Santos

# Regional Interests Development Application Assessment Report

# Hector South East gas well & pipeline (PL1046 & PPL2053)

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## Abbreviations and definitions

| Acronym/Term | 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 |
| ESA | Environmentally Sensitive Area |
| Linear infrastructure | Buried gas pipeline and access track. |
| Non-linear infrastructure | All components of proposed activities other than pipelines and access tracks. |
| P&G Act 2004 | *Petroleum and Gas (Production and Safety) Act 2004* |
| PL | Petroleum Lease |
| Proposed activities | Construction and operation of one conventional petroleum well (Hector South East), associated well lease, stockpile area, borrow pit and linear infrastructure. |

| Acronym/Term | Description |
|---|---|
| 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 |
| Site | The footprint of the proposed activities including the outer construction boundary. |

# 1.0 Introduction

Santos Limited is the principal holder of Petroleum Lease (PL) 1046 and applicant for Pipeline Licence (PPL) 2053, located approximately 65 km south of the Ballera Gas Plant, in the Queensland Cooper Basin. Approximately half of PL 1046, and around 45% of PPL 2053 (under application), is located within the Channel Country strategic environmental area (SEA) prescribed under the *Regional Interests Planning Regulation 2014* (RPI Reg). Prescribed SEAs 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 in order to carry out a resource activity within an 'area of regional interest'.

Santos is proposing to drill and operate a new conventional gas well on PL1046 and construct and operate 3.15 km of gas flowline on PPL 2053 within the Channel Country SEA. 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:

- describes the proposed resource activities
- identifies the relevant environmental attributes of the land subject to the application
- evaluates the potential impacts on the identified relevant environmental attributes
- assesses how the proposed activities meet the required outcome for SEAs detailed by the *Regional Planning Interests Regulation 2014* (RPI Reg).

## 1.1 Applicant and related approvals

Santos Limited, is the holder of PL 1046 and associated Environmental Authority (EA) EPPG03517415, and primary applicant for PPL 2053 and associated Environmental Authority, and is therefore an *eligible person* under s28 of the RPI Act.

## 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 proposed activities within the SEA are located on Lot 2528 PH429 forming part of the Orientos property—a 1,442 $km^2$ cattle station operated by the landholders. Discretionary notification under s34(4) 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 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

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

## 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 Natural Resources, Mines and Energy (DNRME).

# 2.0 Proposed activity – Hector South East

The resource activities the subject of this RIDA application include construction and operation of:

- the Hector South East 1 well on PL1046
- approximately 3.15 km of buried gas flowline (known as the Hector South East Flowline) on PPL 2053
- associated access track
- a borrow pit within PL1046.

Figure 1 shows the proposed locations of this infrastructure. The final locations of non-linear infrastructure associated with the well may vary slightly from those shown in Figure 1, once ground-truthed, to ensure that:

- any identified cultural heritage constraints are avoided
- mature trees are avoided, where practicable
- linear infrastructure crossings minimise earthworks.

Any relocation of this infrastructure would occur within the outer construction boundary identified on Figure 2.

The total area of disturbance associated with the proposed activities within the SEA is 11.8 hectares (Table 1).

**Table 1: Proposed surface disturbance within SEA**

| Proposed Infrastructure | Proposed Disturbance (ha) |
|---|---|
| Petroleum well (including lease and spoil area) | 1.6 |
| Linear infrastructure (buried gas flowline and access) | 9.5 |
| Borrow pit | 0.7 |
| Total | **11.8** |

Descriptions of the above resource activities are provided in sections 2.1 to 2.3 below.

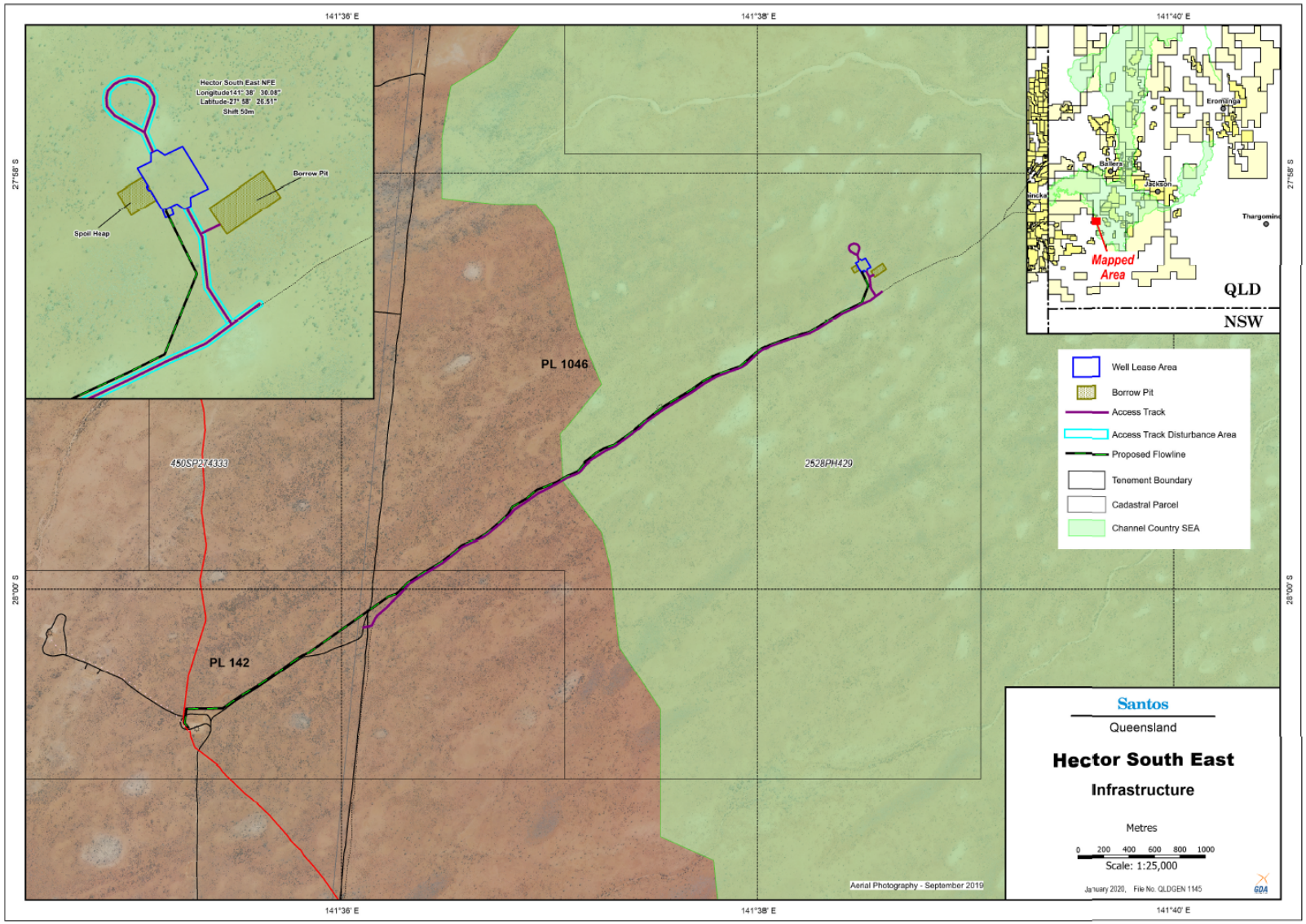


**Figure 1 Proposed infrastructure**

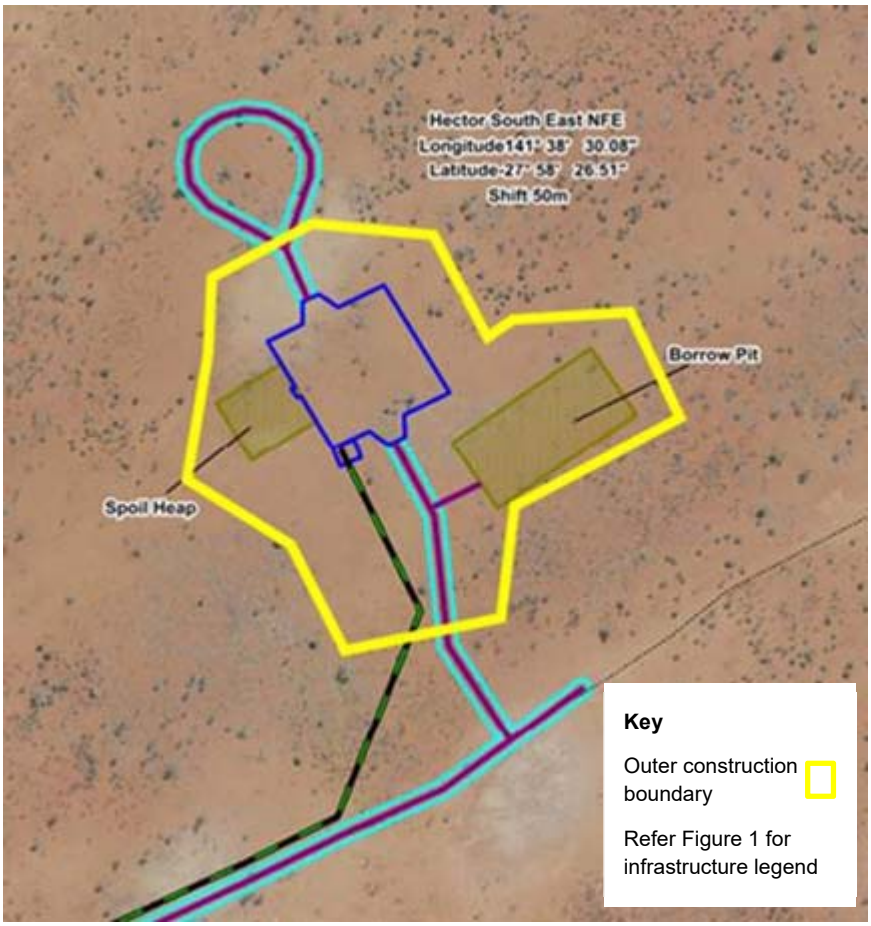


**Figure 2** **Outer construction boundary for potential relocation of non-linear infrastructure**

## 2.1 Conventional petroleum well and lease

A well lease is proposed to be constructed to accommodate modular drilling and ancillary equipment, including a derrick, power generators, pipe handling equipment, tanks, drilling sumps and associated stockpile, flares, and office areas. The layout of a typical well lease during drilling is provided in Appendix A.

