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13 October 2026

Santos Reference: EQ22-13

Camilla Scott
Principal Environmental Officer
Energy and Extractive Resources | Environmental Services and Regulation
Department of Environment, Tourism, Science and Innovation
Level 7, 400 George Street
BRISBANE QLD 4001

Dear Camilla,

Application for a new site-specific Environmental Authority – PL 1123 – RFI Response

Santos Ventures Pty Ltd (Santos), on behalf of its joint venture (JV) partners TotalEnergies EP Australia II, KGLNG E&P Pty Ltd, TotalEnergies EP Australia and PAPL (Upstream) Pty Limited applied to the Department of the Environment, Tourism, Science and Innovation (DETSI) for a new site-specific Environmental Authority (EA) to authorise petroleum production operations on proposed Petroleum Lease (PL) 1123. Santos is the principal applicant. The application was submitted by Santos to DETSI on 2nd February 2026.

DETSI considered the abovementioned application and responded to Santos with a request for further information (RFI) on 2nd April 2026 to further inform assessment of the application.

The following information is attached in support of the application and to respond to the DETSI RFI:

- Attachment 1 – Response to Information Request for a Site-Specific Environmental Authority Application, Petroleum Lease 1123, DETSI application reference number: A-EA-NEW-101038827.

Please contact Alex Clarke, Senior Environmental Advisor, at alex.clarke@santos.com, should you have any questions in relation to the application.

Yours sincerely,

Julie McDowell

Team Leader Environmental Approvals QLD/NT Gas / PNG AU
Santos Ltd

Santos

Attachment 1

Response to Information Request for a Site-Specific Environmental Authority Application

Petroleum Lease 1123

DETSI application reference number: A-EA-NEW-101038827

1.0 DETSI Information Request

Santos Ventures Pty Ltd (Santos), on behalf of its joint venture (JV) partners TotalEnergies EP Australia II, KGLNG E&P Pty Ltd, TotalEnergies EP Australia and PAPL (Upstream) Pty Limited applied to the Department of the Environment, Tourism, Science and Innovation (DETSI) for a new site-specific Environmental Authority (EA) to authorise petroleum production operations on proposed Petroleum Lease (PL) 1123.

Santos is the principal applicant. PL 1123 will wholly replace all existing blocks of Authority to Prospect (ATP) 2053, which is an existing exploration tenure operated by Santos.

The application was submitted by Santos to DETSI on 2 February 2026.

DETSI considered the abovementioned application and responded to Santos with a request for further information (RFI) to enable assessment of the application (DETSI RFI attached as Appendix 1).

The information requested by DETSI in the RFI is repeated below in black text, with responses from Santos then provided in **blue** text. Where the DETSI RFI item is complex, the requested information has been replicated above the Santos response in black text for ease of reference.

1.1 RFI Item A

Maps and images in application documents are not legible. The reports provided as part of the application contain maps and images that have a low resolution which makes it difficult to verify and assess the information provided.

Information requested:

Provide updated application documents in a higher quality pdf format in which the maps and images are legible.

1.2 Santos Response to RFI Item A

Image quality in the application documents must be compressed to reduce file size for purposes of application submission and transmittal. Maps and images in the application documents have been prepared to a quality and scale that is suitable for general assessment purposes. However, additional maps of proposed disturbances have been included in this RFI response at the Santos Response to RFI item C5) (refer to Section 1.6). Further, to enable detailed spatial assessment, Geographical Information System (GIS) data has been provided to DETSI with this RFI response (refer to Appendix 2).

1.3 RFI Item B

The proposed activity comprises proposed disturbance under Petroleum Lease (PL) 1123 and existing disturbance under Authority to Prospect (ATP) 2053. DETSI seeks to understand and condition the existing and proposed disturbance footprint of the activity.

Information requested:

Provide all existing and proposed infrastructure in a Table format below, accompanied by associated GIS (shapefile) data.

