates: Zone 55 707087 7143345 **Datum:**

Vegetation structure

Median height of EDL is to be measured
Cover density is to be estimated
D = touching-overlap <0; M = touching-slight separation 0-0.25;
S = clearly separated 0.25-1; V = well separated 1-20

Stratum	Median height	Height interval	Est. cover density (D,M,S,V)
E		-	
T1	12	11-14	S
T2	8.5	7-10	M
T3		-	
S1	4.5	1-6	M
S2		-	
G	0.6	0-1	S

Structural formation (including height):

Open-forest

Ecologically dominant layer: T1

Land form element# (40 m radius): Gently sloping

Land form pattern# (300 m radius): Gently undulating /

rolling hills

Soil and geology: Light brown, loamy sand

Slope and aspect: East, <5º

Recently burnt – re-sprouting

Vast II

Mapped 11.10.11/11.10.7a (Assessed 11.10.11)

Plant species

Record relative (numerical) dominance for each stratum;
d – dominant; ***c*** – codominant; ***s*** – subdominant; ***a*** – associated
* = exotic; [2] = class 2 declared weed; [3] = class 3 declared weed

Str.	Rel. dom.	Scientific Name
T1	a	*Callitris glaucophylla*
T1	d	*Eucalyptus populnea*
T2	d	*Callitris glaucophylla*
T2	a	*Eucalyptus populnea*
S1	a	*Atalaya hemiglauca*
S1	a	*Eremophila mitchellii*
S1	a	*Opuntia tomentosa**
S1	a	*Allocasuarina luehmannii*
S1	a	*Carissa ovata*
S1	a	*Owenia acidula*
G	a	*Acacia excelsa* subsp. *excelsa*
G	a	*Eremophila debilis*
G	c	*Cymbopogon refractus*
G	c	*Maireana microphylla*
G	a	*Aristida caput-medusae*
G	a	*Chrysopogon fallax*
G	a	*Portulaca australis*
G	a	*Fimbristylis dichotoma*
G	a	*Enteropogon ramosus*
G	a	*Cenchrus ciliaris**

Quaternary Site Form

Location

Site: Q15 **Recorder:** JN **Day/Date:** 14/12/2013

Project: Fairview Lot 55

Locality: RoW 28CP Photos: N: 0232 E: 0233 S: 0234 W: 0235

Coordinates: Zone 55 706822 7146265 **Datum:**

Vegetation structure

Median height of EDL is to be measured
Cover density is to be estimated
D = touching-overlap <0; M = touching-slight separation 0-0.25;
S = clearly separated 0.25-1; V = well separated 1-20

Stratum	Median height	Height interval	Est. cover density (D,M,S,V)
E		-	
T1	14	11-16	S
T2	8	7-9	M
T3		-	
S1	4.5	1-6	M
S2		-	
G	0.4	0-0.5	V

Structural formation (including height):

Open-forest

Ecologically dominant layer: T1

Land form element[#] (40 m radius): Gently sloping

Land form pattern[#] (300 m radius): Gently undulating / rolling hills

Soil and geology: Light brown, sand

Slope and aspect: South, <5º

Recently burnt – re-sprouting

Vast II

Mapped 11.10.11/11.10.7a (Assessed 11.10.11)

Plant species

Record relative (numerical) dominance for each stratum;
d – dominant; ***c*** – codominant; ***s*** – subdominant; ***a*** – associated
* = exotic; [2] = class 2 declared weed; [3] = class 3 declared weed

Str.	Rel. dom.	Scientific Name
T1	a	*Callitris glaucophylla*
T1	d	*Eucalyptus populnea*
T2	d	*Callitris glaucophylla*
T2	a	*Eucalyptus populnea*
T2	s	*Allocasuarina luehmannii*
S1	d	*Callitris glaucophylla*
S1	s	*Allocasuarina luehmannii*
S1	a	*Acacia excelsa* subsp. *excelsa*
S1	a	*Eremophila mitchellii*
S1	a	*Petalostigma pubescens*
S1	a	*Dodonaea viscosa* subsp. *spatulata*
S1	a	*Carissa ovata*
S1	a	*Grevillea striata*
S1	a	*Geijera parviflora*
G	a	*Aristida caput-medusae*
G	a	*Aristida calycina*
G	a	*Opuntia tomentosa**
G	a	*Lomandra leucocephala*
G	a	*Cheilanthes sieberi*
G	a	*Dianella caerulea*

Quaternary Site Form

Location

Site: Q16 **Recorder:** JN **Day/Date:** 14/12/2013

Project: Fairview Lot 55

Locality: RoW 28CP Photos: N: 0236 E: 0237 S: 0238 W: 0239

Coordinates: Zone 55 707592 7146673 **Datum:**

Vegetation structure

Median height of EDL is to be measured
Cover density is to be estimated
D = touching-overlap <0; M = touching-slight separation 0-0.25;
S = clearly separated 0.25-1; V = well separated 1-20

Stratum	Median height	Height interval	Est. cover density (D,M,S,V)
E		-	
T1	1	8-13	S
T2		-	
T3		-	
S1	7	5-7	M
S2	2.5	1-4	S
G	0.4	0-1	V

Structural formation (including height):

Low open-forest

Ecologically dominant layer: T1

Land form element# (40 m radius): Gently sloping

Land form pattern# (300 m radius): Gently undulating / rolling hills

Soil and geology: Light brown, sand

Slope and aspect: East, 4º

Vast III

Mapped non-remnant at edge of remnant 11.10.11/ 11.10.7a

Plant species

Record relative (numerical) dominance for each stratum;
d – dominant; ***c*** – codominant; ***s*** – subdominant; ***a*** – associated
* = exotic; [2] = class 2 declared weed; [3] = class 3 declared weed

Str.	Rel. dom.	Scientific Name
T1	d	*Callitris glaucophylla*
T1	s	*Eucalyptus populnea*
T1	a	*Eucalyptus melanophloia*
T1	a	*Corymbia trachyphloia*
T1	a	*Allocasuarina luehmannii*
S1	c	*Allocasuarina luehmannii*
S1	c	*Callitris glaucophylla*
S1	a	*Petalostigma pubescens*
S2	d	*Callitris glaucophylla*
S2	a	*Petalostigma pubescens*
S2	a	*Acacia leiocalyx*
G	a	*Aristida calycina*
G	a	*Cheilanthes sieberi*
G	a	*Portulaca australis*
G	a	*Aristida caput-medusae*
G	a	*Chrysopogon fallax*
G	a	*Opuntia tomentosa**
G	a	*Enneapogon nigricans*

Quaternary Site Form

Location

Site: Q17/VC5 **Recorder:** JN **Day/Date:** 14/12/2013

Project: Fairview Lot 55

Locality: RoW 29BPa Photos: N: 0240 E: 0241 S: 0242 W: 0243

Coordinates: Zone 55 709850 7147818 **Datum:**

Vegetation structure

Median height of EDL is to be measured
Cover density is to be estimated
D = touching-overlap <0; M = touching-slight separation 0-0.25;
S = clearly separated 0.25-1; V = well separated 1-20

Stratum	Median height	Height interval	Est. cover density (D,M,S,V)
E		-	
T1	13	10-14	S
T2	8	7-9	M
T3		-	
S1	6	4-6	M
S2	1.5	1-3	M
G	0.5	0-1	M

Structural formation (including height):

Open woodland

Ecologically dominant layer: T1

Land form element# (40 m radius): Gently sloping

Land form pattern# (300 m radius): Gently undulating / rolling hills

Soil and geology: Light reddish-brown, soft, fine, sandy clay

Slope and aspect: East, 3º

Vast II

Incorrectly mapped as 11.3.2. More consistent with 11.10.11

Plant species

Record relative (numerical) dominance for each stratum;
d – dominant; ***c*** – codominant; ***s*** – subdominant; ***a*** – associated
* = exotic; [2] = class 2 declared weed; [3] = class 3 declared weed

Str.	Rel. dom.	Scientific Name
T1	d	*Eucalyptus populnea*
T1	a	*Eucalyptus melanophloia*
T2	s	*Eremophila mitchellii*
T2	d	*Eucalyptus populnea*
S1	d	*Eremophila mitchellii*
S1	a	*Callitris glaucophylla*
S1	a	*Geijera parviflora*
S2	a	*Grewia latifolia*
S2	a	*Eremophila mitchellii*
S2	a	*Geijera parviflora*
S2	d	*Dodonaea viscosa* subsp. *spatulata*
S2	a	*Acacia leiocalyx*
S2	a	*Opuntia tomentosa**
S2	a	*Dodonaea heteromorpha*
S2	a	*Parsonsia eucalyptophylla*
G	a	*Cymbopogon refractus*
G	A	*Aristida* sp.
G	d	*Themeda triandra*
G	a	*Chrysopogon fallax*
G	a	*Bothriochloa decipiens*
G	a	*Enteropogon ramosus*
G	a	*Cenchrus ciliaris**
G	a	*Opuntia tomentosa**

Quaternary Site Form

Location

Site: Q18 **Recorder:** JN **Day/Date:** 14/12/2013

Project: Fairview Lot 55

Locality: RoW 36B Photos: N: 0244 E: 0245 S: 0246 W: 0247

Coordinates: Zone 55 711070 7148128 **Datum:**

Vegetation structure

Median height of EDL is to be measured
Cover density is to be estimated
D = touching-overlap <0; M = touching-slight separation 0-0.25;
S = clearly separated 0.25-1; V = well separated 1-20

Stratum	Median height	Height interval	Est. cover density (D,M,S,V)
E		-	
T1	14	11-17	S
T2	8	8-10	M
T3		-	
S1	6	4-7	S
S2	2.5	1-3	M
G	0.4	0-0.8	M

Structural formation (including height):

Open woodland

Ecologically dominant layer: T1

Land form element[#] (40 m radius): Gently sloping

Land form pattern[#] (300 m radius): Gently undulating / rolling hills

Soil and geology: Light brown, clay-sands

Slope and aspect: North-west, 4º

Vast II

Incorrectly mapped as 11.3.2. More consistent with 11.10.11

Plant species

Record relative (numerical) dominance for each stratum;
d – dominant; ***c*** – codominant; ***s*** – subdominant; ***a*** – associated
* = exotic; [2] = class 2 declared weed; [3] = class 3 declared weed

Str.	Rel. dom.	Scientific Name
T1	d	*Eucalyptus populnea*
T1	a	*Brachychiton populneus*
T2	d	*Callitris glaucophylla*
T2	a	*Eucalyptus populnea*
T2	a	*Atalaya hemiglauca*
S1	d	*Callitris glaucophylla*
S1	a	*Geijera parviflora*
S1	a	*Eremophila mitchellii*
S2	a	*Eremophila mitchellii*
S2	a	*Geijera parviflora*
S2	d	*Dodonaea viscosa* subsp. *spatulata*
S2	a	*Acacia decora*
S2	a	*Eucalyptus populnea*
S2	a	*Carissa ovata*
S2	a	*Capparis lasiantha*
S2	a	*Acacia excels* subsp. *excelsa*
G	a	*Eragrostis setifolia*
G	a	*Capparis lasiantha*
G	a	*Aristida caput-medusae*
G	d	*Cenchrus ciliaris**
G	a	*Opuntia tomentosa**
G	a	*Cymbopogon refractus*

Quaternary Site Form

Location

Site: Q19 **Recorder:** JN **Day/Date:** 14/12/2013

Project: Fairview Lot 55

Locality: RoW 36B Photos: N: 0248 E: 0249 S: 0250 W: 0251

Coordinates: Zone 55 711393 7147712 **Datum:**

Vegetation structure

Median height of EDL is to be measured
Cover density is to be estimated
D = touching-overlap <0; M = touching-slight separation 0-0.25;
S = clearly separated 0.25-1; V = well separated 1-20

Stratum	Median height	Height interval	Est. cover density (D,M,S,V)
E		-	
T1	14	10-18	M
T2	8	7-9	M
T3		-	
S1	5.5	1-6	M
S2		-	
G	0.5	0-0.6	S

Structural formation (including height):

Open woodland

Ecologically dominant layer: T1

Land form element[#] (40 m radius): Gently sloping

Land form pattern[#] (300 m radius): Gently undulating / rolling hills

Soil and geology: Light brown, loamy-sand

Slope and aspect: South, 5º

Vast II

Mapped 11.10.9

Plant species

Record relative (numerical) dominance for each stratum;
d – dominant; ***c*** – codominant; ***s*** – subdominant; ***a*** – associated
* = exotic; [2] = class 2 declared weed; [3] = class 3 declared weed

Str.	Rel. dom.	Scientific Name
T1	d	*Eucalyptus populnea*
T1	s	*Callitris glaucophylla*
T2	a	*Cymbidium canaliculatum*
T2	d	*Callitris glaucophylla*
T2	a	*Corymbia tessellaris*
T2	a	*Eucalyptus populnea*
T2	a	*Grevillea striata*
T2	a	*Geijera parviflora*
S1	s	*Geijera parviflora*
S1	a	*Eremophila mitchellii*
S1	a	*Petalostigma pubescens*
S1	d	*Acacia excelsa* subsp. *excelsa*
S1	a	*Brachychiton populneus*
S1	d	*Callitris glaucophylla*
S1	a	*Opuntia tomentosa**
S1	a	*Acacia leiocalyx*
G	d	*Cenchrus ciliaris**
G	a	*Enneapogon nigricans*
G	a	*Cymbopogon refractus*
G	a	*Enteropogon ramosus*

Quaternary Site Form

Location

Site: Q20 **Recorder:** JN **Day/Date:** 14/12/2013

Project: Fairview Lot 55

Locality: RoW 35BP Photos: N: 0252 E: 0253 S: 0254 W: 0255

Coordinates: Zone 55 | 711072 | 7143715 **Datum:**

Vegetation structure

Median height of EDL is to be measured
Cover density is to be estimated
D = touching-overlap <0; M = touching-slight separation 0-0.25;
S = clearly separated 0.25-1; V = well separated 1-20

Stratum	Median height	Height interval	Est. cover density (D,M,S,V)
E		-	
T1	15	11-16	S
T2	9	8-10	M
T3		-	
S1	7	5-7	M
S2	2	1-4	V
G	0.5	0-1	S

Structural formation (including height):

Open woodland

Ecologically dominant layer: T1

Land form element# (40 m radius): Gently sloping

Land form pattern# (300 m radius): Gently undulating / rolling hills

Soil and geology: Light brown, sand

Slope and aspect: South-east, 2º

Vast II

Mapped 11.10.9

Plant species

Record relative (numerical) dominance for each stratum;
d – dominant; ***c*** – codominant; ***s*** – subdominant; ***a*** – associated
* = exotic; [2] = class 2 declared weed; [3] = class 3 declared weed

Str.	Rel. dom.	Scientific Name
T1	d	*Callitris glaucophylla*
T1	a	*Corymbia trachyphloia*
T1	a	*Eucalyptus chloroclada*
T2	d	*Callitris glaucophylla*
T2	a	*Eucalyptus chloroclada*
S1	a	*Alphitonia excelsa*
S1	d	*Callitris glaucophylla*
S1	a	*Petalostigma pubescens*
S1	a	*Hakea lorea*
S2	a	*Petalostigma pubescens*
S2	d	*Callitris glaucophylla*
S2	a	*Acacia longispicata*
S2	d	*Carissa ovata*
G	a	*Plectranthus parviflorus*
G	a	*Arundinella nepalensis*
G	a	*Cenchrus ciliaris**
G	a	*Pandorea pandorana*
G	a	*Cymbopogon refractus*
G	a	*Cheilanthes sieberi*
G	a	*Opuntia aurantiaca**
G	a	*Aristida psammophila*
G	a	*Parsonsia eucalyptophylla*
G	a	*Eragrostis setifolia*

	Str.	Rel. dom.	Scientific Name
	G	a	*Chrysopogon fallax*
	G	a	*Commelina diffusa*

Transect - crown cover measured *(transect intercept method)*

Coordinates: **Datum:** **Transect length:**

Start point Zone E 0 N

End point Zone E 0 N

Interval (metres)	Intercept	Str.	Height
-	m		
-	m		
-	m		
-	m		
-	m		
-	m		
-	m		
-	m		
-	m		
-	m		
-	m		
-	m		
-	m		
-	m		
-	m		
-	m		

Summary:

Minimum height of plants included in the transect table:	m
Intercept of EDL 0 - 50m:	m
Intercept of EDL 50 -100m:	m
Measured crown cover % of EDL 0 -100m:	%
Structural formation:	
Conclusions/notes:	

END

Vegetation community/ analogue site

Site: VC1/Q5	**Date:** 11/12/2013	**Lot/plan:** Lot 55 FTY1153	**Obs:** JN

Photo nos: North: 0192 East: 0193 South: 0194 West: 0195

RE type: Regrowth 11.10.11 **GPS coords:** Zone 55, 699095, 7143732

Location description: RoW 45a

Structural formation/Veg community: Regrowth *Eucalyptus populnea* low woodland

Ecologically dominant layer: T1

Disturbance:

Wildfire (0=<1yr, 1=1-5yr, 2=>5yr): 0	**Grazing** (0=none to 3=severe): 1
Weeds (0=none to 3=severe): 1	**Erosion** (0=none to 3=severe): 1
Clearing (0=none to 3=severe): 2	**Other:**

VAST condition (see VAST table):3

Erosion definition: 0=stable, 1=slight disturbance (ie cattle tracks), 2 = moderate (pedestalling, sheet, rill), 3 = severe (pedestals, scalds, sand blown, exposure),
Grazing definition: 0=none, 1=small amount from few plants, 2=small to moderate amount from many plants, 3=moderate to large amount from many plants
Clearing definition: 0=none, 1=small amount/historic yet still remnant, 2= moderate amount, regrowth or near remnant status, 3=large amount, non-rem

Ecosystem function:

Size of patch (area ha): > 1000ha	**Shape of patch:** (large polygon, linear <200m wide) Large polygon
Location of patch (low, med, high, very high): High	**Presence of edge effects impacts** (0=none to 3=severe): (weeds, light, wind, sp. composition) 3

Location of patch: low=not connected to remnant or regrowth veg, **med**=connected to remnant veg along 10-50% of border OR connected to remnant veg along 1-10% of border and regrowth >25% of border, **high** = connected to remnant 50-75% of border, **very high** = connected to remnant >75% of border
Edge effects definition: **0** = stable, **1** = slight disturbance (ie couple non native sp), **2** = moderate (minor disturbance, some non native sp), **3** = severe (different sp composition, wind damage, differences in light amount)

Landform

Situation: A	**Element:** HSL	**Pattern:** RH
Slope position: G	**Slope degree:** 5	**Slope aspect:** North
Top soil depth: D	**Soil colour:** Light brown	**Texture:** Sandy

Notes, potential landzone: 10

Situation

Code	Description
Plains	
A	Not otherwise specified, flat gentle slopes; undulating terrain
B	Alluvial plain or flat, alluvium, flood plain
U	Claypan, Playa or Salina(including inland lakes), Salt Flat(inland).
V	Tidal Flat (coastal), Salt Flat (coastal).
Streams, Lakes	
C	Banks of lake, river, stream, watercourse, levees
D	Gully, drainage line, ravine gorge, outwash
E	Channel Bed, distributaries of inland streams
Hills, Mountains, Tablelands	
F	Slope or Hill not specified
L	Cliff (steep rocky faces), rocky ledge, rocky outcrop, scarp, crevice
N	Coastal rocky headland
K	Top, crest of mountain or ridge
Q	Jump Up (Cuesta) and Mesa, Tableland, Plateau,
Dunes	
R	Recent Coastal Dune (low dune less than about 15m) and
S	Fossil Coastal Dune (High Dune greater than about 15m)
T	Inland Dune.
Water	
W	Swamp or Marsh.
X	Fresh Water Aquatic.
Y	Salt Water Aquatic.
Z	Melon Holes, Gilgai, Depressions in Soil, Sink Holes.

Element

Code	Description	Code	Description	Code	Description
HCR	Hillcrest	DUS	Duneslope	STF	Supratidal flat
SUS	Summit Surface	BRK	Breakaway	FIL	Fill-top
DUC	Dunecrest	CFS	Cliff-foot slope	REF	Feef flat
TOR	Tor	SFS	Scarp-foot Slope	ALC	Alcove
TUM	Tumulus	BEN	Bench	GUL	Gully
DUN	Dune	BER	Berm	CIR	Cirque
CON	Cone	PED	Pediment	DDE	Drainage depression
MOU	Mound	FOO	Footslope	STC	Stream channel
LEV	Levee	TAL	Talus	STB	Stream bed
BAR	Bar	PLA	Plain	TDC	Tidal creek
SCR	Scroll	RFL	Rock flat	EST	Estuary
PST	Prior stream	RPL	Rock platform	SWP	Swamp
FOR	Foredune	COS	Cut-over surface	SWL	Swale
LUN	Lunette	SCD	Scald	TRE	Trench
BRI	Beach ridge	FAN	Fan	LAK	Lake
EMB	Embankment	VLF	Valley flat	PLY	Playa
DAM	Dam	TEF	Terrace flat	DOL	Doline
CLI	Cliff	CBE	Channel bench	OXB	Ox-bow
SCA	Scarp	BKP	Backplain	LAG	Lagoon
HSL	Hillslope	SRP	Scroll plain	BOU	Blow-out
CUT	Cut face	FLD	Flood-out	MAA	Maar
LDS	Landslide	TEP	Terrace plain	CRA	Crater
BAN	(Stream) Bank	TDF	Tidal flat	PIT	Pit
BEA	Beach	IIF	Intertidal flat		

Pattern

Code	Description
RM	Rolling mountains
SM	Steep mountains
VM	Very steep mountains
PM	Precipitous mountains
UH	Undulating hills
RH	Rolling hills
SH	Steep hills
VH	Very steep hills
PH	Precipitous hills
UL	Undulating low hills
RL	Rolling low hills
SL	Steep low hills
VL	Very steep low hills
B	Badlands
GR	Gently undulating rises
UR	Undulating rises
RR	Rolling rises
SR	Steep rises
LP	Level plain
GP	Gently undulating plain
UP	Undulating plain
RP	Rolling plain

Slope Position

Code	Description
C	Crest
D	Closed Depression
F	Flat
G	Gully
H	Hillock
L	Lower-Slope
M	Mid-Slope
P	Plateau
R	Ridge
U	Upper-Slope
V	Open Depression
W	Wetland

Soil Depth

Code	Description
D	Deep
S	Shallow
X	Skeletal

Ground cover (5 x 1m^2 plots, 0, 25, 50, 75, 100)	1	2	3	4	5	Mean
Native grass	20	25	5	60	0	22
Native herbs/forbs (non-grass)	0	3	0	6	2	2.2
Native shrubs (< 1m height)	0	0	0	0	0	0
Non-native grass	0	0	0	0	0	0
Non-native herbs and shrubs	0	0	0	4	0	0.8
Litter (woodies <10 cm diameter, dead annuals, etc)	20	22	5	10	68	25
Litter (logs > 10 cm diameter)	25	5	0	20	5	11
Rock	0	0	0	0	0	0
Bare ground	35	45	90	0	25	39
Total	***=100%***	***=100%***	***=100%***	***=100%***	***=100%***	***100***
Species in 1 x 1 m quadrat	**%**	**%**	**%**	**%**	**%**	**Mean**
Eremophila debilis	0	0	6	0	2	0.4
Themeda triandra	0	0	0	15	0	3
Aristida caput-medusae	0	0	0	15	0	3
*Verbena aristigera**	0	0	0	4	0	0.8

Other groundcover species (not in 1x1 m plots)				
Species	**Strata**	**Rel. dom.**	**Height (m)**	**Cover estimate <u>100 x 50</u> (0.5 ha) (%)**
Abutilon fraseri	G	a	0.1	3
Spermacoce multicaulis	G	a	0.1	2
*Cenchrus ciliaris**	G	a	0.4	8
Eragrostis sororia	G	a	0.3	6
*Opuntia aurantiaca**	G	a	0.4	5
Cymbopogon refractus	G	a	0.5	20
Chrysocephalum apiculatum	G	a	0.1	7
Aristida calycina	G	a	0.6	5

Tree and shrub canopy cover (estimate)	E	T1	T2	T3	S1	S2	G
Average height (m)	-	11	7	-	4	-	0.4
Height range (m)	-	10-13	7-9	-	1-6	-	0-0.6
Line intercept totals (from below table)	-	8.7	29.9	-	10.0	0.0	-
Cover density estimate (D, M, S, V)	-	S	M	-	S	-	S

D = touching-overlap <0; **M** = touching-slight separation 0-0.25; **S** = clearly separated 0.25-1; **V** = well separated 1-20

Relative dominance (below): ***d*** – dominant; ***c*** – codominant; ***s*** – subdominant; ***a*** – associated

Tree and shrub canopy cover (100m line intercept)				
Species	**Strata**	**Rel. dom.**	**Height (m)**	**Cover (100m line transect) (%)**
Eucalyptus populnea	T2	s	7.5	3.5
Eucalyptus populnea	T1	d	9	4.2
Eucalyptus populnea	T2	s	7	2.1
Eucalyptus populnea	T1	d	10	3.1
Eucalyptus populnea	T2	s	7.5	2.8
Eucalyptus populnea	T1	d	9	1.4
Callitris glaucophylla	T2	d	7	1.9
Eucalyptus populnea	T2	s	7.5	2.2
Eucalyptus populnea	T2	s	7.5	5.2
Eucalyptus populnea	T2	s	13	9.2
Callitris glaucophylla	T2	d	8	3.0
Eucalyptus populnea	S1	a	3	0.3
Eucalyptus populnea	S1	a	5	0.4
Eucalyptus populnea	S1	a	5	3.3
Callitris glaucophylla	S1	d	6	4.8
Eucalyptus populnea	S1	a	3.5	0.6
Eucalyptus populnea	S1	a	6	0.3
Eucalyptus populnea	S1	a	4	0.3
Other tree and shrub species (not in 100 m transect)				
Species	**Strata**	**Rel. dom.**	**Height (m)**	**Cover estimate 100 x 50 (0.5 ha) (%)**
Allocasuarina luehmannii	S1	a	5.5	4

Tree and shrub stem counts			
Canopy Species (E, T1, T2,T3) Greater than 20 cm DBH only	**Strata**	**Height (m)**	**Stem count (in <u>100 x 50</u> (0.5 ha area))** Results x 2 = stems per ha
Eucalyptus populnea	T2	7	6
Eucalyptus populnea	T1	11	10
Allocasuarina luehmannii	T2	7	1
Callitris glaucophylla	T2	7	1

Shrub Species (S1, S2)	**Strata**	**Height (m)**	**Stem count (in <u>50 x 10</u> (0.05 ha))** Results x 20 = stems per ha
Eucalyptus populnea	S1	4	16
Callitris glaucophylla	S1	4	9
Allocasuarina luehmannii	S1	4	2
*Opuntia tomentosa**	S1	4	1

Vegetation community/ analogue site

Site: VC2/Q7	**Date:** 11/12/2013	**Lot/plan:** Lot 55 FTY1153	**Obs:** JN

Photo nos: North: 0200 East: 0201 South: 0202 West: 0202

RE type: Non-remnant **GPS coords:** Zone 55, 699512, 7142652

Location description: RoW 45a

Structural formation/Veg community: Non-remnant sparse regrowth eucalypt woodland

Ecologically dominant layer: T1

Disturbance:

Wildfire (0=<1yr, 1=1-5yr, 2=>5yr): 1	**Grazing** (0=none to 3=severe): 2
Weeds (0=none to 3=severe): 1	**Erosion** (0=none to 3=severe): 0
Clearing (0=none to 3=severe): 2	**Other:**

VAST condition (see VAST table):3

Erosion definition: 0=stable, 1=slight disturbance (ie cattle tracks), 2 = moderate (pedestalling, sheet, rill), 3 = severe (pedestals, scalds, sand blown, exposure),
Grazing definition: 0=none, 1=small amount from few plants, 2=small to moderate amount from many plants, 3=moderate to large amount from many plants
Clearing definition: 0=none, 1=small amount/historic yet still remnant, 2= moderate amount, regrowth or near remnant status, 3=large amount, non-rem

Ecosystem function:

Size of patch (area ha): > 1000 ha	**Shape of patch:** (large polygon, linear <200m wide) Medium polygon
Location of patch (low, med, high, very high): High	**Presence of edge effects impacts** (0=none to 3=severe): (weeds, light, wind, sp. composition) 3

Location of patch: low=not connected to remnant or regrowth veg, **med**=connected to remnant veg along 10-50% of border OR connected to remnant veg along 1-10% of border and regrowth >25% of border, **high** = connected to remnant 50-75% of border, **very high** = connected to remnant >75% of border
Edge effects definition: **0** = stable, **1** = slight disturbance (ie couple non native sp), **2** = moderate (minor disturbance, some non native sp), **3** = severe (different sp composition, wind damage, differences in light amount)

Landform

Situation: A	**Element:** HSL	**Pattern:** RH
Slope position: M	**Slope degree:** 5	**Slope aspect:** North
Top soil depth: D	**Soil colour:** Light brown	**Texture:** Sandy

Notes, potential landzone: 10

Situation

Code	Description
Plains	
A	Not otherwise specified, flat gentle slopes; undulating terrain
B	Alluvial plain or flat, alluvium, flood plain
U	Claypan, Playa or Salina(including inland lakes), Salt Flat(inland).
V	Tidal Flat (coastal), Salt Flat (coastal).
Streams, Lakes	
C	Banks of lake, river, stream, watercourse, levees
D	Gully, drainage line, ravine gorge, outwash
E	Channel Bed, distributaries of inland streams
Hills, Mountains, Tablelands	
F	Slope or Hill not specified
L	Cliff (steep rocky faces), rocky ledge, rocky outcrop, scarp, crevice
N	Coastal rocky headland
K	Top, crest of mountain or ridge
Q	Jump Up (Cuesta) and Mesa, Tableland, Plateau,
Dunes	
R	Recent Coastal Dune (low dune less than about 15m) and
S	Fossil Coastal Dune (High Dune greater than about 15m)
T	Inland Dune.
Water	
W	Swamp or Marsh.
X	Fresh Water Aquatic.
Y	Salt Water Aquatic.
Z	Melon Holes, Gilgai, Depressions in Soil, Sink Holes.

Element

Code	Description	Code	Description	Code	Description
HCR	Hillcrest	DUS	Duneslope	STF	Supratidal flat
SUS	Summit Surface	BRK	Breakaway	FIL	Fill-top
DUC	Dunecrest	CFS	Cliff-foot slope	REF	Feef flat
TOR	Tor	SFS	Scarp-foot Slope	ALC	Alcove
TUM	Tumulus	BEN	Bench	GUL	Gully
DUN	Dune	BER	Berm	CIR	Cirque
CON	Cone	PED	Pediment	DDE	Drainage depression
MOU	Mound	FOO	Footslope	STC	Stream channel
LEV	Levee	TAL	Talus	STB	Stream bed
BAR	Bar	PLA	Plain	TDC	Tidal creek
SCR	Scroll	RFL	Rock flat	EST	Estuary
PST	Prior stream	RPL	Rock platform	SWP	Swamp
FOR	Foredune	COS	Cut-over surface	SWL	Swale
LUN	Lunette	SCD	Scald	TRE	Trench
BRI	Beach ridge	FAN	Fan	LAK	Lake
EMB	Embankment	VLF	Valley flat	PLY	Playa
DAM	Dam	TEF	Terrace flat	DOL	Doline
CLI	Cliff	CBE	Channel bench	OXB	Ox-bow
SCA	Scarp	BKP	Backplain	LAG	Lagoon
HSL	Hillslope	SRP	Scroll plain	BOU	Blow-out
CUT	Cut face	FLD	Flood-out	MAA	Maar
LDS	Landslide	TEP	Terrace plain	CRA	Crater
BAN	(Stream) Bank	TDF	Tidal flat	PIT	Pit
BEA	Beach	IIF	Intertidal flat		

Pattern

Code	Description
RM	Rolling mountains
SM	Steep mountains
VM	Very steep mountains
PM	Precipitous mountains
UH	Undulating hills
RH	Rolling hills
SH	Steep hills
VH	Very steep hills
PH	Precipitous hills
UL	Undulating low hills
RL	Rolling low hills
SL	Steep low hills
VL	Very steep low hills
B	Badlands
GR	Gently undulating rises
UR	Undulating rises
RR	Rolling rises
SR	Steep rises
LP	Level plain
GP	Gently undulating plain
UP	Undulating plain
RP	Rolling plain

Slope Position

Code	Description
C	Crest
D	Closed Depression
F	Flat
G	Gully
H	Hillock
L	Lower-Slope
M	Mid-Slope
P	Plateau
R	Ridge
U	Upper-Slope
V	Open Depression
W	Wetland

Soil Depth

Code	Description
D	Deep
S	Shallow
X	Skeletal

Ground cover (5 x 1m^2 plots, 0, 25, 50, 75, 100)	1	2	3	4	5	Mean
Native grass	56	32	20	57	55	44
Native herbs/forbs (non-grass)	0	0	0	0	0	0
Native shrubs (< 1m height)	0	0	0	0	0	0
Non-native grass	4	8	0	0	0	2.4
Non-native herbs and shrubs	0	0	0	0	0	0
Litter (woodies <10 cm diameter, dead annuals, etc)	10	10	20	8	15	12.6
Litter (logs > 10 cm diameter)	0	20	0	0	10	6
Rock	0	0	0	0	0	0
Bare ground	30	30	60	35	20	35
Total	***=100%***	***=100%***	***=100%***	***=100%***	***=100%***	***100***
Species in 1 x 1 m quadrat	**%**	**%**	**%**	**%**	**%**	**Mean**
Chrysopogon fallax	0	0	0	0	50	10
Sporobolus creber	0	0	20	0	0	4
*Cenchrus ciliaris**	0	5	0	0	0	1
Cymbopogon refractus	5	10	0	5	5	5

Other groundcover species (not in 1x1 m plots)				
Species	**Strata**	**Rel. dom.**	**Height (m)**	**Cover estimate <u>100 x 50</u> (0.5 ha) (%)**
Juncus usitatus	G	a	0.6	1
Fimbristylis dichotoma	G	a	0.4	5
Eragrostis leptostachya	G	a	0.6	2
*Melinis repens**	G	a	0.7	1
Aristida lignosa	G	a	0.7	10
Heteropogon contortus	G	a	0.7	5

Tree and shrub canopy cover (estimate)	E	T1	T2	T3	S1	S2	G
Average height (m)	-	9	-	-	5.5	2	0.6
Height range (m)	-	8-12	-	-	5-7	1-4	0-0.8
Line intercept totals (from below table)	-	10.6	-	-	0.0	0.0	-
Cover density estimate (D, M, S, V)	-	S	-	-	S	S	M

D = touching-overlap <0; **M** = touching-slight separation 0-0.25; **S** = clearly separated 0.25-1; **V** = well separated 1-20

Relative dominance (below): ***d*** – dominant; ***c*** – codominant; ***s*** – subdominant; ***a*** – associated

Tree and shrub canopy cover (100m line intercept)				
Species	**Strata**	**Rel. dom.**	**Height (m)**	**Cover (100m line transect) (%)**
Eucalyptus melanophloia	T1	s	8.5	5.5
Eucalyptus populnea	T1	a	8	5.1
Other tree and shrub species (not in 100 m transect)				
Species	**Strata**	**Rel. dom.**	**Height (m)**	**Cover estimate 100 x 50 (0.5 ha) (%)**
Eucalyptus chloroclada	S1	a	5.5	5
Petalostigma pubescens	S2	a	2	5
Allocasuarina luehmannii	T1	a	9	4
Allocasuarina luehmannii	S1	a	5.5	8
Callitris glaucophylla	S1	d	5.5	7

Tree and shrub stem counts			
Canopy Species (E, T1, T2,T3) Greater than 20 cm DBH only	**Strata**	**Height (m)**	**Stem count (in <u>100 x 50</u> (0.5 ha area))** Results x 2 = stems per ha
Eucalyptus populnea	T1	9	6
Eucalyptus melanophloia	T1	9	1

Shrub Species (S1, S2)	**Strata**	**Height (m)**	**Stem count (in <u>50 x 10</u> (0.05 ha))** Results x 20 = stems per ha
Eucalyptus populnea	S1	5.5	2
Eucalyptus populnea	S2	2	4
*Opuntia tomentosa**	S2	2	3
Allocasuarina luehmannii	S2	2	4
Eucalyptus melanophloia	S2	2	2
Petalostigma pubescens	S2	2	1
Eucalyptus chloroclada	S1	5.5	2
Allocasuarina luehmannii	S1	5.5	1

Vegetation community/ analogue site

Site: VC3/Q10	**Date:** 13/12/2013	**Lot/plan:** Lot 55 FTY1153	**Obs:** JN
Photo nos: North: 0212	East: 0213	South: 0214	West: 0215
RE type: 11.10.9	**GPS coords:** Zone 55, 700633, 7144651		

Location description: RoW 45b

Structural formation/Veg community: *Callitris glaucophylla* open-forest with a sparse ground layer

Ecologically dominant layer: T1

Disturbance:

Wildfire (0=<1yr, 1=1-5yr, 2=>5yr): 1	**Grazing** (0=none to 3=severe): 1
Weeds (0=none to 3=severe): 1	**Erosion** (0=none to 3=severe): 0
Clearing (0=none to 3=severe): 1	**Other:**

VAST condition (see VAST table): 2

Erosion definition: 0=stable, 1=slight disturbance (ie cattle tracks), 2 = moderate (pedestalling, sheet, rill), 3 = severe (pedestals, scalds, sand blown, exposure),
Grazing definition: 0=none, 1=small amount from few plants, 2=small to moderate amount from many plants, 3=moderate to large amount from many plants
Clearing definition: 0=none, 1=small amount/historic yet still remnant, 2= moderate amount, regrowth or near remnant status, 3=large amount, non-rem

Ecosystem function:

Size of patch (area ha): 100 – 500 ha	**Shape of patch:** (large polygon, linear <200m wide) Large polygon
Location of patch (low, med, high, very high): Very high	**Presence of edge effects impacts** (0=none to 3=severe): (weeds, light, wind, sp. composition) 1

Location of patch: low=not connected to remnant or regrowth veg, **med**=connected to remnant veg along 10-50% of border OR connected to remnant veg along 1-10% of border and regrowth >25% of border, **high** = connected to remnant 50-75% of border, **very high** = connected to remnant >75% of border
Edge effects definition: **0** = stable, **1** = slight disturbance (ie couple non native sp), **2** = moderate (minor disturbance, some non native sp), **3** = severe (different sp composition, wind damage, differences in light amount)

Landform

Situation: A	**Element:** HSL	**Pattern:** RH
Slope position: G	**Slope degree:** 3	**Slope aspect:** North
Top soil depth: D	**Soil colour:** Light brown	**Texture:** Sandy

Notes, potential landzone: 10

Situation

Code	Description
Plains	
A	Not otherwise specified, flat gentle slopes; undulating terrain
B	Alluvial plain or flat, alluvium, flood plain
U	Claypan, Playa or Salina(including inland lakes), Salt Flat(inland).
V	Tidal Flat (coastal), Salt Flat (coastal).
Streams, Lakes	
C	Banks of lake, river, stream, watercourse, levees
D	Gully, drainage line, ravine gorge, outwash
E	Channel Bed, distributaries of inland streams
Hills, Mountains, Tablelands	
F	Slope or Hill not specified
L	Cliff (steep rocky faces), rocky ledge, rocky outcrop, scarp, crevice
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K	Top, crest of mountain or ridge
Q	Jump Up (Cuesta) and Mesa, Tableland, Plateau,
Dunes	
R	Recent Coastal Dune (low dune less than about 15m) and
S	Fossil Coastal Dune (High Dune greater than about 15m)
T	Inland Dune.
Water	
W	Swamp or Marsh.
X	Fresh Water Aquatic.
Y	Salt Water Aquatic.
Z	Melon Holes, Gilgai, Depressions in Soil, Sink Holes.

Element

Code	Description	Code	Description	Code	Description
HCR	Hillcrest	DUS	Duneslope	STF	Supratidal flat
SUS	Summit Surface	BRK	Breakaway	FIL	Fill-top
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TOR	Tor	SFS	Scarp-foot Slope	ALC	Alcove
TUM	Tumulus	BEN	Bench	GUL	Gully
DUN	Dune	BER	Berm	CIR	Cirque
CON	Cone	PED	Pediment	DDE	Drainage depression
MOU	Mound	FOO	Footslope	STC	Stream channel
LEV	Levee	TAL	Talus	STB	Stream bed
BAR	Bar	PLA	Plain	TDC	Tidal creek
SCR	Scroll	RFL	Rock flat	EST	Estuary
PST	Prior stream	RPL	Rock platform	SWP	Swamp
FOR	Foredune	COS	Cut-over surface	SWL	Swale
LUN	Lunette	SCD	Scald	TRE	Trench
BRI	Beach ridge	FAN	Fan	LAK	Lake
EMB	Embankment	VLF	Valley flat	PLY	Playa
DAM	Dam	TEF	Terrace flat	DOL	Doline
CLI	Cliff	CBE	Channel bench	OXB	Ox-bow
SCA	Scarp	BKP	Backplain	LAG	Lagoon
HSL	Hillslope	SRP	Scroll plain	BOU	Blow-out
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Pattern

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RM	Rolling mountains
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Slope Position

Code	Description
C	Crest
D	Closed Depression
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G	Gully
H	Hillock
L	Lower-Slope
M	Mid-Slope
P	Plateau
R	Ridge
U	Upper-Slope
V	Open Depression
W	Wetland

Soil Depth

Code	Description
D	Deep
S	Shallow
X	Skeletal

Ground cover (5 x 1m^2 plots, 0, 25, 50, 75, 100)	1	2	3	4	5	Mean
Native grass	2	10	15	20	20	13.4
Native herbs/forbs (non-grass)	0	0	5	0	10	3
Native shrubs (< 1m height)	0	0	0	0	0	0
Non-native grass	0	0	0	0	0	0
Non-native herbs and shrubs	0	0	0	0	0	0
Litter (woodies <10 cm diameter, dead annuals, etc)	75	82	70	50	50	65.4
Litter (logs > 10 cm diameter)	8	0	0	0	0	1.6
Rock	0	0	0	0	20	4
Bare ground	15	8	10	30	0	12.6
Total	***=100%***	***=100%***	***=100%***	***=100%***	***=100%***	***100***
Species in 1 x 1 m quadrat	**%**	**%**	**%**	**%**	**%**	**Mean**
Unknown native grass	2	0	15	20	5	8.4
Unknown native grass	0	10	0	0	0	2
Cheilanthes seiberi	0	0	5	0	5	2
Murdannia graminea	0	0	0	0	5	1
Eragrostis setifolia	0	0	0	0	15	3

Other groundcover species (not in 1x1 m plots)				
Species	**Strata**	**Rel. dom.**	**Height (m)**	**Cover estimate <u>100 x 50</u> (0.5 ha) (%)**
Laxmannia gracilis	G	a	0.2	5
*Cenchrus ciliaris**	G	a	0.6	1
Fimbristylis dichotoma	G	a	0.3	5
Aristida calycina	G	a	0.6	8
Lomandra leucocephala	G	a	0.4	2
Eragrostis sororia	G	a	0.3	3

Tree and shrub canopy cover (estimate)	E	T1	T2	T3	S1	S2	G
Average height (m)	-	14	7.5	-	4	-	0.4
Height range (m)	-	11-18	7-10	-	1-6	-	0-0.6
Line intercept totals (from below table)	-	24.2	7.7	-	4.3	-	-
Cover density estimate (D, M, S, V)	-	S	M	-	M	-	S

D = touching-overlap <0; **M** = touching-slight separation 0-0.25; **S** = clearly separated 0.25-1; **V** = well separated 1-20

Relative dominance (below): ***d*** – dominant; ***c*** – codominant; ***s*** – subdominant; ***a*** – associated

Tree and shrub canopy cover (100m line intercept)				
Species	**Strata**	**Rel. dom.**	**Height (m)**	**Cover (100m line transect) (%)**
Callitris glaucophylla	T1	d	13	0.2
Allocasuarina luehmannii	S1	a	2	0.2
Acacia leiocalyx	S1	d	1	0.2
Callitris glaucophylla	T1	d	7	2.3
Acacia leiocalyx	S1	d	2.5	0.4
Callitris glaucophylla	T1	d	16	4.8
Allocasuarina luehmannii	S1	a	3.5	1.6
Callitris glaucophylla	T1	d	14	4.5
Allocasuarina luehmannii	T2	a	7	2.4
Callitris glaucophylla	T1	d	15	2.4
Callitris glaucophylla	T1	d	14	2.2
Allocasuarina luehmannii	T2	a	7	1.6
Callitris glaucophylla	T2	a	9	3.7
Callitris glaucophylla	T1	d	17	2.7
Callitris glaucophylla	T1	d	16	5.3
Callitris glaucophylla	S1	s	5	1.1
Allocasuarina luehmannii	S1	a	5.5	0.8
Other tree and shrub species (not in 100 m transect)				
Species	**Strata**	**Rel. dom.**	**Height (m)**	**Cover estimate 100 x 50 (0.5 ha) (%)**
Eucalyptus melanophloia	T2	a	7.5	5
Eucalyptus populnea	T2	a	7.5	3
*Opuntia tomentosa**	S1	a	1	4

Tree and shrub stem counts			
Canopy Species (E, T1, T2,T3) Greater than 20 cm DBH only	**Strata**	**Height (m)**	**Stem count (in 100 x 50 (0.5 ha area))** Results x 2 = stems per ha
Callitris glaucophylla	T1	14	43
Callitris glaucophylla	T2	7.5	28
Allocasuarina luehmannii	T2	7.5	1

Shrub Species (S1, S2)	**Strata**	**Height (m)**	**Stem count (in 50 x 10 (0.05 ha))** Results x 20 = stems per ha
Acacia leiocalyx	S1	4	16
Callitris glaucophylla	S1	4	3
Allocasuarina luehmannii	S1	4	14

Vegetation community/ analogue site

Site: VC4/Q12	**Date:** 13/12/2013	**Lot/plan:** Lot 55 FTY1153	**Obs:** JN
Photo nos: North: 0220	East: 0221	South: 0222	West: 0223
RE type: 11.10.11	**GPS coords:** Zone 55, 700126, 7142482		

Location description: RoW 48a

Structural formation/Veg community: *Eucalyptus populnea* and *Callitris glaucophylla* open-forest

Ecologically dominant layer: T1

Disturbance:

Wildfire (0=<1yr, 1=1-5yr, 2=>5yr): 1	**Grazing** (0=none to 3=severe): 1
Weeds (0=none to 3=severe): 1	**Erosion** (0=none to 3=severe): 0
Clearing (0=none to 3=severe): 1	**Other:**

VAST condition (see VAST table): 2

Erosion definition: 0=stable, 1=slight disturbance (ie cattle tracks), 2 = moderate (pedestalling, sheet, rill), 3 = severe (pedestals, scalds, sand blown, exposure),
Grazing definition: 0=none, 1=small amount from few plants, 2=small to moderate amount from many plants, 3=moderate to large amount from many plants
Clearing definition: 0=none, 1=small amount/historic yet still remnant, 2= moderate amount, regrowth or near remnant status, 3=large amount, non-rem

Ecosystem function:

Size of patch (area ha): > 1000 ha	**Shape of patch:** (large polygon, linear <200m wide) Large polygon
Location of patch (low, med, high, very high): Very high	**Presence of edge effects impacts** (0=none to 3=severe): (weeds, light, wind, sp. composition) 1

Location of patch: low=not connected to remnant or regrowth veg, **med**=connected to remnant veg along 10-50% of border OR connected to remnant veg along 1-10% of border and regrowth >25% of border, **high** = connected to remnant 50-75% of border, **very high** = connected to remnant >75% of border
Edge effects definition: **0** = stable, **1** = slight disturbance (ie couple non native sp), **2** = moderate (minor disturbance, some non native sp), **3** = severe (different sp composition, wind damage, differences in light amount)

Landform

Situation: A	**Element:** HSL	**Pattern:** RH
Slope position: G	**Slope degree:** 3	**Slope aspect:** North-east
Top soil depth: D	**Soil colour:** Light brown	**Texture:** Loamy-sand

Notes, potential landzone: 10

Situation

Code	Description
Plains	
A	Not otherwise specified, flat gentle slopes; undulating terrain
B	Alluvial plain or flat, alluvium, flood plain
U	Claypan, Playa or Salina(including inland lakes), Salt Flat(inland).
V	Tidal Flat (coastal), Salt Flat (coastal).
Streams, Lakes	
C	Banks of lake, river, stream, watercourse, levees
D	Gully, drainage line, ravine gorge, outwash
E	Channel Bed, distributaries of inland streams
Hills, Mountains, Tablelands	
F	Slope or Hill not specified
L	Cliff (steep rocky faces), rocky ledge, rocky outcrop, scarp, crevice
N	Coastal rocky headland
K	Top, crest of mountain or ridge
Q	Jump Up (Cuesta) and Mesa, Tableland, Plateau,
Dunes	
R	Recent Coastal Dune (low dune less than about 15m) and
S	Fossil Coastal Dune (High Dune greater than about 15m)
T	Inland Dune.
Water	
W	Swamp or Marsh.
X	Fresh Water Aquatic.
Y	Salt Water Aquatic.
Z	Melon Holes, Gilgai, Depressions in Soil, Sink Holes.

