



Referral of proposed action

What is a referral?

The *Environment Protection and Biodiversity Conservation Act 1999* (the EPBC Act) provides for the protection of the environment, especially matters of national environmental significance (NES). Under the EPBC Act, a person must not take an action that has, will have, or is likely to have a significant impact on any of the matters of NES without approval from the Australian Government Environment Minister or the Minister's delegate. (Further references to 'the Minister' in this form include references to the Minister's delegate.) To obtain approval from the Environment Minister, a proposed action should be referred. The purpose of a referral is to obtain a decision on whether your proposed action will need formal assessment and approval under the EPBC Act.

Your referral will be the principal basis for the Minister's decision as to whether approval is necessary and, if so, the type of assessment that will be undertaken. These decisions are made within 20 business days, provided sufficient information is provided in the referral.

Who can make a referral?

Referrals may be made by or on behalf of a person proposing to take an action, the Commonwealth or a Commonwealth agency, a state or territory government, or agency, provided that the relevant government or agency has administrative responsibilities relating to the action.

When do I need to make a referral?

A referral must be made for actions that are likely to have a significant impact on the following matters protected by Part 3 of the EPBC Act:

- World Heritage properties (sections 12 and 15A)
- National Heritage places (sections 15B and 15C)
- Wetlands of international importance (sections 16 and 17B)
- Listed threatened species and communities (sections 18 and 18A)
- Listed migratory species (sections 20 and 20A)
- Protection of the environment from nuclear actions (sections 21 and 22A)
- Commonwealth marine environment (sections 23 and 24A)
- Great Barrier Reef Marine Park (sections 24B and 24C)
- A water resource, in relation to coal seam gas development and large coal mining development (sections 24D and 24E)
- The environment, if the action involves Commonwealth land (sections 26 and 27A), including:
 - actions that are likely to have a significant impact on the environment of Commonwealth land (even if taken outside Commonwealth land);
 - actions taken on Commonwealth land that may have a significant impact on the environment generally;
- The environment, if the action is taken by the Commonwealth (section 28)
- Commonwealth Heritage places outside the Australian jurisdiction (sections 27B and 27C)

You may still make a referral if you believe your action is not going to have a significant impact, or if you are unsure. This will provide a greater level of certainty that Commonwealth assessment requirements have been met.

To help you decide whether or not your proposed action requires approval (and therefore, if you should make a referral), the following guidance is available from the Department's website:

- the Policy Statement titled Significant Impact Guidelines 1.1 – Matters of National Environmental Significance. Additional sectoral guidelines are also available.

- the Policy Statement titled Significant Impact Guidelines 1.2 - Actions on, or impacting upon, Commonwealth land, and actions by Commonwealth agencies.
- the Policy Statement titled Significant Impact Guidelines: Coal seam gas and large coal mining developments—Impacts on water resources.
- the interactive map tool (enter a location to obtain a report on what matters of NES may occur in that location).

Can I refer part of a larger action?

In certain circumstances, **the Minister may not accept a referral for an action that is a component of a larger action and may request the person proposing to take the action to refer the larger action for consideration under the EPBC Act (Section 74A, EPBC Act)**. If you wish to make a referral for a staged or component referral, read 'Fact Sheet 6 Staged Developments/Split Referrals' and contact the Referrals Gateway (1800 803 772).

Do I need a permit?

Some activities may also require a permit under other sections of the EPBC Act or another law of the Commonwealth. Information is available on the Department's web site.

Is your action in the Great Barrier Reef Marine Park?

If your action is in the Great Barrier Reef Marine Park it may require permission under the *Great Barrier Reef Marine Park Act 1975* (GBRMP Act). If a permission is required, referral of the action under the EPBC Act is deemed to be an application under the GBRMP Act (see section 37AB, GBRMP Act). This referral will be forwarded to the Great Barrier Reef Marine Park Authority (the Authority) for the Authority to commence its permit processes as required under the Great Barrier Reef Marine Park Regulations 1983. If a permission is not required under the GBRMP Act, no approval under the EPBC Act is required (see section 43, EPBC Act). The Authority can provide advice on relevant permission requirements applying to activities in the Marine Park.

The Authority is responsible for assessing applications for permissions under the GBRMP Act, GBRMP Regulations and Zoning Plan. Where assessment and approval is also required under the EPBC Act, a single integrated assessment for the purposes of both Acts will apply in most cases. Further information on environmental approval requirements applying to actions in the Great Barrier Reef Marine Park is available from <http://www.gbrmpa.gov.au/> or by contacting GBRMPA's Environmental Assessment and Management Section on (07) 4750 0700.

The Authority may require a permit application assessment fee to be paid in relation to the assessment of applications for permissions required under the GBRMP Act, even if the permission is made as a referral under the EPBC Act. Further information on this is available from the Authority:

Great Barrier Reef Marine Park Authority
2-68 Flinders Street PO Box 1379
Townsville QLD 4810
AUSTRALIA
Phone: + 61 7 4750 0700
Fax: + 61 7 4772 6093
www.gbrmpa.gov.au

What information do I need to provide?

Completing all parts of this form will ensure that you submit the required information and will also assist the Department to process your referral efficiently. If a section of the referral document is not applicable to your proposal enter N/A.

You can complete your referral by entering your information into this Word file.

Instructions

Instructions are provided in blue text throughout the form.

Attachments/supporting information

The referral form should contain sufficient information to provide an adequate basis for a decision on the likely impacts of the proposed action. You should also provide supporting documentation, such as environmental reports or surveys, as attachments.

Coloured maps, figures or photographs to help explain the project and its location should also be submitted with your referral. Aerial photographs, in particular, can provide a useful perspective and context. Figures should be good quality as they may be scanned and viewed electronically as black and white documents. Maps should be of a scale that clearly shows the location of the proposed action and any environmental aspects of interest.

Please ensure any attachments are below three megabytes (3mb) as they will be published on the Department's website for public comment. To minimise file size, enclose maps and figures as separate files if necessary. If unsure, contact the Referrals Gateway (email address below) for advice. Attachments larger than three megabytes (3mb) may delay processing of your referral.

Note: the Minister may decide not to publish information that the Minister is satisfied is commercial-in-confidence.

How do I pay for my referral?

From 1 October 2014 the Australian Government commenced cost recovery arrangements for environmental assessments and some strategic assessments under the EPBC Act. If an action is referred on or after 1 October 2014, then cost recovery will apply to both the referral and any assessment activities undertaken. Further information regarding cost recovery can be found on the Department's website at:

<http://www.environment.gov.au/epbc/publications/cost-recovery-cris>

Payment of the referral fee can be made using one of the following methods:

- **EFT Payments can be made to:**

BSB: 092-009

Bank Account No. 115859

Amount: \$7352

Account Name: Department of the Environment.

Bank: Reserve Bank of Australia

Bank Address: 20-22 London Circuit Canberra ACT 2601

Description: The reference number provided (see note below)

- **Cheque** - Payable to "Department of the Environment". Include the reference number provided (see note below), and if posted, address:

The Referrals Gateway
Environment Assessment Branch
Department of the Environment
GPO Box 787
Canberra ACT 2601

- **Credit Card**

Please contact the Collector of Public Money (CPM) directly (call (02) 6274 2930 or 6274 20260 and provide the reference number (see note below).

Note: in order to receive a reference number, submit your referral and the Referrals Gateway will email you the reference number.

How do I submit a referral?

Referrals may be submitted by mail or email.

Mail to:

Referrals Gateway
Environment Assessment Branch
Department of Environment
GPO Box 787
CANBERRA ACT 2601

- If submitting via mail, electronic copies of documentation (on CD/DVD or by email) are required.

Email to: epbc.referrals@environment.gov.au

- Clearly mark the email as a 'Referral under the EPBC Act'.
- Attach the referral as a Microsoft Word file and, if possible, a PDF file.
- **Follow up with a mailed hardcopy including copies of any attachments or supporting reports.**

What happens next?

Following receipt of a valid referral (containing all required information) you will be advised of the next steps in the process, and the referral and attachments will be published on the Department's web site for public comment.

The Department will write to you within 20 business days to advise you of the outcome of your referral and whether or not formal assessment and approval under the EPBC Act is required. There are a number of possible decisions regarding your referral:

The proposed action is NOT LIKELY to have a significant impact and does NOT NEED approval

No further consideration is required under the environmental assessment provisions of the EPBC Act and the action can proceed (subject to any other Commonwealth, state or local government requirements).

The proposed action is NOT LIKELY to have a significant impact IF undertaken in a particular manner

The action can proceed if undertaken in a particular manner (subject to any other Commonwealth, state or local government requirements). The particular manner in which you must carry out the action will be identified as part of the final decision. You must report your compliance with the particular manner to the Department.

The proposed action is LIKELY to have a significant impact and does NEED approval

If the action is likely to have a significant impact a decision will be made that it is a *controlled action*. The particular matters upon which the action may have a significant impact (such as World Heritage values or threatened species) are known as the *controlling provisions*.

The controlled action is subject to a public assessment process before a final decision can be made about whether to approve it. The assessment approach will usually be decided at the same time as the controlled action decision. (Further information about the levels of assessment and basis for deciding the approach are available on the Department's web site.)

The proposed action would have UNACCEPTABLE impacts and CANNOT proceed

The Minister may decide, on the basis of the information in the referral, that a referred action would have clearly unacceptable impacts on a protected matter and cannot proceed.

Compliance audits

If a decision is made to approve a project, the Department may audit it at any time to ensure that it is completed in accordance with the approval decision or the information provided in the referral. If the project changes, such that the likelihood of significant impacts could vary, you should write to the Department to advise of the changes. If your project is in the Great Barrier Reef Marine Park and a decision is made to approve it, the Authority may also audit it. (See "*Is your action in the Great Barrier Reef Marine Park*," p.2, for more details).

For more information

- call the Department of the Environment Community Information Unit on 1800 803 772 or
- visit the web site <http://www.environment.gov.au/epbc>

All the information you need to make a referral, including documents referenced in this form, can be accessed from the above web site.

Referral of proposed action

Project title:

1 Summary of proposed action

1.1 Short description

Australia Pacific LNG Pty Limited (Australia Pacific LNG) and Australia Pacific LNG CSG Marketing Pty Limited (Australia Pacific LNG CSG Marketing) proposes to further develop the coal seam gas (CSG) resources located in the southern part of Petroleum Lease (PL) 418 currently in application, known as the Spring Gully South-West Development.

The Spring Gully South-West Development (referred to as 'the Project') comprises 11 wells and associated gathering infrastructure which will connect into the operating gas processing facilities (GPF) and water treatment facility (WTF), located on PL195 and PL204, which form part of the existing Spring Gully CSG Project. The Spring Gully CSG Project located on PLs 195, 200, 203, 204 and 268 (currently in application to replace PL 203) commenced CSG production during 2005 and supplies the domestic market and the Australia Pacific LNG liquefied natural gas (LNG) plant at Gladstone for export.

The Project is located approximately 65km north-east of Roma in southern central Queensland.

The following terms are used in this report to describe spatial extents:

- Development footprint – area which will be disturbed by the Project. Comprises 38ha on Lot 14 SP269470.
- Spring Gully South-West Development Area (Project area) – approximately 3,755ha encompassing Lot 14 SP269470, 11 AB55, 13 AB61 and 12 AB55
- Spring Gully CSG Project – the existing Spring Gully development located on PLs 195, 200, 203, 204 and 268 (currently in application to replace PL 203)
- Spring Gully Regional Assessment Area - describes the area encompassed by previous regional environmental studies and includes PLs 195, 200, 203, 204 268, 414 to 419 and Authority to Prospect (ATP) 592.

1.2 Latitude and longitude

location point	Latitude			Longitude		
	degrees	minutes	seconds	degrees	minutes	seconds
A	-25°	57'	55.302"	148°	57'	3.969"
B	-25°	59'	54.385"	148°	57'	3.971"
C	-25°	59'	54.387"	148°	58'	3.966"
D	-26°	1'	54.385"	148°	58'	3.969"
E	-26°	1'	54.387"	148°	59'	3.964"
F	-26°	3'	54.385"	148°	59'	3.967"
G	-26°	3'	54.387"	149°	0'	3.962"
H	-25°	57'	54.392"	149°	0'	3.955"
I	-25°	57'	54.388"	148°	58'	3.964"
J	-25°	57'	29.670"	148°	58'	3.964"
K	-25°	57'	36.410"	148°	57'	42.145"
L	-25°	57'	49.316"	148°	57'	31.061"

1.3 Locality and property description

The Project is located approximately 45km to the south-east of Injune and 65km north-east of Roma in Surat Basin.

1.4	Size of the development footprint or work area (hectares)	The Project area is approximately 3,755ha, however the development footprint of the Project encompasses only 38ha.
1.5	Street address of the site	Not relevant

1.6	Lot description	The Project area covers the following lot and plans however the development footprint is only located on Lot 14 SP269470: • 14 SP269470 (Freehold) • 11 AB55 (Freehold) • 13 AB61 (Lands Lease) • 12 AB55 (Freehold)	
1.7	Local Government Area and Council contact (if known)	The Project is located wholly within the Maranoa Regional Council	
1.8	Time frame	The Project will commence construction in Q3 2016. Construction will occur over approximately nine months and production from the CSG wells will take place over approximately 30 years.	
1.9	Alternatives to proposed action	☒	No
		☐	Yes, you must also complete section 2.2
1.10	Alternative time frames etc	☒	No
		☐	Yes, you must also complete Section 2.3. For each alternative, location, time frame, or activity identified, you must also complete details in Sections 1.2-1.9, 2.4-2.7 and 3.3 (where relevant).
1.11	State assessment	☒	No environmental impact statement (EIS) is required. The Project is currently authorised under the <i>Environmental Protection Act 1994</i> (EP Act) by the Spring Gully Environmental Authority (EA) (EPPG00885313). An EA amendment application was submitted to the administering authority in March 2013 to include PL418 in the EA. The amendment did not trigger the requirement for an EIS (Section 310V of the EP Act) or public notification (Section 310W of the EA Act) and the EA was granted in May 2013. The EA authorises up to 600 wells and associated infrastructure on PLs 195, 200, 203, 204, 268 and 414 to 419. The Project is located on PL418 and will not exceed the authorised scale and intensity of petroleum activities as detailed in Schedule A Table 1 of the Spring Gully EA.
		☐	Yes, you must also complete Section 2.5
1.12	Component of larger action	☐	No
		☒	Yes, you must also complete Section 2.7
1.13	Related actions/proposals	☐	No
		☒	Yes, provide details: Once constructed the Project will form part of the existing Spring Gully CSG Project, which commenced CSG production in 2005 and supplies the domestic market and the Australia Pacific LNG plant at Gladstone for export. Gas and water produced from the Project will be directed to the existing GPFs and WTF on PL195 and 204.
1.14	Australian Government funding	☒	No
		☐	Yes, provide details:
1.15	Great Barrier Reef Marine Park	☒	No
		☐	Yes, you must also complete Section 3.1 (h), 3.2 (e)

2 Detailed description of proposed action

2.1 Description of proposed action

2.1.1 Overview

The Project will involve the progressive development of CSG infrastructure on PL418 (part) and will include the following activities:

- Drilling, installation, operation and maintenance of up to 11 production wells. Wells will be constructed over approximately nine months and will operate for around 30 years
- Installation, operation and maintenance of gas and water gathering flowlines
- Installation, operation and maintenance of associated supporting infrastructure (e.g. access roads, power and communication systems, laydowns, stockpiles and storage areas)
- Decommissioning and rehabilitation of infrastructure and disturbed areas.

The Project will not require development of gas processing facilities or water management and treatment infrastructure as gas and water will be directed to existing gas processing and water treatment infrastructure located on PL195 and PL204 and operated as part of the Spring Gully CSG Project. The use of existing gas processing and water treatment facilities will minimise land disturbance and associated environmental impacts in the Project area.