The well lease has been oriented to minimise the amount of clearing required and to avoid removing mature trees as far as practicable.

***Construction***

Once the drill rig is in place on the well pad, drilling would take approximately 11 days. Drilling fluid would be continuously circulated down the drill pipe and back to the surface equipment to balance underground pressure (if required), cool the drill bit and flush out rock cuttings. A drilling sump with an operating volume of approximately 384 kL (total volume of 576 kL given a one metre freeboard) would be used to contain drilling fluids. The drilling sump would be designed to exclude overland flow.

Following the completion of drilling, the rig would be dismantled and transported from site. Partial rehabilitation would commence including removal of drilling fluids from the drilling sump and backfilling of the sump. This is expected to be completed within six months of well completion. While the sump

remains in use, flood alerts would be monitored to ensure it is emptied before forecast floodwater has the potential to impact the site.

Drilling activities would be scheduled during periods where surface water is expected to be absent from the site, and outside of flood events/inundation periods. The well would be drilled in accordance with Santos Management System (SMS) *Onshore Drilling and Completions technical standards* which are consistent with industry standards from the American Petroleum Institute (API) and NORSOK. These standards provide minimum construction requirements and good industry practice for petroleum production. The preliminary well design is a 2-string design with 7-5/8" steel surface casing and 3-1/2" chrome steel tubing. These strings would be cemented either back to surface or to inside the previous casing.

***Operation***

During operation of the well, surface facilities would be used for the purpose of petroleum production. Surface facilities would include the wellhead and a tie-in riser. The wellhead consists of equipment which supports the various pipe strings, seals off the well, and controls the paths and flow of reservoir fluids. The tie-in riser connects the well to the gas flowline, and enables transportation of the extracted petroleum.

Well workovers may also be required during operation of the well. Well workover activities include basic maintenance works like cleaning out 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) would be required temporarily. This infrastructure would be contained in the existing disturbance area. Workovers would also 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 would be restored at end-of-life in accordance with the *Petroleum and Gas (Production and Safety) Act 2004* (P&G Act 2004) and the relevant EA conditions.

## 2.1 Buried gas flowline

To commercialise gas from the well, a flowline is required to connect the well to existing gas gathering infrastructure. The. Gas from the well would flow through the proposed flowline into the existing Raffle 1 gas flowline (PPL 96) then to the Thoar to Ashby Gas Trunkline to the Dullingari gas satellite in South Australia and on to Moomba.

The flowline would be approximately seven kilometres in length, although only approximately 3.15 km of this is within the SEA and therefore the subject of this application. It would consist of a 100 mm diameter (DN 100) steel pipe, buried to a depth of around 1200 mm.

The proposed flowline runs alongside an existing station track which reduces the level of disturbance required for construction. Some sections of the flowline may need to deviate from the access track for operational functionality and to minimise vegetation clearing.

***Construction***

A maximum right-of-way (ROW) width of 16 metres is required for installation of the flowline. This area comprises the topsoil bank on either side of the ROW, access for pipe truck and side boom tractor/excavator, the flowline trench, and a trench spoil bank (see Appendix B). Given there are no mapped watercourses along the flowline route, there would be no significant waterway crossings. ROW widths would be restricted to the smallest extent practicable (approximately 11 metres) through any minor crossings of unmapped waterways.

The length of the flowline through the SEA is 3.15 kilometres. This would be constructed in sections and it is anticipated that there would be no more than two kilometres of open trench at any one time. Breaks/bridges would be employed around every 800 metres for cattle/wildlife egress.

Once the flowline is laid within the trench, it would be bedded with padding placed around it, backfilled and compacted. The ROW would then be reinstated to the condition and profiles existing at the commencement of activities. All wheel and equipment ruts along the flowline route would be filled in and levelled by grading. Top soil and seed stock removed during installation would be re-spread over the ROW and windrows removed. Where seed stock has not been displaced during installation, the area would be lightly scarified to promote regrowth. The constructed flowline would have a midline riser approximately 1.8 kilometres from the proposed well lease and a pig launcher.

***Operation***

Once operational, the flowline would transport gas to the Dullingari gas satellite in South Australia and then onto Moomba for processing and distribution. Pipeline maintenance activities, such as pigging, and inspections would also be carried from time to time.

The flowline would be decommissioned at end-of-life in accordance with the *Petroleum and Gas (Production and Safety) Act 2004* (P&G Act 2004) and the relevant EA conditions.

## 2.2 Access tracks

The well would be accessed primarily by an existing station track which would be upgraded to withstand heavy vehicle use. Approximately 1,160 metres of additional track would be constructed to provide access from the station track to the well lease and to provide a truck turn-around area.

***Construction***

The proposed access track would be up to 13 metres in width to accommodate a six metre wide roadway and 3.5 metre wide table drains either side of the roadway spaced out as per Class D spacing recommendations (see Appendix C). This may require some widening of the existing track. The roadway would be lightly graded and capped with clay or similar locally available borrow pit material.

***Operation***

The access track would be used for ongoing access to the well site and flowline. The access track would be designed to convey natural surface water flows consistent with the existing hydrology and would not be accessed during prolonged wet weather.

At the end of operations, the access track would be rehabilitated in accordance with EA conditions, or left in place for future use by the landholder subject to agreement.

## 2.3 Borrow pit

A borrow pit would be established close to the well lease to provide suitable material to construct a stable and supportive surface for the lease and access track. The location of the proposed borrow pit is shown in Figure 2.

The side batters of the borrow pit will be maintained at a slope of approximately 3:1, and the batters of the entrance / exit will be maintained at a slope of approximately 7:1. The borrow pit will be stabilised by ripping the floor and sides of the borrow pit to a depth of approximately 300 mm generally along the contour (Figure 3). During restoration, stockpiled topsoil and vegetation would be respread to a uniform depth over the entire area from which it was removed. The sides and floor of the pit would be graded to give a contoured finish, as required by the relevant EA conditions.

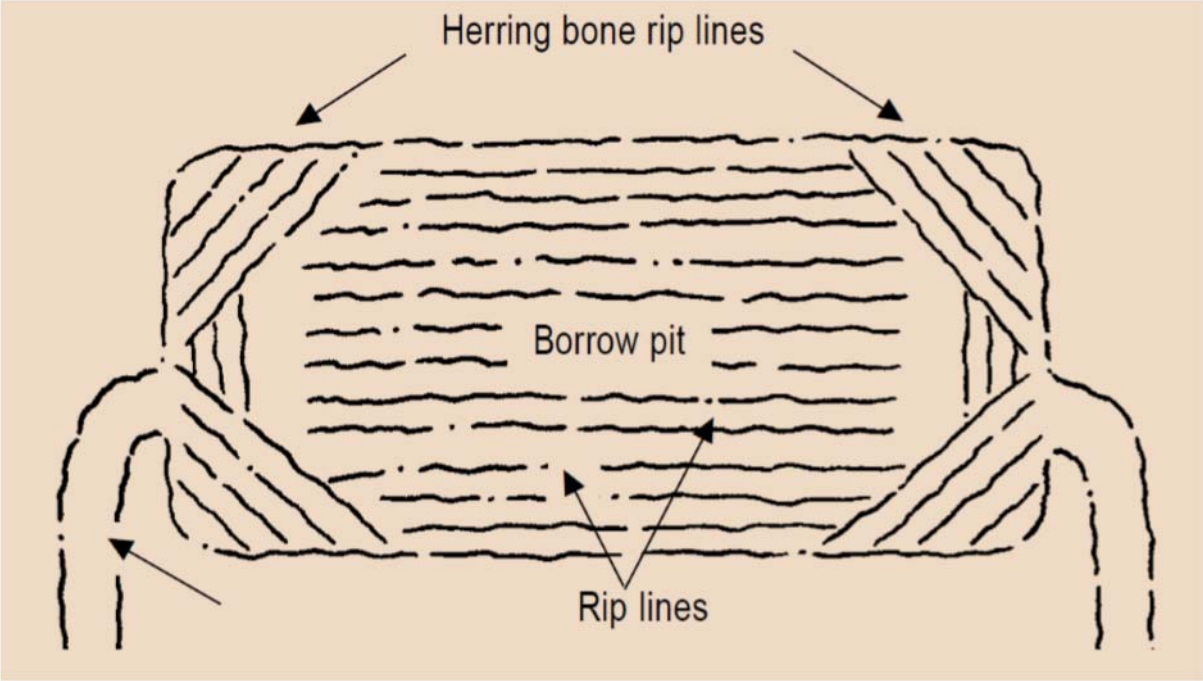


**Figure 3** **Example borrow pit ripping for rehabilitation**

# 3.0 Environmental attributes and potential impacts

Section 7 of the RPI Reg identifies 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 Department of Infrastructure, Local Government and Planning's (DILGP) *RPI Act Statutory Guideline 05/14* states that these attributes broadly relate to:

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

The relevance of the above environmental attributes to the proposed activities is described below.

