Santos

Regional Interests Development Application Assessment Report

Wackett Area Flowlines (PPL 2050)

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Abbreviations and Units

Acronym	Description
ATP	Authority to Prospect
DES	Department of Environment and Science, Queensland
DNRME	Department of Natural Resources, Mines and Energy
DSDMIP	Department of State Development, Mining, Infrastructure and Planning
EA	Environmental Authority
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) has prepared this assessment report to support an assessment application for a Regional Interests Development Approval (RIDA) as required under section 29 of the *Regional Planning Interests Act 2014)* (RPI Act).

The application is of an administrative nature. It seeks only to authorise operation of existing pipelines located within Wackett Area Petroleum Pipeline Licence 2050 ((PPL 2050)) on Lot 1 on Plan SP133822 within the Channel Country Strategic Environmental Area. PPL 2050 covers a number of Petroleum Leases (PLs) – PL 25, PL 62, PL 79, PL 82, PL 83, PL 86 and PL 146, which are administered under the *Petroleum Act 1923*. Seven (7) existing pipelines in SEA constructed under the authorisations of the PLs above within PPL 2050, will transfer natural gas from the Wackett field through existing Santos infrastructure to the Ballera Gas Facility.

The assessment report 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 Strategic Environmental Areas (SEA) as detailed in the *Regional Planning Interests Regulation 2014* (RPI Reg).

1.1 Landholder Copy of the Application

Separate regulatory systems are in place that require Santos to notify the landholder of petroleum activities occurring within their properties. Given the pre-existing nature of the activities (refer to Section 2.0) notification to the landholder has already ensued. Notwithstanding, a copy of the 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.

1.2 Non-Notifiable Application

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.

The activities are located solely on Lot 1 on Plan SP 133822 forming part of Durham Downs Pastoral Station, a 8,910 km^2 cattle station operated by S. Kidman & Co.

Discretionary notification under s34(4) would not be necessary given the pre-existing nature of the activities (refer section 2.0), the very large size of the cattle station relative to the activities and that the landholder will receive a copy of the application as described above.

1.3 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 Natural Resources, Mines and Energy (DNRME).

2.0 Proposed Activity

The application seeks authorisation to operate seven (7) existing gas flowlines under PPL 2050 and within the Channel Country SEA. Infrastructure and disturbances associated with PPL 2050 is listed in Table 1 and shown in Figure 1. The infrastructure listed in Table 1 is existing infrastructure, constructed under the authority of PL 25 (EPPG03518115), PL 62 (EPPG03518115), PL 79 (EPPG00307216), PL 82 (EPPG03518115), PL 83 (EPPG03517715), PL 86 (EPPG03517715), PL 108 (EPPG03517715), PL 132 (EPPG03517715), and PL 146 (EPPG03517715) (refer to Table 2 for further detail).

Table 1: Existing Surface Disturbance

Pre-Existing Infrastructure	Pre-Existing Disturbance		
	Length (km)	Operational Width (km)	Area (ha)
Buried Gas Pipelines	16.64	0.003	5.0
		Total	**5.00 ha**

The seven (7) existing gas flowlines are located on tenures that are administered under the *Petroleum Act 1923*. The Wackett Area PPL (PPL 2050) and associated EA are required because the *Petroleum Act 1923* does not provide for flowlines operating across tenure boundaries. An application for an Area PPL (PPL 2050) was lodged with DRNME on 29 November 2019 to authorise the operation of each of these seven (7) pipelines, as well as, a number of flowlines located outside of the Channel Country SEA. A subsequent application for an EA for PPL 2050 will be lodged with DES in the near future. Santos intends to utilise these flowlines for production testing, production and commercialisation of gas from any successful wells. The operation of these flowlines will not result in new disturbance to land outside of the exiting disturbance footprint. Activities will be limited to production testing and "production" related operational maintenance and restoration at the end-of-life. A description of the activities is provided in Section 2.1.

All seven (7) gas flowlines are located on the Durham Downs Pastoral Station (Lot 1 on Plan SP133822). Durham Downs is a pastoral lease that operates a cattle station with a capacity of up to 21,500 head of cattle[1]. The primary land uses are cattle grazing and petroleum activities. Sections of the pastoral lease have been subject to long-term cattle grazing from pastoral operations.

2.1 Buried Pipeline

The seven (7) flowlines within PPL 2050, are buried steel pipelines ranging in size between 114.3 mm diameter (DN100) and 168.3 mm diameter (DN150). Santos are seeking to utilise these pipelines to transport extracted petroleum for production testing and production. As a part of production testing and production, Santos will carry out routine maintenance activities and undertake regular surveillance inspections to ensure the structural and hydraulic integrity of the pipelines. Minor rectifications works may be necessary if an issue is identified during routine maintenance or inspections.

Details of each pipeline is presented in Table 2, including length, associated infrastructure, start and end points, relevant underlying tenures and associated EAs. All pipelines begin in the Wackett field and all will transfer natural gas through existing Santos infrastructure to the Ballera Gas Facility. There are two midline risers located on the Wackett 4 gas pipeline. One of these midline risers is buried and the other is raised approximately 0.8 m above ground level on supports, and protrudes from the surface for approximately

[1] S. Kidman & Co Ltd (2018) *Durham Downs*, https://www.kidman.com.au/properties/5/durham-downs, Accessed 28/08/2019.

