

**Regional Interests
Development Application
Assessment Report**

**Cherokee 2 and Cherokee 3
(Petroleum Lease 1047)**

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Abbreviations and Units

Acronym	Description
ATP	Authority to Prospect
DES	Department of Environment and Science, Queensland
DSDILGP	Department of State Development, Infrastructure, Local Government and Planning
DoR	Department of Resources
EA	Environmental Authority
ESA	Environmentally Sensitive Area
P&G Act	<i>Petroleum and Gas (Production and Safety) Act 2004</i>
PL	Petroleum Lease
RE	Regional Ecosystem
RIDA	Regional Interests Development Approval
RPI Act	<i>Regional Planning Interests Act 2014</i>
RPI Reg	Regional Planning Interests Regulation 2014
SEA	Strategic Environmental Area

1.0 Introduction

Santos Limited (Santos) is the principal holder of Petroleum Lease Application (PLA) 1047, located approximately 25 (kilometres) km north-east of the Ballera Gas Plant, in the Queensland Cooper Basin. PLA 1047 is wholly located within the Channel Country Strategic Environmental Area (SEA) as prescribed by the *Regional Planning Interests Regulation 2014* (RPI Reg). Santos has prepared this assessment report to support an application for a Regional Interests Development Approval (RIDA) required under Section 29 of the *Regional Planning Interests Act 2014* (RPI Act) to be submitted to the Department of State Development, Infrastructure, Local Government and Planning (DSDILGP).

This application is of an administrative nature. It seeks to authorise production from, and decommissioning and rehabilitation of, the existing Cherokee 2 gas well and Cherokee 3 gas well, including associated infrastructure within the Channel Country SEA. Construction of these wells was authorised under Authority to Prospect (ATP) 1189 and Environmental Authority (EA) EPPG03518215. Activities under ATP 1189 are exempt from the RIDA requirement under Section 24 of the RPI Act which provides an exemption for pre-existing resource activities. PLA 1047 is currently in application and will be granted in the near future to authorise production. EA EPPG03518115 has been amended to authorise production activities on PLA 1047.

The new tenure (once awarded) and amended EA does not qualify for the exemption for pre-existing activities under Section 24 of the RPI Act. Therefore, a RIDA is sought to authorise the existing wells and associated infrastructure.

This assessment report provides the following:

- description of the existing 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 existing 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 1047 and the associated EA EPPG03518115. Other RIDAs associated with PL 1047 include:

- *RPI18-020/Santos - Okotoko North 1;*
- *RPI19-001/Santos - Cherokee 1 and Piute 1; and*
- *RPI19-011/Santos – Okotoko North 2.*

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 activity is located solely on Lot 1 on SP133822 forming part of Durham Downs Pastoral Station, which operates as an 8,910 km² cattle station. Discretionary notification under Section 34(4) of the RPI Act is not necessary given that separate regulatory systems are in place that require Santos to notify the landholder of petroleum activities occurring within their properties, 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 below.

1.3 Landholder Copy of the Application

Given the pre-existing nature of the activity (refer 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 as per Section 30 of the RPI Act and Schedule 5 of the RPI Reg.

1.4 Referable Application

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

2.0 Existing Activities

Santos is seeking to undertake ‘petroleum production’ on PL 1047, located over Lot 1 on SP133822 within the Channel Country SEA, from:

- 2 gas wells,
- 2 borrow pits;
- 3.5 km of access tracks; and
- 2.1 km of pipelines.

Disturbances associated with the above infrastructure is listed in **Table 1** and shown on **Figure 1**:

Table 1: Pre-Existing Infrastructure Area Surface Disturbance

Pre-Existing Infrastructure	Area (ha)
Existing Petroleum Wells (Cherokee 2 and Cherokee 3)	2.6
Existing Associated Infrastructure (Pipelines, Access Tracks, Borrow Pits)	9.5
	12.1

The infrastructure listed in Table 1 is pre-existing infrastructure and will be operated for the purposes of petroleum production as authorised by EA EPPG03518115.

No new surface disturbance to land, outside of the existing disturbance footprint, is required to facilitate ongoing petroleum production at these locations. The activity is limited to production, operational maintenance, decommissioning and rehabilitation of existing infrastructure at end-of-life as described in Section 2.1 to Section 2.4.