Element

Code	Description	Code	Description	Code	Description
HCR	Hillcrest	DUS	Duneslope	STF	Supratidal flat
SUS	Summit Surface	BRK	Breakaway	FIL	Fill-top
DUC	Dunecrest	CFS	Cliff-foot slope	REF	Feef flat
TOR	Tor	SFS	Scarp-foot Slope	ALC	Alcove
TUM	Tumulus	BEN	Bench	GUL	Gully
DUN	Dune	BER	Berm	CIR	Cirque
CON	Cone	PED	Pediment	DDE	Drainage depression
MOU	Mound	FOO	Footslope	STC	Stream channel
LEV	Levee	TAL	Talus	STB	Stream bed
BAR	Bar	PLA	Plain	TDC	Tidal creek
SCR	Scroll	RFL	Rock flat	EST	Estuary
PST	Prior stream	RPL	Rock platform	SWP	Swamp
FOR	Foredune	COS	Cut-over surface	SWL	Swale
LUN	Lunette	SCD	Scald	TRE	Trench
BRI	Beach ridge	FAN	Fan	LAK	Lake
EMB	Embankment	VLF	Valley flat	PLY	Playa
DAM	Dam	TEF	Terrace flat	DOL	Doline
CLI	Cliff	CBE	Channel bench	OXB	Ox-bow
SCA	Scarp	BKP	Backplain	LAG	Lagoon
HSL	Hillslope	SRP	Scroll plain	BOU	Blow-out
CUT	Cut face	FLD	Flood-out	MAA	Maar
LDS	Landslide	TEP	Terrace plain	CRA	Crater
BAN	(Stream) Bank	TDF	Tidal flat	PIT	Pit
BEA	Beach	IIF	Intertidal flat		

Pattern

Code	Description
RM	Rolling mountains
SM	Steep mountains
VM	Very steep mountains
PM	Precipitous mountains
UH	Undulating hills
RH	Rolling hills
SH	Steep hills
VH	Very steep hills
PH	Precipitous hills
UL	Undulating low hills
RL	Rolling low hills
SL	Steep low hills
VL	Very steep low hills
B	Badlands
GR	Gently undulating rises
UR	Undulating rises
RR	Rolling rises
SR	Steep rises
LP	Level plain
GP	Gently undulating plain
UP	Undulating plain
RP	Rolling plain

Slope Position

Code	Description
C	Crest
D	Closed Depression
F	Flat
G	Gully
H	Hillock
L	Lower-Slope
M	Mid-Slope
P	Plateau
R	Ridge
U	Upper-Slope
V	Open Depression
W	Wetland

Soil Depth

Code	Description
D	Deep
S	Shallow
X	Skeletal

Ground cover (5 x 1m^2 plots, 0, 25, 50, 75, 100)	1	2	3	4	5	Mean
Native grass	37	25	25	34	23	28.8
Native herbs/forbs (non-grass)	4	15	5	3	4	6.2
Native shrubs (< 1m height)	0	0	0	0	0	0
Non-native grass	0	0	5	0	0	1
Non-native herbs and shrubs	0	0	0	0	0	0
Litter (woodies <10 cm diameter, dead annuals, etc)	36	35	50	43	25	37.8
Litter (logs > 10 cm diameter)	0	0	0	0	10	2
Rock	0	0	0	0	0	0
Bare ground	23	25	15	20	38	24.2
Total	***=100%***	***=100%***	***=100%***	***=100%***	***=100%***	***100***
Species in 1 x 1 m quadrat	**%**	**%**	**%**	**%**	**%**	**Mean**
Sporobolus creber	0	0	25	5	0	6
Portulaca australis	0	0	3	0	0	0.6
*Cenchrus ciliaris**	4	0	3	0	0	1.4
Eragrostis sororia	0	0	0	25	0	5
Eragrostis setifolia	0	0	0	0	15	3
Fimbristylis dichotoma	0	15	0	0	4	3.8
Themeda triandra	0	0	0	0	4	0.8
Enneapogon nigricans	3	25	0	4	0	6.4
Heteropogon contortus	30	0	0	0	0	6
Unknown forb	2	0	0	0	0	0.4
Cheilanthes sieberi	2	0	2	3	0	1.4

Other groundcover species (not in 1x1 m plots)				
Species	**Strata**	**Rel. dom.**	**Height (m)**	**Cover estimate <u>100 x 50</u> (0.5 ha) (%)**
Murdannia graminea	G	a	0.2	2
Aristida caput-medusae	G	a	0.4	8
Heteropogon contortus	G	a	0.5	10
Themeda triandra	G	a	0.7	4
Cymbopogon refractus	G	a	0.7	10
Chrysopogon fallax	G	a	0.5	5
Lomandra filiformis	G	a	0.3	3
Lomandra leucocephala	G	a	0.3	1

Tree and shrub canopy cover (estimate)	E	T1	T2	T3	S1	S2	G
Average height (m)	-	15	9	-	4	-	0.5
Height range (m)	-	11-17	7-10	-	1-6	-	0-0.6
Line intercept totals (from below table)	-	26.5	19.8	-	9.1	-	-
Cover density estimate (D, M, S, V)	-	S	M	-	M	-	M

D = touching-overlap <0; **M** = touching-slight separation 0-0.25; **S** = clearly separated 0.25-1; **V** = well separated 1-20

Relative dominance (below): ***d*** – dominant; ***c*** – codominant; ***s*** – subdominant; ***a*** – associated

Tree and shrub canopy cover (100m line intercept)				
Species	**Strata**	**Rel. dom.**	**Height (m)**	**Cover (100m line transect) (%)**
Callitris glaucophylla	T2	d	8	0.4
Eucalyptus populnea	T1	a	13	5.9
Callitris glaucophylla	T2	d	7	1.7
Callitris glaucophylla	S1	a	5	1.7
Eucalyptus populnea	T1	a	14	1.2
Callitris glaucophylla	S1	a	6	1.4
Callitris glaucophylla	S1	a	5.5	1.3
Eucalyptus populnea	T1	a	12	2.3
Callitris glaucophylla	S1	a	6	0.3
Eucalyptus populnea	T1	a	17	7.2
Allocasuarina luehmannii	S1	a	2	0.7
Callitris glaucophylla	T2	a	10	3.2
Callitris glaucophylla	T1	s	11	3.8
Callitris glaucophylla	T2	d	7	0.9
Eucalyptus populnea	T1	a	15	0.9
Callitris glaucophylla	T2	d	8	2.0
Allocasuarina luehmannii	S1	a	4	1.1
Allocasuarina luehmannii	T2	a	8.5	3.2
Eucalyptus populnea	T1	a	13	1.5
Allocasuarina luehmannii	S1	a	4	1.1
Callitris glaucophylla	T2	d	9	1.3
Allocasuarina luehmannii	T2	a	7	1.8
Allocasuarina luehmannii	S1	a	3.5	1.5
Eucalyptus populnea	T1	a	12	3.7
Callitris glaucophylla	T2	d	8	3.0
Callitris glaucophylla	T2	d	7	2.3
Other tree and shrub species (not in 100 m transect)				
Species	**Strata**	**Rel. dom.**	**Height (m)**	**Cover estimate 100 x 50 (0.5 ha) (%)**
Eucalyptus melanophloia	T1	a	15	8
Brachychiton populneus	T1	a	15	2
Acacia salicina	T2	a	9	3
Acacia leiocalyx	S1	a	4	15
*Opuntia tomentosa**	S1	a	4	3
Dodonaea viscosa subsp. *spatulata*	S1	a	4	4
Eremophila mitchellii	S1	a	4	3

Tree and shrub stem counts			
Canopy Species (E, T1, T2,T3) Greater than 20 cm DBH only	**Strata**	**Height (m)**	**Stem count (in <u>100 x 50</u> (0.5 ha area))** Results x 2 = stems per ha
Eucalyptus populnea	T1	15	15
Allocasuarina luehmannii	T2	9	1
Allocasuarina luehmannii	T1	15	1
Callitris glaucophylla	T1	15	10
Callitris glaucophylla	T2	9	5
Brachychiton populneus	T1	15	1

Shrub Species (S1, S2)	**Strata**	**Height (m)**	**Stem count (in <u>50 x 10</u> (0.05 ha))** Results x 20 = stems per ha
Allocasuarina luehmannii	S1	4	33
Callitris glaucophylla	S1	4	31
*Opuntia tomentosa**	S1	4	4
Brachychiton populneus	S1	4	1
Acacia leiocalyx	S1	4	2
Eucalyptus populnea	S1	4	1

Vegetation community/ analogue site

Site: VC5/Q17	**Date:** 14/12/2013	**Lot/plan:** Lot 55 FTY1153	**Obs:** JN

Photo nos: North: 0240 East: 0241 South: 0242 West: 0243

RE type: 11.10.11 (Incorrectly mapped as 11.3.2) **GPS coords:** Zone 55, 709850, 7147818

Location description: RoW 29BPa

Structural formation/Veg community: *Eucalyptus populnea* low woodland with a moderate-dense shrub layer

Ecologically dominant layer: T1

Disturbance:

Wildfire (0=<1yr, 1=1-5yr, 2=>5yr): 1	**Grazing** (0=none to 3=severe): 1
Weeds (0=none to 3=severe): 1	**Erosion** (0=none to 3=severe): 0
Clearing (0=none to 3=severe): 1	**Other:**

VAST condition (see VAST table): 2

Erosion definition: 0=stable, 1=slight disturbance (ie cattle tracks), 2 = moderate (pedestalling, sheet, rill), 3 = severe (pedestals, scalds, sand blown, exposure),
Grazing definition: 0=none, 1=small amount from few plants, 2=small to moderate amount from many plants, 3=moderate to large amount from many plants
Clearing definition: 0=none, 1=small amount/historic yet still remnant, 2= moderate amount, regrowth or near remnant status, 3=large amount, non-rem

Ecosystem function:

Size of patch (area ha): 100-500 ha	**Shape of patch:** (large polygon, linear <200m wide) Medium polygon
Location of patch (low, med, high, very high): High	**Presence of edge effects impacts** (0=none to 3=severe): (weeds, light, wind, sp. composition) 1

Location of patch: low=not connected to remnant or regrowth veg, **med**=connected to remnant veg along 10-50% of border OR connected to remnant veg along 1-10% of border and regrowth >25% of border, **high** = connected to remnant 50-75% of border, **very high** = connected to remnant >75% of border
Edge effects definition: **0** = stable, **1** = slight disturbance (ie couple non native sp), **2** = moderate (minor disturbance, some non native sp), **3** = severe (different sp composition, wind damage, differences in light amount)

Landform

Situation: A	**Element:** HSL	**Pattern:** RH
Slope position: M	**Slope degree:** 3	**Slope aspect:** East
Top soil depth: D	**Soil colour:** Light reddish-brown	**Texture:** Soft, fine, sandy-clay

Notes, potential landzone: 10

Situation

Code	Description
Plains	
A	Not otherwise specified, flat gentle slopes; undulating terrain
B	Alluvial plain or flat, alluvium, flood plain
U	Claypan, Playa or Salina(including inland lakes), Salt Flat(inland).
V	Tidal Flat (coastal), Salt Flat (coastal).
Streams, Lakes	
C	Banks of lake, river, stream, watercourse, levees
D	Gully, drainage line, ravine gorge, outwash
E	Channel Bed, distributaries of inland streams
Hills, Mountains, Tablelands	
F	Slope or Hill not specified
L	Cliff (steep rocky faces), rocky ledge, rocky outcrop, scarp, crevice
N	Coastal rocky headland
K	Top, crest of mountain or ridge
Q	Jump Up (Cuesta) and Mesa, Tableland, Plateau,
Dunes	
R	Recent Coastal Dune (low dune less than about 15m) and
S	Fossil Coastal Dune (High Dune greater than about 15m)
T	Inland Dune.
Water	
W	Swamp or Marsh.
X	Fresh Water Aquatic.
Y	Salt Water Aquatic.
Z	Melon Holes, Gilgai, Depressions in Soil, Sink Holes.

Element

Code	Description	Code	Description	Code	Description
HCR	Hillcrest	DUS	Duneslope	STF	Supratidal flat
SUS	Summit Surface	BRK	Breakaway	FIL	Fill-top
DUC	Dunecrest	CFS	Cliff-foot slope	REF	Feef flat
TOR	Tor	SFS	Scarp-foot Slope	ALC	Alcove
TUM	Tumulus	BEN	Bench	GUL	Gully
DUN	Dune	BER	Berm	CIR	Cirque
CON	Cone	PED	Pediment	DDE	Drainage depression
MOU	Mound	FOO	Footslope	STC	Stream channel
LEV	Levee	TAL	Talus	STB	Stream bed
BAR	Bar	PLA	Plain	TDC	Tidal creek
SCR	Scroll	RFL	Rock flat	EST	Estuary
PST	Prior stream	RPL	Rock platform	SWP	Swamp
FOR	Foredune	COS	Cut-over surface	SWL	Swale
LUN	Lunette	SCD	Scald	TRE	Trench
BRI	Beach ridge	FAN	Fan	LAK	Lake
EMB	Embankment	VLF	Valley flat	PLY	Playa
DAM	Dam	TEF	Terrace flat	DOL	Doline
CLI	Cliff	CBE	Channel bench	OXB	Ox-bow
SCA	Scarp	BKP	Backplain	LAG	Lagoon
HSL	Hillslope	SRP	Scroll plain	BOU	Blow-out
CUT	Cut face	FLD	Flood-out	MAA	Maar
LDS	Landslide	TEP	Terrace plain	CRA	Crater
BAN	(Stream) Bank	TDF	Tidal flat	PIT	Pit
BEA	Beach	IIF	Intertidal flat		

Pattern

Code	Description
RM	Rolling mountains
SM	Steep mountains
VM	Very steep mountains
PM	Precipitous mountains
UH	Undulating hills
RH	Rolling hills
SH	Steep hills
VH	Very steep hills
PH	Precipitous hills
UL	Undulating low hills
RL	Rolling low hills
SL	Steep low hills
VL	Very steep low hills
B	Badlands
GR	Gently undulating rises
UR	Undulating rises
RR	Rolling rises
SR	Steep rises
LP	Level plain
GP	Gently undulating plain
UP	Undulating plain
RP	Rolling plain

Slope Position

Code	Description
C	Crest
D	Closed Depression
F	Flat
G	Gully
H	Hillock
L	Lower-Slope
M	Mid-Slope
P	Plateau
R	Ridge
U	Upper-Slope
V	Open Depression
W	Wetland

Soil Depth

Code	Description
D	Deep
S	Shallow
X	Skeletal

Ground cover (5 x 1m^2 plots, 0, 25, 50, 75, 100)	1	2	3	4	5	Mean
Native grass	30	65	35	35	35	40
Native herbs/forbs (non-grass)	0	0	0	0	0	0
Native shrubs (< 1m height)	5	0	0	0	0	1
Non-native grass	0	0	0	0	0	0
Non-native herbs and shrubs	0	0	0	0	0	0
Litter (woodies <10 cm diameter, dead annuals, etc)	45	30	30	0	40	29
Litter (logs > 10 cm diameter)	0	0	0	20	0	4
Rock	0	0	0	0	0	0
Bare ground	20	5	35	45	25	26
Total	***=100%***	***=100%***	***=100%***	***=100%***	***=100%***	***100***
Species in 1 x 1 m quadrat	**%**	**%**	**%**	**%**	**%**	**Mean**
Aristida sp.	30	5	0	5	10	10
Themeda triandra	0	60	35	0	0	19
Cymbopogon refractus	0	0	0	30	25	11

Other groundcover species (not in 1x1 m plots)				
Species	**Strata**	**Rel. dom.**	**Height (m)**	**Cover estimate <u>100 x 50</u> (0.5 ha) (%)**
*Opuntia tomentosa**	G	a	0.7	2
Cyrsopogon fallax	G	a	0.8	5
Sporobolus creber	G	a	0.6	5
Bothriochloa decipiens	G	a	0.6	15
*Cencrus ciliaris**	G	a	0.5	8
Enteropogon ramosus	G	a	0.8	3

Tree and shrub canopy cover (estimate)	E	T1	T2	T3	S1	S2	G
Average height (m)	-	13	8	-	6	1.5	0.5
Height range (m)	-	10-14	7-9	-	4-6	1-3	0-1
Line intercept totals (from below table)	-	20.2	2.6	-	7.5	0.0	-
Cover density estimate (D, M, S, V)	-	S	M	-	M	M	M

D = touching-overlap <0; **M** = touching-slight separation 0-0.25; **S** = clearly separated 0.25-1; **V** = well separated 1-20

Relative dominance (below): ***d*** – dominant; ***c*** – codominant; ***s*** – subdominant; ***a*** – associated

Tree and shrub canopy cover (100m line intercept)				
Species	**Strata**	**Rel. dom.**	**Height (m)**	**Cover (100m line transect) (%)**
Eucalyptus populnea	T1	d	11	5.8
Eremophila mitchellii	S1	d	6	1.4
Eucalyptus populnea	T1	d	10	3.6
Eucalyptus populnea	T1	d	12	3.1
Eremophila mitchellii	S1	d	3	1.1
Eremophila mitchellii	S1	d	3.5	0.1
Eucalyptus populnea	T1	d	14	1.4
Eremophila mitchellii	S1	d	4	0.4
Eucalyptus populnea	T1	d	12	3.6
Eucalyptus populnea	T2	d	8.5	2.6
Eucalyptus populnea	S1	a	6	0.9
Eucalyptus populnea	S1	a	5	1.2
Eucalyptus populnea	T1	d	11	1.2
Eremophila mitchellii	S1	d	5	2.4
Eucalyptus populnea	T1	d	10.5	1.5
Other tree and shrub species (not in 100 m transect)				
Species	**Strata**	**Rel. dom.**	**Height (m)**	**Cover estimate 100 x 50 (0.5 ha) (%)**
Eucalyptus melanophloia	T1	a	13	5
Callitris glaucophylla	T2	a	8	3
*Opuntia tomentosa**	S1	a	6	2
Geijera parviflora	S1	a	6	5
Geijera parviflora	S2	a	1.5	3
Parsonsia eucalyptophylla	S2	a	1.5	1
Dodonaea heteromorpha	S2	a	1.5	10
Dodonaea viscosa subsp. *spatulata*	S2	d	1.5	15
Acacia leiocalyx	S2	a	1.5	5
Grewia latifolia	S2	a	1.5	1

Tree and shrub stem counts			
Canopy Species (E, T1, T2,T3) Greater than 20 cm DBH only	**Strata**	**Height (m)**	**Stem count (in <u>100 x 50</u> (0.5 ha area))** Results x 2 = stems per ha
Eucalyptus populnea	T1	13	18
Eucalyptus populnea	T2	8	19
Eucalyptus melanophloia	T1	13	3
Eremophila mitchellii	S1	6	1
Eucalyptus populnea x melanophloia	T2	8	1
Geijera parviflora	S1	6	1

Shrub Species (S1, S2)	**Strata**	**Height (m)**	**Stem count (in <u>50 x 10</u> (0.05 ha))** Results x 20 = stems per ha
Eremophila mitchellii	S2	1.5	16
Dodonaea heteromorpha	S2	1.5	5
*Opuntia tomentosa**	S2	1.5	7
Dodonaea viscosa subsp. *spatulata*	S2	1.5	6
Eremophila mitchellii	S1	6	6
Grewia latifolia	S2	1.5	1
Acacia leiocalyx	S2	1.5	1
Eucalyptus populnea	S1	6	2

Site habitat assessment		
Site: HA 1	**Date:** 10/12/2013	**Observers:** LM
Photo nos: North: 452, East: 453, South: 454, West: 455		
RE type: 11.10.9	**GPS Co-ords:** 693519, 7143310	

Habitat description:
Callitris dominated open forest, sparse emergent eucalypts and grassy groundcover, RoW 29

Trees with hollows (in 100 x 50 (0.5 ha area))	**No. of trees containing hollows (tally)**	**Total number of hollows**
Hollow size < 10 cm diameter	2	3
Hollow size > 10 cm diameter	1	1
Hollow bearing logs (in 100 x 50 (0.5 ha area)), hollows >10 cm diameter	**No. of logs containing hollows (tally)** 1	**Total number of hollows in logs** 2
Fallen woody material (in 50 x 10 (0.05 ha area))	**Total length of logs >10 cm diameter** Total: 40 m	**Total number of logs (tally)** 5

Other habitat characteristics (in 100 x 50 (0.5 ha area):

Characteristic	**Abundance (0-7)^**	**Notes**
Decorticating bark	3	On larger callitris trees only
Course leaf litter (>2cm diam)	0	
Fine leaf litter (<2cm diam)	0	
Bare ground	3	
Grass	5	
Soil cracks	0	
Stones (20-60 cm)	0	
Boulders (61 cm – 2 m)	0	
Large boulders (>2 m)	0	
Rock crevices	0	
Exfoliating rock	0	

^Abundance key: 0 = nil, **1** = Rare, **2** = Rare to occasional, **3** = Occasional, **4** = Occasional to common, **5** = common, **6** = common to abundant, **7** = Abundant

Other habitat features and notes (e.g. potential threatened species)**:**
no threatened fauna recorded within vegetation management area
potential habitat for golden tailed gecko, squatter pigeon

Photos

North

East

South

West

Site habitat assessment		
Site: HA 2	**Date:** 10/12/2013	**Observers:** LM
Photo nos: North: 456, East: 457, South: 458, West: 459		
RE type: 11.10.9	**GPS Co-ords:** 694503, 7143679	

Habitat description:
Callitris dominated woodland to open forest, RoW 35

Trees with hollows (in 100 x 50 (0.5 ha area))	**No. of trees containing hollows (tally)**	**Total number of hollows**
Hollow size < 10 cm diameter	3	3
Hollow size > 10 cm diameter	2	3
Hollow bearing logs (in 100 x 50 (0.5 ha area)), hollows >10 cm diameter	**No. of logs containing hollows (tally)** 1	**Total number of hollows in logs** 1
Fallen woody material (in 50 x 10 (0.05 ha area))	**Total length of logs >10 cm diameter** Total: 24 m	**Total number of logs (tally)** 4

Other habitat characteristics (in 100 x 50 (0.5 ha area):

Characteristic	**Abundance (0-7)^**	**Notes**
Decorticating bark	4	
Course leaf litter (>2cm diam)	1	
Fine leaf litter (<2cm diam)	0	
Bare ground	3	
Grass	6	
Soil cracks	0	
Stones (20-60 cm)	0	
Boulders (61 cm – 2 m)	0	
Large boulders (>2 m)	0	
Rock crevices	0	
Exfoliating rock	0	

^Abundance key: 0 = nil, **1** = Rare, **2** = Rare to occasional, **3** = Occasional, **4** = Occasional to common, **5** = common, **6** = common to abundant, **7** = Abundant

Other habitat features and notes (e.g. potential threatened species)**:**
no threatened fauna recorded within vegetation management area
hollow bearing trees are present in vegetation management zone, avoid clearing fauna habitat features
potential habitat for golden tailed gecko, squatter pigeon

Photos

North

East

South

West

Site habitat assessment		
Site: HA 3	**Date:** 10/12/2013	**Observers:** LM
Photo nos: North: 460, East: 461, South: 462, West: 463		
RE type: 11.3.2/11.3.25	**GPS Co-ords:** 695023, 7143860	

Habitat description:
Callitris dominated woodland to open forest, RoW 35

Trees with hollows (in 100 x 50 (0.5 ha area))	**No. of trees containing hollows (tally)**	**Total number of hollows**
Hollow size < 10 cm diameter	1	3
Hollow size > 10 cm diameter	2	4
Hollow bearing logs (in 100 x 50 (0.5 ha area)), hollows >10 cm diameter	**No. of logs containing hollows (tally)** 0	**Total number of hollows in logs** 0
Fallen woody material (in 50 x 10 (0.05 ha area))	**Total length of logs >10 cm diameter** Total: 55 m	**Total number of logs (tally)** 15

Other habitat characteristics (in 100 x 50 (0.5 ha area):

Characteristic	**Abundance (0-7)^**	**Notes**
Decorticating bark	4	
Course leaf litter (>2cm diam)	1	
Fine leaf litter (<2cm diam)	0	
Bare ground	4	
Grass	5	
Soil cracks	0	
Stones (20-60 cm)	0	
Boulders (61 cm – 2 m)	0	
Large boulders (>2 m)	0	
Rock crevices	0	
Exfoliating rock	0	

^Abundance key: 0 = nil, **1** = Rare, **2** = Rare to occasional, **3** = Occasional, **4** = Occasional to common, **5** = common, **6** = common to abundant, **7** = Abundant

Other habitat features and notes (e.g. potential threatened species)**:**
Potential habitat for golden tailed gecko, squatter pigeon

Photos

North

East

South

West

Site habitat assessment		
Site: HA 4	**Date:** 11/12/2013	**Observers:** LM
Photo nos: North: 466, East: 467, South: 468, West: 469		
RE type: 11.10.11	**GPS Co-ords:** 698462, 7144176	

Habitat description:
Eucalyptus populnea woodland with dense callitris T2 understorey, sparse to mid-dense grass cover and scattered woody debris, RoW 42P

Trees with hollows (in 100 x 50 (0.5 ha area))	**No. of trees containing hollows (tally)**	**Total number of hollows**
Hollow size < 10 cm diameter	5	7
Hollow size > 10 cm diameter	4	5
Hollow bearing logs (in 100 x 50 (0.5 ha area)), hollows >10 cm diameter	**No. of logs containing hollows (tally)** 1	**Total number of hollows in logs** 2
Fallen woody material (in 50 x 10 (0.05 ha area))	**Total length of logs >10 cm diameter** Total: 60 m	**Total number of logs (tally)** 18

Other habitat characteristics (in 100 x 50 (0.5 ha area):

Characteristic	**Abundance (0-7)^**	**Notes**
Decorticating bark	3	
Course leaf litter (>2cm diam)	1	
Fine leaf litter (<2cm diam)	4	
Bare ground	4	
Grass	3	
Soil cracks	0	
Stones (20-60 cm)	0	
Boulders (61 cm – 2 m)	0	
Large boulders (>2 m)	0	
Rock crevices	0	
Exfoliating rock	0	

^Abundance key: 0 = nil, **1** = Rare, **2** = Rare to occasional, **3** = Occasional, **4** = Occasional to common, **5** = common, **6** = common to abundant, **7** = Abundant

Other habitat features and notes (e.g. potential threatened species)**:**
no threatened fauna recorded within vegetation management area
avoid clearing fauna habitat features/potential breeding places within vegetation management area
potential habitat for golden tailed gecko, squatter pigeon, brigalow scaly foot

Photos

North

East

South

West

Site habitat assessment		
Site: HA 5	**Date:** 11/12/2013	**Observers:** LM
Photo nos: North: 470, East: 471, South: 472, West: 473		
RE type: regrowth and non-remnant	**GPS Co-ords:** 699092, 7143726	

Habitat description:

Eucalyptus populnea woodland with mid-dense callitris T2 and shrub layer, mid-dense grassy groundcover and woody debris present, RoW 45

Trees with hollows (in 100 x 50 (0.5 ha area))	**No. of trees containing hollows (tally)**	**Total number of hollows**
Hollow size < 10 cm diameter	4	6
Hollow size > 10 cm diameter	1	1
Hollow bearing logs (in 100 x 50 (0.5 ha area)), hollows >10 cm diameter	**No. of logs containing hollows (tally)** 4	**Total number of hollows in logs** 6
Fallen woody material (in 50 x 10 (0.05 ha area))	**Total length of logs >10 cm diameter** Total: 25 m	**Total number of logs (tally)** 6

Other habitat characteristics (in 100 x 50 (0.5 ha area):

Characteristic	**Abundance (0-7)^**	**Notes**
Decorticating bark	2	
Course leaf litter (>2cm diam)	1	
Fine leaf litter (<2cm diam)	3	
Bare ground	4	
Grass	4	
Soil cracks	0	
Stones (20-60 cm)	2	
Boulders (61 cm – 2 m)	0	
Large boulders (>2 m)	2	
Rock crevices	0	
Exfoliating rock	0	

^Abundance key: 0 = nil, **1** = Rare, **2** = Rare to occasional, **3** = Occasional, **4** = Occasional to common, **5** = common, **6** = common to abundant, **7** = Abundant

Other habitat features and notes (e.g. potential threatened species)**:**

No threatened fauna recorded within vegetation management area, some clearing within vegetation management area has already occurred from adjacent powerline RoW. Avoid clearing fauna habitat features/potential breeding places within vegetation management area

Potential habitat for golden tailed gecko

Photos

North

East

South

West

Site habitat assessment		
Site: HA 6	**Date:** 11/12/2013	**Observers:** LM
Photo nos: North: 480, East: 481, South: 482, West: 483		
RE type: 11.10.11	**GPS Co-ords:** 700248, 7143177	

Habitat description:
Eucalyptus populnea woodland with mid-dense callitris shrub layer, dense grassy groundcover and scattered woody debris, RoW 49

Trees with hollows (in 100 x 50 (0.5 ha area))	**No. of trees containing hollows (tally)**	**Total number of hollows**
Hollow size < 10 cm diameter	0	0
Hollow size > 10 cm diameter	1	1
Hollow bearing logs (in 100 x 50 (0.5 ha area)), hollows >10 cm diameter	**No. of logs containing hollows (tally)** 2	**Total number of hollows in logs** 4
Fallen woody material (in 50 x 10 (0.05 ha area))	**Total length of logs >10 cm diameter** Total: 27 m	**Total number of logs (tally)** 12

Other habitat characteristics (in 100 x 50 (0.5 ha area):

Characteristic	**Abundance (0-7)^**	**Notes**
Decorticating bark	2	
Course leaf litter (>2cm diam)	2	
Fine leaf litter (<2cm diam)	1	
Bare ground	3	
Grass	6	
Soil cracks	0	
Stones (20-60 cm)	0	
Boulders (61 cm – 2 m)	0	
Large boulders (>2 m)	0	
Rock crevices	0	
Exfoliating rock	0	

^Abundance key: 0 = nil, **1** = Rare, **2** = Rare to occasional, **3** = Occasional, **4** = Occasional to common, **5** = common, **6** = common to abundant, **7** = Abundant

Other habitat features and notes (e.g. potential threatened species)**:**
no threatened fauna recorded within vegetation management area
avoid clearing fauna habitat features/potential breeding places within vegetation management area
potential habitat for golden tailed gecko, squatter pigeon

Photos

North

East

South

West

Site habitat assessment		
Site: HA 7	**Date:** 11/12/2013	**Observers:** LM
Photo nos: North: 484, East: 485, South: 486, West: 487		
RE type: non-remnant	**GPS Co-ords:** 699464, 7142611	

Habitat description:
Scattered mature and juvenile eucalypts, very open woodland, sparese to mid dense shrubs including callitirs and casuarinas, RoW 45P

Trees with hollows (in 100 x 50 (0.5 ha area))	**No. of trees containing hollows (tally)**	**Total number of hollows**
Hollow size < 10 cm diameter	0	0
Hollow size > 10 cm diameter	0	0
Hollow bearing logs (in 100 x 50 (0.5 ha area)), hollows >10 cm diameter	**No. of logs containing hollows (tally)** 0	**Total number of hollows in logs** 0
Fallen woody material (in 50 x 10 (0.05 ha area))	**Total length of logs >10 cm diameter** Total: 5 m	**Total number of logs (tally)** 2

Other habitat characteristics (in 100 x 50 (0.5 ha area):

Characteristic	**Abundance (0-7)^**	**Notes**
Decorticating bark	2	
Course leaf litter (>2cm diam)	0	
Fine leaf litter (<2cm diam)	0	
Bare ground	5	
Grass	4	
Soil cracks	0	
Stones (20-60 cm)	0	
Boulders (61 cm – 2 m)	0	
Large boulders (>2 m)	0	
Rock crevices	0	
Exfoliating rock	0	

^Abundance key: 0 = nil, **1** = Rare, **2** = Rare to occasional, **3** = Occasional, **4** = Occasional to common, **5** = common, **6** = common to abundant, **7** = Abundant

Other habitat features and notes (e.g. potential threatened species)**:**
no threatened fauna recorded within vegetation management area
avoid clearing fauna habitat features/potential breeding places within vegetation management area
potential habitat for square tailed kite, squatter pigeon

Photos

North

East

South

West

Site habitat assessment		
Site: HA 8	**Date:** 11/12/2013	**Observers:** LM
Photo nos: North: 488, East: 489, South: 490, West: 491		
RE type: regrowth	**GPS Co-ords:** 699745, 7142460	

Habitat description:
Dense stand of young callitirs small trees with emergent eucalypts, grassy understorey, RoW 47

Trees with hollows (in 100 x 50 (0.5 ha area))	**No. of trees containing hollows (tally)**	**Total number of hollows**
Hollow size < 10 cm diameter	0	0
Hollow size > 10 cm diameter	1	1
Hollow bearing logs (in 100 x 50 (0.5 ha area)), hollows >10 cm diameter	**No. of logs containing hollows (tally)** 1	**Total number of hollows in logs** 2
Fallen woody material (in 50 x 10 (0.05 ha area))	**Total length of logs >10 cm diameter** Total: 22 m	**Total number of logs (tally)** 5

Other habitat characteristics (in 100 x 50 (0.5 ha area):

Characteristic	**Abundance (0-7)^**	**Notes**
Decorticating bark	2	
Course leaf litter (>2cm diam)	3	
Fine leaf litter (<2cm diam)	3	
Bare ground	3	
Grass	5	
Soil cracks	0	
Stones (20-60 cm)	0	
Boulders (61 cm – 2 m)	0	
Large boulders (>2 m)	0	
Rock crevices	0	
Exfoliating rock	0	

^Abundance key: 0 = nil, **1** = Rare, **2** = Rare to occasional, **3** = Occasional, **4** = Occasional to common, **5** = common, **6** = common to abundant, **7** = Abundant

Other habitat features and notes (e.g. potential threatened species)**:**
no threatened fauna recorded within vegetation management area
avoid clearing fauna habitat features/potential breeding places within vegetation management area
potential habitat for square tailed kite, squatter pigeon

Photos

North

East

South

West

Site habitat assessment		
Site: HA 9	**Date:** 13/12/2013	**Observers:** LM
Photo nos: North: 492, East: 493, South: 494, West: 495		
RE type: 11.10.9	**GPS Co-ords:** 700443, 7145190	

Habitat description:
Callitris dominated open forest with a grassy understorey, RoW 43

Trees with hollows (in 100 x 50 (0.5 ha area))	**No. of trees containing hollows (tally)**	**Total number of hollows**
Hollow size < 10 cm diameter	0	0
Hollow size > 10 cm diameter	0	0
Hollow bearing logs (in 100 x 50 (0.5 ha area)), hollows >10 cm diameter	**No. of logs containing hollows (tally)** 0	**Total number of hollows in logs** 0
Fallen woody material (in 50 x 10 (0.05 ha area))	**Total length of logs >10 cm diameter** Total: 63 m	**Total number of logs (tally)** 26

Other habitat characteristics (in 100 x 50 (0.5 ha area):

Characteristic	**Abundance (0-7)^**	**Notes**
Decorticating bark	3	
Course leaf litter (>2cm diam)	0	
Fine leaf litter (<2cm diam)	0	
Bare ground	5	
Grass	5	
Soil cracks	0	
Stones (20-60 cm)	0	
Boulders (61 cm – 2 m)	0	
Large boulders (>2 m)	0	
Rock crevices	0	
Exfoliating rock	0	

^Abundance key: 0 = nil, **1** = Rare, **2** = Rare to occasional, **3** = Occasional, **4** = Occasional to common, **5** = common, **6** = common to abundant, **7** = Abundant

Other habitat features and notes (e.g. potential threatened species)**:**
no threatened fauna recorded within vegetation management area
avoid clearing fauna habitat features/potential breeding places within vegetation management area
vegetation management area is mostly cleared from previous forestry clearing

Photos

North

East

South

West

Site habitat assessment		
Site: HA 10	**Date:** 13/12/2013	**Observers:** LM
Photo nos: North: 501, East: 502, South: 503, West: 504		
RE type: 11.10.9	**GPS Co-ords:** 700528, 7144640	

Habitat description:
Callitris dominated open forest with a grassy understorey, RoW 45

Trees with hollows (in 100 x 50 (0.5 ha area))	**No. of trees containing hollows (tally)**	**Total number of hollows**
Hollow size < 10 cm diameter	2	2
Hollow size > 10 cm diameter	0	0
Hollow bearing logs (in 100 x 50 (0.5 ha area)), hollows >10 cm diameter	**No. of logs containing hollows (tally)** 0	**Total number of hollows in logs** 0
Fallen woody material (in 50 x 10 (0.05 ha area))	**Total length of logs >10 cm diameter** Total: 110 m	**Total number of logs (tally)** 26

Other habitat characteristics (in 100 x 50 (0.5 ha area):

Characteristic	**Abundance (0-7)^**	**Notes**
Decorticating bark	3	
Course leaf litter (>2cm diam)	1	
Fine leaf litter (<2cm diam)	1	
Bare ground	5	
Grass	4	
Soil cracks	0	
Stones (20-60 cm)	0	
Boulders (61 cm – 2 m)	1	
Large boulders (>2 m)	0	
Rock crevices	0	
Exfoliating rock	0	

^Abundance key: 0 = nil, **1** = Rare, **2** = Rare to occasional, **3** = Occasional, **4** = Occasional to common, **5** = common, **6** = common to abundant, **7** = Abundant

Other habitat features and notes (e.g. potential threatened species)**:**
no threatened fauna recorded within vegetation management area
avoid clearing fauna habitat features/potential breeding places within vegetation management area
potential habitat for golden tailed gecko, squatter pigeon
vegetation management area is partially cleared from logging and adjacent powerline RoW

Photos

North

East

South

West

Site habitat assessment		
Site: HA 11	**Date:** 13/12/2013	**Observers:** LM
Photo nos: North: 505, East: 506, South: 507, West: 508		
RE type: 11.10.11	**GPS Co-ords:** 701137, 7142537	

Habitat description:
Eucalyptus populnea open woodland with dense callitiris understorey, RoW 48

Trees with hollows (in 100 x 50 (0.5 ha area))	**No. of trees containing hollows (tally)**	**Total number of hollows**
Hollow size < 10 cm diameter	4	4
Hollow size > 10 cm diameter	0	0
Hollow bearing logs (in 100 x 50 (0.5 ha area)), hollows >10 cm diameter	**No. of logs containing hollows (tally)** 0	**Total number of hollows in logs** 0
Fallen woody material (in 50 x 10 (0.05 ha area))	**Total length of logs >10 cm diameter** Total: 42 m	**Total number of logs (tally)** 13

Other habitat characteristics (in 100 x 50 (0.5 ha area):

Characteristic	**Abundance (0-7)^**	**Notes**
Decorticating bark	2	
Course leaf litter (>2cm diam)	2	
Fine leaf litter (<2cm diam)	2	
Bare ground	5	
Grass	3	
Soil cracks	0	
Stones (20-60 cm)	0	
Boulders (61 cm – 2 m)	0	
Large boulders (>2 m)	0	
Rock crevices	0	
Exfoliating rock	0	

^Abundance key: 0 = nil, **1** = Rare, **2** = Rare to occasional, **3** = Occasional, **4** = Occasional to common, **5** = common, **6** = common to abundant, **7** = Abundant

Other habitat features and notes (e.g. potential threatened species)**:**
no threatened fauna recorded within vegetation management area
avoid clearing fauna habitat features/potential breeding places within vegetation management area
potential habitat for golden tailed gecko, squatter pigeon

Photos

North

East

South

West

Site habitat assessment		
Site: HA 12	**Date:** 13/12/2013	**Observers:** LM
Photo nos: North: 513, East: 514, South: 515, West: 516		
RE type: 11.10.11	**GPS Co-ords:** 700034, 7142426	

Habitat description:

Eucalyptus populnea open woodland with dense callitiris and casuarina understorey, RoW 48

Trees with hollows (in 100 x 50 (0.5 ha area))	**No. of trees containing hollows (tally)**	**Total number of hollows**
Hollow size < 10 cm diameter	0	0
Hollow size > 10 cm diameter	1	1
Hollow bearing logs (in 100 x 50 (0.5 ha area)), hollows >10 cm diameter	**No. of logs containing hollows (tally)** 3	**Total number of hollows in logs** 5
Fallen woody material (in 50 x 10 (0.05 ha area))	**Total length of logs >10 cm diameter** Total: 53 m	**Total number of logs (tally)** 11

Other habitat characteristics (in 100 x 50 (0.5 ha area):

Characteristic	**Abundance (0-7)^**	**Notes**
Decorticating bark	3	
Course leaf litter (>2cm diam)	3	
Fine leaf litter (<2cm diam)	3	
Bare ground	6	
Grass	4	
Soil cracks	0	
Stones (20-60 cm)	0	
Boulders (61 cm – 2 m)	0	
Large boulders (>2 m)	0	
Rock crevices	0	
Exfoliating rock	0	

^Abundance key: 0 = nil, **1** = Rare, **2** = Rare to occasional, **3** = Occasional, **4** = Occasional to common, **5** = common, **6** = common to abundant, **7** = Abundant

Other habitat features and notes (e.g. potential threatened species)**:**

Avoid clearing this vegetation management area if possible, particularly as there are fauna habitat features/breeding places, watercourses, type A restricted species and potential habitat for threatened species within the area

No threatened fauna recorded within vegetation management area, potential habitat for golden tailed gecko, squatter pigeon, brigalow scaly foot, koala. Avoid clearing fauna habitat features/potential breeding places within vegetation management area

Photos

North

East

South

West

Site habitat assessment		
Site: HA 13	**Date:** 13/12/2013	**Observers:** LM
Photo nos: North: 523, East: 524, South: 525, West: 526		
RE type: 11.10.11/11.10.7a	**GPS Co-ords:** 708208, 7143396	

Habitat description:
Eucalyptus populnea woodland with dense to mid-dense mixed shrubby understorey , RoW 4BP

Trees with hollows (in 100 x 50 (0.5 ha area))	**No. of trees containing hollows (tally)**	**Total number of hollows**
Hollow size < 10 cm diameter	2	4
Hollow size > 10 cm diameter	1	1
Hollow bearing logs (in 100 x 50 (0.5 ha area)), hollows >10 cm diameter	**No. of logs containing hollows (tally)** 0	**Total number of hollows in logs** 0
Fallen woody material (in 50 x 10 (0.05 ha area))	**Total length of logs >10 cm diameter** Total: 25 m	**Total number of logs (tally)** 8

Other habitat characteristics (in 100 x 50 (0.5 ha area):

Characteristic	**Abundance (0-7)^**	**Notes**
Decorticating bark	2	
Course leaf litter (>2cm diam)	3	
Fine leaf litter (<2cm diam)	1	
Bare ground	4	
Grass	6	
Soil cracks	0	
Stones (20-60 cm)	0	
Boulders (61 cm – 2 m)	0	
Large boulders (>2 m)	0	
Rock crevices	0	
Exfoliating rock	0	

^Abundance key: 0 = nil, **1** = Rare, **2** = Rare to occasional, **3** = Occasional, **4** = Occasional to common, **5** = common, **6** = common to abundant, **7** = Abundant

Other habitat features and notes (e.g. potential threatened species)**:**
no threatened fauna recorded within vegetation management area
avoid clearing fauna habitat features/potential breeding places within vegetation management area
potential habitat for squatter pigeon, powerful owl, koala

Photos

North

East

South

West

Site habitat assessment		
Site: HA 14	**Date:** 14/12/2013	**Observers:** LM
Photo nos: North: 531, East: 532, South: 533, West: 534		
RE type: 11.10.11/11.10.7a	**GPS Co-ords:** 706846, 7143341	

Habitat description:
Eucalyptus populnea woodland with mixed shrublayer, RoW 4BP

Trees with hollows (in 100 x 50 (0.5 ha area))	**No. of trees containing hollows (tally)**	**Total number of hollows**
Hollow size < 10 cm diameter	5	7
Hollow size > 10 cm diameter	3	3
Hollow bearing logs (in 100 x 50 (0.5 ha area)), hollows >10 cm diameter	**No. of logs containing hollows (tally)** 3	**Total number of hollows in logs** 7
Fallen woody material (in 50 x 10 (0.05 ha area))	**Total length of logs >10 cm diameter** Total: 44 m	**Total number of logs (tally)** 17

Other habitat characteristics (in 100 x 50 (0.5 ha area):

Characteristic	**Abundance (0-7)^**	**Notes**
Decorticating bark	2	
Course leaf litter (>2cm diam)	3	
Fine leaf litter (<2cm diam)	1	
Bare ground	4	
Grass	6	
Soil cracks	0	
Stones (20-60 cm)	0	
Boulders (61 cm – 2 m)	0	
Large boulders (>2 m)	0	
Rock crevices	0	
Exfoliating rock	0	

^Abundance key: 0 = nil, **1** = Rare, **2** = Rare to occasional, **3** = Occasional, **4** = Occasional to common, **5** = common, **6** = common to abundant, **7** = Abundant

Other habitat features and notes (e.g. potential threatened species)**:**
no threatened fauna recorded within vegetation management area
avoid clearing fauna habitat features/potential breeding places within vegetation management area
potential habitat for squatter pigeon, powerful owl, koala

Photos

North

East

South

West

Site habitat assessment		
Site: HA 15	**Date:** 14/12/2013	**Observers:** LM
Photo nos: North: 539, East: 540, South: 541, West: 542		
RE type: 11.10.11/11.10.7a	**GPS Co-ords:** 706815, 7146257	

Habitat description:
Eucalyptus populnea woodland with dense shrubby understorey, RoW 28CP

Trees with hollows (in 100 x 50 (0.5 ha area))	**No. of trees containing hollows (tally)**	**Total number of hollows**
Hollow size < 10 cm diameter	1	2
Hollow size > 10 cm diameter	1	3
Hollow bearing logs (in 100 x 50 (0.5 ha area)), hollows >10 cm diameter	**No. of logs containing hollows (tally)** 0	**Total number of hollows in logs** 0
Fallen woody material (in 50 x 10 (0.05 ha area))	**Total length of logs >10 cm diameter** Total: 62 m	**Total number of logs (tally)** 24