20 m. The location of each midline riser is shown in Figure 1. All pipeline right-of-way surfaces have been rehabilitated to reinstate natural drainage. No new surface disturbance to land is required. All pipelines will be restored at end-of-life in accordance with the relevant EA conditions.

Table 2: Buried Pipeline Summary

Pipeline Name	Wackett South 1	Wackett East 1	Wackett 4	Wackett 14	Okotoko 3	Costa 1	Costa West 1
Length (km)	4.95	2.18	2.94	0.71	1.15	2.27	2.42
Diameter (mm)	DN100 114.3 mm OD	DN100 114.3 mm OD	DN100 114.3 mm OD	DN150 168.3 OD	DN100 114.3 mm OD	DN100 114.3 mm OD	DN150 168.3 OD
Product	Gas						
Location	Below Ground						
Midline Risers	Nil	Nil	2	Nil	Nil	Nil	Nil
Pigging Facilities	Nil	Nil	Nil	Nil	Nil	Nil	Nil
Start Point	Wackett South 1 Well	Wackett East 1 Well	Wackett 4 Lease	Wackett 14 Lease	Okotoko 3 Lease	Costa 1 Lease	Costa West 1 Lease
End Point	Wackett 14 Well	Wackett 14 Well	Wackett 3 Flowline	Wackett 12 Flowline	Okotoko East 1 Flowline Midline	Judga Spineline (Buried Tee Midline)	Judga Spineline (Buried Tee Midline)
Relevant Tenure	PL 62 PL 86 PL 146	PL 62 PL 146	PL 62 PL 86	PL 25 PL 62 PL 86	PL82 PL83	PL 62 PL 79	PL 108 PL 132
Relevant Environmental Authority(ies)	EPPG03518115 EPPG03517715					EPPG03518115 EPPG00307216	EPPG03517715

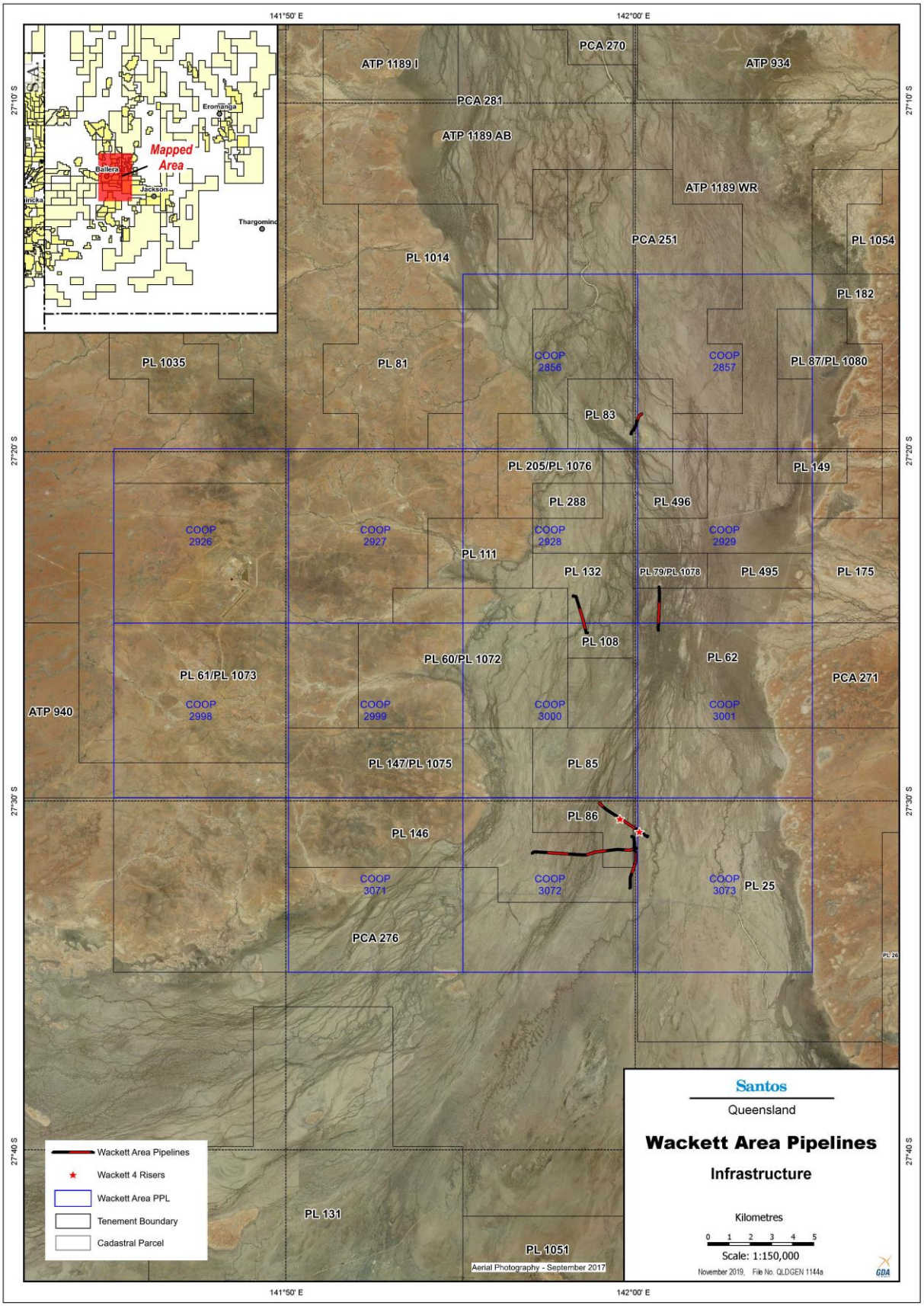

Figure 1: Location of Flowlines within Wackett Area PPL (PPL 2050)

3.0 Environmental Attributes and Potential Impacts

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.*

DSDMIP's RPI Act *Statutory Guideline 05/14: Carrying out resource activities and regulated activities within a Strategic Environmental Area* summarises the above attributes to broadly relate to:

- Riparian process;
- Wildlife corridors;
- Water quality;
- Hydrologic processes;
- Geomorphic processes; and
- Beneficial flooding.