The existing Spring Gully CSG Project comprises the following infrastructure:

- Four GPFs with a combined processing capacity of approximately 372TJ/day
- One WTF (12ML/day capacity) and associated storage and brine ponds
- Aquifer reinjection facility with capacity of 1ML/day
- 389 existing and proposed (for 2016) CSG wells and associated gathering networks.

Existing activities for the Spring Gully CSG Project have been previously referred under the EPBC Act, as described in Section 2.7, and determined to be not a controlled action.

The layout of infrastructure proposed to be constructed for the Project is presented in Attachment A, Figure 1. Locations of infrastructure may be refined as the detailed design process of the development progresses.

Petroleum activities are currently scheduled to commence in Q3 2016, with gas production likely to commence by Q2 2017.

2.1.2 Wells

For the Project, horizontal/vertical well pairs are the base case concept. However multi-lateral wells and standard vertical wells could potentially be used in the future.

Horizontal/vertical intercept wells concepts include one vertical well with a pump which intercepts with a well running horizontally through the coal seam. The horizontal section is lined with a fibre glass liner which is pre-perforated to allow inflow of gas and water into the well where it then flows to the vertical intercept well and pumped to surface. This is shown diagrammatically in Plate 1. Typically the horizontal well head is not connected to the gathering system and surface production facilities are not installed.

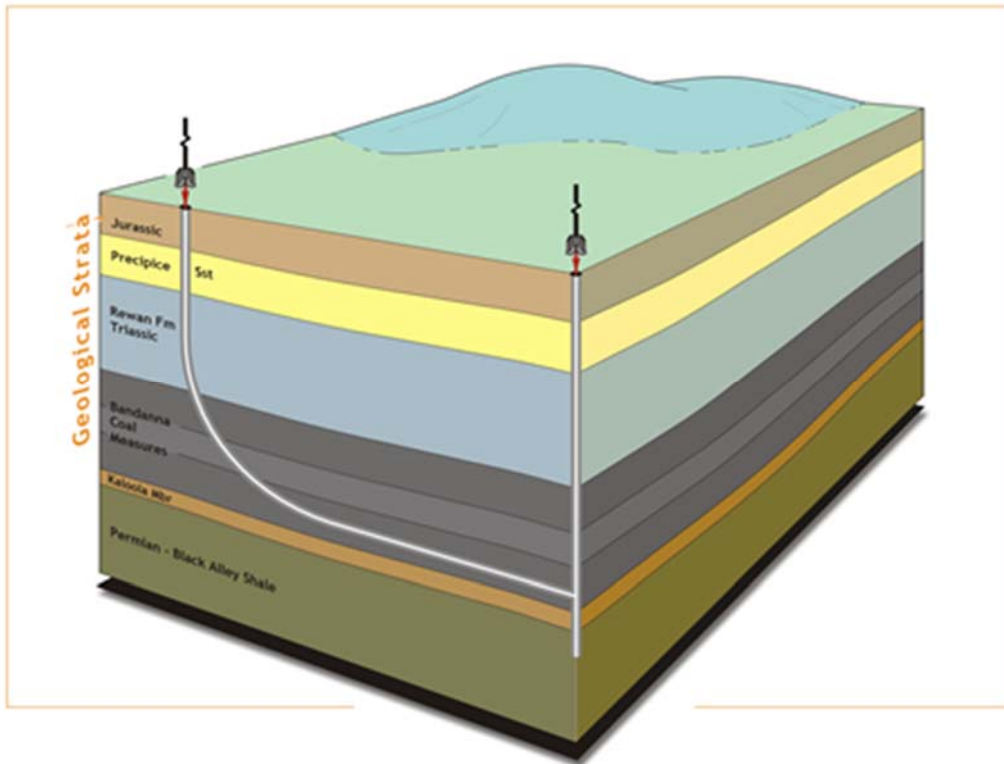


Plate 1: Horizontal well to intersect vertical production well

As an alternative concept, the multi-lateral wells are drilled utilising Coiled Tubing Drilling technology to drill up to four lateral hole sections from a single vertical mother-bore.

In comparison to a standard vertical well concept, horizontal/vertical intercept wells and multi-lateral wells require less gathering infrastructure, thereby reducing the disturbance footprint.

Drilling

Before the drilling rig is mobilised, the drilling site or 'well lease' and access tracks are prepared. For a full civil lease, vegetation is cleared and where required larger vegetation is felled, a mulcher may be used and the mulch stored at the site for later rehabilitation use. Recoverable hollow timber, larger rocks and other features are relocated to provide microhabitat adjacent to the disturbed area. Topsoil is removed and stockpiled to one side of the well lease site and access track (where required) for later rehabilitation. Lastly, earthmoving equipment is used to cut and fill the lease site where necessary.

Where practicable in favourable topographic areas, minimum disturbance leases (MDL) are used to minimise the impacts to the environment, cost and schedule delays. These leases require minimal stripping and stockpiling of topsoil across the lease area and therefore reduce impacts to soil and risk of erosion. There are three different types of MDL leases:

- MDL type 1 – this requires the least amount of lease preparation and only requires slashing of grass or pasture (refer to Plate 2)
- MDL type 2 – some ground levelling may be required (by rolling or grading) and removal and mulching of trees, however no topsoil is stripped. Trees outside the minimum workable area will be left where practicable (refer to Plate 3).
- MDL type 3 – some cut and fill is required for small portions of the lease. In these areas, the topsoil will be stripped and stockpiled for later use or respread once the earthworks has been completed.

A full civil lease will require 1ha of disturbance. An MDL requires an area of approximately 0.73ha although depending on the type, not all of this will be disturbed. Additional areas may be required around the full civil leases in areas of steep slope for cut and fill required to reduce the batter slope and appropriate erosion and sediment control. It is anticipated that the majority of leases for the Project will be MDL however civil leases have been assumed for the purposes of environmental impact assessment.



Plate 2: MDL Type 1



Plate 3: MDL Type 2

Once the lease is prepared, a drilling rig arrives to install a large diameter conductor pipe. The drilling rig sets up over the conductor pipe. The drilling rig is usually made up of:

- A diesel motor that drives the rigs operation
- A derrick, which is a vertical tower used to manage the long pieces of drill pipe for the drilling process
- A mud pump which pumps drilling mud (comprised primarily of bentonite and water) through the drill pipe and brings rock cuttings to the surface. Mud and cuttings brought to the surface are circulated into tanks or ground sumps, where the cuttings settle out and the mud is re-used
- An iron roughneck, which tightens the pieces of drill stem together as the hole is drilled
- A generator to maintain power to equipment and associated ancillary site buildings.

A photo of the typical drilling rig used by the Project is provided in Plate 4 below.



Plate 4: Typical drilling rig used by the Project

The drilling rig first drills the surface section of the hole which takes around one day. A casing is then cemented in place by pumping cement into the wellbore and circulating back through the casing/well ring. This cement isolates any shallow surface aquifers and prevents cross flow between aquifers.

The second stage is to drill the production section of the hole, which is lined with perforated casing across the coal seams to allow gas and water from the coal seam to flow into the well. Above the coal seams the casing is cemented back to surface to prevent flow into aquifers. It will usually take around three to five days to drill the vertical wells to an average depth of 900m. The drilling rig is then packed up and moved to the next well.

The same rig is used to drill the horizontal intersect well. In this case the well is drilled to above the target Bandanna coal seams where the casing is set and cemented in place to prevent any possible connection from the target Bandanna coal seam and shallower formations. The well is then drilled along the coal seam using geo-steering techniques to stay in seam as much as possible and then to intersect the vertical production well drilled previously. The length of the horizontal well is typical 1,500m to 2,500m in length. The horizontal section is then lined with a fibreglass production liner which is pre-perforated to allow inflow of gas and water into the well. The water and gas flow along the well to the vertical production well where the fluids are pumped to surface and into the gathering infrastructure.

Landspray while drilling (LWD) may be used for the management of drilling by-products as an alternative to excavating pits/sumps to store the by-products which are subsequently buried.

LWD involves the application of drilling by-products onto the soil surface at low application rates provided the drilling by-products and receiving soils meet the quality criteria and the release does not result in scour, erosion, pooling, runoff or vegetation dieback. LWD is managed in accordance with the Spring Gully EA (EPPG00885313).

Completions

Following the drilling program, a completions rig is mobilised to site of the vertical production well, assembled and then drills through the barriers left by the drilling and installs the equipment required to operate the gas well. The completions rig has similar equipment as the main drilling rig.

During the life of a well, a similar rig (referred to as a "work-over rig") may be mobilised to the well lease to work-over the well to replace the down-hole pump or remediate a down-hole problem.

No hydraulic fracture stimulation is proposed for the Project.

Typical chemicals used in drilling and completions

Drilling of a well will utilise approximately 200m³ of drilling mud comprised mainly of water and the clay mineral bentonite. Water from the drilling mud will be separated from the drill cuttings and managed through an approved disposal or beneficial reuse method. The drill cuttings brought to the surface will be rehabilitated in-situ by mix-bury-cover method if the materials meet the approved quality criteria (as described in the Spring Gully EA EPPG00885313) or by land spraying while drilling method.

Minor quantities of additional chemical additives are blended into the drilling and completion fluids to assist the drilling process. Most of the chemicals utilised in well drilling and completions, which may include biocides and corrosion inhibitors, are not dangerous goods, as defined by the *Work Health and Safety Act 2011* (Qld). Biocides are used to limit the growth

and spread of bacteria that may cause fouling. Corrosion inhibitors limit potential for corrosion and failure of well completions, thus maintaining the integrity of the wells.

The drilling process also utilises limited quantities of chemicals that are classed as dangerous goods including corrosive liquids (Class 8) such as acetic acid and caustic soda solution, as well as some paint thinners, degreasers and oils (Class 3). Chemical additives used in the drilling process are generally at concentrations (pounds per barrel (lb/bbl)) less than 10% of the total drilling fluid. Where required inert additives to manage loss circulation will be added in higher concentrations.

Completions activities will use chemical additives at a maximum 12.5% of the total completions fluid initially but will reduce to 2.5% by the end of the completions operations. A list of chemicals used during the drilling and completions is detailed in Table 1.

Table 1: Chemicals used during drilling and completions

Name	Type	Descriptions
Barite	Weighting Agent	A naturally-occurring high density mineral milled to uniform particle size and used to increase fluid density. Completely inert within the environment.
Bentonite	Viscosifier	A naturally occurring high yield clay compound mined and ground to a uniform particle size used to impart viscosity to the drilling fluid. Readily dispersed in water.
Calcium Carbonate / CIRCAL 1000	Weighting Agent/ Bridging Agent	Naturally occurring ground and sized marble particles used to increase drilling fluid density and to plug pore spaces within the sandstones in the wellbore. Inert and harmless in a wide range of marine and terrestrial environments.
CON DET	Drilling Detergent	A blend of water-soluble surfactants that efficiently wets metal surfaces. Often used to clear the drilling bit of balling caused by the adhesion of soft clays and shales.
DUO-VIS	Viscosifier	Used to impart viscosity to the drilling fluid.
FLC2000	Polymer Blend	Additive consisting of mixtures of vegetable derived material which are temperature stabilized with water-soluble synthetic and partially-soluble organic polymers and insoluble metal oxides.
FLO-TROL	Fluid-Loss Reducer	Controls fluid invading the rock matrix in the wellbore
KLA-STOP	Shale inhibitor	Used in small quantities to control swelling of drilled clays and shales and improve drilling fluid lubricity.
KWIKSEAL	Lost Circulation Material	Contingency product used in various concentrations to stop fluid losses into porous / fracture formations.
POLYPAC UL	Fluid-Loss Reducer	Controls fluid invading the rock matrix in the wellbore
Potassium Chloride	Potassium Source	Naturally occurring salt used to increase fluid density and control swelling of drilled clays and shales.
RADIAGREEN	Lubricant	Ester lubricant for high salinity system and brines.
ROD EASE	Lubricant	Lubricant for Horizontal Directional Drilling, coring and rotary drilling
SAFE CIDE	Biocide	Small quantities used to control bacterial activity within the drilling and completions fluids.
SAPP	Thinner and Dispersant	Used for the reduction of viscosity and gel strengths in freshwater drilling fluids, dispersion of reactive clays
Soda Ash	Hardness Reducer	A naturally occurring fully water-soluble alkali. Small quantities are used to increase and control drilling fluid pH in the range 8.5-10 and to reduce free calcium within the water phase of the drilling fluid.
Sodium Bicarbonate	Acidity Control	Used to treat out cement contamination.
Sodium Formate	Brine	Salt used to increase fluid density and control swelling of drilled clays and shales
STARGLIDE	Lubricant	Reduces torque, drag and the potential for differential sticking
STEELSEAL	Lost Circulation Material	Contingency product used in various concentrations to stop fluid losses into porous / fracture formations.
STOPPIT	Lost Circulation Material	Contingency product used in various concentrations to stop fluid losses into porous / fracture formations.
SUPER SWEEP	Well bore and hole cleaning	Increases the suspension and hole cleaning ability of the fluid
Torque Seal	Lost Circulation Material	Contingency product used in various concentrations to stop fluid losses into porous / fracture formations.
WALNUT PLUG M	Lost Circulation Material	Contingency product used in various concentrations to stop fluid losses into porous / fracture formations.
Wildcat 555	Biocide	Small quantities used to control bacterial activity within the drilling and completions fluids.

In support of drilling operations, fuels such as diesel (combustible liquid) are used to fuel power generation supplies and other drilling related required equipment.

All chemicals will be stored and handled in accordance with the relevant legislative requirements and Australian Standards.

In accordance with the Code of practice for constructing and abandoning coal seam gas wells and associated bore in Queensland (DNRM 2013), the drilling process must confirm Zonal Isolation of aquifers. Well bores are constructed with casing and cement and through pressure testing or cement bond logs zonal isolation is confirmed. If isolation is not verified remedial actions are taken until aquifers are isolated.

Well Production

Once the well bore is constructed a wellhead and separation equipment is installed to separate the well flow into two streams – gas and water. The lease sites are progressively rehabilitated at this point to the footprint required for the operation of the well, which is typically 0.3ha.

The typical surface facilities associated with a CSG well are:

- A wellhead through which the gas and associated water is brought to the surface
- A pump that lifts the water in the coal seam to the surface
- A wellhead separator with associated control devices (refer to Plate 5) which separates the gas and the water.



Plate 5: Typical Wellhead Separator

All these facilities are appropriately fenced to keep livestock out. Well lease infrastructure is electrically powered with electricity transmitted by a network of buried cables that are co-located with gas and water flowlines.

As the well pressure declines, a small compressor may be required at the wellhead to ensure that maximum recovery of available gas is achieved. At this time, a pump may also be required to maintain water transfer.

2.1.3 Gas and Water Gathering Flowlines

After separation occurs at the wellhead, the low pressure CSG flows into a network of buried pipelines constructed from high density polyethylene pipe. These interconnect all wells operating in a specific area to form the gas gathering network.

The gas flows through several subsystems which direct the gas to the GPF. CSG that is produced within the Project will be processed at one of the existing Spring Gully GPFs on PL195 and PL204.

After separation at the wellhead, the water flows into a similarly buried high density polyethylene pipeline network. This forms the water gathering network which channels the water to the Spring Gully WTF on PL195. Some water of appropriate quality may also be beneficially used in construction for dust suppression or irrigation purposes prior to treatment.

Some gas will be entrained in the water flowlines and some water will be present in the gas flowlines. This is managed by high point vents and low point drains which are installed along the right of way (RoW).

Construction of the flowlines involves the following activities:

- Clear and grade of the RoW
- Pipe stringing and bending

- Pipe welding, non-destructive testing and joint coating
- Trenching
- Padding
- Pipe placement in the trench (lowering in and laying)
- Backfilling and compaction
- Pneumatic or hydrostatic testing
- Rehabilitation.