Other habitat characteristics (in 100 x 50 (0.5 ha area):

Characteristic	**Abundance (0-7)^**	**Notes**
Decorticating bark	3	
Course leaf litter (>2cm diam)	1	
Fine leaf litter (<2cm diam)	3	
Bare ground	6	
Grass	2	
Soil cracks	0	
Stones (20-60 cm)	0	
Boulders (61 cm – 2 m)	0	
Large boulders (>2 m)	0	
Rock crevices	0	
Exfoliating rock	0	

^Abundance key: 0 = nil, **1** = Rare, **2** = Rare to occasional, **3** = Occasional, **4** = Occasional to common, **5** = common, **6** = common to abundant, **7** = Abundant

Other habitat features and notes (e.g. potential threatened species)**:**
no threatened fauna recorded within vegetation management area
avoid clearing fauna habitat features/potential breeding places within vegetation management area
potential habitat for brigalow scaly foot, squatter pigeon

Photos

North

East

South

West

Site habitat assessment		
Site: HA 16	**Date:** 14/12/2013	**Observers:** LM
Photo nos: North: 543, East: 544, South: 545, West: 546		
RE type: 11.3.2	**GPS Co-ords:** 709848, 7147787	

Habitat description:
Eucalyptus populnea woodland with a mid-dense shrublayer and grassy groundlayer , RoW 29BP

Trees with hollows (in 100 x 50 (0.5 ha area))	**No. of trees containing hollows (tally)**	**Total number of hollows**
Hollow size < 10 cm diameter	4	8
Hollow size > 10 cm diameter	3	3
Hollow bearing logs (in 100 x 50 (0.5 ha area)), hollows >10 cm diameter	**No. of logs containing hollows (tally)** 0	**Total number of hollows in logs** 0
Fallen woody material (in 50 x 10 (0.05 ha area))	**Total length of logs >10 cm diameter** Total: 41 m	**Total number of logs (tally)** 8

Other habitat characteristics (in 100 x 50 (0.5 ha area):

Characteristic	**Abundance (0-7)^**	**Notes**
Decorticating bark	3	
Course leaf litter (>2cm diam)	3	
Fine leaf litter (<2cm diam)	2	
Bare ground	3	
Grass	6	
Soil cracks	0	
Stones (20-60 cm)	0	
Boulders (61 cm – 2 m)	0	
Large boulders (>2 m)	0	
Rock crevices	0	
Exfoliating rock	0	

^Abundance key: 0 = nil, **1** = Rare, **2** = Rare to occasional, **3** = Occasional, **4** = Occasional to common, **5** = common, **6** = common to abundant, **7** = Abundant

Other habitat features and notes (e.g. potential threatened species)**:**
no threatened fauna recorded within vegetation management area
avoid clearing fauna habitat features/potential breeding places and Type A restricted plants within vegetation management area
potential habitat for squatter pigeon, koala

Photos

North

East

South

West

Site habitat assessment		
Site: HA 17	**Date:** 14/12/2013	**Observers:** LM
Photo nos: North: 547, East: 548, South: 549, West: 550		
RE type: 11.3.2	**GPS Co-ords:** 711070, 7148133	

Habitat description:
Eucalyptus populnea woodland with a dense shrubby understorey , RoW 36B

Trees with hollows (in 100 x 50 (0.5 ha area))	**No. of trees containing hollows (tally)**	**Total number of hollows**
Hollow size < 10 cm diameter	4	6
Hollow size > 10 cm diameter	1	3
Hollow bearing logs (in 100 x 50 (0.5 ha area)), hollows >10 cm diameter	**No. of logs containing hollows (tally)** 2	**Total number of hollows in logs** 4
Fallen woody material (in 50 x 10 (0.05 ha area))	**Total length of logs >10 cm diameter** Total: 57 m	**Total number of logs (tally)** 8

Other habitat characteristics (in 100 x 50 (0.5 ha area):

Characteristic	**Abundance (0-7)^**	**Notes**
Decorticating bark	3	
Course leaf litter (>2cm diam)	3	
Fine leaf litter (<2cm diam)	3	
Bare ground	4	
Grass	6	
Soil cracks	0	
Stones (20-60 cm)	0	
Boulders (61 cm – 2 m)	0	
Large boulders (>2 m)	0	
Rock crevices	0	
Exfoliating rock	0	

^Abundance key: 0 = nil, **1** = Rare, **2** = Rare to occasional, **3** = Occasional, **4** = Occasional to common, **5** = common, **6** = common to abundant, **7** = Abundant

Other habitat features and notes (e.g. potential threatened species)**:**
no threatened fauna recorded within vegetation management area
avoid clearing fauna habitat features/potential breeding places within vegetation management area
potential habitat for brigalow scaly foot, squatter pigeon, golden tail gecko

Photos

North

East

South

West

Site habitat assessment		
Site: HA 18	**Date:** 14/12/2013	**Observers:** LM
Photo nos: North: 556, East: 557, South: 558, West: 559		
RE type: 11.10.9	**GPS Co-ords:** 711405, 7147698	

Habitat description:
Callitris glaucophylla dominated open forest with dense shrubs and a grassy understorey. Emergent eucalypts also present , RoW 36B

Trees with hollows (in 100 x 50 (0.5 ha area))	**No. of trees containing hollows (tally)**	**Total number of hollows**
Hollow size < 10 cm diameter	2	3
Hollow size > 10 cm diameter	7	9
Hollow bearing logs (in 100 x 50 (0.5 ha area)), hollows >10 cm diameter	**No. of logs containing hollows (tally)** 4	**Total number of hollows in logs** 5
Fallen woody material (in 50 x 10 (0.05 ha area))	**Total length of logs >10 cm diameter** Total: 69 m	**Total number of logs (tally)** 8

Other habitat characteristics (in 100 x 50 (0.5 ha area):

Characteristic	**Abundance (0-7)^**	**Notes**
Decorticating bark	2	
Course leaf litter (>2cm diam)	3	
Fine leaf litter (<2cm diam)	4	
Bare ground	5	
Grass	4	
Soil cracks	0	
Stones (20-60 cm)	0	
Boulders (61 cm – 2 m)	0	
Large boulders (>2 m)	0	
Rock crevices	0	
Exfoliating rock	0	

^Abundance key: 0 = nil, **1** = Rare, **2** = Rare to occasional, **3** = Occasional, **4** = Occasional to common, **5** = common, **6** = common to abundant, **7** = Abundant

Other habitat features and notes (e.g. potential threatened species)**:**
no threatened fauna recorded within vegetation management area
avoid clearing watercourse area and fauna habitat features/potential breeding places within vegetation management area
potential habitat for squatter pigeon, golden tail gecko

Photos

North

East

South

West

Site habitat assessment		
Site: HA 19	**Date:** 14/12/2013	**Observers:** LM
Photo nos: North: 560, East: 561, South: 562, West: 563		
RE type: 11.10.9	**GPS Co-ords:** 711068, 7143723	

Habitat description:
Callitris glaucophylla open forest with occasional emergent eucalypts and dense shrubs, RoW 35BP

Trees with hollows (in 100 x 50 (0.5 ha area))	**No. of trees containing hollows (tally)**	**Total number of hollows**
Hollow size < 10 cm diameter	1	1
Hollow size > 10 cm diameter	0	0
Hollow bearing logs (in 100 x 50 (0.5 ha area)), hollows >10 cm diameter	**No. of logs containing hollows (tally)** 1	**Total number of hollows in logs** 1
Fallen woody material (in 50 x 10 (0.05 ha area))	**Total length of logs >10 cm diameter** Total: 15 m	**Total number of logs (tally)** 7

Other habitat characteristics (in 100 x 50 (0.5 ha area):

Characteristic	**Abundance (0-7)^**	**Notes**
Decorticating bark	3	
Course leaf litter (>2cm diam)	2	
Fine leaf litter (<2cm diam)	4	
Bare ground	2	
Grass	5	
Soil cracks	0	
Stones (20-60 cm)	0	
Boulders (61 cm – 2 m)	0	
Large boulders (>2 m)	0	
Rock crevices	0	
Exfoliating rock	0	

^Abundance key: 0 = nil, **1** = Rare, **2** = Rare to occasional, **3** = Occasional, **4** = Occasional to common, **5** = common, **6** = common to abundant, **7** = Abundant

Other habitat features and notes (e.g. potential threatened species)**:**
no threatened fauna recorded within vegetation management area
avoid clearing fauna habitat features/potential breeding places within vegetation management area
potential habitat for squatter pigeon, golden tail gecko

Photos

North

East

South

West

Koala Habitat Assessment and Faecal Pellet Survey

Project: Lot 55 Fairview **Site name/number:** KHA 1

Date and recorder: 10/12/13 LM **Photos:** 452 - 455

Easting: 693519 **Northing:** 7143310 wp 105

General habitat description: Callitris dominated open forest

Canopy tree species composition

Tree species	**% canopy cover of species** What proportion of canopy is represented by this species	**Primary food tree species in LGA –** refer AKF *National Koala Tree Protection List 2012* [a] **–** trees in bold	**Food tree species in LGA –** refer AKF *National Koala Tree Protection List 2012* [a] – trees not in bold	**Koala habitat tree* as defined in SEQ Koala SPP** [b] **–** *any other Eucalyptus sp., and trees in genera Corymbia, Melaleuca, Lophostemon, Angophora*	**Not a koala habitat tree**
		Tick one for each tree species			
Callitris glaucophylla	96	n	n	n	y
Angophora leiocarpa	2	n	n	y	-
Eucalyptus melanophloia	2	n	y	y	-

***** non-juvenile koala habitat tree > 4 m in height OR trunk circumference > 31.5 cm at height of 1.3 m

Other habitat information [c]	**Comments**
Vegetative ground cover (% of ground area)	65
Leaf litter cover (% of ground area)	<10
Area of surface water (% of ground area)	0
Distance to surface water (approximate)	Approximately 3 km
Evidence of dogs in area	No

Habitat critical to the survival of the koala [c]	**Yes / No**
Primary koala food tree species comprise at least 30% of the overstorey trees	n
Primary koala food tree species comprise less than 30% of the overstorey trees, but together with secondary food tree species comprise at least 50% of the overstorey trees (secondary food trees in this instance are those identified for LGA that are not primary food trees (AKF, 2012))	n
Primary food tree species are absent but secondary food tree species alone comprise at least 50% of the overstorey trees	n
The above qualities are absent in a forest or woodland, but other essential habitat features are present and adjacent to areas exhibiting the above qualities	n
A relatively high density of koalas is supported, regardless of the presence of food tree species	n
Any form of landscape corridor which is essential for the dispersal of koalas between forest of woodland habitats	n

Other site notes

Site context: large patch of contiguous remnant vegetation in the Hallett State Forest

Condition and disturbance: previous clearing for RoWs and access roads for grazing properties are adjacent

Koala faecal pellet survey - overview

Method based on Spot Assessment Technique (Phillips and Callaghan, 2011 [d])

Faecal pellet survey data

Survey date and time; survey team: not undertaken as not koala habitat

Survey location details (site name / number): N/A

Survey location (transect start) Easting and Northing: N/A

Survey location (transect end) Easting and Northing: N/A

	Search area 1	Search area 2	Search area 3
Pellet visibility (Poor, Medium, Good)*	-		
Number of trees searched	-		
Koala faecal pellets observed (Y/N)	-		
Arboreal mammal scratches observed (Y/N)	-		
Koala(s) observed (Y/N – if yes, details)	-		

*Poor: Thick layer of leaf litter, grasses, weeds, shed bark / Medium: Limited amount of leaf litter, grasses, weeds, shed bark / Good: little or no leaf litter, grasses, weeds, shed bark

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Key references:

a Australian Koala Foundation's National Koala Tree Protection List; Recommended Tree Species for Protection and Planting of Koala Habitat (Mitchell, 2012): https://www.savethekoala.com/sites/default/files/Australian%20Koala%20Foundation_National%20Koala%20Tree%20Protection%20List.pdf

b State Planning Policy 2/10 Koala Conservation in South East Queensland (DERM, 2010): http://www.ehp.qld.gov.au/wildlife/koalas/strategy/pdf/koala-spp.pdf

c Required habitat information and definition of 'habitat critical to the survival of the species' sourced from Interim koala referral advice for proponents (DSEWPaC, 2012): http://www.environment.gov.au/epbc/publications/pubs/bio240-0612-interim-koala-referral-advice.pdf

NOTE: this habitat assessment sheet will need to be reviewed and where necessary updated when the finalised koala referral guidelines are released by the Commonwealth

d The Spot Assessment Technique (Phillips and Callaghan, 2011): http://www.biolink.com.au/sites/www.biolink.com.au/files/publications/Phillips%20%26%20Callaghan.pdf

e Nature Conservation (Koala) Conservation Plan 2006-2016: http://www.ehp.qld.gov.au/wildlife/koalas/legislation/pdf/conservation-plan-06-16.pdf

f Dique *et al*. (2003). Evaluation of line transect sampling for estimating koala abundance in the Pine Rivers Shire, south east Queensland. Wildlife Research, 30, 127-133.

Site photos

Koala Habitat Assessment and Faecal Pellet Survey

Project: Lot 55 Fairview **Site name/number:** KHA 2

Date and recorder: 10/12/13 LM **Photos:** 456 - 459

Easting: 694503 **Northing:** 7143679

General habitat description: Callitris dominated woodland to open forest

Canopy tree species composition

Tree species	**% canopy cover of species** What proportion of canopy is represented by this species	**Primary food tree species in LGA –** refer AKF *National Koala Tree Protection List 2012* [a] **–** trees in bold	**Food tree species in LGA –** refer AKF *National Koala Tree Protection List 2012* [a] – trees not in bold	**Koala habitat tree* as defined in SEQ Koala SPP** [b] **–** *any other Eucalyptus sp., and trees in genera Corymbia, Melaleuca, Lophostemon, Angophora*	**Not a koala habitat tree**
		Tick one for each tree species			
Callitris glaucophylla	95	n	n	n	y
Angophora leiocarpa	5	n	n	y	-

***** non-juvenile koala habitat tree > 4 m in height OR trunk circumference > 31.5 cm at height of 1.3 m

Other habitat information [c]	**Comments**
Vegetative ground cover (% of ground area)	65
Leaf litter cover (% of ground area)	<5
Area of surface water (% of ground area)	0
Distance to surface water (approximate)	Approximately 2 km to a farm dam
Evidence of dogs in area	No

Habitat critical to the survival of the koala [c]	**Yes / No**
Primary koala food tree species comprise at least 30% of the overstorey trees	n
Primary koala food tree species comprise less than 30% of the overstorey trees, but together with secondary food tree species comprise at least 50% of the overstorey trees (secondary food trees in this instance are those identified for LGA that are not primary food trees (AKF, 2012))	n
Primary food tree species are absent but secondary food tree species alone comprise at least 50% of the overstorey trees	n
The above qualities are absent in a forest or woodland, but other essential habitat features are present and adjacent to areas exhibiting the above qualities	n
A relatively high density of koalas is supported, regardless of the presence of food tree species	n
Any form of landscape corridor which is essential for the dispersal of koalas between forest of woodland habitats	n

Other site notes

Site context: large patch of contiguous remnant vegetation in the Hallett State Forest

Condition and disturbance: previous clearing for RoWs

Koala faecal pellet survey - overview

Method based on Spot Assessment Technique (Phillips and Callaghan, 2011 [d])

Faecal pellet survey data

Survey date and time; survey team: not undertaken as not koala habitat

Survey location details (site name / number): N/A

Survey location (transect start) Easting and Northing: N/A

Survey location (transect end) Easting and Northing: N/A

	Search area 1	Search area 2	Search area 3
Pellet visibility (Poor, Medium, Good)*	-		
Number of trees searched	-		
Koala faecal pellets observed (Y/N)	-		
Arboreal mammal scratches observed (Y/N)	-		
Koala(s) observed (Y/N – if yes, details)	-		

*Poor: Thick layer of leaf litter, grasses, weeds, shed bark / Medium: Limited amount of leaf litter, grasses, weeds, shed bark / Good: little or no leaf litter, grasses, weeds, shed bark

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Key references:

a Australian Koala Foundation's National Koala Tree Protection List; Recommended Tree Species for Protection and Planting of Koala Habitat (Mitchell, 2012): https://www.savethekoala.com/sites/default/files/Australian%20Koala%20Foundation_National%20Koala%20Tree%20Protection%20List.pdf

b State Planning Policy 2/10 Koala Conservation in South East Queensland (DERM, 2010): http://www.ehp.qld.gov.au/wildlife/koalas/strategy/pdf/koala-spp.pdf

c Required habitat information and definition of 'habitat critical to the survival of the species' sourced from Interim koala referral advice for proponents (DSEWPaC, 2012): http://www.environment.gov.au/epbc/publications/pubs/bio240-0612-interim-koala-referral-advice.pdf

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d The Spot Assessment Technique (Phillips and Callaghan, 2011): http://www.biolink.com.au/sites/www.biolink.com.au/files/publications/Phillips%20%26%20Callaghan.pdf

e Nature Conservation (Koala) Conservation Plan 2006-2016: http://www.ehp.qld.gov.au/wildlife/koalas/legislation/pdf/conservation-plan-06-16.pdf

f Dique *et al*. (2003). Evaluation of line transect sampling for estimating koala abundance in the Pine Rivers Shire, south east Queensland. Wildlife Research, 30, 127-133.

Site photos

Koala Habitat Assessment and Faecal Pellet Survey

Project: Lot 55 Fairview **Site name/number:** KHA 3

Date and recorder: 10/12/13 LM **Photos:** 460 - 463

Easting: 695023 **Northing:** 7143860

General habitat description: Callitris dominated woodland

Canopy tree species composition

Tree species	**% canopy cover of species** What proportion of canopy is represented by this species	**Primary food tree species in LGA –** refer AKF *National Koala Tree Protection List 2012* [a] – trees in bold	**Food tree species in LGA –** refer AKF *National Koala Tree Protection List 2012* [a] – trees not in bold	**Koala habitat tree* as defined in SEQ Koala SPP [b] –** *any other Eucalyptus sp., and trees in genera Corymbia, Melaleuca, Lophostemon, Angophora*	**Not a koala habitat tree**
		Tick one for each tree species			
Callitris glaucophylla	95	n	n	n	y
Angophora leiocarpa	3	n	n	y	-
Eucalyptus populnea	2	n	y	y	-

***** non-juvenile koala habitat tree > 4 m in height OR trunk circumference > 31.5 cm at height of 1.3 m

Other habitat information [c]	**Comments**
Vegetative ground cover (% of ground area)	70
Leaf litter cover (% of ground area)	<5
Area of surface water (% of ground area)	0
Distance to surface water (approximate)	200 m to ephemeral creekline, no water present
Evidence of dogs in area	No

Habitat critical to the survival of the koala [c]	**Yes / No**
Primary koala food tree species comprise at least 30% of the overstorey trees	n
Primary koala food tree species comprise less than 30% of the overstorey trees, but together with secondary food tree species comprise at least 50% of the overstorey trees (secondary food trees in this instance are those identified for LGA that are not primary food trees (AKF, 2012))	n
Primary food tree species are absent but secondary food tree species alone comprise at least 50% of the overstorey trees	n
The above qualities are absent in a forest or woodland, but other essential habitat features are present and adjacent to areas exhibiting the above qualities	n
A relatively high density of koalas is supported, regardless of the presence of food tree species	n
Any form of landscape corridor which is essential for the dispersal of koalas between forest of woodland habitats	n

Other site notes

Site context: large patch of contiguous remnant vegetation in the Hallett State Forest, ephemeral creekline present but not supporting different riparian vegetation communities favoured by koalas

Condition and disturbance: historic selective logging

Koala faecal pellet survey - overview

Method based on Spot Assessment Technique (Phillips and Callaghan, 2011 [d])

Faecal pellet survey data

Survey date and time; survey team: not undertaken as not koala habitat

Survey location details (site name / number): N/A

Survey location (transect start) Easting and Northing: N/A

Survey location (transect end) Easting and Northing: N/A

	Search area 1	**Search area 2**	**Search area 3**
Pellet visibility (Poor, Medium, Good)*	-		
Number of trees searched	-		
Koala faecal pellets observed (Y/N)	-		
Arboreal mammal scratches observed (Y/N)	-		
Koala(s) observed (Y/N – if yes, details)	-		

*Poor: Thick layer of leaf litter, grasses, weeds, shed bark / Medium: Limited amount of leaf litter, grasses, weeds, shed bark / Good: little or no leaf litter, grasses, weeds, shed bark

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Key references:

a Australian Koala Foundation's National Koala Tree Protection List; Recommended Tree Species for Protection and Planting of Koala Habitat (Mitchell, 2012): https://www.savethekoala.com/sites/default/files/Australian%20Koala%20Foundation_National%20Koala%20Tree%20Protection%20List.pdf

b State Planning Policy 2/10 Koala Conservation in South East Queensland (DERM, 2010): http://www.ehp.qld.gov.au/wildlife/koalas/strategy/pdf/koala-spp.pdf

c Required habitat information and definition of 'habitat critical to the survival of the species' sourced from Interim koala referral advice for proponents (DSEWPaC, 2012): http://www.environment.gov.au/epbc/publications/pubs/bio240-0612-interim-koala-referral-advice.pdf

NOTE: this habitat assessment sheet will need to be reviewed and where necessary updated when the finalised koala referral guidelines are released by the Commonwealth

d The Spot Assessment Technique (Phillips and Callaghan, 2011): http://www.biolink.com.au/sites/www.biolink.com.au/files/publications/Phillips%20%26%20Callaghan.pdf

e Nature Conservation (Koala) Conservation Plan 2006-2016: http://www.ehp.qld.gov.au/wildlife/koalas/legislation/pdf/conservation-plan-06-16.pdf

f Dique *et al*. (2003). Evaluation of line transect sampling for estimating koala abundance in the Pine Rivers Shire, south east Queensland. Wildlife Research, 30, 127-133.

Site photos

Koala Habitat Assessment and Faecal Pellet Survey

Project: Lot 55 Fairview **Site name/number:** KHA 4

Date and recorder: 11/12/13 LM **Photos:** 466 - 469

Easting: 698462 **Northing:** 7144176

General habitat description: *Eucalyptus populnea* woodland with dense callitiris understorey

Canopy tree species composition

Tree species	**% canopy cover of species** What proportion of canopy is represented by this species	**Primary food tree species in LGA –** refer AKF *National Koala Tree Protection List 2012* [a] **–** trees in bold	**Food tree species in LGA –** refer AKF *National Koala Tree Protection List 2012* [a] – trees not in bold	**Koala habitat tree* as defined in SEQ Koala SPP** [b] **–** *any other Eucalyptus sp., and trees in genera Corymbia, Melaleuca, Lophostemon, Angophora*	**Not a koala habitat tree**
		Tick one for each tree species			
Callitris glaucophylla	70	n	n	n	y
Eucalyptus populnea	30	n	y	y	-

***** non-juvenile koala habitat tree > 4 m in height OR trunk circumference > 31.5 cm at height of 1.3 m

Other habitat information [c]	**Comments**
Vegetative ground cover (% of ground area)	35
Leaf litter cover (% of ground area)	20
Area of surface water (% of ground area)	0
Distance to surface water (approximate)	Approximately 2 km
Evidence of dogs in area	No

Habitat critical to the survival of the koala [c]	**Yes / No**
Primary koala food tree species comprise at least 30% of the overstorey trees	n
Primary koala food tree species comprise less than 30% of the overstorey trees, but together with secondary food tree species comprise at least 50% of the overstorey trees (secondary food trees in this instance are those identified for LGA that are not primary food trees (AKF, 2012))	n
Primary food tree species are absent but secondary food tree species alone comprise at least 50% of the overstorey trees	n
The above qualities are absent in a forest or woodland, but other essential habitat features are present and adjacent to areas exhibiting the above qualities	n
A relatively high density of koalas is supported, regardless of the presence of food tree species	n
Any form of landscape corridor which is essential for the dispersal of koalas between forest of woodland habitats	n

Other site notes

Site context: large patch of contiguous remnant vegetation in the Hallett State Forest, species present are unlikely to support koalas therefore are not considered koala habitat

Condition and disturbance: road and powerline easement disturbance, previous selective logging

Koala faecal pellet survey - overview

Method based on Spot Assessment Technique (Phillips and Callaghan, 2011 [d])

Faecal pellet survey data

Survey date and time; survey team: not undertaken as not koala habitat

Survey location details (site name / number): N/A

Survey location (transect start) Easting and Northing: N/A

Survey location (transect end) Easting and Northing: N/A

	Search area 1	Search area 2	Search area 3
Pellet visibility (Poor, Medium, Good)*	-		
Number of trees searched	-		
Koala faecal pellets observed (Y/N)	-		
Arboreal mammal scratches observed (Y/N)	-		
Koala(s) observed (Y/N – if yes, details)	-		

*Poor: Thick layer of leaf litter, grasses, weeds, shed bark / Medium: Limited amount of leaf litter, grasses, weeds, shed bark / Good: little or no leaf litter, grasses, weeds, shed bark

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Key references:

a Australian Koala Foundation's National Koala Tree Protection List; Recommended Tree Species for Protection and Planting of Koala Habitat (Mitchell, 2012): https://www.savethekoala.com/sites/default/files/Australian%20Koala%20Foundation_National%20Koala%20Tree%20Protection%20List.pdf

b State Planning Policy 2/10 Koala Conservation in South East Queensland (DERM, 2010): http://www.ehp.qld.gov.au/wildlife/koalas/strategy/pdf/koala-spp.pdf

c Required habitat information and definition of 'habitat critical to the survival of the species' sourced from Interim koala referral advice for proponents (DSEWPaC, 2012): http://www.environment.gov.au/epbc/publications/pubs/bio240-0612-interim-koala-referral-advice.pdf

NOTE: this habitat assessment sheet will need to be reviewed and where necessary updated when the finalised koala referral guidelines are released by the Commonwealth

d The Spot Assessment Technique (Phillips and Callaghan, 2011): http://www.biolink.com.au/sites/www.biolink.com.au/files/publications/Phillips%20%26%20Callaghan.pdf

e Nature Conservation (Koala) Conservation Plan 2006-2016: http://www.ehp.qld.gov.au/wildlife/koalas/legislation/pdf/conservation-plan-06-16.pdf

f Dique *et al*. (2003). Evaluation of line transect sampling for estimating koala abundance in the Pine Rivers Shire, south east Queensland. Wildlife Research, 30, 127-133.

Site photos

Koala Habitat Assessment and Faecal Pellet Survey

Project: Lot 55 Fairview **Site name/number:** KHA 5

Date and recorder: 11/12/13 LM **Photos:** 470 - 473

Easting: 699084 **Northing:** 7143735 wp 112

General habitat description: *Eucalyptus populnea* woodland with callitris understorey

Canopy tree species composition

Tree species	**% canopy cover of species** What proportion of canopy is represented by this species	**Primary food tree species in LGA –** refer AKF *National Koala Tree Protection List 2012* [a] – trees in bold	**Food tree species in LGA –** refer AKF *National Koala Tree Protection List 2012* [a] – trees not in bold	**Koala habitat tree* as defined in SEQ Koala SPP [b] –** *any other Eucalyptus sp., and trees in genera Corymbia, Melaleuca, Lophostemon, Angophora*	**Not a koala habitat tree**
		Tick one for each tree species			
Eucalyptus populnea	65	n	y	y	-
Eucalyptus melanophloia	5	n	y	y	-
Callitris glaucophylla	30	n	n	n	y

***** non-juvenile koala habitat tree > 4 m in height OR trunk circumference > 31.5 cm at height of 1.3 m

Other habitat information [c]	**Comments**
Vegetative ground cover (% of ground area)	60
Leaf litter cover (% of ground area)	20
Area of surface water (% of ground area)	0
Distance to surface water (approximate)	Approximately 4 km
Evidence of dogs in area	No

Habitat critical to the survival of the koala [c]	**Yes / No**
Primary koala food tree species comprise at least 30% of the overstorey trees	n
Primary koala food tree species comprise less than 30% of the overstorey trees, but together with secondary food tree species comprise at least 50% of the overstorey trees (secondary food trees in this instance are those identified for LGA that are not primary food trees (AKF, 2012))	n
Primary food tree species are absent but secondary food tree species alone comprise at least 50% of the overstorey trees	y
The above qualities are absent in a forest or woodland, but other essential habitat features are present and adjacent to areas exhibiting the above qualities	n
A relatively high density of koalas is supported, regardless of the presence of food tree species	n
Any form of landscape corridor which is essential for the dispersal of koalas between forest of woodland habitats	n

Other site notes

Site context: large patch of contiguous remnant vegetation in the Hallett State Forest, quite a dry environment that is unlikely to support koalas

Condition and disturbance: previous clearing for RoWs and access roads

Koala faecal pellet survey - overview

Method based on Spot Assessment Technique (Phillips and Callaghan, 2011 [d])

Note: If a more detailed koala survey is required (i.e. density estimates), refer to Policy 4 of the Queensland Government's Nature Conservation (Koala) Conservation Plan 2006-2016 [e] and Dique *et al*. 2003 [f]. This may be required where preliminary surveys (i.e. faecal pellet searches) reveal the presence of the koala at a site, for the purposes of informing impact assessment and Commonwealth referral.

Faecal pellet survey data

Survey date and time; survey team: as per koala habitat assessment

Survey location details (site name / number): as per koala habitat assessment

Survey location (transect start) Easting and Northing: as per koala habitat assessment

Survey location (transect end) Easting and Northing: as per koala habitat assessment

	Search area 1	**Search area 2**	**Search area 3**
Pellet visibility (Poor, Medium, Good)*	good		
Number of trees searched	30		
Koala faecal pellets observed (Y/N)	n		
Arboreal mammal scratches observed (Y/N)	n		
Koala(s) observed (Y/N – if yes, details)	n		

*Poor: Thick layer of leaf litter, grasses, weeds, shed bark / Medium: Limited amount of leaf litter, grasses, weeds, shed bark / Good: little or no leaf litter, grasses, weeds, shed bark

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Key references:

a Australian Koala Foundation's National Koala Tree Protection List; Recommended Tree Species for Protection and Planting of Koala Habitat (Mitchell, 2012): https://www.savethekoala.com/sites/default/files/Australian%20Koala%20Foundation_National%20Koala%20Tree%20Protection%20List.pdf

b State Planning Policy 2/10 Koala Conservation in South East Queensland (DERM, 2010): http://www.ehp.qld.gov.au/wildlife/koalas/strategy/pdf/koala-spp.pdf

c Required habitat information and definition of 'habitat critical to the survival of the species' sourced from Interim koala referral advice for proponents (DSEWPaC, 2012): http://www.environment.gov.au/epbc/publications/pubs/bio240-0612-interim-koala-referral-advice.pdf

NOTE: this habitat assessment sheet will need to be reviewed and where necessary updated when the finalised koala referral guidelines are released by the Commonwealth

d The Spot Assessment Technique (Phillips and Callaghan, 2011): http://www.biolink.com.au/sites/www.biolink.com.au/files/publications/Phillips%20%26%20Callaghan.pdf

e Nature Conservation (Koala) Conservation Plan 2006-2016: http://www.ehp.qld.gov.au/wildlife/koalas/legislation/pdf/conservation-plan-06-16.pdf

f Dique *et al*. (2003). Evaluation of line transect sampling for estimating koala abundance in the Pine Rivers Shire, south east Queensland. Wildlife Research, 30, 127-133.

Site photos

Koala Habitat Assessment and Faecal Pellet Survey

Project: Lot 55 Fairview **Site name/number:** KHA 6

Date and recorder: 11/12/13 LM **Photos:** 480 - 483

Easting: 700248 **Northing:** 7143177 wp 113

General habitat description: *Eucalyptus populnea* woodland with *Callitris glaucophylla* shrubs

Canopy tree species composition

Tree species	**% canopy cover of species** What proportion of canopy is represented by this species	**Primary food tree species in LGA –** refer AKF *National Koala Tree Protection List 2012* [a] **–** trees in bold	**Food tree species in LGA –** refer AKF *National Koala Tree Protection List 2012* [a] – trees not in bold	**Koala habitat tree* as defined in SEQ Koala SPP** [b] **–** *any other Eucalyptus sp., and trees in genera Corymbia, Melaleuca, Lophostemon, Angophora*	**Not a koala habitat tree**
		Tick one for each tree species			
Eucalyptus populnea	70	n	y	y	-
Callitris glaucophylla	30	n	n	n	y

***** non-juvenile koala habitat tree > 4 m in height OR trunk circumference > 31.5 cm at height of 1.3 m

Other habitat information [c]	**Comments**
Vegetative ground cover (% of ground area)	80
Leaf litter cover (% of ground area)	15
Area of surface water (% of ground area)	0
Distance to surface water (approximate)	Approximately 5 km
Evidence of dogs in area	No

Habitat critical to the survival of the koala [c]	**Yes / No**
Primary koala food tree species comprise at least 30% of the overstorey trees	n
Primary koala food tree species comprise less than 30% of the overstorey trees, but together with secondary food tree species comprise at least 50% of the overstorey trees (secondary food trees in this instance are those identified for LGA that are not primary food trees (AKF, 2012))	n
Primary food tree species are absent but secondary food tree species alone comprise at least 50% of the overstorey trees	y
The above qualities are absent in a forest or woodland, but other essential habitat features are present and adjacent to areas exhibiting the above qualities	n
A relatively high density of koalas is supported, regardless of the presence of food tree species	n
Any form of landscape corridor which is essential for the dispersal of koalas between forest of woodland habitats	n

Other site notes

Site context: large patch of contiguous remnant vegetation in the Hallett State Forest, quite a dry environment that is unlikely to support koalas but may be utilised by transient koalas

Condition and disturbance: previous clearing for gas infrastructure

Koala faecal pellet survey - overview

Method based on Spot Assessment Technique (Phillips and Callaghan, 2011 [d])

Note: If a more detailed koala survey is required (i.e. density estimates), refer to Policy 4 of the Queensland Government's Nature Conservation (Koala) Conservation Plan 2006-2016 [e] and Dique *et al*. 2003 [f]. This may be required where preliminary surveys (i.e. faecal pellet searches) reveal the presence of the koala at a site, for the purposes of informing impact assessment and Commonwealth referral.

Faecal pellet survey data

Survey date and time; survey team: as per koala habitat assessment

Survey location details (site name / number): as per koala habitat assessment

Survey location (transect start) Easting and Northing: as per koala habitat assessment

Survey location (transect end) Easting and Northing: as per koala habitat assessment

	Search area 1	**Search area 2**	**Search area 3**
Pellet visibility (Poor, Medium, Good)*	medium		
Number of trees searched	30		
Koala faecal pellets observed (Y/N)	n		
Arboreal mammal scratches observed (Y/N)	n		
Koala(s) observed (Y/N – if yes, details)	n		

*Poor: Thick layer of leaf litter, grasses, weeds, shed bark / Medium: Limited amount of leaf litter, grasses, weeds, shed bark / Good: little or no leaf litter, grasses, weeds, shed bark

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Key references:

a Australian Koala Foundation's National Koala Tree Protection List; Recommended Tree Species for Protection and Planting of Koala Habitat (Mitchell, 2012): https://www.savethekoala.com/sites/default/files/Australian%20Koala%20Foundation_National%20Koala%20Tree%20Protection%20List.pdf

b State Planning Policy 2/10 Koala Conservation in South East Queensland (DERM, 2010): http://www.ehp.qld.gov.au/wildlife/koalas/strategy/pdf/koala-spp.pdf

c Required habitat information and definition of 'habitat critical to the survival of the species' sourced from Interim koala referral advice for proponents (DSEWPaC, 2012): http://www.environment.gov.au/epbc/publications/pubs/bio240-0612-interim-koala-referral-advice.pdf

NOTE: this habitat assessment sheet will need to be reviewed and where necessary updated when the finalised koala referral guidelines are released by the Commonwealth

d The Spot Assessment Technique (Phillips and Callaghan, 2011): http://www.biolink.com.au/sites/www.biolink.com.au/files/publications/Phillips%20%26%20Callaghan.pdf

e Nature Conservation (Koala) Conservation Plan 2006-2016: http://www.ehp.qld.gov.au/wildlife/koalas/legislation/pdf/conservation-plan-06-16.pdf

f Dique *et al*. (2003). Evaluation of line transect sampling for estimating koala abundance in the Pine Rivers Shire, south east Queensland. Wildlife Research, 30, 127-133.

Site photos

Koala Habitat Assessment and Faecal Pellet Survey

Project: Lot 55 Fairview **Site name/number:** KHA 7

Date and recorder: 11/12/13 LM **Photos:** 484 - 487

Easting: 699464 **Northing:** 7142611 wp 114

General habitat description: scattered eucalypt woodland, non-remnant

Canopy tree species composition

Tree species	**% canopy cover of species** What proportion of canopy is represented by this species	**Primary food tree species in LGA –** refer AKF *National Koala Tree Protection List 2012* [a] **–** trees in bold	**Food tree species in LGA –** refer AKF *National Koala Tree Protection List 2012* [a] – trees not in bold	**Koala habitat tree* as defined in SEQ Koala SPP [b] –** *any other Eucalyptus sp., and trees in genera Corymbia, Melaleuca, Lophostemon, Angophora*	**Not a koala habitat tree**
		Tick one for each tree species			
Eucalyptus populnea	70	n	y	y	-
Corymbia tessellaris	5	n	n	y	-
Eucalyptus melanophloia	5	n	y	y	-
Casuarina sp.	10	n	n	n	y
Callitris glaucophylla	30	n	n	n	y

***** non-juvenile koala habitat tree > 4 m in height OR trunk circumference > 31.5 cm at height of 1.3 m

Other habitat information [c]	**Comments**
Vegetative ground cover (% of ground area)	70
Leaf litter cover (% of ground area)	5
Area of surface water (% of ground area)	0
Distance to surface water (approximate)	Approximately 1 km
Evidence of dogs in area	No

Habitat critical to the survival of the koala [c]	**Yes / No**
Primary koala food tree species comprise at least 30% of the overstorey trees	n
Primary koala food tree species comprise less than 30% of the overstorey trees, but together with secondary food tree species comprise at least 50% of the overstorey trees (secondary food trees in this instance are those identified for LGA that are not primary food trees (AKF, 2012))	n
Primary food tree species are absent but secondary food tree species alone comprise at least 50% of the overstorey trees	y
The above qualities are absent in a forest or woodland, but other essential habitat features are present and adjacent to areas exhibiting the above qualities	n
A relatively high density of koalas is supported, regardless of the presence of food tree species	n
Any form of landscape corridor which is essential for the dispersal of koalas between forest of woodland habitats	n

Other site notes

Site context: non-remnant area, koala food trees sparsely spaced, unlikely to support koalas

Condition and disturbance: previous clearing for gas infrastructure

Koala faecal pellet survey - overview

Method based on Spot Assessment Technique (Phillips and Callaghan, 2011 [d])

Note: If a more detailed koala survey is required (i.e. density estimates), refer to Policy 4 of the Queensland Government's Nature Conservation (Koala) Conservation Plan 2006-2016 [e] and Dique *et al*. 2003 [f]. This may be required where preliminary surveys (i.e. faecal pellet searches) reveal the presence of the koala at a site, for the purposes of informing impact assessment and Commonwealth referral.

Faecal pellet survey data

Survey date and time; survey team: not undertaken as not koala habitat

Survey location details (site name / number): N/A

Survey location (transect start) Easting and Northing: N/A

Survey location (transect end) Easting and Northing: N/A

	Search area 1	**Search area 2**	**Search area 3**
Pellet visibility (Poor, Medium, Good)*	-		
Number of trees searched	-		
Koala faecal pellets observed (Y/N)	-		
Arboreal mammal scratches observed (Y/N)	-		
Koala(s) observed (Y/N – if yes, details)	-		

*Poor: Thick layer of leaf litter, grasses, weeds, shed bark / Medium: Limited amount of leaf litter, grasses, weeds, shed bark / Good: little or no leaf litter, grasses, weeds, shed bark

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Key references:

a Australian Koala Foundation's National Koala Tree Protection List; Recommended Tree Species for Protection and Planting of Koala Habitat (Mitchell, 2012): https://www.savethekoala.com/sites/default/files/Australian%20Koala%20Foundation_National%20Koala%20Tree%20Protection%20List.pdf

b State Planning Policy 2/10 Koala Conservation in South East Queensland (DERM, 2010): http://www.ehp.qld.gov.au/wildlife/koalas/strategy/pdf/koala-spp.pdf

c Required habitat information and definition of 'habitat critical to the survival of the species' sourced from Interim koala referral advice for proponents (DSEWPaC, 2012): http://www.environment.gov.au/epbc/publications/pubs/bio240-0612-interim-koala-referral-advice.pdf

NOTE: this habitat assessment sheet will need to be reviewed and where necessary updated when the finalised koala referral guidelines are released by the Commonwealth

d The Spot Assessment Technique (Phillips and Callaghan, 2011): http://www.biolink.com.au/sites/www.biolink.com.au/files/publications/Phillips%20%26%20Callaghan.pdf

e Nature Conservation (Koala) Conservation Plan 2006-2016: http://www.ehp.qld.gov.au/wildlife/koalas/legislation/pdf/conservation-plan-06-16.pdf

f Dique *et al*. (2003). Evaluation of line transect sampling for estimating koala abundance in the Pine Rivers Shire, south east Queensland. Wildlife Research, 30, 127-133.

Site photos

Koala Habitat Assessment and Faecal Pellet Survey

Project: Lot 55 Fairview **Site name/number:** KHA 8

Date and recorder: 11/12/13 LM **Photos:** 488 - 491

Easting: 699745 **Northing:** 7142460 wp 115

General habitat description: scattered eucalypt woodland, non-remnant

Canopy tree species composition

Tree species	**% canopy cover of species** What proportion of canopy is represented by this species	**Primary food tree species in LGA –** refer AKF *National Koala Tree Protection List 2012* [a] **–** trees in bold	**Food tree species in LGA –** refer AKF *National Koala Tree Protection List 2012* [a] – trees not in bold	**Koala habitat tree* as defined in SEQ Koala SPP** [b] **–** *any other Eucalyptus sp., and trees in genera Corymbia, Melaleuca, Lophostemon, Angophora*	**Not a koala habitat tree**
		Tick one for each tree species			
Eucalyptus populnea	35	n	y	y	-
Callitris glaucophylla	65	n	n	n	y

***** non-juvenile koala habitat tree > 4 m in height OR trunk circumference > 31.5 cm at height of 1.3 m

Other habitat information [c]	**Comments**
Vegetative ground cover (% of ground area)	50
Leaf litter cover (% of ground area)	30
Area of surface water (% of ground area)	0
Distance to surface water (approximate)	Approximately 2 km
Evidence of dogs in area	No

Habitat critical to the survival of the koala [c]	**Yes / No**
Primary koala food tree species comprise at least 30% of the overstorey trees	n
Primary koala food tree species comprise less than 30% of the overstorey trees, but together with secondary food tree species comprise at least 50% of the overstorey trees (secondary food trees in this instance are those identified for LGA that are not primary food trees (AKF, 2012))	n
Primary food tree species are absent but secondary food tree species alone comprise at least 50% of the overstorey trees	n
The above qualities are absent in a forest or woodland, but other essential habitat features are present and adjacent to areas exhibiting the above qualities	n
A relatively high density of koalas is supported, regardless of the presence of food tree species	n
Any form of landscape corridor which is essential for the dispersal of koalas between forest of woodland habitats	n

Other site notes

Site context: high value regrowth, unlikely to support koalas

Condition and disturbance: previous clearing for gas infrastructure

Koala faecal pellet survey - overview

Method based on Spot Assessment Technique (Phillips and Callaghan, 2011 [d])

Note: If a more detailed koala survey is required (i.e. density estimates), refer to Policy 4 of the Queensland Government's Nature Conservation (Koala) Conservation Plan 2006-2016 [e] and Dique *et al*. 2003 [f]. This may be required where preliminary surveys (i.e. faecal pellet searches) reveal the presence of the koala at a site, for the purposes of informing impact assessment and Commonwealth referral.

Faecal pellet survey data

Survey date and time; survey team: not undertaken as not koala habitat

Survey location details (site name / number): N/A

Survey location (transect start) Easting and Northing: N/A

Survey location (transect end) Easting and Northing: N/A

	Search area 1	**Search area 2**	**Search area 3**
Pellet visibility (Poor, Medium, Good)*	-		
Number of trees searched	-		
Koala faecal pellets observed (Y/N)	-		
Arboreal mammal scratches observed (Y/N)	-		
Koala(s) observed (Y/N – if yes, details)	-		

*Poor: Thick layer of leaf litter, grasses, weeds, shed bark / Medium: Limited amount of leaf litter, grasses, weeds, shed bark / Good: little or no leaf litter, grasses, weeds, shed bark

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Key references:

a Australian Koala Foundation's National Koala Tree Protection List; Recommended Tree Species for Protection and Planting of Koala Habitat (Mitchell, 2012): https://www.savethekoala.com/sites/default/files/Australian%20Koala%20Foundation_National%20Koala%20Tree%20Protection%20List.pdf

b State Planning Policy 2/10 Koala Conservation in South East Queensland (DERM, 2010): http://www.ehp.qld.gov.au/wildlife/koalas/strategy/pdf/koala-spp.pdf

c Required habitat information and definition of 'habitat critical to the survival of the species' sourced from Interim koala referral advice for proponents (DSEWPaC, 2012): http://www.environment.gov.au/epbc/publications/pubs/bio240-0612-interim-koala-referral-advice.pdf

NOTE: this habitat assessment sheet will need to be reviewed and where necessary updated when the finalised koala referral guidelines are released by the Commonwealth

d The Spot Assessment Technique (Phillips and Callaghan, 2011): http://www.biolink.com.au/sites/www.biolink.com.au/files/publications/Phillips%20%26%20Callaghan.pdf

e Nature Conservation (Koala) Conservation Plan 2006-2016: http://www.ehp.qld.gov.au/wildlife/koalas/legislation/pdf/conservation-plan-06-16.pdf

f Dique *et al*. (2003). Evaluation of line transect sampling for estimating koala abundance in the Pine Rivers Shire, south east Queensland. Wildlife Research, 30, 127-133.