## 3.1 General

### 3.1.1 Land use

The proposed activities are located on Orientos Station on Lot 2528/PH429. Orientos Station is a 1,442 km$^2$ sized property. Cattle grazing and petroleum activities are the primary land uses on the property. Sections of pastoral lease have been extensively overgrazed from pastoral operations.

### 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 as shown on Figure 5. Climate data from the Ballera Gas Field weather station (045009) shows that the mean rainfall for region since 2000 is 181.8 mm/year. The mean number of days of rain more than or equal to 1 mm is 20.3 days/year; that is on average, the project area can expect 344 days each year of less than 1 mm of rainfall. 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.

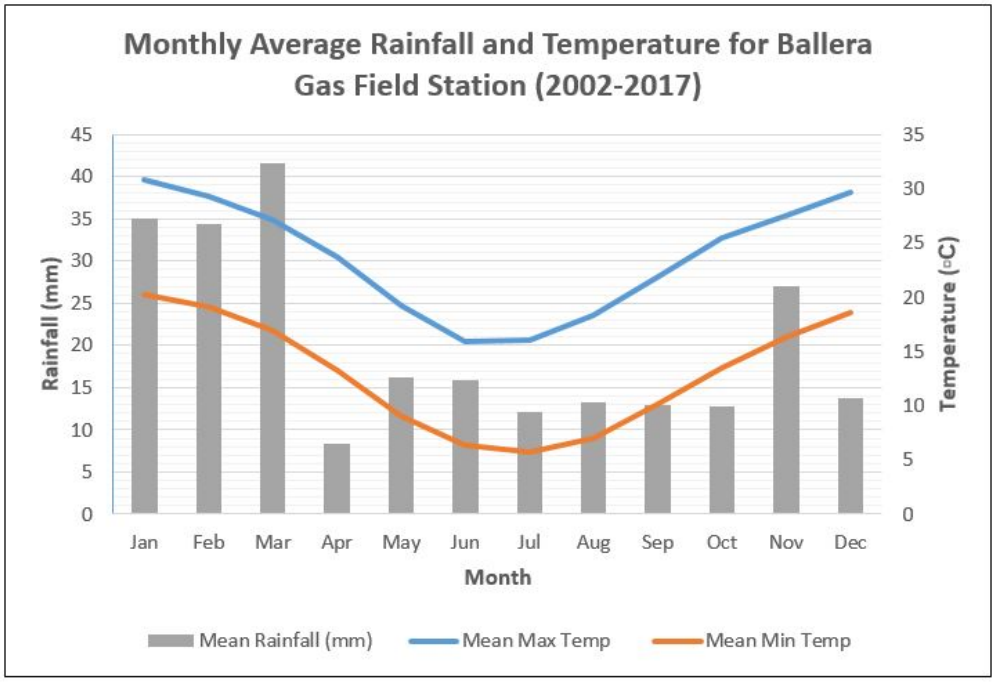


**Figure 4** **Monthly average rainfall and temperature for Ballera Gas Field station (2002-2017)**

## 3.2 Riparian processes

Regional Ecosystem (RE) mapping indicates that vegetation in and surrounding the site is sparse to very sparse and dominated by *Acacia aneura.* Palustrine wetlands also occur, particularly in the eastern part of the project area.

REs mapped to be present within the proposed infrastructure area within the SEA are shown in Figure 6, and detailed in Table 2. All REs have a biodiversity status of No Concern at Present (NCAP) and a Vegetation Management Act class of Least Concern. REs 5.3.16a and 5.6.4 are mapped within PL 1046 as having 100% of their pre-clearing extent remaining in 2017. RE 5.5.2 as mapped within PL 1046 as having over 99% of its pre-clearing extent remaining in 2017.

While these REs are known to include riparian vegetation within the Cooper Creek and its braided channels, the site is located outside of the floodplain in sandplains and dunal land systems. The nearest mapped drainage line to the proposed activity is Koolongoo Creek, a non-perrenial 4$^{th}$ order stream, located approximately 1.5 km north of the proposed activity at its nearest point. This drainage line and has been subject to the long-term grazing operations of the Orientos cattle station.

There are no mapped Environmentally Sensitive Areas (ESAs) or permanent waterholes present within or immediately surrounding the proposed activity.

**Table 2 Regional ecosystem descriptions**

| RE code | RE short description | Detailed description | VM Act Class | BD Status | Structural Category |
|---|---|---|---|---|---|
| 5.6.4 | *Atalaya hermglauca* +/- *Acacia aneura* +/- *Acacia spp.* +/- *Corymbia terminalis* low open woodland on reticulate sand dunes | Various trees and tall shrubs occur forming a distinct but discontinuous canopy. *Acacia aneura* usually predominates, but in places *Atalaya hemiglauca*, *Hakea leucoptera* and *Ventilago viminalis* may be co-dominant. Usually there is no well defined, low shrub layer, but in places, dense stands of *Dodonaea viscosa* subsp. *angustissima* and *Eremophila sturtii* may occur. The ground layer is seasonally variable and composed of grasses and forbs. The composition and structural formation of this association varies considerably. Occurs on low dunes with sloping flanks (less than 3%). The dunes are frequently reticulate and usually overlie recent clay alluvia. Often concentrated in areas fringing large lakes or flood plains. Soils are reddish-brown, coarse sands, or deep red, earthy to siliceous sands. Ferruginous hardpans are often present. (BVG1M: 23a) (Queensland Government 2019a). | LC | NCAP | Sparse |
| 5.5.2 | *Acacia aneura* low open woodland +/- *Acacia sibirica* +/- *Eremophila latrobei* on Quaternary deposits | *Acacia aneura* usually predominates forming a distinct but very discontinuous canopy in distinct groves. Isolated trees emerge above the canopy. There is a distinct shrub layer of *Acacia sibirica* which is codominant or occasionally dominant. Other scattered low shrubs occur frequently. The ground layer is sparse and composed of grasses and forbs. Occurs on slightly undulating to undulating plains with slopes of less than 3% associated with the tops of dissected residuals. Soils shallow to very shallow, loamy red earths and lithosols with silcrete stone frequent on the soil (BVG1M: 23b) (Queensland Government 2019b). | LC | NCAP | Very sparse |
| 5.3.16a | *Eragrostis australasica* sparse tussock grassland on intermittently inundated depressions on flood plains, interdune flats, clay pans and clay plains | *Eragrostis australasica* sparse tussock grassland occasionally with scattered Eucalyptus coolabah low trees. *Eragrostis australasica* often forms pure stands, but scattered *Maireana microcarpa* and *Duma florulenta* low shrubs may occur. The ground layer between the grass hummocks is usually extremely sparse (often bare), but various grasses such as *Leptochloa fusca* and *Eragrostis dielsii* and forbs such as *Atriplex spongiosa*, *Maireana microcarpa*, *Teucrium racemosum* var. *racemosum* and *Frankenia uncinata* may be seasonally abundant. Occurs on interdune flats and clay pans and less frequently in depressions on clay plains Palustrine wetland (e.g. vegetated swamp). (BVG1M: 34b) (Queensland Government 2019c). | LC | NCAP | Very sparse |