The RoW width is dependent on several factors including the number of pipes and topographical constraints. The construction RoW width for the Project ranges from 12m to 32m wide with an average of 18m. During operations, the RoW is reduced to 8m to allow access along the pipe for maintenance activities. A typical construction RoW layout is provided in Plate 6. For the purposes of the impact assessment, 25m construction RoW width has been assumed.

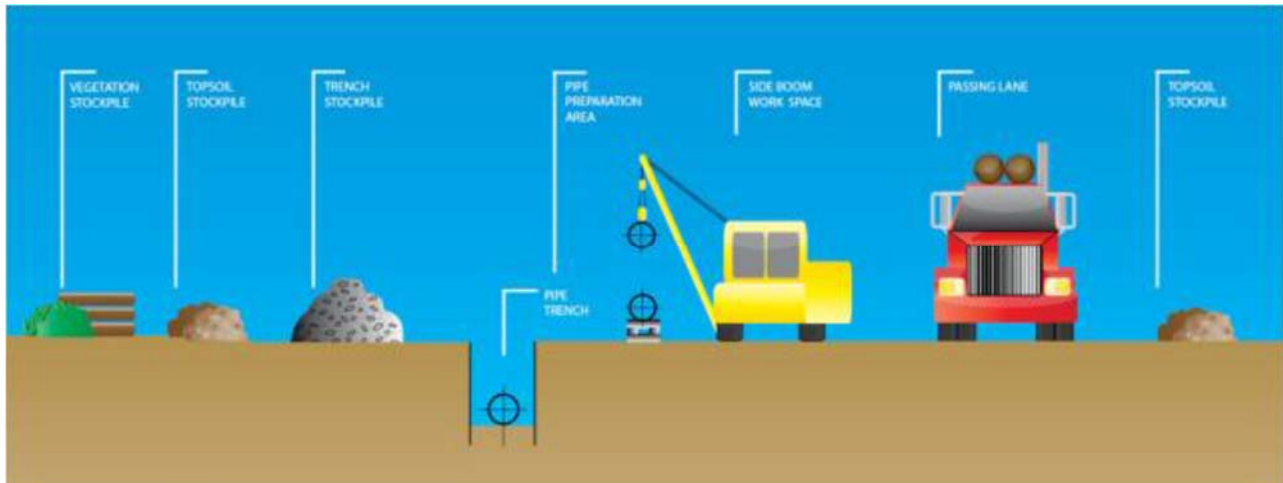


Plate 6: Typical construction RoW layout

2.1.4 Supporting Infrastructure

The construction workforce will be accommodated in workers accommodation camps close to work sites whilst the operations workforce will be housed in existing permanent accommodation facilities and/or within local housing in nearby regional townships.

Access to wells and associated above-ground facilities will require construction of unsealed access roads, though grading and sealing of some roads may be necessary. Access tracks will predominantly be co-located with the gathering RoW. For standalone access, utilisation and minor upgrades of existing access tracks is preferred.

Laydowns, stockpiles, extra work spaces, mobile offices and substation kiosks are some of the additional supporting infrastructure that may be required. These will be sited to avoid any impacts to threatened ecological communities.

2.1.5 Field Planning

The final location of wells, flowlines, access tracks and ancillary infrastructure gives consideration to a range of matters including environmentally sensitive areas (ESAs), threatened ecological communities (TEC), significant vegetation, habitat for listed species, topography, cultural heritage, impact on landholders, engineering constraints and construction costs. Wherever practicable, previously disturbed areas are utilised and gathering network and access tracks are co-located. Selected locations are progressively refined in consultation with landholders and other stakeholders to minimise adverse environmental and landholder impacts whilst balancing cost and constructability.

A robust internal disturbance approval process ensures the project execution aligns with conditions of approval and management commitments, particularly avoidance of key environmental impacts where there are reasonable and practicable design alternatives. The disturbance approval process occurs over a number of stages:

- FEL 0: Preliminary concept developed (well spacing, number, type) based on reservoir modelling
- FEL 1: Conceptual layout of infrastructure developed giving consideration to the results of the ecology assessment, landholder and engineering constraints
- FEL 2: Environmental specialists, construction personnel, engineers and landholders undertake site assessment to assess the proposed infrastructure locations and the layout in finalised.
- FEL 3: Detailed design is completed
- Execute: Construction commences

The environmental constraints assessment is based on the following principles:

- Minimising adverse environmental impacts and enhancing environmental benefits associated with project activities, products or services; conserving and protecting the biodiversity values and water resources in its operational areas
- Avoiding direct and indirect adverse impacts on environmental values including MNES where practicable

- Mitigating and managing direct and indirect adverse impacts to minimise cumulative adverse impacts on environmental values including MNES
- Active site remediation and rehabilitation of impacted areas to promote and maintain long term recovery of affected environments including MNES.

The infrastructure layout for the Project shown in Attachment A Figure 1 has been developed through application of this process. Note this layout may be refined further through design development and construction execution.

2.1.6 Disturbance Area

During the construction of petroleum infrastructure for the Project, it is estimated that approximately 38ha of land (approximately 1% of the Project area) will be disturbed. Of this 38ha, less than 2ha will impact on remnant vegetation with the balance located in previously cleared grazing land.

The operational requirements are likely to require approximately 18ha of disturbance (approximately 0.5% of the Project area).

2.1.7 Water management

Water produced from the Project will be transferred and managed within the existing approved facilities on PL195. Approximately 167ML will be produced over the life of the Project and will be managed in accordance with the existing Spring Gully water management strategy which comprises:

- Beneficial use of water for Project activities (including construction, dust suppression and landscaping and revegetation) in accordance with the General Beneficial Use Approval Associated Water (including coal seam gas water) (DEHP 2014a) (the General BUA)
- Irrigation in accordance with the General Beneficial Use Approval Irrigation of Associated Water (including coal seam gas water) (DEHP 2014b)
- Treatment by reverse osmosis at the existing WTF (capacity of 12ML/day)
- Aquifer injection of treated water into the Precipice sandstone of 1ML/d
- Intermittent contingency release of treated water to Eurombah Creek when the inherent variability of irrigation demand means that a proportion of the treated water cannot be beneficially used.

The volume of water estimated to be produced by the Project is very small relative to existing water production at Spring Gully (currently 8.4ML/day) and the installed capacity of the water treatment facilities. As such, there are no proposed changes to the existing strategy as a result of the minor volumes of additional water produced by the Project.

2.2 Alternatives to taking the proposed action

Nil

2.3 Alternative locations, time frames or activities that form part of the referred action

Nil, however refer to Section 2.1.5 for a description of the process used to design infrastructure locations to minimise environmental impacts.

2.4 Context, planning framework and state/local government requirements

Petroleum and Gas (Production and Safety) Act 2004

Petroleum activities in Queensland are regulated under the *Petroleum and Gas (Production and Safety) Act 2004* (PAG Act).

Petroleum authorities that are issued under the PAG Act include petroleum survey licences, petroleum leases, petroleum pipeline licences and petroleum facilities licences.

The principal petroleum authority that is required prior to the construction of gas wells and any other associated infrastructure in the gas fields for production is a petroleum lease. A petroleum lease allows Australia Pacific LNG to carry out various activities, including producing petroleum, constructing and operating petroleum pipelines and water pipelines, petroleum storage and petroleum processing facilities authorised under the lease. Other related incidental activities may also be authorised under this lease.

The Project is located on PL418 which is currently in application with an expected grant date of June 2016.

Environmental Protection Act 1994

The EP Act aims to promote ecologically sustainable development in Queensland in order to protect Queensland's environment. This Act is the principal environmental legislation in Queensland and governs the environmental regulation of petroleum activities, including the issue of environmental authorities for a petroleum activity.

The Spring Gully EA (EPPG00885313) has been granted and authorises up to 600 wells and associated infrastructure in the following PLs:

- PL195

- PL200
- PL203/PL268
- PL204
- PL414 to PL419

No amendment to the EA is required to include the Project in PL418. The total number of wells and associated infrastructure detailed in Schedule A Table 1 of the Spring Gully EA will not be exceeded. Minor amendments to the EA may be sought to ensure compliance with spatial rules for siting infrastructure defined in the EA.

The Project may require additional approvals under other State legislation including but not limited to:

- *Fisheries Act 1994*
- *Nature Conservation Act 1992*
- *Regional Planning Interests Act 2014*
- *Sustainable Planning Act 2009*
- *Water Act 2000*
- *Aboriginal Cultural Heritage Act 2003*

Approvals under these acts will be obtained as required.

2.5 Environmental impact assessments under Commonwealth, state or territory legislation

As described in Section 1.11, the Project has been assessed and approved through granting of the Spring Gully EA under the EP Act.

2.6 Public consultation (including with Indigenous stakeholders)

Land owner Consultation

Engagement and consultation with landowners has occurred for existing infrastructure and will be undertaken for future project activities in accordance with the requirements of the PAG Act and Land Access Policy Framework, which includes the Land Access Code (DEEDI, 2010).

The Land Access Code outlines mandatory conditions for resource companies undertaking activities on private land and also provides a best practice guide to communications between landholders and resource companies.

A dedicated project team for landowner liaison exists to support sub-project teams responsible for infrastructure delivery.

The typical landholder engagement process is detailed in Plate 7 below.



Plate 7: Typical landholder engagement process

Indigenous Stakeholders

The Project is located on Mandandanji country. Origin have negotiated and agreed Indigenous Land Use Agreements and Right to Negotiate agreements under the *Native Title Act 1993* for access to the land with this group.

We have negotiated a Cultural Heritage Management Plan (CHMP) under the *Aboriginal Cultural Heritage Act 2003* has been negotiated and covers:

- Archaeological surveys
- Annual review of Agreements

- Use of and terms of employment of representatives of the relevant Native Title parties for cultural heritage assessment and/or monitoring of Project activities
- Dispute resolution processes
- Recording and mapping of cultural heritage sites/artefacts
- Restricted Heritage areas
- Audits
- Keeping places for artefacts recovered or salvaged
- Cultural Heritage awareness training for Origin personnel and Contractors.

New development is subject to internal disturbance approval that addresses site specific heritage requirements and identifies conditions of approval. Instances of Aboriginal heritage in the Project area has been recorded in consultation with the relevant Aboriginal parties and is detailed on project plans to ensure avoidance.

To date a number of Aboriginal Heritage finds (including flakes and corestones) have been identified within the Project area which have been collected and relocated in accordance with the CHMP.

A dedicated project team for heritage (both Aboriginal and Shared) exists to support sub-project teams responsible for infrastructure delivery in meeting our duty of care.

2.7 A staged development or component of a larger project

The Spring Gully CSG Project has been previously referred to the department twice. The Spring Gully Stage 1 development for seismic activities, CSG wells, access tracks, flowlines, facilities and associated infrastructure within PL195, 200, 203 and 204 was referred in July 2004 (EPBC 2004/1644) and was deemed 'Not a Controlled Action' in August 2004. A subsequent referral for Stage 2 was submitted in December 2004 and deemed 'Not a Controlled Action' in January 2004 (EPBC 2004/1924). Stage 2 also involved seismic activities and the construction and operation of CSG wells, access tracks, flowlines, facilities and associated infrastructure within PL195, 200, 203 and 204.

The geographic area encompassed by these two referrals did not include the tenures to the east and west where development is now proposed or is being investigated. These areas encompass four distinct regions:

- South-West Development Area
- North-West Development Area
- South-East Development Area
- North-East Development Area.

These four development areas have been organised based on proposed development timing, distinct geography and hydraulic separation of gathering systems as described below. Construction and operation of each of these development areas is considered separate in its own right and independent from activities on other development areas. There are no additional or co-dependent activities which would make the construction or operation of any development area dependent on another.

The only operational linkage between the development areas is that the separate gathering networks for the south-west, north-west and north-east development areas will terminate at the existing gas processing and water treatment facilities within the Spring Gully CSG Project area. It has not yet been determined if the gas and water from the South-East Development Area will flow to existing processing and water treatment facilities within the Spring Gully CSG Project area or to existing processing and water treatment facilities within the Combabula development area (PL403, PL408, PL406, PL417, PL297) to the east of PL419.

Timeframe

The design concepts for the four development areas, and therefore construction and operation scheduling, are at significantly different stages.

The design concepts for the south-east and north-east development areas are at an early conceptual design stage only (pre FEL 0), which simplistically assumes a theoretical grid spacing of 750m to 1.8km for an indicative number of wells. Design work for a gathering network has not yet commenced. Fine scale well layout and gathering system designs will be informed by findings of regional exploration activities and the field planning process described in Section 2.1.5.

Construction activities for these development areas are not proposed to commence until mid 2017 (north-east) or 2018 (south-east). Production is currently planned for early 2018 for the north-east development area and during 2019 for the south-east development area, though this date may alter as a result of further exploration activities.

Given the conceptual status of infrastructure design for these development areas it is not currently practicable to undertake a meaningful assessment of impacts to MNES in support of EPBC referrals. Whilst these development areas will be referred, it is proposed to complete the field planning process (as discussed in Section 2.1.5) to a more advanced stage, such that any impacts to MNES can be predicted with greater confidence, prior to submission of referrals.

The design concepts for the south-west and north-west development areas are significantly more advanced, having progressed through the field planning process. Current scheduling is based on construction of the south-west development area commencing during Q3 2016. The targeted production date for both areas is Q3 2017. This staggered timing enables optimisation of both construction activities (including drilling rig utilisation and gathering network sequencing) and production. If timing optimisation cannot be achieved the viability of either development area will not be compromised.

Geography

The four development areas are geographically separated and present significantly different ecological values.

The South-West Development Area is located within the southern section of PL418. The proposed development footprint is located within a flat to undulating, cleared landscape with a long history of agricultural land use, particularly cattle grazing. Remaining remnant vegetation within the proposed development footprint is restricted to isolated linear remnants adjacent to Western Creek and other low order watercourses. Given this low ecological value, construction and operation of this development area can occur with minimal risk to threatened species and ecological communities listed under the EPBC Act.

The North-West Development Area is located within PL414, PL415, PL416 and the northern section of PL418. The proposed development is approximately 6km north and northwest of the development footprint in the South-West Development Area. Approximately half of the North-West Development Area is within cleared, undulating agricultural land. The remainder occurs within steep sandstone hills which support extensive areas of open forest, some areas of which have been subject to logging activity. Given the presence of extensive areas of open forest and sandstone topography ecological values are significantly greater than the South-West Development Area.

The North-East Development Area is located entirely within PL417. The development footprint is more than 15km east of both the north-west and south-west development areas, and approximately 7km north of the development footprint of the South-East Development Area. The landscape in the northern portion of the development footprint comprises open forest on sandstone hills, whilst the southern section is a predominantly agricultural landscape.

The South-East Development Area is located entirely within PL419. The conceptual development footprint is 30km south-east of the South-West Development Area at its closest point. The landscape comprises flat, cleared agricultural land with remnant vegetation restricted to linear shadelines adjacent to paddock boundaries and roads and some riparian vegetation. The target coal formation in PL419 is the Walloons Coal Measures, whereas all other development areas will target the Bandana Formation.

Hydraulics

Due to the physical separation and topographical differences the gathering network of each development areas will be constructed and operated independently.

The gas and water gathering network for the South-West Development Area and the North-West Development Area are separated due to the topography and independently collect to the appropriate processing facility. Gas and water produced in the South-West Development Area is proposed to be gathered to Spring Gully and Talooka GPFs and the Talooka Water Gathering Station while gas and water produced in the North-West Development Area is proposed to be gathered to the Strathblane and Eurombah Creek GPFs and Strathblane Water Gathering Station. The GPF utilised for processing may change in the future depending on GPF capacity and use.

Detailed design of the gathering networks for the North-East Development Area and South-East Development Area has not commenced.

