Santos

Regional Interests Development Application Assessment Report

Hector 3D Seismic Survey (PL 1046)

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Abbreviations and Definitions

Acronym	Description
ATP	Authority to Prospect
DES	Department of Environment and Science, Queensland
DNRME	Department of Natural Resources, Mines and Energy
DoR	Department of Resources, Queensland
DSDILGP	Department of State Development, Infrastructure, Local Government and Planning
EA	Environmental Authority
ESA	Environmentally Sensitive Area
ha	Hectares
km	Kilometre
m	Metres
N/A	Not Applicable
P&G Act 2004	*Petroleum and Gas (Production and Safety) Act 2004*
PL	Petroleum Lease
QLD	Queensland
RE	Regional Ecosystem
RIDA	Regional Interests Development Approval
RPI Act	*Regional Planning Interests Act 2014*
RPI Reg	*Regional Planning Interests Regulation 2014*
SEA	Strategic Environmental Areas
SWQ	South-West Queensland

1.0 Introduction

Santos Limited (Santos) on behalf of the joint venture partners Delhi Petroleum Pty Ltd, Santos Petroleum Pty Ltd and Vamgas Pty Ltd, propose to undertake 3D seismic survey activities on Petroleum Lease (PL) 1046. PL 1046 is located approximately 67 km south-west of the Ballera Gas Plant, in the Queensland Cooper Basin.

Prescribed Strategic Environmental Areas (SEA) are identified as 'areas of regional interest', under Section 7 of the *Regional Interests Planning Act 2014* (RPI Act). A regional interest development approval (RIDA) issued under Section 53 of the RPI Act is required to carry out a resource activity within an 'area of regional interest'.

Santos is proposing to undertake a 3D seismic survey over PL 1046 within the area of the Channel Country SEA (refer to Figure 1). The survey will be known as the Hector 3D seismic survey. The findings of the survey will provide Santos with an improved understanding of the geology of the survey area. This information will be used to inform future petroleum activities (e.g. petroleum well location and drilling activities) in PL 1046.

Approximately half of PL 1046 (50%) is located within the Channel Country SEA prescribed under the *Regional Interests Planning Regulation 2014* (RPI Reg) (Refer to Figure 1). The proposed seismic survey activities would be undertaken over the entirety of the Channel Country SEA located in PL 1046. The Channel Country SEA within PL 1046 comprises an area of approximately 2,620 ha. The proposed seismic survey activities will be undertaken in accordance with the definition of '*low impact petroleum activities'* as defined by Environmental Authority (EA) EPPG03517415 (refer to Section 2.0 for further information).

This assessment report has been prepared to support a RIDA application for the proposed resource activities. It has been prepared in accordance with the RPI Act *Statutory Guideline 01/14: How to make an assessment application for a regional interests development approval under the Regional Planning Interests Act 2014* and the RPI Act *Statutory Guideline 05/14: Carrying out resource activities and regulated activities within a Strategic Environmental Area*.

This assessment report provides the following:

- description of the proposed activities;
- identification of the relevant environmental attributes of the land subject to the application;
- evaluation of the potential impacts on the identified relevant environmental attributes; and
- an assessment of how the proposed activities meet the required outcome for SEAs as detailed in the RPI Reg.

1.1 Applicant and Related Approvals

Santos is an *eligible person* under Section 28 of the RPI Act, as it is the holder of PL 1046 and associated environmental authority (EA) EPPG03517415 (attached as Appendix A). Other RIDAs associated with PL 1046 include *RPI20/001 Santos – Hector South East* and *RP121/031 – Hector South East 2*.

1.2 Landholder Copy of the Application

Separate regulatory systems are in place that require the Applicant to notify the landholder of petroleum activities occurring within their properties. The landholder (or typically the Pastoral Operations Manager and on-ground Station Manager) is initially consulted during the planning phase to discuss the details of each activity and ensure that planning takes into consideration any relevant property constraints (i.e.

stock impacts). Ongoing consultation with the Station Manager continues before and during each activity through a dedicated land access representative or delegate, who will be present during the activity. As a result, notification to the landholder occurs well prior to undertaking the proposed activities, and continues throughout.

Notwithstanding, a copy of this application will be given to the landowner within 5 business days after the application is made, in accordance with Section 30 of the RPI Act and Schedule 5 of the RPI Reg.

Proposed activities (within the Channel Country SEA) are located on the Orientos (Lot-Plan 2528-PH429) and Nappa Merrie Pastoral Stations (Lot-Plan 450-SP274333) (refer to Figure 1). Orientos and Nappa Merrie are approximately 1,442 and 7,275 km^2 in size, respectively. Orientos and Nappa Merrie are pastoral leases that operate as cattle stations. The primary land use for both properties is cattle grazing.

1.3 Non-Notifiable Application / Exemption from Public Notification

In accordance with Section 34(2) of the RPI Act, and Section 13 of the RPI Reg, notification of the assessment application is not mandatory, as the activities are not proposed to be carried out in an area of regional interest that is a priority living area.

Discretionary notification under Section 34(4) of the RPI Act would not be necessary given that separate regulatory systems are in place that require Santos to notify the landholder of petroleum activities occurring within their property, the very large size of the cattle stations relative to the activities, and that the landholder will receive a copy of the application as described above.

The proposed 3D seismic survey activities described in this application are identical to activities that can be undertaken within a Data Acquisition Authority (DAA). A DAA under the RPI Act is not considered a resource activity, and the activities would not require a RIDA to be granted.

1.4 Referable Application

In accordance with Section 12(2) and Schedule 1 of the RPI Reg, the application is referrable to the Department of Environment and Science (DES) and the Department of Resources (DoR).

2.0 Proposed Activity

Santos holds EA EPPG03517415 for PL 1046, which authorises petroleum activities, including seismic surveys within the tenure area. This application seeks authorisation to undertake 3D seismic survey activities in the Channel Country SEA within PL 1046 (refer to Figure 1).

2D seismic survey data has historically been captured in PL 1046. However, the existing 2D seismic survey data is insufficient to map complex variations in fluvial geomorphology and faulting, which is critical to hydrocarbon trap identification, and optimal exploration drilling / petroleum well placement.

The proposed seismic survey activities will be undertaken over the entirety of the Channel Country SEA located in PL 1046 (refer to Figure 1). The Channel Country SEA in PL 1046 comprises an area of approximately 2,620 ha. For the purposes of this application, the 2,620 ha area of the Channel Country SEA located in PL 1046 will henceforth be referred to as the 'SEA'.

The proposed 3D seismic survey activities will be undertaken in accordance with the definition of 'low impact petroleum activities' as defined by EA EPPG03517415 (attached as Appendix A) – refer below:

Low impact petroleum activities

"Means petroleum activities which do not result in the clearing of native vegetation, cause disruption to soil profiles through earthworks or excavation or result in significant disturbance to land which cannot be rehabilitated immediately using hand tools after the activity is completed.

Examples of such activities include but are not necessarily limited to soil surveys (excluding test pits), topographic surveys, cadastral surveys and ecological surveys, may include installation of monitoring equipment provided that it is within the meaning of low impact and traversing land by car or foot via existing access tracks or routes or in such a way that does not result in permanent damage to vegetation"

Given the proposed resource activities located within the Channel Country SEA will be low impact, there will be no area of expected impact (i.e. no significant disturbance). A description of the proposed Hector 3D seismic survey activities, and how they will comply with the definition of 'low impact petroleum activities', is detailed in Section 2.1.

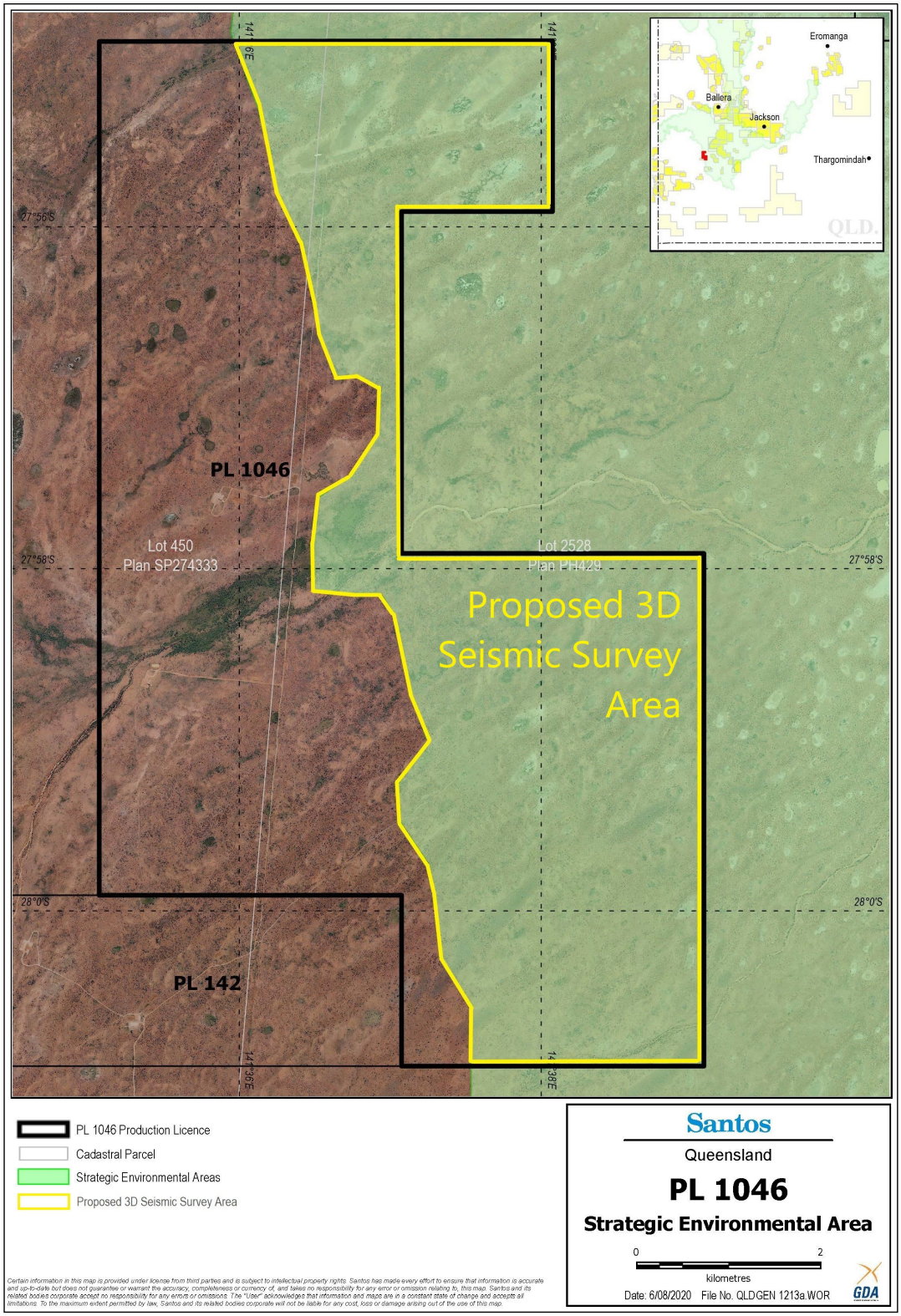

Figure 1: PL 1046 and Channel Country SEA

2.1 Seismic Survey Activities

The following section provides a general description of the seismic survey data acquisition method, followed by a specific outline of how seismic survey activities will be undertaken for the Hector 3D seismic survey.

Seismic survey data acquisition allows the hydrocarbon explorers to 'image' below the Earth's surface and identify areas where hydrocarbons may have accumulated. Onshore seismic surveys generally involve the creation of an acoustic shock wave (i.e. a seismic wave) on the Earth's surface along a designated line ('seismic survey line') using an energy source. The seismic wave travels into the Earth and is reflected of subsurface geological formations before returning to the surface where it is recorded by a series of 'receivers' known as 'geophones'. Geophones are small electronic devices that convert the returning seismic waves into a varying voltage, which can be recorded and interpreted by geophysicists (refer to Figure 2). The acoustic energy source is normally provided by a truck mounted vibrator unit known as a 'Vibroseis truck' (refer to Figure 2). Vibroseis trucks are equipped with heavy belly-mounted plates that are lowered to the ground at regular intervals (these locations are known as "shot points") with pressure applied and then vibrated at specific frequencies to create seismic energy waves.

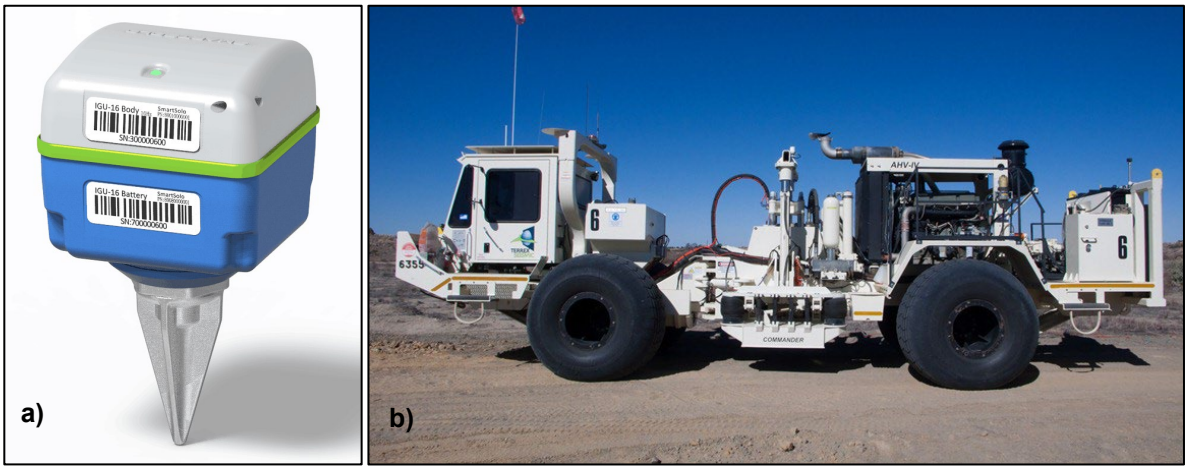

Figure 2: Geophone node (a) and Vibroseis truck (b)

Receiver and shot points are placed at regular intervals along seismic survey lines. By analysing the time it takes for the seismic waves to reflect off subsurface geological formations and then return to the surface, geophysicists can map subsurface formations and predict where hydrocarbon deposits may occur.

3D seismic surveys involve placing shot and receiver points across a survey area in a grid pattern. Receiver points are laid out in parallel 'receiver lines', and shot points are laid out in parallel 'shot lines' generally perpendicular to receiver lines to form a cross-hatched grid (refer to Figure 3). Spacing of seismic survey lines is determined by the design and objectives of the survey, but they are generally located 200-300 metres apart. For the Hector 3D survey, receiver line spacing will be 200 metres, and source line spacing will be 150 metres arranged in an orthogonal grid.

This grid arrangement means that receiver points and shot points are spread over the entire survey area, which allows each receiver point to collect seismic reflections from all directions across the survey area. This data can then be analysed to create a 3D image of the subsurface.

Seismic survey lines are generally surveyed on-ground using GPS technology and some survey designs are also marked out on-ground using wooden pegs (which are removed at the end of the project) so the

grid can be easily navigated. In order to lay out receiver points and create shot points, light vehicles (e.g. 4WD vehicles) generally require access along seismic survey lines.

Further, desktop and field-based pre-planning of seismic survey areas is undertaken to plan to avoid sensitive obstacles and infrastructure such as dense vegetation, waterholes and waterways, roads, buildings and sites of cultural significance.

Modern seismic survey lines are not perfectly straight and lines are deliberately weaved and offset around trees, dense vegetation, obstacles and sensitivities (refer to Figure 3). Furthermore, in areas of very high sensitivity (e.g. wetlands), geophones can be 'hand-carried' by seismic personnel, and the associated shot lines can be offset to avoid traversing the area with a Vibroseis truck.

Seismic lines do not typically require any preparation to be traversed by vehicles and vibroseis trucks i.e. the seismic lines are simply driven. In rough or highly vegetated terrain, seismic lines may require minor preparation and some vegetation clearing by earthmoving equipment to enable safe vehicle and equipment access. Santos undertakes seismic surveys in accordance with best practice environmental management principles, which are documented in the *Statement of Environmental Objectives (SEO) for Seismic Operations in the Cooper and Eromanga Basins* (Santos, 2012).