Infrastructure on ATP 2053 & PL 1123	Existing infrastructure (at the time of the RFI response)			Proposed infrastructure		
	Number	Total area of impact (ha; length and size for linear infrastructure)	Spatial data file reference	Number	Total area of impact (ha; length and size for linear infrastructure)	Spatial data file reference
Wells						
Well pads						
Access tracks						
Gathering lines						
Borrow Pits						
Pipelines						
Right of way						
Laydown areas						
Temporary workers camp						

1.4 Santos Response to RFI Item B

Petroleum exploration activities currently undertaken on ATP 2053 (being proposed PL 1123, henceforth referred to as the 'Project Area') are authorised by EA 0002052.

Exploration and appraisal activities undertaken by Santos in the Project Area to date include:

- drilling, completion and appraisal of five (5) coal seam gas (CSG) wells (RM23-21-1, RM23-43-1, RM23-42-1, RM23-41-1 and RM23-46-1); and

- construction and operation of associated linear infrastructure (gas and water gathering lines, access tracks, power and communications lines).

This application covers the total impacts and disturbances associated with a 24-well CSG development, comprising five existing wells and 19 proposed new wells.

The proposed development will initially include:

- progressive drilling (including hydraulic fracture stimulation), completion, and connection of up to 24 CSG exploration, appraisal, and development wells (with some multi-well pads);
- construction and operation of associated linear infrastructure (gas and water gathering lines, access tracks, power and communications lines). This infrastructure will be co-located wherever feasible, and will consist of:
    - buried gas and water gathering lines (these are typically co-located with power and communication lines); and
    - access tracks (typically co-located with gas and water gathering infrastructure) comprised of both new access tracks and the upgrade of existing access tracks.
- tie in of the existing wells to gas and water gathering lines to begin production; and
- other ancillary / incidental activities in support of the above activities.

No compression facilities are proposed, and no regulated structures will be required as part of the proposed activity. Other activities proposed to be undertaken in the Project Area under the EA include but are not limited to construction and/or operation of the following:

- seismic surveys.
- gas and water gathering systems / flowlines / pipelines.
- powerlines and communication lines (above and/or below ground).
- access tracks and roads.
- small-scale water management infrastructure i.e. porTable tanks.
- a temporary worker's camp including a sewage treatment plant (STP) and associated irrigation (<21 Equivalent Persons (EP)); and
- other ancillary infrastructure / incidental activities such as laydowns, fencing and borrow pits/quarries.

CSG production may occur from a total of up to 24 CSG wells. For the purposes of minimising land disturbance to the Project Area, some well leases located in the Project Area may host multiple CSG wells i.e. "multi-well leases". Figure 2 in the Supporting Information Report displays existing disturbance areas.

Santos has undertaken significant ecological field surveys, field development planning and field scouting to locate existing and proposed infrastructure / disturbance in the Project Area to avoid, minimise and mitigate disturbance to Environmental Values (EVs). To this end, Santos developed a preliminary disturbance footprint (PDF) for the Project to provide an indicative infrastructure layout across the Project Area to avoid, minimise and mitigate disturbance to Matters of National Environmental Significance (MNES), Matters of State Environmental Significance (MSES), Prescribed Environmental Matters (PEMs) and other environmental values.

The process for locating infrastructure, developing the PDF, and defining environmental constraints is described in *Santos Roma Phase 7-7B-SD20 Development Environmental Protocol for Constraints Planning and Field Development Constraints Protocol* (Constraints Protocol) (attached to this RFI response as Appendix 3). Infrastructure was located using Santos's eight-step Integrated Disturbance Planning process (IDP), which includes ecological field survey, desktop assessment, field scouting and GIS verification before any ground disturbance occurs. Full details are set out in the Constraints Protocol (Appendix 3).

Santos undertook multiple revisions of the PDF (summarised into four revisions in Table 1) to refine the layout to avoid and mitigate disturbance to MNES/MSES/PEMs and other environmental values. Proposed infrastructure has been largely located in cleared agricultural land with minimal disturbance to MNES/MSES/PEMs values proposed. Existing watercourse crossings (e.g. existing landholder roads) have been utilised to locate roads and gathering lines. Each revision of the disturbance footprint resulted in reduced disturbance to environmental values as summarised in Table 1.