Table 2: Proposed Development Areas

	South-West Development Area (this referral)	North-West Development Area	South-East Development Area	North-East Development Area
Tenure	PL418 (part)	PL414, 415, 416 and PL418 (part)	PL419	PL417
Proposed construction commencement date	Q3 2016	Q3 2017	2018	Q2 2017 to Q4 2017
Proposed production commencement date	Q2 2017 to Q3 2017	Q3 2017 to Q1 2018	2019	Q1 2018
Proposed infrastructure	Advanced design of 11 wells with associated infrastructure.	Advanced design of 40 wells with associated infrastructure.	Conceptual design of approximately 150 wells based on theoretical 750m grid spacing. Design work for gathering system network not yet commenced.	Conceptual design of approximately 150 wells based on theoretical 750m grid spacing. Design work for gathering system network not yet commenced.

The four development areas will not significantly increase the scale of activity beyond that presented in the Stage 1 and 2 referrals (400-600 wells and 4-14 processing facilities), either collectively or individually. The geographical spread of activities will simply extend from the originally referred tenements into four distinct areas. Note, however, that exploration and production results may indicate further geographical expansion beyond the four development areas is viable. Data to determine this is not likely to be available for a number of years after production commences in any of the development areas. Any such further development would be subject to assessment against EPBC Act significant guidelines to determine any referral requirements.

3 Description of environment & likely impacts

3.1 Matters of national environmental significance

The existing environment of the Project area has been impacted by a history of land clearing and agricultural land uses that have significantly reduced the biodiversity values across the landscape. The biodiversity baseline and surface and groundwater assessments undertaken by Australia Pacific LNG to date have characterised the existing environmental features (including MNES) considered in this document. These previous assessments have been comprehensive and the following reports have been referenced to provide the following summary of the existing environment relating to MNES:

- Attachment B - Spring Gully South-West Development Area, Matters of National Environmental Significance (ERM, 2016)
- Attachment C - Spring Gully Environmental Protection and Biodiversity Conservation Act Referral - Aquatic Matters of National Environmental Significance, Spring Gully South-West Development (FRC, 2016)
- Attachment D - Spring Gully Development EPBC Referral Hydrogeological Assessment – Spring Gully South-West Development (KCB, 2016)

The Spring Gully Regional Assessment Area describes the area encompassed by previous studies and includes PLs 195, 200, 203, 204 268, 414 to 419 and ATP 592 (refer to Attachment A Figure 2).

3.1 (a) World Heritage Properties

Description

There are no world heritage properties identified within the Project area. The closest World Heritage Sites are Fraser Island World Heritage Area (400km east north-east) and the Gondwana Rainforests of Australia (460km south-east).

Nature and extent of likely impact

No direct or indirect impacts are expected to occur due to the large distance between the Project area and the protected area.

3.1 (b) National Heritage Places

Description

There are no National Heritage Places identified within the Project area. The closest listed Natural Heritage Place is the Glasshouse Mountains National Landscape (400km south-east).

Nature and extent of likely impact

No direct or indirect impacts are expected to occur due to the large distance between the Project area and National Heritage Places.

3.1 (c) Wetlands of International Importance (declared Ramsar wetlands)

Description

There are five Ramsar sites within Queensland (Administrator is shown in brackets): Moreton Bay (Queensland), Bowling Green Bay (Queensland), Currawinya Lakes (Queensland), Shoalwater and Corio Bays (Queensland/Commonwealth), and Great Sandy (Queensland). None of these wetlands, or their respective catchment areas, occurs within the Project area.

The Project area does occur upstream approximately 440km north-east of the Narran Lake Nature Reserve, a Ramsar listed wetland. Minor tributaries south of the Project area (in the Maranoa-Balonne catchment) drain south into the Balonne River eventually meeting the Narran River south-west of Dirranbandi, Queensland. The Narran River crosses the border into New South Wales (NSW), ultimately draining into the NSW Narran Lake Nature Reserve.

Nature and extent of likely impact

No direct or indirect impacts are expected to occur due to the large distance between the Project area and Ramsar wetlands.

3.1 (d) Listed threatened species and ecological communities

Description

A significant portion of the Project area has been historically cleared of vegetation. Within the development footprint remnant vegetation persists only as a few isolated remnant shadelines, patches of regrowth vegetation and vegetation along Western Creek. As such the habitat value of the development footprint for listed threatened species and ecological communities is considered low.

One (1) TEC - Brigalow (*Acacia harpophylla* dominant and co-dominant) listed as endangered has been mapped within the Project area (refer to Attachment A Figure 3) and covers approximately 90.9ha.

The TEC 'The community of native species dependent on natural discharge of groundwater from the Great Artesian Basin' (hereafter EPBC groundwater community) is also known to occur in the region surrounding the Project area at the Lucky Last and Scott's Creek spring complexes (OGIA 2016). The Scott's Creek spring complex is approximately 30km north-east of the Project area and the Lucky Last spring complex is approximately 25km north-west of the Project area. Wetlands at both the Lucky Last and Scott Creek spring complexes support populations of the EPBC listed (endangered) salt pipewort *Eriocaulon carsonii*.

Three other spring complexes in the region surrounding the Project area have been identified as potentially affected by the Project. These are:

- Springrock Creek, 34.2km north-west from the Project area centroid
- 311, 36.5km north-west from the Project area centroid
- Yebna 2 (591), 32.1km north-west from the Project area centroid.

Springrock Creek, 311 and Yebna 2 all occur within outcrop areas of the Precipice Sandstone (OGIA 2016, Table H-1) and are located on the eastern margins of the Great Artesian Basin (GAB). According to the recovery plan for the community of native species dependent on natural discharge of groundwater from the Great Artesian Basin (Fensham et al 2010, page 6), springs which occur within the outcrop areas of the Precipice Sandstone on the eastern margins of the GAB or which are recharge springs do not qualify as the EPBC groundwater community. As such any wetlands associated with these spring complexes are not considered to form part of the EPBC listed community.

However, an assessment of springs in the region surrounding the Project area undertaken by the Commonwealth of Australia (2014) identified the Yebna 2 spring as part of the EPBC groundwater community (Appendix C of Commonwealth of Australia 2014). Detailed field studies for the wetland associated with this spring undertaken by OGIA (2015) indicates that this spring is located within an ephemeral tributary of the Dawson River, as shown in Plate 8. The spring complex is also a type of wetland spring which is mainly sourced by regional groundwater systems and some local system contributions.



Plate 8: Wetland associated with Spring 591

The rationale for concluding that Yebna 2 forms part of the EPBC community is not specifically described by the Commonwealth of Australia (2014) and the same report identifies that the Springrock Creek and 311 complexes do not form part of the EPBC groundwater community. Given there is some ambiguity around the EPBC status of the wetland associated with the Yebna 2 spring complex it has been assumed for the purposes of this referral that the wetland forms part of the EPBC groundwater community.

Ecological surveys (Fensham et al 2011, Golder and Associates 2013, Commonwealth of Australia 2014) have not located any threatened species of MNES at the Springrock Creek, 311 or Yebna 2 spring complexes.

No EPBC Act listed threatened flora or fauna have been confirmed within the Project area during the various field surveys (as reported in Attachment B). A desktop assessment of all field surveys and the protected matters search tool (PMST) conservatively identified twelve (12) listed EPBC Act listed threatened species which have potential habitat within the Project area, or are known to occur proximal to the Project area, as listed in Table 3 below.

Table 3: EPBC listed threatened species

Scientific name	Common name	EPBC Status
<i>Phascolarctos cinereus</i>	koala	Vulnerable

Scientific name	Common name	EPBC Status
<i>Dasyurus hallucatus</i>	northern quoll	Endangered
<i>Petauroides volans</i>	greater glider	Vulnerable
<i>Geophaps scripta scripta</i>	squatter pigeon	Vulnerable
<i>Cadellia pentastylis</i>	Ooline	Vulnerable
<i>Chalinolobus dwyeri</i>	large-eared pied bat	Vulnerable
<i>Nyctophilus corbeni</i> (South-eastern form)	south-eastern long-eared bat	Vulnerable
<i>Furina dunmalli</i>	Dunmall's snake	Vulnerable
<i>Egernia rugosa</i>	yakka skink	Vulnerable
<i>Delma torquata</i>	collared delma	Vulnerable
<i>Elseya albagula</i>	White throated snapping turtle	Critically endangered
<i>Eriocaulon carsonii</i>	Salt pipewort	Endangered

No listed fish species have been recorded from the Spring Gully Regional Assessment Area and are unlikely to be present in the ephemeral creeks in the development footprint.

A population of white-throated snapping turtle is known from a site on Eurombah Creek approximately 14km downstream of the confluence of Western Creek and Eurombah Creek, and approximately 19km downstream from the development footprint. This species is listed as critically endangered under the EPBC Act due to pervasive loss of eggs to native and introduced predators causing minimal recruitment to the adult population. The white-throated snapping turtle is recognised as a habitat specialist (Todd *et al.*, 2013) which occupies clear, flowing, well-oxygenated waters. Important habitat for the survival of the species is defined as all in-stream and adjacent banks to within approximately 50m of known populations (TSSC, 2014). Suitable habitat for this turtle is likely to occur along the main channel of Eurombah Creek which is approximately 5km downstream of the development footprint.

The Fitzroy River turtle, listed as vulnerable under the EPBC Act, was identified from the PMST but is not known from the upper Dawson River. The closest record of this species is approximately 170km from the Project area.

The significance of impacts to threatened species and ecological communities have been assessed using available Commonwealth guidelines, including:

- Matters of National Environmental Significance Significant Impact Guidelines 1.1 (SIG 1.1) (DoE, 2013)
- Draft Referral Guidelines for the Nationally Listed Brigalow Belt Reptiles (DSEWPAC, 2011)
- EPBC Act referral guidelines for the vulnerable koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) (DoE, 2014).

Only those species assessed as having likely and potential habitat in the Project area (as listed in Table 3) have been assessed. Where the same set of impact assessment guidelines apply to multiple species, the impact assessments for these species have been grouped. Where species-specific guidelines are available, species have been assessed individually.

Nature and extent of likely impact

Potential habitat for MNES within the Project area may be damaged or lost through the clearing of vegetation for construction of Project infrastructure. The estimated development footprint is approximately 38ha. This represents approximately 1% of the total Project area (3,755ha). The disturbance to habitats for species likely or potentially occurring does not exceed 1.7ha for any individual species. No disturbance of known or potential habitat for the EPBC groundwater community, salt pipewort or white throated snapping turtle will occur so these MNES are not listed in Table 4 below.

The Fitzroy River turtle is located over 170km downstream of the Project area and is sufficiently displaced to have no risk of impact.

The Project will be undertaken in an area that has already undergone substantial vegetation clearing and has some existing landholder infrastructure already in place (e.g. existing roads and tracks), thereby reducing the need for additional clearing. However, some clearing will be required and this has the potential to impact upon EPBC Act-listed species and TECs within the Project area.

The areas of disturbance shown in Table 4 are conservative, and are slightly greater than the actual area of disturbance. Where access tracks have been upgraded as part of the Project, the full area of access track surface (including pre-existing surface) has been included in the disturbance area. Further, the disturbance areas outlined are based on broad vegetation communities, and the actual area of habitat (in consideration of preferred microhabitat features) could be smaller than the disturbance area listed.

Table 4: Area of disturbance

Scientific Name	Species / Community	Status	Disturbance Area (ha)	Area within Project Area (ha)	Percentage disturbed (%)
Brigalow (<i>Acacia harpophylla</i> dominant and co-dominant)		E	0.2	90.9	0.2%
<i>Phascolarctos cinereus</i>	koala	V	1.6	443.8	0.4%
<i>Dasyurus hallucatus</i>	northern quoll	E	1.6	443.8	0.4%
<i>Petauroides volans</i>	greater glider	V	1.4	401.5	0.3%
<i>Geophaps scripta scripta</i>	squatter pigeon	V	1.6	443.8	0.4%
<i>Cadellia pentastylis</i>	Ooline	V	0.2	134.4	0.02%
<i>Chalinolobus dwyeri</i>	large-eared pied bat	V	0.2	528.5	0.04%
<i>Nyctophilus corbeni</i> (South-eastern form)	south-eastern long-eared bat	V	0.3	560.9	0.05%
<i>Furina dunmalli</i>	Dunmall's snake	V	1.7	578.2	0.3%
<i>Egernia rugosa</i>	yakka skink	V	1.7	578.2	0.3%
<i>Delma torquata</i>	Collared delma	V	1.4	401.5	0.3%
Status under EPBC Act: E= endangered; V = vulnerable					

A number of species habitats overlap and therefore it is not suitable to consider the sum of these clearing areas. Taking into account overlap, the total area of listed threatened species habitat likely to be impacted during construction is 1.7ha.

The impact evaluation (as provided in Attachments B, C and D) was undertaken in three phases:

- identification of potential impacts to MNES
- development of management measures to address identified potential impacts (refer to Section 4 of this referral)
- evaluation of residual impacts.

The Matters of National Environmental Significance Significant Impact Guidelines 1.1 (DoE 2013) have been used to guide the assessment of the Project's impact significance on MNES. Assessments of significance against the guideline criteria for each TEC and species known or likely to occur within the Project area, or known to occur proximal to the Project area, are provided in Attachment B (terrestrial species and Brigalow TEC), Attachment C (white-throated snapping turtle) and Attachment D (EPBC groundwater community and salt pipewort). Summaries are provided in Table 5.

Table 5: Significant impact assessment

MNES	Area of Impact	Guideline Threshold and Recommendation
Brigalow TEC	0.2ha	Approximately 0.2ha of Brigalow TEC will be cleared to accommodate access tracks and flowlines. This very small area of clearing is not considered to be a significant impact. No significant impact.

MNES	Area of Impact	Guideline Threshold and Recommendation
EPBC groundwater community	0 ha	There will be no direct impacts to the Lucky Last, Scott's Creek or Yebna 2 spring complexes from the Project. The only plausible indirect impact is reduction in groundwater water pressures at the spring complexes due to water extraction from the Bandanna Formation during CSG production. Recent investigations (OGIA 2016) have shown that the source aquifer for the Lucky Last spring complex is the Boxvale Sandstone Member of the Evergreen Formation, and not the deeper Precipice Sandstone as previously understood. The Precipice Sandstone is overlain by the Evergreen Formation aquitard (which is over 100m thick in the Project area) and limits hydraulic connection between the Precipice Sandstone and the Hutton Sandstone. While the Boxvale Sandstone is an internal member of the Evergreen Formation, the low permeability sediments of the Evergreen Formation which encapsulate this spring source aquifer will limit potential connectivity. As a result the Lucky Last spring complex is no longer considered at risk from water extraction associated with CSG development (OGIA 2016). The source aquifer for the Scott's Creek spring complex is the Hutton Sandstone. Due to the presence of the Evergreen Formation aquitard between the Hutton Sandstone and Precipice Sandstone no impacts to groundwater water pressures or levels at the Scott's Creek spring due to Project activities are predicted. No drawdown at the Yebna 2 spring complex is predicted as a result of the project. Groundwater modelling results indicate that the influence of the Reedy Creek injection program (as described in section 3.1i below) on the Precipice Sandstone aquifer across the Project area overrides any potential minor drawdown effects from the Project. Full assessments of risks to spring complexes from the Project are provided in the attached groundwater assessment report (KCB 2016). No significant impact.
greater glider	1.4ha	Not recorded from the Project area. The greater glider was the most common arboreal mammal recorded within the regional assessment area by GHD (2013) in forested habitat where it was recorded predominantly in areas of spotted gum and ironbark vegetation, often on mid-slopes. Small areas of this vegetation community occur in the Project area, but none are intersected by the development footprint. No thresholds or definitions of habitat critical to the survival of the greater glider are provided in available documentation. The development footprint will remove approximately 1.4ha of potential dispersal habitat on alluvial plains. This is approximately 0.3% of available habitat for this species within the Project area and is not of an extent that is likely to lead to a decline in the species. No significant impact.
koala	1.6ha (habitat score of 4)	An action that impacts 20ha or greater of habitat critical to the survival of the koala where the habitat had a score of 8 or more, (for inland populations) should be referred. Habitat within the development footprint receives a score of four based on the guidance provided in the habitat assessment tool and is therefore not considered habitat critical to the survival of the koala. No significant impact.
northern quoll	1.6ha	There has been a reported observation of the northern quoll in the north of the Spring Gully Regional Assessment Area adjacent to extensive areas of remnant vegetation. The sighting was by landholder comments, with no other observations of signs of/or quolls by qualified practitioners. The mostly cleared, undulating grazing and farming land within the Project area is not preferred habitat for this species though it may provide a movement corridor only. The Project area does not contain any known critical habitat features for this species and the action is unlikely to have a significant impact based on guidance provided in the SIG 1.1. No significant impact.
squatter pigeon	1.6ha	No thresholds or definitions of habitat critical to the survival of the squatter pigeon are provided in available documentation. The development will remove approximately 1.6ha of possible dispersal habitat. This is approximately 0.4% of available habitat for this species within the Project area and is not of an extent that is likely to lead to a decline in the species. No significant impact.