Site photos

Koala Habitat Assessment and Faecal Pellet Survey

Project: Lot 55 Fairview **Site name/number:** KHA 9

Date and recorder: 13/12/13 LM **Photos:** 492 - 495

Easting: 700443 **Northing:** 7145190 wp 116

General habitat description: scattered eucalypt woodland, non-remnant

Canopy tree species composition

Tree species	**% canopy cover of species** What proportion of canopy is represented by this species	**Primary food tree species in LGA –** refer AKF *National Koala Tree Protection List 2012* [a] **–** trees in bold	**Food tree species in LGA –** refer AKF *National Koala Tree Protection List 2012* [a] – trees not in bold	**Koala habitat tree* as defined in SEQ Koala SPP** [b] **–** *any other Eucalyptus sp., and trees in genera Corymbia, Melaleuca, Lophostemon, Angophora*	**Not a koala habitat tree**
		Tick one for each tree species			
Eucalyptus populnea	5	n	y	y	-
Callitris glaucophylla	95	n	n	n	y

***** non-juvenile koala habitat tree > 4 m in height OR trunk circumference > 31.5 cm at height of 1.3 m

Other habitat information [c]	**Comments**
Vegetative ground cover (% of ground area)	65
Leaf litter cover (% of ground area)	5
Area of surface water (% of ground area)	0
Distance to surface water (approximate)	Approximately 5 km
Evidence of dogs in area	No

Habitat critical to the survival of the koala [c]	**Yes / No**
Primary koala food tree species comprise at least 30% of the overstorey trees	n
Primary koala food tree species comprise less than 30% of the overstorey trees, but together with secondary food tree species comprise at least 50% of the overstorey trees (secondary food trees in this instance are those identified for LGA that are not primary food trees (AKF, 2012))	n
Primary food tree species are absent but secondary food tree species alone comprise at least 50% of the overstorey trees	n
The above qualities are absent in a forest or woodland, but other essential habitat features are present and adjacent to areas exhibiting the above qualities	n
A relatively high density of koalas is supported, regardless of the presence of food tree species	n
Any form of landscape corridor which is essential for the dispersal of koalas between forest of woodland habitats	n

Other site notes

Site context: large patch of contiguous remnant vegetation in the Hallett State Forest, unlikely to support koalas

Condition and disturbance: previous clearing for gas infrastructure, and forestry

Koala faecal pellet survey - overview

Method based on Spot Assessment Technique (Phillips and Callaghan, 2011 [d])

Note: If a more detailed koala survey is required (i.e. density estimates), refer to Policy 4 of the Queensland Government's Nature Conservation (Koala) Conservation Plan 2006-2016 [e] and Dique *et al*. 2003 [f]. This may be required where preliminary surveys (i.e. faecal pellet searches) reveal the presence of the koala at a site, for the purposes of informing impact assessment and Commonwealth referral.

Faecal pellet survey data

Survey date and time; survey team: not undertaken as not koala habitat

Survey location details (site name / number): N/A

Survey location (transect start) Easting and Northing: N/A

Survey location (transect end) Easting and Northing: N/A

	Search area 1	**Search area 2**	**Search area 3**
Pellet visibility (Poor, Medium, Good)*	-		
Number of trees searched	-		
Koala faecal pellets observed (Y/N)	-		
Arboreal mammal scratches observed (Y/N)	-		
Koala(s) observed (Y/N – if yes, details)	-		

*Poor: Thick layer of leaf litter, grasses, weeds, shed bark / Medium: Limited amount of leaf litter, grasses, weeds, shed bark / Good: little or no leaf litter, grasses, weeds, shed bark

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Key references:

a Australian Koala Foundation's National Koala Tree Protection List; Recommended Tree Species for Protection and Planting of Koala Habitat (Mitchell, 2012): https://www.savethekoala.com/sites/default/files/Australian%20Koala%20Foundation_National%20Koala%20Tree%20Protection%20List.pdf

b State Planning Policy 2/10 Koala Conservation in South East Queensland (DERM, 2010): http://www.ehp.qld.gov.au/wildlife/koalas/strategy/pdf/koala-spp.pdf

c Required habitat information and definition of 'habitat critical to the survival of the species' sourced from Interim koala referral advice for proponents (DSEWPaC, 2012): http://www.environment.gov.au/epbc/publications/pubs/bio240-0612-interim-koala-referral-advice.pdf

NOTE: this habitat assessment sheet will need to be reviewed and where necessary updated when the finalised koala referral guidelines are released by the Commonwealth

d The Spot Assessment Technique (Phillips and Callaghan, 2011): http://www.biolink.com.au/sites/www.biolink.com.au/files/publications/Phillips%20%26%20Callaghan.pdf

e Nature Conservation (Koala) Conservation Plan 2006-2016: http://www.ehp.qld.gov.au/wildlife/koalas/legislation/pdf/conservation-plan-06-16.pdf

f Dique *et al*. (2003). Evaluation of line transect sampling for estimating koala abundance in the Pine Rivers Shire, south east Queensland. Wildlife Research, 30, 127-133.

Site photos

Koala Habitat Assessment and Faecal Pellet Survey

Project: Lot 55 Fairview **Site name/number:** KHA 10

Date and recorder: 13/12/13 LM **Photos:** 501- 504

Easting: 700536 **Northing:** 7144637 wp 117

General habitat description: scattered eucalypt woodland, non-remnant

Canopy tree species composition

Tree species	**% canopy cover of species** What proportion of canopy is represented by this species	**Primary food tree species in LGA –** refer AKF *National Koala Tree Protection List 2012* [a] – trees in bold	**Food tree species in LGA –** refer AKF *National Koala Tree Protection List 2012* [a] – trees not in bold	**Koala habitat tree* as defined in SEQ Koala SPP [b] –** *any other Eucalyptus sp., and trees in genera Corymbia, Melaleuca, Lophostemon, Angophora*	**Not a koala habitat tree**
		Tick one for each tree species			
Eucalyptus melanophloia	5	n	y	y	-
Callitris glaucophylla	90	n	n	n	y
Casuarina sp.	5	n	n	n	y

***** non-juvenile koala habitat tree > 4 m in height OR trunk circumference > 31.5 cm at height of 1.3 m

Other habitat information [c]	**Comments**
Vegetative ground cover (% of ground area)	50
Leaf litter cover (% of ground area)	5
Area of surface water (% of ground area)	0
Distance to surface water (approximate)	Approximately 3 km
Evidence of dogs in area	No

Habitat critical to the survival of the koala [c]	**Yes / No**
Primary koala food tree species comprise at least 30% of the overstorey trees	n
Primary koala food tree species comprise less than 30% of the overstorey trees, but together with secondary food tree species comprise at least 50% of the overstorey trees (secondary food trees in this instance are those identified for LGA that are not primary food trees (AKF, 2012))	n
Primary food tree species are absent but secondary food tree species alone comprise at least 50% of the overstorey trees	n
The above qualities are absent in a forest or woodland, but other essential habitat features are present and adjacent to areas exhibiting the above qualities	n
A relatively high density of koalas is supported, regardless of the presence of food tree species	n
Any form of landscape corridor which is essential for the dispersal of koalas between forest of woodland habitats	n

Other site notes

Site context: large patch of contiguous remnant vegetation in the Hallett State Forest, unlikely to support koalas

Condition and disturbance: previous clearing for gas infrastructure, and forestry

Koala faecal pellet survey - overview

Method based on Spot Assessment Technique (Phillips and Callaghan, 2011 [d])

Note: If a more detailed koala survey is required (i.e. density estimates), refer to Policy 4 of the Queensland Government's Nature Conservation (Koala) Conservation Plan 2006-2016 [e] and Dique *et al*. 2003 [f]. This may be required where preliminary surveys (i.e. faecal pellet searches) reveal the presence of the koala at a site, for the purposes of informing impact assessment and Commonwealth referral.

Faecal pellet survey data

Survey date and time; survey team: not undertaken as not koala habitat

Survey location details (site name / number): N/A

Survey location (transect start) Easting and Northing: N/A

Survey location (transect end) Easting and Northing: N/A

	Search area 1	**Search area 2**	**Search area 3**
Pellet visibility (Poor, Medium, Good)*	-		
Number of trees searched	-		
Koala faecal pellets observed (Y/N)	-		
Arboreal mammal scratches observed (Y/N)	-		
Koala(s) observed (Y/N – if yes, details)	-		

*Poor: Thick layer of leaf litter, grasses, weeds, shed bark / Medium: Limited amount of leaf litter, grasses, weeds, shed bark / Good: little or no leaf litter, grasses, weeds, shed bark

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Key references:

a Australian Koala Foundation's National Koala Tree Protection List; Recommended Tree Species for Protection and Planting of Koala Habitat (Mitchell, 2012): https://www.savethekoala.com/sites/default/files/Australian%20Koala%20Foundation_National%20Koala%20Tree%20Protection%20List.pdf

b State Planning Policy 2/10 Koala Conservation in South East Queensland (DERM, 2010): http://www.ehp.qld.gov.au/wildlife/koalas/strategy/pdf/koala-spp.pdf

c Required habitat information and definition of 'habitat critical to the survival of the species' sourced from Interim koala referral advice for proponents (DSEWPaC, 2012): http://www.environment.gov.au/epbc/publications/pubs/bio240-0612-interim-koala-referral-advice.pdf

NOTE: this habitat assessment sheet will need to be reviewed and where necessary updated when the finalised koala referral guidelines are released by the Commonwealth

d The Spot Assessment Technique (Phillips and Callaghan, 2011): http://www.biolink.com.au/sites/www.biolink.com.au/files/publications/Phillips%20%26%20Callaghan.pdf

e Nature Conservation (Koala) Conservation Plan 2006-2016: http://www.ehp.qld.gov.au/wildlife/koalas/legislation/pdf/conservation-plan-06-16.pdf

f Dique *et al*. (2003). Evaluation of line transect sampling for estimating koala abundance in the Pine Rivers Shire, south east Queensland. Wildlife Research, 30, 127-133.

Site photos

Koala Habitat Assessment and Faecal Pellet Survey

Project: Lot 55 Fairview **Site name/number:** KHA 11

Date and recorder: 13/12/13 LM **Photos:** 505 - 508

Easting: 701137 **Northing:** 7142537 wp 118

General habitat description: *Eucalyptus populnea* woodland with callitris understorey

Canopy tree species composition

Tree species	**% canopy cover of species** What proportion of canopy is represented by this species	**Primary food tree species in LGA –** refer AKF *National Koala Tree Protection List 2012* [a] **–** trees in bold	**Food tree species in LGA –** refer AKF *National Koala Tree Protection List 2012* [a] – trees not in bold	**Koala habitat tree* as defined in SEQ Koala SPP** [b] **–** *any other Eucalyptus sp., and trees in genera Corymbia, Melaleuca, Lophostemon, Angophora*	**Not a koala habitat tree**
		Tick one for each tree species			
Eucalyptus populnea	20	n	y	y	-
Callitris glaucophylla	80	n	n	n	y

***** non-juvenile koala habitat tree > 4 m in height OR trunk circumference > 31.5 cm at height of 1.3 m

Other habitat information [c]	**Comments**
Vegetative ground cover (% of ground area)	40
Leaf litter cover (% of ground area)	20
Area of surface water (% of ground area)	0
Distance to surface water (approximate)	Approximately 5 km
Evidence of dogs in area	No

Habitat critical to the survival of the koala [c]	**Yes / No**
Primary koala food tree species comprise at least 30% of the overstorey trees	n
Primary koala food tree species comprise less than 30% of the overstorey trees, but together with secondary food tree species comprise at least 50% of the overstorey trees (secondary food trees in this instance are those identified for LGA that are not primary food trees (AKF, 2012))	n
Primary food tree species are absent but secondary food tree species alone comprise at least 50% of the overstorey trees	n
The above qualities are absent in a forest or woodland, but other essential habitat features are present and adjacent to areas exhibiting the above qualities	n
A relatively high density of koalas is supported, regardless of the presence of food tree species	n
Any form of landscape corridor which is essential for the dispersal of koalas between forest of woodland habitats	n

Other site notes

Site context: large patch of contiguous remnant vegetation in the Hallett State Forest, quite a dry environment that is unlikely to support koalas

Condition and disturbance: previous clearing for RoWs and access roads, evidence of fire

Koala faecal pellet survey - overview

Method based on Spot Assessment Technique (Phillips and Callaghan, 2011 [d])

Note: If a more detailed koala survey is required (i.e. density estimates), refer to Policy 4 of the Queensland Government's Nature Conservation (Koala) Conservation Plan 2006-2016 [e] and Dique *et al*. 2003 [f]. This may be required where preliminary surveys (i.e. faecal pellet searches) reveal the presence of the koala at a site, for the purposes of informing impact assessment and Commonwealth referral.

Faecal pellet survey data

Survey date and time; survey team: as per koala habitat assessment

Survey location details (site name / number): as per koala habitat assessment

Survey location (transect start) Easting and Northing: as per koala habitat assessment

Survey location (transect end) Easting and Northing: as per koala habitat assessment

	Search area 1	**Search area 2**	**Search area 3**
Pellet visibility (Poor, Medium, Good)*	medium		
Number of trees searched	30		
Koala faecal pellets observed (Y/N)	n		
Arboreal mammal scratches observed (Y/N)	n		
Koala(s) observed (Y/N – if yes, details)	n		

*Poor: Thick layer of leaf litter, grasses, weeds, shed bark / Medium: Limited amount of leaf litter, grasses, weeds, shed bark / Good: little or no leaf litter, grasses, weeds, shed bark

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Key references:

a Australian Koala Foundation's National Koala Tree Protection List; Recommended Tree Species for Protection and Planting of Koala Habitat (Mitchell, 2012): https://www.savethekoala.com/sites/default/files/Australian%20Koala%20Foundation_National%20Koala%20Tree%20Protection%20List.pdf

b State Planning Policy 2/10 Koala Conservation in South East Queensland (DERM, 2010): http://www.ehp.qld.gov.au/wildlife/koalas/strategy/pdf/koala-spp.pdf

c Required habitat information and definition of 'habitat critical to the survival of the species' sourced from Interim koala referral advice for proponents (DSEWPaC, 2012): http://www.environment.gov.au/epbc/publications/pubs/bio240-0612-interim-koala-referral-advice.pdf

NOTE: this habitat assessment sheet will need to be reviewed and where necessary updated when the finalised koala referral guidelines are released by the Commonwealth

d The Spot Assessment Technique (Phillips and Callaghan, 2011): http://www.biolink.com.au/sites/www.biolink.com.au/files/publications/Phillips%20%26%20Callaghan.pdf

e Nature Conservation (Koala) Conservation Plan 2006-2016: http://www.ehp.qld.gov.au/wildlife/koalas/legislation/pdf/conservation-plan-06-16.pdf

f Dique *et al*. (2003). Evaluation of line transect sampling for estimating koala abundance in the Pine Rivers Shire, south east Queensland. Wildlife Research, 30, 127-133.

Site photos

Koala Habitat Assessment and Faecal Pellet Survey

Project: Lot 55 Fairview **Site name/number:** KHA 12

Date and recorder: 13/12/13 LM **Photos:** 513 - 516

Easting: 700035 **Northing:** 7142426 wp 119

General habitat description: *Eucalyptus populnea* woodland with callitris understorey

Canopy tree species composition

Tree species	**% canopy cover of species** What proportion of canopy is represented by this species	**Primary food tree species in LGA –** refer AKF *National Koala Tree Protection List 2012* [a] – trees in bold	**Food tree species in LGA –** refer AKF *National Koala Tree Protection List 2012* [a] – trees not in bold	**Koala habitat tree* as defined in SEQ Koala SPP [b] –** *any other Eucalyptus sp., and trees in genera Corymbia, Melaleuca, Lophostemon, Angophora*	**Not a koala habitat tree**
		Tick one for each tree species			
Eucalyptus populnea	35	n	y	y	-
Callitris glaucophylla	60	n	n	n	y
Casuarina sp.	5	n	n	n	y

***** non-juvenile koala habitat tree > 4 m in height OR trunk circumference > 31.5 cm at height of 1.3 m

Other habitat information [c]	**Comments**
Vegetative ground cover (% of ground area)	40
Leaf litter cover (% of ground area)	15
Area of surface water (% of ground area)	0
Distance to surface water (approximate)	Approximately 3 km
Evidence of dogs in area	No

Habitat critical to the survival of the koala [c]	**Yes / No**
Primary koala food tree species comprise at least 30% of the overstorey trees	n
Primary koala food tree species comprise less than 30% of the overstorey trees, but together with secondary food tree species comprise at least 50% of the overstorey trees (secondary food trees in this instance are those identified for LGA that are not primary food trees (AKF, 2012))	n
Primary food tree species are absent but secondary food tree species alone comprise at least 50% of the overstorey trees	n
The above qualities are absent in a forest or woodland, but other essential habitat features are present and adjacent to areas exhibiting the above qualities	n
A relatively high density of koalas is supported, regardless of the presence of food tree species	n
Any form of landscape corridor which is essential for the dispersal of koalas between forest of woodland habitats	n

Other site notes

Site context: large patch of contiguous remnant vegetation in the Hallett State Forest, quite a dry environment that is unlikely to support koalas

Condition and disturbance: previous clearing for RoWs and access roads, evidence of fire

Koala faecal pellet survey - overview

Method based on Spot Assessment Technique (Phillips and Callaghan, 2011 [d])

Note: If a more detailed koala survey is required (i.e. density estimates), refer to Policy 4 of the Queensland Government's Nature Conservation (Koala) Conservation Plan 2006-2016 [e] and Dique *et al*. 2003 [f]. This may be required where preliminary surveys (i.e. faecal pellet searches) reveal the presence of the koala at a site, for the purposes of informing impact assessment and Commonwealth referral.

Faecal pellet survey data

Survey date and time; survey team: as per koala habitat assessment

Survey location details (site name / number): as per koala habitat assessment

Survey location (transect start) Easting and Northing: as per koala habitat assessment

Survey location (transect end) Easting and Northing: as per koala habitat assessment

	Search area 1	**Search area 2**	**Search area 3**
Pellet visibility (Poor, Medium, Good)*	medium		
Number of trees searched	30		
Koala faecal pellets observed (Y/N)	n		
Arboreal mammal scratches observed (Y/N)	y		
Koala(s) observed (Y/N – if yes, details)	n		

*Poor: Thick layer of leaf litter, grasses, weeds, shed bark / Medium: Limited amount of leaf litter, grasses, weeds, shed bark / Good: little or no leaf litter, grasses, weeds, shed bark

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Key references:

a Australian Koala Foundation's National Koala Tree Protection List; Recommended Tree Species for Protection and Planting of Koala Habitat (Mitchell, 2012): https://www.savethekoala.com/sites/default/files/Australian%20Koala%20Foundation_National%20Koala%20Tree%20Protection%20List.pdf

b State Planning Policy 2/10 Koala Conservation in South East Queensland (DERM, 2010): http://www.ehp.qld.gov.au/wildlife/koalas/strategy/pdf/koala-spp.pdf

c Required habitat information and definition of 'habitat critical to the survival of the species' sourced from Interim koala referral advice for proponents (DSEWPaC, 2012): http://www.environment.gov.au/epbc/publications/pubs/bio240-0612-interim-koala-referral-advice.pdf

NOTE: this habitat assessment sheet will need to be reviewed and where necessary updated when the finalised koala referral guidelines are released by the Commonwealth

d The Spot Assessment Technique (Phillips and Callaghan, 2011): http://www.biolink.com.au/sites/www.biolink.com.au/files/publications/Phillips%20%26%20Callaghan.pdf

e Nature Conservation (Koala) Conservation Plan 2006-2016: http://www.ehp.qld.gov.au/wildlife/koalas/legislation/pdf/conservation-plan-06-16.pdf

f Dique *et al*. (2003). Evaluation of line transect sampling for estimating koala abundance in the Pine Rivers Shire, south east Queensland. Wildlife Research, 30, 127-133.

Site photos

Koala Habitat Assessment and Faecal Pellet Survey

Project: Lot 55 Fairview **Site name/number:** KHA 13

Date and recorder: 13/12/13 LM **Photos:** 523 - 526

Easting: 708210 **Northing:** 7143396 wp 120

General habitat description: *Eucalyptus populnea* woodland

Canopy tree species composition

Tree species	**% canopy cover of species** What proportion of canopy is represented by this species	**Primary food tree species in LGA –** refer AKF *National Koala Tree Protection List 2012* [a] **–** trees in bold	**Food tree species in LGA –** refer AKF *National Koala Tree Protection List 2012* [a] – trees not in bold	**Koala habitat tree* as defined in SEQ Koala SPP** [b] **–** *any other Eucalyptus sp., and trees in genera Corymbia, Melaleuca, Lophostemon, Angophora*	**Not a koala habitat tree**
		Tick one for each tree species			
Eucalyptus populnea	65	n	y	y	-
Callitris glaucophylla	35	n	n	n	y

***** non-juvenile koala habitat tree > 4 m in height OR trunk circumference > 31.5 cm at height of 1.3 m

Other habitat information [c]	**Comments**
Vegetative ground cover (% of ground area)	65
Leaf litter cover (% of ground area)	15
Area of surface water (% of ground area)	0
Distance to surface water (approximate)	Approximately 1 km
Evidence of dogs in area	No

Habitat critical to the survival of the koala [c]	**Yes / No**
Primary koala food tree species comprise at least 30% of the overstorey trees	n
Primary koala food tree species comprise less than 30% of the overstorey trees, but together with secondary food tree species comprise at least 50% of the overstorey trees (secondary food trees in this instance are those identified for LGA that are not primary food trees (AKF, 2012))	n
Primary food tree species are absent but secondary food tree species alone comprise at least 50% of the overstorey trees	y
The above qualities are absent in a forest or woodland, but other essential habitat features are present and adjacent to areas exhibiting the above qualities	n
A relatively high density of koalas is supported, regardless of the presence of food tree species	n
Any form of landscape corridor which is essential for the dispersal of koalas between forest of woodland habitats	n

Other site notes

Site context: large patch of contiguous remnant vegetation in the Hallett State Forest, ephemeral drainage lines are present, potential habitat for transient koalas in low densities

Condition and disturbance: previous clearing for RoWs and access roads, evidence of fire

Koala faecal pellet survey - overview

Method based on Spot Assessment Technique (Phillips and Callaghan, 2011 [d])

Note: If a more detailed koala survey is required (i.e. density estimates), refer to Policy 4 of the Queensland Government's Nature Conservation (Koala) Conservation Plan 2006-2016 [e] and Dique *et al*. 2003 [f]. This may be required where preliminary surveys (i.e. faecal pellet searches) reveal the presence of the koala at a site, for the purposes of informing impact assessment and Commonwealth referral.

Faecal pellet survey data

Survey date and time; survey team: as per koala habitat assessment

Survey location details (site name / number): as per koala habitat assessment

Survey location (transect start) Easting and Northing: as per koala habitat assessment

Survey location (transect end) Easting and Northing: as per koala habitat assessment

	Search area 1	**Search area 2**	**Search area 3**
Pellet visibility (Poor, Medium, Good)*	medium		
Number of trees searched	30		
Koala faecal pellets observed (Y/N)	n		
Arboreal mammal scratches observed (Y/N)	y		
Koala(s) observed (Y/N – if yes, details)	n		

*Poor: Thick layer of leaf litter, grasses, weeds, shed bark / Medium: Limited amount of leaf litter, grasses, weeds, shed bark / Good: little or no leaf litter, grasses, weeds, shed bark

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Key references:

a Australian Koala Foundation's National Koala Tree Protection List; Recommended Tree Species for Protection and Planting of Koala Habitat (Mitchell, 2012): https://www.savethekoala.com/sites/default/files/Australian%20Koala%20Foundation_National%20Koala%20Tree%20Protection%20List.pdf

b State Planning Policy 2/10 Koala Conservation in South East Queensland (DERM, 2010): http://www.ehp.qld.gov.au/wildlife/koalas/strategy/pdf/koala-spp.pdf

c Required habitat information and definition of 'habitat critical to the survival of the species' sourced from Interim koala referral advice for proponents (DSEWPaC, 2012): http://www.environment.gov.au/epbc/publications/pubs/bio240-0612-interim-koala-referral-advice.pdf

NOTE: this habitat assessment sheet will need to be reviewed and where necessary updated when the finalised koala referral guidelines are released by the Commonwealth

d The Spot Assessment Technique (Phillips and Callaghan, 2011): http://www.biolink.com.au/sites/www.biolink.com.au/files/publications/Phillips%20%26%20Callaghan.pdf

e Nature Conservation (Koala) Conservation Plan 2006-2016: http://www.ehp.qld.gov.au/wildlife/koalas/legislation/pdf/conservation-plan-06-16.pdf

f Dique *et al*. (2003). Evaluation of line transect sampling for estimating koala abundance in the Pine Rivers Shire, south east Queensland. Wildlife Research, 30, 127-133.

Site photos

Koala Habitat Assessment and Faecal Pellet Survey

Project: Lot 55 Fairview **Site name/number:** KHA 14

Date and recorder: 14/12/13 LM **Photos:** 531 - 534

Easting: 706845 **Northing:** 7143343 wp 122

General habitat description: *Eucalyptus populnea* woodland with mixed shrubby understorey

Canopy tree species composition

Tree species	**% canopy cover of species** What proportion of canopy is represented by this species	**Primary food tree species in LGA –** refer AKF *National Koala Tree Protection List 2012* [a] – trees in bold	**Food tree species in LGA –** refer AKF *National Koala Tree Protection List 2012* [a] – trees not in bold	**Koala habitat tree* as defined in SEQ Koala SPP [b] –** *any other Eucalyptus sp., and trees in genera Corymbia, Melaleuca, Lophostemon, Angophora*	**Not a koala habitat tree**
		Tick one for each tree species			
Eucalyptus populnea	75	n	y	y	-
Callitris glaucophylla	20	n	n	n	y
Eucalyptus melanophloia	5	n	y	y	-

***** non-juvenile koala habitat tree > 4 m in height OR trunk circumference > 31.5 cm at height of 1.3 m

Other habitat information [c]	**Comments**
Vegetative ground cover (% of ground area)	70
Leaf litter cover (% of ground area)	5
Area of surface water (% of ground area)	0
Distance to surface water (approximate)	Approximately 3 km
Evidence of dogs in area	No

Habitat critical to the survival of the koala [c]	**Yes / No**
Primary koala food tree species comprise at least 30% of the overstorey trees	n
Primary koala food tree species comprise less than 30% of the overstorey trees, but together with secondary food tree species comprise at least 50% of the overstorey trees (secondary food trees in this instance are those identified for LGA that are not primary food trees (AKF, 2012))	n
Primary food tree species are absent but secondary food tree species alone comprise at least 50% of the overstorey trees	y
The above qualities are absent in a forest or woodland, but other essential habitat features are present and adjacent to areas exhibiting the above qualities	n
A relatively high density of koalas is supported, regardless of the presence of food tree species	n
Any form of landscape corridor which is essential for the dispersal of koalas between forest of woodland habitats	n

Other site notes

Site context: large patch of contiguous remnant vegetation in the Hallett State Forest, lots of tree hollows present, potential habitat for transient koalas in low densities

Condition and disturbance: previous clearing for existing gas infrastructure

Koala faecal pellet survey - overview

Method based on Spot Assessment Technique (Phillips and Callaghan, 2011 [d])

Note: If a more detailed koala survey is required (i.e. density estimates), refer to Policy 4 of the Queensland Government's Nature Conservation (Koala) Conservation Plan 2006-2016 [e] and Dique *et al*. 2003 [f]. This may be required where preliminary surveys (i.e. faecal pellet searches) reveal the presence of the koala at a site, for the purposes of informing impact assessment and Commonwealth referral.

Faecal pellet survey data

Survey date and time; survey team: as per koala habitat assessment

Survey location details (site name / number): as per koala habitat assessment

Survey location (transect start) Easting and Northing: as per koala habitat assessment

Survey location (transect end) Easting and Northing: as per koala habitat assessment

	Search area 1	**Search area 2**	**Search area 3**
Pellet visibility (Poor, Medium, Good)*	medium		
Number of trees searched	30		
Koala faecal pellets observed (Y/N)	n		
Arboreal mammal scratches observed (Y/N)	n		
Koala(s) observed (Y/N – if yes, details)	n		

*Poor: Thick layer of leaf litter, grasses, weeds, shed bark / Medium: Limited amount of leaf litter, grasses, weeds, shed bark / Good: little or no leaf litter, grasses, weeds, shed bark

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Key references:

a Australian Koala Foundation's National Koala Tree Protection List; Recommended Tree Species for Protection and Planting of Koala Habitat (Mitchell, 2012): https://www.savethekoala.com/sites/default/files/Australian%20Koala%20Foundation_National%20Koala%20Tree%20Protection%20List.pdf

b State Planning Policy 2/10 Koala Conservation in South East Queensland (DERM, 2010): http://www.ehp.qld.gov.au/wildlife/koalas/strategy/pdf/koala-spp.pdf

c Required habitat information and definition of 'habitat critical to the survival of the species' sourced from Interim koala referral advice for proponents (DSEWPaC, 2012): http://www.environment.gov.au/epbc/publications/pubs/bio240-0612-interim-koala-referral-advice.pdf

NOTE: this habitat assessment sheet will need to be reviewed and where necessary updated when the finalised koala referral guidelines are released by the Commonwealth

d The Spot Assessment Technique (Phillips and Callaghan, 2011): http://www.biolink.com.au/sites/www.biolink.com.au/files/publications/Phillips%20%26%20Callaghan.pdf

e Nature Conservation (Koala) Conservation Plan 2006-2016: http://www.ehp.qld.gov.au/wildlife/koalas/legislation/pdf/conservation-plan-06-16.pdf

f Dique *et al*. (2003). Evaluation of line transect sampling for estimating koala abundance in the Pine Rivers Shire, south east Queensland. Wildlife Research, 30, 127-133.

Site photos

Koala Habitat Assessment and Faecal Pellet Survey

Project: Lot 55 Fairview **Site name/number:** KHA 15

Date and recorder: 14/12/13 LM **Photos:** 539- 540

Easting: 706816 **Northing:** 7146259 wp 123

General habitat description: *Eucalyptus populnea* woodland with dense to mid-dense mixed shrubby understorey

Canopy tree species composition

Tree species	**% canopy cover of species** What proportion of canopy is represented by this species	**Primary food tree species in LGA –** refer AKF *National Koala Tree Protection List 2012* [a] **–** trees in bold	**Food tree species in LGA –** refer AKF *National Koala Tree Protection List 2012* [a] – trees not in bold	**Koala habitat tree* as defined in SEQ Koala SPP** [b] **–** *any other Eucalyptus sp., and trees in genera Corymbia, Melaleuca, Lophostemon, Angophora*	**Not a koala habitat tree**
		Tick one for each tree species			
Eucalyptus populnea	70	n	y	y	-
Callitris glaucophylla	30	n	n	n	y

***** non-juvenile koala habitat tree > 4 m in height OR trunk circumference > 31.5 cm at height of 1.3 m

Other habitat information [c]	**Comments**
Vegetative ground cover (% of ground area)	15
Leaf litter cover (% of ground area)	15
Area of surface water (% of ground area)	0
Distance to surface water (approximate)	Approximately 5 km
Evidence of dogs in area	No

Habitat critical to the survival of the koala [c]	**Yes / No**
Primary koala food tree species comprise at least 30% of the overstorey trees	n
Primary koala food tree species comprise less than 30% of the overstorey trees, but together with secondary food tree species comprise at least 50% of the overstorey trees (secondary food trees in this instance are those identified for LGA that are not primary food trees (AKF, 2012))	n
Primary food tree species are absent but secondary food tree species alone comprise at least 50% of the overstorey trees	y
The above qualities are absent in a forest or woodland, but other essential habitat features are present and adjacent to areas exhibiting the above qualities	n
A relatively high density of koalas is supported, regardless of the presence of food tree species	n
Any form of landscape corridor which is essential for the dispersal of koalas between forest of woodland habitats	n

Other site notes

Site context: large patch of contiguous remnant vegetation in the Hallett State Forest, unlikely to support koalas as it is on the edge of a non-remnant area and a dry environment

Condition and disturbance: previous clearing for gas infrastructure, evidence of fire

Koala faecal pellet survey - overview

Method based on Spot Assessment Technique (Phillips and Callaghan, 2011 [d])

Note: If a more detailed koala survey is required (i.e. density estimates), refer to Policy 4 of the Queensland Government's Nature Conservation (Koala) Conservation Plan 2006-2016 [e] and Dique *et al*. 2003 [f]. This may be required where preliminary surveys (i.e. faecal pellet searches) reveal the presence of the koala at a site, for the purposes of informing impact assessment and Commonwealth referral.

Faecal pellet survey data

Survey date and time; survey team: not undertaken as not koala habitat

Survey location details (site name / number): N/A

Survey location (transect start) Easting and Northing: N/A

Survey location (transect end) Easting and Northing: N/A

	Search area 1	**Search area 2**	**Search area 3**
Pellet visibility (Poor, Medium, Good)*	-		
Number of trees searched	-		
Koala faecal pellets observed (Y/N)	-		
Arboreal mammal scratches observed (Y/N)	-		
Koala(s) observed (Y/N – if yes, details)	-		

*Poor: Thick layer of leaf litter, grasses, weeds, shed bark / Medium: Limited amount of leaf litter, grasses, weeds, shed bark / Good: little or no leaf litter, grasses, weeds, shed bark

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Key references:

a Australian Koala Foundation's National Koala Tree Protection List; Recommended Tree Species for Protection and Planting of Koala Habitat (Mitchell, 2012): https://www.savethekoala.com/sites/default/files/Australian%20Koala%20Foundation_National%20Koala%20Tree%20Protection%20List.pdf

b State Planning Policy 2/10 Koala Conservation in South East Queensland (DERM, 2010): http://www.ehp.qld.gov.au/wildlife/koalas/strategy/pdf/koala-spp.pdf

c Required habitat information and definition of 'habitat critical to the survival of the species' sourced from Interim koala referral advice for proponents (DSEWPaC, 2012): http://www.environment.gov.au/epbc/publications/pubs/bio240-0612-interim-koala-referral-advice.pdf

NOTE: this habitat assessment sheet will need to be reviewed and where necessary updated when the finalised koala referral guidelines are released by the Commonwealth

d The Spot Assessment Technique (Phillips and Callaghan, 2011): http://www.biolink.com.au/sites/www.biolink.com.au/files/publications/Phillips%20%26%20Callaghan.pdf

e Nature Conservation (Koala) Conservation Plan 2006-2016: http://www.ehp.qld.gov.au/wildlife/koalas/legislation/pdf/conservation-plan-06-16.pdf

f Dique *et al*. (2003). Evaluation of line transect sampling for estimating koala abundance in the Pine Rivers Shire, south east Queensland. Wildlife Research, 30, 127-133.

Site photos

Koala Habitat Assessment and Faecal Pellet Survey

Project: Lot 55 Fairview **Site name/number:** KHA 16

Date and recorder: 14/12/13 LM **Photos:** 542 - 546

Easting: 709845 **Northing:** 7147788 wp 124

General habitat description: *Eucalyptus populnea* woodland with a mid-dense shrublayer and grassy groundlayer

Canopy tree species composition

Tree species	**% canopy cover of species** What proportion of canopy is represented by this species	**Primary food tree species in LGA –** refer AKF *National Koala Tree Protection List 2012* [a] **–** trees in bold	**Food tree species in LGA –** refer AKF *National Koala Tree Protection List 2012* [a] – trees not in bold	**Koala habitat tree* as defined in SEQ Koala SPP** [b] **–** *any other Eucalyptus sp., and trees in genera Corymbia, Melaleuca, Lophostemon, Angophora*	**Not a koala habitat tree**
		Tick one for each tree species			
Eucalyptus populnea	100	n	y	y	-

***** non-juvenile koala habitat tree > 4 m in height OR trunk circumference > 31.5 cm at height of 1.3 m

Other habitat information [c]	**Comments**
Vegetative ground cover (% of ground area)	80
Leaf litter cover (% of ground area)	10
Area of surface water (% of ground area)	0
Distance to surface water (approximate)	Approximately 5 km
Evidence of dogs in area	No

Habitat critical to the survival of the koala [c]	**Yes / No**
Primary koala food tree species comprise at least 30% of the overstorey trees	n
Primary koala food tree species comprise less than 30% of the overstorey trees, but together with secondary food tree species comprise at least 50% of the overstorey trees (secondary food trees in this instance are those identified for LGA that are not primary food trees (AKF, 2012))	n
Primary food tree species are absent but secondary food tree species alone comprise at least 50% of the overstorey trees	y
The above qualities are absent in a forest or woodland, but other essential habitat features are present and adjacent to areas exhibiting the above qualities	n
A relatively high density of koalas is supported, regardless of the presence of food tree species	n
Any form of landscape corridor which is essential for the dispersal of koalas between forest of woodland habitats	n

Other site notes

Site context: large patch of contiguous remnant vegetation in the Hallett State Forest, dry environment, potential habitat for transient koalas in low densities

Condition and disturbance: previous clearing for existing gas infrastructure

Koala faecal pellet survey - overview

Method based on Spot Assessment Technique (Phillips and Callaghan, 2011 [d])

Note: If a more detailed koala survey is required (i.e. density estimates), refer to Policy 4 of the Queensland Government's Nature Conservation (Koala) Conservation Plan 2006-2016 [e] and Dique *et al*. 2003 [f]. This may be required where preliminary surveys (i.e. faecal pellet searches) reveal the presence of the koala at a site, for the purposes of informing impact assessment and Commonwealth referral.

Faecal pellet survey data

Survey date and time; survey team: as per koala habitat assessment

Survey location details (site name / number): as per koala habitat assessment

Survey location (transect start) Easting and Northing: as per koala habitat assessment

Survey location (transect end) Easting and Northing: as per koala habitat assessment

	Search area 1	**Search area 2**	**Search area 3**
Pellet visibility (Poor, Medium, Good)*	poor		
Number of trees searched	30		
Koala faecal pellets observed (Y/N)	n		
Arboreal mammal scratches observed (Y/N)	n		
Koala(s) observed (Y/N – if yes, details)	n		

*Poor: Thick layer of leaf litter, grasses, weeds, shed bark / Medium: Limited amount of leaf litter, grasses, weeds, shed bark / Good: little or no leaf litter, grasses, weeds, shed bark

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Key references:

a Australian Koala Foundation's National Koala Tree Protection List; Recommended Tree Species for Protection and Planting of Koala Habitat (Mitchell, 2012): https://www.savethekoala.com/sites/default/files/Australian%20Koala%20Foundation_National%20Koala%20Tree%20Protection%20List.pdf

b State Planning Policy 2/10 Koala Conservation in South East Queensland (DERM, 2010): http://www.ehp.qld.gov.au/wildlife/koalas/strategy/pdf/koala-spp.pdf

c Required habitat information and definition of 'habitat critical to the survival of the species' sourced from Interim koala referral advice for proponents (DSEWPaC, 2012): http://www.environment.gov.au/epbc/publications/pubs/bio240-0612-interim-koala-referral-advice.pdf

NOTE: this habitat assessment sheet will need to be reviewed and where necessary updated when the finalised koala referral guidelines are released by the Commonwealth

d The Spot Assessment Technique (Phillips and Callaghan, 2011): http://www.biolink.com.au/sites/www.biolink.com.au/files/publications/Phillips%20%26%20Callaghan.pdf

e Nature Conservation (Koala) Conservation Plan 2006-2016: http://www.ehp.qld.gov.au/wildlife/koalas/legislation/pdf/conservation-plan-06-16.pdf

f Dique *et al*. (2003). Evaluation of line transect sampling for estimating koala abundance in the Pine Rivers Shire, south east Queensland. Wildlife Research, 30, 127-133.

Site photos

Koala Habitat Assessment and Faecal Pellet Survey

Project: Lot 55 Fairview **Site name/number:** KHA 17

Date and recorder: 14/12/13 LM **Photos:** 547 - 550

Easting: 711070 **Northing:** 7148134 wp 125

General habitat description: *Eucalyptus populnea* woodland with a shrubby understorey

Canopy tree species composition

Tree species	**% canopy cover of species** What proportion of canopy is represented by this species	**Primary food tree species in LGA –** refer AKF *National Koala Tree Protection List 2012* [a] **–** trees in bold	**Food tree species in LGA –** refer AKF *National Koala Tree Protection List 2012* [a] – trees not in bold	**Koala habitat tree* as defined in SEQ Koala SPP** [b] **–** *any other Eucalyptus sp., and trees in genera Corymbia, Melaleuca, Lophostemon, Angophora*	**Not a koala habitat tree**
		Tick one for each tree species			
Eucalyptus populnea	80	n	y	y	-
Callitris glaucophylla	20	n	n	n	y

***** non-juvenile koala habitat tree > 4 m in height OR trunk circumference > 31.5 cm at height of 1.3 m

Other habitat information [c]	**Comments**
Vegetative ground cover (% of ground area)	75
Leaf litter cover (% of ground area)	10
Area of surface water (% of ground area)	0
Distance to surface water (approximate)	Approximately 5 km
Evidence of dogs in area	No

Habitat critical to the survival of the koala [c]	**Yes / No**
Primary koala food tree species comprise at least 30% of the overstorey trees	n
Primary koala food tree species comprise less than 30% of the overstorey trees, but together with secondary food tree species comprise at least 50% of the overstorey trees (secondary food trees in this instance are those identified for LGA that are not primary food trees (AKF, 2012))	n
Primary food tree species are absent but secondary food tree species alone comprise at least 50% of the overstorey trees	y
The above qualities are absent in a forest or woodland, but other essential habitat features are present and adjacent to areas exhibiting the above qualities	n
A relatively high density of koalas is supported, regardless of the presence of food tree species	n
Any form of landscape corridor which is essential for the dispersal of koalas between forest of woodland habitats	n

Other site notes

Site context: large patch of contiguous remnant vegetation in the Hallett State Forest, dry environment, may be potential habitat for transient koalas in low densities

Condition and disturbance: previous clearing for existing gas infrastructure

Koala faecal pellet survey - overview

Method based on Spot Assessment Technique (Phillips and Callaghan, 2011 [d])

Note: If a more detailed koala survey is required (i.e. density estimates), refer to Policy 4 of the Queensland Government's Nature Conservation (Koala) Conservation Plan 2006-2016 [e] and Dique *et al*. 2003 [f]. This may be required where preliminary surveys (i.e. faecal pellet searches) reveal the presence of the koala at a site, for the purposes of informing impact assessment and Commonwealth referral.

Faecal pellet survey data

Survey date and time; survey team: as per koala habitat assessment

Survey location details (site name / number): as per koala habitat assessment

Survey location (transect start) Easting and Northing: as per koala habitat assessment

Survey location (transect end) Easting and Northing: as per koala habitat assessment

	Search area 1	**Search area 2**	**Search area 3**
Pellet visibility (Poor, Medium, Good)*	medium		
Number of trees searched	30		
Koala faecal pellets observed (Y/N)	n		
Arboreal mammal scratches observed (Y/N)	n		
Koala(s) observed (Y/N – if yes, details)	n		

*Poor: Thick layer of leaf litter, grasses, weeds, shed bark / Medium: Limited amount of leaf litter, grasses, weeds, shed bark / Good: little or no leaf litter, grasses, weeds, shed bark

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Key references:

a Australian Koala Foundation's National Koala Tree Protection List; Recommended Tree Species for Protection and Planting of Koala Habitat (Mitchell, 2012): https://www.savethekoala.com/sites/default/files/Australian%20Koala%20Foundation_National%20Koala%20Tree%20Protection%20List.pdf

b State Planning Policy 2/10 Koala Conservation in South East Queensland (DERM, 2010): http://www.ehp.qld.gov.au/wildlife/koalas/strategy/pdf/koala-spp.pdf

c Required habitat information and definition of 'habitat critical to the survival of the species' sourced from Interim koala referral advice for proponents (DSEWPaC, 2012): http://www.environment.gov.au/epbc/publications/pubs/bio240-0612-interim-koala-referral-advice.pdf

NOTE: this habitat assessment sheet will need to be reviewed and where necessary updated when the finalised koala referral guidelines are released by the Commonwealth

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e Nature Conservation (Koala) Conservation Plan 2006-2016: http://www.ehp.qld.gov.au/wildlife/koalas/legislation/pdf/conservation-plan-06-16.pdf

f Dique *et al*. (2003). Evaluation of line transect sampling for estimating koala abundance in the Pine Rivers Shire, south east Queensland. Wildlife Research, 30, 127-133.

Site photos

Koala Habitat Assessment and Faecal Pellet Survey

Project: Lot 55 Fairview **Site name/number:** KHA 18

Date and recorder: 14/12/13 LM **Photos:** 556- 559

Easting: 711406 **Northing:** 7147699 wp 126

General habitat description: *Callitris glaucophylla* dominated open forest with dense shrubs and a grassy understorey. Emergent eucalypts also present

Canopy tree species composition

Tree species	**% canopy cover of species** What proportion of canopy is represented by this species	**Primary food tree species in LGA –** refer AKF *National Koala Tree Protection List 2012* [a] **–** trees in bold	**Food tree species in LGA –** refer AKF *National Koala Tree Protection List 2012* [a] – trees not in bold	**Koala habitat tree* as defined in SEQ Koala SPP** [b] **–** *any other Eucalyptus sp., and trees in genera Corymbia, Melaleuca, Lophostemon, Angophora*	**Not a koala habitat tree**
		Tick one for each tree species			
Eucalyptus populnea	30	n	y	y	-
Callitris glaucophylla	70	n	n	n	y

***** non-juvenile koala habitat tree > 4 m in height OR trunk circumference > 31.5 cm at height of 1.3 m

Other habitat information [c]	**Comments**
Vegetative ground cover (% of ground area)	55
Leaf litter cover (% of ground area)	20
Area of surface water (% of ground area)	0
Distance to surface water (approximate)	Approximately 5 km
Evidence of dogs in area	No

Habitat critical to the survival of the koala [c]	**Yes / No**
Primary koala food tree species comprise at least 30% of the overstorey trees	n
Primary koala food tree species comprise less than 30% of the overstorey trees, but together with secondary food tree species comprise at least 50% of the overstorey trees (secondary food trees in this instance are those identified for LGA that are not primary food trees (AKF, 2012))	n
Primary food tree species are absent but secondary food tree species alone comprise at least 50% of the overstorey trees	n
The above qualities are absent in a forest or woodland, but other essential habitat features are present and adjacent to areas exhibiting the above qualities	n
A relatively high density of koalas is supported, regardless of the presence of food tree species	n
Any form of landscape corridor which is essential for the dispersal of koalas between forest of woodland habitats	n

Other site notes

Site context: large patch of contiguous remnant vegetation in the Hallett State Forest, dominated by non-eucalypt species, not koala habitat

Condition and disturbance: previous clearing for gas infrastructure, evidence of fire

Koala faecal pellet survey - overview

Method based on Spot Assessment Technique (Phillips and Callaghan, 2011 [d])

Note: If a more detailed koala survey is required (i.e. density estimates), refer to Policy 4 of the Queensland Government's Nature Conservation (Koala) Conservation Plan 2006-2016 [e] and Dique *et al*. 2003 [f]. This may be required where preliminary surveys (i.e. faecal pellet searches) reveal the presence of the koala at a site, for the purposes of informing impact assessment and Commonwealth referral.

Faecal pellet survey data

Survey date and time; survey team: not undertaken as not koala habitat

Survey location details (site name / number): N/A

Survey location (transect start) Easting and Northing: N/A

Survey location (transect end) Easting and Northing: N/A

	Search area 1	**Search area 2**	**Search area 3**
Pellet visibility (Poor, Medium, Good)*	-		
Number of trees searched	-		
Koala faecal pellets observed (Y/N)	-		
Arboreal mammal scratches observed (Y/N)	-		
Koala(s) observed (Y/N – if yes, details)	-		

*Poor: Thick layer of leaf litter, grasses, weeds, shed bark / Medium: Limited amount of leaf litter, grasses, weeds, shed bark / Good: little or no leaf litter, grasses, weeds, shed bark

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Key references:

a Australian Koala Foundation's National Koala Tree Protection List; Recommended Tree Species for Protection and Planting of Koala Habitat (Mitchell, 2012): https://www.savethekoala.com/sites/default/files/Australian%20Koala%20Foundation_National%20Koala%20Tree%20Protection%20List.pdf

b State Planning Policy 2/10 Koala Conservation in South East Queensland (DERM, 2010): http://www.ehp.qld.gov.au/wildlife/koalas/strategy/pdf/koala-spp.pdf

c Required habitat information and definition of 'habitat critical to the survival of the species' sourced from Interim koala referral advice for proponents (DSEWPaC, 2012): http://www.environment.gov.au/epbc/publications/pubs/bio240-0612-interim-koala-referral-advice.pdf

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e Nature Conservation (Koala) Conservation Plan 2006-2016: http://www.ehp.qld.gov.au/wildlife/koalas/legislation/pdf/conservation-plan-06-16.pdf

f Dique *et al*. (2003). Evaluation of line transect sampling for estimating koala abundance in the Pine Rivers Shire, south east Queensland. Wildlife Research, 30, 127-133.