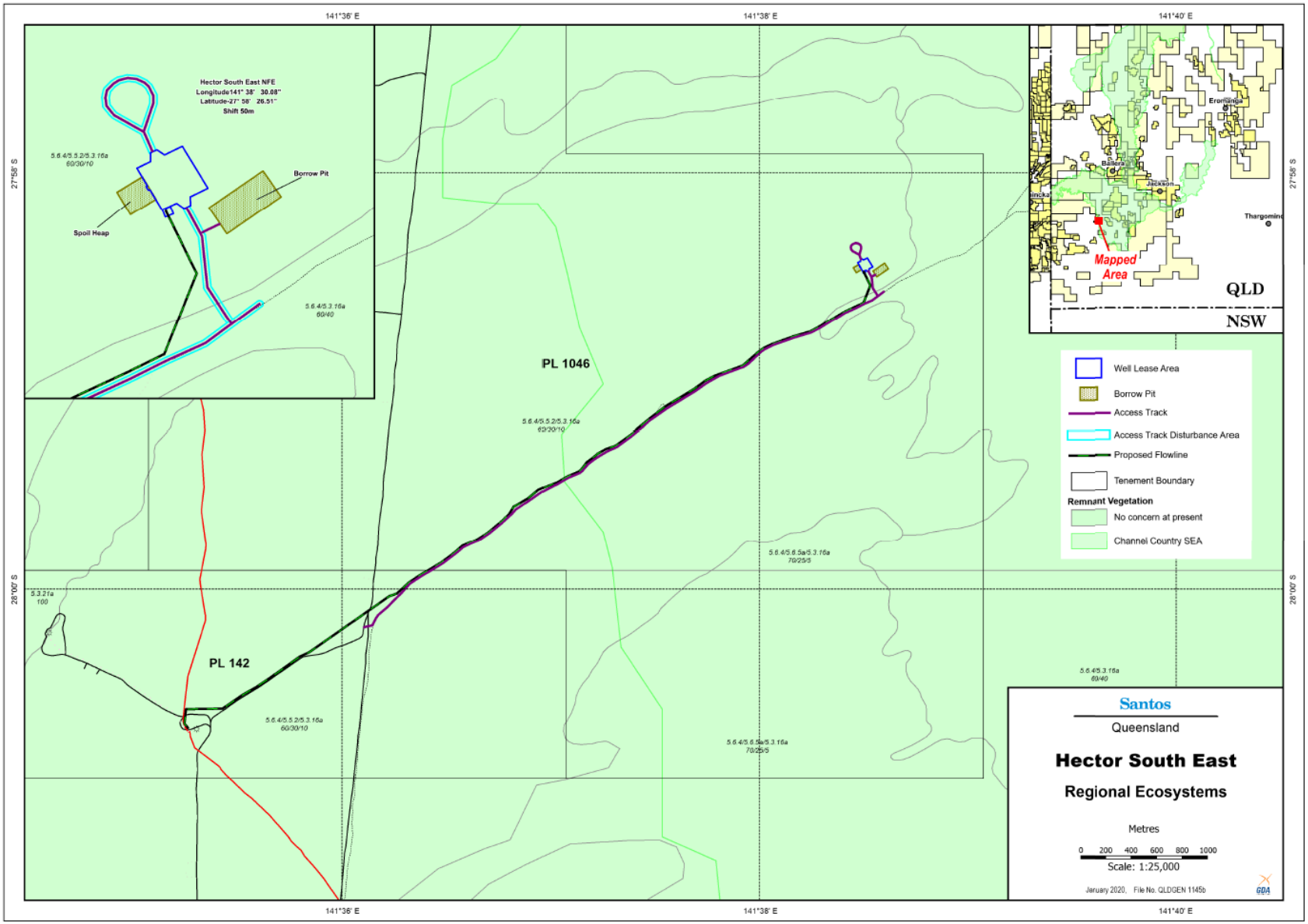


**Figure 5: Regional Ecosystems**

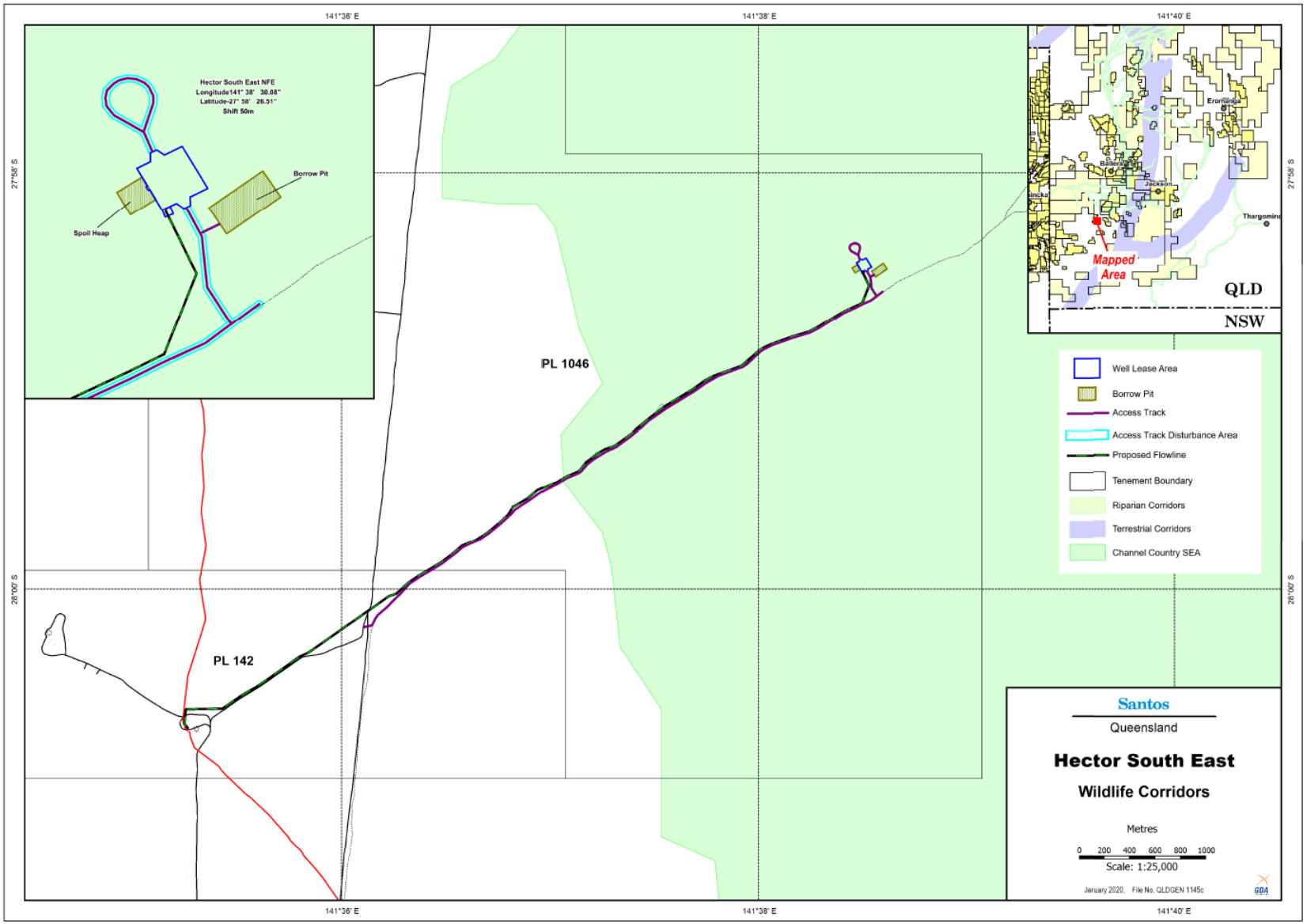


**Figure 6: Wildlife Corridors**

## 3.1 Wildlife corridors

No *Biodiversity Planning Assessments* derived riparian or terrestrial corridors of state, regional or local significance occur within PL1046 or PPL 2053 (refer Figure 6). The nearest mapped riparian and terrestrial corridors are associated with the Wilson River and Cooper Creek and are located approximately 10km and 30 km east of the site respectively (DES 2019).

## 3.2 Water quality

### 3.2.1 Surface water

While there is limited water quality data available for Cooper Creek, the data that is available indicates water quality is likely subject to local influence and conditions vary between flood times and periods of no-flow (Smith et al. 2016). Electrical conductivity (EC) levels, while normally low and stable, tend to increase during low or no-flow periods and sharply decrease following inundation (Smith et al. 2016). Turbidity is generally high but varies subject to local influences (Smith et al. 2016). Turbidity decreases from upstream to downstream and then increases again before the Cooper Creek crosses the Queensland–SA border (Smith et al. 2016; Karim et al. 2015).

Historical (1965-2016) water quality data from the QLD Government's Cooper Creek gauging station 003103A, located approximately 95 kilometres south west, is summarised in Table 3 3.

**Table 3 Cooper Creek surface water quality (1956-2016)**

| Parameter | Average Value |
|---|---|
| Conductivity @ 25°C | 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 |

### 3.2.2 Groundwater

The main GAB aquifers (i.e. in the Eromanga Basin stratigraphy) in relation to PL 1046 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 3,000 to 13,000 µS/cm[1].

[1] Golder Associates 2013 *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.

The well's total depth is expected to be 2,320 metres. The primary target of the well is the Permian-aged Toolachee Formation (2,000 metres depth). This formation is interpreted to consist fully of fluvially 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. The secondary target of the well is the deeper Epsilon Formation (2,224 metres depth).

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 bores within PL 1046 or PPL 2053. The nearest registered bore is located approximately 1.8 km north-west of the proposed well. There are no GAB ROP discharge or recharge springs located within or near PL 1046 or PPL 2053. The closest GAB springs are located more than 200km east of PL 1046. Terrestrial groundwater dependent ecosystems may be present within the project area.

## 3.3 Hydrological processes and beneficial flooding

### 3.3.1 Regional

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 $km^2$.

Flows within Cooper Creek are usually confined to the main creek channels. 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.

### 3.3.2 Local

The site is located around 5 km west of the Cooper Creek floodplain on land mapped as sandplains and dunefields. The site does not intersect any mapped watercourses. Two mapped watercourses flow roughly parallel to the pipeline route including Koolongoo Creek approximately 1.7km north of the flowline (1.5 km at its nearest point) and an unnamed watercourse approximately 3km south of the pipeline. Both watercourses are hydrologically connected to the Cooper Creek floodplain, and they will flow water through PL 1046 towards the Cooper Creek floodplain as a result of heavy local rainfall events (EOSDIS, 2018).

Heavy local rainfall events of approximately 25 mm or more may cause minor surface water flows and ponding in watercourses, alluvial plains and claypan wetlands surrounding the site. Daily rainfall events

of 25 mm or more have only been recorded four times at Orientos Station in the last five years, including three times in 2016 and once in 2019 (BOM 2020).

The proposed activity is located within land mapped as palustrine wetlands – arid/semi-arid non-floodplain grass, sedge, herb swamps (DES 2019). These swamps primarily fill from inflowing channels, overland flow and backflow from flooded rivers, and local runoff (DES 2013) and are typically dry. Water depth when filled may be shallow to moderate depending on local conditions and flows (DES 2013). The site may be subject to intermittent surface water flows during storm events, causing localised ponding of surface water.