MNES	Area of Impact	Guideline Threshold and Recommendation
ooline	0.2ha	The Project area provides potential habitat for the species, but no ooline individuals were identified from within the development footprint during surveys, and the development footprint is not considered to provide an important population for the species. No significant impact.
large-eared pied bat	0.2ha	The development footprint will remove approximately 0.2ha of potential habitat for large-eared pied bat. This habitat is not considered habitat critical to the survival of the species as there are no sandstone cliffs and fertile wooded valley habitat within close proximity of each other and is less than 0.04% of available habitat for these species within the Project area. Habitat outside the development footprint will not be modified as a result of the works. No significant impact.
south-eastern long-eared bat	0.3ha	No definitions of habitat critical to the survival of south-eastern long-eared bat are provided in available documentation. The development footprint will remove approximately 0.3ha of potential habitat for south-eastern long-eared bat. This is less than 0.05% of available habitat for this species within the Project area and is not of an extent that is likely to lead to a decline in the species. Habitat outside the development footprint will not be modified as a result of the works. No significant impact.
Dunmall's snake	1.7ha	The Project area is not anticipated to provide important habitat for the Brigalow Belt reptiles. The development footprint does not represent a barrier to dispersal throughout the landscape. Vegetation clearing is generally confined to linear corridors, providing minimal fragmentation or barriers to the movement/dispersal of these species. No significant impact.
yakka skink	1.7ha	The Project area is not anticipated to provide important habitat for the Brigalow Belt reptiles. The development footprint does not represent a barrier to dispersal throughout the landscape. Vegetation clearing is generally confined to linear corridors, providing minimal fragmentation or barriers to the movement/dispersal of these species. No significant impact.
collared delma	1.4ha	The Project area is not anticipated to provide important habitat for the Brigalow Belt reptiles. The development footprint does not represent a barrier to dispersal throughout the landscape. Vegetation clearing is generally confined to linear corridors, providing minimal fragmentation or barriers to the movement/dispersal of these species. No significant impact.
white throated snapping turtle	0ha	The ephemeral 1st/2nd order watercourses within the development footprint do not provide suitable habitat for the white-throated snapping turtle and there are no plausible risks of the Project causing direct impacts to potential or known habitat within Eurombah Creek. Indirect downstream impacts of any significance are also not considered plausible given standard mitigation measures (as described in Section 5) for working within watercourses and the substantial distance between the development footprint and known habitat within Eurombah Creek. No significant impact.
Salt pipewort	0 ha	No direct or indirect impacts due to the Project are predicted to either of the spring complexes (Scott's Creek or Lucky Last) where this species is known to occur. No significant impact.

3.1 (e) Listed migratory species

Description

Migratory and marine species identified as known, likely or with potential to occur within the Project area are detailed in Table 6 below.

Table 6: Migratory/Marine species known or likely to occur

Scientific Name	Common Name	Likelihood of Occurrence
<i>Anthus novaeseelandiae</i>	Australasian pipit	Known
<i>Apus pacificus</i>	fork-tailed swift	Likely
<i>Ardea ibis</i>	cattle egret	Potential
<i>Ardea modesta</i>	eastern great egret	Potential
<i>Cacomantis flabelliformis</i>	fan-tailed cuckoo	Likely
<i>Chalcites basal</i>	Horsefield's bronze-cuckoo	Likely
<i>Chalcites lucidus</i>	shining bronze-cuckoo	Likely
<i>Chalcites osculans</i>	black-eared cuckoo	Likely
<i>Coracina novaehollandiae</i>	black-faced cuckoo-shrike	Likely
<i>Coracina papuensis</i>	white-bellied cuckoo-shrike	Likely
<i>Cuculus optatus</i>	oriental cuckoo	Likely
<i>Cuculus saturates</i>	oriental cuckoo	Likely
<i>Eurostopodus mystacalis</i>	white-throated nightjar	Likely
<i>Eurystomus orientalis</i>	dollarbird	Likely
<i>Falco cenchroides</i>	nankeen kestrel	Likely
<i>Grallina cyanoleuca</i>	magpie-lark	Known
<i>Haliaeetus leucogaster</i>	white-bellied sea-eagle	Likely
<i>Hirundapus caudacutus</i>	white-throated needletail	Likely
<i>Hirundo neoxena</i>	welcome swallow	Likely
<i>Merops ornatus</i>	rainbow bee-eater	Likely
<i>Motacilla flava</i>	yellow wagtail	Likely
<i>Myiagra cyanoleuca</i>	satin flycatcher	Likely
<i>Ninox novaeseelandiae</i>	southern boobook	Likely
<i>Todiramphus macleayii</i>	forest kingfisher	Likely
<i>Zosterops lateralis</i>	silveryeye	Likely

Nature and extent of likely impact

An action is likely to have a significant impact on a migratory species if there is a real chance or possibility that it will:

- Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species;
- Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species, or
- Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species.

An area of 'important habitat' for a migratory species is:

- Habitat utilised by a migratory species occasionally or periodically within a region that supports an ecologically significant proportion of the population of the species, and/or
- Habitat that is of critical importance to the species at particular life-cycle stages, and/or

- Habitat utilised by a migratory species which is at the limit of the species range, and/or
- Habitat within an area where the species is declining.

Given the species' migratory habits, the ephemeral nature of food and habitat resources and the extent of habitat across the species' range, it is likely that the existing resources within the Project area would be utilised by most of the migratory/marine species listed. However, as these species are typically common and widespread, and available documentation indicates that the Project area does not include habitat features of particular significance to these species or provide an area of important habitat for a migratory species.

The Project will not seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of any population of a migratory species and the likelihood of a significant impact to migratory species is considered low. No significant impact.

3.1 (f) Commonwealth marine area

Description

There are no Commonwealth Marine Areas in the vicinity of the Project area and, due to the large distance between the Project area and protected marine areas, no direct or indirect impacts are expected to occur.

Nature and extent of likely impact

Due to the large distance between the Project area and Commonwealth Marine Areas, no direct or indirect impacts are expected to occur.

3.1 (g) Commonwealth land

Description

The action is not on Commonwealth land.

Nature and extent of likely impact

N/A

3.1 (h) The Great Barrier Reef Marine Park

Description

The Project area is located approximately 400km south-west of the Great Barrier Reef World Heritage Area (GBRWhA). The Dawson River begins near Injune and flows through the Spring Gully Regional Assessment Area, Taroom, Theodore and Baralaba before meeting the Mackenzie River (FBA, 2011). Where the Dawson and Mackenzie Rivers converge, the Fitzroy River begins, eventually draining into the GBRWhA. The Project area does not occur within the Great Barrier Reef Marine Park.

Nature and extent of likely impact

Due to the large distance between the Project area and the Great Barrier Reef Marine Park, no direct or indirect impacts are expected to occur.

3.1 (i) A water resource, in relation to coal seam gas development and large coal mining development

Description

Groundwater

As described in the Spring Gully Development EPBC Referral Hydrogeological Assessment – Spring Gully South-West Development (KCB, 2016) in Attachment D, the Project is situated within the Surat Basin which forms part of the Great Artesian Basin (GAB). The GAB comprises of a number of regional-scale aquifers and confining aquitards with the aquifers being a significant source of water used for stock, public, and domestic supply. The Bandanna Formation within the Bowen Basin is the target gas bearing formation for the Project. The Bowen Basin underlies the Surat Basin.

The formations of importance to this assessment are the Precipice Sandstone aquifer and Bandanna Formation. The Precipice Sandstone is the oldest unit within the Surat Basin and unconformably overlies Triassic/Permian units of the Bowen Basin. The Precipice Sandstone is overlain by the Evergreen Formation, an aquitard which separates the Precipice Sandstone from the Hutton Sandstone aquifer. Sequences within the Bowen Basin that unconformably underlie the Precipice Sandstone include the Moolayember Formation, Clematis Sandstone, Rewan Group and Bandanna Formation.

Generally, the Bandanna Formation is isolated from overlying Precipice Sandstone aquifer by the Rewan Group aquitard. However, located to the east of Injune along the western extent of the Project area, a north-south trending zone exists where the upper Bowen Basin formations (Moolayember, Clematis and Rewan) are not present. As a result, the Precipice Sandstone unconformably overlies the Bandanna Formation across this zone, increasing the potential for interaction between the two Formations in this area.

The contact area between the Precipice Sandstone and the Bandanna Formation is referred to as the Bandanna Formation sub-crop. To the east of the sub-crop, the Bandanna Formation is separated from the overlying Precipice Sandstone by the very low permeability mudstones of the Rewan Formation. Figure 1 presents the regional hydrostratigraphy as presented in the 2012 Underground Water Impact Report (QWC, 2012).

Ongoing monitoring of the groundwater levels/pressures within the sub-crop area suggests that depressurisation of the Bandanna Formation due to existing extensive development of the Spring Gully and Fairview (operated by Santos, with production occurring since 1996) CSG fields has shown no discernible drawdown of water levels within the Precipice Sandstone to date. In fact, groundwater levels within the Precipice Sandstone have shown a 2m rise between 2007 and 2015 (OGIA, 2016). This rise in groundwater levels has also been observed in the Australia Pacific LNG groundwater monitoring bores installed within the Precipice Sandstone aquifer in proximity to the Project area, and is discussed further below.

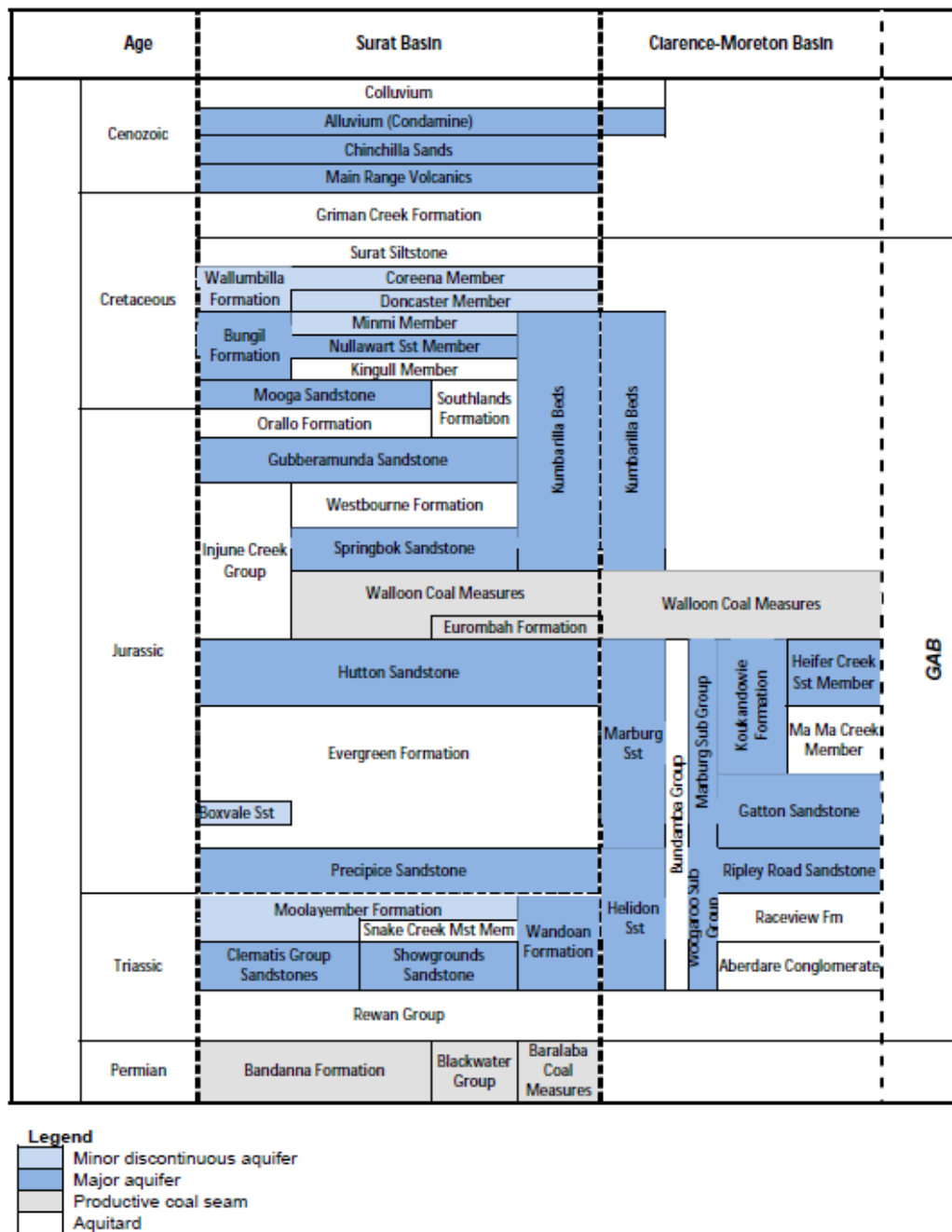


Figure 1: Regional Hydrostratigraphy (sourced from QWC, 2012)

The Precipice Sandstone has historically been depleted through extraction of water for agricultural purposes. Currently, nine groundwater bores, installed for stock and domestic water supply purposes and screened within the Precipice Sandstone, have been identified within a ~25km radius of the Project. Based on the available data from the existing Spring Gully CSG production wells and groundwater monitoring bores, groundwater in the Precipice Sandstone is predominantly NaHCO₃ type water and groundwater extracted from the Bandanna Formation is Na-Cl type water.

Surface water

The Project is located in the Upper Dawson River sub-basin of the Fitzroy Basin catchment. Minor streams of orders 1 and 2 flow into Western Creek (stream order 2) and Eurombah Creek (stream order 5) within the Project area. The development footprint of the Project intersects streams of orders 1 and 2 only. These minor watercourses have low aquatic ecological values as they are ephemeral and typically dry and therefore don't provide habitat for aquatic species of high conservation value, and only occasionally (i.e. in high rainfall events) provide habitat for common aquatic species.

Generally the aquatic habitat of the Spring Gully Regional Assessment Area demonstrates low diversity and complexity (FRC 2016, Attachment C) due to:

- low channel diversity
- low to moderate bank stability
- low flow habitat diversity; watercourses within the Project area are ephemeral and dry most of the time, with temporary riffle and or run habitat only present during significant rainfall events, and shallow isolated pools within watercourses only persisting for short periods after significant rainfall often cleared and/or with sparse riparian vegetation, with the riparian zone of Western Creek containing remnant vegetation
- substrates dominated by clay and/or silt
- limited physical habitat features such as undercut banks and boulders
- low diversity and cover aquatic plants and trailing vegetation.

Watercourses are in relatively poor condition due to past and existing agricultural land uses which have resulted in:

- cleared catchment area and riparian zones, with most of the Project area containing non-remnant vegetation
- cattle disturbances of bank and beds
- erosion of banks and bed, and localised sedimentation of beds
- presence of a range of weed species within and surrounding watercourses.