Santos has also utilised existing disturbance areas (e.g. farm tracks / roads) to place linear infrastructure (e.g. pipelines) to avoid creation of new linear disturbances in the landscape – particularly where existing roads / tracks cross watercourses / riparian vegetation. For existing infrastructure, this has been done in consultation with the underlying landholder, to ensure infrastructure does not interfere with agricultural activities and minimise disturbance to productive land i.e. cropping / grazing land. Please note that detailed final field scouting and formal landholder agreements have not yet occurred for all proposed infrastructure, which may result in some potential for change to the layout. To further minimise land disturbance, some well pads will also host multiple CSG wells instead of multiple well pads.

Proposed infrastructure has predominantly been located in cleared agricultural land with only minor disturbance to MNES/MSES values required, and no disturbance to Threatened Ecological Communities (TECs) is proposed. The PDF is displayed in Figure 2 in the Supporting Information Report, and a shapefile of the PDF is attached to this RFI response as “ATP 2053_PDF_GDA2020” (refer to Appendix 2).

Table 1: Disturbance footprint iterations and disturbance areas

Disturbance Footprint Version	**Constraints and Disturbance Areas**		
	TEC	**Other Remnant / Regrowth Vegetation**	**General Ephemeral Wetland Habitat**
Original Disturbance Footprint	5.24 ha	2.78 ha	NA
Desktop Reviewed Disturbance Footprint	3.41 ha	1.90 ha	NA
Field Reviewed Disturbance Footprint	0.11 ha	0.30 ha	0.93 ha
Proposed Preliminary Disturbance Footprint for EA Application	**Nil**	**0.30 ha**	**0.60 ha**

However, due to the nature of gas field development, there is a possibility that the proposed PDF and planned infrastructure locations may need to be modified further (and be the subject of a post-EA approval i.e. future EA amendment application) due to unforeseen constraints (e.g. environmental, cultural heritage and landholder constraints), engineering requirements, or final EA conditions and other regulatory requirements. Any changes to the PDF would need to comply with maximum disturbance limits detailed in Tables 14, 15 and 16 of the Supporting Information Report.

Due to the abovementioned iterative planning process, the majority of existing and proposed authorised disturbances have been located in non-remnant vegetation / cleared agricultural areas. Where disturbance to remnant and regrowth vegetation will be required, Santos has actively shifted or reduced disturbance areas to avoid, minimise and mitigate disturbance to sensitivities wherever practicable. More specifically, Santos has minimised disturbance to remnant and regrowth vegetation and/or potential protected species habitat to be limited to the following:

- 0.30 ha of remnant and regrowth vegetation - Regional Ecosystem (RE) 11.3.2; and
- 0.60 ha of general ephemeral wetland habitat (non-remnant vegetation).

Please note that specific proposed numbers of, or disturbance areas for, infrastructure (e.g. area (ha), length and size) cannot be provided to DETSI or conditioned in the EA because detailed final field scouting, engineering design and all formal landholder agreements have not yet occurred for proposed infrastructure i.e. the specifics variables for the development are subject to change. Furthermore, the final number, configuration and location of infrastructure may change due to unforeseen constraints e.g. cultural heritage sites, landholder concerns or engineering requirements.

However, proposed maximum disturbance limits to MNES and MSES/PEMs will not change beyond what is proposed in the application (and that will be explicitly authorised in the new EA) without further environmental assessment and regulatory approval (e.g. Significant Impact (SI) / Significant Residual Impact (SRI) assessments, *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) / Environmental Protection Act (EP Act) approvals, respectively).

Santos has input available information for existing and proposed disturbance areas into Table 2 as requested by DETSI, and spatial data (ESRI shapefiles) demarcating existing disturbance areas (undertaken under EA 0002052) and the PDF are attached to this RFI response as Appendix 2.

As discussed above, the explicit location, variables (e.g. area and length) and quantities of proposed infrastructure (other than number of wells) or a spatial data reference cannot be provided for proposed infrastructure as it is subject to change. The proposed infrastructure layout is currently represented by the PDF. Ultimately, the proposed development will impact a fraction of land in the Project Area. Existing and proposed disturbance as part of the proposed development will constitute ~62 ha or ~5% of total land area in the Project Area (1229 ha), which is almost wholly located on pre-disturbed land due to historic agriculture development. Further, the proposed EA conditions for the new EA are consistent with surrounding Santos tenures and associated EAs. Proposed conditions are not new and are proportionate to the risk of the proposed development.