However, as discussed in Section 2.0, the proposed Hector 3D seismic survey activities will be undertaken to ensure they comply with the definition of 'low impact petroleum activities' as defined in EA EPPG03517415. Therefore, for Hector 3D, seismic survey activities will be undertaken in accordance with the following measures:

- Driving vehicles along seismic lines in such a way that will not result in permanent damage to vegetation;
- No vegetation clearing or earth moving activities will be undertaken;
- Where grass and herb density is very high, minor slashing of grasses and herbs may be undertaken for safety reasons, however woody vegetation and trees will not be cleared or slashed, and will otherwise be weaved around;
- In areas of dense fallen dead timber, skid steer loaders fitted with stick rakes may be utilised to move fallen timber to the side of the seismic line where dead timber cannot be weaved around. However, to re-emphasise, no earthworks, soil disturbance or vegetation clearing will be undertaken as part of these activities;
- No off-line driving or creation of shortcuts will be permitted;
- As no earthworks or significant disturbance will occur, there will be no impacts to natural surface water flows, or significant disturbance to wetlands or watercourses;
- All operations will be suspended if wet ground conditions exist (to minimise disruption to soils);
- Pre-disturbed areas associated with existing infrastructure (Santos and landholder access tracks and other infrastructure) will be preferentially used for access and to locate seismic lines (where appropriate to do so); and
- Hygiene protocols, such as washing down vehicles prior to mobilisation, will be implemented as appropriate to minimise the introduction, spread and persistence of weed species.

As a result of the methods outlined above, the proposed activities will comply with the definition of 'low impact petroleum activities' and no significant disturbance requiring rehabilitation (of any form) will be required.

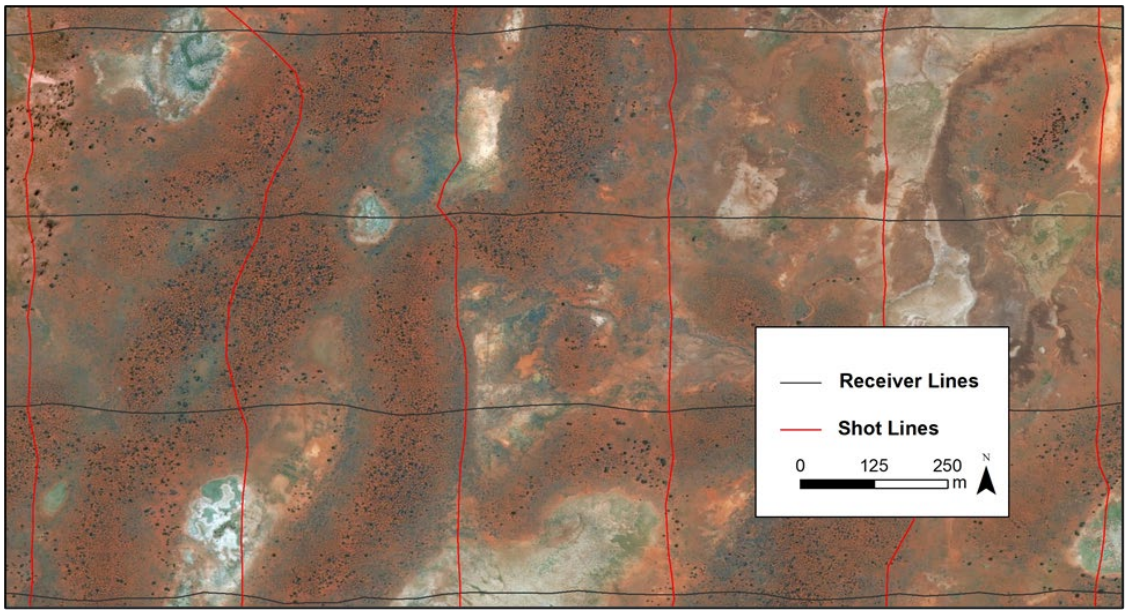

Figure 3: 3D Seismic Survey Receiver Lines and Shot Lines

2.2 Project Timing and Scope

The Hector 3D seismic survey is scheduled for acquisition early Q3 2022. Survey duration is expected to require a minimum of 40 days.

2.3 Access Roads / Tracks and Existing Infrastructure

Existing petroleum and landholder infrastructure (including wells, pipelines, bores, fencing, gates and access tracks) is located within the SEA. Access to the 3D seismic operations in the SEA will be via existing access roads and tracks. No new access tracks will be created within the SEA to facilitate the work. Further, existing pre-disturbed areas associated with existing infrastructure will be preferentially used to locate seismic lines (where appropriate to do so). No off-line driving or creation of shortcuts will be permitted.

2.4 Campsites and Water

No campsites will be located in the SEA. There are no water requirements for the proposed activities in the SEA.

3.0 Environmental Attributes

Section 7 of the RPI Reg prescribes the following environmental attributes relevant to the Channel Country SEA:

(a) the natural hydrologic processes of the area characterised by-

(i) natural, unrestricted flows in and along stream channels and the channel network in the area; and

(ii) overflow from stream channels and the channel network onto the flood plains of the area, or the other way; and

(iii) natural flow paths of water across flood plains connecting waterholes, lakes and wetlands in the area; and

(iv) groundwater sources, including the Great Artesian Basin and springs, that support waterhole persistence and ecosystems in the area;

(b) the natural water quality in the stream channels and aquifers and on flood plains in the area;

(c) the beneficial flooding of land that supports flood plain grazing and ecological processes in the area.

The RPI Act *Statutory Guideline 05/14: Carrying Out Resource Activity and Regulated Activity within a Strategic Environmental Area* summarises the above attributes to broadly relate to:

- riparian processes;
- wildlife corridors;
- water quality;
- hydrologic processes;
- geomorphic processes; and
- beneficial flooding.

As discussed in Section 2.0, the proposed Hector 3D seismic survey activities will be undertaken in accordance with the definition of 'low impact petroleum activities' as defined by EA EPPG03517415.

As a result, no area of impact (i.e. no significant disturbance) to the environmental values of the SEA is expected. Notwithstanding, the abovementioned SEA environmental attributes (where relevant to the proposed activities) are described in the following sections.

3.1 General

3.1.1 Land Use

The Hector 3D seismic survey area is located in the Bulloo Shire local government area approximately 67 km south-west of the Santos Ballera Gas Facility.

The SEA is located on the Orientos (Lot-Plan 2528-PH429) and Nappa Merrie Pastoral Stations (Lot-Plan 450-SP274333) (refer to Figure 1). Orientos and Nappa Merrie are pastoral leases that operate as cattle stations and they are approximately 1,442 km^2 and 7,275 km^2 in size, respectively. Primary land uses in the SEA (and broader surrounding region) include cattle grazing and petroleum exploration.

3.1.2 Climate

The SEA is located in the arid to semi-arid region of central Australia where the average rainfall is low. Seasons in the area are characterised by dry, hot summers and short, very dry winters. Climate data from the closest weather station (Ballera Gas Field Station - 045009) shows that the mean annual rainfall is 181.7 mm/year (BOM, 2021).

The mean number of days of rain more than or equal to 1 mm is 20.3 days/year (BOM, 2021). In summer, mean maximum temperature is 38.5°C and mean minimum temperature is 24.9°C. In winter, mean maximum temperature is 21.5°C and mean minimum temperature is 8.2°C (BOM, 2021).

The El-Nino Southern Oscillation (ENSO) exerts significant influence on inter-annual climate variability across the area, produced marked fluctuations in the amount, timing and distribution of rainfall. As such, there is considerable year-to-year variation, particularly during the summer months, ranging from ‘failed’ wet seasons, to ‘normal’ and above average rainfall and tropical cyclone activity.

3.2 Riparian Processes

The SEA is located in the Cooper Creek catchment area of the Channel Country bioregion and Bulloo Dunefields subregion. Despite being situated in the Channel Country bioregion, the entirety of PL 1046 (and the SEA within it) is located approximately 4 km west of the Cooper Creek floodplain (refer to Figure 4) i.e. the SEA within PL 1046 is entirely located in elevated dunefields outside of the Cooper Creek floodplain.

Further, land zones in the SEA are classified as predominantly (>75% of the area) Landzone 6 (Quaternary inland dunefields), with minor components of Landzone 3 (Alluvium (river and creek flats)) and Landzone 5 (Old loamy and sandy plains) also present. These minor areas of alluvia are associated with the non-perennial Koolongoo Creek, which is further described below.

No major non-perennial or perennial watercourses are located within the SEA. The Koolongoo Creek (non-perenial, stream order (SO) 4) crosses the centre of the SEA. A second watercourse (non-perennial) also crosses the far south-eastern corner of the SEA. These creeks may flow into the Cooper Creek floodplain to the east following heavy localised rainfall events (refer to Figure 4).

Minor non-floodplain wetlands are mapped to occur in the SEA in the form of ephemeral claypan lakes. These claypans are surrounded by dunes and sand plains. Following heavy localised rainfall events, these claypans will receive local inflows from the surrounding dunefields and sandplains. The claypans are non-floodplain ephemeral wetlands that do not receive inflows from the Cooper Creek or other watercourses. Semi-arid / arid clay pans are typically dry due to their reliability on local rainfall, combined with high evaporation rates, and highly variable annual rainfall rates (refer to Figure 4). Several of these claypans are mapped as Referable Wetlands of General Ecological Significance (GES). There are no High Ecological Significance (HES) wetlands mapped in the SEA.

Vegetation within the SEA is typical of the Channel Country bioregion and Bulloo Dunefields subregion, being dominated by dunefield vegetation consisting of low open woodland and grassland on sand dunes supporting Whitewood (*Atalaya hemiglauca),* Mulga (*Acacia aneura*) and Bloodwood (*Corymbia terminalis*) with an understorey of Spinifex (*Triodia basedowii*). Dunefield vegetation communities (REs 5.5.2, 5.6.1, 5.6.4 and 5.6.5a) constitute ~87% of vegetation in the SEA.

Consistent with the small number of non-perennial creeks and ephemeral claypan lakes present in the SEA, small areas of ephemeral grassland and herbland are mapped to occur in the area. A section of sparse to open herbland (RE 5.3.21a) is mapped over the Koolongoo Creek area, and small areas of Swamp canegrass (*Eragrostis australasica*) sparse tussock grassland (RE 5.3.16a) are mapped to occur in the claypan lakes (refer to Figure 5). These vegetation types may be partially classified as riparian, but they predominately consist of short-lived herb and grassland species that grow in response to episodic local rainfall events. These vegetation communities constitute ~13% of vegetation in the SEA.

Regional ecosystems (REs) mapped to be present in the SEA are detailed in Table 1 and displayed on Figure 5. All REs located in the SEA have a biodiversity status of no concern at present (NCAP), and a *Vegetation Management Act 1999* (VM Act) class of least concern. Vegetation structure is identified as grassland, sparse, very sparse. Further, there are no Environmentally Sensitive Areas (ESAs) mapped in the SEA.

Table 1: Regional Ecosystem Descriptions - SEA

RE Code	RE Short Description	VM Act Class	BD Status	Structural Category	Area in SEA (Ha)	% Area in SEA
5.3.16a	*Eragrostis australasica* sparse tussock grassland on intermittently inundated depressions on flood plains, interdune flats, clay pans and clay plains.	LC	NCAP	Very Sparse	275.4	11%
5.3.21a	Variable sparse to open herbland, *Senna* spp. open shrubland and bare scalded areas on infrequently flooded alluvia of major rivers their distributaries, drainage channels and creeks	LC	NCAP	Very Sparse	57.7	2%
5.5.2	*Acacia aneura* low woodland +/- *Acacia sibirica* +/- *Eremophila latrobei* on Quaternary deposits	LC	NCAP	Very Sparse	293.6	11%
5.6.1	*Crotalaria eremaea +/- Eragrostis eriopoda* sparse to open herbland on isolated and/or deflated sand dunes on alluvium	LC	NCAP	Sparse	200.8	8%
5.6.4	*Atalaya hemiglauca* +/- *Acacia aneura* +/- *Acacia* spp. +/- *Corymbia terminalis* low open woodland on reticulate sand dunes.	LC	NCAP	Sparse	1657.7	64%
5.6.5a	Variable sparse to open-herbland +/- *Triodia basedowii* on dune flanks, crests and sandy interdunes	LC	NCAP	Grassland	106.2	4%

Key: Non-remnant - NR, Remnant – REM, Mature Regrowth Vegetation – MR. VM class and BD status under the *Vegetation Management Act 1999*: NCAP – No Concern at Present, LC – Least Concern, OC – Of Concern, E – Endangered