The surface water quality is typically low and several parameters (including dissolved oxygen, turbidity, total phosphorus and iron) do not meet regional water quality targets.

The species richness and percent cover of aquatic plants is also low in the Project area.

Nature and extent of likely impact

Groundwater

Localised Impacts – Resource Hydrology

An assessment was conducted using Aqtesolv to determine the localised impacts on the Precipice Sandstone aquifer as a result of water extraction from the Bandana Coal Measures for the Project (KCB 2016, Attachment D). The Project is predicted to extract only approximately 167ML of water from the Bandanna Formation over 30 years of operation.

The assessment takes into account the influences from the injection of treated water into the Precipice Sandstone aquifer at Reedy Creek within the Australia Pacific LNG Combabula Development Area, some 50km south-east of the Project area.

The Reedy Creek injection program involves treatment of water produced from the Combabula Development Area and injection into the Precipice Sandstone via twelve bores. The treatment process involves filtration to remove suspended solids, reverse osmosis, blending with filtered associated water, and removal of dissolved gases by membrane de-oxygenation. This process ensures that the quality of injected water is the same or better than the in-situ groundwater of the Precipice Sandstone.

The injection program commenced in early 2015 following several years of detailed scientific trials. The average injection rate during the initial 13 months of operation was 15ML/day. This will increase to 20-25ML/day over the next 15 years and then slowly decrease with the cessation of CSG production.

Positive displacement in groundwater levels of the Precipice Sandstone aquifer from the injection program is observed from groundwater monitoring bores in the region. A rise in groundwater levels of approximately 2m has been observed in Precipice Sandstone monitoring bores within or adjacent to the Project area, as described in Attachment D.

Modelling results indicate that the influence of the Reedy Creek injection program on the Precipice Sandstone aquifer across the Project area overrides any potential minor drawdown effects from the Project. Across the nine groundwater bores and three relevant springs, the net displacement of groundwater levels for the duration of the Project is predicted to remain positive (i.e. no drawdown predicted at these wells or springs for the duration of production), as shown in Figure 2.

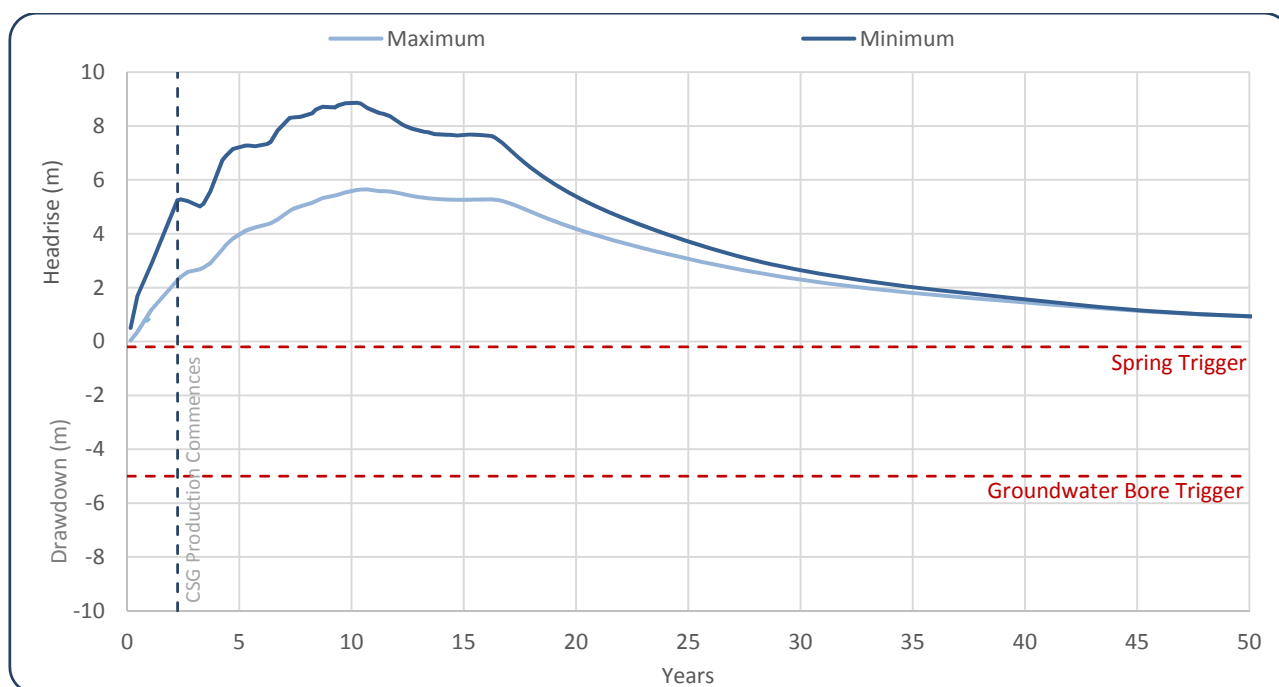


Figure 2: Modelled Minimum and Maximum Headrise/Drawdown at the Groundwater Receptors

As such, the Project is not predicted to cause significant effects to groundwater resource hydrology for any of the following parameters:

- Flow Regime
- Recharge rates to groundwater
- Aquifer pressure or pressure relationship between aquifers.
- Groundwater table and potentiometric surface levels
- Groundwater/surface water interactions
- River/floodplain connectivity
- Inter-aquifer connectivity
- Seriously affects the habitat or lifecycle of a native species dependent on a water resource

Cumulative Impacts – Resource Hydrology

No cumulative impacts to groundwater drawdown are predicted from the Project due to the very small scale of water extraction relative to existing CSG developments and the positive effect of the Reedy Creek injection scheme on water pressures within the Precipice Sandstone.

Resource Quality

Changes in water quality as a result of the Project are not anticipated. As the Precipice Sandstone aquifer overlies the Bandanna Formation, any water extracted from the CSG production wells is drawn down within the Bandanna Formation and therefore, due to the head differential between the formations any interaction or flow of water would be from the Precipice Sandstone to the Bandanna Formation.

The construction of wells has the potential to cause cross flow between the target gas producing formation to another aquifer and introduce substances that may cause environmental harm. To manage these risks wells are constructed in accordance with the Code of Practice for constructing and abandoning coal seam gas wells and associated bores in Queensland (DNRM 2013) which outlines the mandatory requirements for well design, construction and operation. This includes:

- preventing any interconnection between hydrocarbon bearing formations and aquifers
- ensuring that gas is contained within the well and associated pipework and equipment without leakage
- ensuring zonal isolation between different aquifers is achieved
- not introducing substances that may cause environmental harm.

Given these controls, the Project is not predicted to cause significant effects to groundwater resource quality for any of the following parameters:

- Create risk to human or animal health or to the condition of the environment
- Substantially reduce the amount of water available for human consumptive uses or for other uses, including environmental uses which are dependent on water of the appropriate quality
- Causes persistent organic chemicals, heavy metals, salt or other potentially harmful substances to accumulate in the environment

- Causes the establishment of an invasive species (or the spread of an existing invasive species) that is harmful to the ecosystem function of the water resource
- There is a significant worsening of local water quality (where current local water quality is superior to local or regional water quality objectives)
- High quality water is released into an ecosystem which is adapted to a lower quality of water.

Surface water

Without implementation of standard controls (which are described in Section 5) the potential impacts to surface water from the Project include:

- localised sedimentation of watercourses associated with runoff from cleared well leases
- localised increases in turbidity and suspended solids in surface water associated with runoff from cleared well leases
- contamination of watercourses and groundwater from spills of hydrocarbons and chemicals from vehicles and machinery used during lease preparation, drilling, installation and operation of the well.

Construction of pipelines and access tracks across minor watercourses has potential to result in the following effects if not designed and constructed appropriately:

- impacts to fauna passage (e.g. raised bed profile after construction is complete; installation of barriers during construction)
- impacts (barriers) to low flows
- loss of bank stability after constructing, resulting in bank erosion and loss of bank habitat
- loss of bed habitat at the crossing location
- localised loss of riparian vegetation.

The sensitivity, value and quality of the surface water resources in the Project area are considered low and unlikely to be significantly impacted from the proposed activities. Existing impacts to aquatic habitat and water quality will be of greater magnitude and extent than minor localised impacts to ephemeral watercourses that may occur due to the Project. As such, no significant impact on the resource hydrology or resource quality of any surface watercourse is predicted.

3.2 Nuclear actions, actions taken by the Commonwealth (or Commonwealth agency), actions taken in a Commonwealth marine area, actions taken on Commonwealth land, or actions taken in the Great Barrier Reef Marine Park

3.2 (a)	Is the proposed action a nuclear action?	X	No
			Yes (provide details below)
If yes, nature & extent of likely impact on the whole environment			
3.2 (b)	Is the proposed action to be taken by the Commonwealth or a Commonwealth agency?	X	No
			Yes (provide details below)
If yes, nature & extent of likely impact on the whole environment			
3.2 (c)	Is the proposed action to be taken in a Commonwealth marine area?	X	No
			Yes (provide details below)
If yes, nature & extent of likely impact on the whole environment (in addition to 3.1(f))			
3.2 (d)	Is the proposed action to be taken on Commonwealth land?	X	No
			Yes (provide details below)
If yes, nature & extent of likely impact on the whole environment (in addition to 3.1(g))			
3.2 (e)	Is the proposed action to be taken in the	X	No

Great Barrier Reef Marine Park?		Yes (provide details below)
If yes, nature & extent of likely impact on the whole environment (in addition to 3.1(h))		

3.3 Other important features of the environment

3.3 (a) Flora and fauna

The Project area's existing environment has been significantly impacted by a history of land clearing and agricultural land uses that have reduced biodiversity values across the landscape. Surveys of the Spring Gully Regional Assessment Area included the Project area and have been used to describe the baseline terrestrial ecological values present (refer to Attachment B).

Nine (9) broad fauna habitat types were described across the Spring Gully Regional Assessment Area. Of these, five habitat types have small areas remaining in the Project area (refer to Table 7 and Attachment A Figure 3). The vast majority of habitat in the Project area is cleared grazing land.

Table 7: Broad Habitat Types present within the Project area

Broad habitat type	General characteristics (ERM 2016)	Development Footprint (ha)
Sclerophyll woodland to open woodland on alluvial plains	Strongly associated with alluvial plains Sparse to moderate canopy layer Sparse shrub layer with moderate to dense grassy understorey Fallen bark, leaf litter and logs present in low densities Hollow-bearing trees sparse Ledges sparse throughout this habitat type Boulders and rocks very sparse Forage resources for nectarivorous mammals and birds, granivores and insectivores Some habitat for arboreal mammals, owls and parrots Predators, including birds of prey, snakes and dingos	1.4
Fringing sclerophyll open forest/woodland along watercourses and major drainage lines	strongly associated with watercourses Moderate canopy cover Moderate shrub layer with dense ground layer Sparse fallen bark and leaf litter Occasional logs and trees bearing loose bark Hollow bearing trees common Abundant habitat for arboreal mammals, owls and parrots Foraging habitat for microchiropteran bats Some shelter habitat for reptile species Predators including birds of prey, snakes and dingos	0
Brigalow woodland - open forest	In both alluvial plains and undulating landscapes Typically moderate to dense canopy layer Moderate to dense shrub layer usually with native grassy understorey Abundance of fallen bark, trees with loose bark, leaf litter and small-large logs with hollows Tree hollows sparse No caves/ledges Forage resources for nectarivorous mammals and birds, granivores and insectivores Predators, including birds of prey, snakes and dingos High amount of shelter habitat for reptile species	0.2
Spotted gum open forest on hill slopes and crests	Moderate canopy cover Moderate shrub layer, with sparse to dense ground layer Occurs on hills and ranges formed from medium to coarse grained sediments Leaf litter, fallen bark, logs and trees with loose bark present Boulders and rocky micro-habitats common Hollows present Caves and ledges relatively common throughout this broad habitat type Abundance of habitat for mammal and reptile species Abundance of habitat for roosting and foraging microchiropteran bats Forage resources for nectarivorous mammals and birds, granivores and	0

Broad habitat type	General characteristics (ERM 2016)	Development Footprint (ha)
	insectivores	
Callitris woodland-open forest on hills and plains	Moderate to dense canopy cover Moderate shrub and ground layers Fallen bark, leaf litter, and logs present in variable abundances from sparse to common Sparse boulders and rocks Hollow-bearing trees sparse Caves and ledges very sparse Habitat for grassland and woodland bird species	0.2

3.3 (b) Hydrology, including water flows

Refer to Section 3.1 (i) for a description on the hydrology within the Project area.

3.3 (c) Soil and Vegetation characteristics

The Project is located in the Southern Downs subregion (11.26), the largest subregion in the Brigalow Belt bioregion.

The Southern Downs subregion contains Jurassic and Cretaceous sediments that form outcrops around the Great Artesian Basin. The sediments form a low hilly landscape and are fine grained forming the Great Artesian basin watershed. The landforms and geology of this subregion are relatively complex but generally comprise low hills and undulating plains derived from fine-grained sedimentary rocks, with clay-dominated flood-out country in the south (Sattler and Williams, 1999). Vegetation communities within this subregion are dominated by brigalow, narrow-leaved ironbark (*Eucalyptus crebra*) and belah (*Casuarina cristata*) (Sattler and Williams, 1999). Within the Project area, this subregion comprises the mostly cleared, undulating grazing and farming land.

3.3 (d) Outstanding natural features

There are no outstanding natural features in the Project area.

3.3 (e) Remnant native vegetation

The various Regional Ecosystems (RE) mapped for the Project area and their broad habitat values are listed in Table 8 and mapped in Attachment A Figure 3. The remaining 3,176 ha (85% of the Project area) is characterised by cleared grazing land.

Table 8: Regional Ecosystems

RE	EPBC Status	Description	Broad habitat values	Project area (ha)	Development footprint (ha)
11.10.1/ 11.3.2	Not Listed	<i>Corymbia citriodora</i> woodland on coarse-grained sedimentary rocks <i>Eucalyptus populnea</i> woodland on alluvial plains	Spotted gum open forest on hill slopes and crests Sclerophyll woodland and open woodland on alluvial plains	384.2	0
11.10.9	Not Listed	<i>Callitris glaucophylla</i> woodland on coarse-grained sedimentary rocks	Callitris woodland-open forest on hills and plains	32.3	0.2
11.3.2	Not Listed	<i>Eucalyptus populnea</i> woodland on alluvial plains	Sclerophyll woodland and open woodland on alluvial plains	17.3	1.4
11.3.2/ 11.3.25	Not Listed	<i>Eucalyptus populnea</i> woodland on alluvial plains <i>Eucalyptus tereticornis</i> or <i>E. camaldulensis</i> woodland fringing drainage lines	Fringing sclerophyll open forest and woodland along watercourses and major drainage lines Sclerophyll woodland and open woodland on alluvial plains	10.0	0
11.9.5	Endangered	Brigalow (<i>Acacia harpophylla</i> dominant and co-dominant) open forest on fine-grained sedimentary rocks	Brigalow woodland and open forest	134.4	0.2

Six introduced terrestrial vertebrates were recorded from the Spring Gully Regional Assessment Area, and are likely to occur within the Project area. Introduced species recorded were:

- One amphibian - cane toad (*Rhinella marina*)
- Five mammals –European rabbit (*Oryctolagus cuniculus*), cat (*Felis catus*), pig (*Sus scrofa*), dog (*Canis familiaris*), and red fox (*Vulpes vulpes*).

3.3 (f) Gradient (or depth range if action is to be taken in a marine area)

The Project area is gently undulating to flat with slopes up to 10% over the majority of the area.

3.3 (g) Current state of the environment

The majority of the Project area has been cleared, with the exception of isolated remnant shadelines, patches of regrowth vegetation and vegetation along Western Creek and Eurombah Creek. The area has historically been utilised as a grazing enterprise for managed cattle.