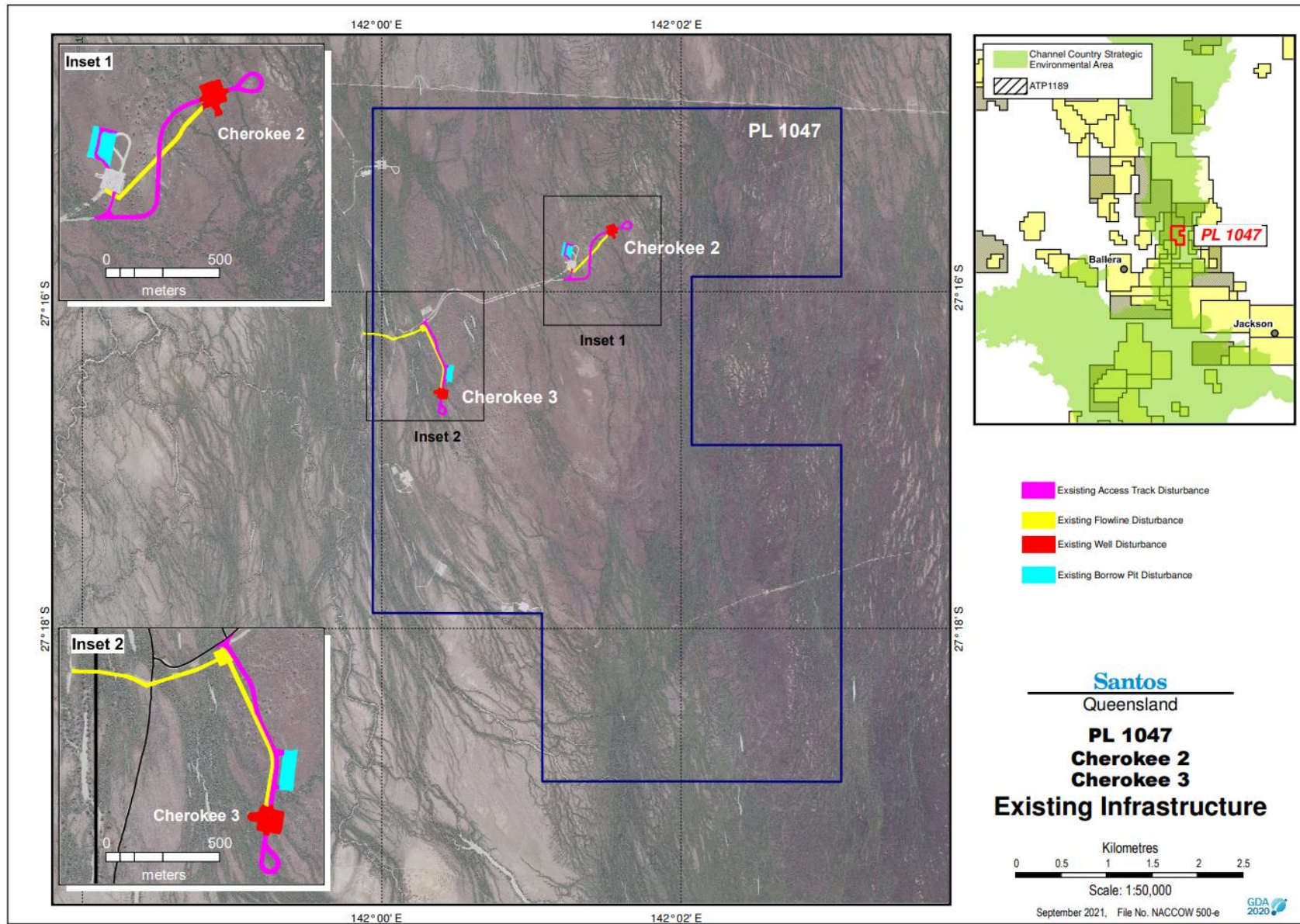


Figure 1: PL 1047 Location of Existing Infrastructure

2.1 Conventional Petroleum Well and Lease

No new petroleum wells are proposed as part of this application.

Surface facilities on the Cherokee 2 well includes the wellhead and tie-in riser. The wellhead comprises of equipment that supports the various pipe strings, seals off the well and controls the paths and flow of reservoir fluids. The tie-in riser will connect the well to the pipeline to enable transportation of the extracted gas.

Well stimulation techniques including hydraulic fracturing may be used to increase the recovery of resources (in this case, gas) by increasing the permeability of the reservoir. Hydraulic fracturing involves pumping a fluid under pressure into the reservoir to open up and connect fractures within the reservoir rock, thereby increasing the opportunity for the resource to move within the reservoir rock and flow toward the well. After the fracture process is completed, fluids that return to surface when the pressure is released are captured for reuse, recycling or transported to a licenced water management facility.

It is feasible that workover operations will be required in the future. Workover operations include activities such as cleaning out of production conduits and replacing tubing, retrieving or drilling out obstructions in the well, and well bore decommissioning. For some workovers, a workover rig and associated infrastructure (i.e. a drilling fluids sump) will need to be set up within the disturbance footprint for a temporary duration.

Workover and stimulation operations will be scheduled to be completed when no surface water is expected to be present on site and outside of flood events / inundation periods. The well will be restored at end-of-life in accordance with the *Petroleum and Gas (Production and Safety) Act 2004* (P&G Act) and the relevant EA conditions.

Cherokee 3 well will be plugged and abandoned due to poor results in accordance with the P&G Act. Rehabilitation will be undertaken as follows in accordance with the EA:

- Fencing will be removed;
- Imported material will be stripped off the well pad and returned to the borrow pit;
- Disturbed area will be re-shaped, including the backfilling of the sump, and natural drainage will be re-established to create a stable landform, consistent with the surrounding terrain;
- Stockpiled topsoil will be spread evenly across the disturbed area; and
- A roughened surface will be created by gouging or scarifying to promote natural establishment of vegetation.

2.2 Pipelines

No new pipelines are proposed as part of this application. Cherokee 2 and 3 pipelines are buried steel pipelines (100 mm and 150 mm in diameter) with a mid-line riser on Cherokee 3 pipeline.

