Santos
GLNG Project

Ecological Assessment Report
47 Jump-up road upgrade

Date	Rev	Reason For Issue	Author	Checked
Sept 2015	A	Draft for Review	Mitch Bird	
Sept 2015	0	Draft for Review	Mitch Bird	Erik Kadri

Abbreviations

Abbreviation	Definition
CSG	Coal Seam Gas
DERM	Department of Environment and Resource Management
DEHP	Department of Environment and Heritage Protection
E	Endangered
EA	Environmental Authority
EABU	East Australia Business Unit
EMP	Environmental Management Plan
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999
ESA	Environmentally Sensitive Area
GIS	Geographic Information System
GLNG	Gladstone Liquefied Natural Gas
GLNG ESC Manual	GLNG Project Upstream Activities Erosion and Sediment Control Manual
GPS	Global Positioning System
JV	Joint Ventures
LNG	Liquefied Natural Gas
M	Migratory
NC Act	Nature Conservation Act 1992
NEAL	National Environmental Alert List
NCP	No Concern at Present
NT	Near Threatened
OC	Of Concern
PL	Petroleum Lease
PWMP	Pest and Weed Management Plan
QLD	Queensland
RCAP	Roma Conventional Abandonment Project
RE	Regional Ecosystem
SLC	Special Least Concern
SSMP	Significant Species Management Plan
TAR	Type A Restricted Plant
TEC	Threatened Ecological Community
V	Vulnerable
WONS	Weeds of National Significance

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1. Introduction

1.1. Project Description

The Gladstone Liquefied Natural Gas (GLNG) Project (the GLNG Project) involves the construction and operation of coal seam gas fields (CSG Fields) in the Bowen and Surat Basins, a gas transmission pipeline (GTP) and an LNG liquefaction and export facility (LNG Facility) in Gladstone, Queensland.

The CSG field's component of the Project is operated by Santos Limited (Santos) on behalf of the GLNG joint venture. The Commonwealth Minister for the Department of the Environment (DOTE) (formerly the Department of Sustainability, Environment, Water, Populations and Communities (SEWPaC) granted conditional approvals to the Project under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) on 22 October 2010. These include approval no. 2008/4059 which relates to the CSG Fields component of the Project (EPBC Approval).

The evaluation report for the Project under the *State Development and Public Works Organisation Act 1971* (Qld) (SDWPO Act) was prepared by the Co-ordinator General and published in May 2010 (CG Report). The CG Report included an evaluation of the CSG Fields.

The development of the CSG fields will be undertaken pursuant to petroleum authorities under the *Petroleum and Gas (Production and Safety) Act 2004*, and the *Petroleum Act 1923*, environmental authorities under the *Environment Protection Act 1994 (Qld)* (EP Act), the EPBC Approval and in accordance with the requirements of the *Nature Conservation Act 1992* (Qld) (NC Act).

1.2. Scope and Purpose

The 47 Jump Up and CS2 Road Upgrade is located on the Moonah property (Lot 20 on WT 32). The 47 Jump Up consists of a 2 section of the CS2 Road, from near the Hutton Creek crossing to the top of a plateau; a difference in elevation of approximately 100 m. The road is initially flat, then has gentle slopes before steepening considerably with several tight hairpin turns, particularly the last one 500m from the top. The road is currently unsealed and allows single direction traffic flow with traffic lights positioned at the top and bottom of the Jump Up.

2. Site Location

The proposed 47 Jump-up road upgrade is located on a private field road on Petroleum Lease 92 within the Fairview gas fields. The closest major towns are Injune to the West and Taroom to the East.

Figure 1 Locality Plan

3. Methodology

The survey was undertaken on the 11th of August 2014 by Andrew Franks (O2 Ecology) and Santos Ecologist Mitch Bird (Commonwealth approved terrestrial (flora and fauna) ecologists).

The ecological survey was undertaken in accordance with Santos Methodology for Conducting Ecological Assessments "the Methodology". The extent of disturbance (project area) is illustrated in Attachment 8.1.