3.3 (h) Commonwealth Heritage Places or other places recognised as having heritage values

There are no commonwealth heritage places or other places recognised as having heritage values with the Project area.

3.3 (i) Indigenous heritage values

The Project area is located on Mandandanji country.

To date a large number of Aboriginal Heritage finds (including flakes and corestones) have been identified within the Project Area which have been collected and relocated in accordance with the CHMP.

3.3 (j) Other important or unique values of the environment

There are no other important or unique values in the Project area.

3.3 (k) Tenure of the action area (eg freehold, leasehold)

The majority of the Project area is freehold with one parcel lands lease.

3.3 (l) Existing land / marine uses of area

The Project area is utilised as a grazing enterprise for managed cattle.

3.3 (m) Any proposed land / marine uses of area

The Project area will be used for undertaking petroleum activities and cattle grazing will continue.

4 Environmental outcomes

Ecological assessments have been undertaken to assess any likely impacts to MNES from the Project. These assessments have involved field surveys, desktop reviews and significant impact assessments for MNES. These assessments have concluded that the Project is not likely to result in a significant impact upon any MNES and therefore the development of outcomes based conditions is not proposed.

5 Measures to avoid or reduce impacts

Management measures to minimise impacts to MNES are based on the following hierarchy:

1. Avoid direct and indirect adverse impacts to MNES
2. Mitigate and manage any unavoidable direct and indirect adverse impacts to MNES
3. Implement remediation and rehabilitation of impacted areas to promote long-term recovery of MNES

Avoid Direct And Indirect Adverse Impacts To MNES	
Avoidance	Ecology surveys have been undertaken to ground-truth vegetation communities, sample presence of flora and fauna species, determine habitat values and identify areas of existing disturbance. Results of the ecology surveys have been used to inform infrastructure planning and decision making, as follows: • Infrastructure will be preferentially sited to avoid areas of TEC or habitat for listed species. Where such areas are unavoidable, the disturbance area will be minimised to the greatest extent practicable. • Use of existing disturbed areas (such as access tracks, clearings) will be maximised as far as practicable to reduce disturbance to remnant vegetation. • Ancillary infrastructure (laydown areas, temp camps etc.) will be sited in cleared land and will not require clearing of remnant vegetation.
Mitigate And Manage Any Unavoidable Direct And Indirect Adverse Impacts To MNES	
Pre-clearance Inspections	A pre-clearing inspection will be undertaken by a qualified fauna spotter catcher (holds a valid rehabilitation permit (spotter/catcher endorsed)). A qualified fauna spotter catcher will also be present during clearing activities. If active breeding places of listed fauna species are identified during the pre-clear inspection or construction, a buffer will be established and marked out as directed by the fauna spotter catcher. The fauna spotter catcher is to determine whether the active breeding place is to be relocated, left in situ to allow the breeding cycle to occur (i.e. young have fully fledged or left the breeding place) or if clearing is to proceed. The following hierarchy is to be applied, and records kept by the fauna spotter catcher to demonstrate application of the hierarchy: • Avoid – leave the active breeding place in situ to allow the breeding cycle to occur • Relocate the active breeding place to adjacent undisturbed habitat and monitor to determine a return by breeding individuals. • Remove the active breeding place or remove young/eggs from irrecoverable breeding place and place in the care of a wildlife carer until ready for release to the wild. If options 1 to 3 are not practicable the active breeding place may be destroyed (destroy eggs/euthanase young, orphaned animal) where it is deemed by the fauna spotter catcher that that the young/eggs cannot be successfully rehabilitated to the wild. The Code of Practice "Care of sick injured or orphaned Animals in Queensland" (EHP, 2013) must be followed in the event euthanasia is required. Any animal captured under the permit will be returned to the nearest appropriate habitat (or in accordance with the relevant permit holders conditions), unless the animal is sick, injured or orphaned.
Incident Response	If during clearing, a listed species is found sick, injured or orphaned a fauna spotter catcher who holds a valid rehabilitation permit will conduct fauna handling in

	accordance with Code of Practice – Care of Sick, Injured or Orphaned Protected Animals in Queensland (EHP 2013). Any injured fauna shall be transported to a veterinarian or recognised wildlife carer immediately for treatment or euthanized, if necessary. The permit holder must notify EHP within 24 hours of taking possession of a vulnerable animal.
Clearing Controls	Clearing will be carried out in a sequential manner and in a way that directs escaping wildlife away from clearing and into adjacent native vegetation or natural areas and not cross roads or into other areas of threat.
Speed Restriction	A speed limit of 40km/hr will be enforced in construction sites to minimise mortality by vehicle collision.
Staff Induction and training	Staff conducting clearing activities should be educated in fauna management measures, prior to commencing activities. Staff involved in clearing will be instructed to follow the advice of the available suitably qualified fauna spotter catcher.
Dust Controls	To minimise the generation of dust, the following controls will be implemented: • The area of exposed soils will be minimised and progressively reinstated as soon as possible upon completion of the works; • Exposed and/or disturbed soils will be regularly treated with water where required to mitigate dust generation; • During dry and windy conditions, high dust generating works (e.g. stripping, excavation) will be avoided where feasible; and • Dust suppression activities will be modified or increased in the event of unacceptable dust generation or in the event of a complaint.
Noise Controls	Noise attenuation devices (e.g. mufflers) will be installed and maintained on all equipment during construction activities to minimise noise pollution disturbance to foraging, breeding or roosting.
Directional Lighting	Directional lighting or shrouding of lights will be used to reduce light spillage into any habitat areas adjacent to construction activities to minimise light pollution disturbance to foraging, breeding or roosting.
Reduce risk of fire	The following controls will be implemented to minimise the risk of fire: • No burning of cleared vegetation will be undertaken; • Fire extinguishers will be present at the location of hot works (primarily welding); • Hot works permits will be followed at all times where applicable; • Site vehicles will be equipped with fire extinguishers; • Flammable material will not be stockpiled or stored near hot work activities (including vegetation stockpiles); and • Smoking areas will be designated with provision for containers for safe disposal of cigarette butts.
Weed and Pest Control	The following key measures, amongst others described in the Australia Pacific LNG Biosecurity Management Plan (Q-1000-15-MP-107), will be implemented for the management of declared weeds and pests: • All vehicles requiring access to an Origin site or property must have a valid biosecurity hygiene declaration unless an exemption applies. Biosecurity hygiene declarations are to be issued only by an authorised inspector; • All vehicles/equipment carrying loads of high-risk materials must also have a valid biosecurity hygiene declaration for that load; • Personnel must not enter areas of known weed infestation (e.g. areas fenced or signed as weed zones) without prior approval from the environmental advisor or health, safety and environment advisor responsible for the area; • Pre-clearance weed survey will be completed to identify declared weeds present at a site. A site specific weed management plan will be prepared if required and will outline roles and responsibilities, proposed treatment, access controls and survey results; • The construction area will be monitored for weed growth during regular inspections. In the event a weed infestation is discovered, access to the

	area will be restricted and weed control will be undertaken. Random spots checks of vehicles, equipment and visitors will be completed to ensure conformance with the weed hygiene procedures; • Reinstated areas will also be monitored for effectiveness of prevention, containment and control strategies; and • In the event a biosecurity threat other than weeds is identified, the following must be completed: - Attempt to confirm the identity of the pest or pathogen where possible; - Check whether the species is listed on the notifiable pests list; - If the pest is a notifiable pest, immediately advise the Project Delivery Environment Manager who must notify Biosecurity Queensland or the Emergency Disease Watch Hotline; - Notify landholders where required and as advised by the Environment Manager and Land Relations Advisor; and - Prepare a site-specific pest management procedure outlining specific management actions to address the threat as required.
Erosion and Sediment Controls	A site specific erosion and sediment control plan will be prepared and implemented during construction to minimise sedimentation off site and impacts to adjacent watercourses.
Specific Management Measures for Koalas	When a koala is identified in a tree or trees where the crown is overlapping with the trees earmarked for clearing, the fauna spotter catcher must establish an exclusion zone around the tree in which the koala is residing. The exclusion zone must be clearly marked by tape and/ or signage to ensure there is no clearing in that area until the koala has moved from the tree of its own accord. The exclusion zone should include a path for the koala to move out of the clearing area on its own accord. The fauna spotter catcher must take in to account the following when marking the exclusion zone: • Any tree that could cause risk to the koala if being felled • Direction of clearing • A way for the koala to leave the clearing site (trees that can act as a corridor) • Suitable locations away from the clearing site for the koala to self-relocate to. A fauna spotter catcher must ensure that no vegetation is cleared that can fall into the marked exclusion zone and no vehicles are to enter the exclusion zone at any time until the koala has moved on without the authorisation of the fauna spotter catcher. Throughout clearing the fauna spotter catcher must monitor the koala. If the koala displays signs of stress or agitation (i.e. moving about the tree, sitting up, unsettled and staying alert) the clearing must cease at that location and can continue further away from the koala as directed by the fauna spotter catcher.
Specific Management Measures for fauna capture in trenches and pipelines	The length of open trench will be minimised and backfilling must be undertaken progressively. Cellar pits on leases will be backfilled immediately following drilling operations Duration of open excavations (including bell holes) will be minimised and backfilled immediately following completion of construction Fauna egress (e.g. matting, ladder) will be installed in all excavations left open overnight Fauna refuge will be installed for any open excavations left open overnight Open excavations and trenches will be inspected daily on active work sites and weekly in other areas Prior to backfilling, the excavation or trench must be inspected for presence of fauna and evidence of burrowing fauna or breeding places. If fauna present, a fauna spotter catcher must relocate the animal. The use of "night caps" will be implemented over ends of welded pipe to prevent the ingress of wildlife

	Pipes will be strung with gaps to allow for fauna movement across the line of the pipe.
Implement Remediation And Rehabilitation Of Impacted Areas To Promote Long-Term Recovery Of MNES	
Progressive rehabilitation	Progressive rehabilitation of significantly disturbed land which is not required for ongoing petroleum activities will be undertaken and will commence within nine months following completion of works. Progressive rehabilitation will include: • Remediation of any land contaminated during construction (e.g. soils contaminated from minor hydrocarbon spills) • Reshape all significantly disturbed land to a stable landform • Re-profile all significantly disturbed land to original contours and re-establish surface drainage lines • Reinststate the top layer of the soil profile • Establish groundcover to ensure that erosion is minimised • Establish vegetation of floristic species composition found in analogue sites. Regular maintenance and at least yearly monitoring for three years of rehabilitated areas will be undertaken to determine rehabilitation success. In the event the rehabilitation is not successful, maintenance and monitoring will continue until it has been achieved for three years.

6 Conclusion on the likelihood of significant impacts

6.1 Do you THINK your proposed action is a controlled action?

☒	No, complete section 5.2
☐	Yes, complete section 5.3

6.2 Proposed action IS NOT a controlled action.

The Project does not impact World Heritage Properties, National Heritage Places, Great Barrier Reef Marine Park, Commonwealth marine areas or Commonwealth land and it is not a nuclear action.

Two (2) TECs (Brigalow and EPBC groundwater community), twelve (12) listed threatened species and twenty five migratory/marine species are likely or have potential to occur within the Project area or are known to occur proximal to the Project area. The significance of impacts to these species and ecological communities has been assessed using available Commonwealth guidelines, including:

- Matters of National Environmental Significance Significant Impact Guidelines 1.1 (SIG 1.1) (DoE 2013)
- Draft Referral Guidelines for the Nationally Listed Brigalow Belt Reptiles (DSEWPAC 2011)
- EPBC Act referral guidelines for the vulnerable koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) (DoE 2014).

Due to the Project area's highly disturbed nature, the avoidance measures implemented during the design phase and limited potential for important populations to occur it is concluded that no significant impact is likely to occur for any EPBC Act-listed threatened species or TEC.

The groundwater modelling results indicate that the influence of the Reedy Creek injection program on the Precipice Sandstone aquifer across the Project area overrides any potential minor drawdown effects from the Project. Across the nine groundwater bores and three relevant springs, the net displacement of groundwater levels for the duration of the Project is predicted to remain positive (i.e. no drawdown predicted at these wells or springs for the duration of production). No significant impacts to groundwater resource hydrology are predicted as a result of the Project.

No cumulative impacts to groundwater drawdown are predicted from the Project due to the very small scale of water extraction relative to existing CSG developments and the positive effect of the Reedy Creek injection scheme on water pressures within the Precipice Sandstone.

Changes in water quality as a result of the Project are not anticipated due to the nature of the geology and the construction of wells in accordance with the Code of Practice for constructing and abandoning coal seam gas wells and associated bores in Queensland (DNRM 2013) which outlines the mandatory requirements for well design, construction and operation. No significant impacts to groundwater resource quality are predicted as a result of the Project.

The sensitivity, value and quality of the surface water resources in the Project area are considered low and unlikely to be significantly impacted from the proposed activities. Existing impacts to aquatic habitat and water quality will be of greater magnitude and extent than minor localised impacts to ephemeral watercourses that may occur due to the Project. No significant impacts to surface water resource hydrology or quality are predicted as a result of the Project.

6.3 Proposed action IS a controlled action

Matters likely to be impacted

☐	World Heritage values (sections 12 and 15A)
☐	National Heritage places (sections 15B and 15C)
☐	Wetlands of international importance (sections 16 and 17B)
☐	Listed threatened species and communities (sections 18 and 18A)
☐	Listed migratory species (sections 20 and 20A)
☐	Protection of the environment from nuclear actions (sections 21 and 22A)
☐	Commonwealth marine environment (sections 23 and 24A)
☐	Great Barrier Reef Marine Park (sections 24B and 24C)
☐	A water resource, in relation to coal seam gas development and large coal mining development

	(sections 24D and 24E)
	Protection of the environment from actions involving Commonwealth land (sections 26 and 27A)
	Protection of the environment from Commonwealth actions (section 28)
	Commonwealth Heritage places overseas (sections 27B and 27C)

7 Environmental record of the responsible party

NOTE: If a decision is made that a proposal needs approval under the EPBC Act, the Environment Minister will also decide the assessment approach. The EPBC Regulations provide for the environmental history of the party proposing to take the action to be taken into account when deciding the assessment approach.