Cherokee 2 pipeline will be used to transport petroleum extracted from Cherokee 2 well to the Ballera Gas Plant, via the Aztec 1 Gas Flowline (PPL 2046) and associated gathering network. At Ballera Gas Plant, the petroleum product will be processed for domestic and export markets.

As a part of pipeline operation, Santos will carry out routine maintenance activities and undertake regular surveillance inspections to ensure the structural and hydraulic integrity of the pipeline. Minor rectification works may be necessary if an issue is identified during routine maintenance or inspections.

Due to the poor well results at Cherokee 3, the pipeline will be mothballed to preserve it for potential future use.

The pipelines will be decommissioned at end-of-life in accordance with the relevant EA conditions.

2.3 Access Tracks

No new access tracks are proposed as part of this application.

The existing access track will be used for ongoing access to Cherokee 2, involving surveillance and maintenance activities. The existing access track is not designed to be used during wet weather conditions. As such, they have not been constructed to any flood immunity and will facilitate the passage of surface water keeping with existing hydrology while operational. The access track will be restored at end-of-life in accordance with the relevant EA conditions.

Due to the poor well results, the access track to Cherokee 3 will be rehabilitated as follows:

- Imported material will be stripped off the road and returned to the borrow pit;
- Disturbed area will be re-shaped and natural drainage will be re-established to create a stable landform, consistent with the surrounding terrain;
- Stockpiled topsoil will be spread evenly across the disturbed area; and
- A roughened surface will be created by gouging or scarifying to promote natural establishment of vegetation.

2.4 Borrow Pits

No new borrow pits are proposed as part of this application.

The existing borrow pits located at Cherokee 1 will be used to provide a source of material for the ongoing maintenance of the well lease and access tracks associated with the activity. Cherokee 3 borrow pit will be restored during the rehabilitation activities.

The side batters of the existing borrow pits will be maintained at a slope of approximately 6:1 where possible (maximum slope of 3:1) and the batters of the entrance/exit will be maintained at a slope of approximately 7:1.

Once material is returned to the borrow pit from the well pad and road during rehabilitation, the borrow pits will be progressively restored. Stockpiled topsoil and vegetation will be re-spread to a uniform depth over the entire area from which it was removed. The area is graded to give a contoured finish as required by the relevant EA conditions.

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 activity of petroleum production will not change the nature of the activities already conducted under ATP 1189. The proposed activity is limited to production, operational maintenance, decommissioning and rehabilitation of infrastructure at end-of-life. Notwithstanding, the relevance of the above environmental attributes to the activity is described below.

3.1 General

3.1.1 Land Use

The pre-existing infrastructure area is located within PL 1047 on the Durham Downs Pastoral Station (Lot 1 on SP133822). Durham Downs Pastoral Station is a pastoral lease that operates as a cattle station with a capacity of up to 21,500 head of cattle. The primary land uses are cattle grazing and petroleum activities.

3.1.2 Climate

The Channel Country SEA is located in an 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 rainfall for the region since 2000 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; on average the region can expect 344 days each year of less

than 1 mm of rainfall. 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.

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

Regional Ecosystem (RE) mapping and aerial photography indicate that vegetation present is typical of that elsewhere in the bioregion (Channel Country) and subregion (Cooper-Diamantina Plains) - dominated by variable to sparse herblands and low open *Chenopod* shrublands supporting predominantly Lignum (*Duma florulenta*) and Queensland Bluebush (*Chenopodium auricomum*), with sporadic Coolabah (*Eucalyptus coolabah*) low open woodlands on more defined drainage channels.

The REs mapped to be present within the pre-existing infrastructure area are shown on

Figure 2. All REs comprise a least concern (LC) *Vegetation Management Act 1999* (VM Act) class and no concern at present (NCAP) biodiversity status (refer Table 2). These REs are identified as having 100 % of their pre-cleared extent remaining and are known to include riparian vegetation, particularly within the Cooper Creek and its braided channels, which surround the pre-existing infrastructure area.

Table 2: Mapped Regional Ecosystems Descriptions

RE Code	RE Short Description	VM Act Class	BD Status	Structural Category
5.3.8a	<i>Eucalyptus coolabah</i> low open woodland +/- <i>Duma florulenta</i> on braided channels, drainage lines, flood plain lakes and claypans	LC	NCAP	Very sparse
5.3.13a	<i>Duma florulenta</i> open shrubland in depressions on flood plains, interdune flats, clay pans and clay plains	LC	NCAP	Mid-dense
5.3.18a	Braided channel complex of major alluvial plains, includes <i>Chenopodium auricomum</i> open shrubland and variable sparse to open-herbland	LC	NCAP	Very sparse
5.3.18b	Braided channel complex of major alluvial plains, includes <i>Chenopodium auricomum</i> open shrubland and variable sparse to open-herbland	LC	NCAP	Very sparse

3.3 Wildlife Corridors

The pre-existing infrastructure intersects mapped riparian corridors, which are associated with the Cooper Creek (refer to Figure 3). These riparian corridors, which represent major channels and minor channels (250k geodata hierarchy 1, 2 and 3) necessary to capture permanent waterholes, buffered by 1km either side and clipped to land zone 3¹, are associated with the Cooper Creek. There are no mapped terrestrial corridors present within or surrounding the activity.