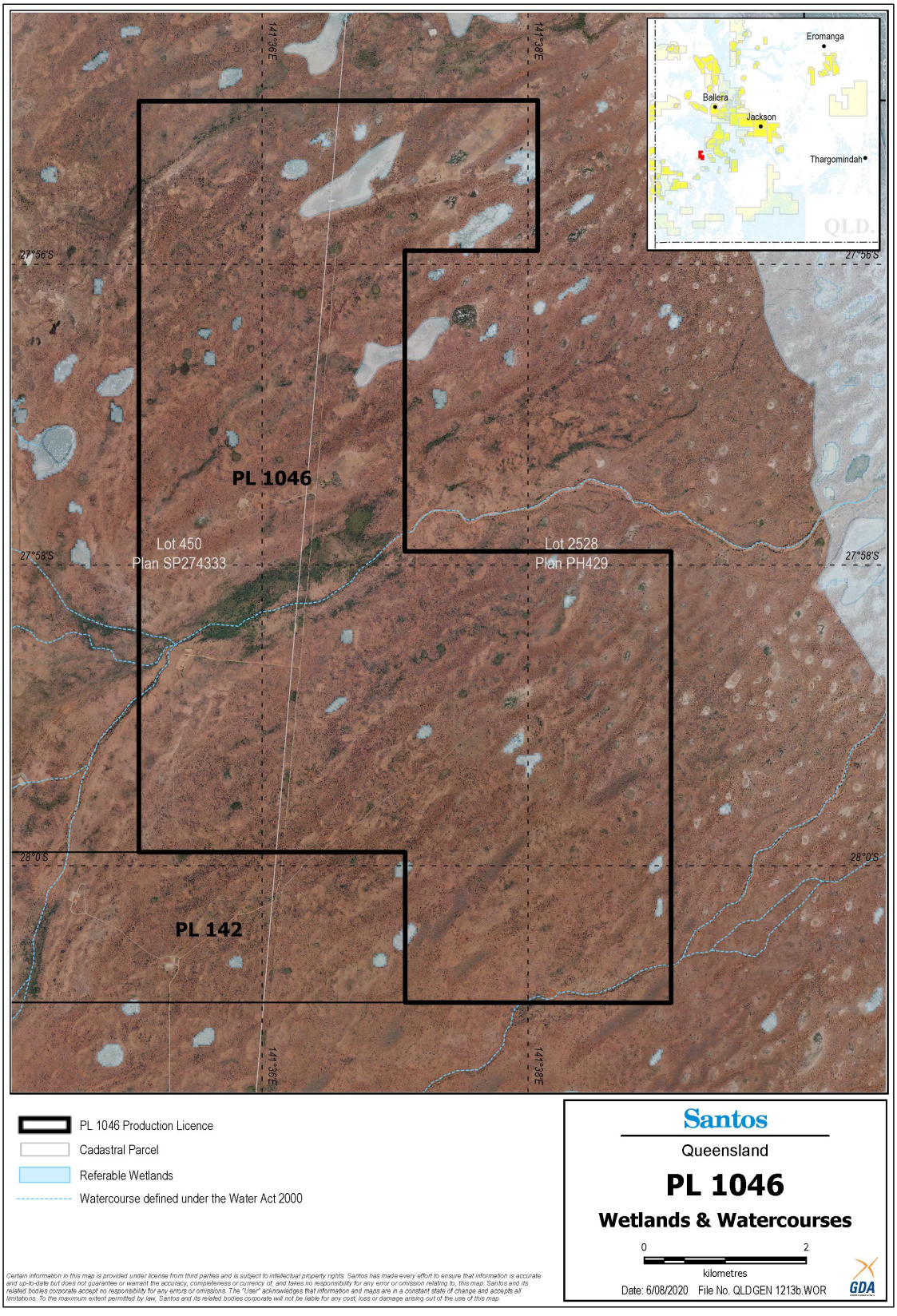

Figure 4: Surface Waters and Wetlands

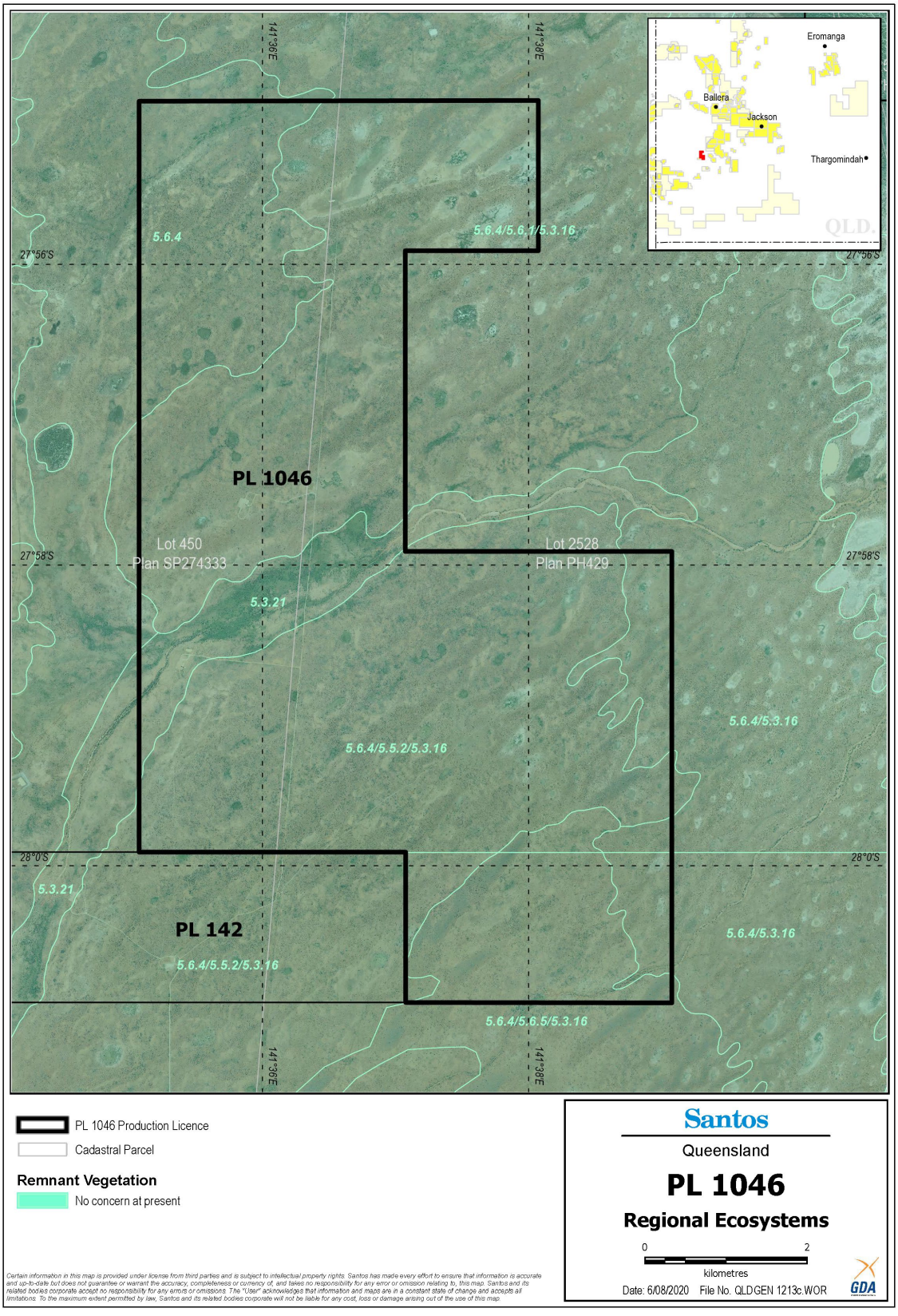

Figure 5: Regional Ecosystems

3.3 Wildlife Corridors

No Biodiversity Planning Assessment derived riparian or terrestrial corridors of state, regional or local significance occur within the SEA (refer to Figure 6). The nearest mapped riparian and terrestrial corridors are associated with the Wilson River and Cooper Creek and are located approximately 10 km east of the SEA, respectively.

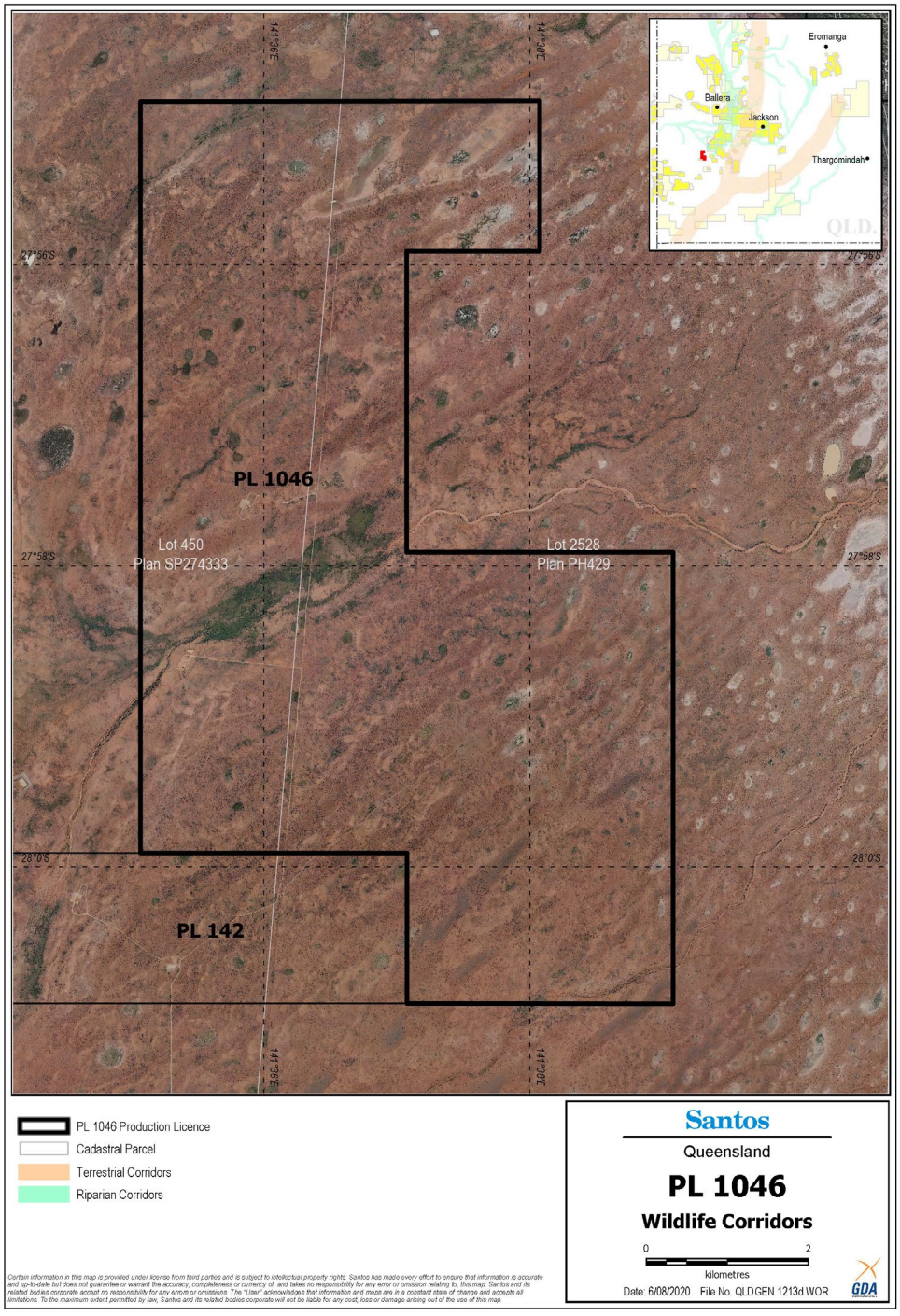

Figure 6: Wildlife Corridors

3.4 Water Quality

3.4.1 Surface Water

As discussed in Section 3.2, despite being located in the Cooper Creek catchment area, the entirety of the SEA is located in an elevated dunefield outside of the Cooper Creek floodplain i.e. the entirety of PL 1046 (and the SEA within it) is located approximately 4 km west of the Cooper Creek floodplain (refer to Figure 4). Further, as detailed in Section 3.2, two minor non-perennial creeks and several ephemeral claypan lakes are located in the SEA. Following heavy localised rainfall events, these creeks may flow water to the east and into the Cooper Creek floodplain. The claypan lakes may also receive inflows from their local catchments surrounding dunefields and sandplains – however they are not connected to the Cooper Creek floodplain.

For context, the Cooper Creek is typically confined to the main channels, but every 3-4 years, flows are sufficient to inundate parts of the Cooper Creek floodplain via a network of tributary channels. During extended periods of no flow, Cooper Creek contracts to a series of waterholes. Very large Cooper Creek flood events with the potential to inundate the broader Channel Country region, and flow water into the lower Cooper Creek in South Australia, occur on average once every 10 years, reaching Lake Eyre North in an estimated 1 in every 20 years. Historical (1965-2021) water quality data from the Queensland (QLD) Government's Cooper Creek gauging station 003103A (at Nappa Merrie Station), located approximately 60 km north-west of the SEA is summarised in Table 2.

Table 2: Cooper Creek Surface Water Quality (1965-2021)

Parameter	Average Value
Conductivity @ 25°C	314 µS/cm
Turbidity	537 NTU
pH	7.4
Total Nitrogen	1.3 mg/L
Total Phosphorus as P	0.4 mg/L
Sodium as Na	39.6 mg/L
Magnesium as Mg	6.6 mg/L
Chloride as Cl	59.5 mg/L
Fluoride as F	0.2 mg/L

3.4.2 Groundwater

The main Great Artesian Basin (GAB) aquifers (i.e. in the Eromanga Basin stratigraphy) in relation to the SEA are the Winton Formation, Cadna-owie Formation, Hooray Sandstone, Hutton Sandstone and Poolowanna Formation (Precipice Sandstone equivalent). The aquifers of the Eromanga Basin are considered highly productive aquifers over most of the GAB.

Shallow groundwater is generally found within the Quaternary and Tertiary alluvium formations associated with the very flat structures of flood plains and is absent where the Winton Formation occasionally outcrops. Groundwater from Tertiary sediments and the Winton Formation are characterised by a higher proportion of sodium and magnesium ranging in EC values from 900 µS/cm to 13,000 µS/cm^2. The aquifers of the Cooper Basin, which underlies the GAB sediments of the Eromanga Basin, are not considered sandstone aquifers of the GAB. Groundwater yields from the Cooper Basin may be feasible from the Wimma Sandstone, Toolachee Formation, Epsilon Formation, Patchawarra Formation and Tirrawarra Formation. Within the Santos Cooper Basin tenements, only the upper aquifers of the Eromanga Basin sequence are of economic interest to the local community. This is due to the significant depth of the water bearing formations in the Cooper Basin and the general

unreliability of the groundwater quality that may be encountered (i.e. it may have a high salinity and contain free and dissolved hydrocarbons).

There are no registered groundwater bores mapped within the SEA. There are no groundwater dependent ecosystems (GDEs) mapped within the SEA. The closest GAB springs are located more than 240 km from the SEA. Terrestrial GDEs may be present within the SEA.

3.5 Hydrological Processes and Beneficial Flooding

As discussed in Sections 3.2 and 3.4.1, despite being located in the Cooper Creek catchment area, the entirety of the SEA is located in an elevated dunefield outside of the Cooper Creek floodplain. Land within the SEA of PL 1046 is not subject to inundation caused by Cooper Creek flood events. Further, two minor non-perennial creeks and several ephemeral claypan lakes are located in the SEA. Following heavy localised rainfall events, these claypans may receive inflows from their local catchments, and the creeks may flow water to the east and ultimately into the Cooper Creek floodplain.

3.6 Geomorphic Processes

3.6.1 Regional

As discussed in Section 3.2, despite being located in the Cooper Creek catchment area, the entirety of the SEA is located in an elevated dunefield outside of the Cooper Creek floodplain. Landzones in the SEA are therefore predominantly (>75% of the area) Landzone 6 (Quaternary inland dunefields) with minor components of Landzone 3 (Alluvium (river and creek flats)) and Landzone 5 (Old loamy and sandy plains). Surface geology is dominated by well sorted fine to medium quartz sand, dunes and sandplains with dunes (may include numerous interdune claypans), and minor areas of alluvia.

3.6.2 Local

Land systems in the SEA are consistent with Landzone and Regional Ecosystem mapping and are dominated by dunefields and sandplains with minor areas of alluvia associated with the non-perennial creeks that traverse the area. Detailed land system mapping for the SEA is provided in Table 3.

Table 3: Land System Descriptions - SEA

Map Code	Land System Description		Area within SEA (ha)	% Area within SEA	Agricultural Land Class
A6	Alluvial plains with well defined channels, sometimes braided and occasionally with low sandy rises and dunes.	56.5	2 %	C2 – Pasture Land – native pastures	
D4	Dunes (3-5 m high) with rounded crests, which infrequently may be mobile, and sloping duneflanks (1-5%). Dunes are reticulate, approaching longitudinal in places. Vegetated inter-connected interdune areas form drainage lines in places. Claypans which frequently become inundated are common.	1137.3	44 %	C3 - Pasture Land - native pastures, light grazing	
D6	Flat to gently undulating sandplain with low dunes, frequently with eroded aprons. Poorly defined, well vegetated drainage lines connect the lower parts of the plains.	1397.3	54 %	C3 - Pasture Land - native pastures, light grazing	

4.0 Potential Impacts to Environmental Attributes and Proposed Mitigation

As discussed in Sections 2.0 and 2.1, the proposed seismic survey activities will be undertaken in accordance with a range of mitigation measures to ensure they comply with the definition of 'low impact petroleum activities' as defined by EA EPPG03517415.

As a result, no area of impact (i.e. no significant disturbance) to the environmental values of the SEA is expected. Notwithstanding, an assessment of the potential for impacts to the Channel Country SEA environmental attributes is described in the following sections.

4.1 Riparian Processes and Wildlife Corridors

As discussed in Section 3.2, vegetation within the SEA is typical of the Channel Country bioregion and Bulloo Dunefields subregion, being dominated by dunefield vegetation with sparse, very sparse or grassland structural categories. Minor areas of short-lived herblands and grasslands (that grow in response to episodic local rainfall events) are present in the ephemeral creek and claypan lake areas in the SEA. All REs located in the SEA have a biodiversity status of NCAP and a VM Act class of least concern. Further, no ESAs or Biodiversity Planning Assessment derived riparian or terrestrial corridors occur within the SEA.

As detailed in Section 2.1, the proposed seismic survey activities will be carried out as per the definition of 'low impact petroleum activities' in EA EPPG03517415, which does not permit vegetation clearing or earth moving activities. Rather, vehicles will be driven along seismic lines in such a way that will not result in permanent damage to vegetation. Given the sparse nature of, there will be maximum ability to weave around and avoid woody mature vegetation. Where grass and herb density is very high, minor slashing of grasses and herbs may be undertaken for safety reasons, however woody vegetation and trees will not be cleared or slashed, and will otherwise be weaved around. In areas of dense fallen dead timber, skid steer loaders fitted with stick rakes may be utilized to move fallen timber to the side of the seismic line where dead timber cannot be weaved around. However, to re-emphasise, no earthworks, soil disturbance or vegetation clearing will be undertaken as part of these activities, and no off-line driving or creation of shortcuts will be permitted.

As no earthworks or significant disturbance will occur, there will be very limited potential for disruption to natural surface water flows, or significant disturbance to riparian vegetation or associated values. All operations will be suspended if wet ground conditions exist (to minimise disruption to soils). Hygiene protocols, such as washing down vehicles prior to mobilisation, will be implemented as appropriate to minimise the introduction, spread and persistence of weed species.

Given implementation of the methods outlined above, and the low impact nature of the proposed activities, no widespread or irreversible impact to riparian processes or wildlife corridors in the Channel Country SEA is expected as a result of undertaking the proposed activities.

4.2 Water Quality

As discussed in Section 3.2, despite being located in the Cooper Creek catchment area, the entirety of the SEA is located in an elevated dunefield outside of the Cooper Creek floodplain. Further, as detailed in Section 3.2, two minor non-perennial creeks and several ephemeral claypan lakes are located in the SEA. Following heavy localised rainfall events, these creeks may flow water to the east and into the Cooper Creek floodplain. The claypans may also receive inflows from their local catchments surrounding dunefields and sandplains – however they are not connected to the Cooper Creek.

As detailed in Section 2.1, the proposed seismic survey activities will be carried out as per the definition of 'low impact petroleum activities' in EA EPPG03517415, which does not permit vegetation clearing, earth moving activities, significant disturbance to soils or land, or disturbance to natural surface water flows. As no earthworks or significant disturbance to soils or land will occur, no impacts to groundwater, natural surface water flows or surface water quality as a result of undertaking the proposed activities are expected. Pre-disturbed areas associated with existing infrastructure (Santos and landholder access tracks and other infrastructure) will also be preferentially used for access and to locate seismic lines (where appropriate to do so). Further, all operations will be suspended if wet ground conditions exist (to minimise disruption to soils).