3.1.Survey Limitations

Ecological surveys often fail to record all flora and fauna species present within a site due to a variety of reasons, particularly the seasonality of the survey. In this context, it is noted that some flora species do not persist over all seasons, and some flora species are more prominent in certain seasons when flowers and/or fruits are produced.

In addition, the limited time spent on site, the scope of the fauna survey (i.e. no trapping and no nocturnal survey) and the time of day the survey was undertaken all limit the overall survey effort and associated species detected. The assessment of the project area was limited to a diurnal survey and therefore nocturnal and cryptic species were highly unlikely to be detected. A dedicated fauna survey was not conducted. Instead the fauna habitat values based on ecological characteristics of the project were the focus of this assessment.

Despite the constraints as described above, the survey effort applied is considered sufficient given the location and context of the site.

4. Results and discussion

4.1. Water

4.1.1. Watercourses

A desktop review of the Santos GIS database ("Ordered Drainage" layers) indicates there are no mapped watercourses within 100m of the project area. No watercourses were identified during the field assessment.

4.1.2. Wetlands

A review of the Santos Referable Wetlands GIS layer and a Map of Referable Wetlands sourced from the DEHP shows no referable wetlands are located within the project area. No referable wetlands will be impacted by the proposed activities.

4.1.3. Lakes

A desktop review of the Santos GIS database indicated there are no lakes in the project area. The field assessment verified the absence of lakes in the project area.

4.1.4. Springs

A desktop review of the Santos GIS database showed no springs in the project area. The field assessment verified the absence of springs within the project area.

4.1.5. Floodplains

A review of Santos GIS database indicated that the project area is not within a floodplain. The field assessment verified the absence of a floodplain within the project area.

4.2. Vegetation

4.2.1. Vegetation Communities

The project area supported two vegetation communities, these communities are described below.

Vegetation Community 1 (VC 1) – Semi-evergreen vine thicket (SEVT) on medium to coarse-grained sediments at the top of the scarp transitioning to fine-grained sedimentary rocks at the bottom of the scarp. This vegetation is typical of south facing sandstone escarpments in Fairview.

VC1 occurred throughout the majority of the steep scarped areas on either side of the existing CS2 road at Jump Up 47. The location of this vegetation community and the areas to be impacted by upgrading CS2 Road is shown in Attachment 8.1. Attachment 8.2 provides a baseline data sheet containing vegetation, geology and habitat data.

Plates 1 and 2 illustrate the typical structure and condition of this community.