Site photos

Koala Habitat Assessment and Faecal Pellet Survey

Project: Lot 55 Fairview **Site name/number:** KHA 19

Date and recorder: 14/12/13 LM **Photos:** 560- 563

Easting: 711069 **Northing:** 7143723 wp 127

General habitat description: *Callitris glaucophylla* open forest with occasional emergent eucalypts and dense shrubs

Canopy tree species composition

Tree species	**% canopy cover of species** What proportion of canopy is represented by this species	**Primary food tree species in LGA –** refer AKF *National Koala Tree Protection List 2012* [a] – trees in bold	**Food tree species in LGA –** refer AKF *National Koala Tree Protection List 2012* [a] – trees not in bold	**Koala habitat tree* as defined in SEQ Koala SPP [b] –** *any other Eucalyptus sp., and trees in genera Corymbia, Melaleuca, Lophostemon, Angophora*	**Not a koala habitat tree**
		Tick one for each tree species			
Eucalyptus melanophloia	5	n	y	y	-
Callitris glaucophylla	90	n	n	n	y
Corymbia clarksoniana	5	n	n	y	-

***** non-juvenile koala habitat tree > 4 m in height OR trunk circumference > 31.5 cm at height of 1.3 m

Other habitat information [c]	**Comments**
Vegetative ground cover (% of ground area)	70
Leaf litter cover (% of ground area)	20
Area of surface water (% of ground area)	0
Distance to surface water (approximate)	Approximately 5 km
Evidence of dogs in area	No

Habitat critical to the survival of the koala [c]	**Yes / No**
Primary koala food tree species comprise at least 30% of the overstorey trees	n
Primary koala food tree species comprise less than 30% of the overstorey trees, but together with secondary food tree species comprise at least 50% of the overstorey trees (secondary food trees in this instance are those identified for LGA that are not primary food trees (AKF, 2012))	n
Primary food tree species are absent but secondary food tree species alone comprise at least 50% of the overstorey trees	n
The above qualities are absent in a forest or woodland, but other essential habitat features are present and adjacent to areas exhibiting the above qualities	n
A relatively high density of koalas is supported, regardless of the presence of food tree species	n
Any form of landscape corridor which is essential for the dispersal of koalas between forest of woodland habitats	n

Other site notes

Site context: large patch of contiguous remnant vegetation in the Hallett State Forest, dominated by non-eucalypt species, not koala habitat

Condition and disturbance: previous clearing for gas infrastructure, good condition

Koala faecal pellet survey - overview

Method based on Spot Assessment Technique (Phillips and Callaghan, 2011 [d])

Note: If a more detailed koala survey is required (i.e. density estimates), refer to Policy 4 of the Queensland Government's Nature Conservation (Koala) Conservation Plan 2006-2016 [e] and Dique *et al*. 2003 [f]. This may be required where preliminary surveys (i.e. faecal pellet searches) reveal the presence of the koala at a site, for the purposes of informing impact assessment and Commonwealth referral.

Faecal pellet survey data

Survey date and time; survey team: not undertaken as not koala habitat

Survey location details (site name / number): N/A

Survey location (transect start) Easting and Northing: N/A

Survey location (transect end) Easting and Northing: N/A

	Search area 1	**Search area 2**	**Search area 3**
Pellet visibility (Poor, Medium, Good)*	-		
Number of trees searched	-		
Koala faecal pellets observed (Y/N)	-		
Arboreal mammal scratches observed (Y/N)	-		
Koala(s) observed (Y/N – if yes, details)	-		

*Poor: Thick layer of leaf litter, grasses, weeds, shed bark / Medium: Limited amount of leaf litter, grasses, weeds, shed bark / Good: little or no leaf litter, grasses, weeds, shed bark

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Key references:

a Australian Koala Foundation's National Koala Tree Protection List; Recommended Tree Species for Protection and Planting of Koala Habitat (Mitchell, 2012): https://www.savethekoala.com/sites/default/files/Australian%20Koala%20Foundation_National%20Koala%20Tree%20Protection%20List.pdf

b State Planning Policy 2/10 Koala Conservation in South East Queensland (DERM, 2010): http://www.ehp.qld.gov.au/wildlife/koalas/strategy/pdf/koala-spp.pdf

c Required habitat information and definition of 'habitat critical to the survival of the species' sourced from Interim koala referral advice for proponents (DSEWPaC, 2012): http://www.environment.gov.au/epbc/publications/pubs/bio240-0612-interim-koala-referral-advice.pdf

NOTE: this habitat assessment sheet will need to be reviewed and where necessary updated when the finalised koala referral guidelines are released by the Commonwealth

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e Nature Conservation (Koala) Conservation Plan 2006-2016: http://www.ehp.qld.gov.au/wildlife/koalas/legislation/pdf/conservation-plan-06-16.pdf

f Dique *et al*. (2003). Evaluation of line transect sampling for estimating koala abundance in the Pine Rivers Shire, south east Queensland. Wildlife Research, 30, 127-133.

Site photos

WORKS WITHIN A WATERCOURSE ASSESSMENT

This watercourse assessment is to be filled out for all watercourse crossings to ensure compliance with environmental requirements and to ensure appropriate approvals are obtained.

FIELD ASSESSMENT

Inspected by:	Roisin Feeney	GHD	**Inspected Date:**	11/12/2013
Company:			**Time:**	9:00 am

Crossing Name:	Un-named watercourse	**CWP Number**	
Watercourse ID	WC 1	**Crossing Type (E.g. pipeline/road)**	Vegetation Management Area
Lot/Plan:	55FTY1153	**Location Reference**	RoW 45 a
Site	R-HCS-02 ☐ F-HCS-04 ☒ F-HCS-05 ☐ other/area:		
Land Tenure:	Freehold / Leasehold / other :	**Petroleum Tenure**	
Crossing Disturbance Status:	Existing crossing with no upgrade required: ☐ Existing crossing with upgrade required: ☒ New crossing in previously disturbed area: ☐ New crossing in undisturbed area: ☐		
Land Access Approval to undertake assessment:	Yes ☒ No ☐	**Approval No:**	
Cultural Heritage Approval to undertake assessment:	Yes ☐ No ☐	**Approval No:**	
Anticipated commencement date:		**Can the crossing be installed within 10 days?** If No, development approval and other approvals may be required.	Yes ☒ No ☐

HEALTH AND SAFETY		
Have you completed a Safety Task Assessment (STA)?	Yes ☒ No ☐	If No, cease inspection and complete.
Do you have appropriate PPE for the task?	Yes ☒ No ☐	
Do you have adequate amount of water – at least 10 litres?	Yes ☒ No ☐	

GENERAL ENVIRONMENTAL CONDITIONS	
Temp: Cold (<5◦C) ☐ Cool (<15◦C) ☐ Mild (<25◦C) ☐ Warm (<35◦C) ☒ Hot (>35◦C) ☐	Weather now: Clear/Fine ☐ Scattered Clouds ☐ Cloudy ☒
	Past 24 hrs: Clear/Fine ☒ Scattered Clouds ☐ Cloudy ☐
Wind: Still ☐ Slight breeze ☒ Windy ☐ Strong Wind ☐	Air now: Dry ☐ Humid ☐ Rain (Steady)☒ Rain (Heavy) ☐
	Air past 24hrs: Dry ☐ Humid ☒ Rain (Steady)☐ Rain (Heavy) ☐

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CROSSING LOCATION (REFER SECTION 8.2)

GPS Coordinates - Latitude/Longitude (E – 6 Figs, N – 7 Figs) GDA94

Latitude (E)	699054	**Longitude (S)**	7143718
Bankfull Width (m)	12 m	**Bank Width (m):**	Left Bank: 4 m Right Bank: 5 m
Stream Width at Water Surface (m):	NA	**Baseflow Stream Width (m):**	3 m
Bank Height: Baseflow and water surface height difference:	Downstream left Bank: 1 m/ NA Downstream Right Bank 0.5 m/ NA	**Photographs of site** Provide photos looking upstream and downstream from crossing location, as well as relevant to watercourse / waterway determination. Label photos.	

Location	Latitude (E)	Longitude (S)
A	NA	NA
B	NA	NA
C	NA	NA
D	NA	NA
E	NA	NA

Water Present:	Yes ☐ No ☒
Water Type:	Flowing ☐ Pool(s) present ☐ Dry ☒
Sample Site Length: 50 m	Water Surface Depth to Bed: NA

CHANNEL DETERMINATION (REFER TO SECTION 8.3)

Stream Order: 1☐ 2☒ 3☐ 4☐ 4+☐		Functional Zone Type - Sediment	Supply☐ Transfer☐ Storage☒
Identify Channel Type:	Irregular		
Channel Modifications:	Reinforced with rocks and woodchips at powerline RoW and culvert at Injune-Taroom Road		
Bed Sediment Character:	Tight ☐ Packed ☐ Moderate ☐ Low 1 ☐ Low 2 ☒		
Bank Sediments Composition:	Bedrock 20 % Boulder 1 % Cobble 2 % Pebble 2 % Gravel 1 % Sand Fines 74 %		
Bed Material Angularity:	Very Angular☐ Angular ☒ Sub-angular ☐ Rounded ☐Well-rounded ☐ Cobble peddle and gravel fractions not present ☐		
Bank Predominant Shape:	Concave ☒ Convex ☐ Stepped ☐ Wide lower bench ☐ Undercut ☐		
Bank Slope Downstream Right:	Vertical 80-90° ☐ Steep 60-80° ☒ Moderate 30-60° ☐ Low 10-30° ☐ Flat<10°☐		
Bank Slope Downstream Left:	Vertical 80-90° ☐ Steep 60-80° ☒ Moderate 30-60° ☐ Low 10-30° ☐ Flat<10°☐		
Channel Shape:	U-shape		
Bed Stability:	Severe Erosion ☐ Moderate Erosion ☐ Bed Stable ☐ Moderate Deposition ☒ Severe Deposition ☐		
Potential Fish Habitat Class:	Class1 ☐ Class2 ☐ Class3 ☐ Class4 ☒		
Fish Migratory Passage Potential:	Nil ☒ Very Restricted ☐ Moderately Restricted ☐ Partly Restricted ☐ Good Passage ☐ Unrestricted Passage ☐		

FLORA/FAUNA ASSESSMENT (REFER TO SECTION 8.4)

Does any vegetation need to be removed?	Yes ☐ No ☒	**If Yes, no more than 0.25 Ha can be removed Estimate how much needs to be removed**
Vegetation community description		
Has an Aquatic and Ecological Assessment been undertaken previously that encompasses the watercourse crossing point (both for flora and fauna characteristics).	Yes ☒ No ☐	If yes, reference Report No:

Has a pre-disturbance assessment been undertaken previously that encompasses the watercourse crossing point (both for flora and fauna characteristics).	Yes ☒ No ☐	If no, a pre-disturbance assessment may be required
Does the riparian zone at the watercourse fall within a mapped extent of a Regional Ecosystem and/ or TEC? (refer to Dekho maps)	Yes ☐ No ☒	If Yes, detail mapped RE code (biodiversity status) and TEC where applicable: Mapped as high value regrowth
Does the riparian zone at the watercourse fall within any Category A, B or C Environmentally Sensitive Areas (ESAs) and/or their primary or secondary primary protection (buffer) zones (refer to Dekho maps)	Yes ☒ No ☐	If Yes, detail ESA category: Category C ESA
If present, is the mapped RE/TEC community consistent with the vegetation community observed on the ground	Yes ☐ No ☒	If no, Check whether discrepancies have already been recorded in previous reports and GIS layers updated. If not a pre-disturbance assessment or quaternary level assessment may be required. Ground-truthed regrowth (Quaternary Assessment)
Does the proposed development activity comply with the clearing/significant disturbance restrictions of the applicable EA (refer Table 3)	Yes ☒ No ☐	If, no then flag with FLUOR Environment Team for review.
Are there any Cultural Heritage sites located within the crossing location or nearby area (refer to Dekho maps)	Yes ☐ No ☐	If Yes, detail site:
General Vegetation Community description: (including a list of dominant flora species within each stratum)	*Callitris glaucophylla* dominated open woodland, sparse shrub layer of *C. glaucophylla* and *Eucalyptus populnea*, sparse grassy groundlayer	

Are there any declared weeds within the area of the crossing?	Yes☒ No ☐	If yes, describe flag on the ground and GPS and provide on map. Opuntia sp.
Are there any conservation significant species (i.e ENVT or Type A flora) within the area of the crossing?	Yes☐ No ☒	
Riparian vegetation cover: Trees > 10 m: Trees < 10 m: Shrubs: Grasses, herbs and sedges:	1 % 20 % 10 % 50 %	
Riparian vegetation patchiness:	Occasional clumps	
Describe the riparian vegetation condition:	VAST II - Modified	
Native woody vegetation regeneration:	Abundant ☒ Present ☐ Limited ☐	

SAFETY CONSIDERATIONS		
Are there any safety implications at the proposed crossing due to decreased Right of Way from Environmental Sensitive Areas or other constraints like topography?	Yes ☐ No ☒	**If Yes, Note concerns**

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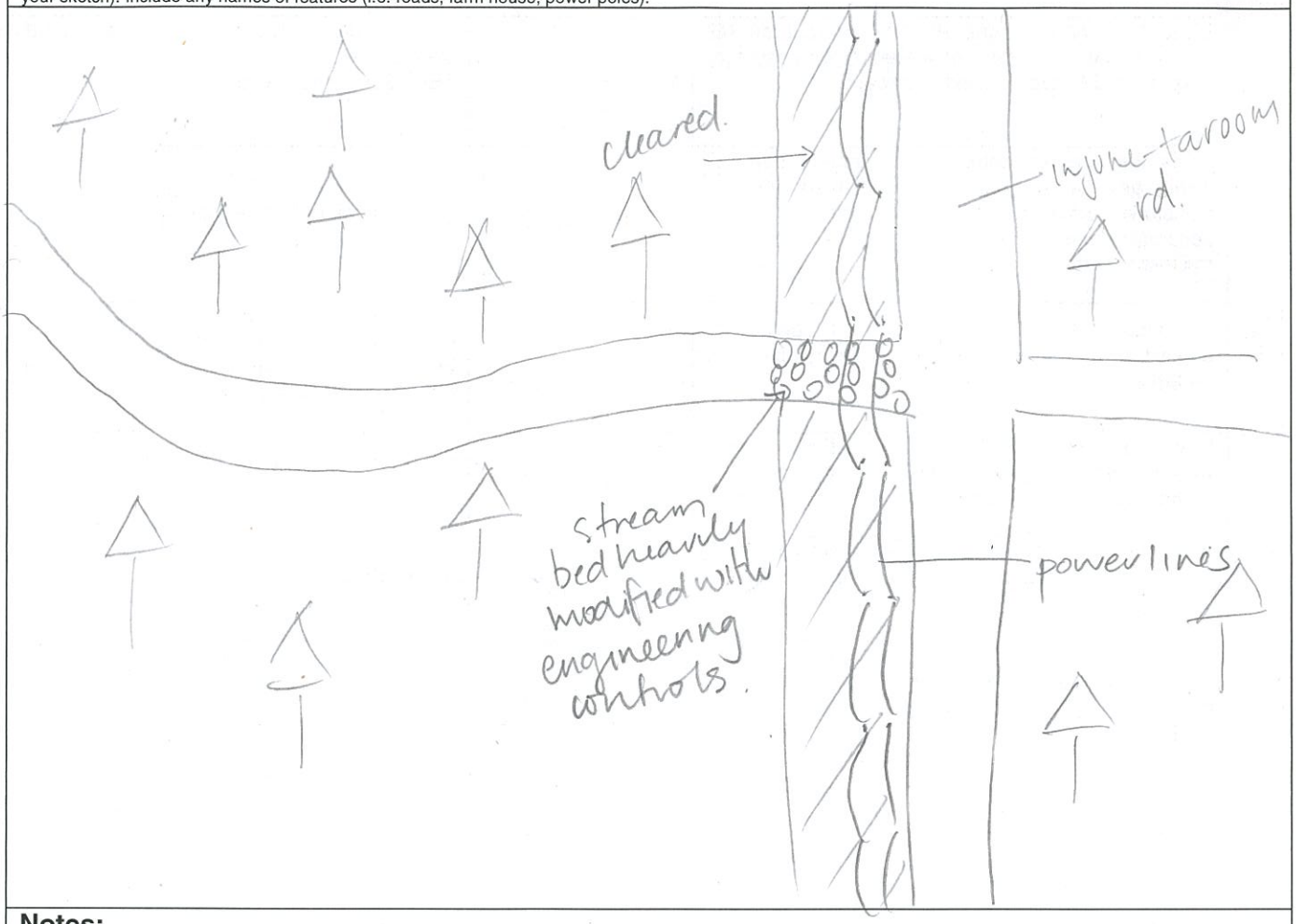
SKETCH OF CROSSING (BIRDS EYE VIEW) (REFER SECTION 8.5)

Sketch birds eye view (i.e. view looking from above), depict how the stream curves, any vegetation, trees, areas of significance (cultural significance if known). Complete approx 10 times the Bankfull Width upstream and downstream of crossing site. Take photographs upstream and downstream (write photo locations on your sketch). Include any names of features (i.e. roads, farm house, power poles).



Notes:

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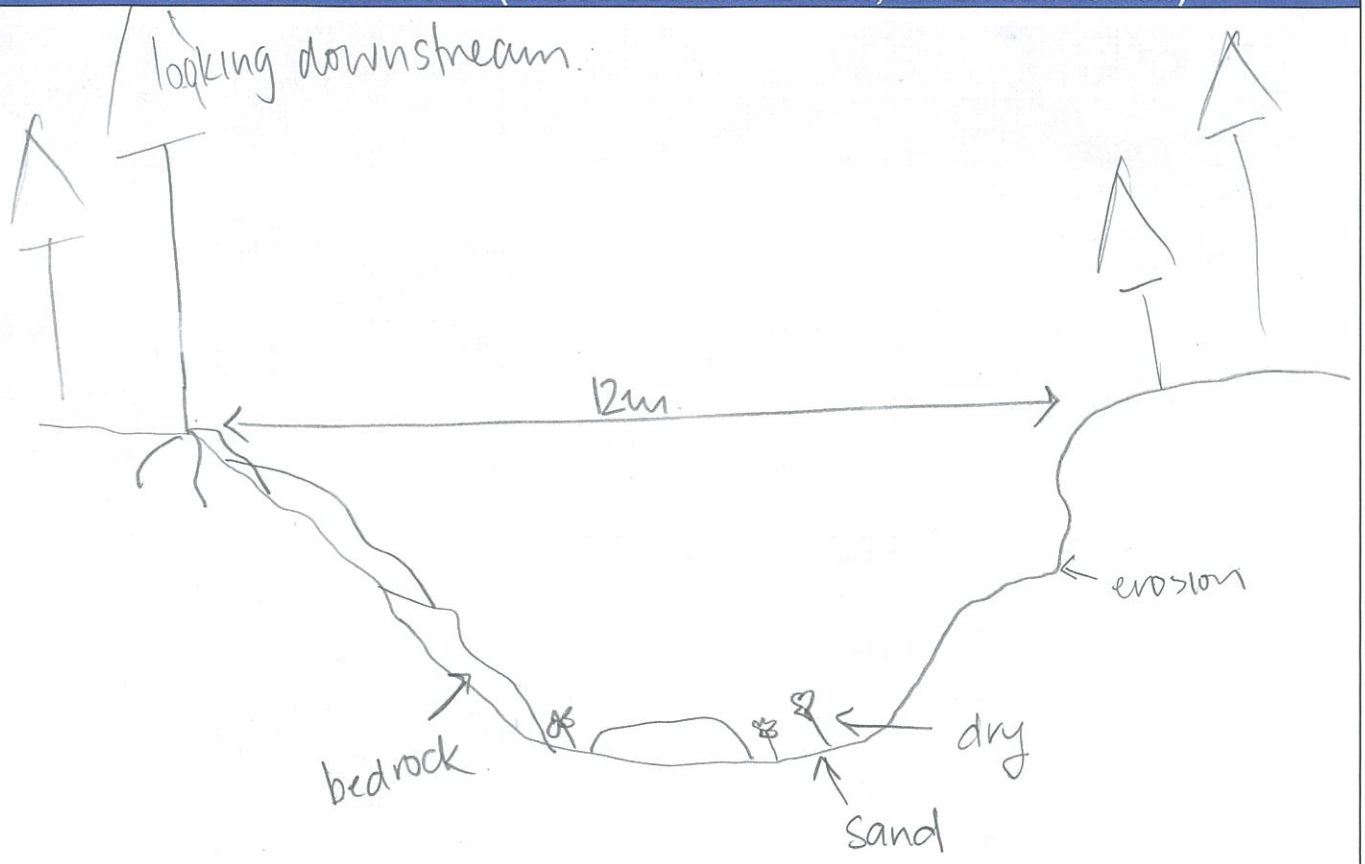
SKETCH OF CROSSING (CROSS-SECTIONAL VIEW, REFER SECTION 8.5)



Notes:

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ASSESSMENT OUTCOME

LEGISLATIVE REQUIREMENTS DETERMINATION				
Part 1 - Waterway Definition Assessment (*Fisheries Act 1994*)				
Environmental Value	**Checklist**	**Y / N**	**Justification for Placement**	**Field Comments**
Does the feature satisfy the waterway definition requirements of FHMOP 008 2009 (refer section 7.3.2) under the *Fisheries Act 1994*? Refer to Section 7 of Watercourse Assessment Manual	Does the feature have a defined bed and banks: The bed and banks need to be continuous rather than isolated and broken sections of a depression.	☒yes ☐no	If **Yes to all** , complete Section 2 If **No to any of these, the feature does not constitute a waterway and no further assessment is required for the Fisheries Act.** Implement waterway crossing design and environmental protection measures as required in Environmental Authority and other relevant environmental requirements.	**WATERWAY UNDER *FISHERIES ACT 1994?*** ☐ **YES** **(APPROVAL/ LODGEMENT REQUIRED)**
	Does the feature have an extended, if non-permanent, period of flow: Flow must continue for a reasonable period after rain ceases and have some reliability commensurate with rainfall? Flow for several weeks after rainfall ceases does not constitute extended flow. Consider e.g. water present, catchment size, geomorphological features, and ecological indicators of sustained flow.	☐yes ☒no	If **Yes to all** , complete Section 2 If **No to any of these, the feature does not constitute a waterway and no further assessment is required for the Fisheries Act.** Implement waterway crossing design and environmental protection measures as required in Environmental Authority and other relevant environmental requirements. **No evidence of aquatic life. Vegetation consistent with areas surrounding (outside of area of influence**	☒ **NO** **(NO LODGEMENT REQUIRED**
	Does the feature have sufficient flow adequacy: The flow needs to be sufficient to sustain basic ecological processes and to maintain biodiversity within the feature. Comment on any ecological indicators present e.g. riparian vegetation, presence/evidence of aquatic life etc.	☐yes ☒no		

Section 2 - Waterway Barrier Works Requirements (Only complete if works are to take place within a waterway)				
Environmental Value	**Checklist**	**Y / N**	**Justification for Placement**	**Field Comments**
a. **Do the works constitute waterway barrier works as defined in FHMOP 008 2009 (Appendix 3)?**	As well as dams and weirs the following are examples of developments that are considered to be waterway barrier works: ▪ Temporary dams, barriers to flow ▪ Culverts ▪ Bed level waterway crossings ▪ Causeways (water crossings slightly above stream bed) ▪ Tidal or floodgates (including maintenance and repair) ▪ Partial bunds (where the development will only partially block a waterway) ▪ Levee banks ▪ Silt curtains ▪ Netting and screens ▪ Litter booms or Trash racks ▪ Riffle structure	☐yes ☐no	If **Yes**, complete Section **2b**. If **No**, implement construction works in accordance with environmental protection measures as requires in Environmental Authority and other relevant environmental requirements. Attach/reference all records and place in Z:\653R_Environmental Complete paperwork and forward to FLUOR Environment Team for review.	
b. **Is the waterway crossing self assessable under WWBW01 for Temporary Waterway Barrier Works**	Do the works involve: ▪ Waterway barriers that will be in place for less than 42 calendar days ▪ Waterway barriers that are less than 20m in length across the waterway from bank to bank and; ▪ 10m or less in width (at the widest point). ▪ Waterway barriers that are at least 500m distance from any existing natural or artificial waterway barrier (upstream or downstream) unless: ○ the barrier is being constructed in order to perform maintenance or repairs on, or removal of, the existing barrier, or ○ the barrier is being constructed in order to facilitate dewatering between the new and existing barriers, or ○ the barrier is a silt curtain for control of sediment. ▪ Disturbance to the bed and banks of a waterway less than 5m from the toe of the barrier on either side. ▪ Construction at the time of the year when the flows are lowest or have completely stopped. ▪ A waterway barrier where there will be no ponding of water upstream.	☐yes ☐no	If **Yes**, comply with all applicable requirements of WWBW01 in addition to waterway crossing design and environmental protection measures as required in CEMP, Environmental Authority, EIS and other relevant environmental requirements. Provide evidence that waterway crossing design satisfies DAFF self assessment codes including reference to design drawings. Attach/reference all records and place in Z:\653R_Environmental Complete paperwork and forward to FLUOR Environment Team for review. If **No**, go to Section **2c**.	

Section 2 - Waterway Barrier Works Requirements (Only complete if works are to take place within a waterway)				
Environmental Value	**Checklist**	**Y / N**	**Justification for Placement**	**Field Comments**
c. **Is the waterway crossing self assessable under WWBW02 for Minor Waterway Barrier Works**	Do the works involve: • New waterway barrier works **at least 100m** from any other permanent waterway barrier works on same waterway. • Construction that is **not** on a bend or rapid section of a waterway. • Construction perpendicular to the water flow (within 10°). • Construction of minor barriers must commence and finish within 60 calendar days. • Construction during times of low flow, base flow or no flow conditions. • And either one of either: • <u>*Part 1, Dams and Weirs*</u> • Construction of a new **dam or weir** or maintenance of existing one on a waterway with a stream order of 1 or 2 • Maximum waterway barrier height is **one metre or less** above the lowest point of the waterway bed • Upstream and downstream disturbance area must not be more than **10 m** in total from the upstream and downstream toe of the barrier. • <u>Or, *Part 3, Culverts*</u> • Construction of a new **culvert** crossing or replacement/ modification or maintenance of existing culvert where the bankfull width of the waterway **is not** greater than 20m. • Construction of **culverts** where the **maximum** upstream/downstream length of the culvert cells is 15m plus apron (3m scour protection for culverts) or less. • The maximum disturbance area outside barrier footprint of 10 m (scour protection is included in the barrier footprint (upstream and/or downstream). • <u>Or, *Part 4, Bed Level Crossings*</u> • Construction of a new **bed level** crossing or replacement/ modification or maintenance of existing **bed level** waterway where the bankfull width of the waterway can be less than or greater than 20m. • **Bed level** crossing footprint is no more than **15 m wide** (upstream/downstream), with a maximum disturbance area outside crossing footprint of **10 m** (**25 m in total**). • Installation of **bed level** crossings **no higher** than natural bed level. • Installation of a **bed level** crossing at the same gradient as the waterway bed gradient.	☐yes ☐no	If **Yes**, comply with all applicable requirements of WWBW02 in addition to waterway crossing design and environmental protection measures as required, Environmental Authority and other relevant environmental requirements. Provide evidence that waterway crossing design satisfies DAFF self assessment codes including reference to design drawings. Attach/reference all records and place in Z:\653R_Environmental Complete paperwork and forward to FLUOR Environment Team for review.	

Part 3 - Water Definition Assessment (Water Act 2000) & Relevant Environmental Authority				
Environmental Value	**Checklist**	**Y / N**	**Justification for Placement**	**Overall Outcome**
Does the feature fit the definition of a ***Drainage Feature*** under the Water Act 2000? ***Drainage feature*** means a natural landscape feature, including a gully, drain, drainage depression or other erosion feature that— (a) is formed by the concentration of, or operates to confine or concentrate, overland flow water during and immediately after rainfall events; and (b) flows for only a short duration after a rainfall event, regardless of the frequency of flow events; and (c) commonly, does not have enough continuing flow to create a Riverine environment Refer to Section 7 of Watercourse Assessment Manual	1. Does the feature carrying water flow only for a short duration after a rainfall event? 2. Does the feature lack the presence of a riverine environment? (i.e flow adequacy to support riverine species). 3. Does the feature lack the presence of in-stream islands, benches or bars?	☒yes ☐no ☒yes ☐no ☒yes ☐no	If ***Yes to all*** of these questions then the feature does not constitute a watercourse and no further assessment is required for the Water Act. If ***no to any*** one of these questions then this feature constitutes a watercourse under the Water Act 2000	**Drainage Feature UNDER the *WATER ACT 2000?*** ☒ **YES** **(NO APPROVAL REQUIRED)** Implement environmental protection measures as required in Environmental authority and other relevant environmental requirements. ☐ **NO** **Determined a Watercourse – see below** **Watercourse under the *WATER ACT 2000?*** ☐ **YES** **(APPROVAL/ LODGEMENT REQUIRED – DETERMINED A WATERCOURSE)** Complete Pre and Post works checklists, and ensure appropriate lodgements are undertaken as per Environmental Authority Requirements. ☒ **NO** **Determined a drainage feature– see Above.**

Part 4 - Water Act Requirements (only complete if works are to take place within or adjacent to the watercourse – refer to Section 2 (Water Act) outcomes)				
Environmental Value	**Checklist**	**Y / N**	**Justification for Placement**	**Comments**
Do the works require approval under the Water Act? (Refer to summary flowchart within Section 9 of watercourse manual)	Do the works involve: • Excavation or placing fill in a way that would interfere with the flow of water in a watercourse, lake or spring by impounding or redirecting the flow of water (referring to completed product, following construction works).	☐yes ☒no	If **Yes**, go to Part **5**, works may require a Riverine Protection Permit under the Water Act. Provide evidence that waterway crossing design satisfies DEHP Guidelines (next section) including reference to design drawings. Attach/reference all records and store in relevant Environmental Drive. Complete paperwork and forward to FLUOR Environment Team for review. If No, adhere to EA requirements!	

Part 5 – DNRM Assessment Requirements (Guideline – activities in a watercourse, lake or spring associated with mining operations) (refer to Section 1 (Water Act) outcomes)			
What type (if any) vegetation will be required to be removed and quantity (area). (no more than 0.25ha), how will the vegetation be removed?	☒yes ☐no	List all species required for removal. Ensure FLUOR/SANTOS vegetation management plan and EA conditions are followed (indicate the requirements for this crossing).	<0.25 ha of vegetation will require clearing Majority of the crossing location has already been cleared Potential species to be cleared include: *Callitris glaucophylla, Eucalyptus populnea* and *Eremopilla mitchelli*
Can the water crossing be located in a previously disturbed area?	☒yes ☐no	If No, why not?	Already located adjacent to RoW and road crossing
Is the water course from groundwater origin?	☐yes ☒no	Determine upstream water sources	

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Section 6 – Overall Assessment Outcome

Has the stream order been assessed a watercourse (Water Act)	☐yes ☒no	If Yes, must comply with the "Guideline – activities in a watercourse, lake or spring associated with mining operations" – Ensure all of this checklist is completed and conveyed to all relevant staff, contractors are to ensure compliance with EA conditions – ensure lodgement of PREWORKS TO DEHP 10 Business prior to works commencing.	☐ **YES** **(APPROVAL REQUIRED)** ☒ **NO** **(NO LODGEMENT REQUIRED, ASSESSED AS DRAINAGE FEATURE)**
Has the stream order been assessed as a waterway (*Fisheries Act*)	☐yes ☒no	If **Yes** complete check boxes below If **No** – no further assessment required	☐ **YES** **(APPROVAL REQUIRED)** ☒ **NO** **(NO LODGEMENT REQUIRED)**
Is a development approval required (i.e. the self assessable code can not be adhered to)?	☐yes ☒no	If **Yes** Contact FLUOR Environment Team.	
Was the crossing assessed as a 'minor waterway barrier'?, either:		If **Yes** complete the relevant 'Minor Waterway Barrier Works Self-Assessment Sheet' lodge to FLUOR Environment Team.	
Part 1 – Dams and Weirs	☐yes ☒no		
Part 3 – Culverts	☐yes ☒no		
Part 4 – Bed Level Crossings	☐yes ☒no		
Was the crossing assessed as a 'temporary waterway barrier'?	☐yes ☒no	If **Yes** complete a Temporary Waterway Barrier Works Self-Assessment Sheet lodge to FLUOR Environmental Team for review.	
Were any EVNT species listed under the EPBC Act and/or NC Act present within the riparian zone of the waterway crossing	☐yes ☒no	If Yes GPS the position of individuals/populations, flag on site and contact FLUOR Environmental Team for review. If No – no further assessment required	
Were any vegetation mapping discrepancies identified within the riparian zone of the waterway crossing	☐yes ☒no	If Yes undertake a quaternary level RE assessment and GPS the extent of the mapped community assemblage where applicable. Contact FLUOR Environment Team for review. If No – no further assessment required	

WC 1 Pre-works Photographs

Photo A – Looking across the waterway at the proposed site works

Vegetation Management Area

Powerline RoW 45 easement

Photo B – Looking downstream of the proposed site of works

Photo C – Looking upstream of the proposed site of works

WORKS WITHIN A WATERCOURSE ASSESSMENT

This watercourse assessment is to be filled out for all watercourse crossings to ensure compliance with environmental requirements and to ensure appropriate approvals are obtained.

FIELD ASSESSMENT

Inspected by:	Roisin Feeney	GHD	**Inspected Date:**	13/12/2013
Company:			**Time:**	9:35 am

Crossing Name:	Un-named watercourse	**CWP Number**	
Watercourse ID	WC 2	**Crossing Type (E.g. pipeline/road)**	Vegetation Management Area
Lot/Plan:	55FTY1153	**Location Reference**	RoW 45 b
Site	R-HCS-02 ☐ F-HCS-04 ☒ F-HCS-05 ☐ other/area:		
Land Tenure:	Freehold / Leasehold / other :	**Petroleum Tenure**	
Crossing Disturbance Status:	Existing crossing with no upgrade required: ☐ Existing crossing with upgrade required: ☒ New crossing in previously disturbed area: ☐ New crossing in undisturbed area: ☐		
Land Access Approval to undertake assessment:	Yes ☒ No ☐	**Approval No:**	
Cultural Heritage Approval to undertake assessment:	Yes ☐ No ☐	**Approval No:**	
Anticipated commencement date:		**Can the crossing be installed within 10 days?** If No, development approval and other approvals may be required.	Yes ☒ No ☐

HEALTH AND SAFETY		
Have you completed a Safety Task Assessment (STA)?	Yes ☒ No ☐	If No, cease inspection and complete.
Do you have appropriate PPE for the task?	Yes ☒ No ☐	
Do you have adequate amount of water – at least 10 litres?	Yes ☒ No ☐	

GENERAL ENVIRONMENTAL CONDITIONS	
Temp: Cold (<5◦C) ☐ Cool (<15◦C) ☐ Mild (<25◦C) ☐ Warm (<35◦C) ☒ Hot (>35◦C) ☐	Weather now: Clear/Fine ☒ Scattered Clouds ☐ Cloudy ☐
	Past 24 hrs: Clear/Fine ☐ Scattered Clouds ☐ Cloudy ☒
Wind: Still ☐ Slight breeze ☒ Windy ☐ Strong Wind ☐	Air now: Dry ☐ Humid ☒ Rain (Steady)☐ Rain (Heavy) ☐
	Air past 24hrs: Dry ☐ Humid ☒ Rain (Steady)☒ Rain (Heavy) ☐

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CROSSING LOCATION (REFER SECTION 8.2)

GPS Coordinates - Latitude/Longitude (E – 6 Figs, N – 7 Figs) GDA94

Latitude (E)	700531	**Longitude (S)**	7144651
Bankfull Width (m)	9 m	**Bank Width (m):**	Left Bank: 2 m Right Bank: 3 m
Stream Width at Water Surface (m):	NA	**Baseflow Stream Width (m):**	3 m
Bank Height: Baseflow and water surface height difference:	Downstream left Bank: 1 m/ NA Downstream Right Bank 2 m/ NA	**Photographs of site** Provide photos looking upstream and downstream from crossing location, as well as relevant to watercourse / waterway determination. Label photos.	

Location	Latitude (E)	Longitude (S)
A	NA	NA
B	NA	NA
C	NA	NA
D	NA	NA
E	NA	NA

Water Present:	Yes ☐ No ☒
Water Type:	Flowing ☐ Pool(s) present ☐ Dry ☒
Sample Site Length: 50 m	Water Surface Depth to Bed: NA

CHANNEL DETERMINATION (REFER TO SECTION 8.3)

Stream Order: 1☒ 2☐ 3☐ 4☐ 4+☐	Functional Zone Type - Sediment	Supply☒ Transfer☐ Storage☐
Identify Channel Type:	Mildly sinuous	
Channel Modifications:	Reinforced with rocks and woodchips at powerline RoW	
Bed Sediment Character:	Tight ☐ Packed ☐ Moderate ☐ Low 1 ☐ Low 2 ☒	
Bank Sediments Composition:	Bedrock <1 % Boulder <1 % Cobble <1 % Pebble <1 % Gravel <1 % Sand Fines 100 %	
Bed Material Angularity:	Very Angular☐ Angular ☐ Sub-angular ☐ Rounded ☐Well-rounded ☐ Cobble peddle and gravel fractions not present ☒	
Bank Predominant Shape:	Concave ☐ Convex ☐ Stepped ☒ Wide lower bench ☐ Undercut ☐	
Bank Slope Downstream Right:	Vertical 80-90° ☐ Steep 60-80° ☒ Moderate 30-60° ☐ Low 10-30° ☐ Flat<10°☐	
Bank Slope Downstream Left:	Vertical 80-90° ☒ Steep 60-80° ☐ Moderate 30-60° ☐ Low 10-30° ☐ Flat<10°☐	
Channel Shape:	Deepened u-shape	
Bed Stability:	Severe Erosion ☒ Moderate Erosion ☐ Bed Stable ☐ Moderate Deposition ☐ Severe Deposition ☐	
Potential Fish Habitat Class:	Class1 ☐ Class2 ☐ Class3 ☐ Class4 ☒	
Fish Migratory Passage Potential:	Nil ☒ Very Restricted ☐ Moderately Restricted ☐ Partly Restricted ☐ Good Passage ☐ Unrestricted Passage ☐	

FLORA/FAUNA ASSESSMENT (REFER TO SECTION 8.4)

Does any vegetation need to be removed?	Yes ☐ No ☒	**If Yes, no more than 0.25 Ha can be removed Estimate how much needs to be removed**
Vegetation community description		
Has an Aquatic and Ecological Assessment been undertaken previously that encompasses the watercourse crossing point (both for flora and fauna characteristics).	Yes ☒ No ☐	If yes, reference Report No:

Has a pre-disturbance assessment been undertaken previously that encompasses the watercourse crossing point (both for flora and fauna characteristics).	Yes ☒ No ☐	If no, a pre-disturbance assessment may be required
Does the riparian zone at the watercourse fall within a mapped extent of a Regional Ecosystem and/ or TEC? (refer to Dekho maps)	Yes ☒ No ☐	If Yes, detail mapped RE code (biodiversity status) and TEC where applicable: Mapped as Least Concern RE 11.10.9
Does the riparian zone at the watercourse fall within any Category A, B or C Environmentally Sensitive Areas (ESAs) and/or their primary or secondary primary protection (buffer) zones (refer to Dekho maps)	Yes ☒ No ☐	If Yes, detail ESA category: Category C ESA
If present, is the mapped RE/TEC community consistent with the vegetation community observed on the ground	Yes ☒ No ☐	If no, Check whether discrepancies have already been recorded in previous reports and GIS layers updated. If not a pre-disturbance assessment or quaternary level assessment may be required. Ground-truthed regrowth (Quaternary Assessment)
Does the proposed development activity comply with the clearing/significant disturbance restrictions of the applicable EA (refer Table 3)	Yes ☒ No ☐	If, no then flag with FLUOR Environment Team for review.
Are there any Cultural Heritage sites located within the crossing location or nearby area (refer to Dekho maps)	Yes ☐ No ☐	If Yes, detail site:
General Vegetation Community description: (including a list of dominant flora species within each stratum)	*Open woodland dominated by Callitris glaucophylla with sparse shrub and ground layer.*	

Are there any declared weeds within the area of the crossing?	Yes☒ No ☐	If yes, describe flag on the ground and GPS and provide on map. Opuntia sp.
Are there any conservation significant species (i.e ENVT or Type A flora) within the area of the crossing?	Yes☐ No ☒	
Riparian vegetation cover: Trees > 10 m: Trees < 10 m: Shrubs: Grasses, herbs and sedges:	0 % 40 % 10 % 20 %	
Riparian vegetation patchiness:	Semi continuous	
Describe the riparian vegetation condition:	VAST II - Modified	
Native woody vegetation regeneration:	Abundant ☐ Present ☒ Limited ☐	

SAFETY CONSIDERATIONS		
Are there any safety implications at the proposed crossing due to decreased Right of Way from Environmental Sensitive Areas or other constraints like topography?	Yes ☐ No ☒	**If Yes, Note concerns**

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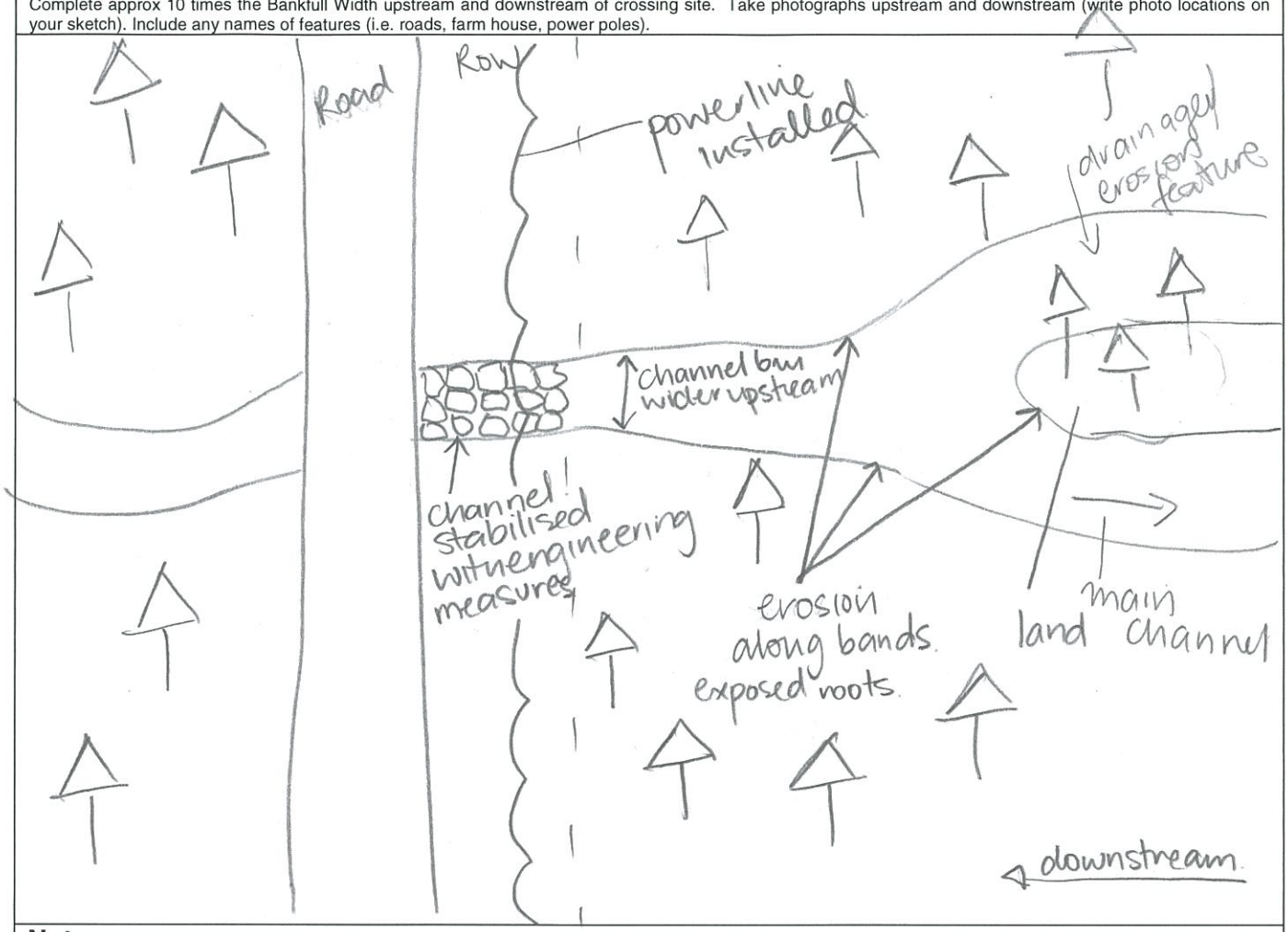
SKETCH OF CROSSING (BIRDS EYE VIEW) (REFER SECTION 8.5)

Sketch birds eye view (i.e. view looking from above), depict how the stream curves, any vegetation, trees, areas of significance (cultural significance if known). Complete approx 10 times the Bankfull Width upstream and downstream of crossing site. Take photographs upstream and downstream (write photo locations on your sketch). Include any names of features (i.e. roads, farm house, power poles).