As discussed in Section 2.0, the operation of the existing gas flowlines comprising PPL 2050 will not result in new surface disturbance to land outside of the existing disturbance footprint. The proposed activities are limited to production testing, production, operational maintenance and restoration of existing infrastructure at end-of-life. Notwithstanding, the relevance of the above environmental attributes to the activity is described below.

3.1 Riparian Process

PPL 2050 is entirely located within the Channel Country bioregion. The Cooper – Diamantina Plains subregion runs north-south off-centre on the eastern side of the tenure, and the Sturt Stony Desert subregion covers the majority of the western side of the tenure, with a small strip located down the eastern boundary. There are also small areas of the Lake Pure subregion on the western boundary of the tenure. Regional Ecosystem (RE) mapping and aerial photography indicate that vegetation present within PPL 2050 is typical of elsewhere in the bioregion and subregions – dominated by open shrublands, sparse tussock grasslands, variable sparse to open-herbland and low open woodland typically fringing drainage lines. REs present in PPL 2050 are widespread and commonly present across the broader Cooper Creek catchment area. Vegetation within PPL 2050 has been subject to long-term cattle grazing from the operation of the Durham Downs Station.

REs mapped to be present where the activity is proposed is shown in Figure 4, and detailed in Table 3. All REs are listed as No Concern at Present (NCAP). These REs are known to include riparian vegetation, particularly within the Cooper Creek and its braided channels, which surround the proposed activity. Six (6) of the seven (7) buried gas pipelines cross the braided channels of the Cooper Creek, some at a number of locations.

Table 3: Regional Ecosystems Descriptions

RE Code	RE Short Description	VM Act Class	BD Status	Structural Category
5.3.8a	*Eucalyptus coolabah l*ow open woodland +/- *Duma florulenta* on braided channels, drainage lines, flood plain lakes and claypans	LC	NCAP	Very Sparse
5.3.18a	Braided channel complex of major alluvial plains, includes *Chenopodium auricomum* open shrubland and variable sparse to open-herbland	LC	NCAP	Sparse
5.3.18b	Braided channel complex of major alluvial plains, includes *Chenopodium auricomum* open shrubland and variable sparse to open-herbland	LC	NCAP	Sparse
5.6.1	*Crotalaria eremaea* +/- *Eragrostis eriopoda* sparse to open herbland on isolated and/or deflated sand dunes on alluvium	LC	NCAP	Other

3.1.1 Regional Ecosystem Descriptions

5.3.8a - *Eucalyptus coolabah* low open woodland *+/- Duma florulenta* on braided channels, drainage lines, flood plain lakes and claypans

*Eucalyptus coolabah l*ow open woodland with a distinct and semi-continuous, low shrub layer dominated by *Duma florulenta*. Scattered shrubs including *Acacia stenophylla, Eremophila bignoniiflora* and *Chenopodium auricomum* occur frequently. The ground cover is dominated by the perennial grasses *Eragrostis setifolia* and *Sporobolus mitchellii* and/or seasonally abundant ephemeral herbs. The latter includes the grasses *Dactyloctenium radulans, Dichanthium spp.* and *Iseilema vaginiflorum* which occur infrequently and the forbs *Alternanthera nodiflora, Calotis hispidula, Centipeda thespidioides, Stemodia glabella, Cullen cinereum, Senecio depressicola* and *Streptoglossa adscendens*, which are frequently present. A number of other ephemeral forbs, including species from the *Apiaceae, Convolvulaceae, Fabaceae, Goodeniaceae,* and *Malvaceae* occur infrequently but may be seasonally prominent. Widespread on and between braided channels where water backs up on frequently flooded alluvial plains. Associated soils are very deep, grey and brown cracking clays with a self mulching surface. Surface silt and sand bands are common in soil profile. Riverine wetland or fringing riverine wetland. (BVG1M: 16a)

5.3.18a - Braided channel complex of major alluvial plains, includes *Chenopodium auricomum* open shrubland and variable sparse to open-herbland

Chenopodium auricomum open shrubland, frequently with pure stands of *Chenopodium auricomum*, however, scattered *Eucalyptus coolabah* low trees and *Eremophila bignoniiflora* tall shrubs may be present. The ground layer is usually sparse, and seasonally dominated by grasses, sedges and forbs. The sedge *Eleocharis pallens* or perennial grass *Eragrostis setifolia* frequently dominate the ground layer. *Sporobolus mitchellii* is frequently dominant in the channels. Occurs on braided channels on alluvial plains of major rivers. Associated soils are very deep, crusted, red, brown and grey cracking clays that are subject to scalding. Surfaces may be weakly self mulching. Palustrine wetland (e.g. vegetated swamp). (BVG1M: 34g)

5.3.18b - Braided channel complex of major alluvial plains, includes *Chenopodium auricomum* open shrubland and variable sparse to open-herbland