Furthermore, detailed authorised land disturbance information with associated spatial data will be provided to DETSI in future as part of ongoing mandatory annual spatial disturbance data submissions (i.e. annual EA returns process) and Estimated Rehabilitation Cost (ERC) application and decision requirements under the EP Act.

The Project was also referred to the Department of Climate Change, Energy, the Environment and Water (DCCEEW) for a decision under the EPBC Act (EPBC 2025/10227). The proposed action was determined not to be a controlled action (NCA).

Table 2: Existing and Proposed Infrastructure

Infrastructure on ATP 2053 & PL 1123	Existing infrastructure (at the time of RFI response)			Proposed infrastructure		
	Number	Total area of impact (ha; length and size for linear infrastructure)	Spatial data file reference	Number	Total area of impact (ha; length and size for linear infrastructure)	Spatial data file reference
Wells	5	3.9 ha*	Well Pad	Up to 24#	Up to 36 ha	PDF
Well pads	5	3.9 ha*	Well Pad	Up to 24#	Up to 36 ha&	PDF
Access tracks	31	3.2 ha	Access Track	As required	As required	PDF
Gathering lines	6	5.7 ha^	Pipelines	As required	As required	PDF
Borrow Pits	0	0	NA	As required	As required	PDF
Pipelines	0	0	N/A	As required	As required	PDF
Right of way	6	5.7 ha^	Pipelines	As required	As required	PDF
Laydown areas	0	0	NA	As required	As required	PDF
Temporary workers camp	0	0	NA	As required	As required	PDF

Notes:

* Wells and well pads are the same disturbance area totalling 3.9 ha

Total proposed number is inclusive of the five (5) existing wells and associated well pads

& Some well pads may include multiple wells. Proposed well pad disturbance area is the total area required for all 24 wells, and is inclusive of the existing disturbance area

^ Gathering lines and Right of way are the same disturbance area totalling 5.7 ha.

Total disturbance area for existing infrastructure (at the time of RFI response) is 12.8 ha.

1.5 RFI item C

Prescribed Environmental Matters (PEMs) & Matters of State Environmental Significance (MSES)

The *Ecological Assessment Report* (EAR) by Boobook Ecological Consulting provides an assessment of ground-truthed vegetation and habitat assessment surveys to inform potential impacts to PEMs, however, there are gaps of information that need to be addressed requiring further justification.

1) Cumulative Impacts

The EAR refers to field surveys conducted since 2022 and provides ground-truthed mapping which identifies regional ecosystems (REs) and environmentally sensitive areas (ESAs) as well as showing

the limit of pre-disturbance vegetation. It is unclear whether the quantified impacts to PEMs are inclusive of existing disturbance conducted under EA 0002052.

Figure 1 below represents an area which could potentially be protected wildlife habitat and subsequently Category C ESA, which has been disturbed, as show in Figure 2.

Information requested:

Confirm if the quantified impacts to PEMs and ESAs in the EAR are inclusive of existing disturbance conducted under EA 0002052;

i. If so, demonstrate that desktop surveys and ground-truthing was conducting prior to disturbance, and provide a breakdown of existing impacts and proposed impacts; or
ii. If the EAR is not inclusive of impacts from existing disturbance, conduct a desktop assessment using pre-disturbance mapping and identify all potential PEMs and ESAs. Update the findings of the EAR to include any impacts identified in this process.