Any fuels/chemicals used on site will be stored and handled in accordance with relevant Australian Standards, and spill kits will be located on site where required to contain any spills should they occur. Waste materials and non-essential infrastructure will be removed at the end of the petroleum activities as soon as reasonably practicable, minimising risks associated with contamination, or a reduction in water quality, in accordance with the relevant EA conditions.

Given implementation of the methods outlined above, and the low impact nature of the proposed activities, no widespread or irreversible impact to the physical, chemical and biological quality of water in the Channel Country SEA is expected as a result of undertaking the proposed activities.

4.3 Hydrological Processes and Beneficial Flooding

As discussed in Section 3.5, despite being located in the Cooper Creek catchment area, the entirety of the SEA is located in an elevated dunefield outside of the Cooper Creek floodplain. Land within the SEA of PL 1046 is not subject to inundation caused by Cooper Creek flood events, and the proposed activities will be undertaken in a predominately dunefield environment. Two minor non-perennial creeks and several ephemeral claypan lakes are located in the SEA. These claypans may receive inflows from their local catchments, and the creeks may flow water to the east and ultimately into the Cooper Creek floodplain.

As detailed in Section 2.1, the proposed seismic survey activities will be carried out as per the definition of 'low impact petroleum activities' in EA EPPG03517415, which does not permit earth moving activities, significant disturbance to soils or land, or disturbance to natural surface water flows. As no earthworks or significant disturbance will occur, no impacts to natural surface water flows (or to the watercourses and claypan lakes) as a result of undertaking the proposed activities are expected. Further, all operations will be suspended if wet ground conditions exist (to minimise disruption to soils).

Given implementation of the methods outlined above, and the low impact nature of the proposed activities, no widespread or irreversible impact on hydrological or beneficial flooding processes in the Channel Country SEA is expected as a result of undertaking the proposed activities.

4.4 Geomorphic Processes

As detailed in Section 2.1, the proposed activities will be carried out as per the definition of 'low impact petroleum activities' in EA EPPG03517415, which does not permit significant disturbance to land or soils. No earthworks, significant soil disturbance or vegetation clearing will be undertaken as part of the proposed activities, and no off-line driving or creation of shortcuts will be permitted.

As no earthworks or significant disturbance will occur, no impacts to land and soils are expected e.g. erosion. All operations will be suspended if wet ground conditions exist (to minimise disruption to soils). As discussed in Section 3.2, land systems in the SEA are consistent with Landzone and Regional Ecosystem mapping and are dominated by dunefields and sandplains with minor areas of alluvia associated with the non-perennial creeks that traverse the area. Sandy dunefield environments in the

Cooper Basin are subject to natural sand movement and revelation, and minor disturbances to the land surface naturally repair themselves over time i.e. natural wind-blown sands will be deposited across areas of minor disturbance over time.

Given implementation of the methods outlined above, and the low impact nature of the proposed activities, no widespread or irreversible impact on geomorphic processes in the Channel Country SEA is expected as a result of undertaking the proposed activities.

5.0 Required Outcome Assessment

Schedule 2, Part 5 of the RPI Reg provides criteria for assessment by agencies. In accordance with Section 14(3) of the RPI Reg, if the application demonstrates compliance with either of the prescribed solutions stated Schedule 2, Part 5 of the RPI Reg, the proposed activity will meet the required outcome for the regional interest. Critically, the application demonstrates that the prescribed solution provided in Schedule 2, Part 5, Item 15(1)(b) of the RPI Reg will be met as outlined within Table 4.

Table 4: Required Outcome Assessment Schedule 2, Part 5 RPI Reg

Schedule 2, Part 5 RPI Reg		Relevance to Application
14 Required outcome The activity will not result in a widespread or irreversible impact on an environmental attribute of a strategic environmental area.	✓	The proposed activities will not result in widespread or irreversible damage to the environmental attributes listed in Section 7 of the RPI Reg for the Channel Country SEA as demonstrated in Section 4.0. The application demonstrates the proposed activity will be undertaken in accordance with the below prescribed solution.
15 Prescribed solution (1) The application demonstrates either— (a) the activity will not, and is not likely to, have a direct or indirect impact on an environmental attribute of the strategic environmental area; or	✓	The application demonstrates the proposed activity will be undertaken in accordance with the prescribed solution provided in Schedule 2, Part 5, Item 15(1)(b) of the RPI Reg.
(b) all of the following— (i) if the activity is being carried out in a designated precinct in the strategic environmental area—the activity is not an unacceptable use for the precinct;	✓	The proposed activities do not include any of the unacceptable uses prescribed by Schedule 2, Part 5, Item15(2) of the RPI Reg.
(ii) the construction and operation footprint of the activity on the environmental attribute is minimised to the greatest extent possible;	✓	The proposed petroleum activities within the Channel Country SEA will be undertaken in accordance with the definition of 'low impact petroleum activities' as defined by EA EPPG03517415. As a result, there will be no area of expected significant impact.
(iii) the activity does not compromise the preservation of the environmental attribute within the strategic environmental area;	✓	Refer to Sections 3.0 – 4.0.
(iv) if the activity is to be carried out in a strategic environmental area identified in a regional plan—the activity will contribute to the regional outcomes, and be consistent with the regional policies, stated in the regional plan.	✓	The South West Regional Plan does not identify the Channel Country SEA.

6.0 Appendices

Appendix A – EA EPPG03517415

Permit

Environmental Protection Act 1994

Environmental authority EPPG03517415

This environmental authority is issued by the administering authority under Chapter 5 of the Environmental Protection Act 1994.

Environmental authority number: EPPG03517415

Environmental authority takes effect on 08 July 2021

Environmental authority holder(s)

Name(s)	Registered address
SANTOS LIMITED	Ground Floor, Santos Centre 60 Flinders Street ADELAIDE SA 5000 Australia
DELHI PETROLEUM PTY. LTD.	25 Conyngham Street GLENSIDE SA 5065 Australia
VAMGAS PTY LTD	Ground Floor, Santos Centre 60 Flinders Street ADELAIDE SA 5000 Australia
SANTOS PETROLEUM PTY LTD	Ground Floor, Santos Centre 60 Flinders Street ADELAIDE SA 5000 Australia

Environmentally relevant activity and location details

Environmentally relevant activity/activities	Location(s)
Schedule 3 08: A petroleum or GHG storage activity, other than items 1 to 7, that includes an activity from Schedule 2 with an AES	PL1046, PL1057, PL110, PL129, PL130, PL134, PL140, PL142, PL143, PL144, PL150, PL186, PL34, PL37, PL497, PL502, PL63, PL68, PL75, PL84, PL88
Ancillary 60 - Waste disposal 1: Operating a facility for disposing of, in a year, the following quantity of waste mentioned in subsection (1)(a) (a) less than 50,000t	PL63
Ancillary 57 - Regulated Waste Transport Transporting regulated waste, other than end-of-life tyres (05 vehicles only)	PL1046, PL1057, PL110, PL129, PL130, PL134, PL140, PL142, PL143, PL144, PL150, PL186, PL34, PL37, PL497, PL502, PL63, PL68, PL75, PL84, PL88

Environmentally relevant activity/activities	Location(s)
Ancillary 60 - Waste disposal 1: Operating a facility for disposing of, in a year, the following quantity of waste mentioned in subsection (1)(a) (b) 50,000t to 100,000t	PL34, PL63
Ancillary 60 - Waste disposal 1: Operating a facility for disposing of, in a year, the following quantity of waste mentioned in subsection (1)(a) (c) 100,000 to 200,000t	PL75
Ancillary 60 - Waste disposal 1: Operating a facility for disposing of, in a year, the following quantity of waste mentioned in subsection (1)(a) (d) more than 200,000t	PL34
Ancillary 08 - Chemical Storage 3: Storing more than 500 cubic metres of chemicals of class C1 or C2 combustible liquids under AS 1940 or dangerous goods class 3 under subsection (1)(c)	PL34, PL68, PL75
Ancillary 55 - Other waste reprocessing or treatment 1: Operating a facility for receiving and either reprocessing or treating, in a year, the following quantity of general waste- (c) more than 10,000t	PL34
Ancillary 60 - Waste disposal 2: Operating a facility for disposing of, in a year, the following quantity of waste mentioned in subsection (1)(b) (a) less than 2000t	PL34
Ancillary 55 - Other waste reprocessing or treatment 2: Operating a facility for receiving and either reprocessing or treating, in a year, the following quantity of category 2 regulated waste- (c) more than 10,000t	PL34
Ancillary 61 - Thermal waste reprocessing and treatment 1: Thermally reprocessing or treating, in a year, the following quantity of general waste- (a) not more than 5,000t	PL34

Environmentally relevant activity/activities	Location(s)
Ancillary 55 - Other waste reprocessing or treatment 3: Operating a facility for receiving and either reprocessing or treating, in a year, the following quantity of category 1 regulated waste- (c) more than 10,000t	PL34
Ancillary 55 - Other waste reprocessing or treatment 4: Operating a facility for receiving and either reprocessing or treating clinical waste or biosecurity waste	PL34

Additional information for applicants

Environmentally relevant activities

The description of any environmentally relevant activity (ERA) for which an environmental authority (EA) is issued is a restatement of the ERA as defined by legislation at the time the EA is issued. Where there is any inconsistency between that description of an ERA and the conditions stated by an EA as to the scale, intensity, or manner of carrying out an ERA, the conditions prevail to the extent of the inconsistency.

An EA authorises the carrying out of an ERA and does not authorise any environmental harm unless a condition stated by the EA specifically authorises environmental harm.

A person carrying out an ERA must also be a registered suitable operator under the *Environmental Protection Act 1994* (EP Act).

Contaminated land

It is a requirement of the EP Act that an owner or occupier of contaminated land give written notice to the administering authority if they become aware of the following:

- the happening of an event involving a hazardous contaminant on the contaminated land (notice must be given within 24 hours); or
- a change in the condition of the contaminated land (notice must be given within 24 hours); or
- a notifiable activity (as defined in Schedule 3) having been carried out, or is being carried out, on the contaminated land (notice must be given within 20 business days);

that is causing, or is reasonably likely to cause, serious or material environmental harm.

For further information, including the form for giving written notice, refer to the Queensland Government website www.qld.gov.au, using the search term ‘duty to notify’.

Take effect

Please note that, in accordance with section 200 of the EP Act, an EA has effect:

a) if the authority is for a prescribed ERA and it states that it takes effect on the day nominated by the holder of the authority in a written notice given to the administering authority-on the nominated day; or

b) if the authority states a day or an event for it to take effect-on the stated day or when the stated event happens; or

c) otherwise-on the day the authority is issued.

However, if the EA is authorising an activity that requires an additional authorisation (a relevant tenure for a resource activity, a development permit under the *Sustainable Planning Act 2009* or an SDA Approval under the *State Development and Public Works Organisation Act 1971*), this EA will not take effect until the additional authorisation has taken effect.

If this EA takes effect when the additional authorisation takes effect, you must provide the administering authority written notice within 5 business days of receiving notification of the related additional authorisation taking effect.

If you have incorrectly claimed that an additional authorisation is not required, carrying out the ERA without the additional authorisation is not legal and could result in your prosecution for providing false or misleading information or operating without a valid environmental authority.

Tristan Roberts
Department of Environment and Science
Delegate of the administering authority
Environmental Protection Act 1994

Date issued: 08 July 2021

Enquiries:
Extraction, Energy and Chemical Industries Assessment
Department of Environment and Science

Phone: 1300 130 372
Email: palm@des.qld.gov.au

Obligations under the *Environmental Protection Act 1994*

In addition to the requirements found in the conditions of this environmental authority, the holder must also meet their obligations under the EP Act, and the regulations made under the EP Act. For example, the holder must comply with the following provisions of the Act:

- general environmental duty (section 319)
- duty to notify environmental harm (section 320-320G)
- offence of causing serious or material environmental harm (sections 437-439)
- offence of causing environmental nuisance (section 440)
- offence of depositing prescribed water contaminants in waters and related matters (section 440ZG)
- offence to place contaminant where environmental harm or nuisance may be caused (section 443)

THIS ENVIRONMENTAL AUTHORITY CONSISTS OF THE FOLLOWING SCHEDULES:

SCHEDULE A	**GENERAL CONDITIONS**
SCHEDULE B	**WATER**
SCHEDULE C	**GROUNDWATER**
SCHEDULE D	**DAMS**
SCHEDULE E	**LAND**
SCHEDULE F	**BIODIVERSITY**
SCHEDULE G	**ACOUSTIC**
SCHEDULE H	**AIR**
SCHEDULE I	**WASTE**
SCHEDULE J	**REHABILITATION**
SCHEDULE K	**WELL CONSTRUCTION, MAINTENANCE, STIMULATION**
SCHEDULE L	**UNDERGROUND GAS STORAGE**
SCHEDULE M	**DEFINITIONS**

SCHEDULE A – GENERAL

(A1) This environmental authority authorises the carrying out of the following resource activities:

(a) the petroleum activities listed in **Schedule A, Table 1 – Scale of Activities** to the extent they are carried out in accordance with the activity's corresponding scale and intensity;

(b) petroleum activities, including but not limited to:

(i) linear infrastructure;

(ii) borrow pits / extracting, other than by dredging; and

(iii) compressor stations; and

(iv) sewage treatment – operating sewage treatment works, other than no release works; and

(v) seismic surveys.

(c) the specified relevant activities prescribed by this Environmental Authority at the locations specified on the cover pages of this environmental authority;

(d) incidental activities that are not otherwise specified relevant activities.

Schedule A, Table 1 – Scale of Activities

Petroleum Activities and Infrastructure	***Scale (number of activities)***	***Intensity (area of activities authorised)***
Wells	279	N/A
Facilities containing chemical storages greater than 500m^3.	4	N/A
Landfill(s)	0	0
Low consequence dams (excluding drilling sumps and flare pits).	30	N/A
Stimulation	279 wells	N/A

(A2) The activities in condition (A1) are authorised subject to the conditions of this environmental authority.

(A3) This environmental authority does not authorise a relevant act[1] to occur in carrying out an authorised resource activity unless a condition of this environmental authority expressly authorises the relevant act

to occur[2]. Where there is no condition, the lack of a condition must not be construed as authorising the relevant act.

[1] See section 493A of the Act.

[2] Section 493A(2) of the Act provides that a relevant act is unlawful unless it is authorised to be done under, among other things, an environmental authority.

(A4) By 22 November 2020 an inventory of all existing petroleum activities which commenced prior to 22 May 2020 must be developed and maintained.

(A5) The inventory required under condition (A4) must be provided to the administering authority upon written request and within the requested timeframe.

(A6) At the request of the administering authority, a third-party auditor must audit compliance with the conditions of this environmental authority.

(A7) Notwithstanding condition (A6), and prior to undertaking the third-party audit, the timing[1], scope and content of the third-party audit may be negotiated with the administering authority.

[1] The intent of allowing the timing to be negotiated is to allow the EA holder to plan and commission third party audits in such a way that does not result in unnecessary administrative burden on the EA holder (e.g. no more than four (4) audits in a given year across the EA holders other resource EAs in south-west QLD).

(A8) An audit report must be prepared and certified by the third-party auditor presenting the findings of each audit carried out.

(A9) Any recommendations arising from the audit report must be acted upon by:

(a) investigating any non-compliance issues identified; and

(b) as soon as reasonably practicable, implementing measures or taking necessary action to ensure compliance with the requirements of this environmental authority.

(A10) A written response must be attached to the audit report detailing the actions taken or to be taken on stated dates:

(a) to ensure compliance with this environmental authority; and

(b) to prevent a recurrence of any non-compliance issues identified.

(A11) All monitoring must be undertaken by a suitably qualified person.

(A12) If requested by the administering authority in relation to investigating a complaint, monitoring must be commenced within 10 business days.

(A13) All laboratory analyses and tests must be undertaken by a laboratory that has NATA accreditation for such analyses and tests unless NATA accredited tests are not available in Australia.

(A14) Monitoring and sampling must be carried out in accordance with the requirements of the following documents (as relevant to the sampling being undertaken), as amended from time to time:

(a) for waters and aquatic environments, the Queensland Government's Monitoring and Sampling Manual 2009 – Environmental Protection (Water) Policy 2009;

(b) for groundwater, Groundwater Sampling and Analysis – A Field Guide (2009:27 GeoCat #6890.1);

(c) for noise, the Environmental Protection Regulation 2019;

(d) for air, the Queensland Air Quality Sampling Manual and/or Australian Standard 4323.1:1995 Stationary source emissions method 1: Selection of sampling positions, as appropriate for the relevant measurement;

(e) for soil, the Guidelines for Surveying Soil and Land Resources, 2nd edition (McKenzie et al. 2008), and/or the Australian Soil and Land Survey Handbook, 3rd edition (National Committee on Soil and Terrain, 2009);

(f) for dust, Australian Standard 3580.