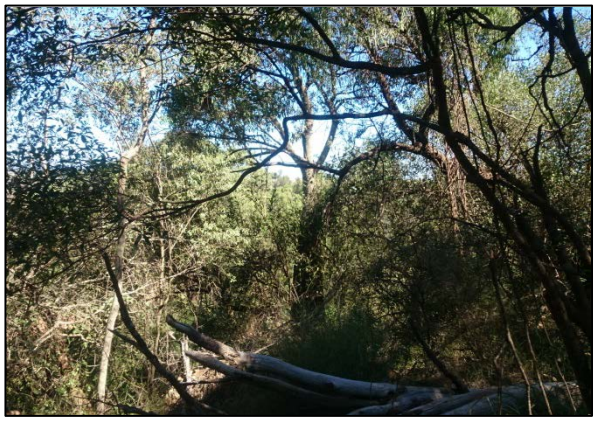

Plate 1 – VC1 Top of the scarp

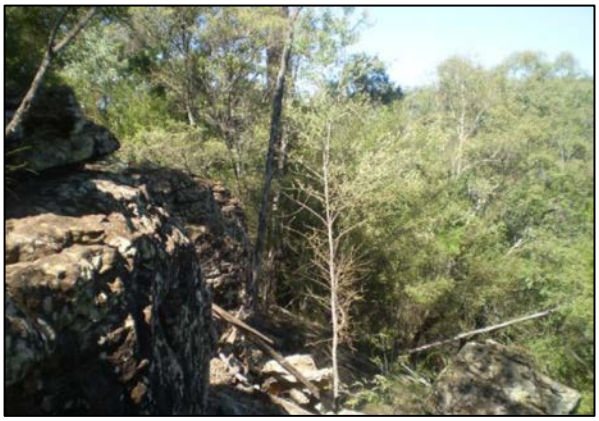

Plate 2 – VC1 Looking down the scarp

Note that the SEVT along the scarps in Fairview gas field extend across two different land zones; Land Zone 9 – fine grain sedimentary rocks at the bottom of the scarp and Land Zone 10 - coarse grain sedimentary rocks at the top of the scarp. The Land zone is one of the three factors that determine the Regional Ecosystem vegetation communities in Queensland. SEVT vegetation on land zone 9 is RE 11.9.4 while SEVT vegetation on land zone 10 is RE 11.10.8. A description of the conservation status of each of these REs is shown in Table 1.

Table 1 The Conservation Status of SEVT vegetation on Land Zone 9 and Land Zone 10

Regional Ecosystem	Land Zone	Short Description (REDD)	EP Act Status (Qld)	EPBC Act Threatened Ecological Community
11.9.4	9	Semi-evergreen vine thicket or *Acacia harpophylla* with a semi-evergreen vine thicket understorey on fine-grained sedimentary rocks	Endangered	Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions
11.10.8	10	Semi-evergreen vine thicket in sheltered habitats on medium to coarse-grained sedimentary rocks	Of Concern	Not a TEC

Both RE 11.9.4 and RE 11.10.8 have identical structural and floristic characteristics at the Site. In addition they have similar high biological values, subject to similar threatening processes and require the same management regimes. Given the higher conservation status granted to SEVT vegetation on Land Zone 9 under both federal and state legislation, VC1 in the project area has been conservatively mapped as a Regional Ecosystem 11.9.4 an Endangered RE, Category B ESA and TEC.

Vegetation Community 2 (VC 2) – Disturbed open grassland dominated by *Cenchrus ciliaris* (Buffel grass) with other introduced and native grasses on coarse-grained sediments on the top of the scarp and fine grained sediments below Jump Up 47.

VC1 occurred throughout the majority of the project area not currently utilised as the existing road (See Attachment 8.1).

Table 2 - Vegetation Communities within the project area

Vegetation Community	Threatened Ecological Community	Regional Ecosystem / Regrowth / Non Remnant	Environmentally Sensitive Area (ESA)	EPBC/NC Act Flora Species
VC1	Yes – Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions	11.9.4 / 11.10.8	Category B ESA	Nil
VC2	Not a TEC	Not an RE	Not an ESA	Nil

4.2.2. MNES and EVNT Flora Species

Desktop Assessment

Two Commonwealth MNES threatened flora species listed under the EPBC Act were identified by a search of the Protected Matters Database using a 10 km radius from Jump-up 47 at Latitude -25.7230 and Longitude 148.9157. *Cadellia pentastylis* (Ooline), listed as Vulnerable and *Tylophora linearis*, listed as Endangered.

The Site does support the preferred SEVT habitat for Ooline. However this is a conspicuous tree and none were observed on site. The site does not support habitat for *Tylophora linearis*, being dry scrub, open forest and woodlands associated with *Melaleuca uncinata*, *Eucalyptus fibrosa*, *E. sideroxylon, E. albens, Callitris endlicheri, C. glaucophylla, Allocasuarina luehmannii, Acacia hakeoides, A. lineata, Myoporum spp*., and *Casuarina spp*. (DECC, 2005; Forster et al., 2004)..

A Wildlife Online database search using a 10 km radius from Jump-up 47 at Latitude -25.7230 and Longitude 148.9157 identified three species listed under the NC Act:

- *Acacia spania* (Near Threatened)
- *Sannantha brachypoda* (Vulnerable)
- *Melaleuca irbyana* (Endangered)

Field Assessment Results

No EVNT flora species were observed within the project area during the field assessment.