¹ DERM 2009 *Biodiversity Planning Assessment, Channel Country Bioregion, Landscape Expert Panel Report, Version 1.1*

The REs surrounding Cherokee 2 (REs 5.3.18b/5.3.13a and 5.3.18a/5.3.13a) and Cherokee 3 (REs 5.3.8a/5.3.18a and 5.3.18a) may provide suitable habitat general habitat for a range of species, including the following listed threatened species under the *Nature Conservation Act 1992* (NC Act):

- Grey grasswren (*Amytornis barbatus*) – endangered/near threatened (NC Act);
- Grey falcon (*Falco hypoleucos*) – vulnerable (NC Act);
- White-throated needletail (*Hirundapus caudacutus*) – vulnerable (NC Act); and
- Major Mitchell's cockatoo (*Lophochroa leadbeateri*) – vulnerable (NC Act).

There are no mapped environmentally sensitive areas (ESA) identified within the pre-existing infrastructure area or PL 1047. The closest ESA, category C ESA essential habitat, is located approximately 6.5 km south-east of the Cherokee 3 well lease pad.

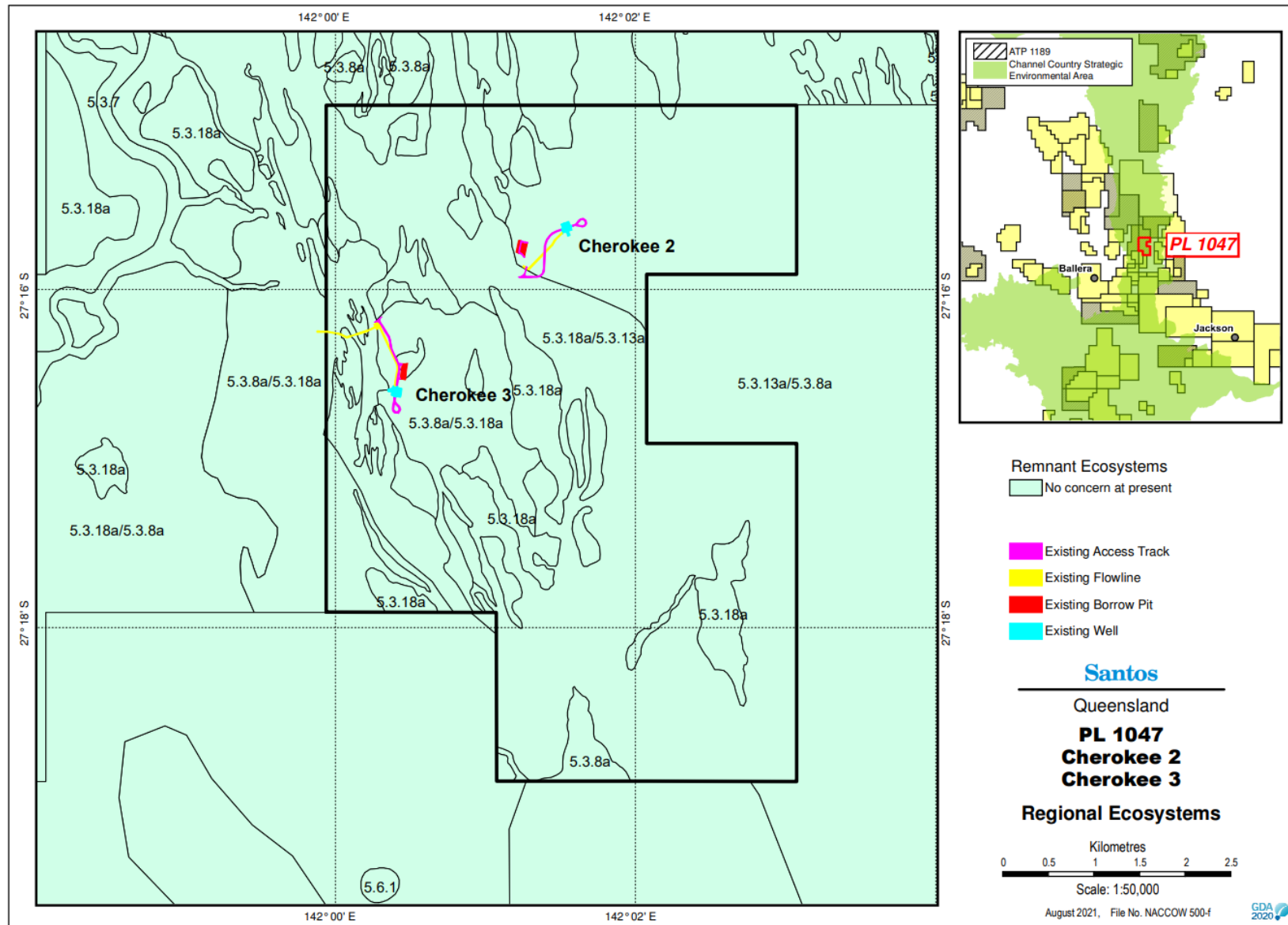


Figure 2: PL 1047 Regional Ecosystems

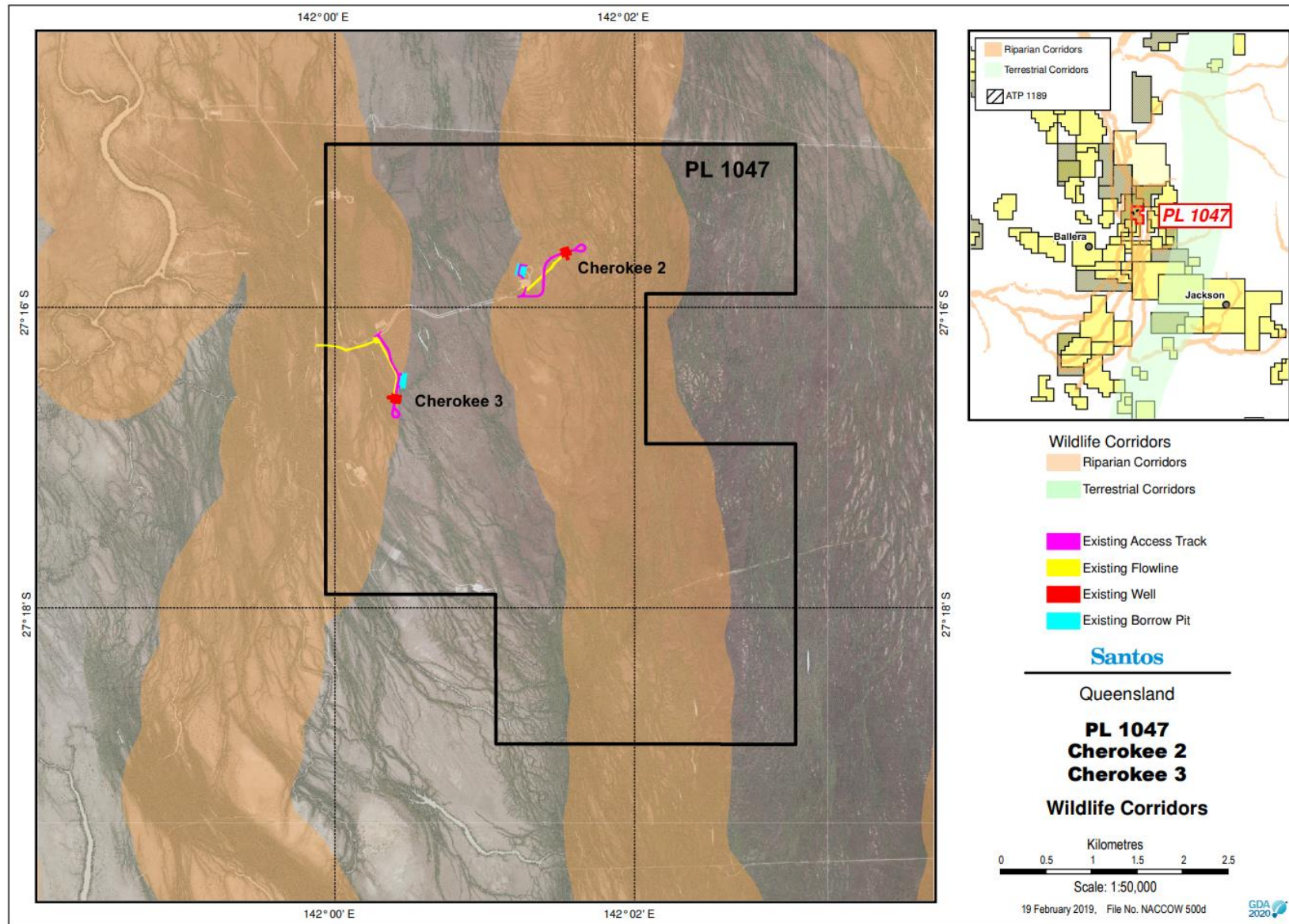


Figure 3: PL 1047 Wildlife Corridors

3.4 Water Quality

Surface Water

The pre-existing infrastructure area is surrounded by braided channels associated with Cooper Creek. Generally, 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, 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, located approximately 90 km south-west is summarised in Table 3.

Table 3: 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

Groundwater

The main Great Artesian Basin (GAB) aquifers (i.e. in the Eromanga Basin stratigraphy) in relation to PL 1047 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/cm².

² Golder Associates 2019 *Underground Water Impact Report for Santos Cooper Basin Oil & Gas Fields, SW QLD*

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.

Both wells primarily target the Permian-aged Toolachee Formation, which is interpreted to consist fully of fluviially derived sediment consisting of fining upward channel sandstones. These reservoir intervals are thought to be interbedded with coal and floodplain shales, which act as intraformational seals. The Toolachee Formation is overlain by basal Nappamerri Group shales, which forms the main regional seal to the Toolachee 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 groundwater bores mapped within the pre-existing infrastructure area or PL 1047. There are no groundwater dependent ecosystems (GDEs) mapped within PL 1047. The closest GAB springs are located more than 240 km from PL 1047. Terrestrial GDEs may be present within the pre-existing infrastructure area.