There are no wetlands of high ecological significance located within the vicinity of the proposed activities. The nearest is associated with Cooper Creek and is located over 5km east of the site. Some wetlands of general ecological significance (GES) are located near to, but are not traversed by, the site. These GES wetlands are identified as 'referrable wetlands' on Figure 7.

## 3.4 Geomorphic processes

### 3.4.1 Regional

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

### 3.4.2 Local

The proposed activities are located in the Channel Country bioregion and Bulloo Dunefields sub-region. They are not located within the Cooper Creek floodplain. According to Regional Ecosystem mapping, dominant land zones traversed by and surrounding the proposed activities include Land Zone 6 (Quaternary inland dunefields) and Land Zone 5 (Tertiary early Quaternary loamy and sandy plains and plateaus). Land Zone 3 (recent Quaternary alluvial systems) is also mapped as occurring, particularly at the eastern extent of the proposed activities.

Land systems mapping accessed via the Queensland Globe website indicates the proposed activities traverse two land systems as described in Table 4.

**Table 4: Land systems traversed by proposed activities**

| Map Code | Land System Description | Agricultural Land Class | Location and extent (% project area) |
|---|---|---|---|
| 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. | C3 - Pasture Land - native pastures, light grazing | Southern/western portion of pipeline and access track. |
| 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. | C3 - Pasture Land - native pastures, light grazing | Northern/eastern portion of pipeline and access track, well lease, borrow pit, spoil stockpile and track turnaround. |

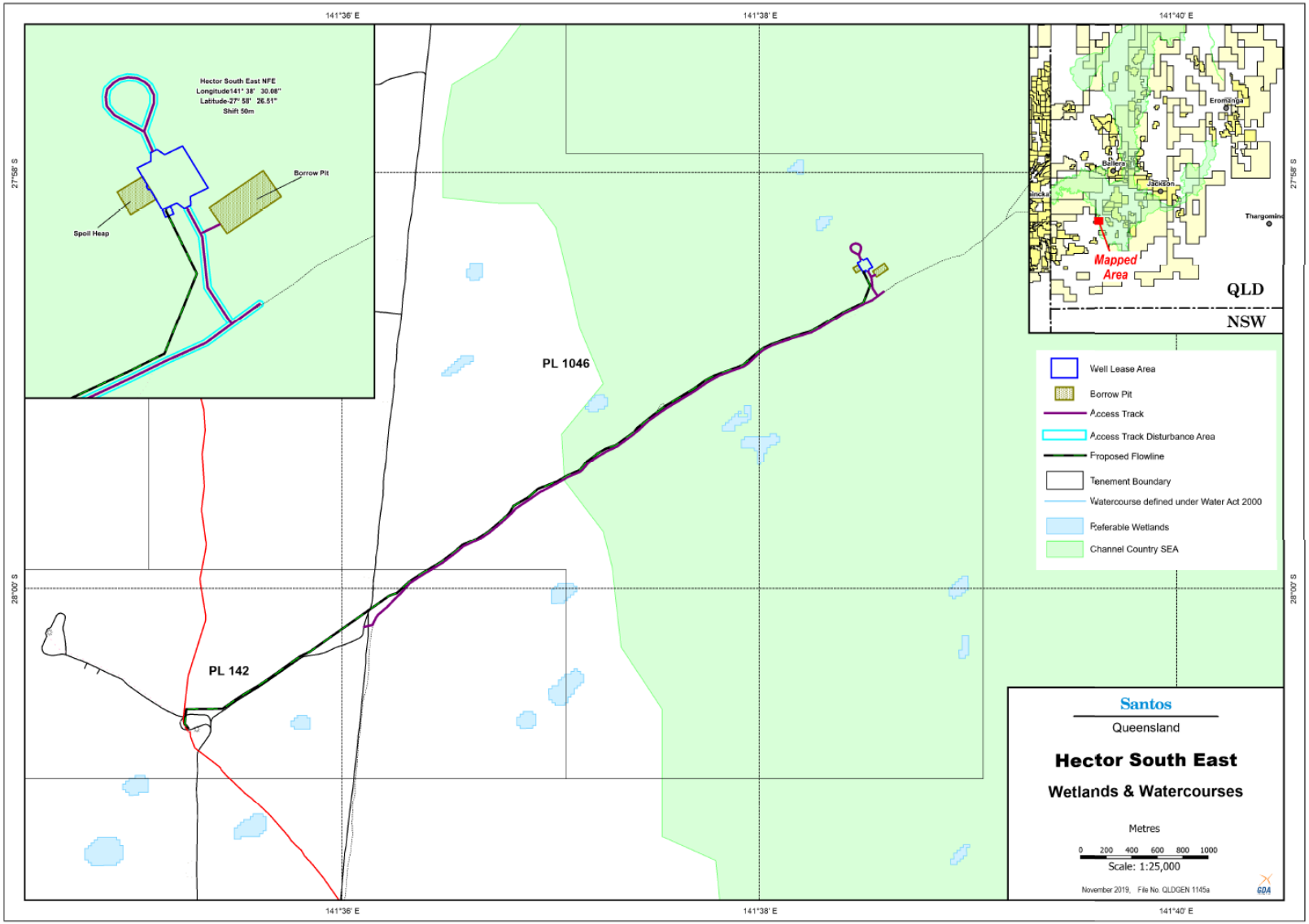


**Figure 7** **Mapped wetlands and watercourses**

# 4.0 Potential impacts to environmental attributes and proposed mitigation

## 4.1 Riparian processes and wildlife corridors

The proposed activities would require minimal vegetation clearing given the sparse or very sparse structure of the vegetation communities present. The area of impact is adequately offset from mapped watercourses and wetlands. The REs present within and near the disturbance footprint are naturally ephemeral and resilient to disturbance having adapted to the boom and bust periods associated with the Channel Country Bioregion. Given their sparse structure they are likely to respond well to rehabilitation under appropriate conditions.

The REs mapped within PL 1046 have >99% of their pre-clear extent mapped in the 2017 remnant mapping. This indicates the level of historic vegetation clearing for replacement land cover in PL 1046 is minimal and any additional clearing required for the proposed activities will not significantly reduce the area of occupancy of the existing RE vegetation. As such, the proposed activities are unlikely to compromise riparian function or critically impede the use of the riparian vegetation for migration, shelter and habitat associated with watercourses.

In addition, Santos would implement the following measures to ensure that the proposed activities do not compromise riparian processes or wildlife corridor functions:

- Vegetation disturbance would be minimised as far as practicable and would not exceed 11.8 hectares. This would include:
    - using the existing farm track for access and co-locating the pipeline with this access track to reduce the overall width of the linear infrastructure corridor
    - where practicable, relocating infrastructure within the construction footprint to avoid mature trees
    - where practicable, lopping/trimming branches rather than removing mature trees and shrubs.
- The proposed linear infrastructure corridor does not cross any mapped watercourses. In the event that the corridor crosses unmapped watercourses, the width of the corridor would be restricted to the smallest extent practicable through these crossings.
- Chemicals and fuels would be stored and handled in accordance with Australian Standards and spill kits would be located onsite to contain any spills if required.
- Measures shall be adopted to prevent fauna entrapment within excavation work areas and infrastructure developments, such as:
    - restricting the length of open trench to 2km at any one time, and ensuring breaks / bridges are employed at least every 800m for cattle egress
    - using branches, ropes, hessian sacks, ramped gang planks or similar to create ‘ladders’ to enable fauna to exit the excavations
    - ensuring a cellar cover is installed at the well as soon as reasonably practicable.
- Access to and from authorised activities would occur along designated access tracks only.
- Rehabilitation to promote conditions suitable for the natural revegetation of disturbed areas would occur progressively.
- Infrastructure / disturbances with no future use would be rehabilitated as soon as reasonably practicable following the cessation of petroleum activities to promote the natural re-establishment of vegetation of similar species composition and density to the surrounding undisturbed land in accordance with the relevant EA.

Given the distance of the proposed activities from mapped watercourses and wetlands, the characteristics and vegetation to be removed and minimal disturbance area, and the above management measures, the proposed activities are unlikely to cause widespread or irreversible impacts on riparian function or wildlife corridors within the Channel Country SEA.

## 4.2 Water quality

Vegetation removal, earthworks, drilling and site access associated with the proposed activity may increase the erosion potential of the site which in turn could increase sedimentation of surrounding waterways. However, the proposed activities are considered unlikely to have a significant effect on surface water quality within the SEA given the distance of the site from mapped watercourses (minimum 1.5km) and wetlands and the small disturbance footprint (11.8 ha). In addition, Cooper Creek has generally high turbidity levels particularly towards its lower reaches (Karim et al. 2015, Smith et al. 2016) where the site is located.

The extent of disturbance required for the proposed activities has been minimised through the design process by:

- locating the well to avoid mapped watercourses and wetlands, and significant vegetation
- using the existing access track
- co-locating the buried gas pipeline adjacent to the existing access track to reduce the overall width of the linear infrastructure corridor.

To further reduce disturbance levels and erosion potential of the site, Santos would commence rehabilitation as soon as reasonably practicable following the cessation of activities. In the event that unmapped watercourses are crossed by linear infrastructure or encountered within the disturbance footprint:

- non-linear infrastructure would be relocated within the defined construction boundary (refer Figure X) to avoid these
- dry crossing sites with minimal earthwork requirements would be selected.