Notes:

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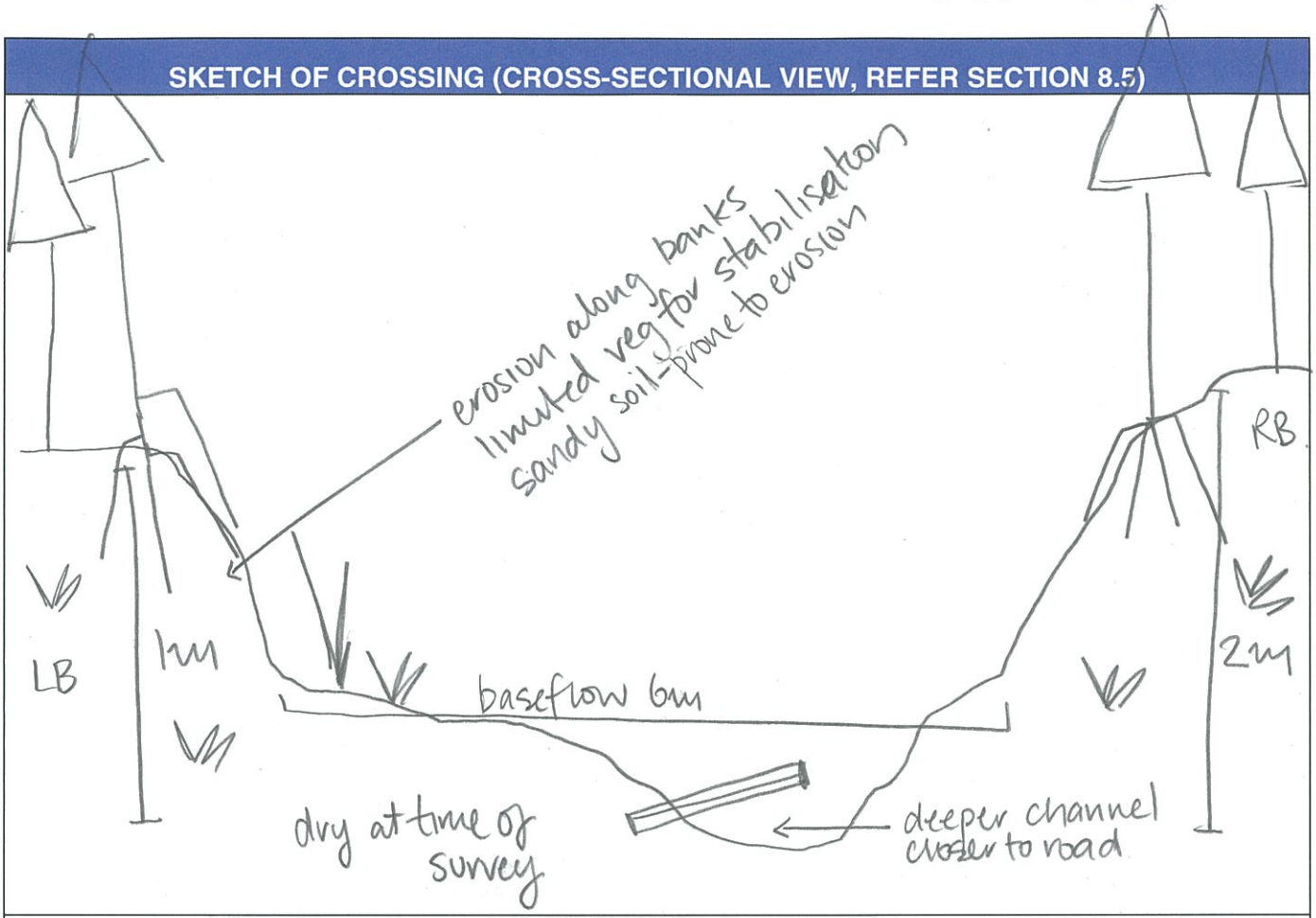
SKETCH OF CROSSING (CROSS-SECTIONAL VIEW, REFER SECTION 8.5)



Notes:

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ASSESSMENT OUTCOME

LEGISLATIVE REQUIREMENTS DETERMINATION				
Part 1 - Waterway Definition Assessment (*Fisheries Act 1994*)				
Environmental Value	**Checklist**	**Y / N**	**Justification for Placement**	**Field Comments**
Does the feature satisfy the waterway definition requirements of FHMOP 008 2009 (refer section 7.3.2) under the *Fisheries Act 1994*? Refer to Section 7 of Watercourse Assessment Manual	Does the feature have a defined bed and banks: The bed and banks need to be continuous rather than isolated and broken sections of a depression.	☒yes ☐no	If **Yes to all** , complete Section 2 If **No to any of these, the feature does not constitute a waterway and no further assessment is required for the Fisheries Act.** Implement waterway crossing design and environmental protection measures as required in Environmental Authority and other relevant environmental requirements.	**WATERWAY UNDER *FISHERIES ACT 1994?*** ☐ **YES** **(APPROVAL/ LODGEMENT REQUIRED)**
	Does the feature have an extended, if non-permanent, period of flow: Flow must continue for a reasonable period after rain ceases and have some reliability commensurate with rainfall? Flow for several weeks after rainfall ceases does not constitute extended flow. Consider e.g. water present, catchment size, geomorphological features, and ecological indicators of sustained flow.	☐yes ☒no	If **Yes to all** , complete Section 2 If **No to any of these, the feature does not constitute a waterway and no further assessment is required for the Fisheries Act.** Implement waterway crossing design and environmental protection measures as required in Environmental Authority and other relevant environmental requirements. **No evidence of aquatic life. Vegetation consistent with areas surrounding (outside of area of influence**	☒ **NO** **(NO LODGEMENT REQUIRED**
	Does the feature have sufficient flow adequacy: The flow needs to be sufficient to sustain basic ecological processes and to maintain biodiversity within the feature. Comment on any ecological indicators present e.g. riparian vegetation, presence/evidence of aquatic life etc.	☐yes ☒no		

Section 2 - Waterway Barrier Works Requirements (Only complete if works are to take place within a waterway)				
Environmental Value	**Checklist**	**Y / N**	**Justification for Placement**	**Field Comments**
a. **Do the works constitute waterway barrier works as defined in FHMOP 008 2009 (Appendix 3)?**	As well as dams and weirs the following are examples of developments that are considered to be waterway barrier works: ▪ Temporary dams, barriers to flow ▪ Culverts ▪ Bed level waterway crossings ▪ Causeways (water crossings slightly above stream bed) ▪ Tidal or floodgates (including maintenance and repair) ▪ Partial bunds (where the development will only partially block a waterway) ▪ Levee banks ▪ Silt curtains ▪ Netting and screens ▪ Litter booms or Trash racks ▪ Riffle structure	☐yes ☐no	If **Yes**, complete Section **2b**. If **No**, implement construction works in accordance with environmental protection measures as requires in Environmental Authority and other relevant environmental requirements. Attach/reference all records and place in Z:\653R_Environmental Complete paperwork and forward to FLUOR Environment Team for review.	
b. **Is the waterway crossing self assessable under WWBW01 for Temporary Waterway Barrier Works**	Do the works involve: ▪ Waterway barriers that will be in place for less than 42 calendar days ▪ Waterway barriers that are less than 20m in length across the waterway from bank to bank and; ▪ 10m or less in width (at the widest point). ▪ Waterway barriers that are at least 500m distance from any existing natural or artificial waterway barrier (upstream or downstream) unless: ○ the barrier is being constructed in order to perform maintenance or repairs on, or removal of, the existing barrier, or ○ the barrier is being constructed in order to facilitate dewatering between the new and existing barriers, or ○ the barrier is a silt curtain for control of sediment. ▪ Disturbance to the bed and banks of a waterway less than 5m from the toe of the barrier on either side. ▪ Construction at the time of the year when the flows are lowest or have completely stopped. ▪ A waterway barrier where there will be no ponding of water upstream.	☐yes ☐no	If **Yes**, comply with all applicable requirements of WWBW01 in addition to waterway crossing design and environmental protection measures as required in CEMP, Environmental Authority, EIS and other relevant environmental requirements. Provide evidence that waterway crossing design satisfies DAFF self assessment codes including reference to design drawings. Attach/reference all records and place in Z:\653R_Environmental Complete paperwork and forward to FLUOR Environment Team for review. If **No**, go to Section **2c**.	

Section 2 - Waterway Barrier Works Requirements (Only complete if works are to take place within a waterway)				
Environmental Value	**Checklist**	**Y / N**	**Justification for Placement**	**Field Comments**
c. **Is the waterway crossing self assessable under WWBW02 for Minor Waterway Barrier Works**	Do the works involve: • New waterway barrier works **at least 100m** from any other permanent waterway barrier works on same waterway. • Construction that is **not** on a bend or rapid section of a waterway. • Construction perpendicular to the water flow (within 10°). • Construction of minor barriers must commence and finish within 60 calendar days. • Construction during times of low flow, base flow or no flow conditions. • And either one of either: • <u>*Part 1, Dams and Weirs*</u> • Construction of a new **dam or weir** or maintenance of existing one on a waterway with a stream order of 1 or 2 • Maximum waterway barrier height is **one metre or less** above the lowest point of the waterway bed • Upstream and downstream disturbance area must not be more than **10 m** in total from the upstream and downstream toe of the barrier. • <u>Or, *Part 3, Culverts*</u> • Construction of a new **culvert** crossing or replacement/ modification or maintenance of existing culvert where the bankfull width of the waterway **is not** greater than 20m. • Construction of **culverts** where the **maximum** upstream/downstream length of the culvert cells is 15m plus apron (3m scour protection for culverts) or less. • The maximum disturbance area outside barrier footprint of 10 m (scour protection is included in the barrier footprint (upstream and/or downstream). • <u>Or, *Part 4, Bed Level Crossings*</u> • Construction of a new **bed level** crossing or replacement/ modification or maintenance of existing **bed level** waterway where the bankfull width of the waterway can be less than or greater than 20m. • **Bed level** crossing footprint is no more than **15 m wide** (upstream/downstream), with a maximum disturbance area outside crossing footprint of **10 m** (**25 m in total**). • Installation of **bed level** crossings **no higher** than natural bed level. • Installation of a **bed level** crossing at the same gradient as the waterway bed gradient.	☐yes ☐no	If **Yes**, comply with all applicable requirements of WWBW02 in addition to waterway crossing design and environmental protection measures as required, Environmental Authority and other relevant environmental requirements. Provide evidence that waterway crossing design satisfies DAFF self assessment codes including reference to design drawings. Attach/reference all records and place in Z:\653R_Environmental Complete paperwork and forward to FLUOR Environment Team for review.	

Part 3 - Water Definition Assessment (Water Act 2000) & Relevant Environmental Authority				
Environmental Value	**Checklist**	**Y / N**	**Justification for Placement**	**Overall Outcome**
Does the feature fit the definition of a ***Drainage Feature*** under the Water Act 2000? ***Drainage feature*** means a natural landscape feature, including a gully, drain, drainage depression or other erosion feature that— (a) is formed by the concentration of, or operates to confine or concentrate, overland flow water during and immediately after rainfall events; and (b) flows for only a short duration after a rainfall event, regardless of the frequency of flow events; and (c) commonly, does not have enough continuing flow to create a Riverine environment Refer to Section 7 of Watercourse Assessment Manual	1. Does the feature carrying water flow only for a short duration after a rainfall event? 2. Does the feature lack the presence of a riverine environment? (i.e flow adequacy to support riverine species). 3. Does the feature lack the presence of in-stream islands, benches or bars?	☒yes ☐no ☒yes ☐no ☒yes ☐no	If ***Yes to all*** of these questions then the feature does not constitute a watercourse and no further assessment is required for the Water Act. If ***no to any*** one of these questions then this feature constitutes a watercourse under the Water Act 2000	**Drainage Feature UNDER the *WATER ACT 2000?*** ☒ **YES** **(NO APPROVAL REQUIRED)** Implement environmental protection measures as required in Environmental authority and other relevant environmental requirements. ☐ **NO** **Determined a Watercourse – see below** **Watercourse under the *WATER ACT 2000?*** ☐ **YES** **(APPROVAL/ LODGEMENT REQUIRED – DETERMINED A WATERCOURSE)** Complete Pre and Post works checklists, and ensure appropriate lodgements are undertaken as per Environmental Authority Requirements. ☒ **NO** **Determined a drainage feature– see Above.**

Part 4 - Water Act Requirements (only complete if works are to take place within or adjacent to the watercourse – refer to Section 2 (Water Act) outcomes)				
Environmental Value	**Checklist**	**Y / N**	**Justification for Placement**	**Comments**
Do the works require approval under the Water Act? (Refer to summary flowchart within Section 9 of watercourse manual)	Do the works involve: • Excavation or placing fill in a way that would interfere with the flow of water in a watercourse, lake or spring by impounding or redirecting the flow of water (referring to completed product, following construction works).	☐yes ☒no	If **Yes**, go to Part **5**, works may require a Riverine Protection Permit under the Water Act. Provide evidence that waterway crossing design satisfies DEHP Guidelines (next section) including reference to design drawings. Attach/reference all records and store in relevant Environmental Drive. Complete paperwork and forward to FLUOR Environment Team for review. If No, adhere to EA requirements!	

Part 5 – DNRM Assessment Requirements (Guideline – activities in a watercourse, lake or spring associated with mining operations) (refer to Section 1 (Water Act) outcomes)			
What type (if any) vegetation will be required to be removed and quantity (area). (no more than 0.25ha), how will the vegetation be removed?	☒yes ☐no	List all species required for removal. Ensure FLUOR/SANTOS vegetation management plan and EA conditions are followed (indicate the requirements for this crossing).	<0.25 ha of vegetation will require clearing Majority of the crossing location has already been cleared Potential species to be cleared include: *Callitris glaucophylla*
Can the water crossing be located in a previously disturbed area?	☒yes ☐no	If No, why not?	Already located adjacent to RoW and road crossing
Is the water course from groundwater origin?	☐yes ☒no	Determine upstream water sources	

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Section 6 – Overall Assessment Outcome			
Has the stream order been assessed a watercourse (Water Act)	☐yes ☒no	If Yes, must comply with the "Guideline – activities in a watercourse, lake or spring associated with mining operations" – Ensure all of this checklist is completed and conveyed to all relevant staff, contractors are to ensure compliance with EA conditions – ensure lodgement of PREWORKS TO DEHP 10 Business prior to works commencing.	☐ YES (APPROVAL REQUIRED) X NO (NO LODGEMENT REQUIRED, ASSESSED AS DRAINAGE FEATURE)
Has the stream order been assessed as a waterway (*Fisheries Act*)	☐yes ☒no	If **Yes** complete check boxes below If **No** – no further assessment required	☐ YES (APPROVAL REQUIRED) X NO (NO LODGEMENT REQUIRED)
Is a development approval required (i.e. the self assessable code can not be adhered to)?	☐yes ☒no	If **Yes** Contact FLUOR Environment Team.	
Was the crossing assessed as a 'minor waterway barrier'?, either:		If **Yes** complete the relevant 'Minor Waterway Barrier Works Self-Assessment Sheet' lodge to FLUOR Environment Team.	
Part 1 – Dams and Weirs	☐yes ☒no		
Part 3 – Culverts	☐yes ☒no		
Part 4 – Bed Level Crossings	☐yes ☒no		
Was the crossing assessed as a 'temporary waterway barrier'?	☐yes ☒no	If **Yes** complete a Temporary Waterway Barrier Works Self-Assessment Sheet lodge to FLUOR Environmental Team for review.	
Were any EVNT species listed under the EPBC Act and/or NC Act present within the riparian zone of the waterway crossing	☐yes ☒no	If Yes GPS the position of individuals/populations, flag on site and contact FLUOR Environmental Team for review. If No – no further assessment required	
Were any vegetation mapping discrepancies identified within the riparian zone of the waterway crossing	☐yes ☒no	If Yes undertake a quaternary level RE assessment and GPS the extent of the mapped community assemblage where applicable. Contact FLUOR Environment Team for review. If No – no further assessment required	RE as mapped

WC 2 Pre-works Photographs

Photo A – Looking across the waterway at the proposed site works

Vegetation Management Area

Photo B – Looking downstream of the proposed site of works

Photo C – Looking upstream of the proposed site of works

WORKS WITHIN A WATERCOURSE ASSESSMENT

This watercourse assessment is to be filled out for all watercourse crossings to ensure compliance with environmental requirements and to ensure appropriate approvals are obtained.

FIELD ASSESSMENT

Inspected by:	Roisin Feeney	GHD	**Inspected Date:**	13/12/2013
Company:			**Time:**	11:40 am

Crossing Name:	Un-named watercourse	**CWP Number**	
Watercourse ID	WC 3	**Crossing Type (E.g. pipeline/road)**	Vegetation Management Area
Lot/Plan:	55FTY1153	**Location Reference**	RoW 48 a
Site	R-HCS-02 ☐ F-HCS-04 ☒ F-HCS-05 ☐ other/area:		
Land Tenure:	Freehold / Leasehold / other :	**Petroleum Tenure**	
Crossing Disturbance Status:	Existing crossing with no upgrade required: ☐ Existing crossing with upgrade required: ☒ New crossing in previously disturbed area: ☐ New crossing in undisturbed area: ☐		
Land Access Approval to undertake assessment:	Yes ☒ No ☐	**Approval No:**	
Cultural Heritage Approval to undertake assessment:	Yes ☐ No ☐	**Approval No:**	
Anticipated commencement date:		**Can the crossing be installed within 10 days?** If No, development approval and other approvals may be required.	Yes ☒ No ☐

HEALTH AND SAFETY		
Have you completed a Safety Task Assessment (STA)?	Yes ☒ No ☐	If No, cease inspection and complete.
Do you have appropriate PPE for the task?	Yes ☒ No ☐	
Do you have adequate amount of water – at least 10 litres?	Yes ☒ No ☐	

GENERAL ENVIRONMENTAL CONDITIONS	
Temp: Cold (<5◦C) ☐ Cool (<15◦C) ☐ Mild (<25◦C) ☐ Warm (<35◦C) ☒ Hot (>35◦C) ☐	Weather now: Clear/Fine ☒ Scattered Clouds ☐ Cloudy ☐
	Past 24 hrs: Clear/Fine ☐ Scattered Clouds ☐ Cloudy ☒
Wind: Still ☒ Slight breeze ☐ Windy ☐ Strong Wind ☐	Air now: Dry ☐ Humid ☒ Rain (Steady) ☐ Rain (Heavy) ☐
	Air past 24hrs: Dry ☐ Humid ☐ Rain (Steady) ☒ Rain (Heavy) ☐

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CROSSING LOCATION (REFER SECTION 8.2)

GPS Coordinates - Latitude/Longitude (E – 6 Figs, N – 7 Figs) GDA94

Latitude (E)	699993	**Longitude (S)**	7142410
Bankfull Width (m)	12 m	**Bank Width (m):**	Left Bank: 3 m Right Bank: 3 m
Stream Width at Water Surface (m):	NA	**Baseflow Stream Width (m):**	6 m
Bank Height: Baseflow and water surface height difference:	Downstream left Bank: 1 m/ NA Downstream Right Bank 1 m/ NA	**Photographs of site** Provide photos looking upstream and downstream from crossing location, as well as relevant to watercourse / waterway determination. Label photos.	

Location	Latitude (E)	Longitude (S)
A	NA	NA
B	NA	NA
C	NA	NA
D	NA	NA
E	NA	NA

Water Present:	Yes ☐ No ☒
Water Type:	Flowing ☐ Pool(s) present ☐ Dry ☒
Sample Site Length: 50 m	Water Surface Depth to Bed: NA

CHANNEL DETERMINATION (REFER TO SECTION 8.3)

Stream Order: 1☐ 2☒ 3☐ 4☐ 4+☐	Functional Zone Type - Sediment	Supply☒ Transfer☐ Storage☐	
Identify Channel Type:	Mildly sinuous		
Channel Modifications:	Reinforced with rocks and woodchips at powerline RoW		
Bed Sediment Character:	Tight ☐ Packed ☐ Moderate ☐ Low 1 ☐ Low 2 ☒		
Bank Sediments Composition:	Bedrock <1 % Boulder <1 % Cobble <1 % Pebble <1 % Gravel <1 % Sand Fines 100 %		
Bed Material Angularity:	Very Angular☐ Angular ☐ Sub-angular ☐ Rounded ☐Well-rounded ☐ Cobble peddle and gravel fractions not present ☒		
Bank Predominant Shape:	Concave ☒ Convex ☐ Stepped ☐ Wide lower bench ☐ Undercut ☐		
Bank Slope Downstream Right:	Vertical 80-90° ☐ Steep 60-80° ☐ Moderate 30-60° ☒ Low 10-30° ☐ Flat<10°☐		
Bank Slope Downstream Left:	Vertical 80-90° ☐ Steep 60-80° ☒ Moderate 30-60° ☐ Low 10-30° ☐ Flat<10°☐		
Channel Shape:	Flat u-shape		
Bed Stability:	Severe Erosion ☐ Moderate Erosion ☒ Bed Stable ☐ Moderate Deposition ☐ Severe Deposition ☐		
Potential Fish Habitat Class:	Class1 ☐ Class2 ☐ Class3 ☐ Class4 ☒		
Fish Migratory Passage Potential:	Nil ☒ Very Restricted ☐ Moderately Restricted ☐ Partly Restricted ☐ Good Passage ☐ Unrestricted Passage ☐		

FLORA/FAUNA ASSESSMENT (REFER TO SECTION 8.4)

Does any vegetation need to be removed?	Yes ☐ No ☒	**If Yes, no more than 0.25 Ha can be removed Estimate how much needs to be removed**
Vegetation community description		
Has an Aquatic and Ecological Assessment been undertaken previously that encompasses the watercourse crossing point (both for flora and fauna characteristics).	Yes ☒ No ☐	If yes, reference Report No:

Has a pre-disturbance assessment been undertaken previously that encompasses the watercourse crossing point (both for flora and fauna characteristics).	Yes ☒ No ☐	If no, a pre-disturbance assessment may be required
Does the riparian zone at the watercourse fall within a mapped extent of a Regional Ecosystem and/ or TEC? (refer to Dekho maps)	Yes ☒ No ☐	If Yes, detail mapped RE code (biodiversity status) and TEC where applicable: Mapped as Least Concern RE 11.10.11
Does the riparian zone at the watercourse fall within any Category A, B or C Environmentally Sensitive Areas (ESAs) and/or their primary or secondary primary protection (buffer) zones (refer to Dekho maps)	Yes ☒ No ☐	If Yes, detail ESA category: Category C ESA
If present, is the mapped RE/TEC community consistent with the vegetation community observed on the ground	Yes ☒ No ☐	If no, Check whether discrepancies have already been recorded in previous reports and GIS layers updated. If not a pre-disturbance assessment or quaternary level assessment may be required. Ground-truthed regrowth (Quaternary Assessment)
Does the proposed development activity comply with the clearing/significant disturbance restrictions of the applicable EA (refer Table 3)	Yes ☒ No ☐	If, no then flag with FLUOR Environment Team for review.
Are there any Cultural Heritage sites located within the crossing location or nearby area (refer to Dekho maps)	Yes ☐ No ☐	If Yes, detail site:
General Vegetation Community description: (including a list of dominant flora species within each stratum)	*Open woodland dominated by Eucalyptus populnea with sparse shrub and ground layer.*	

Are there any declared weeds within the area of the crossing?	Yes☒ No ☐	If yes, describe flag on the ground and GPS and provide on map. *Lantana camara* in stream bed
Are there any conservation significant species (i.e ENVT or Type A flora) within the area of the crossing?	Yes☐ No ☒	
Riparian vegetation cover: Trees > 10 m: Trees < 10 m: Shrubs: Grasses, herbs and sedges:	1 % 60 % 20 % 50 %	
Riparian vegetation patchiness:	Semi continuous	
Describe the riparian vegetation condition:	VAST II - Modified	
Native woody vegetation regeneration:	Abundant ☐ Present ☒ Limited ☐	

SAFETY CONSIDERATIONS		
Are there any safety implications at the proposed crossing due to decreased Right of Way from Environmental Sensitive Areas or other constraints like topography?	Yes ☐ No ☒	**If Yes, Note concerns**

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SKETCH OF CROSSING (BIRDS EYE VIEW) (REFER SECTION 8.5)

Sketch birds eye view (i.e. view looking from above), depict how the stream curves, any vegetation, trees, areas of significance (cultural significance if known). Complete approx 10 times the Bankfull Width upstream and downstream of crossing site. Take photographs upstream and downstream (write photo locations on your sketch). Include any names of features (i.e. roads, farm house, power poles).

Notes:

existing ROW cleared powerlines installed

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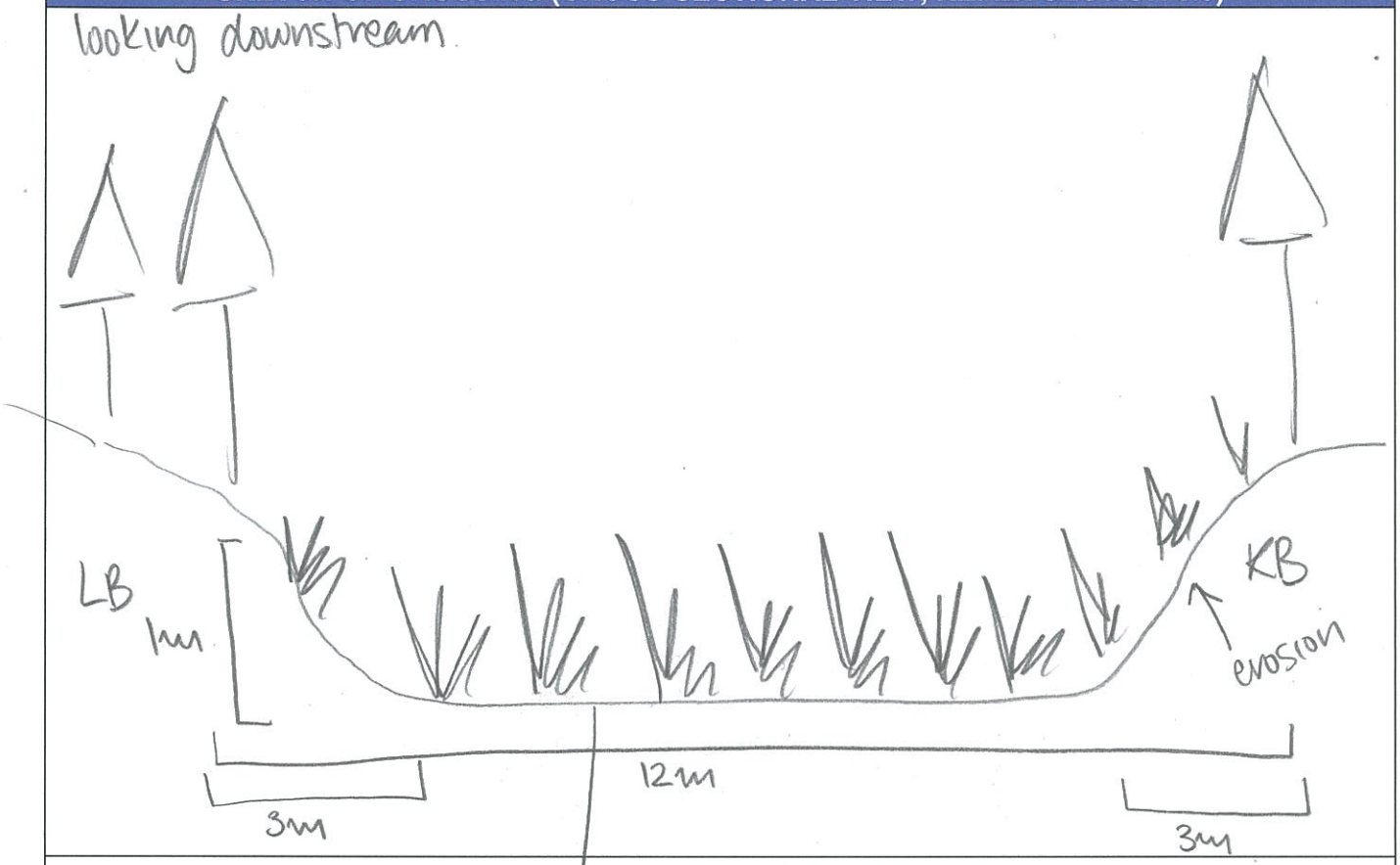
SKETCH OF CROSSING (CROSS-SECTIONAL VIEW, REFER SECTION 8.5)



Notes:

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ASSESSMENT OUTCOME

LEGISLATIVE REQUIREMENTS DETERMINATION				
Part 1 - Waterway Definition Assessment (*Fisheries Act 1994*)				
Environmental Value	**Checklist**	**Y / N**	**Justification for Placement**	**Field Comments**
Does the feature satisfy the waterway definition requirements of FHMOP 008 2009 (refer section 7.3.2) under the *Fisheries Act 1994*? Refer to Section 7 of Watercourse Assessment Manual	Does the feature have a defined bed and banks: The bed and banks need to be continuous rather than isolated and broken sections of a depression.	☐yes ☒no	If **Yes to all** , complete Section 2 If **No to any of these, the feature does not constitute a waterway and no further assessment is required for the Fisheries Act.** Implement waterway crossing design and environmental protection measures as required in Environmental Authority and other relevant environmental requirements.	**WATERWAY UNDER *FISHERIES ACT 1994?*** ☐ **YES** **(APPROVAL/ LODGEMENT REQUIRED)**
	Does the feature have an extended, if non-permanent, period of flow: Flow must continue for a reasonable period after rain ceases and have some reliability commensurate with rainfall? Flow for several weeks after rainfall ceases does not constitute extended flow. Consider e.g. water present, catchment size, geomorphological features, and ecological indicators of sustained flow.	☐yes ☒no	If **Yes to all** , complete Section 2 If **No to any of these, the feature does not constitute a waterway and no further assessment is required for the Fisheries Act.** Implement waterway crossing design and environmental protection measures as required in Environmental Authority and other relevant environmental requirements. **No evidence of aquatic life. Vegetation consistent with areas surrounding (outside of area of influence**	☒ **NO** **(NO LODGEMENT REQUIRED**
	Does the feature have sufficient flow adequacy: The flow needs to be sufficient to sustain basic ecological processes and to maintain biodiversity within the feature. Comment on any ecological indicators present e.g. riparian vegetation, presence/evidence of aquatic life etc.	☐yes ☒no		

Section 2 - Waterway Barrier Works Requirements (Only complete if works are to take place within a waterway)				
Environmental Value	**Checklist**	**Y / N**	**Justification for Placement**	**Field Comments**
a. **Do the works constitute waterway barrier works as defined in FHMOP 008 2009 (Appendix 3)?**	As well as dams and weirs the following are examples of developments that are considered to be waterway barrier works: ▪ Temporary dams, barriers to flow ▪ Culverts ▪ Bed level waterway crossings ▪ Causeways (water crossings slightly above stream bed) ▪ Tidal or floodgates (including maintenance and repair) ▪ Partial bunds (where the development will only partially block a waterway) ▪ Levee banks ▪ Silt curtains ▪ Netting and screens ▪ Litter booms or Trash racks ▪ Riffle structure	☐yes ☐no	If **Yes**, complete Section **2b**. If **No**, implement construction works in accordance with environmental protection measures as requires in Environmental Authority and other relevant environmental requirements. Attach/reference all records and place in Z:\653R_Environmental Complete paperwork and forward to FLUOR Environment Team for review.	
b. **Is the waterway crossing self assessable under WWBW01 for Temporary Waterway Barrier Works**	Do the works involve: ▪ Waterway barriers that will be in place for less than 42 calendar days ▪ Waterway barriers that are less than 20m in length across the waterway from bank to bank and; ▪ 10m or less in width (at the widest point). ▪ Waterway barriers that are at least 500m distance from any existing natural or artificial waterway barrier (upstream or downstream) unless: ○ the barrier is being constructed in order to perform maintenance or repairs on, or removal of, the existing barrier, or ○ the barrier is being constructed in order to facilitate dewatering between the new and existing barriers, or ○ the barrier is a silt curtain for control of sediment. ▪ Disturbance to the bed and banks of a waterway less than 5m from the toe of the barrier on either side. ▪ Construction at the time of the year when the flows are lowest or have completely stopped. ▪ A waterway barrier where there will be no ponding of water upstream.	☐yes ☐no	If **Yes**, comply with all applicable requirements of WWBW01 in addition to waterway crossing design and environmental protection measures as required in CEMP, Environmental Authority, EIS and other relevant environmental requirements. Provide evidence that waterway crossing design satisfies DAFF self assessment codes including reference to design drawings. Attach/reference all records and place in Z:\653R_Environmental Complete paperwork and forward to FLUOR Environment Team for review. If **No**, go to Section **2c**.	

Section 2 - Waterway Barrier Works Requirements (Only complete if works are to take place within a waterway)				
Environmental Value	**Checklist**	**Y / N**	**Justification for Placement**	**Field Comments**
c. **Is the waterway crossing self assessable under WWBW02 for Minor Waterway Barrier Works**	Do the works involve: • New waterway barrier works **at least 100m** from any other permanent waterway barrier works on same waterway. • Construction that is **not** on a bend or rapid section of a waterway. • Construction perpendicular to the water flow (within 10°). • Construction of minor barriers must commence and finish within 60 calendar days. • Construction during times of low flow, base flow or no flow conditions. • And either one of either: • <u>*Part 1, Dams and Weirs*</u> • Construction of a new **dam or weir** or maintenance of existing one on a waterway with a stream order of 1 or 2 • Maximum waterway barrier height is **one metre or less** above the lowest point of the waterway bed • Upstream and downstream disturbance area must not be more than **10 m** in total from the upstream and downstream toe of the barrier. • <u>Or, *Part 3, Culverts*</u> • Construction of a new **culvert** crossing or replacement/ modification or maintenance of existing culvert where the bankfull width of the waterway **is not** greater than 20m. • Construction of **culverts** where the **maximum** upstream/downstream length of the culvert cells is 15m plus apron (3m scour protection for culverts) or less. • The maximum disturbance area outside barrier footprint of 10 m (scour protection is included in the barrier footprint (upstream and/or downstream). • <u>Or, *Part 4, Bed Level Crossings*</u> • Construction of a new **bed level** crossing or replacement/ modification or maintenance of existing **bed level** waterway where the bankfull width of the waterway can be less than or greater than 20m. • **Bed level** crossing footprint is no more than **15 m wide** (upstream/downstream), with a maximum disturbance area outside crossing footprint of **10 m** (**25 m in total**). • Installation of **bed level** crossings **no higher** than natural bed level. • Installation of a **bed level** crossing at the same gradient as the waterway bed gradient.	☐yes ☐no	If **Yes**, comply with all applicable requirements of WWBW02 in addition to waterway crossing design and environmental protection measures as required, Environmental Authority and other relevant environmental requirements. Provide evidence that waterway crossing design satisfies DAFF self assessment codes including reference to design drawings. Attach/reference all records and place in Z:\653R_Environmental Complete paperwork and forward to FLUOR Environment Team for review.	

Part 3 - Water Definition Assessment (Water Act 2000) & Relevant Environmental Authority				
Environmental Value	**Checklist**	**Y / N**	**Justification for Placement**	**Overall Outcome**
Does the feature fit the definition of a ***Drainage Feature*** under the Water Act 2000? ***Drainage feature*** means a natural landscape feature, including a gully, drain, drainage depression or other erosion feature that— (a) is formed by the concentration of, or operates to confine or concentrate, overland flow water during and immediately after rainfall events; and (b) flows for only a short duration after a rainfall event, regardless of the frequency of flow events; and (c) commonly, does not have enough continuing flow to create a Riverine environment Refer to Section 7 of Watercourse Assessment Manual	1. Does the feature carrying water flow only for a short duration after a rainfall event? 2. Does the feature lack the presence of a riverine environment? (i.e flow adequacy to support riverine species). 3. Does the feature lack the presence of in-stream islands, benches or bars?	☒yes ☐no ☒yes ☐no ☒yes ☐no	If ***Yes to all*** of these questions then the feature does not constitute a watercourse and no further assessment is required for the Water Act. If ***no to any*** one of these questions then this feature constitutes a watercourse under the Water Act 2000	**Drainage Feature UNDER the *WATER ACT 2000?*** ☒ **YES** **(NO APPROVAL REQUIRED)** Implement environmental protection measures as required in Environmental authority and other relevant environmental requirements. ☐ **NO** **Determined a Watercourse – see below** **Watercourse under the *WATER ACT 2000?*** ☐ **YES** **(APPROVAL/ LODGEMENT REQUIRED – DETERMINED A WATERCOURSE)** Complete Pre and Post works checklists, and ensure appropriate lodgements are undertaken as per Environmental Authority Requirements. ☒ **NO** **Determined a drainage feature– see Above.**

Part 4 - Water Act Requirements (only complete if works are to take place within or adjacent to the watercourse – refer to Section 2 (Water Act) outcomes)				
Environmental Value	**Checklist**	**Y / N**	**Justification for Placement**	**Comments**
Do the works require approval under the Water Act? (Refer to summary flowchart within Section 9 of watercourse manual)	Do the works involve: • Excavation or placing fill in a way that would interfere with the flow of water in a watercourse, lake or spring by impounding or redirecting the flow of water (referring to completed product, following construction works).	☐yes ☒no	If **Yes**, go to Part **5**, works may require a Riverine Protection Permit under the Water Act. Provide evidence that waterway crossing design satisfies DEHP Guidelines (next section) including reference to design drawings. Attach/reference all records and store in relevant Environmental Drive. Complete paperwork and forward to FLUOR Environment Team for review. If No, adhere to EA requirements!	

Part 5 – DNRM Assessment Requirements (Guideline – activities in a watercourse, lake or spring associated with mining operations) (refer to Section 1 (Water Act) outcomes)			
What type (if any) vegetation will be required to be removed and quantity (area). (no more than 0.25ha), how will the vegetation be removed?	☒yes ☐no	List all species required for removal. Ensure FLUOR/SANTOS vegetation management plan and EA conditions are followed (indicate the requirements for this crossing).	<0.25 ha of vegetation will require clearing Majority of the crossing location has already been cleared Potential species to be cleared include: *Callitris glaucophylla, Acacia leiocalyx, Eucalyptus melanophloia*
Can the water crossing be located in a previously disturbed area?	☒yes ☐no	If No, why not?	Already located adjacent to RoW and road crossing
Is the water course from groundwater origin?	☐yes ☒no	Determine upstream water sources	

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Section 6 – Overall Assessment Outcome			
Has the stream order been assessed a watercourse (Water Act)	☐yes ☒no	If Yes, must comply with the "Guideline – activities in a watercourse, lake or spring associated with mining operations" – Ensure all of this checklist is completed and conveyed to all relevant staff, contractors are to ensure compliance with EA conditions – ensure lodgement of PREWORKS TO DEHP 10 Business prior to works commencing.	☐ YES (APPROVAL REQUIRED) X NO (NO LODGEMENT REQUIRED, ASSESSED AS DRAINAGE FEATURE)
Has the stream order been assessed as a waterway (*Fisheries Act*)	☐yes ☒no	If **Yes** complete check boxes below If **No** – no further assessment required	☐ YES (APPROVAL REQUIRED) X NO (NO LODGEMENT REQUIRED)
Is a development approval required (i.e. the self assessable code can not be adhered to)?	☐yes ☒no	If **Yes** Contact FLUOR Environment Team.	
Was the crossing assessed as a 'minor waterway barrier'?, either:		If **Yes** complete the relevant 'Minor Waterway Barrier Works Self-Assessment Sheet' lodge to FLUOR Environment Team.	
Part 1 – Dams and Weirs	☐yes ☒no		
Part 3 – Culverts	☐yes ☒no		
Part 4 – Bed Level Crossings	☐yes ☒no		
Was the crossing assessed as a 'temporary waterway barrier'?	☐yes ☒no	If **Yes** complete a Temporary Waterway Barrier Works Self-Assessment Sheet lodge to FLUOR Environmental Team for review.	
Were any EVNT species listed under the EPBC Act and/or NC Act present within the riparian zone of the waterway crossing	☐yes ☒no	If Yes GPS the position of individuals/populations, flag on site and contact FLUOR Environmental Team for review. If No – no further assessment required	
Were any vegetation mapping discrepancies identified within the riparian zone of the waterway crossing	☐yes ☒no	If Yes undertake a quaternary level RE assessment and GPS the extent of the mapped community assemblage where applicable. Contact FLUOR Environment Team for review. If No – no further assessment required	RE as mapped

WC 3 Pre-works Photographs

Photo A – Looking across the waterway at the proposed site works

Vegetation Management Area

Photo B – Looking downstream of the proposed site of works

Photo C – Looking upstream of the proposed site of works

WORKS WITHIN A WATERCOURSE ASSESSMENT

This watercourse assessment is to be filled out for all watercourse crossings to ensure compliance with environmental requirements and to ensure appropriate approvals are obtained.

FIELD ASSESSMENT

Inspected by:	Roisin Feeney	GHD	**Inspected Date:**	13/12/2013
Company:			**Time:**	2:10 am

Crossing Name:	Un-named watercourse	**CWP Number**	
Watercourse ID	WC 4	**Crossing Type (E.g. pipeline/road)**	Vegetation Management Area
Lot/Plan:	55FTY1153	**Location Reference**	RoW 4bpb
Site	R-HCS-02 ☐ F-HCS-04 ☒ F-HCS-05 ☐ other/area:		
Land Tenure:	Freehold / Leasehold / other :	**Petroleum Tenure**	
Crossing Disturbance Status:	Existing crossing with no upgrade required: ☐ Existing crossing with upgrade required: ☒ New crossing in previously disturbed area: ☐ New crossing in undisturbed area: ☐		
Land Access Approval to undertake assessment:	Yes ☒ No ☐	**Approval No:**	
Cultural Heritage Approval to undertake assessment:	Yes ☐ No ☐	**Approval No:**	
Anticipated commencement date:		**Can the crossing be installed within 10 days?** If No, development approval and other approvals may be required.	Yes ☒ No ☐

HEALTH AND SAFETY		
Have you completed a Safety Task Assessment (STA)?	Yes ☒ No ☐	If No, cease inspection and complete.
Do you have appropriate PPE for the task?	Yes ☒ No ☐	
Do you have adequate amount of water – at least 10 litres?	Yes ☒ No ☐	

GENERAL ENVIRONMENTAL CONDITIONS	
Temp: Cold (<5◦C) ☐ Cool (<15◦C) ☐ Mild (<25◦C) ☐ Warm (<35◦C) ☒ Hot (>35◦C) ☐	Weather now: Clear/Fine ☒ Scattered Clouds ☐ Cloudy ☐
	Past 24 hrs: Clear/Fine ☐ Scattered Clouds ☐ Cloudy ☒
Wind: Still ☒ Slight breeze ☐ Windy ☐ Strong Wind ☐	Air now: Dry ☐ Humid ☒ Rain (Steady) ☐ Rain (Heavy) ☐
	Air past 24hrs: Dry ☐ Humid ☐ Rain (Steady) ☒ Rain (Heavy) ☐

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CROSSING LOCATION (REFER SECTION 8.2)

GPS Coordinates - Latitude/Longitude (E – 6 Figs, N – 7 Figs) GDA94

Latitude (E)	708264	**Longitude (S)**	7143358
Bankfull Width (m)	5 m	**Bank Width (m):**	Left Bank: 1 m Right Bank: 1 m
Stream Width at Water Surface (m):	NA	**Baseflow Stream Width (m):**	3 m
Bank Height: Baseflow and water surface height difference:	Downstream left Bank: 0.5 m/ NA Downstream Right Bank 0.5 m/ NA	**Photographs of site** Provide photos looking upstream and downstream from crossing location, as well as relevant to watercourse / waterway determination. Label photos.	

Location	Latitude (E)	Longitude (S)
A	NA	NA
B	NA	NA
C	NA	NA
D	NA	NA
E	NA	NA

Water Present:	Yes ☐ No ☒
Water Type:	Flowing ☐ Pool(s) present ☐ Dry ☒
Sample Site Length: 50 m	Water Surface Depth to Bed: NA

CHANNEL DETERMINATION (REFER TO SECTION 8.3)

Stream Order: 1☐ 2☒ 3☐ 4☐ 4+☐	Functional Zone Type - Sediment	Supply☒ Transfer☐ Storage☐	
Identify Channel Type:	Mildly sinuous		
Channel Modifications:	None		
Bed Sediment Character:	Tight ☐ Packed ☐ Moderate ☐ Low 1 ☐ Low 2 ☒		
Bank Sediments Composition:	Bedrock <1 % Boulder <1 % Cobble <1 % Pebble <1 % Gravel <1 % Sand Fines 100 %		
Bed Material Angularity:	Very Angular☐ Angular ☐ Sub-angular ☐ Rounded ☐Well-rounded ☐ Cobble peddle and gravel fractions not present ☒		
Bank Predominant Shape:	Concave ☒ Convex ☐ Stepped ☐ Wide lower bench ☐ Undercut ☐		
Bank Slope Downstream Right:	Vertical 80-90° ☐ Steep 60-80° ☐ Moderate 30-60° ☒ Low 10-30° ☐ Flat<10°☐		
Bank Slope Downstream Left:	Vertical 80-90° ☐ Steep 60-80° ☐ Moderate 30-60° ☒ Low 10-30° ☐ Flat<10°☐		
Channel Shape:	Flat u-shape		
Bed Stability:	Severe Erosion ☐ Moderate Erosion ☐ Bed Stable ☒ Moderate Deposition ☐ Severe Deposition ☐		
Potential Fish Habitat Class:	Class1 ☐ Class2 ☐ Class3 ☐ Class4 ☒		
Fish Migratory Passage Potential:	Nil ☒ Very Restricted ☐ Moderately Restricted ☐ Partly Restricted ☐ Good Passage ☐ Unrestricted Passage ☐		

FLORA/FAUNA ASSESSMENT (REFER TO SECTION 8.4)

Does any vegetation need to be removed?	Yes ☐ No ☒	**If Yes, no more than 0.25 Ha can be removed Estimate how much needs to be removed**
Vegetation community description		
Has an Aquatic and Ecological Assessment been undertaken previously that encompasses the watercourse crossing point (both for flora and fauna characteristics).	Yes ☒ No ☐	If yes, reference Report No:

Has a pre-disturbance assessment been undertaken previously that encompasses the watercourse crossing point (both for flora and fauna characteristics).	Yes ☒ No ☐	If no, a pre-disturbance assessment may be required
Does the riparian zone at the watercourse fall within a mapped extent of a Regional Ecosystem and/ or TEC? (refer to Dekho maps)	Yes ☒ No ☐	If Yes, detail mapped RE code (biodiversity status) and TEC where applicable: Mapped as Least Concern RE 11.10.11/ 11.10.7a
Does the riparian zone at the watercourse fall within any Category A, B or C Environmentally Sensitive Areas (ESAs) and/or their primary or secondary primary protection (buffer) zones (refer to Dekho maps)	Yes ☒ No ☐	If Yes, detail ESA category: Category C ESA
If present, is the mapped RE/TEC community consistent with the vegetation community observed on the ground	Yes ☒ No ☐	If no, Check whether discrepancies have already been recorded in previous reports and GIS layers updated. If not a pre-disturbance assessment or quaternary level assessment may be required. Ground-truthed regrowth (Quaternary Assessment)
Does the proposed development activity comply with the clearing/significant disturbance restrictions of the applicable EA (refer Table 3)	Yes ☒ No ☐	If, no then flag with FLUOR Environment Team for review.
Are there any Cultural Heritage sites located within the crossing location or nearby area (refer to Dekho maps)	Yes ☐ No ☐	If Yes, detail site:
General Vegetation Community description: (including a list of dominant flora species within each stratum)	*Open woodland with canopy dominated by Eucalyptus melanophloia, Eucalyptus populnea and Callitris glaucophylla with sparse shrub layer and dense ground layer including Themeda triandra.*	

Are there any declared weeds within the area of the crossing?	Yes☒ No ☐	If yes, describe flag on the ground and GPS and provide on map. *Opuntia sp.*
Are there any conservation significant species (i.e ENVT or Type A flora) within the area of the crossing?	Yes☐ No ☒	
Riparian vegetation cover: Trees > 10 m: Trees < 10 m: Shrubs: Grasses, herbs and sedges:	5 % 45 % 5 % 80 %	
Riparian vegetation patchiness:	Semi continuous	
Describe the riparian vegetation condition:	VAST II - Modified	
Native woody vegetation regeneration:	Abundant ☐ Present ☒ Limited ☐	

SAFETY CONSIDERATIONS		
Are there any safety implications at the proposed crossing due to decreased Right of Way from Environmental Sensitive Areas or other constraints like topography?	Yes ☐ No ☒	**If Yes, Note concerns**

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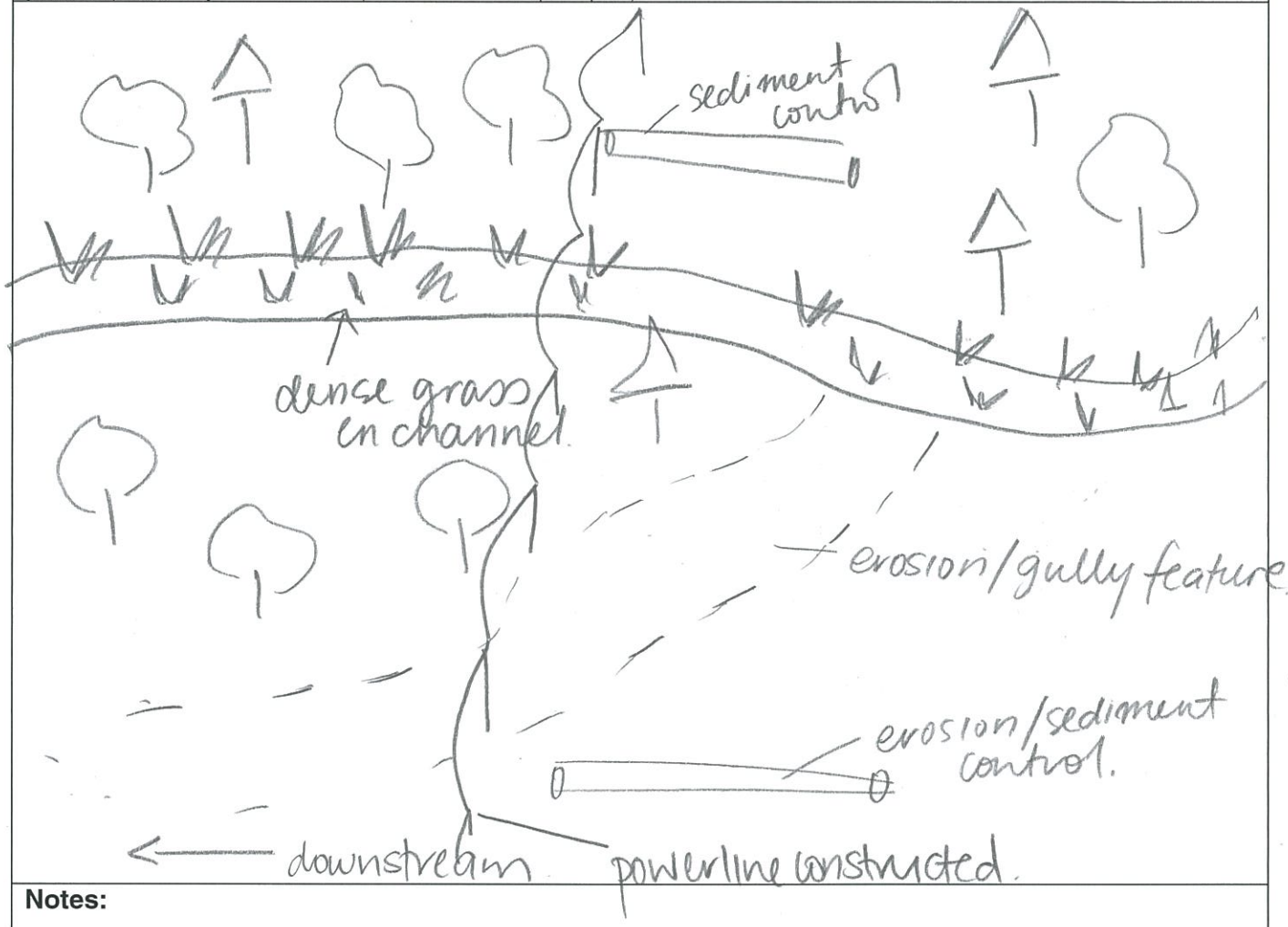
SKETCH OF CROSSING (BIRDS EYE VIEW) (REFER SECTION 8.5)

Sketch birds eye view (i.e. view looking from above), depict how the stream curves, any vegetation, trees, areas of significance (cultural significance if known). Complete approx 10 times the Bankfull Width upstream and downstream of crossing site. Take photographs upstream and downstream (write photo locations on your sketch). Include any names of features (i.e. roads, farm house, power poles).