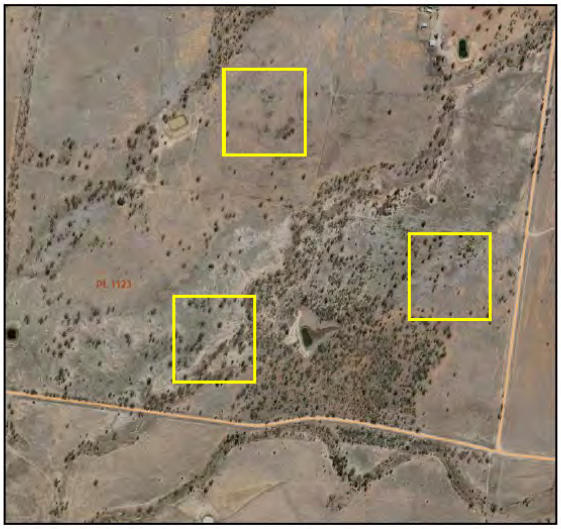

Figure 1. Example of pre-disturbance vegetation in southeast of PL1123 (QGlobe, Jul 2020)

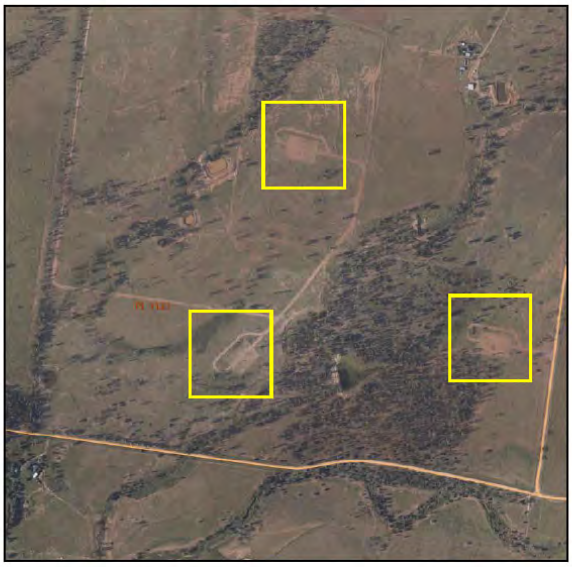

Figure 2. Example of disturbance conducted under ATP 2053 in southeast of PL1123 (QGlobe, current data)

2) Spatial data

Information requested:
Provide spatial data, in a shapefile format as per the department's guideline 'Spatial information submission' (ESR/2018/43337), with each layer as a separate zip file clearly labelled for:

i. the existing disturbance carried out under EA 0002052;
ii. the proposed disturbance (24 wells) and ancillary infrastructure required (RoW, access tracks, gathering lines, water pipelines etc.) at the maximum extent of disturbance;
iii. all relevant environmentally sensitive area mapping layers;
iv. all groundtruthed prescribed environmental matters that would be impacted by the proposal, notwithstanding whether this impact triggers an SRI;
v. all groundtruthed RE mapping identified during ecological surveys;
vi. all groundtruthed protected wildlife, or protected wildlife habitat identified during ecological surveys; and
vii. all PEMs sourced from Government databases that would be impacted by the proposal notwithstanding whether this impact triggers an SRI.

3) Desktop assessment

The desktop assessment in the EAR conducted a likelihood of occurrence assessment using results of online databases utilising a 10km buffer. To ensure that all threatened fauna and flora species potential habitat is identified, a 50km search buffer is more appropriate as it will capture species that have larger habitat ranges or dispersal areas.

Information requested:

i. Conduct a desktop assessment for the area using a 50 kilometre-radius including but not limited to the following:
    - WildNet / Queensland Government Species List;
    - The Atlas of Living Australia, the Birdlife Atlas, Wildnet, Species Profile and Threats (SPRAT) databases and associated Recovery Plans; and
ii. Identify any species likely to occur that were not assessed in the EAR, quantify potential impacts, describe mitigation and avoidance measures, and provide an updated SRI assessment.

4) Targeted fauna surveys

The proposal seeks to disturb up to 0.9 hectares (ha) of protected wildlife habitat for a range of threatened species. It is recognised that vegetation and habitat assessments were conducted, however, the ground-truthed surveys did not conduct targeted fauna surveys in accordance with Terrestrial Vertebrate Fauna Survey Guidelines for Queensland. To mitigate and avoid impacts to threatened species, there has to be an understanding of any individuals or local populations that may occur within the disturbance footprint and surrounding areas. This information is also utilised in evaluating the project against the significant residual impact criteria and without targeted surveys to inform the extent of local populations, the administering authority may opt for a conservative approach when assessing potential impacts.