4.2.3. Pest plants

Two pest plant species Velvety tree pear (*Opuntia tomentosa*) declared under the *Land Protection (Pest and Stock Route Management) Act 2002 (LP Act)* and listed as Weeds of National Significance (WONS) was identified within VC1. Green cestrum (*Cestrum parqui*), a non-declared pest plant was observed on top of the scarp in the vicinity of the proposed disturbance.

4.2.4. EVNT and Migratory Fauna Species

Desktop Assessment

A desktop review of the Santos GIS database indicated there are no records of EVNT fauna species listed under the EPBC Act (Cth) or the NC Act (Qld) previously located within the project area.

Commonwealth MNES identified by a search of the Protected Matters Database, included 15 threatened fauna species and 6 migratory species. The Wildlife Online search returned no significant fauna species.

Field Assessment

No MNES, EVNT fauna were observed within the project area during the field assessment. No migratory species were observed within the project area. However common migratory species such as Cattle Egret are known from the area are expected to incidentally utilise the site.

4.2.5. Fauna Habitat Values and Breeding Places

Notable fauna habitat features identified during the field survey include the exposed deep desiccated sandstone associated with the scarped areas surrounding Jump –up 47 and dense leaf litter within VC1. No breeding places were identified within the project area during the field survey.

4.2.6. Habitat Assessment for MNES Fauna Species

The Habitat Mapping Assessment Tool (HMAT) was used to evaluate habitat for MNES fauna within the project area. Coupled with ecologist's verification, the HMAT uses species distributions, known records, and onsite habitat features to determine the type of habitat for MNES species present within the assessment area. Table 4 provides the results of this assessment for the project area.

Table 3 – HMAT Assessment of MNES fauna habitat within the project area

MNES Fauna Species	Habitat Type		Justification of Habitat Type
	VC1	VC2	
Koala	Unlikely habitat	Unlikely habitat	The project area does not provide suitable habitat for this species.
Squatter pigeon	Unlikely habitat	Unlikely habitat	The SEVT vegetation associated with VC1 SEVT is not the preferred habitat for foraging or breeding.
Black-breasted button quail	General habitat	Unlikely habitat	The SEVT vegetation associated with VC1 provides suitable habitat for this species.
Red Goshawk	Unlikely habitat	Unlikely habitat	The SEVT vegetation associated with VC1 SEVT is not the preferred habitat for foraging or breeding.
Large-eared pied bat	Core habitat	Unlikely habitat	The SEVT vegetation associated with VC1 provides suitable habitat for this species.
South-eastern long-eared bat	Unlikely habitat	Unlikely habitat	The project area does not provide suitable habitat for this species.
Northern quoll	Core Habitat	Unlikely habitat	The SEVT vegetation and sandstone associated with VC1 provides suitable habitat for this species.

Ornamental snake	Unlikely habitat	Unlikely habitat	An absence of moist micro-habitat features suggest the project area does not provide suitable habitat for this species.
Dunmall's snake	Unlikely habitat	Unlikely habitat	The project area does not provide suitable habitat for this species.
Yakka skink	Unlikely habitat	Unlikely habitat	The project area does not provide essential microhabitat for this species.
Collared delma	Unlikely habitat	Unlikely habitat	The project area does not provide suitable habitat for this species.
Australian painted snipe	Unlikely habitat	Unlikely habitat	Absence of suitable wetland habitat for this species.
Fitzroy river turtle	Unlikely habitat	Unlikely habitat	The project area does not provide suitable habitat for this species.
Murray cod	Unlikely habitat	Unlikely habitat	No water systems suited to the Murray cod were located on or in close proximity to the project area.
Boggomoss snail	Unlikely habitat	Unlikely habitat	The project area does not provide suitable habitat for this species, that being elevated peat bogs or swamps scattered among dry woodland communities.