Variable sparse to open-herbland with either grasses or forbs dominating the ground layer depending on incidence of flooding and seasonal conditions. At times extensive areas may be denuded of any species. *Sporobolus mitchellii* occurs frequently and may be prominent, while *Eragrostis setifolia* is locally common. After favourable seasons, herbs form a distinct but discontinuous ground cover. The dominant ephemerals include *Iseilema vaginiflorum, Arabidella nasturtium, Atriplex velutinella, Brachyscome dentata, Pycnosorus pleiocephalus, Ethuliopsis cunninghamii, Euphorbia drummondii, Goodenia fascicularis* and *Senecio depressicola*. Scattered low shrubs may occur with emergent trees fringing the association. Scattered low shrubs may occur. After summer local flooding, *Dactyloctenium radulans, Panicum laevinode, Iseilema* spp. and *Chloris pectinata* usually predominate. *Atriplex* spp., *Sclerolaena* spp., and

Asteraceae are conspicuous after winter local flooding. *Echinochloa turneriana* usually predominates after early summer (general) flooding with *Pycnosorus pleiocephalus* and *Trigonella suavissima* conspicuous after early winter flooding. Occurs on braided channel systems on alluvial plains of major rivers. Associated soils are very deep, crusted, red, brown and grey cracking clays that are subject to scalding. Surfaces may be weakly self mulching. Floodplain (other than floodplain wetlands). (BVG1M: 31a) (DSITI, 2016).

5.6.1 - *Crotalaria eremaea* +/- *Eragrostis eriopoda* sparse to open herbland on isolated and/or deflated sand dunes on alluvium

Crotalaria eremaea sparse to open herbland commonly with *Eragrostis eriopoda.* Floristic composition and cover is variable depending on seasonal conditions and may include *Salsola australis, Tribulus terrestris, Eriachne aristidea, Eragrostis basedowii,* and *Glinus lotoides*. Large areas may be devoid of vegetation. Occasional stunted trees such as *Hakea leucoptera, Owenia acidula, Atalaya hemiglauca, Ventilago viminalis, Clerodendrum floribundum* or *Acacia aneura* may occur as well as occasional scattered shrubs such as *Gunniopsis quadrifida* or *Eremophila macdonnellii, Acacia ligulata* and *Senna spp*. Occurs on rounded and mobile crests and flanks of isolated and/or deflated dunes 5-10 metres high, formed from Quaternary *aeolian* sands overlying alluvia. Associated soils are very deep, acid to neutral, yellow siliceous sands. Clay content increases down the slope. Soils are loose at the crests and form crusts down the slope. (BVG1M: 33a)

3.1.2 Potential Impacts

The activity will be located within the existing infrastructure footprint. No new surface disturbance to land, such as clearing vegetation in or near streams, lakes, floodplains or wetlands, is required as part of the proposed activity. Access to and from the proposed activity will occur along the existing access tracks only.

Following cessation of petroleum production, existing infrastructure would be rehabilitated to promote the natural re-establishment of vegetation consistent with the surrounding undisturbed land in accordance with the relevant EA conditions. As such, there will be no new disturbance or change to riparian corridors along streams and lakes and within floodplains and wetlands as a part of this activity. Accordingly, the proposed activities would not cause a widespread or irreversible impact on riparian processes within the Channel Country SEA.