Notification

(A15) In addition to the requirements under Chapter 7, Part 1, Division 2 of the *Environmental Protection Act 1994*, the administering authority must be notified through the Pollution Hotline and in writing, as soon as possible, but within 48 hours of becoming aware of any of the following events:

(a) any unauthorised significant disturbance to land

(b) potential or actual loss of structural or hydraulic integrity of a dam

(c) when the level of the contents of any regulated dam reaches the mandatory reporting level

(d) when a regulated dam (or network of linked containment systems) will not have available storage to meet the design storage allowance on 1 November of any year

(e) potential or actual loss of well integrity

(f) when the seepage trigger action response procedure required under condition (C3) (g) is or should be implemented

(g) unauthorised releases of any volume of prescribed contaminants to waters

(h) unauthorised releases of volumes of contaminants, in any mixture, to land greater than:

i. 200 L of hydrocarbons; or

ii. 200 L of stimulation additives; or

iii. 500 L of stimulation fluids; or

iv. 1 000 L of brine; or

v. 5 000 L of associated water; or

vi. 5 000 L of raw sewage; or

vii. 10 000 L of treated sewage effluent.

(i) the use of restricted stimulation fluids

(j) groundwater monitoring results from a landholder's active groundwater bore monitored under the stimulation impact monitoring program which is a 10% or greater increase from a previous baseline value for that bore and which renders the water unfit for its intended use

(k) monitoring results where two out of any five consecutive samples do not comply with the relevant limits in the environmental authority.

(A16) From 22 November 2020, petroleum activities involving significant disturbance to land cannot commence until the development of written contingency procedures for emergency environmental incidents which include, but are not necessarily limited to:

(a) a clear definition of what constitutes an environmental emergency incident or near miss for the petroleum activity;

(b) consideration of the risks caused by the petroleum activity including the impact of flooding and other natural events on the petroleum activity;

(c) response procedures to be implemented to prevent or minimise the risks of environmental harm occurring;

(d) the practices and procedures to be employed to restore the environment or mitigate any environmental harm caused;

(e) procedures to investigate causes and impacts including impact monitoring programs for releases to waters and/or land;

(f) training of staff to enable them to effectively respond;

(g) procedures to notify the administering authority, local government, and any potentially impacted landholder.

(A17) All plant and equipment must be maintained and operated in their proper and effective condition.

(A18) For activities commenced after 22 May 2020, measures to minimise fauna being harmed from entrapment must be implemented during the construction and operation of well infrastructure, dams, and pipeline trenches.

(A19) For activities involving significant disturbance to land, control measures that are commensurate to the site-specific risk of erosion, and risk of sediment release to waters must be implemented to:

(a) allow stormwater to be diverted around or pass through the site in a controlled manner

(b) minimise soil erosion resulting from wind, rain, and flowing water

(c) minimise the duration that disturbed soils are exposed to the erosive forces of wind, rain, and flowing water

(d) minimise work-related soil erosion and sediment runoff; and

(e) minimise negative impacts to land or properties adjacent to the activities (including roads).

(A20) Petroleum activities must not cause environmental nuisance at a sensitive place, other than where an alternative arrangement is in place.

(A21) A certification must be prepared by a suitably qualified person within 30 business days of completing every plan, procedure, program, and report required to be developed under this environmental authority, which demonstrates that:

(a) relevant material, including current published guidelines (where available) have been considered in the written document

(b) the content of the written document is accurate and true; and

(c) the document meets the requirements of the relevant conditions of the environmental authority.

(A22) All plans, procedures, programs, reports, and methodologies required under this environmental authority must be written and implemented.

(A23) All documents required to be developed under this environmental authority must be kept for five years.

(A24) All documents required to be prepared, held, or kept under this environmental authority must be provided to the administering authority upon written request within the requested timeframe.

(A25) A record of all complaints must be kept including the date, complainant's details, source, reason for the complaint, description of investigations and actions undertaken in resolving the complaint.

SCHEDULE B – WATER

(B1) Contaminants must not be directly or indirectly released to any waters except as permitted under this environmental authority.

(B2) Conditions (B3), (B4), (B6), and (B7) in Schedule B - Water do not apply to petroleum activity(ies) which commenced prior to 22 May 2020.

(B3) Only linear infrastructure is permitted in a watercourse.[1]

[1] For the purposes of condition B3, a watercourse does not include a floodplain.

(B4) Prior to the construction of any linear infrastructure that will result in significant disturbance in or on the bed and banks of a watercourse, it must be demonstrated that:

(a) no reasonable or practicable alternative exists; and

(b) the activity is preferentially located in pre-existing areas of clearing or significant disturbance.

(B5) The construction or maintenance of linear infrastructure activities in a watercourse must be conducted in the following preferential order:

(a) firstly, in times where there is no water present;

(b) secondly, in times of no flow; and

(c) thirdly in times of flow, but in a way that does not impede low flow.

(B6) Only essential petroleum activities (excluding temporary campsites / workforce accommodation) and borrow pits are permitted within a wetland of high ecological significance.

(B7) Only essential petroleum activities and borrow pits are permitted within a wetland of general ecological significance,

(B8) Prior to carrying out essential petroleum activities within a general ecologically significant wetland or wetland of high ecological significance it must be demonstrated, in the following order of preference that:

(a) no reasonable or practicable alternative exists for carrying out the essential petroleum activities within the general ecologically significant wetland or wetland of high ecological significance;

(b) the essential petroleum activities are preferentially located in pre-existing areas of clearing or significant disturbance.

(B9) Prior to the establishment of a borrow pit within a wetland of high ecologically significance or a general ecologically significant wetland it must be demonstrated, in the following order of preference that:

(a) no reasonable or practicable alternative exists for establishing a borrow pit within the wetland of high ecologically significance or general ecologically significant wetland;

(b) the borrow pit is preferentially located in pre-existing areas of clearing or significant disturbance.

(B10) Petroleum activities other than construction and maintenance activities carried out within any general ecologically significant wetland or wetland of high ecological significance must not:

(a) change the existing surface water hydrological regime; or

(b) impact bank stability.

(B11) Construction or maintenance of petroleum activities in a general ecologically significant wetland or a wetland of high ecological significance must not:

(a) prohibit the flow of surface water in or out of the wetland;

(b) impact surface water quality in the wetland unless specifically authorised by this environmental authority;

(c) drain or fill the wetland;

(d) impact bank stability; or

(e) result in the clearing of riparian vegetation outside of the minimum area practicable to carry out the works.

(B12) Construction or maintenance of linear infrastructure that will result in significant disturbance in or on the bed and banks of a watercourse must not release from the site any contaminants to any waters that exceed the water quality limits specified in **Schedule B, Table 1 – Release Limits to Waters.**

(B13) Construction or maintenance activities within a general ecologically significant wetland or wetland of high ecological significance must not release from the site any contaminants to any waters that exceed the water quality limits specified in **Schedule B, Table 1 – Release Limits to Waters**.

Schedule B, Table 1 – Release Limits to Waters

Water Quality Parameters	Units	Water Quality Limits
Turbidity	Nephelometric Turbidity Units (NTU)	For a general ecologically significant wetland or wetland of high ecological significance, if background water turbidity is above 45 NTU, no greater than 25% above background water turbidity measured within a 50 m radius of the construction or maintenance activity. For a watercourse, if background water turbidity is above 45 NTU, no greater than 25% above background water turbidity measured within 50 m downstream of the construction or maintenance activity.
Turbidity	Nephelometric Turbidity Units (NTU)	For a general ecologically significant wetland or wetland of high ecological significance, if background water turbidity is equal to, or below 45 NTU, a turbidity limit of no greater than 55 NTU applies, measured within a 50 m radius of the construction or maintenance activity. For a watercourse, if background water turbidity is equal to, or below 45 NTU, a turbidity limit of no greater than 55 NTU applies, measured within 50 m downstream of the construction or maintenance activity.
Hydrocarbons	-	For a general ecologically significant wetland, wetland of high ecological significance, or watercourse, no visible sheen or slick.

(B14) Monitoring must be undertaken at a frequency that is appropriate to demonstrate compliance with conditions (B12) and (B13).

(B15) After the construction or maintenance works for petroleum activities in a general ecologically significant wetland or a wetland of high ecological significance are completed, the petroleum infrastructure must not:

(a) drain or fill the wetland;

(b) prohibit the flow of surface water in or out of the wetland;

(c) lower or raise the water table and hydrostatic pressure outside the bounds of natural variability that existed before the activities commenced;

(d) result in ongoing negative impacts to water quality;

(e) result in bank instability; or

(f) result in fauna ceasing to use adjacent areas for habitat, feeding, roosting, or nesting.

(B16) From 22 May 2020, records must be kept of all significant construction and maintenance activities causing disturbance and conducted in a general ecologically significant wetland, a wetland of high ecological significance or a watercourse during times of flow, which must include:

(a) location of the activity (e.g. GPS coordinates (GDA94)); and

(b) duration of works.

(B17) Where the petroleum activity(ies) is carried out on floodplains the petroleum activity(ies) must be carried out in a way that does not:

(a) concentrate flood flows in a way that will or may cause environmental harm; or

(b) divert or impede flood flows from natural drainage paths and alter flow distribution; or

(c) increase the local duration of floods; or

(d) increase the risk of detaining flood flows.

SCHEDULE C – GROUNDWATER

(C1) The extraction of groundwater as part of the petroleum activity(ies) from underground aquifers must not directly or indirectly cause environmental harm to any watercourse, lake, wetland, or spring.

(C2) A Seepage Monitoring Program must be developed by a suitably qualified person that is commensurate with the site-specific risk of contaminant seepage from containment facilities and able to determine if seepage of contaminants to groundwater is occurring as a result of storing contaminants in containment facilities by 22 May 2021.

(C3) The Seepage Monitoring Program required by condition (C2), must include, but not necessarily be limited to:

(a) identification of the containment facilities for which seepage will be monitored;

(b) identification of the trigger parameters that are associated with the potential or actual contaminants stored in the containment facility;

(c) identification of trigger concentration levels that are suitable for early detection of contaminant releases at the containment facilities;

(d) Installation of background seepage monitoring bores where groundwater quality will not have been affected by the petroleum activities authorised under this environmental authority to use as reference sites for determining impacts

(e) Installation of seepage monitoring bores that:

i. are within the upper-most aquifer potentially affected by the containment facilities authorised under this environmental authority (i.e. within the potential area of impact)

ii. provide for the early detection of negative impacts prior to reaching sensitive receptors (i.e. groundwater dependent ecosystems, water supply bores)

iii. provide for the early detection of negative impacts prior to reaching migration pathways to other aquifers and formations (i.e. faults, areas of unconformities known to connect two or more formations)

(f) monitoring of groundwater at each background and seepage monitoring bore at a sufficient frequency that will allow for early detection of contaminants for the trigger parameters identified in condition (C3(b));

(g) seepage trigger action response procedures for when trigger parameters and trigger levels identified in conditions (C3(b)) and (C3(c)) trigger the early detection of seepage, or upon becoming aware of any monitoring results that indicate potential groundwater contamination;

(h) a rationale detailing the program conceptualisation including assumptions, determinations, monitoring equipment, sampling methods and data analysis; and

(i) provides for annual updates to the program for new containment facilities constructed in each annual return period.

(C4) A drill bore log must be completed for each seepage monitoring bore in condition (C3), which must include:

(a) bore identification reference and geographical coordinate location

(b) specific construction information including but not limited to depth of bore, depth and length of casing, depth and length of screening and bore sealing details

(c) standing groundwater level and water quality parameters including physical parameter and results of laboratory analysis for the possible trigger parameters

(d) lithological data, preferably a stratigraphic interpretation to identify the important features including the identification of any aquifers; and

(e) target formation of the bore.

SCHEDULE D – DAMS

(D1) The consequence category of any structure, other than flare pits and sumps, must be assessed by a suitably qualified and experienced person in accordance with the *Manual for Assessing Consequence Categories and Hydraulic Performance of Structures* (ESR/2016/1933) at the following times:

(a) following the design and prior to construction of the structure, if it is not an existing structure; or

(b) if it is an existing structure, 22 May 2021; or

(c) prior to any change in its purpose or the nature of its stored contents.

(D2) A consequence assessment report and certification must be prepared for each structure assessed and the report may include a consequence assessment for more than one structure.

(D3) Certification must be provided by the suitably qualified and experienced person who undertook the assessment, in the form set out in the *Manual for Assessing Consequence Categories and Hydraulic Performance of Structures* (ESR/2016/1933).

(D4) Regulated Structures are not authorised by this environmental authority.

SCHEDULE E – LAND

(E1) Contaminants must not be directly or indirectly released to land except for those releases authorised by conditions (I4), (I17), (I22) and (I23).

(E2) Topsoil must be managed in a manner that preserves its biological and chemical properties.

(E3) Chemicals and fuels stored, must be effectively contained and where relevant, meet Australian Standards, where such a standard is applicable.

SCHEDULE F – BIODIVERSITY

(F1) Conditions (F2) to (F9) inclusive in **Schedule F – Biodiversity** do not apply to the petroleum activity(ies) which commenced prior to 22 May 2020.

(F2) Prior to undertaking activities that result in significant disturbance to land in areas of native vegetation, confirmation of on-the-ground biodiversity values of the native vegetation communities at that location must be undertaken by a suitably qualified person.

(F3) A suitably qualified person must develop and certify a methodology so that condition (F2) can be complied with and which is appropriate to confirm on-the-ground biodiversity values by 22 November 2020.

(F4) Where mapped biodiversity values differ from those confirmed under conditions (F2) and (F3), petroleum activities may proceed in accordance with the conditions of the environmental authority based on the confirmed on-the-ground biodiversity value.

(F5) The location of the petroleum activity(ies) must be selected in accordance with the following site planning principles:

(a) maximise the use of areas of pre-existing disturbance;

(b) in order of preference, avoid, minimise, or mitigate any impacts, including cumulative impacts, on areas of native vegetation or other areas of ecological value;

(c) minimise disturbance to land that may result in land degradation;

(d) in order of preference, avoid then minimise isolation, fragmentation, edge effects or dissection of tracts of native vegetation; and

(e) in order of preference, avoid then minimise clearing of native mature trees.

(F6) Linear infrastructure construction corridors must:

(a) maximise co-location

(b) be minimised in width to the greatest practicable extent; and

(c) for linear infrastructure that is an essential petroleum activity authorised in an environmentally sensitive area or its protection zone, be no greater than 40m in total width.

(F7) Where petroleum activities are to be carried out in environmentally sensitive areas or their protection zones, the petroleum activities must be carried out in accordance with **Schedule F, Table 1—Authorised petroleum activities in environmentally sensitive areas and their protection zones**.

Note: Approvals may be required under the *Forestry Act 1959* where the petroleum activity(ies) is proposed to be carried out in ESAs that are State Forests or Timber Reserves.

Schedule F, Table 1—Authorised petroleum activities in environmentally sensitive areas and their protection zones

ESA Category	Within the ESA	Primary protection zone of the ESA	Secondary protection zone of the ESA
Category A ESAs	No petroleum activities permitted	Only low impact petroleum activities permitted.	Only essential petroleum activities permitted
Category B ESAs excluding 'Endangered' Regional Ecosystems	Only low impact petroleum activities permitted	Only essential petroleum activities permitted Subject to condition (F8)	Petroleum activities permitted
Category B ESAs that are 'Endangered' Regional Ecosystems	Only essential petroleum activities permitted	Only essential petroleum activities permitted	Petroleum activities permitted
Category C ESAs that are Essential Habitat, Essential Regrowth Habitat and/or 'Of Concern' Regional Ecosystems	Only essential petroleum activities permitted Subject to condition (F8)	Only essential petroleum activities permitted Subject to condition (F8)	Petroleum activities permitted
Category C ESAs that are Nature Refuges, Koala Habitat and/or Declared Catchment Areas	Only low impact petroleum activities permitted	Only essential petroleum activities permitted Subject to condition (F8)	Petroleum activities permitted

ESA Category	Within the ESA	Primary protection zone of the ESA	Secondary protection zone of the ESA
Category C ESAs that are Resource Reserves	Only essential petroleum activities permitted Subject to condition (F8)	Only essential petroleum activities permitted Subject to condition (F8)	Petroleum activities permitted
Category C ESAs that are State Forests and/or Timber Reserves	Only essential petroleum activities permitted	Petroleum activities permitted	Petroleum activities permitted

(F8) If essential petroleum activity(ies) are located within a primary protection zone or secondary protection zone of an environmentally sensitive area, the activity(ies) must not negatively affect the adjacent environmentally sensitive area.