Notes:

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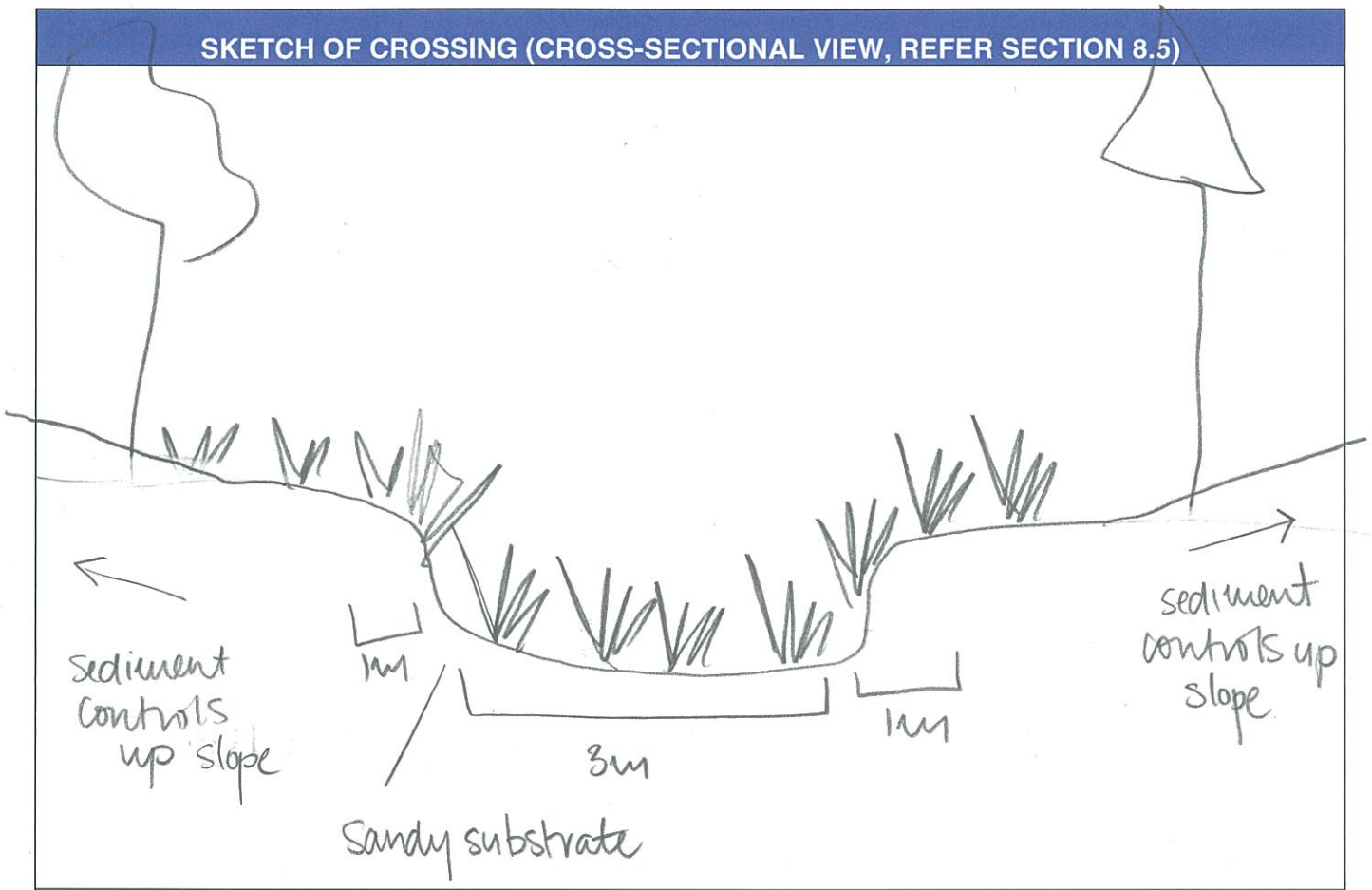
SKETCH OF CROSSING (CROSS-SECTIONAL VIEW, REFER SECTION 8.5)



Notes:

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ASSESSMENT OUTCOME

LEGISLATIVE REQUIREMENTS DETERMINATION				
Part 1 - Waterway Definition Assessment (*Fisheries Act 1994*)				
Environmental Value	**Checklist**	**Y / N**	**Justification for Placement**	**Field Comments**
Does the feature satisfy the waterway definition requirements of FHMOP 008 2009 (refer section 7.3.2) under the *Fisheries Act 1994*? Refer to Section 7 of Watercourse Assessment Manual	Does the feature have a defined bed and banks: The bed and banks need to be continuous rather than isolated and broken sections of a depression.	☐yes ☒no	If **Yes to all** , complete Section 2 If **No to any of these, the feature does not constitute a waterway and no further assessment is required for the Fisheries Act.** Implement waterway crossing design and environmental protection measures as required in Environmental Authority and other relevant environmental requirements.	**WATERWAY UNDER *FISHERIES ACT 1994?*** ☐ **YES** **(APPROVAL/ LODGEMENT REQUIRED)**
	Does the feature have an extended, if non-permanent, period of flow: Flow must continue for a reasonable period after rain ceases and have some reliability commensurate with rainfall? Flow for several weeks after rainfall ceases does not constitute extended flow. Consider e.g. water present, catchment size, geomorphological features, and ecological indicators of sustained flow.	☐yes ☒no	If **Yes to all** , complete Section 2 If **No to any of these, the feature does not constitute a waterway and no further assessment is required for the Fisheries Act.** Implement waterway crossing design and environmental protection measures as required in Environmental Authority and other relevant environmental requirements. **No evidence of aquatic life. Vegetation consistent with areas surrounding (outside of area of influence**	☒ **NO** **(NO LODGEMENT REQUIRED**
	Does the feature have sufficient flow adequacy: The flow needs to be sufficient to sustain basic ecological processes and to maintain biodiversity within the feature. Comment on any ecological indicators present e.g. riparian vegetation, presence/evidence of aquatic life etc.	☐yes ☒no		

Section 2 - Waterway Barrier Works Requirements (Only complete if works are to take place within a waterway)				
Environmental Value	**Checklist**	**Y / N**	**Justification for Placement**	**Field Comments**
a. **Do the works constitute waterway barrier works as defined in FHMOP 008 2009 (Appendix 3)?**	As well as dams and weirs the following are examples of developments that are considered to be waterway barrier works: ▪ Temporary dams, barriers to flow ▪ Culverts ▪ Bed level waterway crossings ▪ Causeways (water crossings slightly above stream bed) ▪ Tidal or floodgates (including maintenance and repair) ▪ Partial bunds (where the development will only partially block a waterway) ▪ Levee banks ▪ Silt curtains ▪ Netting and screens ▪ Litter booms or Trash racks ▪ Riffle structure	☐yes ☐no	If **Yes**, complete Section **2b**. If **No**, implement construction works in accordance with environmental protection measures as requires in Environmental Authority and other relevant environmental requirements. Attach/reference all records and place in Z:\653R_Environmental Complete paperwork and forward to FLUOR Environment Team for review.	
b. **Is the waterway crossing self assessable under WWBW01 for Temporary Waterway Barrier Works**	Do the works involve: ▪ Waterway barriers that will be in place for less than 42 calendar days ▪ Waterway barriers that are less than 20m in length across the waterway from bank to bank and; ▪ 10m or less in width (at the widest point). ▪ Waterway barriers that are at least 500m distance from any existing natural or artificial waterway barrier (upstream or downstream) unless: ○ the barrier is being constructed in order to perform maintenance or repairs on, or removal of, the existing barrier, or ○ the barrier is being constructed in order to facilitate dewatering between the new and existing barriers, or ○ the barrier is a silt curtain for control of sediment. ▪ Disturbance to the bed and banks of a waterway less than 5m from the toe of the barrier on either side. ▪ Construction at the time of the year when the flows are lowest or have completely stopped. ▪ A waterway barrier where there will be no ponding of water upstream.	☐yes ☐no	If **Yes**, comply with all applicable requirements of WWBW01 in addition to waterway crossing design and environmental protection measures as required in CEMP, Environmental Authority, EIS and other relevant environmental requirements. Provide evidence that waterway crossing design satisfies DAFF self assessment codes including reference to design drawings. Attach/reference all records and place in Z:\653R_Environmental Complete paperwork and forward to FLUOR Environment Team for review. If **No**, go to Section **2c**.	

Section 2 - Waterway Barrier Works Requirements (Only complete if works are to take place within a waterway)				
Environmental Value	**Checklist**	**Y / N**	**Justification for Placement**	**Field Comments**
c. **Is the waterway crossing self assessable under WWBW02 for Minor Waterway Barrier Works**	Do the works involve: • New waterway barrier works **at least 100m** from any other permanent waterway barrier works on same waterway. • Construction that is **not** on a bend or rapid section of a waterway. • Construction perpendicular to the water flow (within 10°). • Construction of minor barriers must commence and finish within 60 calendar days. • Construction during times of low flow, base flow or no flow conditions. • And either one of either: • <u>*Part 1, Dams and Weirs*</u> • Construction of a new **dam or weir** or maintenance of existing one on a waterway with a stream order of 1 or 2 • Maximum waterway barrier height is **one metre or less** above the lowest point of the waterway bed • Upstream and downstream disturbance area must not be more than **10 m** in total from the upstream and downstream toe of the barrier. • <u>Or, *Part 3, Culverts*</u> • Construction of a new **culvert** crossing or replacement/ modification or maintenance of existing culvert where the bankfull width of the waterway **is not** greater than 20m. • Construction of **culverts** where the **maximum** upstream/downstream length of the culvert cells is 15m plus apron (3m scour protection for culverts) or less. • The maximum disturbance area outside barrier footprint of 10 m (scour protection is included in the barrier footprint (upstream and/or downstream). • <u>Or, *Part 4, Bed Level Crossings*</u> • Construction of a new **bed level** crossing or replacement/ modification or maintenance of existing **bed level** waterway where the bankfull width of the waterway can be less than or greater than 20m. • **Bed level** crossing footprint is no more than **15 m wide** (upstream/downstream), with a maximum disturbance area outside crossing footprint of **10 m** (**25 m in total**). • Installation of **bed level** crossings **no higher** than natural bed level. • Installation of a **bed level** crossing at the same gradient as the waterway bed gradient.	☐yes ☐no	If **Yes**, comply with all applicable requirements of WWBW02 in addition to waterway crossing design and environmental protection measures as required, Environmental Authority and other relevant environmental requirements. Provide evidence that waterway crossing design satisfies DAFF self assessment codes including reference to design drawings. Attach/reference all records and place in Z:\653R_Environmental Complete paperwork and forward to FLUOR Environment Team for review.	

Part 3 - Water Definition Assessment (Water Act 2000) & Relevant Environmental Authority				
Environmental Value	**Checklist**	**Y / N**	**Justification for Placement**	**Overall Outcome**
Does the feature fit the definition of a ***Drainage Feature*** under the Water Act 2000? ***Drainage feature*** means a natural landscape feature, including a gully, drain, drainage depression or other erosion feature that— (a) is formed by the concentration of, or operates to confine or concentrate, overland flow water during and immediately after rainfall events; and (b) flows for only a short duration after a rainfall event, regardless of the frequency of flow events; and (c) commonly, does not have enough continuing flow to create a Riverine environment Refer to Section 7 of Watercourse Assessment Manual	1. Does the feature carrying water flow only for a short duration after a rainfall event? 2. Does the feature lack the presence of a riverine environment? (i.e flow adequacy to support riverine species). 3. Does the feature lack the presence of in-stream islands, benches or bars?	☒yes ☐no ☒yes ☐no ☒yes ☐no	If ***Yes to all*** of these questions then the feature does not constitute a watercourse and no further assessment is required for the Water Act. If ***no to any*** one of these questions then this feature constitutes a watercourse under the Water Act 2000	**Drainage Feature UNDER the *WATER ACT 2000?*** ☒ **YES** **(NO APPROVAL REQUIRED)** Implement environmental protection measures as required in Environmental authority and other relevant environmental requirements. ☐ **NO** **Determined a Watercourse – see below** **Watercourse under the *WATER ACT 2000?*** ☐ **YES** **(APPROVAL/ LODGEMENT REQUIRED – DETERMINED A WATERCOURSE)** Complete Pre and Post works checklists, and ensure appropriate lodgements are undertaken as per Environmental Authority Requirements. ☒ **NO** **Determined a drainage feature– see Above.**

Part 4 - Water Act Requirements (only complete if works are to take place within or adjacent to the watercourse – refer to Section 2 (Water Act) outcomes)				
Environmental Value	**Checklist**	**Y / N**	**Justification for Placement**	**Comments**
Do the works require approval under the Water Act? (Refer to summary flowchart within Section 9 of watercourse manual)	Do the works involve: • Excavation or placing fill in a way that would interfere with the flow of water in a watercourse, lake or spring by impounding or redirecting the flow of water (referring to completed product, following construction works).	☐yes ☒no	If **Yes**, go to Part **5**, works may require a Riverine Protection Permit under the Water Act. Provide evidence that waterway crossing design satisfies DEHP Guidelines (next section) including reference to design drawings. Attach/reference all records and store in relevant Environmental Drive. Complete paperwork and forward to FLUOR Environment Team for review. If No, adhere to EA requirements!	

Part 5 – DNRM Assessment Requirements (Guideline – activities in a watercourse, lake or spring associated with mining operations) (refer to Section 1 (Water Act) outcomes)			
What type (if any) vegetation will be required to be removed and quantity (area). (no more than 0.25ha), how will the vegetation be removed?	☒yes ☐no	List all species required for removal. Ensure FLUOR/SANTOS vegetation management plan and EA conditions are followed (indicate the requirements for this crossing).	<0.25 ha of vegetation will require clearing Majority of the crossing location has already been cleared Potential species to be cleared include: *Callitris glaucophylla, Eucalyptus melanophloia, Eucalyptus populnea*
Can the water crossing be located in a previously disturbed area?	☒yes ☐no	If No, why not?	Already located adjacent to RoW and road crossing
Is the water course from groundwater origin?	☐yes ☒no	Determine upstream water sources	

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Section 6 – Overall Assessment Outcome			
Has the stream order been assessed a watercourse (Water Act)	☐yes ☒no	If Yes, must comply with the "Guideline – activities in a watercourse, lake or spring associated with mining operations" – Ensure all of this checklist is completed and conveyed to all relevant staff, contractors are to ensure compliance with EA conditions – ensure lodgement of PREWORKS TO DEHP 10 Business prior to works commencing.	☐ YES (APPROVAL REQUIRED) X NO (NO LODGEMENT REQUIRED, ASSESSED AS DRAINAGE FEATURE)
Has the stream order been assessed as a waterway (*Fisheries Act*)	☐yes ☒no	If **Yes** complete check boxes below If **No** – no further assessment required	☐ YES (APPROVAL REQUIRED) X NO (NO LODGEMENT REQUIRED)
Is a development approval required (i.e. the self assessable code can not be adhered to)?	☐yes ☒no	If **Yes** Contact FLUOR Environment Team.	
Was the crossing assessed as a 'minor waterway barrier'?, either:		If **Yes** complete the relevant 'Minor Waterway Barrier Works Self-Assessment Sheet' lodge to FLUOR Environment Team.	
Part 1 – Dams and Weirs	☐yes ☒no		
Part 3 – Culverts	☐yes ☒no		
Part 4 – Bed Level Crossings	☐yes ☒no		
Was the crossing assessed as a 'temporary waterway barrier'?	☐yes ☒no	If **Yes** complete a Temporary Waterway Barrier Works Self-Assessment Sheet lodge to FLUOR Environmental Team for review.	
Were any EVNT species listed under the EPBC Act and/or NC Act present within the riparian zone of the waterway crossing	☐yes ☒no	If Yes GPS the position of individuals/populations, flag on site and contact FLUOR Environmental Team for review. If No – no further assessment required	
Were any vegetation mapping discrepancies identified within the riparian zone of the waterway crossing	☐yes ☒no	If Yes undertake a quaternary level RE assessment and GPS the extent of the mapped community assemblage where applicable. Contact FLUOR Environment Team for review. If No – no further assessment required	RE as mapped

WC 4 Pre-works Photographs

Photo A – Looking across the waterway at the proposed site works

Vegetation Management Area

Photo B – Looking downstream of the proposed site of works

Photo C – Looking upstream of the proposed site of works

WORKS WITHIN A WATERCOURSE ASSESSMENT

This watercourse assessment is to be filled out for all watercourse crossings to ensure compliance with environmental requirements and to ensure appropriate approvals are obtained.

FIELD ASSESSMENT

Inspected by:	Roisin Feeney	GHD	**Inspected Date:**	14/12/2013
Company:			**Time:**	8:00 am

Crossing Name:	Un-named watercourse	**CWP Number**	
Watercourse ID	WC 5	**Crossing Type (E.g. pipeline/road)**	Vegetation Management Area
Lot/Plan:	55FTY1153	**Location Reference**	RoW 4bpa
Site	R-HCS-02 ☐ F-HCS-04 ☒ F-HCS-05 ☐ other/area:		
Land Tenure:	Freehold / Leasehold / other :	**Petroleum Tenure**	
Crossing Disturbance Status:	Existing crossing with no upgrade required: ☐ Existing crossing with upgrade required: ☒ New crossing in previously disturbed area: ☐ New crossing in undisturbed area: ☐		
Land Access Approval to undertake assessment:	Yes ☒ No ☐	**Approval No:**	
Cultural Heritage Approval to undertake assessment:	Yes ☐ No ☐	**Approval No:**	
Anticipated commencement date:		**Can the crossing be installed within 10 days?** If No, development approval and other approvals may be required.	Yes ☒ No ☐

HEALTH AND SAFETY		
Have you completed a Safety Task Assessment (STA)?	Yes ☒ No ☐	If No, cease inspection and complete.
Do you have appropriate PPE for the task?	Yes ☒ No ☐	
Do you have adequate amount of water – at least 10 litres?	Yes ☒ No ☐	

GENERAL ENVIRONMENTAL CONDITIONS	
Temp: Cold (<5◦C) ☐ Cool (<15◦C) ☐ Mild (<25◦C) ☒ Warm (<35◦C) ☐ Hot (>35◦C) ☐	Weather now: Clear/Fine ☒ Scattered Clouds ☐ Cloudy ☐
	Past 24 hrs: Clear/Fine ☒ Scattered Clouds ☐ Cloudy ☐
Wind: Still ☒ Slight breeze ☐ Windy ☐ Strong Wind ☐	Air now: Dry ☐ Humid ☒ Rain (Steady) ☐ Rain (Heavy) ☐
	Air past 24hrs: Dry ☐ Humid ☒ Rain (Steady) ☐ Rain (Heavy) ☐

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CROSSING LOCATION (REFER SECTION 8.2)

GPS Coordinates - Latitude/Longitude (E – 6 Figs, N – 7 Figs) GDA94

Latitude (E)	706768	**Longitude (S)**	7143355
Bankfull Width (m)	9 m	**Bank Width (m):**	Left Bank: 4 m Right Bank: 4 m
Stream Width at Water Surface (m):	NA	**Baseflow Stream Width (m):**	1 m
Bank Height: Baseflow and water surface height difference:	Downstream left Bank: 1.5 m/ NA Downstream Right Bank 1.5 m/ NA	**Photographs of site** Provide photos looking upstream and downstream from crossing location, as well as relevant to watercourse / waterway determination. Label photos.	

Location	Latitude (E)	Longitude (S)
A	NA	NA
B	NA	NA
C	NA	NA
D	NA	NA
E	NA	NA

Water Present:	Yes ☐ No ☒
Water Type:	Flowing ☐ Pool(s) present ☐ Dry ☒
Sample Site Length: 50 m	Water Surface Depth to Bed: NA

CHANNEL DETERMINATION (REFER TO SECTION 8.3)

Stream Order: 1☒ 2☐ 3☐ 4☐ 4+☐		Functional Zone Type - Sediment	Supply☒ Transfer☐ Storage☐
Identify Channel Type:	Mildly sinuous		
Channel Modifications:	None		
Bed Sediment Character:	Tight ☐ Packed ☐ Moderate ☐ Low 1 ☐ Low 2 ☒		
Bank Sediments Composition:	Bedrock <1 % Boulder <1 % Cobble <1 % Pebble <1 % Gravel <1 % Sand Fines 100 %		
Bed Material Angularity:	Very Angular☐ Angular ☐ Sub-angular ☐ Rounded ☐Well-rounded ☐ Cobble peddle and gravel fractions not present ☒		
Bank Predominant Shape:	Concave ☐ Convex ☐ Stepped ☒ Wide lower bench ☐ Undercut ☐		
Bank Slope Downstream Right:	Vertical 80-90° ☐ Steep 60-80° ☒ Moderate 30-60° ☐ Low 10-30° ☐ Flat<10°☐		
Bank Slope Downstream Left:	Vertical 80-90° ☐ Steep 60-80° ☒ Moderate 30-60° ☐ Low 10-30° ☐ Flat<10°☐		
Channel Shape:	Two stage		
Bed Stability:	Severe Erosion ☐ Moderate Erosion ☒ Bed Stable ☐ Moderate Deposition ☐ Severe Deposition ☐		
Potential Fish Habitat Class:	Class1 ☐ Class2 ☐ Class3 ☐ Class4 ☒		
Fish Migratory Passage Potential:	Nil ☒ Very Restricted ☐ Moderately Restricted ☐ Partly Restricted ☐ Good Passage ☐ Unrestricted Passage ☐		

FLORA/FAUNA ASSESSMENT (REFER TO SECTION 8.4)

Does any vegetation need to be removed?	Yes ☐ No ☒	**If Yes, no more than 0.25 Ha can be removed Estimate how much needs to be removed**
Vegetation community description		
Has an Aquatic and Ecological Assessment been undertaken previously that encompasses the watercourse crossing point (both for flora and fauna characteristics).	Yes ☒ No ☐	If yes, reference Report No:

Has a pre-disturbance assessment been undertaken previously that encompasses the watercourse crossing point (both for flora and fauna characteristics).	Yes ☒ No ☐	If no, a pre-disturbance assessment may be required
Does the riparian zone at the watercourse fall within a mapped extent of a Regional Ecosystem and/ or TEC? (refer to Dekho maps)	Yes ☒ No ☐	If Yes, detail mapped RE code (biodiversity status) and TEC where applicable: Mapped as Least Concern RE 11.10.11/ 11.10.7a
Does the riparian zone at the watercourse fall within any Category A, B or C Environmentally Sensitive Areas (ESAs) and/or their primary or secondary primary protection (buffer) zones (refer to Dekho maps)	Yes ☒ No ☐	If Yes, detail ESA category: Category C ESA
If present, is the mapped RE/TEC community consistent with the vegetation community observed on the ground	Yes ☒ No ☐	If no, Check whether discrepancies have already been recorded in previous reports and GIS layers updated. If not a pre-disturbance assessment or quaternary level assessment may be required. Ground-truthed regrowth (Quaternary Assessment)
Does the proposed development activity comply with the clearing/significant disturbance restrictions of the applicable EA (refer Table 3)	Yes ☒ No ☐	If, no then flag with FLUOR Environment Team for review.
Are there any Cultural Heritage sites located within the crossing location or nearby area (refer to Dekho maps)	Yes ☐ No ☐	If Yes, detail site:
General Vegetation Community description: (including a list of dominant flora species within each stratum)	*Open woodland with canopy dominated by Eucalyptus sp. and Callitris glaucophylla with sparse shrub layer and mid-dense ground layer.*	

Are there any declared weeds within the area of the crossing?	Yes☒ No ☐	If yes, describe flag on the ground and GPS and provide on map. *Opuntia sp.*
Are there any conservation significant species (i.e ENVT or Type A flora) within the area of the crossing?	Yes☐ No ☒	
Riparian vegetation cover: Trees > 10 m: Trees < 10 m: Shrubs: Grasses, herbs and sedges:	2 % 48 % 10 % 60 %	
Riparian vegetation patchiness:	Semi continuous	
Describe the riparian vegetation condition:	VAST II - Modified	
Native woody vegetation regeneration:	Abundant ☐ Present ☒ Limited ☐	

SAFETY CONSIDERATIONS		
Are there any safety implications at the proposed crossing due to decreased Right of Way from Environmental Sensitive Areas or other constraints like topography?	Yes ☐ No ☒	**If Yes, Note concerns**

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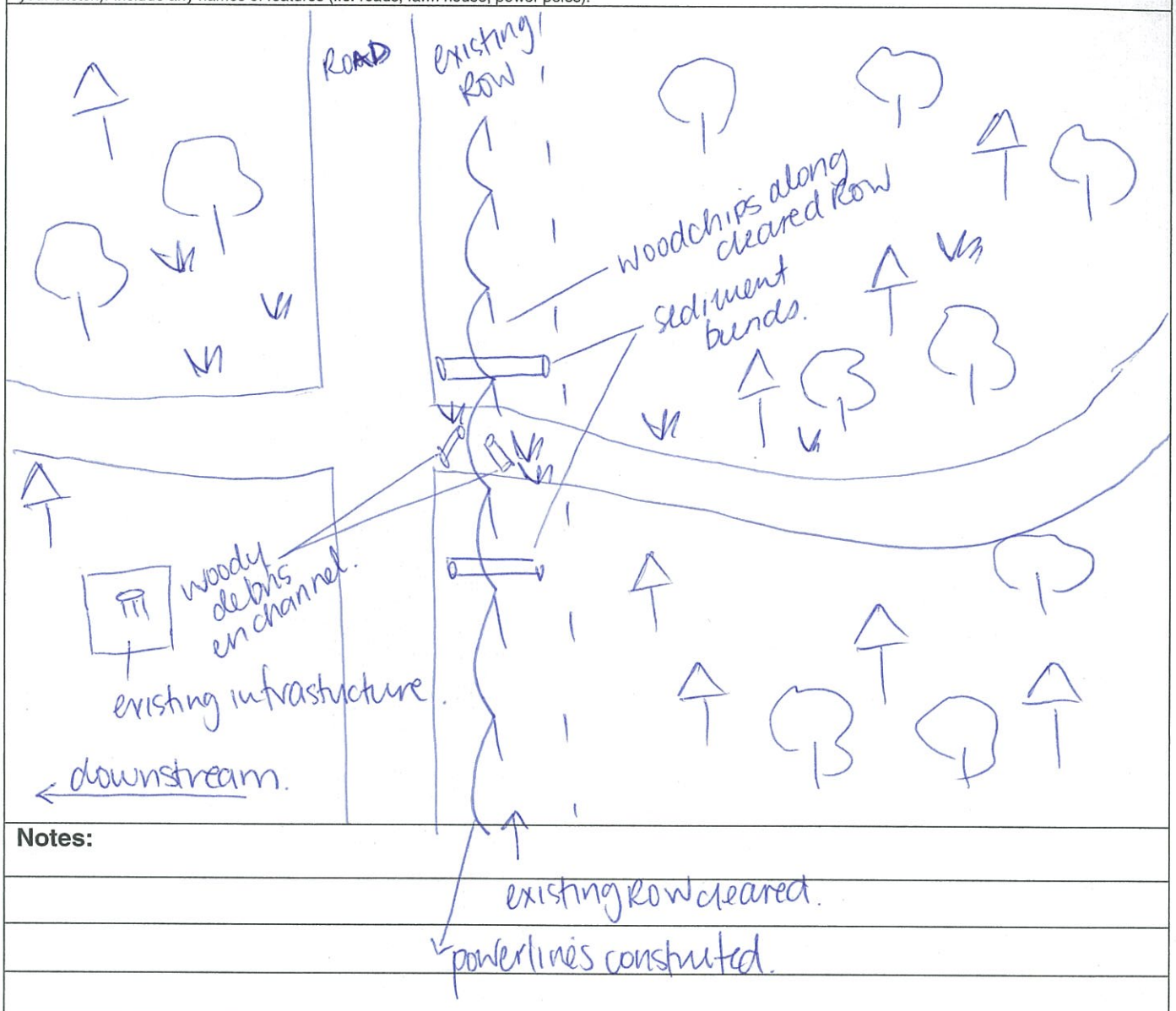
SKETCH OF CROSSING (BIRDS EYE VIEW) (REFER SECTION 8.5)

Sketch birds eye view (i.e. view looking from above), depict how the stream curves, any vegetation, trees, areas of significance (cultural significance if known). Complete approx 10 times the Bankfull Width upstream and downstream of crossing site. Take photographs upstream and downstream (write photo locations on your sketch). Include any names of features (i.e. roads, farm house, power poles).



Notes:

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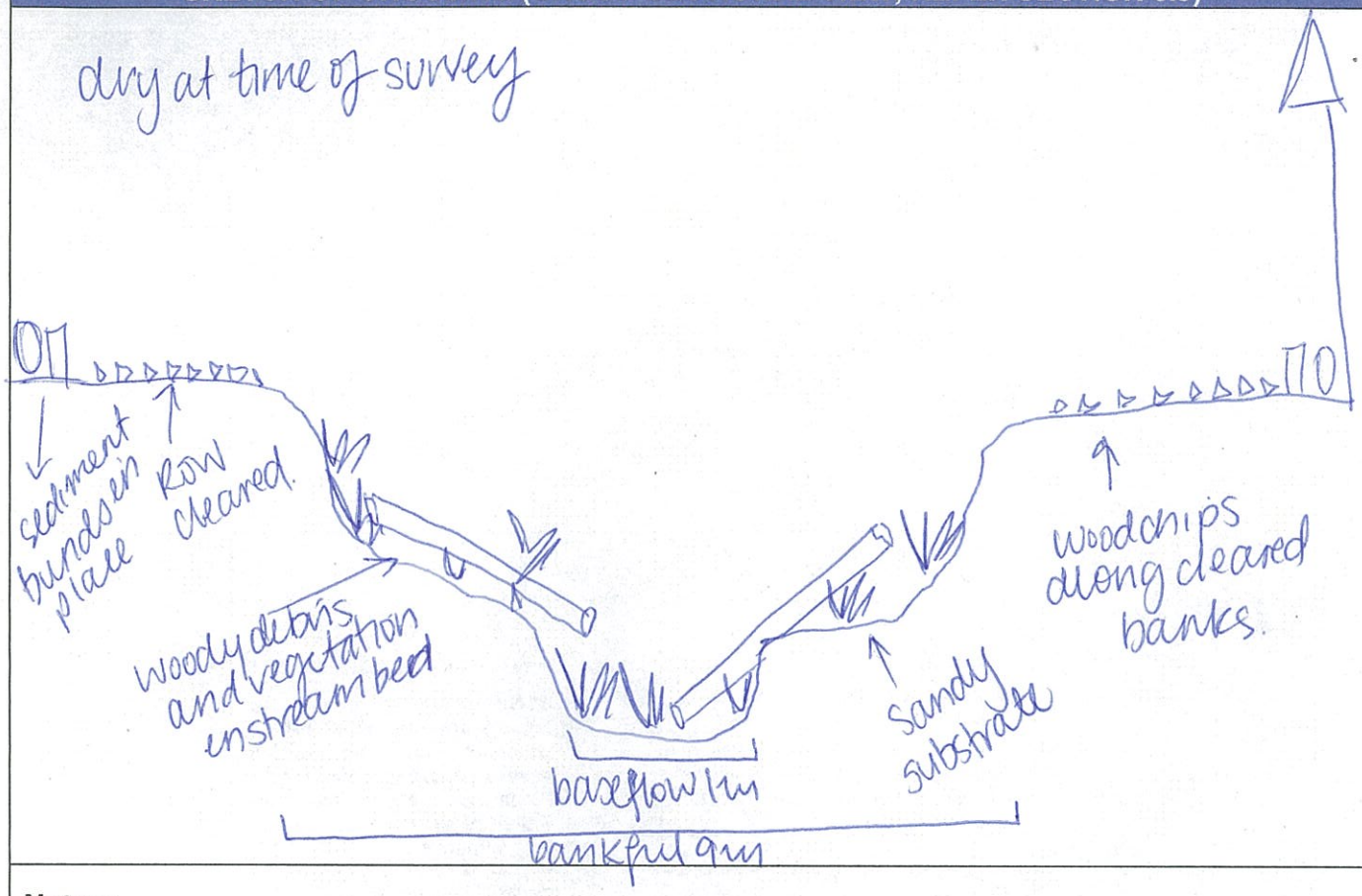
SKETCH OF CROSSING (CROSS-SECTIONAL VIEW, REFER SECTION 8.5)



Notes:

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ASSESSMENT OUTCOME

LEGISLATIVE REQUIREMENTS DETERMINATION				
Part 1 - Waterway Definition Assessment (*Fisheries Act 1994*)				
Environmental Value	**Checklist**	**Y / N**	**Justification for Placement**	**Field Comments**
Does the feature satisfy the waterway definition requirements of FHMOP 008 2009 (refer section 7.3.2) under the *Fisheries Act 1994*? Refer to Section 7 of Watercourse Assessment Manual	Does the feature have a defined bed and banks: The bed and banks need to be continuous rather than isolated and broken sections of a depression.	☒yes ☐no	If **Yes to all** , complete Section 2 If **No to any of these, the feature does not constitute a waterway and no further assessment is required for the Fisheries Act.** Implement waterway crossing design and environmental protection measures as required in Environmental Authority and other relevant environmental requirements.	**WATERWAY UNDER *FISHERIES ACT 1994?*** ☐ **YES** **(APPROVAL/ LODGEMENT REQUIRED)**
	Does the feature have an extended, if non-permanent, period of flow: Flow must continue for a reasonable period after rain ceases and have some reliability commensurate with rainfall? Flow for several weeks after rainfall ceases does not constitute extended flow. Consider e.g. water present, catchment size, geomorphological features, and ecological indicators of sustained flow.	☐yes ☒no	If **Yes to all** , complete Section 2 If **No to any of these, the feature does not constitute a waterway and no further assessment is required for the Fisheries Act.** Implement waterway crossing design and environmental protection measures as required in Environmental Authority and other relevant environmental requirements. **No evidence of aquatic life. Vegetation consistent with areas surrounding (outside of area of influence**	☒ **NO** **(NO LODGEMENT REQUIRED**
	Does the feature have sufficient flow adequacy: The flow needs to be sufficient to sustain basic ecological processes and to maintain biodiversity within the feature. Comment on any ecological indicators present e.g. riparian vegetation, presence/evidence of aquatic life etc.	☐yes ☒no		

Section 2 - Waterway Barrier Works Requirements (Only complete if works are to take place within a waterway)				
Environmental Value	**Checklist**	**Y / N**	**Justification for Placement**	**Field Comments**
a. **Do the works constitute waterway barrier works as defined in FHMOP 008 2009 (Appendix 3)?**	As well as dams and weirs the following are examples of developments that are considered to be waterway barrier works: ▪ Temporary dams, barriers to flow ▪ Culverts ▪ Bed level waterway crossings ▪ Causeways (water crossings slightly above stream bed) ▪ Tidal or floodgates (including maintenance and repair) ▪ Partial bunds (where the development will only partially block a waterway) ▪ Levee banks ▪ Silt curtains ▪ Netting and screens ▪ Litter booms or Trash racks ▪ Riffle structure	☐yes ☐no	If **Yes**, complete Section **2b**. If **No**, implement construction works in accordance with environmental protection measures as requires in Environmental Authority and other relevant environmental requirements. Attach/reference all records and place in Z:\653R_Environmental Complete paperwork and forward to FLUOR Environment Team for review.	
b. **Is the waterway crossing self assessable under WWBW01 for Temporary Waterway Barrier Works**	Do the works involve: ▪ Waterway barriers that will be in place for less than 42 calendar days ▪ Waterway barriers that are less than 20m in length across the waterway from bank to bank and; ▪ 10m or less in width (at the widest point). ▪ Waterway barriers that are at least 500m distance from any existing natural or artificial waterway barrier (upstream or downstream) unless: ○ the barrier is being constructed in order to perform maintenance or repairs on, or removal of, the existing barrier, or ○ the barrier is being constructed in order to facilitate dewatering between the new and existing barriers, or ○ the barrier is a silt curtain for control of sediment. ▪ Disturbance to the bed and banks of a waterway less than 5m from the toe of the barrier on either side. ▪ Construction at the time of the year when the flows are lowest or have completely stopped. ▪ A waterway barrier where there will be no ponding of water upstream.	☐yes ☐no	If **Yes**, comply with all applicable requirements of WWBW01 in addition to waterway crossing design and environmental protection measures as required in CEMP, Environmental Authority, EIS and other relevant environmental requirements. Provide evidence that waterway crossing design satisfies DAFF self assessment codes including reference to design drawings. Attach/reference all records and place in Z:\653R_Environmental Complete paperwork and forward to FLUOR Environment Team for review. If **No**, go to Section **2c**.	

Section 2 - Waterway Barrier Works Requirements (Only complete if works are to take place within a waterway)				
Environmental Value	**Checklist**	**Y / N**	**Justification for Placement**	**Field Comments**
c. **Is the waterway crossing self assessable under WWBW02 for Minor Waterway Barrier Works**	Do the works involve: • New waterway barrier works **at least 100m** from any other permanent waterway barrier works on same waterway. • Construction that is **not** on a bend or rapid section of a waterway. • Construction perpendicular to the water flow (within 10°). • Construction of minor barriers must commence and finish within 60 calendar days. • Construction during times of low flow, base flow or no flow conditions. • And either one of either: • <u>*Part 1, Dams and Weirs*</u> • Construction of a new **dam or weir** or maintenance of existing one on a waterway with a stream order of 1 or 2 • Maximum waterway barrier height is **one metre or less** above the lowest point of the waterway bed • Upstream and downstream disturbance area must not be more than **10 m** in total from the upstream and downstream toe of the barrier. • <u>Or, *Part 3, Culverts*</u> • Construction of a new **culvert** crossing or replacement/ modification or maintenance of existing culvert where the bankfull width of the waterway **is not** greater than 20m. • Construction of **culverts** where the **maximum** upstream/downstream length of the culvert cells is 15m plus apron (3m scour protection for culverts) or less. • The maximum disturbance area outside barrier footprint of 10 m (scour protection is included in the barrier footprint (upstream and/or downstream). • <u>Or, *Part 4, Bed Level Crossings*</u> • Construction of a new **bed level** crossing or replacement/ modification or maintenance of existing **bed level** waterway where the bankfull width of the waterway can be less than or greater than 20m. • **Bed level** crossing footprint is no more than **15 m wide** (upstream/downstream), with a maximum disturbance area outside crossing footprint of **10 m** (**25 m in total**). • Installation of **bed level** crossings **no higher** than natural bed level. • Installation of a **bed level** crossing at the same gradient as the waterway bed gradient.	☐yes ☐no	If **Yes**, comply with all applicable requirements of WWBW02 in addition to waterway crossing design and environmental protection measures as required, Environmental Authority and other relevant environmental requirements. Provide evidence that waterway crossing design satisfies DAFF self assessment codes including reference to design drawings. Attach/reference all records and place in Z:\653R_Environmental Complete paperwork and forward to FLUOR Environment Team for review.	

Part 3 - Water Definition Assessment (Water Act 2000) & Relevant Environmental Authority				
Environmental Value	**Checklist**	**Y / N**	**Justification for Placement**	**Overall Outcome**
Does the feature fit the definition of a ***Drainage Feature*** under the Water Act 2000? ***Drainage feature*** means a natural landscape feature, including a gully, drain, drainage depression or other erosion feature that— (a) is formed by the concentration of, or operates to confine or concentrate, overland flow water during and immediately after rainfall events; and (b) flows for only a short duration after a rainfall event, regardless of the frequency of flow events; and (c) commonly, does not have enough continuing flow to create a Riverine environment Refer to Section 7 of Watercourse Assessment Manual	1. Does the feature carrying water flow only for a short duration after a rainfall event? 2. Does the feature lack the presence of a riverine environment? (i.e flow adequacy to support riverine species). 3. Does the feature lack the presence of in-stream islands, benches or bars?	☒yes ☐no ☒yes ☐no ☒yes ☐no	If ***Yes to all*** of these questions then the feature does not constitute a watercourse and no further assessment is required for the Water Act. If ***no to any*** one of these questions then this feature constitutes a watercourse under the Water Act 2000	**Drainage Feature UNDER the *WATER ACT 2000?*** ☒ **YES** **(NO APPROVAL REQUIRED)** Implement environmental protection measures as required in Environmental authority and other relevant environmental requirements. ☐ **NO** **Determined a Watercourse – see below** **Watercourse under the *WATER ACT 2000?*** ☐ **YES** **(APPROVAL/ LODGEMENT REQUIRED – DETERMINED A WATERCOURSE)** Complete Pre and Post works checklists, and ensure appropriate lodgements are undertaken as per Environmental Authority Requirements. ☒ **NO** **Determined a drainage feature– see Above.**

Part 4 - Water Act Requirements (only complete if works are to take place within or adjacent to the watercourse – refer to Section 2 (Water Act) outcomes)				
Environmental Value	**Checklist**	**Y / N**	**Justification for Placement**	**Comments**
Do the works require approval under the Water Act? (Refer to summary flowchart within Section 9 of watercourse manual)	Do the works involve: • Excavation or placing fill in a way that would interfere with the flow of water in a watercourse, lake or spring by impounding or redirecting the flow of water (referring to completed product, following construction works).	☐yes ☒no	If **Yes**, go to Part **5**, works may require a Riverine Protection Permit under the Water Act. Provide evidence that waterway crossing design satisfies DEHP Guidelines (next section) including reference to design drawings. Attach/reference all records and store in relevant Environmental Drive. Complete paperwork and forward to FLUOR Environment Team for review. If No, adhere to EA requirements!	

Part 5 – DNRM Assessment Requirements (Guideline – activities in a watercourse, lake or spring associated with mining operations) (refer to Section 1 (Water Act) outcomes)			
What type (if any) vegetation will be required to be removed and quantity (area). (no more than 0.25ha), how will the vegetation be removed?	☒yes ☐no	List all species required for removal. Ensure FLUOR/SANTOS vegetation management plan and EA conditions are followed (indicate the requirements for this crossing).	<0.25 ha of vegetation will require clearing Majority of the crossing location has already been cleared Potential species to be cleared include: *Callitris glaucophylla, Eucalyptus populnea Geijera parviflora, Grevillea striata*
Can the water crossing be located in a previously disturbed area?	☒yes ☐no	If No, why not?	Already located adjacent to RoW and road crossing
Is the water course from groundwater origin?	☐yes ☒no	Determine upstream water sources	

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Section 6 – Overall Assessment Outcome			
Has the stream order been assessed a watercourse (Water Act)	☐yes ☒no	If Yes, must comply with the "Guideline – activities in a watercourse, lake or spring associated with mining operations" – Ensure all of this checklist is completed and conveyed to all relevant staff, contractors are to ensure compliance with EA conditions – ensure lodgement of PREWORKS TO DEHP 10 Business prior to works commencing.	☐ YES (APPROVAL REQUIRED) X NO (NO LODGEMENT REQUIRED, ASSESSED AS DRAINAGE FEATURE)
Has the stream order been assessed as a waterway (*Fisheries Act*)	☐yes ☒no	If **Yes** complete check boxes below If **No** – no further assessment required	☐ YES (APPROVAL REQUIRED) X NO (NO LODGEMENT REQUIRED)
Is a development approval required (i.e. the self assessable code can not be adhered to)?	☐yes ☒no	If **Yes** Contact FLUOR Environment Team.	
Was the crossing assessed as a 'minor waterway barrier'?, either:		If **Yes** complete the relevant 'Minor Waterway Barrier Works Self-Assessment Sheet' lodge to FLUOR Environment Team.	
Part 1 – Dams and Weirs	☐yes ☒no		
Part 3 – Culverts	☐yes ☒no		
Part 4 – Bed Level Crossings	☐yes ☒no		
Was the crossing assessed as a 'temporary waterway barrier'?	☐yes ☒no	If **Yes** complete a Temporary Waterway Barrier Works Self-Assessment Sheet lodge to FLUOR Environmental Team for review.	
Were any EVNT species listed under the EPBC Act and/or NC Act present within the riparian zone of the waterway crossing	☐yes ☒no	If Yes GPS the position of individuals/populations, flag on site and contact FLUOR Environmental Team for review. If No – no further assessment required	
Were any vegetation mapping discrepancies identified within the riparian zone of the waterway crossing	☐yes ☒no	If Yes undertake a quaternary level RE assessment and GPS the extent of the mapped community assemblage where applicable. Contact FLUOR Environment Team for review. If No – no further assessment required	RE as mapped

WC 5 Pre-works Photographs

Photo A – Looking across the waterway at the proposed site works

Vegetation Management Area

Photo B – Looking downstream of the proposed site of works

Photo C – Looking upstream of the proposed site of works

WORKS WITHIN A WATERCOURSE ASSESSMENT

This watercourse assessment is to be filled out for all watercourse crossings to ensure compliance with environmental requirements and to ensure appropriate approvals are obtained.