4.2.7. Significant Impact Assessment – MNES Fauna

Vegetation Community 1

The results of the HAMT assessments identified VC1 as Core habitat for the Northern quoll and Large-eared pied bat and General Habitat for the Black-breasted button quail. An assessment of the potential adverse impacts indicates that the proposed disturbance would result in a significant residual adverse impact on these three species. A disturbance limit request must be submitted and approved. For all significant residual adverse impacts a suitable offsets will be provided in accordance with the environmental approvals for the GLNG Project.

Vegetation Community 2

No MNES fauna was detected in VC2 during field assessment and there is no significant Impact to MNES Fauna species in VC2

4.2.8. Koala Habitat

The entire project area supports either non-remnant vegetation or SEVT vegetation devoid of mature koala habitat trees. The project area does not support koala habitat.

5. Summary and Recommendations

5.1.Summary

The ecological survey conducted for the proposed 47 Jump up road upgrade was carried out in accordance with the environmental conditions required by relevant Commonwealth and State authorities and revealed the following key information:

- The project area does occur within a Category B ESA (Endangered REs) (VC1).
- The project area and does contain the Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions threatened ecological community (VC1).
- No MNES flora species were located within the project area.
- No EVNT flora or fauna species were located within the project area or within 100m of the project area.
- The results of the HMAT assessments identified VC1 as Core habitat for the Northern quoll and Large-eared pied bat and General Habitat for the Black-breasted button quail. There will be a significant impact on these three MNES fauna species
- The project area does not support koala habitat as defined in the Koala Plan.

Based on Commonwealth or State legislation the significant ecological values within the project area, have been identified in VC1. VC2 contains no significant ecological features.

5.2.Recommendations

Due to notable fauna habitat being located in the project area, project managers should consider using an experienced fauna handler (i.e. spotter-catcher) holding a valid State Rehabilitation Permit to undertake a preclearance fauna habitat survey prior to and as close as practicable to clearing operations taking place. The fauna handler must also be on site to supervise the clearing of fauna habitat features and coordinate the relocation of viable fauna habitat features in accordance with the Upstream Species Management Plan for Roma, Arcadia and Fairview Coal Seam Gas (CSG) Fields and the Significant Species Management Plan.

A disturbance limit request must be submitted and approved prior to any ground disturbance activities. The disturbance limit request needs to cover the following:

- Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions threatened ecological community (VC1)
- Northern quoll habitat
- Black-breasted button quail habitat
- Large-eared pied bat habitat
- The endangered Regional Ecosystem 11.9.4

Clearing and grading activities must be conducted in conjunction with the implementation of erosion and sediment control measures in accordance with the GLNG Erosion and Sediment Control Manual. The current condition of the area relies on the mix of grassy ground cover to maintain soil stability. Any clearing activity is likely to increase the potential risk of erosion and loss of sediment.

6. Reference Documents

6.1. Relevant Project Management Plans and Procedures

- GLNG (2013) 3380-GLNG-3-1.3-0006 Santos GLNG Upstream - Pest and Weed Management Plan;
- GLNG (2013a) 3301-GLNG-4-1.3-0016 Santos GLNG Upstream - Procedure for Conducting Wetland Assessments;
- GLNG (2012) 0020-GLNG-41.3-0003, CSG Fields Significant Species Management Plan;
- RSGPA Fauna Management Plan (0020-GLNG-4-1.3-0073).
- Upstream Species Management Plan for Roma, Arcadia and Fairview Coal Seam Gas (CSG) Fields (231733-002-002)