3.5 Hydrological Processes

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 km². 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 pre-existing infrastructure area is surrounded by a series of braided channels associated with Cooper Creek, with the existing pipeline connecting to the Cherokee 3 well crossing the watercourse (refer Figure 4). The tenure is subject to intermittent flows associated with Cooper Creek flood events. The pre-existing infrastructure area will experience intermittent surface water flows during storm events, causing localised ponding of surface water, as discussed above. The infrastructure is located within wetlands of general ecological significance on the map of Queensland wetland environmental values, which are characterised as arid/semi-arid floodplain lignum swamp (DES, 2013).

3.6 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.

Local

The pre-existing infrastructure area is situated within the Channel Country bioregion and Cooper-Diamantina Plains sub-region. It is entirely located within land zone 3, which comprises recent Quaternary alluvial systems including closed depressions, paleo-estuarine deposits currently under freshwater influence, inland lakes and associated wave-built lunettes (DES, 2016).

Land systems mapped at the location of the existing activities are consistent with land zone mapping. The pre-existing infrastructure area is entirely mapped as an alluvial plain with gradients less than 1:5,000 and anastomosing channels, main channels and shallow flood depressions. The area is associated with the irregularly flooded Cooper Creek main channel area. Land systems present within the pre-existing infrastructure area is summarised in Table 4. According to the Australian Soil Resource Information System (2021), soils are mapped as grey clays and grey cracking clays (Map Code: CC87).

Table 4: Pre-Existing Infrastructure Area Land Systems

Map Code	Land System Description	Agricultural Land Class	% of Existing Area
C1	Alluvial plains with gradients of less than 1:5,000; with anastomosing channels (0.1 to 1 m relief), main channels (<10 m relief), shallow flood depressions, waterholes, billabongs and swamps, and slightly elevated more stable alluvial islands. Isolated sand dunes.	C2 - Pasture Land - native pastures	100%

3.7 Beneficial Flooding

The pre-existing infrastructure area is surrounded by a series of braided channels associated with Cooper Creek, with the existing pipeline connecting to the Cherokee 3 well crossing the watercourse (refer Figure 4). Notwithstanding, the pre-existing infrastructure area will experience intermittent surface water flows during storm events, causing localised ponding of surface water.

Generally, the surrounding 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.