FIELD ASSESSMENT

Inspected by:	Roisin Feeney	GHD	**Inspected Date:**	14/12/2013
Company:			**Time:**	12:15 pm

Crossing Name:	Un-named watercourse	**CWP Number**	
Watercourse ID	WC 6	**Crossing Type (E.g. pipeline/road)**	Vegetation Management Area
Lot/Plan:	55FTY1153	**Location Reference**	RoW 36bp
Site	R-HCS-02 ☐ F-HCS-04 ☒ F-HCS-05 ☐ other/area:		
Land Tenure:	Freehold / Leasehold / other :	**Petroleum Tenure**	
Crossing Disturbance Status:	Existing crossing with no upgrade required: ☐ Existing crossing with upgrade required: ☒ New crossing in previously disturbed area: ☐ New crossing in undisturbed area: ☐		
Land Access Approval to undertake assessment:	Yes ☒ No ☐	**Approval No:**	
Cultural Heritage Approval to undertake assessment:	Yes ☐ No ☐	**Approval No:**	
Anticipated commencement date:		**Can the crossing be installed within 10 days?** If No, development approval and other approvals may be required.	Yes ☒ No ☐

HEALTH AND SAFETY		
Have you completed a Safety Task Assessment (STA)?	Yes ☒ No ☐	If No, cease inspection and complete.
Do you have appropriate PPE for the task?	Yes ☒ No ☐	
Do you have adequate amount of water – at least 10 litres?	Yes ☒ No ☐	

GENERAL ENVIRONMENTAL CONDITIONS	
Temp: Cold (<5◦C) ☐ Cool (<15◦C) ☐ Mild (<25◦C) ☐ Warm (<35◦C) ☐ Hot (>35◦C) ☒	Weather now: Clear/Fine ☒ Scattered Clouds ☐ Cloudy ☐
	Past 24 hrs: Clear/Fine ☒ Scattered Clouds ☐ Cloudy ☐
Wind: Still ☒ Slight breeze ☐ Windy ☐ Strong Wind ☐	Air now: Dry ☐ Humid ☒ Rain (Steady) ☐ Rain (Heavy) ☐
	Air past 24hrs: Dry ☐ Humid ☒ Rain (Steady) ☐ Rain (Heavy) ☐

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CROSSING LOCATION (REFER SECTION 8.2)

GPS Coordinates - Latitude/Longitude (E – 6 Figs, N – 7 Figs) GDA94

Latitude (E)	711413	**Longitude (S)**	7147700
Bankfull Width (m)	4 m	**Bank Width (m):**	Left Bank: 1 m Right Bank: 1 m
Stream Width at Water Surface (m):	NA	**Baseflow Stream Width (m):**	2 m
Bank Height: Baseflow and water surface height difference:	Downstream left Bank: 0.3 m/ NA Downstream Right Bank 0.3 m/ NA	**Photographs of site** Provide photos looking upstream and downstream from crossing location, as well as relevant to watercourse / waterway determination. Label photos.	

Location	Latitude (E)	Longitude (S)
A	NA	NA
B	NA	NA
C	NA	NA
D	NA	NA
E	NA	NA

Water Present:	Yes ☐ No ☒
Water Type:	Flowing ☐ Pool(s) present ☐ Dry ☒
Sample Site Length: 50 m	Water Surface Depth to Bed: NA

CHANNEL DETERMINATION (REFER TO SECTION 8.3)

Stream Order: 1☒ 2☐ 3☐ 4☐ 4+☐	Functional Zone Type - Sediment	Supply☒ Transfer☐ Storage☐
Identify Channel Type:	Mildly sinuous	
Channel Modifications:	None	
Bed Sediment Character:	Tight ☐ Packed ☐ Moderate ☐ Low 1 ☐ Low 2 ☒	
Bank Sediments Composition:	Bedrock <1 % Boulder <1 % Cobble <1 % Pebble <1 % Gravel <1 % Sand Fines 100 %	
Bed Material Angularity:	Very Angular☐ Angular ☐ Sub-angular ☐ Rounded ☐Well-rounded ☐ Cobble peddle and gravel fractions not present ☒	
Bank Predominant Shape:	Concave ☒ Convex ☐ Stepped ☐ Wide lower bench ☐ Undercut ☐	
Bank Slope Downstream Right:	Vertical 80-90° ☐ Steep 60-80° ☐ Moderate 30-60° ☐ Low 10-30° ☒ Flat<10°☐	
Bank Slope Downstream Left:	Vertical 80-90° ☐ Steep 60-80° ☐ Moderate 30-60° ☐ Low 10-30° ☒ Flat<10°☐	
Channel Shape:	Flat u-shape	
Bed Stability:	Severe Erosion ☐ Moderate Erosion ☐ Bed Stable ☒ Moderate Deposition ☐ Severe Deposition ☐	
Potential Fish Habitat Class:	Class1 ☐ Class2 ☐ Class3 ☐ Class4 ☒	
Fish Migratory Passage Potential:	Nil ☒ Very Restricted ☐ Moderately Restricted ☐ Partly Restricted ☐ Good Passage ☐ Unrestricted Passage ☐	

FLORA/FAUNA ASSESSMENT (REFER TO SECTION 8.4)

Does any vegetation need to be removed?	Yes ☐ No ☒	**If Yes, no more than 0.25 Ha can be removed Estimate how much needs to be removed**
Vegetation community description		
Has an Aquatic and Ecological Assessment been undertaken previously that encompasses the watercourse crossing point (both for flora and fauna characteristics).	Yes ☒ No ☐	If yes, reference Report No:

Has a pre-disturbance assessment been undertaken previously that encompasses the watercourse crossing point (both for flora and fauna characteristics).	Yes ☒ No ☐	If no, a pre-disturbance assessment may be required
Does the riparian zone at the watercourse fall within a mapped extent of a Regional Ecosystem and/ or TEC? (refer to Dekho maps)	Yes ☒ No ☐	If Yes, detail mapped RE code (biodiversity status) and TEC where applicable: Mapped as Least Concern RE 11.10.9
Does the riparian zone at the watercourse fall within any Category A, B or C Environmentally Sensitive Areas (ESAs) and/or their primary or secondary primary protection (buffer) zones (refer to Dekho maps)	Yes ☒ No ☐	If Yes, detail ESA category: Category C ESA
If present, is the mapped RE/TEC community consistent with the vegetation community observed on the ground	Yes ☒ No ☐	If no, Check whether discrepancies have already been recorded in previous reports and GIS layers updated. If not a pre-disturbance assessment or quaternary level assessment may be required. Ground-truthed regrowth (Quaternary Assessment)
Does the proposed development activity comply with the clearing/significant disturbance restrictions of the applicable EA (refer Table 3)	Yes ☒ No ☐	If, no then flag with FLUOR Environment Team for review.
Are there any Cultural Heritage sites located within the crossing location or nearby area (refer to Dekho maps)	Yes ☐ No ☐	If Yes, detail site:
General Vegetation Community description: (including a list of dominant flora species within each stratum)	*Callitris glaucophylla open woodland with emergent Eucalyptus populnea, mid dense shrub layer and mid-dense shrub layer and mid dense to sparse ground layer.*	

Are there any declared weeds within the area of the crossing?	Yes☐ No ☒	If yes, describe flag on the ground and GPS and provide on map.
Are there any conservation significant species (i.e ENVT or Type A flora) within the area of the crossing?	Yes☐ No ☒	
Riparian vegetation cover: Trees > 10 m: Trees < 10 m: Shrubs: Grasses, herbs and sedges:	5 % 60 % 20 % 60 %	
Riparian vegetation patchiness:	Semi continuous	
Describe the riparian vegetation condition:	VAST II - Modified	
Native woody vegetation regeneration:	Abundant ☐ Present ☒ Limited ☐	

SAFETY CONSIDERATIONS		
Are there any safety implications at the proposed crossing due to decreased Right of Way from Environmental Sensitive Areas or other constraints like topography?	Yes ☐ No ☒	**If Yes, Note concerns**

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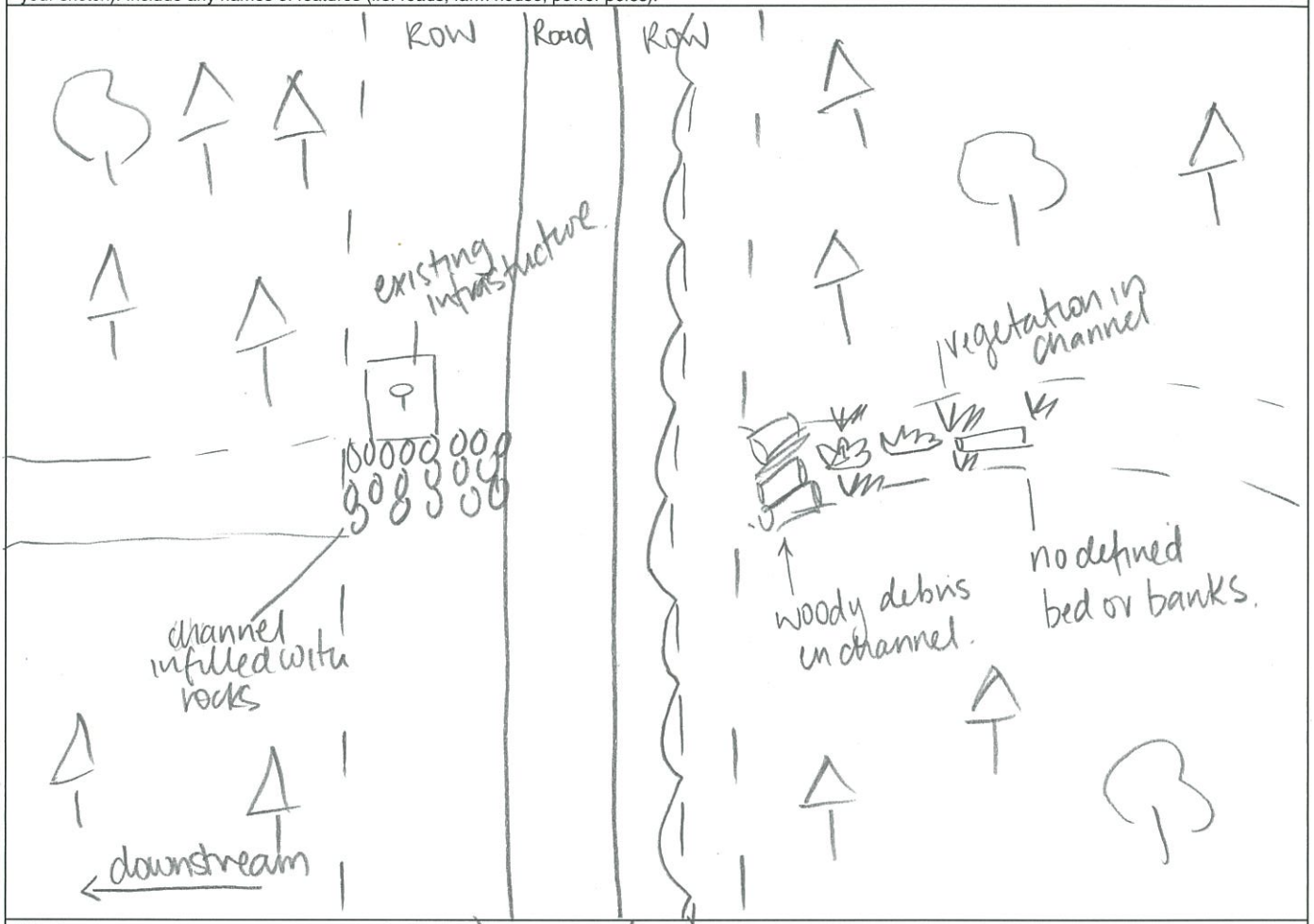
SKETCH OF CROSSING (BIRDS EYE VIEW) (REFER SECTION 8.5)

Sketch birds eye view (i.e. view looking from above), depict how the stream curves, any vegetation, trees, areas of significance (cultural significance if known). Complete approx 10 times the Bankfull Width upstream and downstream of crossing site. Take photographs upstream and downstream (write photo locations on your sketch). Include any names of features (i.e. roads, farm house, power poles).



Notes:

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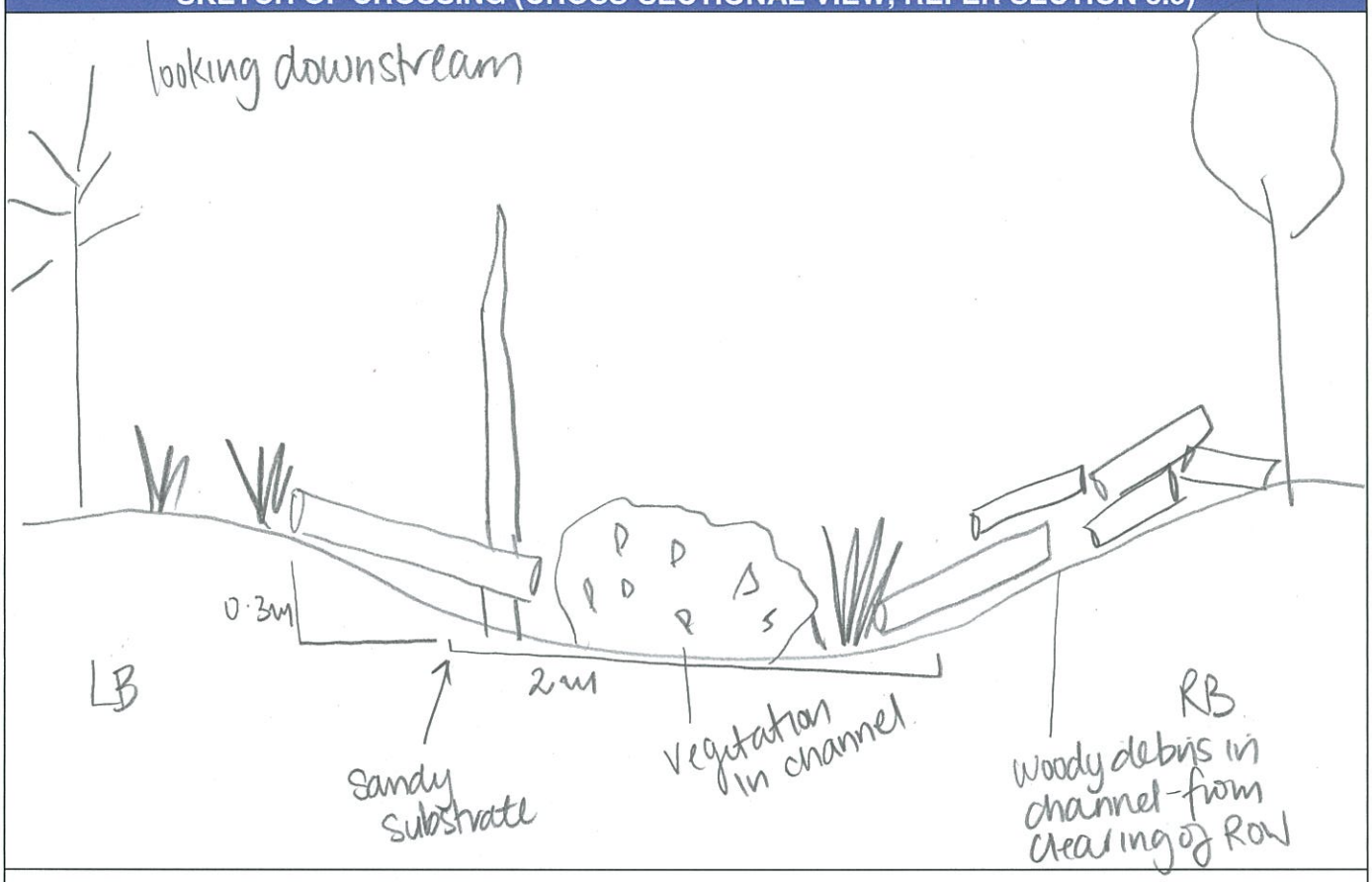
SKETCH OF CROSSING (CROSS-SECTIONAL VIEW, REFER SECTION 8.5)



Notes:

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ASSESSMENT OUTCOME

LEGISLATIVE REQUIREMENTS DETERMINATION				
Part 1 - Waterway Definition Assessment (*Fisheries Act 1994*)				
Environmental Value	**Checklist**	**Y / N**	**Justification for Placement**	**Field Comments**
Does the feature satisfy the waterway definition requirements of FHMOP 008 2009 (refer section 7.3.2) under the *Fisheries Act 1994*? Refer to Section 7 of Watercourse Assessment Manual	Does the feature have a defined bed and banks: The bed and banks need to be continuous rather than isolated and broken sections of a depression.	☒yes ☐no	If **Yes to all** , complete Section 2 If **No to any of these, the feature does not constitute a waterway and no further assessment is required for the Fisheries Act.** Implement waterway crossing design and environmental protection measures as required in Environmental Authority and other relevant environmental requirements.	**WATERWAY UNDER *FISHERIES ACT 1994?*** ☐ **YES** **(APPROVAL/ LODGEMENT REQUIRED)**
	Does the feature have an extended, if non-permanent, period of flow: Flow must continue for a reasonable period after rain ceases and have some reliability commensurate with rainfall? Flow for several weeks after rainfall ceases does not constitute extended flow. Consider e.g. water present, catchment size, geomorphological features, and ecological indicators of sustained flow.	☐yes ☒no	If **Yes to all** , complete Section 2 If **No to any of these, the feature does not constitute a waterway and no further assessment is required for the Fisheries Act.** Implement waterway crossing design and environmental protection measures as required in Environmental Authority and other relevant environmental requirements. **No evidence of aquatic life. Vegetation consistent with areas surrounding (outside of area of influence**	☒ **NO** **(NO LODGEMENT REQUIRED**
	Does the feature have sufficient flow adequacy: The flow needs to be sufficient to sustain basic ecological processes and to maintain biodiversity within the feature. Comment on any ecological indicators present e.g. riparian vegetation, presence/evidence of aquatic life etc.	☐yes ☒no		

Section 2 - Waterway Barrier Works Requirements (Only complete if works are to take place within a waterway)				
Environmental Value	**Checklist**	**Y / N**	**Justification for Placement**	**Field Comments**
a. **Do the works constitute waterway barrier works as defined in FHMOP 008 2009 (Appendix 3)?**	As well as dams and weirs the following are examples of developments that are considered to be waterway barrier works: ▪ Temporary dams, barriers to flow ▪ Culverts ▪ Bed level waterway crossings ▪ Causeways (water crossings slightly above stream bed) ▪ Tidal or floodgates (including maintenance and repair) ▪ Partial bunds (where the development will only partially block a waterway) ▪ Levee banks ▪ Silt curtains ▪ Netting and screens ▪ Litter booms or Trash racks ▪ Riffle structure	☐yes ☐no	If **Yes**, complete Section **2b**. If **No**, implement construction works in accordance with environmental protection measures as requires in Environmental Authority and other relevant environmental requirements. Attach/reference all records and place in Z:\653R_Environmental Complete paperwork and forward to FLUOR Environment Team for review.	
b. **Is the waterway crossing self assessable under WWBW01 for Temporary Waterway Barrier Works**	Do the works involve: ▪ Waterway barriers that will be in place for less than 42 calendar days ▪ Waterway barriers that are less than 20m in length across the waterway from bank to bank and; ▪ 10m or less in width (at the widest point). ▪ Waterway barriers that are at least 500m distance from any existing natural or artificial waterway barrier (upstream or downstream) unless: ○ the barrier is being constructed in order to perform maintenance or repairs on, or removal of, the existing barrier, or ○ the barrier is being constructed in order to facilitate dewatering between the new and existing barriers, or ○ the barrier is a silt curtain for control of sediment. ▪ Disturbance to the bed and banks of a waterway less than 5m from the toe of the barrier on either side. ▪ Construction at the time of the year when the flows are lowest or have completely stopped. ▪ A waterway barrier where there will be no ponding of water upstream.	☐yes ☐no	If **Yes**, comply with all applicable requirements of WWBW01 in addition to waterway crossing design and environmental protection measures as required in CEMP, Environmental Authority, EIS and other relevant environmental requirements. Provide evidence that waterway crossing design satisfies DAFF self assessment codes including reference to design drawings. Attach/reference all records and place in Z:\653R_Environmental Complete paperwork and forward to FLUOR Environment Team for review. If **No**, go to Section **2c**.	

Section 2 - Waterway Barrier Works Requirements (Only complete if works are to take place within a waterway)				
Environmental Value	**Checklist**	**Y / N**	**Justification for Placement**	**Field Comments**
c. **Is the waterway crossing self assessable under WWBW02 for Minor Waterway Barrier Works**	Do the works involve: • New waterway barrier works **at least 100m** from any other permanent waterway barrier works on same waterway. • Construction that is **not** on a bend or rapid section of a waterway. • Construction perpendicular to the water flow (within 10°). • Construction of minor barriers must commence and finish within 60 calendar days. • Construction during times of low flow, base flow or no flow conditions. • And either one of either: • <u>*Part 1, Dams and Weirs*</u> • Construction of a new **dam or weir** or maintenance of existing one on a waterway with a stream order of 1 or 2 • Maximum waterway barrier height is **one metre or less** above the lowest point of the waterway bed • Upstream and downstream disturbance area must not be more than **10 m** in total from the upstream and downstream toe of the barrier. • <u>Or, *Part 3, Culverts*</u> • Construction of a new **culvert** crossing or replacement/ modification or maintenance of existing culvert where the bankfull width of the waterway **is not** greater than 20m. • Construction of **culverts** where the **maximum** upstream/downstream length of the culvert cells is 15m plus apron (3m scour protection for culverts) or less. • The maximum disturbance area outside barrier footprint of 10 m (scour protection is included in the barrier footprint (upstream and/or downstream). • <u>Or, *Part 4, Bed Level Crossings*</u> • Construction of a new **bed level** crossing or replacement/ modification or maintenance of existing **bed level** waterway where the bankfull width of the waterway can be less than or greater than 20m. • **Bed level** crossing footprint is no more than **15 m wide** (upstream/downstream), with a maximum disturbance area outside crossing footprint of **10 m** (**25 m in total**). • Installation of **bed level** crossings **no higher** than natural bed level. • Installation of a **bed level** crossing at the same gradient as the waterway bed gradient.	☐yes ☐no	If **Yes**, comply with all applicable requirements of WWBW02 in addition to waterway crossing design and environmental protection measures as required, Environmental Authority and other relevant environmental requirements. Provide evidence that waterway crossing design satisfies DAFF self assessment codes including reference to design drawings. Attach/reference all records and place in Z:\653R_Environmental Complete paperwork and forward to FLUOR Environment Team for review.	

Part 3 - Water Definition Assessment (Water Act 2000) & Relevant Environmental Authority				
Environmental Value	**Checklist**	**Y / N**	**Justification for Placement**	**Overall Outcome**
Does the feature fit the definition of a ***Drainage Feature*** under the Water Act 2000? ***Drainage feature*** means a natural landscape feature, including a gully, drain, drainage depression or other erosion feature that— (a) is formed by the concentration of, or operates to confine or concentrate, overland flow water during and immediately after rainfall events; and (b) flows for only a short duration after a rainfall event, regardless of the frequency of flow events; and (c) commonly, does not have enough continuing flow to create a Riverine environment Refer to Section 7 of Watercourse Assessment Manual	1. Does the feature carrying water flow only for a short duration after a rainfall event? 2. Does the feature lack the presence of a riverine environment? (i.e flow adequacy to support riverine species). 3. Does the feature lack the presence of in-stream islands, benches or bars?	☒yes ☐no ☒yes ☐no ☒yes ☐no	If ***Yes to all*** of these questions then the feature does not constitute a watercourse and no further assessment is required for the Water Act. If ***no to any*** one of these questions then this feature constitutes a watercourse under the Water Act 2000	**Drainage Feature UNDER the *WATER ACT 2000?*** ☒ **YES** **(NO APPROVAL REQUIRED)** Implement environmental protection measures as required in Environmental authority and other relevant environmental requirements. ☐ **NO** **Determined a Watercourse – see below** **Watercourse under the *WATER ACT 2000?*** ☐ **YES** **(APPROVAL/ LODGEMENT REQUIRED – DETERMINED A WATERCOURSE)** Complete Pre and Post works checklists, and ensure appropriate lodgements are undertaken as per Environmental Authority Requirements. ☒ **NO** **Determined a drainage feature– see Above.**

Part 4 - Water Act Requirements (only complete if works are to take place within or adjacent to the watercourse – refer to Section 2 (Water Act) outcomes)				
Environmental Value	**Checklist**	**Y / N**	**Justification for Placement**	**Comments**
Do the works require approval under the Water Act? (Refer to summary flowchart within Section 9 of watercourse manual)	Do the works involve: • Excavation or placing fill in a way that would interfere with the flow of water in a watercourse, lake or spring by impounding or redirecting the flow of water (referring to completed product, following construction works).	☐yes ☒no	If **Yes**, go to Part **5**, works may require a Riverine Protection Permit under the Water Act. Provide evidence that waterway crossing design satisfies DEHP Guidelines (next section) including reference to design drawings. Attach/reference all records and store in relevant Environmental Drive. Complete paperwork and forward to FLUOR Environment Team for review. If No, adhere to EA requirements!	

Part 5 – DNRM Assessment Requirements (Guideline – activities in a watercourse, lake or spring associated with mining operations) (refer to Section 1 (Water Act) outcomes)			
What type (if any) vegetation will be required to be removed and quantity (area). (no more than 0.25ha), how will the vegetation be removed?	☒yes ☐no	List all species required for removal. Ensure FLUOR/SANTOS vegetation management plan and EA conditions are followed (indicate the requirements for this crossing).	<0.25 ha of vegetation will require clearing Majority of the crossing location has already been cleared Potential species to be cleared include: *Callitris glaucophylla*
Can the water crossing be located in a previously disturbed area?	☒yes ☐no	If No, why not?	Already located adjacent to RoW and road crossing
Is the water course from groundwater origin?	☐yes ☒no	Determine upstream water sources	

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Section 6 – Overall Assessment Outcome			
Has the stream order been assessed a watercourse (Water Act)	☐yes ☒no	If Yes, must comply with the "Guideline – activities in a watercourse, lake or spring associated with mining operations" – Ensure all of this checklist is completed and conveyed to all relevant staff, contractors are to ensure compliance with EA conditions – ensure lodgement of PREWORKS TO DEHP 10 Business prior to works commencing.	☐ YES (APPROVAL REQUIRED) X NO (NO LODGEMENT REQUIRED, ASSESSED AS DRAINAGE FEATURE)
Has the stream order been assessed as a waterway (*Fisheries Act*)	☐yes ☒no	If **Yes** complete check boxes below If **No** – no further assessment required	☐ YES (APPROVAL REQUIRED) X NO (NO LODGEMENT REQUIRED)
Is a development approval required (i.e. the self assessable code can not be adhered to)?	☐yes ☒no	If **Yes** Contact FLUOR Environment Team.	
Was the crossing assessed as a 'minor waterway barrier'?, either:		If **Yes** complete the relevant 'Minor Waterway Barrier Works Self-Assessment Sheet' lodge to FLUOR Environment Team.	
Part 1 – Dams and Weirs	☐yes ☒no		
Part 3 – Culverts	☐yes ☒no		
Part 4 – Bed Level Crossings	☐yes ☒no		
Was the crossing assessed as a 'temporary waterway barrier'?	☐yes ☒no	If **Yes** complete a Temporary Waterway Barrier Works Self-Assessment Sheet lodge to FLUOR Environmental Team for review.	
Were any EVNT species listed under the EPBC Act and/or NC Act present within the riparian zone of the waterway crossing	☐yes ☒no	If Yes GPS the position of individuals/populations, flag on site and contact FLUOR Environmental Team for review. If No – no further assessment required	
Were any vegetation mapping discrepancies identified within the riparian zone of the waterway crossing	☐yes ☒no	If Yes undertake a quaternary level RE assessment and GPS the extent of the mapped community assemblage where applicable. Contact FLUOR Environment Team for review. If No – no further assessment required	RE as mapped

WC 6 Pre-works Photographs

Photo A – Looking across the waterway at the proposed site works

Vegetation Management Area

Woody debris is channel

Photo B – Looking downstream of the proposed site of works

Photo C – Looking upstream of the proposed site of works

Microbat Call Identification Report

Prepared for ("Client"):	GHD
Survey location/project name:	Fairview, Lot 55
Survey dates:	10-14 December 2013
Client project reference:	412712507
Job no.:	GHD-1311
Report date:	2 January 2014

Methods

Data receipt and processing

Bat calls were recorded over three nights (10th, 13th and 14th December 2013) using an Anabat detector (Titley Scientific, Brisbane). The Anabat data file was downloaded from the detector by the client and submitted to *Balance! Environmental* for analysis.

The data file were processed using CFCread (Corben 2012) to yield 1243 Anabat sequence files (zero-crossing analysis, or ZC, format.

Species identification

The Anabat sequence files were viewed using *AnalookW* (Corben 2013) and a subset of files containing representative samples of all call types recorded on each night were selected for further analysis. Calls with fewer than four clearly-defined, non-fragmented pulses were excluded from the analysis.

Species identification was achieved manually by comparing the sonograms of the selected calls with those of reference calls from southern and central Queensland and with reference to published call descriptions (e.g. Reinhold *et al.* 2001; Pennay *et al*. 2004).

Call identification was also guided by considering probability of occurrence based on general distribution information (Churchill 2008; van Dyck & Strahan 2008) and/or database records obtained from Wildlife Online (http://www.ehp.qld.gov.au/wildlife/wildlife-online/index.html) and the Atlas of Living Australia (http://www.ala.org.au).

Reporting standard

The format and content of this report follows Australasian Bat Society standards for the interpretation and reporting of bat call data (Reardon 2003), available on-line at http://www.ausbats.org.au/.

Species nomenclature follows Churchill (2008); except *Mormopterus eleryi* (Reardon *et al.* 2008) and *Nyctophilus corbeni* (Parnaby 2009).

Results & Discussion

Species identified

At least thirteen and as many as sixteen species were recorded during the Fairview Lot 55 surveys (see Table 1). The majority of recorded calls were of good quality, which allowed for reliable species identification in most cases; however, some calls could not be reliably identified, due to low recording quality and/or inter-specific call similarities.

A number of species that are likely to occur in the study area produce very similar calls that can be difficult to differentiate. Where calls were encountered that could not be resolved to species, all potential candidates were listed as possibly present. The characteristics of these unresolved calls and likelihood of species' presence is discussed further below Table 1.

Table 1. Microbat species recorded during the Fairview Lot 55 survey, 10-14 December 2013.

♦ = species positively identified from call data

□ = species possibly present, but not reliably identified

Date:	10/12/2013	13/12/2013	14/12/2013
Total sequence files:	606	410	227
No. calls identified:	89	44	54
SPECIES			
Chalinolobus gouldii	♦	♦	♦
Chalinolobus picatus	♦	♦	♦
Nyctophilus species	♦	♦	
Scotorepens balstoni	□	♦	□
Scotorepens greyii	♦	♦	♦
Vespadelus baverstocki	♦	♦	□
Vespadelus troughtoni		♦	
Austronomus australis	♦	♦	
Chaerephon jobensis	♦	♦	
Mormopterus beccarii	♦	♦	♦
Mormopterus eleryi	□	□	□
Mormopterus ridei	♦	♦	
Mormopterus species 3	♦		□
Saccolaimus flaviventris	♦	♦	♦

Species/groups not reliably identified

Technical terms used in the following discussion are described in the Glossary, below.

Chalinolobus gouldii* and *Mormopterus species 3

Characteristic frequencies (Fc) overlap in the range 27-31 kHz; with *C. gouldii* typically producing steep, broad-band FM-qCF pulses that alternate in frequency, compared with generally flat or slightly-curved, low bandwidth calls (qCF pulses) at uniform frequency in *Mormopterus* sp 3. However, calls can vary considerably in these species, depending on habitat and behaviour (e.g. *C. gouldii* pulses can have low bandwidth when it is foraging in open space; and *Mormopterus* often have steeper broad-band pulses when flying in more cluttered habitats).

Most calls in the frequency range were reliably identified to *C. gouldii* and *Mormopterus* sp. 3 was positively identified from a small number of calls recorded on 10th December. Several intermediate-type calls recorded on 14th December could have been from either species.

Chalinolobus picatus*, *Scotorepens greyii* and *Vespadelus baverstocki

Chalinolobus picatus is listed as **Near Threatened** under the NCA.

All three species produce a steep FM-qCF pulse with broad frequency sweep and curved or hooked body. Characteristic frequency (Fc) overlaps substantially (*C. picatus* 39-43 kHz; *S. greyii* 36-41 kHz; and *V. baverstocki* 39-46 kHz). Most calls were reliably identified based on distinctive alternating pulse frequency (*C. picatus*) or uniform pulse frequency either <39 kHz (*S. greyii*) or >42 kHz (*V. baverstocki*). A number of calls with uniform pulse frequency around 39-41 kHz could not be easily distinguished and could have been from *V. baverstocki* or *S. greyii*.

***Nyctophilus* species**

Long-eared bat calls are usually easy to distinguish from those of other bats; however, the species within the genus cannot be reliably differentiated. Three species potentially occur in the study area, including *N. geoffroyi*, *N. gouldi* and *N. corbeni*.

Nyctophilus corbeni is listed as **Vulnerable** under both the EPBC Act and the NCA. It is known to occur in the Expedition Range National Park, so is a potential candidate for the calls recorded in this study. It is generally restricted to extensive tracts of remnant or old regrowth vegetation, but may venture into more disturbed areas along vegetated water courses or other linear remnants.

Mormopterus eleryi

This species' calls are very similar to those of *Scotorepens greyii* (FM-qCF pulses with broad frequency sweep, curved to hooked body and Fc around 36-40 kHz). The few reference calls available for this species have many pulses with a short, sharp, downward-sweeping tail on the end of the cup-shaped body and this feature may distinguish *M. eleryi* calls from those of *S. greyii*. Most calls recorded in this survey lacked this feature and were considered to be *S.* greyii calls; however, a few calls had some or most pulses with this characteristic, so were considered possibly from *M.* eleryi.

References

Churchill, S. (2008). *Australian Bats*. Jacana Books, Allen & Unwin; Sydney.

Corben, C. (2012). *CFCread Storage ZCAIM interface.* Version 4.4n, 4 November 2012.

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Parnaby, H.E. (2009). A taxonomic review of Australian Greater Long-eared Bats previously known as *Nyctophilus timoriensis* (Chiroptera: Vespertilionidae) and some associated taxa. *Australian Zoologist* **35**(1), 39-81.

Pennay, M., Law, B. and Reinhold, L. (2004). *Bat Calls of New South Wales*. Department of Environment and Conservation, Hurstville.

Reardon, T. (2003). Standards in bat detector based surveys. *Australasian Bat Society Newsletter* **20**, 41-43.

Reardon, T., Adams, M., McKenzie, N. and Jenkins, P. (2008). A new species of Australian freetail bat *Mormopterus eleryi* sp. nov. (Chiroptera: Molossidae) and a taxonomic reappraisal of *M. norfolkensis* (Gray). *Zootaxa* **1875**: 1-31.

Reinhold, L., Law, B., Ford, G. and Pennay, M. (2001). *Key to the bat calls of south-east Queensland and north-east New South Wales*. Department of Natural Resources and Mines, Brisbane.

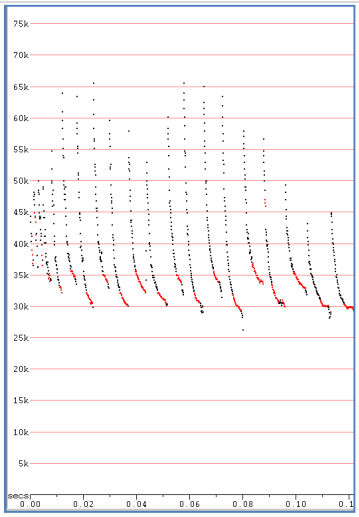
van Dyck, S. and Strahan, R. (ed.) (2008). *The Mammals of Australia* (Third Edition). New Holland; Sydney.

Glossary

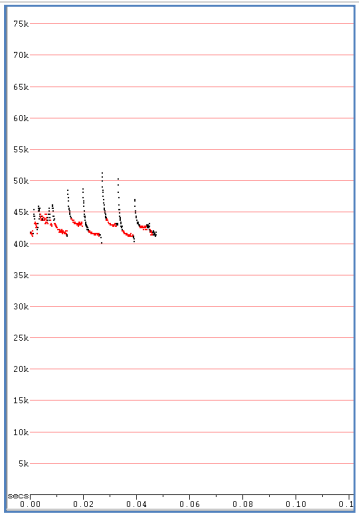
Technical terms used in this report are described in the following table.

Approach phase	The part of a bat *call* emitted as the bat starts to home in on a detected prey item; a transitional series of *pulses* between the *search phase* and *feeding buzz*, that become progressively steeper and shorter in duration.
Call	Refers to a single bat call, made up of a series of individual sound *pulses* in one or more *phases* (*search, approach, feeding buzz*).
CF (=Constant Frequency)	A type of *pulse* in which the dominant component consists of a more-or-less 'pure tone' of sound at a Constant Frequency; with *shape* appearing flat on the sonogram. Often also contains a brief *FM* component at the beginning and/or end of the CF component (*viz.* FM-CF-FM).
Characteristic frequency (Fc)	The frequency of the flattest part of a *pulse*; usually the lowest frequency reached in the *qCF* component of a pulse. This is often the primary diagnostic feature for species identification.
Duration	The time period from the beginning of a *pulse* to the end of the pulse.
Feeding buzz	The terminal part of a *call*, following the *approach phase*, emitted as the bat catches a prey item; a distinctive, rapid series of very steep, very short-duration pulses.
FM (=Frequency Modulated)	A type of *pulse* in which there is substantial change in frequency from beginning to end; *shape* ranges from almost vertical and linear through varying degrees of curvature.
FC range	Refers to the range of frequencies occupied by the *characteristic frequency* section of *pulses* within a call or set of calls.
Frequency sweep or "band-width"	The range of frequencies through which a *pulse* sweeps from beginning to end; Maximum frequency (Fmax) – minimum frequency (Fmin).
Knee	The transitional part of a *pulse* between the initial (usually steeper) frequency sweep and the *characteristic frequency* section (usually flatter); time to knee (Tk) and frequency of knee (Fk) can be diagnostic for some species.
Pulse	An individual pulse of sound within a bat *call*; the *shape*, *duration* and *characteristic frequency* of a pulse are the key diagnostic features used to differentiate species.
Pulse body	The part of the *pulse* between the *knee* and *tail* and containing the *characteristic frequency* section.
Pulse shape	The general appearance of a *pulse* on the sonogram, described using relative terms related to features such as slope and degree of curvature. See also *CF, qCF* and *FM*.
qCF (=quasi Constant Frequency)	A type of *pulse* in which there is very little change in frequency from beginning to end; *shape* appears to be almost flat. Some pulses also contain an *FM* component at the beginning and/or end of the qCF component (*viz.* FM-qCF).
Search phase	The part of a bat *call* generally required for reliable species diagnosis. A consistent series of *pulses* emitted by a bat that is searching for prey or and/or navigating through its habitat. Search phase pulses generally have longer duration, flatter slope and more consistent shape than *approach phase* and *feeding buzz* pulses.
Sequence	Literally, a sequence of *pulses* that may be from one or more bats; but generally refers to a *call* or part (e.g. *phase*) of a call.
Tail	The final component of a *pulse*, following the *characteristic frequency* section; may consist of a short or long sweep of frequencies either upward or downward from the Fc; or may be absent.

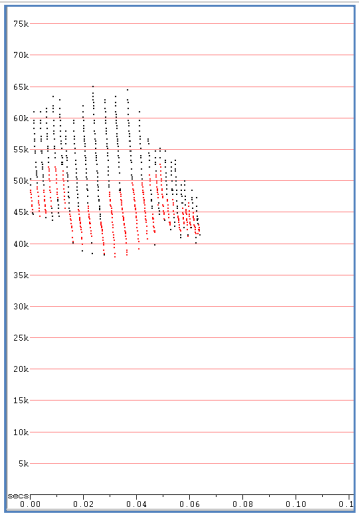
Appendix 1 Representative call sequences from the Fairview Lot 55 survey, December 2013.
(Scale: 10msec per tick; time between pulses removed)



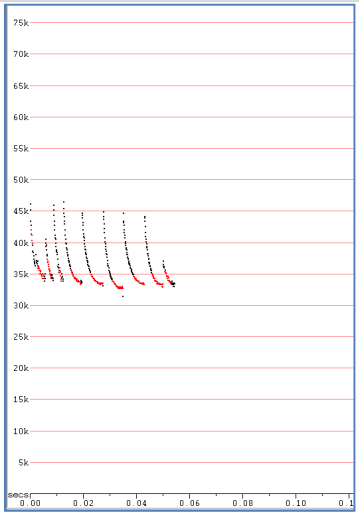
Chalinolobus gouldii



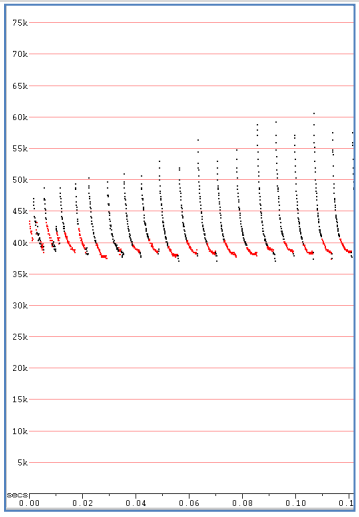
Chalinolobus picatus



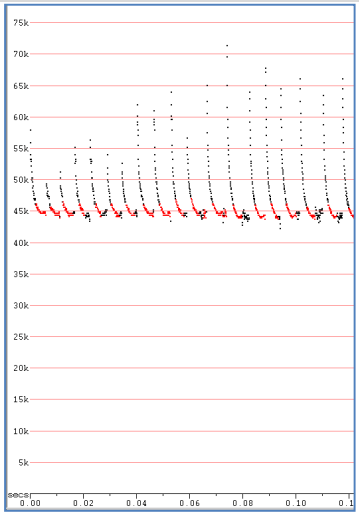
Nyctophilus sp.



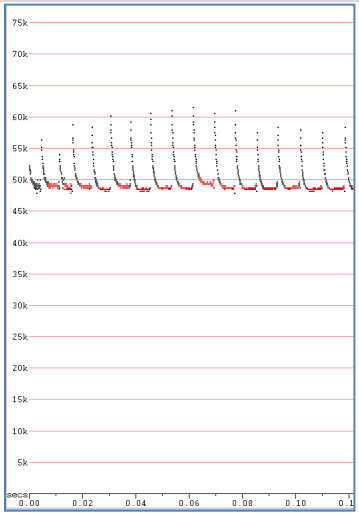
Scotorepens balstoni



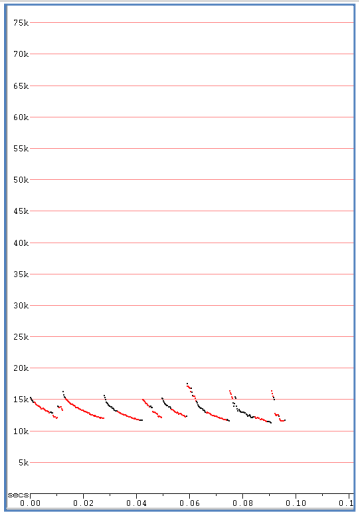
Scotorepens greyii



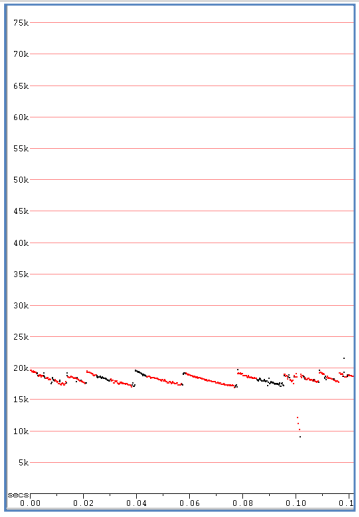
Vespadelus baverstocki



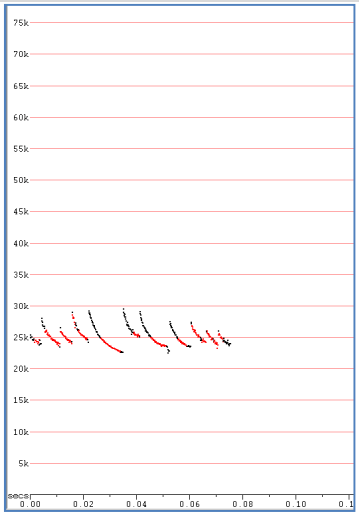
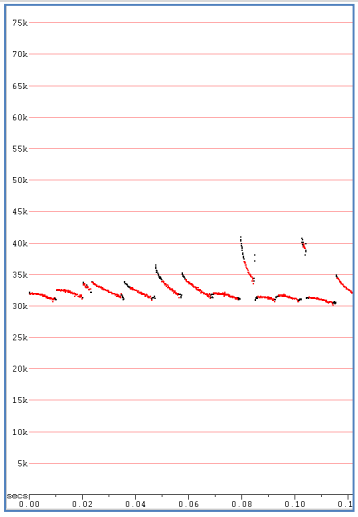
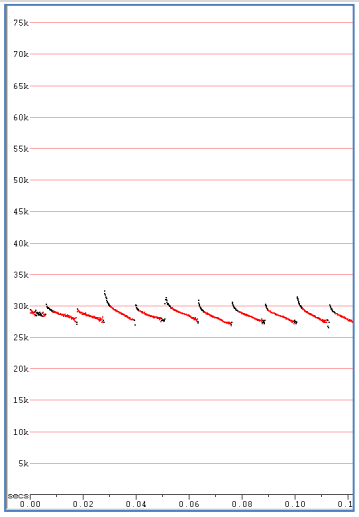
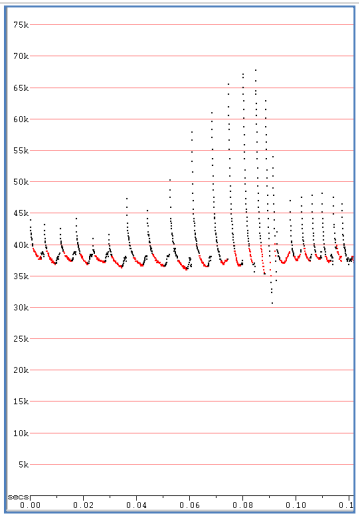
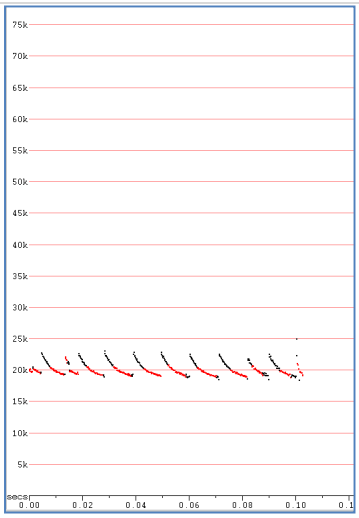
Vespadelus troughtoni



Austronomus australis



Chaerephon jobensis

		
Mormopterus beccarii	*Mormopterus ridei*	*Mormopterus* species 3
		
Possibly *Mormopterus eleryi*	*Saccolaimus flaviventris*	

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Document Status

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