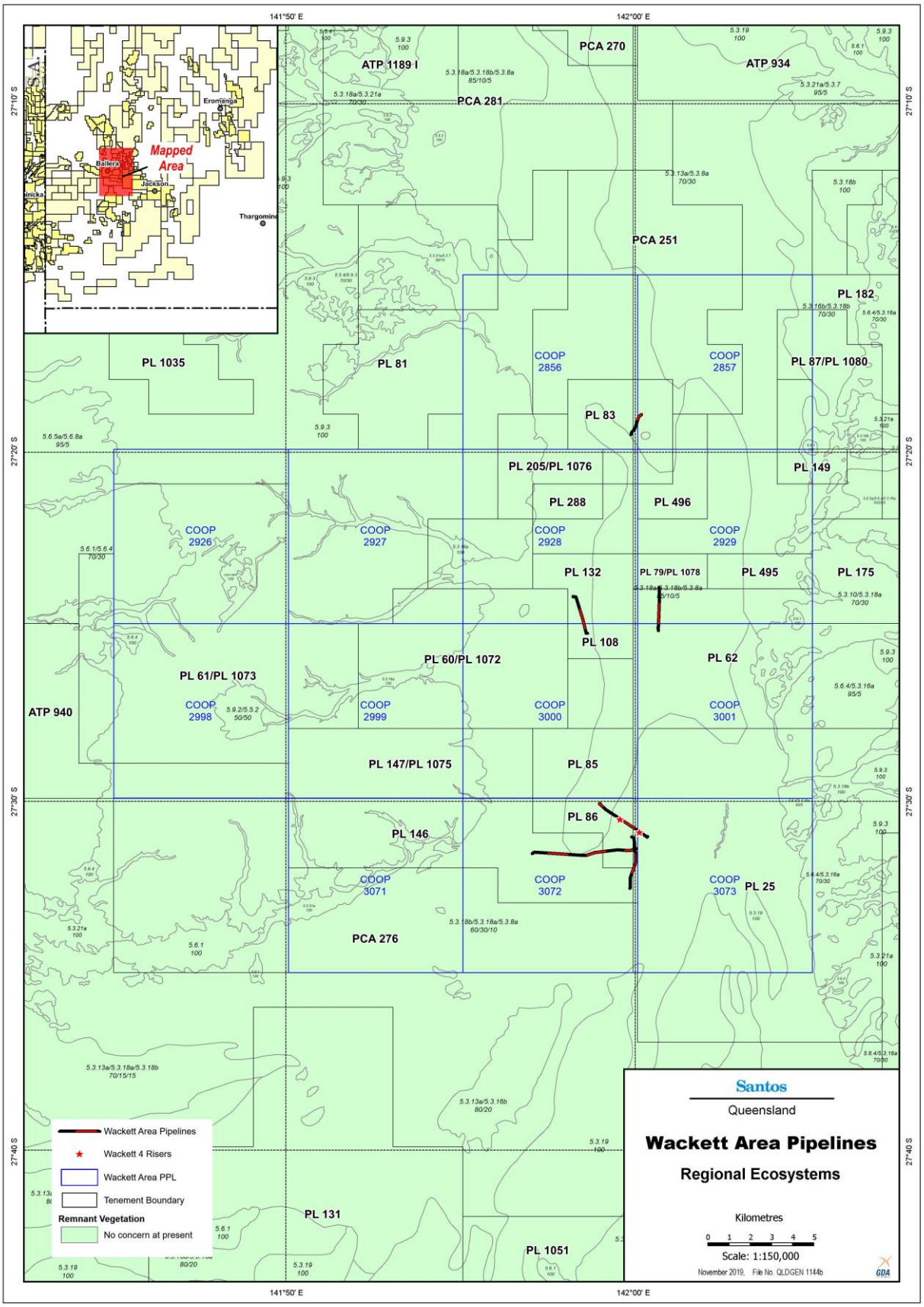

Figure 2: Regional Ecosystems

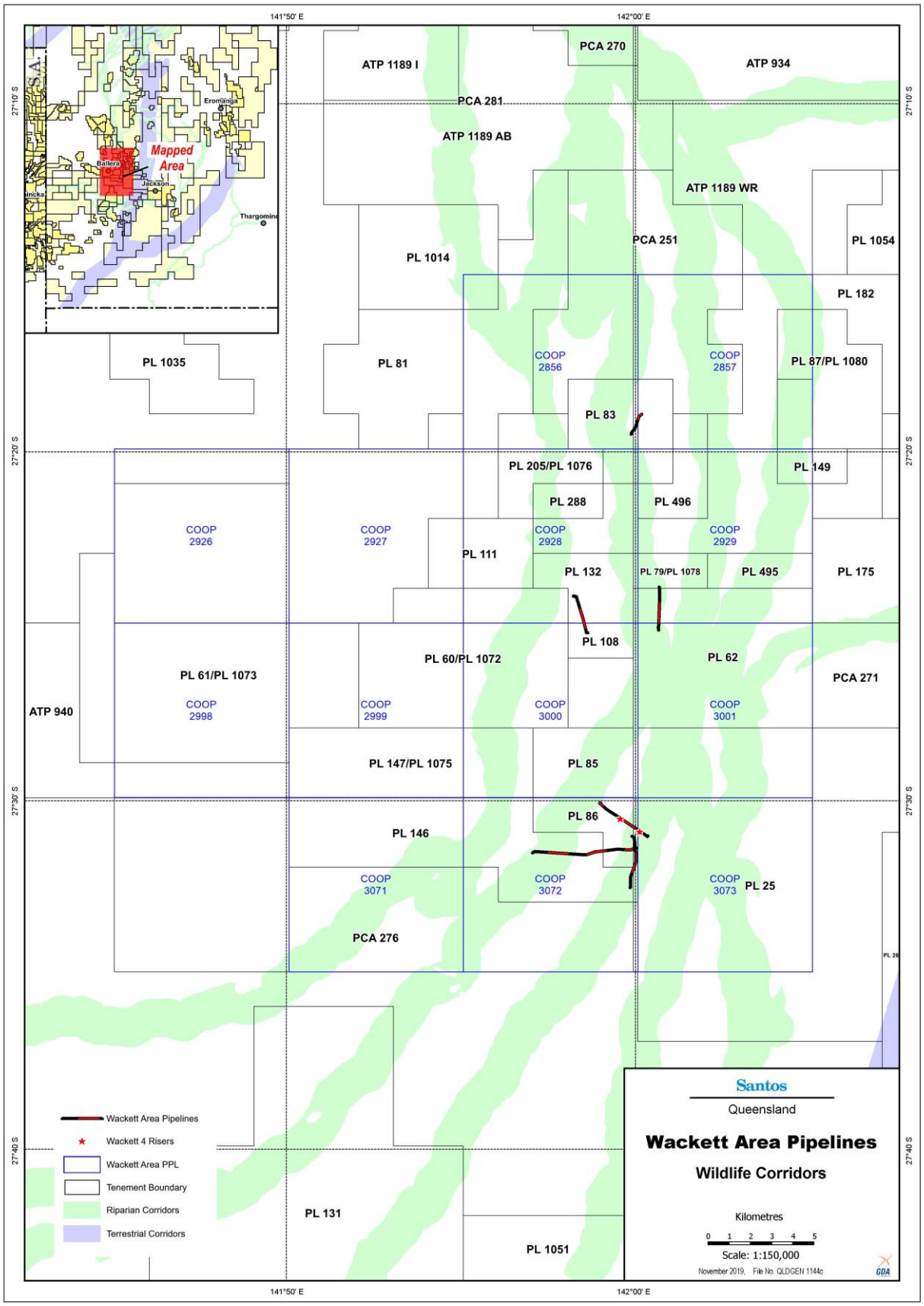

Figure 3: State and Regional Biodiversity Corridors

3.2 Wildlife Corridors

Figure 3 shows state and regional riparian and terrestrial corridors present within Wackett Area PPL as per DES *Biodiversity Planning Assessments and Aquatic Conservation Assessments* environmental reports.