6.2. Other Reference Documents

- Aurecon (2011) GLNG Project Upstream Activities Erosion and Sediment Control Manual, Ref 213885, 27 July 2011.
- Bostock, P.D. & Holland, A.E. (eds) (2010). Census of the Queensland Flora 2010. Queensland Herbarium, Department of Environment and Resource Management, Brisbane.
- DEHP (2014)., *Environmental Protection Act 1994* Roma Project Area Environmental Authority: Permit number EPPG00898213 dated 25 June 2014;
- Department of Environment & Climate Change New South Wales (DECC) 2005, Tylophora linearis – Profile, viewed 8 September 2015, < http://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=10815>
- DERM (2011) QH_Springs_db.zip data, Dataset Custodian – QLD Herbarium DERM, Dataset Date – September 2011, Metadata Date – 16-09-2011.
- EPA 2003, 'BPA BRB South Fauna Expert Panel in Brigalow Belt South Biodiversity Planning Assessment', Environmental Protection Agency, Brisbane.
- Forster, PI, Binns, D & Robertson, G 2004, 'Rediscovery of Tylophora linearis P.I.Forst. (Apocynaceae: Asclepiadaceae) from New South Wales, with revision of its conservation status to vulnerable', Austrobaileya, vol. 6, pp. 941–947.Geoscience Australia (2013) Geoscience Australia (formerly AUSLIG) 250k raster);
- Morcombe (2004). *Field guide to Australian Birds*. Steve Parish Publishing. Archerfield, Australia.
- Neldner, V., Wilson, B., Thompson, E., Dillewaard, H. (2012). Methodology for Survey and Mapping of Regional Ecosystems and Vegetation Communities in Queensland (Version 3.2), Environmental Protection Agency, Queensland.
- Pizzey, G. & Knight, F. (2007), The Field Guide to the Birds of Australia (8th edition) Harper Collins Publishers, NSW, Australia. 580pp.
- Queensland Government (2010) Coordinator-General's evaluation report for an environmental impact statement Gladstone Liquefied Natural Gas - GLNG project. May 2010.

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Attachment 8.1 – Project Area

PL92 - Eastern Queensland

47 Jump Up and CS2 Road Upgrade

Vegetation Communities

250 0 250m

Date: 8 September 2015 File No. FAIRVI 394d

GDA

INSET

50m

Project area

Regional Ecosystems
(Biodiversity Status)

Endangered Dominant

Vegetation Community 1

Vegetation Community 2

INSET

-25° 43' 00"

-25° 44' 00"

148° 53' 00"

148° 54' 00"

148° 55' 00"

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Attachment 8.2 – Baseline Data Sheet (VC1)

Sheet D – regional ecosystem type assessment site

Location

Site No. 34 **Recorder:** A.J.Franks **Day/Date:** 16 APR 2015

Purpose Regional Ecosystem Assessment

Locality: (inc. distance/direction to nearest town)

GPS: GDA94

5	5		0	6	9	2	1	8	8		7	1	5	3	6	1	2

Unit: Lat

Vegetation structure

Median height of the EDL is to be measured

Stratum	Median height	Height interval	Est. cover density (D,M,S,V)
E	15	13-16	V
T1	10	9-11	D
T2		-	
T3		-	
S1	3	2-5	M
S2		-	
G	0.5	0.1-1.0	V

Structural formation: (including height)

Closed forest

Ecologically dominant layer: T1

Plant species

Record relative (numerical) dominance for each stratum;
d – dominant; ***c*** – codominant; **s -** subdominant, ***a*** – associated.

Str.	Rel. dom.	Scientific Name
E	D	*Brachychiton*
T1	C	*Pouteria* sp.
T1	C	*Atalaya hemiglauca*
T1	A	*Denhamia oleaster*
T1	A	*Acalypha eremaea*
T1	A	*Geijera parviflora*
T1	A	*Croton insularis*
S1	C	*Alyxia ruscifolia*
S1	C	*Alectryon diversifolius*
G	D	*Ancistrachne uncinulata*
G	A	*Dianella* sp.

Geology, landform, soils

Geology map/scale/year: Taroom (SG55_08)/250K

Geology code and rock types: Jlp – cross-bedded quartzose sandstone, sublabile lithic sandstone, siltstone

Land system: N

Landform: Top of scarp just below edge

Soils: Sandy loam with organic matter

Field observation and notes:

Landzone: 10

RE code changes

Existing RE code: 11.9.4a

Proposed RE code: 11.10.8

END

Site 34 facing south

Site 34 Rock surface