(F9) Prior to carrying out essential petroleum activities within environmentally sensitive areas in accordance with **Schedule F, Table 1 – Authorised petroleum activities in environmentally sensitive areas and their protection zones**, it must be demonstrated, in the following order of preference that:

(a) No reasonable or practicable alternative exists for carrying out the essential petroleum activities within the environmentally sensitive area; and

(b) The essential petroleum activities are preferentially located in pre-existing areas of clearing or significant disturbance.

(F10) Significant residual impacts to prescribed environmental matters, that occur on or after 14 December 2018 are not authorised on PL 1046 under this environmental authority or the *Environmental Offsets Act 2014.*

(F11) Records demonstrating that each impact to a prescribed environmental matter, on or after 14 December 2018 on PL 1046 did not or is not likely to, result in a significant residual impact to that matters must be:

(a) Completed by an appropriately qualified person; and

(b) Kept for the life of the environmental authority.

SCHEDULE G – ACOUSTIC

(G1) Notwithstanding condition (A20), emission of noise from the petroleum activity(ies) at levels less than those specified in **Schedule G, Table 1—Noise nuisance limits** are not considered to be environmental nuisance.

(c)

(d) Schedule G, Table 1—Noise nuisance limits

Time period	Metric	Short term noise event	Medium term noise event	Long term noise event
7:00am—6:00pm	$L_{Aeq,adj,15\ min}$	45 dBA	43 dBA	40 dBA
6:00pm—10:00pm	$L_{Aeq,adj,15\ min}$	40 dBA	38 dBA	35 dBA
10:00pm—6:00am	$L_{Aeq,adj,15\ min}$	28 dBA	28 dBA	28 dBA
	Max $L_{pA,\ 15\ mins}$	55 dBA	55 dBA	55 dBA
6:00am—7:00am	$L_{Aeq,adj,15\ min}$	40 dBA	38 dBA	35 dBA

The noise limits in Table 1 have been set based on the following deemed background noise levels (L_{ABG}):

7:00am—6:00 pm: 35 dBA

6:00pm—10:00 pm: 30 dBA

10:00pm—6:00 am: 25 dBA

6:00am—7:00 am: 30 dBA

(G2) If the noise subject to a valid complaint is tonal or impulsive, the adjustments detailed in **Schedule G, Table 2—Adjustments to be added to noise levels at sensitive receptors** are to be added to the measured noise level(s) to derive $LA_{eq,\ adj,\ 15\ min.}$

(e)

(f) Schedule G, Table 2—Adjustments to be added to noise levels at sensitive receptors

Noise characteristic	Adjustment to noise
Tonal characteristic is just audible	+ 2 dBA
Tonal characteristic is clearly audible	+ 5 dBA
Impulsive characteristic is detectable	+ 2 to + 5 dBA

(g)

(G3) Notwithstanding condition (G1), emission of any low frequency noise must not exceed either (G3)(a) and (G3)(b), or (G3)(c) and (G3)(d) in the event of a valid complaint about low frequency noise being made to the administering authority:

(a) 60 dB(C) measured outside the sensitive receptor; and

(b) the difference between the external A-weighted and C-weighted noise levels is no greater than 20 dB; or

(c) 50 dB(Z) measured inside the sensitive receptor; and

(d) the difference between the internal A-weighted and Z-weighted (Max $L_{pZ, 15\ min}$) noise levels is no greater than 15dB.

(G4) A Blast Management Plan must be developed for each blasting activity in accordance with Australian Standard 2187.

(G5) Blasting operations must be designed to not exceed an airblast overpressure level of 120 dB (linear peak) at any time, when measured at or extrapolated to any sensitive place.

(G6) Blasting operations must be designed to not exceed a ground-borne vibration peak particle velocity of 10mm/s at any time, when measured at or extrapolated to any sensitive place.
(h)

SCHEDULE H - AIR

(H1) Unless venting is authorised under the *Petroleum and Gas (Production and Safety) Act 2004* or the *Petroleum Act 1923*, waste gas must be flared in a manner that complies with all of (H1)(a) and (H1)(b) and (H1)(c), or with (H1)(d):

(a) an automatic ignition system is used, and

(b) a flame is visible at all times while the waste gas is being flared, and

(c) there are no visible smoke emissions other than for a total period of no more than 5 minutes in any 2 hours, or

(d) it uses an enclosed flare.

SCHEDULE I – WASTE

(I1) All waste generated in carrying out the activity must be lawfully reused, recycled, or removed to a facility that can lawfully accept the waste, except as permitted under another condition of this environmental authority.

(I2) Measures must be implemented so that waste is managed in accordance with the waste and resource management hierarchy and the waste and resource management principles.

(I3) Sumps not required for the management of residual drilling material in accordance with condition (I4), must only be used to store residual drilling material during drilling activities and work over processes.

(I4) From 22 May 2020, residual drilling material can only be disposed of on-site:

(a) by mix-bury cover method if the residual drilling material meets the approved quality criteria; or

(b) if it is certified by a suitably qualified third party as being of acceptable quality for disposal to land by the proposed method and that environmental harm will not result from the proposed disposal.

(I5) In accordance with condition (B1), the disposal of residual drilling material must not result in a direct or indirect release of contaminants to any waters.

(I6) Records must be kept to demonstrate compliance with conditions (I3) and (I4)

(I7) Green waste may be used on-site for either rehabilitation or sediment and erosion control, or both.

(I8) Only landfill(s) identified in **Schedule I, Table 1 - Landfills** are permitted under this environmental authority:

Schedule I, Table 1 – Landfills

Landfill Name	Latitude	Longitude

(I9) Waste may be disposed of onsite at a landfill identified in **Schedule I, Table 1 - Landfills**.

(I10) Landfill facilities identified in **Schedule I, Table 1 - Landfills**, used for the disposal of waste must be:

(a) designed and operated to exclude stormwater runoff from entering the landfill; and

(b) capped upon closure with capping methodology certified by a suitably qualified person as being suitable for containing the waste.

(I11) Waste disposal must not result in litter escaping the boundary of the landfill facility.

(I12) Temporary land farms are authorised under this environmental authority in non-floodplain areas.

(I13) A record of land farm locations must be kept for the life of the authority.

(I14) Land farms must be designed, constructed, and maintained to:

(a) prevent the release of contaminants from the containment system; and

(b) exclude stormwater from entering the containment system.

(I15) Bio remediated soil from land farms may be used for petroleum activities where the soil quality criteria for the intended land use is achieved in accordance with the National Environmental Protection Measures (NEPMs) as amended from time to time.

(I16) The release of contaminants to land must be carried out in a manner such that:

(a) vegetation is not damaged; and

(b) soil quality is not adversely impacted; and

(c) there is no surface ponding or runoff to waters; and

(d) there is no aerosols or odours; and

(e) deep drainage below the root zone of any vegetation is minimised; and

(f) the quality of shallow aquifers is not adversely affected.

(I17) Associated water produced from the authorised petroleum activity(ies) may be used for the following in accordance with condition (I16):

(a) for dust suppression on roads;

(b) for construction and operational purposes, including drilling, well hole activities and stimulation, for the petroleum activity(ies) authorised by this environmental authority;

(c) domestic and stock purposes.

(I18) Associated water produced from the authorised petroleum activity(ies) may be transferred to a third party to be used for the following purposes subject to compliance with conditions (I19) and (I20):

(a) dust suppression;

(b) construction and operational purposes;

(c) livestock watering purposes.

(I19) By 22 November 2020, any associated water supplied to a third party for livestock watering purposes in accordance with condition (I18)(c) must meet the ANZECC and ARMCANZ Water Quality Guidelines 2000 for livestock watering purposes, as amended from time to time.

(I20) If the responsibility of associated water is given or transferred to a third party in accordance with condition (I18), the holder of environmental authority must ensure that:

(a) the responsibility of the associated water is given or transferred in accordance with a written agreement (the third party agreement); and

(b) the third party is made aware of the General Environmental Duty under section 319 of the *Environmental Protection Act 1994*.

(I21) By 22 November 2020, a record of all written agreements as required by section (I20)(a) must be kept for the life of the authority and be made available to the administering authority upon request within the stated time period.

(I22) Hydrostatic test water from pipelines may be released to land in accordance with condition (I16).

(I23) Treated sewage effluent or greywater from a treatment system with a daily peak design capacity of less than 21 equivalent persons (EP) may be released to land provided it:

(a) be to a signed contaminant release area(s);

(b) does not contain any properties nor contain any organisms or other contaminants in concentrations that are capable of causing environmental harm;

(c) does not result in pooling or run-off or aerosols or spray drift or vegetation die-off;

(d) minimises deep drainage below the root zone of any vegetation; and

(e) does not adversely affect the quality of shallow aquifers.

SCHEDULE J – REHABILITATION

(J1) Rehabilitation of disturbed areas must take place progressively as works are staged.

Remaining dams

(J2) Where there is a dam (including a low consequence dam) that is being or intended to be utilised by the landholder or overlapping tenure holder, the dam must be decommissioned to no longer accept inflow from the petroleum activity(ies) and the contained water must be of a quality suitable for the intended on-going uses(s) by the landholder or overlapping tenure holder at the time of handover.

(J3) Significantly disturbed areas, other than those being or intended to be utilised by the landholder or overlapping tenure holder must be rehabilitated in accordance with conditions (J5) to (J8).

(J4) Rehabilitation of significantly disturbed areas in accordance with condition (J5) that are no longer required for on-going petroleum activities must commence within 12 months (unless an exceptional circumstance in the area to be rehabilitated (e.g. a flood event) prevents this timeframe being met).

(i)

(J5) Rehabilitation of significantly disturbed areas must meet the following acceptance criteria:

(a) contaminated land resulting from petroleum activities is remediated

(b) the areas are:

i. non-polluting

ii. a stable landform

iii. re-profiled to contours consistent with the surrounding landform

(c) surface drainage lines are re-established;

(d) topsoil where present, is reinstated; and

(e) plant pest species (restricted matter) are not present or are consistent with the surrounding areas.

Decommissioning of pipelines

(J6) Pipeline decommissioning must meet Australian Standards where such a standard is applicable.

Progressive rehabilitation

(J7) Pipelines trenches must be backfilled in accordance with condition (J8) after pipe laying and rehabilitated as soon as practicable but not longer than three (3) months after completion.

(J8) For the life of the operational pipeline, backfilled pipeline trenches must:

(a) be a stable landform, exhibiting no subsidence or erosion gullies for the life of the operational pipeline; and

(b) be re-profiled to a level consistent with surrounding soils; and

(c) be re-profiled to original contours and established drainage lines; and

(d) plant pest species (restricted matter) are not present or are consistent with the surrounding areas.

SCHEDULE K – WELL CONSTRUCTION, MAINTENACE AND STIMULATION

(K1) Oil based or synthetic based drilling muds must not be used in the carrying out of the petroleum activity(ies).

(K2) Drilling activities and stimulation activities must not cause the connection of the target formation and another aquifer.

(K3) Practices and procedures must be in place to detect, as soon as practicable, any fractures that have or may result in the connection of a target formation and another aquifer as a result of drilling activities.

(K4) The holder of this environmental authority must ensure internal and external mechanical integrity of the well system prior to and during stimulation such that there is:

(a) no significant leakage in the casing, tubing, or packer; and

(b) there is no significant fluid movement into another aquifer through vertical channels adjacent to the well bore hole.

(K5) Practices and procedures must be in place to detect, as soon as practicable, any fractures that cause the connection of a target formation and another aquifer if an aquifer is present within 200 metres above or below the target formation(s) and is spatially located with a two (2) kilometre radius from the location of the stimulation initiation point.

(K6) Prior to undertaking stimulation activities, a risk assessment must be developed to ensure that stimulation activities are managed to prevent environmental harm.

(K7) The stimulation risk assessment must address issues at a relevant geospatial scale such that changes to features and attributes are adequately described and must include, but not necessarily be limited to:

(a) a process description of the stimulation activity to be applied, including equipment;

(b) provide details of where, when, and how often stimulation is to be undertaken on the tenures covered by this environmental authority;

(c) a geological model of the field to be stimulated including geological names, descriptions and depths of the target producing formation(s);

(d) naturally occurring geological faults;

(e) seismic history of the region (e.g. earth tremors, earthquakes);

(f) proximity of overlying and underlying aquifers;

(g) description of the depths that aquifers with environmental values occur, both above and below the target formation.

(h) identification and proximity of landholders' active groundwater bores in the area where stimulation activities are to be carried out;

(i) the environmental values of groundwater in the area;

(j) an assessment of the appropriate limits of reporting for all water quality indicators relevant to stimulation monitoring in order to accurately assess the risks to environmental values of groundwater;

(k) description of overlying and underlying formations in respect of porosity, permeability, hydraulic conductivity, faulting, and fracture propensity;

(l) consideration of barriers or known direct connections between the target formation and the overlying and underlying aquifers;

(m) a description of the well mechanical integrity testing program;

(n) process control and assessment techniques to be applied for determining extent of stimulation activities (e.g. microseismic measurements, modelling etc);

(o) practices and procedures to ensure that the stimulation activities are designed to be contained within the target formation;

(p) groundwater transmissivity, flow rate, hydraulic conductivity, and direction(s) of flow;

(q) a description of the chemicals used in stimulation activities (including estimated total mass, estimated composition, chemical abstract service numbers and properties), their mixtures and the resultant compounds that are formed after stimulation;

(r) a mass balance estimating the concentrations and absolute masses of chemicals that will be reacted, returned to the surface, or left in the target formation subsequent to stimulation;

(s) An environmental hazard assessment of the chemicals used to include their mixtures and the resultant chemicals that are formed after stimulation including:

  i. toxicological and ecotoxicological information of chemical compounds used;

  ii. information on the persistence and bioaccumulation potential of the chemical compounds used;

  iii. identification of the chemicals of potential concern in stimulation fluids derived from the risk assessment;

(t) an environmental hazard assessment of the chemicals used including mixtures and the resultant chemicals that are formed after stimulation;

(u) identification and an environmental hazard assessment of using radioactive tracer beads in stimulation activities where such beads have been used or are proposed to be used;

(v) an environmental hazard assessment of leaving chemical compounds in stimulation fluids in the target formation for extended periods subsequent to stimulation;

(w) human health exposure pathways to operators and the regional population

(x) risk characterisation of environmental impacts based on the environmental hazard assessment;

(y) potential impacts to landholder bores as a result of stimulation activities;

(z) an assessment of cumulative underground impacts, spatially and temporally of the stimulation activities to be carried out on the tenures covered by this environmental authority; and

(aa) potential environmental or health impacts which may result from stimulation activities including but not limited to water quality, air quality (including suppression of dust and other airborne contaminants), noise and vibration.

Water Quality Baseline Monitoring

(K8) Prior to undertaking any stimulation activity, a baseline bore assessment must be undertaken of the water quality of:

(a) landholder's active groundwater bores (subject to access being permitted by the landholder) that are within a two (2) kilometre radius from the location of the stimulation initiation point within the target formation; and

(b) any other bore that could potentially be adversely impacted by the stimulation activity(ies) in accordance with the findings of the risk assessment required by conditions (K6) and (K7).

(K9) Baseline bore assessments required in condition (K8) must include the minimum water quality analytes and physico-chemical parameters identified in the Baseline Assessment Guideline and any restricted stimulation fluids as defined in the *Environmental Protection Act 1994*, as amended from time to time, in order to establish baseline water quality.

Stimulation Impact Monitoring Program

(K10) A Stimulation Impact Monitoring Program must be developed prior to the carrying out stimulation activities which must be able to detect adverse impacts to quality from stimulation activities and must consider the findings of the risk assessment required by conditions (K6) and (K7) that relate to stimulation activities and must include, as a minimum, monitoring of:

(a) the stimulation fluids to be used in stimulation activities at sufficient frequency and which sufficiently represents the quantity and quality of the fluids used; and

(b) flow back waters from stimulation activities at sufficient frequency and which sufficiently

represents the quality of that flow back water; and

(c) all bores in accordance with condition (K8).

(K11) The Stimulation Impact Monitoring Program must provide for monitoring of:

(a) analytes and physico-chemical parameters relevant to stimulation baseline bore assessments required by conditions (K8) and (K9); and

(b) any other analyte or physico-chemical parameters that will enable detection of adverse water quality impacts and the inter-connection with a non-target aquifer as a result of stimulation activities if an aquifer is present within 200 metres above or below the target formation(s) and is spatially located with a two (2) kilometre radius from the location of the stimulation initiation point.