Information requested:

a. Conduct targeted fauna surveys in accordance with Terrestrial Vertebrate Fauna Survey Guidelines for Queensland for species determined likely to occur;
    i. Provide spatial data identifying any occurrences of threatened species;
    ii. Based on the results of the surveys, provide updated avoidance and mitigation measures, and an updated SRI assessment; or

b. Provide justification for not conducting targeted surveys;
   i. Details of any existing ecological data, including vegetation and habitat assessments, to demonstrate that targeted fauna surveys are not required;
   ii. Outline the avoidance and mitigation measures incorporated into the proposal to minimise potential impacts on threatened species;
   iii. Demonstrate how these measures are sufficient to address potential risks, in the absence of targeted fauna surveys; and
   iv. Describe proposed pre-clearance surveys, monitoring, and management strategies that will be implemented to address impacts to any identified individual or local populations during construction of activity.

5) Avoid, mitigate, offset' mitigation hierarchy

Due to the lack of clarity in the maps and images provided in the EAR, certain areas of proposed disturbance that may impact protected wildlife habitat or vegetation appear to be avoidable. These areas include the crossing of Washpool Creek which contains RE 11.3.2, and the proposed intersection of the ground-truthed wetland near BG3-S01 which was identified in the EAR as Australian Painted Snipe habitat. There are nearby pre-existing disturbance areas that could be utilised, including Scotts Road and Seawrights Road, to avoid impacts.

Information requested:
For the particular matters identified above, demonstrate that avoidance of impacts to these areas is not possible.

1.6 Santos Response to RFI item C

Response to RFI item C1) Cumulative Impacts:

Information requested:

Confirm if the quantified impacts to PEMs and ESAs in the EAR are inclusive of existing disturbance conducted under EA 0002052;

   i. If so, demonstrate that desktop surveys and ground-truthing was conducting prior to disturbance, and provide a breakdown of existing impacts and proposed impacts; or

   ii. If the EAR is not inclusive of impacts from existing disturbance, conduct a desktop assessment using pre-disturbance mapping and identify all potential PEMs and ESAs. Update the findings of the EAR to include any impacts identified in this process.

Potential impacts to PEMs and ESAs associated with existing disturbance conducted under the EA 0002052 were assessed by the submitted EAR (attached to Supporting Information Report as Appendix D).

However, Santos did not cause any disturbance to PEMs or ESAs as part of authorised activities conducted under EA 0002052. Further, Santos could not cause disturbance to PEMs or ESAs as it is not authorised under the conditions of EA 0002052 i.e. the conditions of EA 0002052 are the eligibility criteria and standard conditions for Petroleum exploration activities – Version 2. Further, negative impacts to environmental values beyond the authorisations in the standard conditions in Schedule B (i.e. the 'PESCB' conditions) are considered unlawful environmental harm. Standard conditions of EA 0002052 require the following:

- Schedules A and B – site planning requirements, avoidance of impacts to a range of environmental values, and ecological assessment of areas with native vegetation to be undertaken prior to any significant disturbance to land (PESCA 1 to 5 and PESCB 1 to 7).

Prior to authorised activities occurring in ATP 2053 under the conditions of EA 0002052, Santos undertook field-based ecological ground-truthing using suitably qualified third-party ecologists (Boobook Ecological Consulting (Boobook)) to confirm the on-ground environmental values as per Condition PESCB 7 of EA 0002052.

The areas of land disturbed to complete authorised activities located in ATP 2053 under EA 0002052 were ground-truthed between 2 – 4 March 2022 and confirmed to be non-remnant vegetation (i.e. cleared grazing land) and not PEMs or MNES/MSES values (refer to Figures A1 to A3 in the EAR, attached to Supporting Information Report as Appendix D). GIS data supporting the results of ecological ground-truthing is attached to this RFI response (attached as 'ATP 2053_Groundtruthed_RE_Wetland_PEM_ESA_PWH_GDA2020' to Appendix 2). Further details of the ecological surveys conducted, and associated results are included in the EAR (attached to the Supporting Information Report as Appendix D).