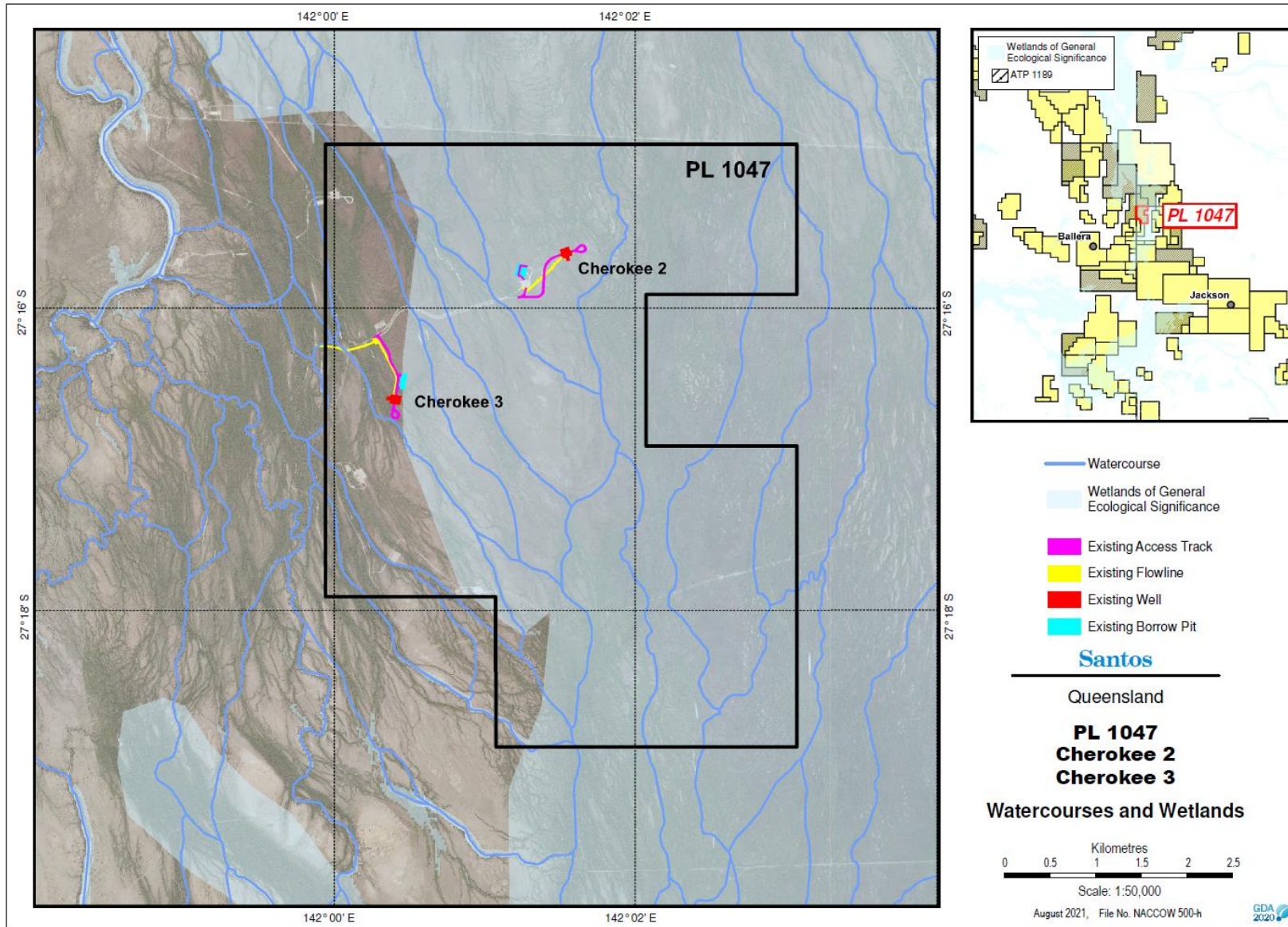


Figure 4: PL 1047 Watercourses and Wetlands

4.0 Potential Impacts to Environmental Attributes

4.1 Riparian Processes and Wildlife Corridors

REs mapped to be present within the pre-existing infrastructure area are typical of the vegetation communities in the Channel Country SEA; having a sparse, very sparse or grassland structural category. These REs are naturally ephemeral, disturbance tolerant and resilient having naturally adapted to respond to the periods of boom and bust associated with the Channel Country bioregion. No new surface disturbance to land is proposed as part of this application. The activity is located within the pre-existing infrastructure area. Access to and from the activity will occur along the existing access tracks only.

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 as per relevant EA conditions. Cherokee 3 well will be plugged and abandoned and the lease rehabilitated to promote the natural re-establishment of vegetation consistent with the surrounding undisturbed land, in accordance with the relevant EA conditions. Following cessation of petroleum production at Cherokee 2, the pre-existing infrastructure will be rehabilitated as well, in accordance with relevant EA conditions.

Given the scope and nature of the activity, no widespread or irreversible impact on riparian processes or wildlife corridors within Channel Country SEA is expected as a result of petroleum production from pre-existing infrastructure.

4.2 Water Quality

No new surface disturbance to land, such as clearing vegetation in or near streams, lakes, floodplains or wetlands, is proposed as part of this application. The activity is located within the pre-existing infrastructure area. The activity does not involve the discharges of water (i.e. point or diffuse sources), or the construction/operation of regulated dams and other major infrastructure (i.e. separation ponds and permanent camps).

Any fuels/chemicals used on site will be stored and handled in accordance with 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.

Measures for unplanned releases of contaminants will be implemented in accordance with the relevant EA conditions. Moreover, due to the slow nature of the encroachment of flood waters in the Cooper Creek, sufficient time is generally available to prepare areas for potential flood impacts i.e. in these situations all non-essential materials present on site at the time (i.e. hydrocarbons, chemicals, infrastructure) will be removed from operational areas prior to the arrival of floodwaters.

The existing petroleum wells (Cherokee 2 and Cherokee 3) have been completed with steel surface casing, steel production casing, and cement to isolate the wells from aquifers, including the GAB and other geological units.

Given the scope and nature of the activity, 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 activity is not expected to cause a widespread or irreversible impact on water quality within the Channel Country SEA.

4.3 Hydrological Processes and Beneficial Flooding

The activity is located within the pre-existing infrastructure area. The existing access tracks have not been constructed to any flood immunity and will facilitate the passage of water in keeping with existing hydrology. The existing pipelines are buried underground and the surface has been rehabilitated to reinstate existing drainage. Any surface infrastructure required as part of future workover operations (i.e. a drilling fluids sump) may result in the diversion or interception of a negligible amount of overland flow, when considering the small footprint of the activity relative to the sub-catchment area (i.e. a typical drilling fluids sump has an operating volume of approximately 300 kL and is designed to exclude surface flow). However, all workover operations will be temporary in nature and scheduled to be completed outside of the wet season (i.e. infrastructure removed prior to Cooper Creek flood events), therefore diversion or interception of overland flow is not expected. Given no new disturbance or activities other than 'production' from existing authorised infrastructure is proposed (as described in Section 2.0), altered natural flow paths and natural extent of flooding across floodplains will not occur. Furthermore, the production and abandonment of petroleum wells within the tenure will be undertaken in accordance with the relevant EA conditions and *Code of practice for the construction and abandonment of petroleum wells and associated bores in Queensland* (DNRME, 2019).

Given the scope and nature of the activity, no widespread or irreversible impacts on hydrological processes or beneficial flooding within Channel Country SEA are expected as a result of petroleum production from pre-existing infrastructure.

4.4 Geomorphic Processes

No new surface disturbance to land is proposed as part of this application. The activity is located within the pre-existing infrastructure area. No new structures are proposed to be placed in a watercourse, lake or spring as part of this application.