(K12) The Stimulation Impact Monitoring Program must provide for monitoring of the bores in condition (K10)(c) at the following minimum frequency:

(a) monthly for the first six (6) months subsequent to stimulation activities being undertaken; then

(b) annually for the first five (5) years subsequent to stimulation activities being undertaken or until analytes and physico-chemical parameters required in condition (K9) are not detected in concentrations above baseline bore monitoring data on two (2) consecutive monitoring occasions.

(K13) The results of the Stimulation Impact Monitoring Program must be made available to any potentially affected landholder upon request by that landholder.

(K14) Polycyclic aromatic hydrocarbons or products that contain polycyclic aromatic hydrocarbons must not be used in stimulation fluids in concentrations above the reporting limit.

(K15) Stimulation activities must not negatively affect water quality, other than that within the stimulation impact zone of the target formation.

SCHEDULE L – UNDERGROUND GAS STORAGE

(L1) Testing and evaluating natural underground reservoirs for petroleum storage or to store prescribed storage gases is authorised under this environmental authority.

(L2) Developing and using natural underground reservoirs for petroleum storage or to store prescribed storage gases is not authorised under this environmental authority.

SCHEDULE M – DEFINITIONS

administering authority	means: (a) for a matter, the administration and enforcement of which has been devolved to a local government under section 514 of the *Environmental Protection Act 1994*—the local government; or (b) for all other matters—the Chief Executive of the Department of Environment and Science; or (c) another State Government Department, Authority, Storage Operator, Board or Trust, whose role is to administer provisions under other enacted legislation.
alternative arrangement	means a written agreement about the way in which a particular environmental nuisance impact will be dealt with at a sensitive place and may include an agreed period of time for which the arrangement is in place. An alternative arrangement may include, but is not limited to, a range of nuisance abatement measures to be installed at the sensitive place, or provision of alternative accommodation for the duration of the relevant nuisance impact.
annual return period	means the most current 12-month period between two anniversary dates.
appropriately qualified person / suitably qualified person	means a person who has professional qualifications, training or skills or experience relevant to the nominated subject matters and can give authoritative assessment, advice, and analysis about performance relevant to the subject matters using relevant protocols, standards, methods, or literature.

<table>
<tr>
<td>approved quality criteria</td>
<td>for the purposes of residual drilling materials, means the residual drilling material meet the following quality standards:

Part A In all cases:

<table>
<tr><th>Parameter</th><th>Maximum concentration</th></tr>
<tr><td>pH</td><td>6-10.5 (range)</td></tr>
<tr><td>Electrical Conductivity</td><td>20d/Sm (20,000µS/cm)</td></tr>
<tr><td>Chloride*</td><td>8000mg/L</td></tr>
</table>

*Chloride analysis is only required if an additive containing chloride was used in the drilling process

The limits in Part A must be measured in the clarified filtrate of oversaturated solids prior to mixing.

Part B If any of the following metals are a component of the drilling fluids, then for that metal:

<table>
<tr><th>Parameter</th><th>Maximum concentration</th></tr>
<tr><td>Arsenic</td><td>20mg/kg</td></tr>
<tr><td>Selenium</td><td>5mg/kg</td></tr>
<tr><td>Boron</td><td>100mg/kg</td></tr>
<tr><td>Cadmium</td><td>3mg/kg</td></tr>
<tr><td>Chromium (total)</td><td>400mg/kg</td></tr>
<tr><td>Copper</td><td>100mg/kg</td></tr>
<tr><td>Lead</td><td>600mg/kg</td></tr>
</table>

The limits in Part B and Part C refer to the post soil/by-product mix.

Part C If a hydrocarbon sheen is visible, the following hydrocarbon fractions:</td>
</tr>
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<tr><td></td><td>
<table>
<tr><th>TPH</th><th>Maximum concentration</th></tr>
<tr><td>C6-C10</td><td>170mg/kg</td></tr>
<tr><td>C10-C16</td><td>150mg/kg</td></tr>
<tr><td>C16-C34</td><td>1300mg/kg</td></tr>
<tr><td>C34-C40</td><td>5600mg/kg</td></tr>
<tr><td>Total Polycyclic Aromatic Hydrocarbons (PAH’s)</td><td>20mg/kg</td></tr>
<tr><td>Phenols (halogenated)</td><td>1mg/kg</td></tr>
<tr><td>Phenols (non-halogenated)</td><td>60mg/kg</td></tr>
<tr><td>Monocyclic aromatic hydrocarbons

(Total sum of benzene, toluene, ethyl, benzene, xylenes (including ortho, para and meta xylenes) and styrene)</td><td>7mg/kg</td></tr>
<tr><td>Benzene</td><td>1mg/kg</td></tr>
</table>
</td></tr>
<tr><td>areas of pre-existing disturbance</td><td>means areas where environmental values have been negatively impacted as a result of anthropogenic activity and these impacts are still evident. Areas of pre-disturbance may include areas where legal clearing, logging, timber harvesting, or grazing activities have previously occurred, where high densities of weed or pest species are present which have inhibited re-colonisation of native regrowth, or where there is existing infrastructure (regardless of whether the infrastructure is associated with the authorised petroleum activities). The term ‘areas of pre-disturbance’ does not include areas that have been impacted by wildfire/s, controlled burning, flood, or natural vegetation die-back.</td></tr>
</table>

assessed or assessment	by a suitably qualified and experienced person in relation to a consequence assessment of a dam, means that a statutory declaration has been made by that person and, when taken together with any attached or appended documents referenced in that declaration, all of the following aspects are addressed and are sufficient to allow an independent audit of the assessment: (a) exactly what has been assessed and the precise nature of that determination; (b) the relevant legislative, regulatory, and technical criteria on which the assessment has been based; (c) the relevant data and facts on which the assessment has been based, the source of that material, and the efforts made to obtain all relevant data and facts; and (d) the reasoning on which the assessment has been based using the relevant data and facts, and the relevant criteria.
associated water	means underground water taken or interfered with, if the taking or interference happens during the course of, or results from, the carrying out of another authorised activity under a petroleum authority, such as a petroleum well, and includes waters also known as produced formation water. The term includes all contaminants suspended or dissolved within the water.
associated works	in relation to a dam, means: (a) operations of any kind and all things constructed, erected, or installed for that dam; and (b) any land used for those operations
Australian Standard 3580	means any of the following publications: • AS3580.10.1 Methods for sampling and analysis of ambient air—Determination of particulate matter—Deposited matter—Gravimetric method. • AS3580.9.6 Methods for sampling and analysis of ambient air—Determination of suspended particulate matter—PM10 high volume sampler with size-selective inlet— Gravimetric method • AS3580.9.9 Methods for sampling and analysis of ambient air—Determination of suspended particulate matter— PM10 low volume sampler—Gravimetric ampler.

Australian Standard 4323	means Australian Standard 4323.1:1995 *Stationary source emissions method 1: Selection of sampling positions*.
bed	of any waters, has the meaning in Schedule 19 of the Environmental Protection Regulation 2019 and— (a) includes an area covered, permanently or intermittently, by tidal or non-tidal waters; but (b) does not include land adjoining or adjacent to the bed that is from time to time covered by floodwater.
being or intended to be utilised by the landholder or overlapping tenure holder	for significantly disturbed land, means there is a written agreement (e.g. land and compensation agreement) between the landholder or the overlapping tenure holder and the holder of the environmental authority identifying that the landholder or the overlapping tenure holder has a preferred use of the land such that rehabilitation standards for revegetation by the holder of the environmental authority are not required. For dams, means there is a written agreement (e.g. land and compensation agreement) between the landholder or the overlapping tenure holder and the holder of the environmental authority identifying that the landholder or the overlapping tenure holder has a preferred use for the dam such that rehabilitation standards for revegetation by the holder of the environmental authority are not required.
biodiversity values	for the purposes of this environmental authority, means environmentally sensitive areas, and wetlands. For tenures with any condition/s that limit or prohibit impacts to prescribed environmental matters, the definition of biodiversity values also includes prescribed environmental matters.
bore	means a water observation bore or a water supply bore that is either sub-artesian or artesian.
brine	means saline water with a total dissolved solid concentration greater than 40 000 mg/l.
Category A Environmentally Sensitive Area	means any area listed in Schedule 19, Part 1 of the Environmental Protection Regulation 2019.
Category B Environmentally Sensitive Area	means any area listed in Schedule 10, Part 2 of the Environmental Protection Regulation 2019.

Category C Environmentally Sensitive Area	means any of the following areas: • nature refuges as defined in the conservation agreement for that refuge under the *Nature Conservation Act 1992* koala habitat areas as defined under the Nature Conservation (Koala) Conservation Plan 2006 • state forests or timber reserves as defined under the *Forestry Act 1959* • regional parks (previously known as resource reserves) under the Nature *Conservation Act 1992* • an area validated as 'essential habitat' from ground-truthing surveys in accordance with the *Vegetation Management Act 1999* for a species of wildlife listed as endangered or vulnerable under the *Nature Conservation Act 1992* • 'of concern regional ecosystems' that are remnant vegetation and identified in the database called 'RE description database' containing regional ecosystem numbers and descriptions.
certification (in relation to structures which are dams or levees - Schedule D)	means assessment and approval must be undertaken by a suitably qualified and experienced person in relation to any assessment or documentation required by this Manual, including design plans, 'as constructed' drawings and specifications, construction, operation, or an annual report regarding regulated structures, undertaken in accordance with the Board of Professional Engineers of Queensland Policy Certification by RPEQs (ID: 1.4 (2A)).
certified or certification	in relation to any matter other than a design plan, 'as constructed' drawings or an annual report regarding dams means, a Statutory Declaration by a suitably qualified person or suitably qualified third party accompanying the written document stating: • the person's qualifications and experience relevant to the function • that the person has not knowingly included false, misleading, or incomplete information in the document • that the person has not knowingly failed to reveal any relevant information or document to the administering authority • that the document addresses the relevant matters for the function and is factually • correct; and • that the opinions expressed in the document are honestly and reasonably held.

clearing	for vegetation means removing, cutting down, ringbarking, pushing over, poisoning, or destroying in any way including by burning, flooding, or draining; but does not include destroying standing vegetation by stock, or lopping a tree.
consequence	in relation to a structure as defined, means the potential for environmental harm resulting from the collapse or failure of the structure to perform its primary purpose of containing, diverting, or controlling flowable substances.
consequence category	means a category, either low, significant, or high, into which a dam is assessed as a result of the application of tables and other criteria in the *Manual for assessing consequence categories and hydraulic performance of structures (ESR/2016/193313).*
construction or constructed	in relation to a dam includes building a new dam and modifying or lifting an existing dam but does not include investigations and testing necessary for the purpose of preparing a design plan.
control measure/s	has the meaning in section 31 of the Environmental Protection Regulation 2019 and means a device, equipment, structure, or management strategy used to prevent or control the release of a contaminant or waste to the environment.
daily peak design capacity	for sewage treatment works, has the meaning in Schedule 2, section 63(4) of the Environmental Protection Regulation 2019 as the higher equivalent person (EP) for the works calculated using each of the formulae found in the definition for EP.
dam(s)	means a land-based structure or a void that contains, diverts, or controls flowable substances, and includes any substances that are thereby contained, diverted, or controlled by that land-based structure or void and associated works.
design plan	is the documentation required to describe the physical dimensions of the dam, the materials, and standards to be used for construction of the dam, and the criteria to be used for operating the dam. The documents must include design and investigation reports, specifications, and certifications, together with the planned decommissioning and rehabilitation works and outcomes. A design plan may include 'as constructed' drawings.

design storage allowance or DSA	means an available volume, estimated in accordance with the *Manual for Assessing Consequence Categories and Hydraulic Performance of Structures ESR/2016/19337),* published by the administering authority, as amended from time to time, that must be provided in a dam to an annual exceedance probability specified in that Manual.
document/s	has the meaning in the *Acts Interpretation Act 1954* and means: • any paper or other material on which there is writing; and • any paper or other material on which there are marks; and • figures, symbols, or perforations having a meaning for a person qualified to interpret them; and • any disc, tape or other article or any material from which sounds, images, writings, or messages are capable of being produced or reproduced (with or without the aid of another article or device).
emergency action plan	means documentation forming part of the operational plan held by the holder or a nominated responsible officer, that identifies emergency conditions that sets out procedures and actions that will be followed and taken by the dam owner and operating personnel in the event of an emergency. The actions are to minimise the risk and consequences of failure and ensure timely warning to affected persons and the implementation of protection measures. The plan must require dam owners to annually review and update contact information where required.
enclosed flare	means a device where the residual gas is burned in a cylindrical or rectilinear enclosure that includes a burning system and a damper where air for the combustion reaction is admitted.
enhanced oil recovery	Means the process of injecting fluids into an oil reservoir to increase production of oil.

environmental harm	has the meaning in section 14 of the *Environmental Protection Act 1994* and means any adverse effect, or potential adverse effect (whether temporary or permanent and of whatever magnitude, duration, or frequency) on an environmental value, and includes environmental nuisance. Environmental harm may be caused by an activity— (a) whether the harm is a direct or indirect result of the activity; or (b) whether the harm results from the activity alone or from the combined effects of the activity and other activities or factors.
environmental nuisance	has the meaning in section 15 of the *Environmental Protection Act 1994* and means unreasonable interference or likely interference with an environmental value caused by— (a) aerosols, fumes, light, noise, odour, particles, or smoke; or (b) an unhealthy, offensive, or unsightly condition because of contamination; or (c) another way prescribed by regulation
environmentally sensitive area	means Category A, B or C environmentally sensitive areas (ESAs).
equivalent person/s or EP	has the meaning under section 3 of the Planning Guidelines For Water Supply and Sewerage, 2005, published by the Queensland Government. It is calculated in accordance with Schedule 2, Section 63(4) of the Environmental Protection Regulation 2019 where: • EP = V/200 where V is the volume, in litres, of the average dry weather flow of sewage that can be treated at the works in a day; or • EP = M/2.5 where M is the mass, in grams, of phosphorus in the influent that the works are designed to treat as the inlet load in a day.

essential petroleum activities	means activities that are essential to bringing the resource to the surface and are only the following:
	• low impact petroleum activities
	• geophysical, geotechnical, geological, topographic, and cadastral surveys including seismic, sample /test / geotechnical pits, core holes)
	• single well sites up to 1.5 ha
	• For multi-well sites, an additional 0.25 ha per additional well up to a maximum of 3 ha
	• If well(s) require stimulation:
	  ○ For single well sites, not exceeding 1.65 ha of disturbance
	  ○ For multi-well sites, not exceeding 3.8 ha of disturbance
	• associated infrastructure located on a well site necessary for the construction and operations of wells:
	  ○ water pumps and generators
	  ○ flare pits
	  ○ chemical / fuel storages
	  ○ sumps for residual drilling material and drilling fluids
	  ○ tanks, or dams which are not significant or high consequence dams to contain wastewater (e.g. stimulation flow back waters, produced water)
	  ○ pipe laydown areas
	  ○ soil and vegetation stockpile areas
	  ○ a temporary camp associated with a drilling rig that may involve sewage treatment works that are no release works
	  ○ temporary administration sites and warehouses
	  ○ dust suppression activities using water that meets the quality and operational
	  ○ standards approved under the environmental authority
	• communication and power lines that are necessary for the undertaking of petroleum activities and that are located within well sites, well pads and pipeline right of ways without increasing the disturbance area of petroleum activities
	• supporting access tracks
	• gathering / flow pipelines from a well head to the initial processing

	facility • activities necessary to achieve compliance with the conditions of the environmental authority in relation to another essential petroleum activity (e.g. sediment and erosion control measures, rehabilitation).
existing structure	means a structure that prior to 22 May 2020 meets any or both of the following, a structure: (a) with a design that is in accordance with the *Manual for Assessing Consequence Categories and Hydraulic Performance of Structures* (ESR/2016/1933, Version 5.02 or more recent) and that is considerably in progress; (b) that is under considerable construction or that is constructed.
flare pit	for the purposes of Schedule D (dam schedule), means containment area where any produced fluid that is discovered in an over-pressured reservoir during a drilling operation is diverted. The flare pit may be used during the drilling, work over process and operation of a petroleum well.
floodplains	has the meaning in the *Water Act 2000* and means an area of reasonably flat land adjacent to a watercourse that— • is covered from time to time by floodwater overflowing from the watercourse; and • does not, other than in an upper valley reach, confine floodwater to generally follow the path of the watercourse; and • has finer sediment deposits than the sediment deposits of any bench, bar, or in-stream island of the watercourse.
flowable substance/s	means matter or a mixture of materials which can flow under any conditions potentially affecting that substance. Constituents of a flowable substance can include water, other liquids fluids or solids, or a mixture that includes water and any other liquids fluids or solids either in solution or suspension.
fuel burning or combustion facility	means a permanent fuel burning or combustion equipment which in isolation, or combined in operation, or which are interconnected, is, or are capable of burning more than 500 kg of fuel in an hour.
GDA	means Geocentric Datum of Australia.