Riparian corridors identified within these environmental reports are based upon major channels (250k geodata hierarchy 1) and minor channels (250k geodata hierarchy 2 and 3) necessary to capture permanent waterholes, buffered by 1 km either side and clipped to land zone 3[2]. Terrestrial corridors identified within these environmental reports are based upon major themes of habitat connectivity across the bioregion. It includes the north/south and east/west links that cover areas characterised by a relative continuity of similar or related habitat[2].

The proposed activities are located within a pre-disturbed area of existing riparian corridors. There are no mapped terrestrial corridors present within or surrounding the proposed activities. The area where the existing infrastructure is present has been subject to long-term cattle grazing from the operation the Durham Downs pastoral station. Notwithstanding, the REs surrounding the existing infrastructure (as described in Section 3.1) may provide suitable general habitat for a range of wetland water birds and other flora and fauna during periods of inundation.

There are four areas of mapped Category C Environmentally Sensitive Areas (ESAs), classified as Essential Habitat, present within the PPL 2050 tenure area. Two (2) of the seven (7) buried gas pipelines are partially located within these areas of Essential Habitat.

3.2.1 Potential Impacts

No new disturbance(s) to aquatic and terrestrial fauna or wildlife corridors is to be undertaken as part of these activities. Measures will be adopted to prevent fauna entrapment within operational areas, and hygiene protocols will be implemented as appropriate to minimise the introduction, spread and persistence of weed species. Access to and from the proposed activity will occur along the existing access tracks only. Following cessation of petroleum production, existing infrastructure would be rehabilitated to promote the natural re-establishment of vegetation consistent with the surrounding undisturbed land, in accordance with relevant EA conditions. As such, there is no disturbance or change to wildlife corridors as a part of this activity and therefore the proposed activities would not cause a widespread or irreversible impact on wildlife corridors within the Channel Country SEA.

3.3 Water Quality

Surface Water

The braided channels associated with the Cooper Creek surround the proposed activity. Generally, the Cooper Creek is confined to the main channels, but every 3-4 years, flows are sufficient to inundate parts of the Cooper floodplain via a network of tributary channels. During extended periods of no flow, the 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 (1965-2016) water quality data from the QLD Government's Cooper Creek gauging station 003103A, located approximately 94 kilometres south west, is summarised in Table 4.

[2] DERM 2009 *Biodiversity Planning Assessment, Channel Country Bioregion, Landscape Expert Panel Report, Version 1.1*

Table 4: Cooper Creek Surface Water Quality (1956-2016)

Parameter	Average Value
Conductivity @ 25ºC	345 µS/cm
Turbidity	512 NTU
pH	7.4
Total Nitrogen	1.4 mg/L
Total Phosphorus as P	0.4 mg/L
Sodium as Na	44.6 mg/L
Magnesium as Mg	7.4 mg/L
Chloride as Cl	62.6 mg/L
Fluoride as F	0.2 mg/L

Groundwater

The main Great Artesian Basin (GAB) aquifers of the PPL 2050 area are within the Eromanga Basin stratigraphy and include 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.

The Quaternary and Tertiary alluvium formations are generally unconfined and form the uppermost phreatic water table (where present). Insufficient water level data is available for the Quaternary formations to determine the level of continuity, resulting in moderate vulnerability of the groundwater to possible contaminants. Groundwater from Tertiary sediments and the Winton Formation are characterised by a higher proportion of sodium and magnesium ranging in EC values from 3,000 to 13,000 µS/cm[3].

There are seven (7) registered groundwater bores located within PPL 2050. The closest groundwater bore is located approximately 1 km from the Okotoko 3 buried gas flowline. All remaining groundwater bores are located more than 3.5 km away. There are no GAB ROP discharge or recharge springs located within PPL 2050. The closest GAB springs are located more than 200 kilometres from all seven (7) buried gas flowlines. Terrestrial Groundwater Dependant Ecosystems (GDE) and GDE aquifers (unconsolidated sedimentary aquifers) may be present within the PPL 2050 area.

3.3.1 Potential Impacts

The activities do not involve any new surface disturbance to land, such as clearing vegetation in or near streams, lakes, floodplains or wetlands. No activities proposed involve the discharges of water (point or diffuse sources) or the construction or operation of regulated dams and other major infrastructure (i.e. separation ponds, permanent camps).

Any fuels / chemicals used on site would be stored and handled in accordance with Australian Standards and spill kits will be located onsite where required to contain any spills should they occur. All waste materials and non-essential infrastructure will be removed at the end of the petroleum activities as soon

[3] Golder Associates 2013 *Underground Water Impact Report For Santos Cooper Basin Oil & Gas Fields, SW QLD*

as reasonably practicable, minimising risks associated with contamination, or a reduction in water quality, in accordance with EA conditions.

Contingency measures for unplanned releases of discharges of contaminants will be implemented in accordance with EA conditions.