Drilling would be scheduled to occur outside of flood events/inundation periods.

No activities proposed involve the discharge of water (point or diffuse sources) or the construction or operation of regulated dams and other major infrastructure (i.e. separator ponds, permanent camps). Any fuels / chemicals used on site will 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 as reasonably practicable, minimising risks associated with contamination, or a reduction in water quality, in accordance with EA conditions. Rehabilitation to promote conditions suitable for the natural revegetation of disturbed areas will occur progressively.

Contingency measures for unplanned releases of contaminants will be implemented in accordance with 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 e.g. in these situations all non-essential materials present on site at the time (e.g. hydrocarbons, chemicals, infrastructure) shall be removed from construction and/or operational areas prior to the arrival of floodwaters.

The petroleum well would be completed with steel surface casing, steel production casing, and cement in accordance with the SMS Onshore Drilling and Completions technical standards, to isolate the well from aquifers, including the Great Artesian Basin, and other geological units that may contain terrestrial groundwater dependent ecosystems.

Terrestrial groundwater dependent ecosystems may be present within the project area. However, groundwater modelling[2] shows that the groundwater pressure in the shallowest formations, which may be hydraulically connected to and support terrestrial ecosystems will not be impacted by the development of any additional wells on PL 1046. This is due to the vertical separation of the target formation for the proposed wells (Permian-aged Toolachee Formation), which is greater than 1,500 m below the surface, and the location of any potential terrestrial ecosystems that may be dependent on groundwater.

The closest GAB springs are located more than 200km from PL 1047. These springs are too far away to be at risk of hydraulic impact due to the proposed activities.

Given the scope and nature of the proposed activities, combined with the implementation of the above management measures, the proposed activities will not cause a widespread or irreversible impact on water quality within the Channel Country SEA.

## 4.3 Hydrological processes and beneficial flooding

The proposed activities are unlikely to effect existing hydrological processes and beneficial flooding given their minimal footprint (11.8 ha) and location. PL1046, including the site, was not inundated during recent Cooper Creek flood events as it is located in sandplains and dunefields, which are elevated above the Cooper Creek floodplain. Furthermore, it is located outside Cooper Creek flood extents for recorded flood events between 1989, 1990, 1997, 2000, 2004, 2006 and 2010 to 2012 (Santos, 2018).

Infrastructure associated with the drilling program is largely temporary and drilling would be scheduled outside of periods of inundation and/or flooding. Drilling fluids would be removed from site and sumps backfilled following completion of drilling. All non-essential infrastructure would be decommissioned and rehabilitated prior to the onset to flood events/inundation periods.

Access tracks would not be constructed to any flood immunity to allow the natural flow of surface water across the site. The proposed pipeline would be buried underground and the surface rehabilitated following construction to reinstate natural drainage patterns.

Surface excavations, such as the drilling sump or borrow pit, have the potential to result in diversion or interception of a negligible amount of overland flow. Both are relatively small compared to the surrounding catchment, and the drilling sump would be designed to exclude overland flow. These activities would also be temporary and scheduled to be completed when no surface water is expected to be present on site and outside of flood events/inundation periods.

Workover activities may occur throughout operation of the well. The infrastructure and activities required for (and therefore potential impacts of) well workovers are similar to those required for initial well drilling. These would also be temporary and conducted outside of periods of inundation. Following workover activities, drilling fluids would be removed from site and sumps backfilled and workover equipment would be removed from the site.

Following cessation of petroleum production, existing infrastructure would be rehabilitated to promote the natural re-establishment of vegetation consistent to the surrounding undisturbed land.

Given the minor nature of the proposed activities and the measures described above, the proposed activities are unlikely to result in widespread or irreversible impacts on hydrological processes or beneficial flooding within the Channel Country SEA.

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

## 4.4 Geomorphic processes

As discussed in section 4.2, the proposed activities would increase the erosion potential of the site, particularly during construction. This is considered unlikely to significantly affect geomorphic processes of the SEA given the minor area of proposed disturbance (11.8 ha) and the temporary nature of construction and drilling during which erosion potential is highest. The well is also around 1.5km from the closest mapped watercourse—the nearest potential area of significant geomorphic processes.

Following completion of construction and drilling activities, areas no longer needed for operation of the well (such as the drilling sump) would be rehabilitated. Remaining disturbed land, such as the well lease, would be rehabilitated following the cessation of petroleum activities. Rehabilitation would aim to reinstate the natural drainage features and micro-contours, and re-establish vegetation consistent with the surrounding undisturbed land such that natural erosion, sedimentation and depositional processes are maintained in the long-term.

Other measures to reduce the proposed activities' impact on existing geomorphic processes discussed above include:

- minimising the total area of disturbance and vegetation clearing required by using the existing access track and co-locating the buried gas pipeline with this access track
- reinstating the pipeline right-of-way following pipeline installation consistent with the surrounding contours of the land
- designing access tracks without flood immunity to allow maintenance of natural overland flows
- ensuring workover activities are conducted outside of flooding/inundation periods.

# 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 Part 5, Schedule 2, the proposed activity will meet the required outcome for the regional interest. Critically, the application demonstrates that the prescribed solution provided in s15(1)(b) will be met as outlined within Table 5.

**Table 5 Schedule 2, Part 5 RPI Reg**

| Schedule 2, Part 5 RPI Reg | | Relevance To Application |
|---|---|---|
| ***14 Required outcome***<br>*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 s7 of the RPI Reg for the Channel Country SEA as demonstrated in Section 4.0. The application demonstrates the proposed activities will be undertaken in accordance with the below prescribed solution. |
| ***15 Prescribed solution***<br>*(1) The application demonstrates either—*<br>*(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*<br>*(b) all of the following—* | ✓ | The application demonstrates the proposed activities will be undertaken in accordance with the prescribed solution provided in s15(1)(b). |
| *(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;* | ✓ | In accordance with EA EPPG03517415, Schedule F – Land, Planning for Land Disturbance, conditions (F10) and (F11), the location of the proposed activities has been selected in accordance with the following site planning principles:<br>- maximise the use of areas of pre-existing disturbance;<br>- in order of preference, avoid, minimise or mitigate any impacts, including cumulative impacts, on areas of native vegetation or other areas of ecological value;<br>- minimise disturbance to land that may result in land degradation;<br>- in order of preference, avoid then minimise isolation, fragmentation, edge effects or dissection of tracts of vegetation;<br>- in order of preference, avoid then minimise clearing of native mature trees;<br>- maximise co-location of linear infrastructure corridors; and<br>- minimise the width of linear infrastructure corridors to the greatest practicable extent.<br><br>Application of these site planning principles has been demonstrated throughout Section 2.0 – 4.0. For example:<br>- the site has been located outside of the Cooper Creek floodplain and away from mapped watercourses<br>- proposed drilling pad has been restricted to 1.5 ha disturbance area<br>- proposed drilling pad has been orientated to avoid clearing mature trees as far as practicable, and to minimise the amount of clearing required |

| | | |
|---|---|---|
| | | - proposed pipeline ROW and access track are co-located and use the existing farm access track. |
| *(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. |

The application also demonstrates the proposed use of a temporary drilling sump does not constitute a *regulated activity* as defined by the RPI Act.

| **s11(3) of the Regional Planning Interests Regulation 2014** | | **Relevance To Application** |
|---|---|---|
| *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—*<br>*(a) to meet the domestic water needs of the occupants of the land;*<br>*(b) to water the stock that is usually grazed on the land;*<br>*(c) to water stock that is travelling on a stock route on or near the land.* | ✓ | N/A – the application does not propose to store water in a dam. The application proposes to temporarily store drilling fluids in a sump designed to exclude surface flow and avoid the impounding of surface water. In addition, construction and workover activities would be scheduled to be completed when no surface water is expected to be present on site and outside of flood events/inundation periods. Therefore, all non-essential surface infrastructure, including a drill sump, would be removed prior to Cooper Creek flood events. |
| **Schedule 6 of the Regional Planning Interests Regulation 2014** | | **Relevance to the application** |
| *dam—*<br>*(a) means the following—*<br>*(i) a barrier, whether permanent or temporary, that does, could or would impound water;* | ✓ | N/A – the drilling sump would not impound water. Santos drilling sumps are designed to exclude surface water and avoid the impounding of surface water. Construction and workover activities would be scheduled to be completed when no surface water is expected to be present on site and outside of flood events/inundation periods. Therefore, all non-essential surface infrastructure, including a drill sump, would be removed prior to Cooper Creek flood events. |
| *(ii) the storage area created by the barrier;*<br>*(iii) an embankment or other structure that is associated with the barrier and controls the flow of water; but* | ✓ | N/A – the sump would not constitute a barrier for the storage of water. |
| *(b) does not include a water tank, including a rainwater tank, constructed of steel, concrete, fibreglass, plastic or similar material.* | ✓ | N/A – the proposed sumps does not constitute a water tank. |