green waste	means waste that is grass cuttings, trees, bushes, shrubs, material lopped from trees, untreated timber or other waste that is similar in nature but does not include pest species (restricted matter).
holder	means: (a) where this document is an environmental authority, any person who is the holder of, or is acting under, that environmental authority; or (b) where this document is a development approval, any person who is the registered operator for that development approval.
hydraulic integrity	refers to the capacity of a dam to contain or safely pass flowable substances based on its design.
incidental activity/ies	For this environmental authority means an activity that is not a specified relevant activity and is necessary to carry out the activities authorised by this environmental authority.
impulsive (for noise)	means sound characterised by brief excursions of sound pressure (acoustic impulses) that significantly exceed the background sound pressure. The duration of a single impulsive sound is usually less than one second.
inventory	in relation to existing petroleum activities means: • relevant shapefiles which clearly show the location and type of infrastructure; and • metadata for the relevant shapefiles which include the infrastructure ID, latitude and longitude, and date of disturbance for the activity.
LAeq, adj, 15 mins	means the A-weighted sound pressure level of a continuous steady sound, adjusted for tonal character, that within any 15 minute period has the same square sound pressure as a sound level that varies with time.

land degradation	has the meaning in the *Vegetation Management Act 1999* and means the following: • soil erosion • rising water tables • the expression of salinity • mass movement by gravity of soil or rock • stream bank instability • a process that results in declining water quality
land farm	a bioremediation system to reduce concentrations of petroleum constituents in soil through biodegradation. Land farming usually involves stimulating aerobic microbial activity in soils through aeration and/or the addition of minerals, nutrients, and moisture.
landholder's active groundwater bore	means bores that are able to continue to provide a reasonable yield of water in terms of quantity for the bores authorised purpose or use. This term does not include monitoring bores owned by the administering authority of the *Water Act 2000*.
linear infrastructure	means communication and powerlines, pipelines, flowlines, roads, and access tracks.
liquid	means a substance which is flowing and offers no permanent resistance to changes of shape.
low consequence dam	means any dam that is not classified as high or significant as assessed using the *Manual for assessing consequence categories and hydraulic performance of structures (ESR/2016/193314)*, published by the administering authority, as amended from time to time.

low impact petroleum activities	means petroleum activities which do not result in the clearing of native vegetation, cause disruption to soil profiles through earthworks or excavation or result in significant disturbance to land which cannot be rehabilitated immediately using hand tools after the activity is completed. Examples of such activities include but are not necessarily limited to soil surveys (excluding test pits), topographic surveys, cadastral surveys, and ecological surveys, may include installation of monitoring equipment provided that it is within the meaning of low impact and traversing land by car or foot via existing access tracks or routes or in such a way that does not result in permanent damage to vegetation.
mandatory reporting level or MRL	means a warning and reporting level determined in accordance with the criteria in the *Manual for assessing consequence categories and hydraulic performance of structures (ESR/2016/193314)* published by the administering authority.
manual	means the *Manual for assessing consequence categories and hydraulic performance of structures (ESR/2016/193314)* published by the administering authority, as amended from time to time.
Max LpA, 15 min	means the absolute maximum instantaneous A-weighted sound pressure level, measured over 15 minutes.
Max LpZ, 15 min	means the maximum value of the Z-weighted sound pressure level measured over 15 minutes.
methodology	means the science of method, especially dealing with the logical principles underlying the organisation of the various special sciences, and the conduct of scientific inquiry.

mix-bury cover method	means the stabilisation of residual drilling solids in the bottom of a sump by mixing with subsoil and which occurs in accordance with the following methodology: • the base of the subsoil and residual solid mixture must be separated from the groundwater table by at least one metre of a continuous layer of impermeable subsoil material (kw=10–8m/s) or subsoil with a clay content of greater than 20%; and • the residual solids is mixed with subsoil in the sump and cover; and • the subsoil and residual solids is mixed at least three parts subsoil to one part waste (v/v); and • a minimum of one metre of clean subsoil must be placed over the subsoil and residual solids mixture; and • topsoil is replaced
month	has the meaning in the *Acts Interpretation Act 1954* and means a calendar month and is a period starting at the beginning of any day of one (1) of the 12 named months and ending— • immediately before the beginning of the corresponding day of the next named month; or • if there is no such corresponding day—at the end of the next named month.
NATA accreditation	means accreditation by the National Association of Testing Authorities Australia.
operational plan	includes: (a) normal operating procedures and rules (including clear documentation and definition of process inputs in the DSA); (b) contingency and emergency action plans including operating procedures designed to avoid and/or minimise environmental impacts including threats to human life resulting from any overtopping or loss of structural integrity of the regulated structure.

pest species (restricted matter)	has the same meaning as 'declared pest' in the *Vegetation Management Act 1999* and means a plant or animal, other than a native species of plant or animal, that is— (a) invasive biosecurity matter under the *Biosecurity Act 2014;* or (b) controlled biosecurity matter or regulated biosecurity matter under the *Biosecurity Act 2014*.
prescribed contaminants	has the meaning in section 440ZD of the *Environmental Protection Act 1994.*
prescribed environmental matters	has the meaning in section 10 of the *Environmental Offsets Act 2014*, limited to the matters of State environmental significant listed in schedule 2 of the Environmental Offsets Regulation 2014.
prescribed storage gases	has the meaning in section 12 of the *Petroleum and Gas (Production and Safety) Act 2004*.
primary protection zone	means an area within 200m from the boundary of any Category A, B or C ESA.
protection zone	means the primary protection zone of any Category A, B or C ESA or the secondary protection zone of any Category A or B ESA.
regional ecosystem	has the meaning in the Methodology for Surveying and Mapping of Regional Ecosystems and Vegetation Communities in Queensland (Version 3.2 August 2012) and means a vegetation community in a bioregion that is consistently associated with a particular combination of geology, landform, and soil. Regional ecosystems of Queensland were originally described in Sattler and Williams (1999). The Regional Ecosystem Description Database (Queensland Herbarium 2013) is maintained by Queensland Herbarium and contains the current descriptions of regional ecosystems.
regulated dam	means any dam in the significant or high consequence category as assessed using the *Manual for Assessing Consequence Categories and Hydraulic Performance of Structures (ESR/2016/19339),* published by the administering authority , as amended from time to time.

regulated structure	means any structure in the significant or high consequence category as assessed using the *Manual for assessing consequence categories and hydraulic performance of structures (ESR/2016/193315)* published by the administering authority and amended from time to time. A regulated structure does not include: • a fabricated or manufactured tank or container, designed and constructed to an Australian Standard that deals with strength and structural integrity of that tank or container; • a sump or earthen pit used to store residual drilling material and drilling fluid only for the duration of drilling and well completion activities; • a flare pit.
rehabilitation or rehabilitated	means the process of reshaping and revegetating land to restore it to a stable landform and in accordance with acceptance criteria and, where relevant, includes remediation of contaminated land. For the purposes of pipeline rehabilitation, rehabilitation includes reinstatement, revegetation, and restoration.
reinstate or reinstatement	for pipelines, means the process of bulk earth works and structural replacement of pre-existing conditions of a site (i.e. soil surface typography, watercourses, culverts, fences and gates and other landscape(d) features) and is detailed in the Australian Pipeline Industry Association (APIA) Code of Environmental Practice: Onshore Pipelines (2013).
reporting limit	means the lowest concentration that can be reliably measured within specified limits of precision and accuracy during routine laboratory operating conditions. For many analytes, the reporting limit is selected as the lowest non-zero standard in the calibration curve. Results that fall below the reporting limit will be reported as “less than” the value of the reporting limit. The reporting limit is also referred to as the practical quantitation limit or the limit of quantitation. For polycyclic aromatic hydrocarbons, the reporting limit must be based on super-ultra trace methods and, depending on the specific polycyclic aromatic hydrocarbon, will range between 0.005 ug/L–0.02 ug/L.
residual drilling material	means waste drilling materials including workover solids and fluids, muds and cuttings or cement returns from well holes and which have been left behind after the drilling fluids are pumped out.

restricted stimulation fluids	has the meaning in section 206 of the *Environmental Protection Act 1994* and means fluids used for the purpose of stimulation, including fracturing, that contain the following chemicals in more than the maximum amount prescribed under a regulation— (a) petroleum hydrocarbons containing benzene, ethylbenzene, toluene, or xylene (b) chemicals that produce, or are likely to produce, benzene, ethylbenzene, toluene, or xylene as the chemical breaks down in the environment. For clarity, the term restricted stimulation fluid only applies to fluid injected down well post- perforation. The amount of any chemical component of the stimulation fluid is not to be measured in relation to the amount of water included in the stimulation fluid.
secondary protection zone	in relation to a Category A or Category B ESA means an area within 100 metres from the boundary of the primary protection zone.
sensitive place	means: • a dwelling (including residential allotment, mobile home or caravan park, residential marina or other residential premises, motel, hotel, or hostel) • a library, childcare centre, kindergarten, school, university, or other educational institution • a medical centre, surgery, or hospital • a protected area • a public park or garden that is open to the public (whether or not on payment of money) for use other than for sport or organised entertainment • a workplace used as an office or for business or commercial purposes, which is not part of the petroleum activity(ies) and does not include employees accommodation or public roads • for noise, a place defined as a sensitive receptor for the purposes of the Environmental Protection (Noise) Policy 2019.
sensitive receptor	is defined in Schedule 2 of the Environmental Protection (Noise) Policy 2019 and means an area or place where noise is measured.

significantly disturbed or significant disturbance or significant disturbance to land	Land is significantly disturbed if— (a) it is contaminated land; or (b) it has been disturbed and human intervention is needed to rehabilitate it – (i) to a condition required under the relevant environmental authority; or (ii) if the environmental authority does not require the land to be rehabilitated to a particular condition—to the condition it was in immediately before the disturbance. However, for the purpose of this authority the following areas are not significantly disturbed: (a) areas off the petroleum authority (e.g. roads or tracks which provide access to the petroleum authority); (b) areas previously significantly disturbed which have been rehabilitated to the final acceptance criteria as identified in 'Schedule J – Rehabilitation' and that continue to meet the final acceptance criteria; (c) areas under permanent infrastructure (e.g. roads, bridges, buildings) as agreed in writing by the landholder, (d) areas that were significantly disturbed prior to the grant of the petroleum authority, unless: a. those areas are re-disturbed by the petroleum authority holder during the course of carrying out the petroleum activities' b. those areas and activities were conducted on a petroleum tenure that was replaced by the current tenure (e.g. through conditional surrender or the transition from an authority to prospect to a petroleum lease).
significant residual impacts	has the meaning in section 8 *Environmental Offsets Act 2014.*
specified relevant activities	for this environmental activity means an activity that but for being carried out as a resource activity, would otherwise be an activity prescribed under section 19 of the Environmental Protection Act 1994 as an environmentally relevant activity and is identified in the cover pages of this environmental authority.

stable	has the meaning in Schedule 8, Part 1 of the Environmental Protection Regulation 2019 and, for a site, means the rehabilitation and restoration of the site is enduring or permanent so that the site is unlikely to collapse, erode or subside.
stimulation	means a technique used to increase the permeability of natural underground reservoir that is undertaken above the formation pressure and involves the addition of chemicals. It includes hydraulic fracturing / hydrofraccing, fracture acidizing and the use of proppant treatments.
stimulation fluid	means the fluid injected underground to increase permeability. For clarity, the term stimulation fluid only applies to fluid injected down well post-perforation. The amount of any chemical component of the stimulation fluid is not to be measured in relation to the amount of water included in the stimulation fluid.
stimulation impact zone	means a 100m maximum radial distance from the stimulation target location within a gas producing formation.
structure	means a dam or levee.
suitably qualified and experienced person	in relation to regulated structures means a person who is a Registered Professional Engineer of Queensland (RPEQ) under the provisions of the *Professional Engineers Act 2002*, and has demonstrated competency and relevant experience: • for regulated dams, an RPEQ who is a civil engineer with the required qualifications in dam safety and dam design • for regulated levees, an RPEQ who is a civil engineer with the required qualifications in the design of flood protection embankments. Note: It is permissible that a suitably qualified and experienced person obtain subsidiary certification from an RPEQ who has demonstrated competence and relevant experience in either geomechanics, hydraulic design or engineering hydrology.
suitably qualified person	means a person who has professional qualifications, training or skills or experience relevant to the nominated subject matters and can give authoritative assessment, advice, and analysis about performance relevant to the subject matters using relevant protocols, standards, methods, or literature.

suitably qualified third party	means a person who: (a) has qualifications and experience relevant to performing the function including but not limited to: i. a bachelor's degree in science or engineering; and ii. 3 years' experience in undertaking soil contamination assessments; and (b) is a member of at least one organisation prescribed in Schedule 14 of the Environmental Protection Regulation 2019; and (c) not be an employee of, nor have a financial interest or any involvement which would lead to a conflict of interest with the holder(s) of the environmental authority.
sump	For the purposes of Schedule D (dam schedule), means a pit in which waste residual drilling material or drilling fluids are stored for the duration of drilling activities.
synthetic based drilling mud	means mud were the base fluid is a synthetic oil, consisting of chemical compounds which are artificially made or synthesised by chemically modifying petroleum components or other raw materials rather than the whole crude oil.
system design plan	means a plan that manages an integrated containment system that shares the required DSA and/or ESS volume across the integrated containment system.
transmissivity	means the rate of flow of water through a vertical strip of aquifer which is one unit wide, and which extends the full saturated depth of the aquifer.
valid complaint	means all complaints unless considered by the administering authority to be frivolous, vexatious, or based on mistaken belief
void	means any man-made, open excavation in the ground (includes borrow pits, drill sumps, frac pits, flare pits, cavitation pits and trenches).

waste and resource management hierarchy	has the meaning provided in section 9 of the *Waste Reduction and Recycling Act 2011* and is the following precepts, listed in the preferred order in which waste and resource management options should be considered— (a) AVOID unnecessary resource consumption (b) REDUCE waste generation and disposal (c) RE-USE waste resources without further manufacturing (d) RECYCLE waste resources to make the same or different products (e) RECOVER waste resources, including the recovery of energy (f) TREAT waste before disposal, including reducing the hazardous nature of waste (g) DISPOSE of waste only if there is no viable alternative.
waste and resource management principles	has the meaning provided in section 4(2)(b) of the *Waste Reduction and Recycling Act 2011* and means the: (a) polluter pays principle (b) user pays principle (c) proximity principle (d) product stewardship principle.
waters	includes all or any part of a creek, river, stream, lake, lagoon, swamp, wetland, spring, unconfined surface water, unconfined water in natural or artificial watercourses, bed, and bank of any waters, non-tidal or tidal waters (including the sea), stormwater channel, stormwater drain, roadside gutter, stormwater run-off, and underground water.
well integrity	the ability of a well to contain the substances flowing through it.

wetland	for the purpose of this environmental authority, wetland means:
	• areas shown on the 'Map of Queensland wetland environmental values' which is a document approved by the chief executive and published by the department, as amended from time to time.
	• areas defined under the Queensland Wetlands Program as permanent or periodic / intermittent inundation, with water that is static or flowing fresh, brackish, or salt, including areas of marine water, the depth of which at low tide does not exceed six (6) metres, and possess one or more of the following attributes:
	  ○ at least periodically, the land supports plants or animals that are adapted to and dependent on living in wet conditions for at least part of their life cycle, or
	  ○ the substratum is predominantly undrained soils that are saturated, flooded or ponded long enough to develop anaerobic conditions in the upper layers, or
	  ○ the substratum is not soil and is saturated with water or covered by water at some time.
	The term wetland includes riverine, lacustrine, estuarine, marine, and palustrine wetlands; and it does not include a Great Artesian Basin Spring or a subterranean wetland that is a cave or aquifer.

wetland of high ecological significance	means a wetland that meets the definition of a wetland and that is shown as a wetland of 'high ecological significance' or wetland of 'high ecological value' on the Map of Queensland wetland environmental values
wetland of general ecological significance / general ecologically significant wetland	means a wetland that meets the definition of a wetland and that is shown as a wetland of 'general environmental significance' or wetland of 'other environmental value' on the Map of Queensland wetland environmental values.