Given the scope of proposed activities, combined with the above management measures, petroleum production from pre-existing infrastructure is unlikely to disturb or alter the physical, chemical and biological quality of water in the watercourse channels and on floodplains that support and maintain the natural aquatic and terrestrial ecosystems. Accordingly, the proposed activities would not cause a widespread or irreversible impact on water quality within the Channel Country SEA.

3.4 Hydrological Processes and Beneficial Flooding

Regional

Topography is limited to low undulating topography between the drainage channel system. The Channel Country is characterised by vast flat-lying, braided, flood and alluvial plains surrounded by gravel or gibber plains, dunefields and low ranges. The low resistant hills and tablelands are remnants of the flat-lying Cretaceous sediments.

The drainage system is dominated by the Cooper Creek Basin draining towards Lake Eyre. During periods of high rainfall, the flat topography and drainage channel system becomes a largely flooded plain with water flow concentrating where Cooper Creek crosses the QLD-SA border. The Cooper Creek system catchment covers an area of approximately 300,000 km^2. Generally, Cooper Creek streamflow is confined to the main channels, but every 3-4 years, flows are sufficient to inundate parts of the Cooper floodplain via a network of tributary channels. During extended periods of no flow, the 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

Local

The braided channels associated with the Cooper Creek surround the proposed activity. Six (6) of the seven (7) buried gas pipelines cross the braided channels of the Cooper Creek, some at a number of locations (refer Figure 4). The area of the proposed activity is subject to intermittent flows associated with Cooper Creek flood events and will experience intermittent surface water flows during storm events, causing localised ponding of surface water, as discussed above.

PPL 2050 contains both general ecological significance (GES) wetlands and high ecological significance (HES) wetlands. There are no buried gas flowlines located within or intersecting HES wetlands. The Costa 1 gas flowline is entirely located within GES wetland. The Wackett 4 gas flowline is partially located within GES wetland. The GES wetland is mapped as palustrine RE – arid/semi-arid floodplain lignum swamps. Palustrine wetlands are essentially low-lying clay pan lakes surrounded by sand dunes and sand plains. The clay pans receive local inflows from their surrounding catchment areas during local rainfall events (BOM, 2018).

3.4.1 Potential Impacts

The proposed activities are located within the existing infrastructure footprint. No new surface disturbance activities, including placing new infrastructure within SEA, are proposed as part of this activity. The existing gas flowlines are buried underground and each surface has been rehabilitated to reinstate existing drainage. The 3-metre operational right-of-ways have not been constructed to any flood immunity; and will enable the passage of water keeping with existing hydrology. The mid-line risers on the Okotoko 4 buried gas flowline are raised approximately 0.8 metres above ground on supports to avoid impacts to the surface hydrology at these locations. Following cessation of flowline operation, existing infrastructure would be

rehabilitated to promote the natural re-establishment of vegetation consistent to the surrounding undisturbed land in accordance with the relevant EA conditions.

No new surface disturbance to land, such as clearing vegetation in or near streams, lakes, floodplains or wetlands, is required as part of the proposed activities. Given the nature of the proposed activities, and the implementation of the above design and management measures, there would be no widespread or irreversible impact on hydrological processes or beneficial flooding within the Channel Country SEA.

3.5 Geomorphic Processes

Regional

Surface geology is dominated by Quaternary alluvium deposits associated with flood plains, with consolidated Tertiary sediments or Winton Formation on the higher ground. Cooper Creek is a large sedimentary sump accreting over a vast floodplain[4].

Local

Land systems mapped at the location of the proposed activity are consistent with Landzone mapping. The proposed activity location is primarily mapped as Channel Country, flooded alluvial plains with anatomising channels. The area is associated with the irregularly flooded Cooper Creek main channel area[5]. The land system present within proposed activity location is summarised in Table 5. Soils are mapped as grey clays (Ug5.24) and grey cracking clays, such as, UG5.34 and Ug5.25 (Map Code: 490)[6].

Table 5: Land System at Proposed Activity Location

Map Code	Land System Description	Agricultural Land Class
CC87	Flooded-plains of major rivers consisting of numerous braided stream channels that are seasonally flooded and slightly higher areas raised between the channels: chief soils are grey clays (Ug5.24) but other cracking clays such as (Ug5.34) and (Ug5.25) may occur.	C2 - Pasture Land - native pastures

3.5.1 Potential Impacts

The proposed activities are located within the existing infrastructure footprint. No new surface disturbance to land, such as excavation, clearing or realigning the beds and banks of watercourse, cultivating soil or excavating on floodplains, are required as part of the proposed activity. No new structures are proposed to be placed in a watercourse, lake or spring or on floodplains as a part of this activity. The proposed activities are located away from the sources / areas of significant geomorphic processes. The existing gas flowlines are buried underground and all surfaces have been rehabilitated to reinstate existing drainage. The 3 metre operational right-of-ways have not been constructed to any flood immunity, and will enable the passage of water keeping with existing hydrology. The Okotoko 4 gas flowline mid-line risers are raised approximately 0.8 metres above ground on supports to avoid impacts to the surface hydrology at these locations. All flowlines will be restored at the end-of-life in accordance with the relevant EA conditions.