# 6.0 References

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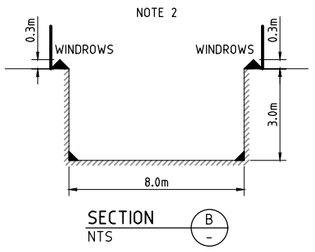
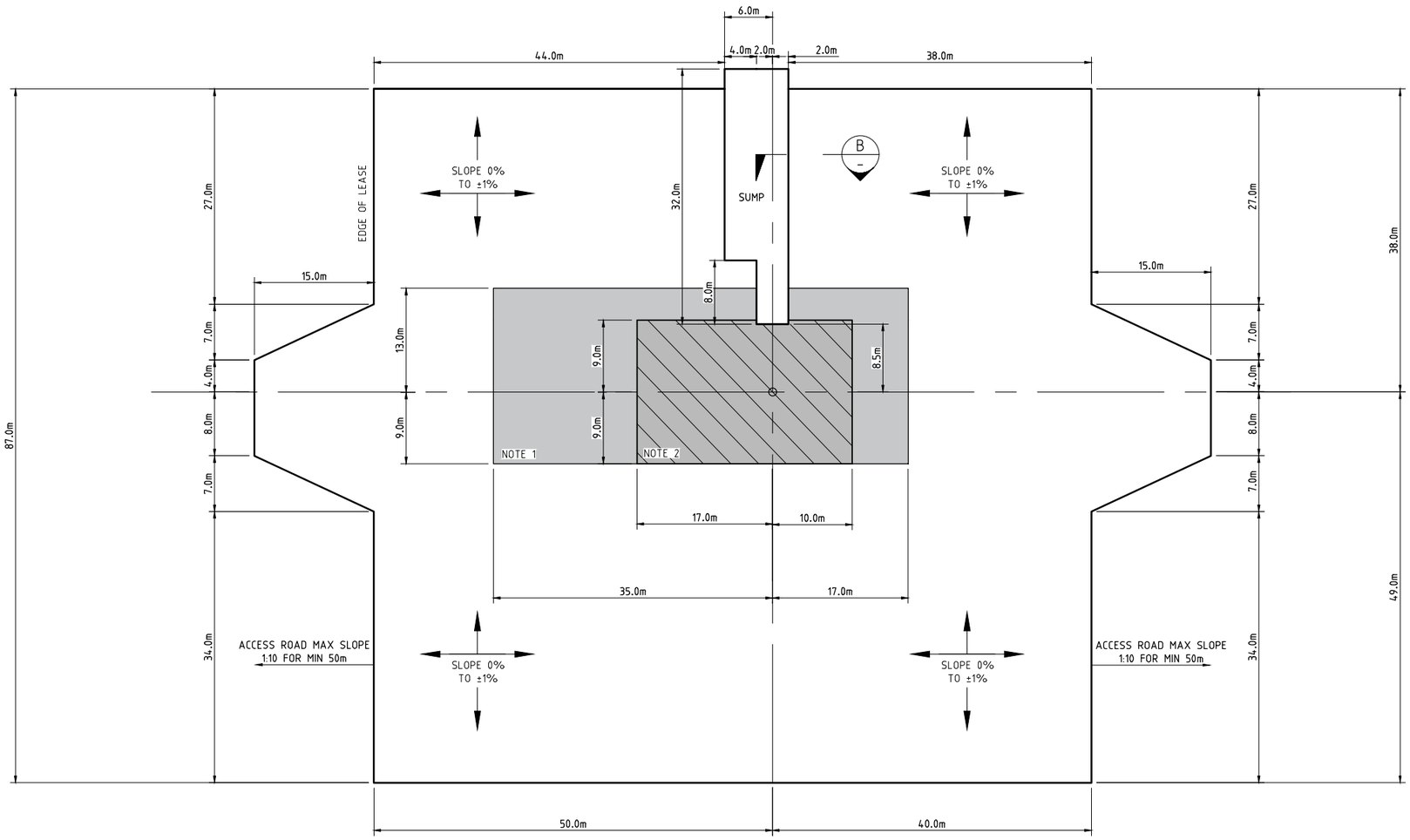
# Appendix A – Proposed well lease layout during drilling

| LEASE INFO | |
|---|---|
| LEASE DISTURBANCE AREA | 8,430m² |
| CAPPING AREA EXCLUDING HARDSTAND & SUMP | 7,720m² |
| RIG HARDSTAND | 486m² |
| SUMP VOLUME | 672m³ |
| SUMP AREA | 224m² |




SECTION B
NTS




PLAN A
SCALE 1:250

SCALE 1:250 0 5 10 15 20 25 METRES

**NOTES:**

1. LEASE LEVEL TOLERANCE IN RIG PAD AREA (GREY SHADED) = +/- 50mm - 15mm MAX DIFFERENCE ACROSS ANY 3m LENGTH. GROUND COMPACTION TO BE FIRM ENOUGH TO SUPPORT RIG.
2. RIG HARDSTAND PAD AREA (DIAGONAL HATCHED) TO FILLED WITH 600mm SUITABLE MOISTURE CONDITIONED CLAY AND COMPACTED. LEVEL TOLERANCE TO BE +/- 20mm, 10mm MAX DIFFERENCE ACROSS ANY 3m HEIGHT.
3. GRADIENTS OF +/- 1% CAN BE USED ACROSS THE LEASE IN ALL AREAS OTHER THAN THOSE COVERED BY NOTE 1.

REVISIONS

| No | DATE | DRN | CHKD | ENG | Q.A. | PROJ | ACC | CP | DESCRIPTION |
|---|---|---|---|---|---|---|---|---|---|
| 2 | 06/08/19 | FYF | KGR | OWL | | | | | ISSUED FOR CLIENT REVIEW |
| 1 | 17/06/19 | FYF | KGR | OWL | | | | | ISSUED FOR CLIENT REVIEW |
| 0 | 11/12/18 | FYF | KGR | OWL | | | | | ISSUED FOR CLIENT REVIEW |

REFERENCE DRAWINGS

| DRG No. | SUBJECT |
|---|---|

| | |
|---|---|
| DRN: | FYF |
| DATE: | 06/08/19 |
| SCALE: | 1:250 |
| CHKD: | KRR |
| ENG: | OWL |
| Q.A.: | |
| PROJ: | |
| ACC: | |

A.B.N. 80 007 550 923

# LEASE PLAN
# ENSIGN 967 RIG

Santos

DRAWING No.

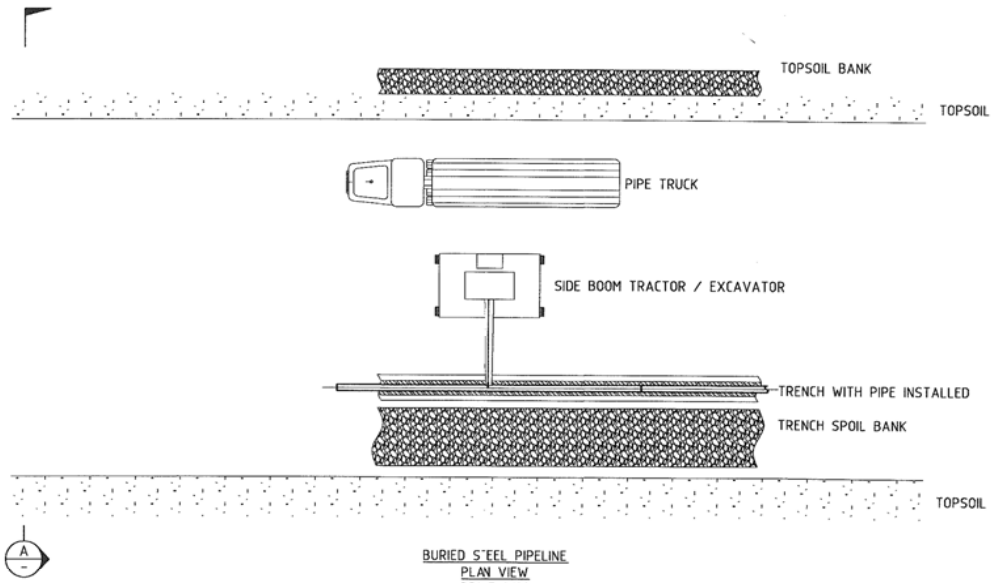
REV 2

CADFILE No. -

AUTOCAD

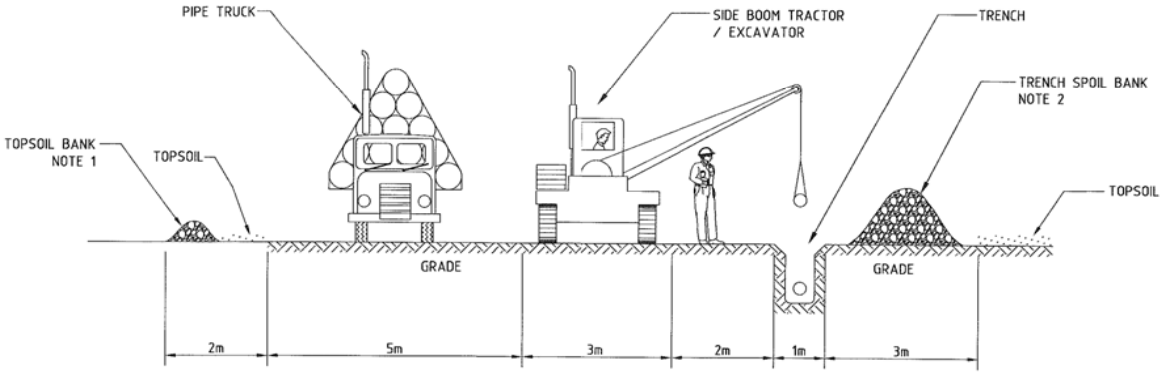
A1SHEET

# Appendix B – Typical buried pipeline right-of-way




BURIED STEEL PIPELINE
PLAN VIEW
SCALE 1:100

0 2.5 5.0 7.5 10
SCALE 1:100 METRES




BURIED STEEL & <DN150 GRE PIPELINE
ELEVATION VIEW

0 1 2 3 4 5
SCALE 1:50 METRES

SECTION A
SCALE: 1:50

## NOTES

1. TOPSOIL SHALL BE STRIPPED FROM RIGHT OF WAY AND STOCK PILED SEPARATELY FROM SUB SOIL.
2. EXCAVATED MATERIAL SHALL BE PLACED IN PILES WITHIN THE LIMITS OF RIGHT OF WAY.
3. TURNING CIRCLE APPROXIMATELY EVERY 2km OR NEAREST CLAY PAN. EXISTING INFRASTRUCTURE TO BE USED WHERE POSSIBLE.
4. NO RESTRICTION TO RIGHT OF WAY WIDTH OVER DUNES.
5. WHERE BELLHOLES ARE REQUIRED, (eg TIE-INS, CROSSINGS) RIGHT OF WAY WIDTH TO BE INCREASED..
6. TYPICAL RIGHT OF WAY LAYOUT BASED ON STD BURIAL DEPTH OF 750mm. EXTRA DEPTH WILL INCREASE OVERALL WIDTH.

| No | DATE | DRN | CHKD | ENG | Q.A. | PROJ | ACC | CP | DESCRIPTION |
|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | | | | | ORIGINAL ISSUE |

REVISIONS

1500-40-817 DRG No.