The existing access tracks have not been constructed to any flood immunity and will facilitate the passage of water in keeping with existing hydrology. The existing pipelines are buried underground and the surface has been rehabilitated to reinstate existing drainage. Any surface infrastructure required as part of future workover operations (i.e. a drilling fluids sump) may result in the diversion or interception of a negligible amount of overland flow, when considering the small footprint of the activity relative to the sub-catchment area (i.e. a typical drilling fluids sump has an operating volume of approximately 300 kL and is designed to exclude surface flow). However, all workover operations will be temporary in nature and scheduled to be completed outside of the wet season (i.e. infrastructure removed prior to Cooper Creek flood events), therefore diversion or interception of overland flow is not expected.

Given the scope and nature of the activity, no widespread or irreversible impacts on geomorphic processes within Channel Country SEA are expected as a result of petroleum production from pre-existing infrastructure.

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 in Schedule 2, Part 5 the activity will meet the required outcome for the regional interest. Critically, the application demonstrates that the prescribed solution will be met by the activity as it will not impact on an environmental attribute of the Channel Country SEA (refer Table 5).

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

Schedule 2, Part 5 RPI Reg		Relevance to Application
<p>14 Required Outcome The activity will not result in a widespread or irreversible impact on an environmental attribute of a strategic environmental area.</p>	✓	<p>The activity 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. Refer to Section 3.0 and Section 4.0.</p>
<p>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</p>	✓	<p>The application demonstrates the activity will be undertaken in accordance with the prescribed solution provided in Schedule 2, Part 5, Item 15(1)(b) of the RPI Reg.</p>
<p>(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;</p>	✓	<p>The activity does not include any of the unacceptable uses prescribed by Schedule 2, Part 5, Item 15(2) of the RPI Reg.</p>
<p>(ii) the construction and operation footprint of the activity on the environmental attribute is minimised to the greatest extent possible;</p>	✓	<p>The pre-existing infrastructure area will be utilised entirely for the activity. No new surface disturbance to land is proposed as part of this application.</p>
<p>(iii) the activity does not compromise the preservation of the environmental attribute within the strategic environmental area;</p>	✓	<p>Refer to Section 3.0 and Section 4.0.</p>
<p>(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.</p>	✓	<p>The South West Regional Plan does not identify the Channel Country SEA.</p>

The RPI Act provides that a regulated activity is an activity that is prescribed in the RPI Reg because it is likely to have a widespread and irreversible impact on an area of regional interest. As discussed within Section 2.1, a drilling fluids sump may be required as a part of future temporary workover operations. The application also demonstrates the proposed use of a temporary drilling fluids sump does not constitute a *regulated activity*, as defined by the RPI Reg (refer Table 6).

Table 6: Regulated Activities RPI Reg

Section 11(3) RPI Reg		Relevance to Application
<p>Water storage (dam) is storing water using a dam, other than storing water on land to be used only for any or all of the following purposes—</p> <p>(a) to meet the domestic water needs of the occupants of the land;</p> <p>(b) to water the stock that is usually grazed on the land;</p> <p>(c) to water stock that is travelling on a stock route on or near the land.</p>	✓	<p>N/A – the application does not propose to store water in a dam; The application proposes the temporary storing of drilling fluids in a drilling fluids sump designed to exclude surface flow if/when workover operations require it. Santos drilling fluids sumps are designed to exclude surface flow and avoid the impounding of surface water. In addition, workover operations will be scheduled to be completed outside of the wet season. Therefore, all surface infrastructure, including a drill sump, will be removed prior to Cooper Creek flood events.</p>
Schedule 6 RPI Reg		Relevance to Application
<p>dam—</p> <p>(a) means the following—</p> <p>(i) a barrier, whether permanent or temporary, that does, could or would impound water;</p>	✓	<p>N/A – the drilling fluids sump will not impound water. Santos drilling fluids sumps are designed to exclude surface water and avoid the impounding of surface water. Workover operations will be scheduled to be completed outside of the wet season. Therefore, all surface infrastructure, including a drilling fluids sump, will be removed prior to Cooper Creek flood events.</p>
<p>(ii) the storage area created by the barrier;</p> <p>(iii) an embankment or other structure that is associated with the barrier and controls the flow of water; but</p>	✓	<p>N/A – the drilling fluids sump will not constitute a barrier for the storage of water.</p>
<p>(b) does not include a water tank, including a rainwater tank, constructed of steel, concrete, fibreglass, plastic or similar material.</p>	✓	<p>N/A – the drilling fluids sump does not constitute a water tank.</p>

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Appendix A – Definitions

Activity	Definition
Access Track	A cleared track approximately 6 m in width constructed of earthen material to facilitate ongoing operational maintenance access to the petroleum well.
Borrow Pit	A source of shallow earthen material excavated to provide material for well lease and access track maintenance.
Buried Pipeline	A pipeline buried underneath the ground used to transport petroleum.
Petroleum Production	A petroleum well operated under normal producing conditions to extract gas for ongoing commercial sale.
Production Testing	A petroleum well operated under normal producing conditions to capture key production measurements used to inform whether commercially viable quantities of gas are present for extraction.
Petroleum Well	A hole in the ground made by drilling through which petroleum or a prescribed gas is produced.
Petroleum Well Pad	An area of up to 1.65 ha used to provide a stable platform for workover rigs and the operation of a petroleum well.

ATTACHMENT 5 – GIS FILES