Following cessation of petroleum production, the existing operational right-of-ways would be rehabilitated to promote the natural re-establishment of vegetation consistent with the surrounding undisturbed land. As

[4] Maroulis, J (undated) *Channel Country landforms and the processes that shape them*. University of Southern QLD Faculty of Education/Australian Centre for Sustainable Catchments.
[5] DES (2018). Land systems – western arid region land use study – part 1 – AWA2 (spatial dataset), Accessed 28/08/2019. . Available online at: qldspatial.information.qld.gov.au
[6] ASRIS (2018). Atlas of Australian Soils (spatial dataset), Australian Soil Resource Information System (CSIRO), Accessed 28/08/2019. Available online at: http://www.asris.csiro.au/downloads/Atlas/soilAtlas2M.zip

such, the proposed activity would not alter the delivery of sediment to the river system from adjacent lands and the natural erosion of the bed, banks and floodplains. Accordingly, it is not envisaged that the proposed activity would cause a widespread or irreversible impact on geomorphic processes within the Channel Country SEA.

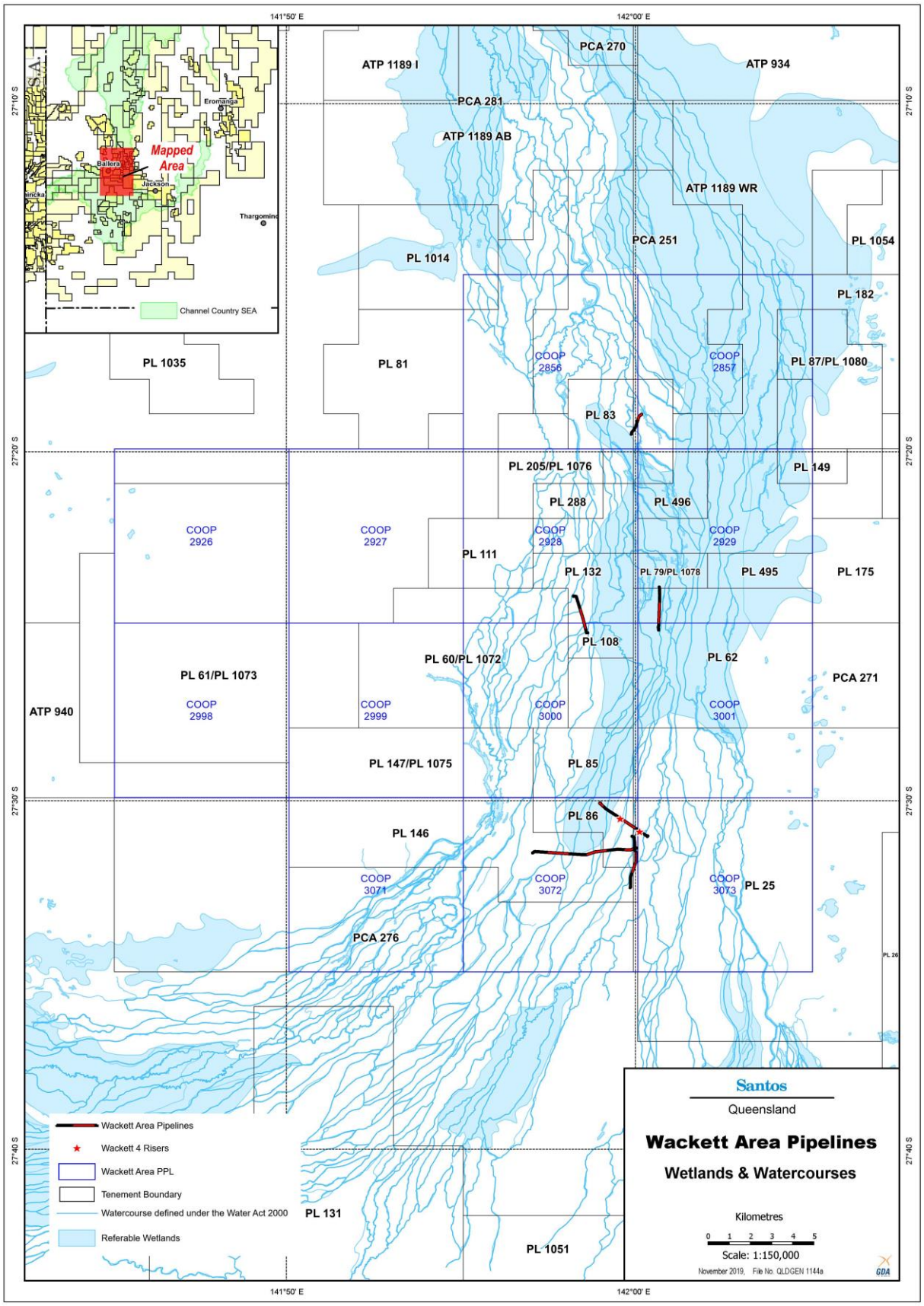

Figure 4: Watercourses, Wetlands and Strategic Environmental Areas

4.0 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 in Part 5, Schedule 2, the proposed activities will meet the required outcome for the regional interest. Critically, the application demonstrates that the prescribed solution provided in s15(1)(a) will be met as the proposed activity, 'operation' from pre-existing disturbances and infrastructure will not impact on an environmental attribute of the Channel Country SEA. The application also demonstrates the prescribed solution provided in s15(1)(b) will also be met (Table 6).

Table 6: 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 petroleum activities would not result in a widespread or irreversible impact on each of the environmental attributes as provided in Section 0.
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*	✓	Refer to Section 0.
(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 Section 15(2) of the RPI Act.
(ii) the construction and operation footprint of the activity on the environmental attribute is minimised to the greatest extent possible;	✓	Existing operational footprint will be utilised entirely. No new disturbance footprint is proposed within this application.
(iii) the activity does not compromise the preservation of the environmental attribute within the strategic environmental area;	✓	Refer to Section 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.