	Yes	No
7.1 Does the party taking the action have a satisfactory record of responsible environmental management? Provide details Origin Energy is committed to responsible environmental management. The Health, Safety and Environmental Management System helps govern all activities and ensures continual improvement in managing environmental risks. Origin sets objectives and targets that promote the efficient use of resources, minimisation of wastes and emissions, and the prevention of pollution. We aim to comply with all environmental regulations and conditions attached to our approvals to operate, and promptly report any non-compliance to relevant authorities. We encourage our people to report on environmental performance associated with our activities. To increase our understanding and improve our company-wide performance we maintain a register of all environmental incidents, observations and good practices.	x	
7.2 Has either (a) the party proposing to take the action, or (b) if a permit has been applied for in relation to the action, the person making the application - ever been subject to any proceedings under a Commonwealth, State or Territory law for the protection of the environment or the conservation and sustainable use of natural resources? If yes, provide details No. Origin Energy has not been subject to court proceedings under a Commonwealth, State or Territory law for the protection of the environment or the conservation and sustainable use of natural resources.		x
7.3 If the party taking the action is a corporation, will the action be taken in accordance with the corporation's environmental policy and planning framework? If yes, provide details of environmental policy and planning framework Origin Energy is committed to protecting the environment and consequently manages Health Safety and Environment (HSE) matters as critical business activities. Origin Energy has developed corporate environmental policies that provide a public statement of the corporate commitment to protecting the environment during operations. In addition, Origin Energy, as an operator of gas production activities, uses a structured approach to the management of HSE issues through a documented HSE Management System. This management system ensures that environmental risks associated with Origin's operations are either avoided or kept to as low as reasonably practicable. In addition the HSE Management System drives continuous improvement in the company's environmental performance and assists in providing confidence to regulators, commercial partners and stakeholders that Origin is managing its operations in an environmentally responsible way. The corporate Health, Safety and Environmental policy forms part of Origin's HSE Management System. A copy of which is attached to this referral (Attachment E).	x	
7.4 Has the party taking the action previously referred an action under the EPBC Act, or been responsible for undertaking an action referred under the EPBC Act?	x	

Provide name of proposal and EPBC reference number (if known)

Reference Number	Title of Referral	Date Received
2016/7694	Origin Energy Darling Downs Solar Farm Pty Ltd/Energy Generation and Supply (renewable)/Lot 119 SP227731/Queensland/Darling Downs Solar Farm, west of Dalby, Qld	29 Apr 2016
2015/7551	Origin Energy Resources Ltd/Energy generation and supply (non-renewable)/Otway Basin/VIC/Halladale and Speculant Gas Pipeline Project, North of Port Campbell, Vic	2 Sept 2015
2012/6565	Origin Energy Resources Limited/Exploration (mineral, oil and gas - marine)/Otway Basin/VIC/The Enterprise 3D Seismic Acquisition Survey, Otway Basin, Vic	2 Oct 2012
2012/6545	Origin Energy Resources Limited/Exploration (mineral, oil and gas - marine)/Otway Basin/VIC/The Enterprise 3D Seismic Acquisition Survey, Otway Basin, Vic	11 Sep 2012 Withdrawn 28 Sep 2012
2011/6421	Origin Energy Resources Limited/Exploration (mineral, oil and gas – marine)/Otway Basin/Commonwealth Marine/Otway Astrolabe 3D Marine Seismic Survey, Otway Basin	7 Jun 2012
2011/6125	Origin Energy Resources Limited/Exploration (mineral, oil and gas – marine)/S of Vic, the Otway Basin, Southern Eastern Marine region/Commonwealth Marine/Otway Basin Exploration Drilling Campaign, Vic	22 Sep 2011
2011/6091	Origin Energy ATP Pty Limited/Mining/300km west of Brisbane /QLD/Ironbark Coal Seam Gas Project	25 Aug 2011 Withdrawn 4 Apr 2014
2011/6048	Origin Energy Resources Ltd/Exploration (mineral, oil and gas - marine)/100km northwest King Island/VIC/Astrolabe 3D Marine Seismic Survey	26 Jul 2011
2011/5879	Halladale & Black Watch Gas Field Development Project	2011
2010/5701	Bass Basin between Tasmania and Victoria/ Aroo Chappell 3D seismic survey	21 Oct 2010
2010/5700	Offshore Otway Region of the Bass Strait/ Undertake a three dimensional marine seismic survey	21 Oct 2010
2010/5558	Origin Energy Resources Ltd/Exploration (mineral, oil and gas - marine)/VIC/RL2, PEP168, PPL10, Otway region, 10km NW of Peterborough/VIC/Speculant 3D Transition Zone Seismic Survey	5 July 2010
2009/4913	Origin Energy Power Limited/Energy generation and supply (non-renewable)/Approx. 2.2 kms SE of Garvoc/VIC/Gas Pipeline Crossing at Mount Emu Creek	27 May 2009
2009/4776	Origin Energy Resources Ltd/Exploration (mineral, oil and gas - marine)/Approx 160kms North-West of Devonport/TAS/Rockhopper-1 and Trefoil-2 Exploration Drilling in Permit Area T/18P	03 Mar 2009
2008/4456	Origin Energy CSG Limited/Mining/Condamine-Kogan Rd, Chinchilla/QLD/Proposed Coal Seam Gas Development & Associated Infrastructure	15 Sep 2008
2007/3551	Origin Energy Resources Limited/Exploration (mineral, oil and gas - marine)/Bass Basin of Bass Strait/Commonwealth Marine/Silvereye 3D Seismic Survey	18 Jul 2007
2007/3377	Origin Energy/Energy generation and supply (non-renewable)/Braemar/QLD/Darling Downs Power Station	28 Mar 2007
2006/2881	Origin Energy Power Limited/Water transport/Mortlake/VIC/Water pipelines, Mortlake Power Station	21 Jun 2006
2005/2180	Origin Energy /Exploration (mineral, oil, gas)/Bass Strait/TAS/Shearwater 2D and 3D marine seismic survey	21 Jun 2005
2005/1995	Origin Energy Power Ltd/Energy generation and supply/Spring Gully/QLD/Construction and operation of a gas fired power station	10 Feb 2005
2005/1984	Origin Energy Power Limited/Energy generation and supply/Port Campbell-Mortlake/VIC/Victorian Generator Project	03 Feb 2005
2005/1942	Origin Energy Retail Ltd/Energy generation and supply/Poolaijelo to Penola/VIC & SA/SESA Pipeline	10 Jan 2005
2004/1924	Origin Energy Limited/Energy generation and supply/Spring	21 Dec 2004

Reference Number	Title of Referral	Date Received
	Gully/QLD/Spring Gully Gas Field (Stage 2)	
2004/1644	Origin Energy CSG Limited/Exploration (mineral, oil, gas)/Spring Gully/QLD/Spring Gully gas field development (Stage 1) within petroleum leases PL195, PL204, PL200 and PL203	15 Jul 2004
2004/1611	Origin Energy/Energy generation and supply/Yankalilla/SA/Kemmiss Hill Road Wind Farm	25 Jun 2004
2003/1154	Oil Company of Australia/Water management and use/Durham Ranch Gas Field/North of Roma/QLD/Discharge of Water From Reverse Osmosis Treatment	19 Aug 2003
2003/1058	Origin Energy Resources Limited/Exploration (mineral, oil, gas)/Bass Strait/Commonwealth Marine/Exploration Drilling Well Trefoil-1	08 May 2003

8 Information sources and attachments

(For the information provided above)

8.1 References

- List the references used in preparing the referral.
- Highlight documents that are available to the public, including web references if relevant.

Commonwealth of Australia, 2014. Ecological and hydrogeological survey of the Great Artesian Basin springs - Springsure, Eulo, Bourke and Bogan River supergroups. Volume 1: history, ecology and hydrogeology, Knowledge report, prepared by UniQuest for the Department of the Environment, Commonwealth of Australia

Department of Environment and Heritage Protection, 2013. Code of Practice - Care of sick injured or orphaned Animals in Queensland

Department of Environment and Heritage Protection, 2014a. General Beneficial Use Approval Associated Water (including coal seam gas water)

Department of Environment and Heritage Protection, 2014b General Beneficial Use Approval - Irrigation of Associated Water (including coal seam gas water)

Department of the Environment, 2013. Matters of National Environmental Significance Significant Impact Guidelines 1.1

Department of the Environment, 2014. EPBC Act referral guidelines for the vulnerable koala (combined populations of Queensland, New South Wales and the Australian Capital Territory)

Department of Natural Resources and Mines, 2013. Code of Practice for constructing and abandoning coal seam gas wells and associated bores in Queensland – Edition 2.0

Department of Employment, Economic Development and Innovation, 2010. Land Access Code

Department of Sustainability, Environment, Water, Population and Communities, 2011. Draft Referral Guidelines for the Nationally Listed Brigalow Belt Reptiles

Environmental Resources Management Australia Pty Ltd, 2016. Spring Gully South-West Development Area, Matters of National Environmental Significance

Fensham R.J, Ponder, W.F. and Fairfax, R.J. 2010. *Recovery plan for the community of native species dependent on natural discharge of groundwater from the Great Artesian Basin*. Report to Department of the Environment, Water, Heritage and the Arts, Canberra. Queensland Department of Environment and Resource Management, Brisbane

Fensham, R. J, Pennay, C. and Drimer, J. 2011. Ecological and botanical survey of springs in the Surat Cumulative Management Area. Department of Environment and resource Management, Brisbane

Golder and Associates 2013. Options for Fairview Springs, Evaluation of Prevention or Mitigation Options (EPMOR)

Fitzroy Basin Association (FBA), 2011. Caring for our Catchment: Fitzroy Basin in Flood. Fitzroy Basin Association. Available from: <http://www.fba.org.au/downloads/FitzroyBasinInFlood-FactSheet.pdf> . Accessed May 2012

FRC environmental, 2016. Spring Gully Environmental Protection and Biodiversity Conservation Act Referral - Aquatic Matters of National Environmental Significance, Spring Gully South-West Development

Klohn Crippen Berger Ltd, 2016. Spring Gully Development EPBC Referral Hydrogeological Assessment – Spring Gully South-West Development

Office of Groundwater Impact Assessment (OGIA), 2015. Wetland Conceptualisation; A summary report on the conceptualisation of springs in the Surat Cumulative Management Area, Version 2.0, Department of Natural Resources and Mines, Brisbane

Office of Groundwater Impact Assessment (OGIA), 2016. Underground Water Impact Report for the Surat Cumulative Management Area – Consultation Draft. Department of Natural Resources and Mines, Brisbane

Queensland Water Commission (QWC), 2012. Underground Water Impact Report for the Surat Cumulative Management Area

Sattler, P and Williams, R, 1999. The Conservation Status of Queensland's Bioregional Ecosystems. Environmental Protection Agency, Brisbane

Threatened Species Scientific Committee, 2014. Conservation Advice for Elseya albagula White-throated snapping turtle <http://www.environment.gov.au/biodiversity/threatened/species/pubs/81648-conservation-advice.pdf> Accessed May 2016

Todd, E.V., Blair, D., Farley, S., Farrington, L., Fitzsimmons, N.N., Georges, A., Limpus, C.J. & Jerry, D.R., 2013, 'Contemporary genetic structure reflects historical drainage isolation in an Australian snapping turtle, Elseya albagula', *Zoological Journal of the Linnean Society* 169: 200-214'

Abbreviation	Description
ATP	Authority to Prospect
Australia Pacific LNG	Australia Pacific LNG Pty Limited
Australia Pacific LNG CSG Marketing	Australia Pacific LNG CSG Marketing Pty Limited
CHMP	Cultural Heritage Management Plan
CSG	coal seam gas
EA	Environmental Authority
EIS	environmental impact statement
EP Act	<i>Environmental Protection Act 1994</i>
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
ESA	environmentally sensitive areas
GAB	Great Artesian Basin
GBRWA	Great Barrier Reef World Heritage Area
HSE	Health Safety and Environment
LNG	liquefied natural gas
LWD	Landspray while drilling
MDL	minimum disturbance leases
MNES	matters of national environmental significance
NSW	New South Wales
PAG Act	<i>Petroleum and Gas (Production and Safety) Act 2004</i>
PL	Petroleum Lease
PMST	Protected matters search tool
RE	Regional Ecosystems
RoW	right of way
TEC	threatened ecological communities

8.2 Reliability and date of information

For information in section 3 specify:

- source of the information;
- how recent the information is;
- how the reliability of the information was tested; and
- any uncertainties in the information.

The information provided in Section 3 has been sourced from various studies gathered from published and unpublished literature as listed in Section 8.1.

The search of protected matters of national significance conducted using the EPBC online database and interactive mapping tool for the proposed project area was undertaken on 6 June 2016 with a 10km buffer.

8.3 Attachments

Indicate the documents you have attached. All attachments must be less than three megabytes (3mb) so they can be published on the Department's website. Attachments larger than three megabytes (3mb) may delay the processing of your referral.

		✓ attached	Title of attachment(s)
You must attach	figures, maps or aerial photographs showing the project locality (section 1)	✓	Attachment A: Maps
	GIS file delineating the boundary of the referral area (section 1)		
	figures, maps or aerial photographs showing the location of the project in respect to any matters of national environmental significance or important features of the environments (section 3)	✓	Attachment A: Maps

If relevant, attach	copies of any state or local government approvals and consent conditions (section 2.5)		
	copies of any completed assessments to meet state or local government approvals and outcomes of public consultations, if available (section 2.6)		
	copies of any flora and fauna investigations and surveys (section 3)	✓	• Attachment B - Spring Gully South-West Development Area, Matters of National Environmental Significance (ERM, 2016) • Attachment C - Spring Gully Environmental Protection and Biodiversity Conservation Act Referral - Aquatic Matters of National Environmental Significance, Spring Gully South-West Development (FRC, 2016) • Attachment D - Spring Gully Development EPBC Referral Hydrogeological Assessment – Spring Gully South-West Development (KCB, 2016)
	technical reports relevant to the assessment of impacts on protected matters that support the arguments and conclusions in the referral (section 3 and 4)	✓	
	report(s) on any public consultations undertaken, including with Indigenous stakeholders (section 3)		

9 Contacts, signatures and declarations

NOTE: Providing false or misleading information is an offence punishable on conviction by imprisonment and fine (s 489, EPBC Act).

Under the EPBC Act a referral can only be made by:

- the person proposing to take the action (which can include a person acting on their behalf); or
- a Commonwealth, state or territory government, or agency that is aware of a proposal by a person to take an action, and that has administrative responsibilities relating to the action¹.

Project title:

9.1 Person proposing to take action

1. Name and Title: Natasha Patterson
General Manager Land, Access and Community

2. Organisation (if applicable): Australia Pacific LNG Pty Limited

3. EPBC Referral Number (if known):

4: ACN / ABN (if applicable): 001 646 331

5. Postal address GPO Box 148
Brisbane QLD 4001

6. Telephone: 07 3033 1862

7. Email: Natasha.patterson@originenergy.com.au

8. Name of proposed proponent (if not the same person at item 1 above and if applicable):

9. ACN/ABN of proposed proponent (if not the same person named at item 1 above):

COMPLETE THIS SECTION ONLY IF YOU QUALIFY FOR EXEMPTION FROM THE FEE(S) THAT WOULD OTHERWISE BE PAYABLE

I qualify for exemption from fees under section 520(4C)(e)(v) of the EPBC Act because I am: ☐ an individual; OR

☐ a small business entity (within the meaning given by section 328-110 (other than subsection 328-119(4)) of the *Income Tax Assessment Act 1997*); OR

☐ not applicable.

If you are small business entity you must provide the Date/Income Year that you became a small business entity:

¹ If the proposed action is to be taken by a Commonwealth, state or territory government or agency, section 8.1 of this form should be completed. However, if the government or agency is aware of, and has administrative responsibilities relating to, a proposed action that is to be taken by another person which has not otherwise been referred, please contact the Referrals Gateway (1800 803 772) to obtain an alternative contacts, signatures and declarations page.

Note: You must advise the Department within 10 business days if you cease to be a small business entity. Failure to notify the Secretary of this is an offence punishable on conviction by a fine (regulation 5.23B(3) Environment Protection and Biodiversity Conservation Regulations 2000 (Cth)).

COMPLETE THIS SECTION ONLY IF YOU WOULD LIKE TO APPLY FOR A WAIVER

I would like to apply for a waiver of full or partial fees under Schedule 1, 5.21A of the [EPBC Regulations](#). Under sub regulation 5.21A(5), you must include information about the applicant (if not you) the grounds on which the waiver is sought and the reasons why it should be made:

☐ not applicable.

Declaration

I declare that to the best of my knowledge the information I have given on, or attached to this form is complete, current and correct.
I understand that giving false or misleading information is a serious offence.
I agree to be the proponent for this action.
I declare that I am not taking the action on behalf of or for the benefit of any other person or entity.

Signature



Date 7/6/16

9.2 Person preparing the referral information (if different from 8.1)

[Individual or organisation who has prepared the information contained in this referral form.](#)

Name Tom Hatfield

Title Environmental Approvals Manager, Origin Energy

Organisation Australia Pacific LNG Pty Limited

ACN / ABN (if applicable) 001 646 331

Postal address GPO Box 148
Brisbane QLD 4001

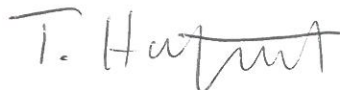
Telephone 07 3028 7156

Email tom.hatfield@originenergy.com.au

Declaration I declare that to the best of my knowledge the information I have given on, or attached to this form is complete, current and correct.

I understand that giving false or misleading information is a serious offence.

Signature



Date 7/6/16