STANDARD BELL HOLE DESIGN SUBJECT

REFERENCE DRAWINGS

DRN: FYF
DATE: 01/11/11
SCALE: AS SHOWN
CHKD: MWK
ENG:
Q.A: TI-VG
PROJ: 5307054
ACC:
A.B.N. 80 007 550 923

AREA 1500 - STANDARD DRAWING
TYPICAL RIGHT OF WAY (R.O.W.) FOR
BURIED STEEL & < DN150 GRE PIPELINE INSTALLATION
PLAN AND ELEVATION ILLUSTRATION

Santos

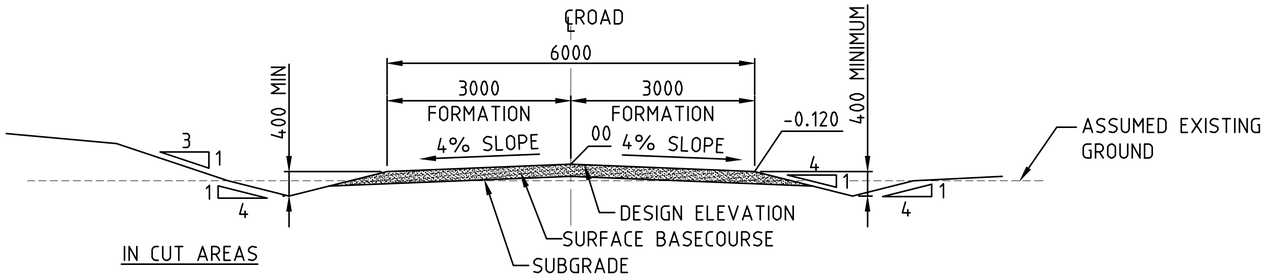
DRAWING No. 1500-50-1276 REV 0

CADFILE No. -

AUTOCAD

BURIED STEEL AND < DN150 GRE PIPELINE INSTALLATION - RIGHT OF WAY A1SHEET

# Appendix C – Typical road cross section for Class D roads

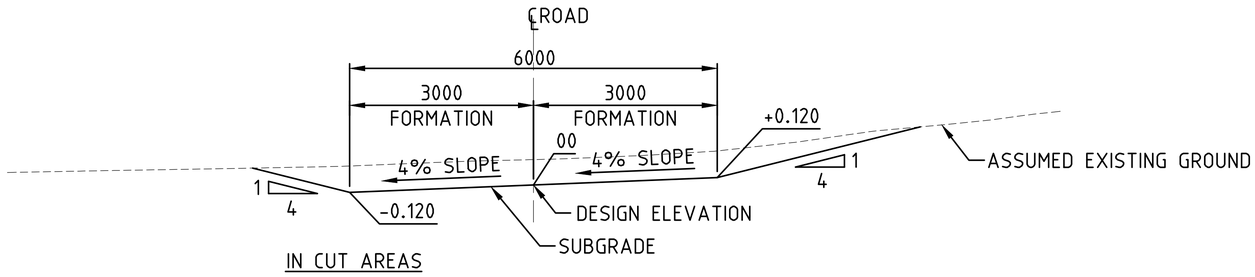



PAVEMENT MATERIAL - CLASS C ROAD

| | |
|---|---|
| SURFACE COURSE | MINIMUM 200mm BEST AVAILABLE LOCAL (CLAY OR CLAYEY SAND) MATERIAL, COMPACTED TO 95% MMDD @ +/- 2% OMC. |
| SUBGRADE | REMOVE ALL VEGETATION AND COMPACT 200mm SUBGRADE TO 95% MMDD @ +/- 2% OMC. |

## TYPICAL SECTION - CLASS D ROAD (FOR ELEVATED SECTIONS)

SCALE 1:50




## TYPICAL SECTION - CLASS D ROAD (FOR SECTIONS GRADED TO HARD SURFACE)

SCALE 1:50

| ROAD CONDITION | MIN. VERTICAL CURVE LENGTH (m) | |
|---|---|---|
| GRADE CHANGE % | CLASS D | CLASS D 30kph* |
| 1 | 80 | 30 |
| 2 | 80 | 30 |
| 3 | 90 | 30 |
| 4 | 120 | 30 |
| 5 | 150 | 30 |
| 6 | 180 | 30 |
| 7 | 210 | 40 |
| 8 | 240 | 40 |
| 9 | | 50 |
| 10 | | 55 |

CLASS D ROADS, SAND DUNE CROSSINGS

| ROAD CONDITION | SPEED LIMIT | MIN. HORIZONTAL CURVE LENGTH (m) |
|---|---|---|
| CLASS D ROAD | 80kph | 500 |

## NOTES:

1. THIS DRAWING TO BE READ IN CONJUNCTION WITH ALL THE COMPLETE CONTRACT DOCUMENTS AND SPECIFICATIONS.
2. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE.
3. FOR SITE PREPARATION, EXCAVATION AND BACKFILL REFER TO PROJECT SPECIFICATION.
4. FOR ROAD CONSTRUCTION REFER TO ROAD WORKS SPECIFICATION 1515-120-S006.
5. SIDE BATTER SLOPES FOR CLASS D ROAD SHALL BE 4 HORIZONTAL TO 1 VERTICAL IN CUT AND FILL.
6. CLEARING, GRUBBING AND STRIPPING OF FULL DEPTH (MIN. 100mm) OF TOPSOIL WITHIN THE ROAD RIGHT OF WAY SHALL BE UNDERTAKEN FOR THE NEW ROAD ALIGNMENTS.
7. FOR CLASS D ROAD, FORMATION ELEVATED TO PROVIDE STABLE RUNNING SURFACE NO PROVISION FOR DRAINAGE.

| ROAD CLASSES | D |
|---|---|
| ROAD WIDTH - METRES | |
| NORMAL WIDTH | 6.0 |
| SAND DUNE CROSSING | 8.0 |
| CULVERT/FLOODWAY | 8.0 |

8. TABLE DRAINS. TABLE DRAINS SHALL MITRE AT THE FOLLOWING SPACING.

| RECOMMENDED MITRE DRAIN SPACING | | |
|---|---|---|
| SLOPE | | SPACING (m) (MAXIMUM) |
| % | GRADIENT | |
| 0.5 | 1 : 200 | 120 |
| 1 | 1 : 100 | 120 |
| 2 | 1 : 50 | 100 |
| 3 | 1 : 33 | 80 |
| 4 | 1 : 25 | 60 |
| 5 | 1 : 20 | 60 |
| 6 | 1 : 17 | 50 |
| 8 | 1 : 12.5 | 30 |

9. MINIMUM INVERT OF TABLE DRAIN TO BE BELOW PAVEMENT SUB-GRADE LEVEL.
10. VERTICAL GRADE ON DUNE APPROACH ROADS TO BE LIMITED TO (10% MAX.) 6% VERTICAL GRADIENT PREFERRED.

1000 0 1000 2000 3000 4000

SCALE 1:50 SCALE IN mm

| No | DATE | DRN | CHKD | ENG | Q.A. | PROJ | ACC | DESCRIPTION |
|---|---|---|---|---|---|---|---|---|
| C | 07/11/17 | FYFE | | SJM | | | | UPDATED FOR CLIENT REVIEW |
| B | 01/04/16 | FYFE | | SJM | | | | REVISED FOR REVIEW UNDER MOC-CB-002992 |
| A | | KBR | | BC | | | | ISSUED FOR CLIENT REVIEW |

REVISIONS

| DRG No. | SUBJECT |
|---|---|

REFERENCE DRAWINGS

DRN: FYFE
DATE:
SCALE: AS SHOWN
CHKD:
ENG: SJM
Q.A.:
PROJ:
ACC:
A.B.N. 80 007 550 923

CIVIL STANDARD DRAWING
TYPICAL ROAD CROSS SECTION
CLASS D ROADS

Santos

DRAWING No. 0001-040-DDR-0005

REV C

CADFILE No. - aaaa-40-005-1

TYPICAL ROAD CROSS SECTIONS - CLASS D ROAD (FOR ELEVATED SECTIONS)

SHEET 1

AUTOCAD