As discussed in Section 1.4 (of this RFI, response to RFI Item B), following confirmation of the on-ground environmental values, Santos undertook significant field development planning in the Project Area to avoid, minimise and mitigate disturbance to EVs in accordance with EA 0002052 conditions (e.g. PESCA 5 and PESCB 5) to locate the access tracks, well pads and appraisal wells (CSG wells RM23-41-1, RM23-42-1 and RM23-46-1) depicted in the DETSI RFI Figures 1 to 2.

The access tracks, well pads and wells (CSG wells RM23-41-1, RM23-42-1 and RM23-46-1) depicted in RFI Figures 1 to 2 were subsequently constructed in early 2024 (January - access and well pads constructed; and April - wells drilled). No disturbance to PEMs or MSES values (or potential protected wildlife habitat / Category C ESA) occurred as part of land disturbed to facilitated drilling of wells and associated infrastructure depicted in DETSI RFI Figures 1 to 2.

Disturbance to non-remnant vegetation, non-PEMs and non-MNES/MSES areas of land for the three (3) wells and associated infrastructure depicted in the DETSI RFI Figures 1 and 2 represents approximately 2.49 ha for the well pads and approximately 1.55 ha for the access tracks. Broader disturbance areas for existing and proposed infrastructure located in the Project Area are detailed in Table 2 (Section 1.4 - of this RFI response to RFI Item B).

Response to RFI item C2) Spatial data

Information requested:

Provide spatial data, in a shapefile format as per the department's guideline 'Spatial information submission' (ESR/2018/43337), with each layer as a separate zip file clearly labelled for:

i. the existing disturbance carried out under EA 0002052;
ii. the proposed disturbance (24 wells) and ancillary infrastructure required (RoW, access tracks, gathering lines, water pipelines etc.) at the maximum extent of disturbance;
iii. all relevant environmentally sensitive area mapping layers;
iv. all groundtruthed prescribed environmental matters that would be impacted by the proposal, notwithstanding whether this impact triggers an SRI;
v. all groundtruthed RE mapping identified during ecological surveys;
vi. all groundtruthed protected wildlife, or protected wildlife habitat identified during ecological surveys; and
vii. all PEMs sourced from Government databases that would be impacted by the proposal notwithstanding whether this impact triggers an SRI.

Santos has attached the requested spatial data (as shapefiles) to this RFI response as Appendix 2 with consideration of notes below:

i. the existing disturbance carried out under EA 0002052:
   - shapefile attached as "ATP 2053_ExistingDisturbance_GDA2020".

ii. the proposed disturbance (24 wells) and ancillary infrastructure required (RoW, access tracks, gathering lines, water pipelines etc.) at the maximum extent of disturbance:
   - shapefile attached as "ATP 2053_PDF_GDA2020", noting limitations outlined in RFI Response to Item B (Section 1.4).

iii. all relevant environmentally sensitive area mapping layers:
   - shapefile attached as 'ATP 2053_Groundtruthed_RE_Wetland_PEM_ESA_PWH_GDA2020', refer to 'ESA' attribute.

iv. all ground truthed prescribed environmental matters that would be impacted by the proposal, notwithstanding whether this impact triggers an SRI;
   - shapefile attached as 'ATP 2053_Groundtruthed_RE_Wetland_PEM_ESA_PWH_GDA2020', refer to 'ESA' attribute, refer to PEM attribute.

v. all ground truthed RE mapping identified during ecological surveys;
   - shapefile attached as 'ATP 2053_Groundtruthed_RE_Wetland_PEM_ESA_PWH_GDA2020', refer to 'RE' attribute.

vi. all ground truthed protected wildlife, or protected wildlife habitat identified during ecological surveys:
   - shapefile attached as 'ATP 2053_Groundtruthed_RE_Wetland_PEM_ESA_PWH_GDA2020', refer to 'ProWildHab' attribute; and

vii. all PEMs sourced from Government databases that would be impacted by the proposal notwithstanding whether this impact triggers an SRI.
   - This spatial information is publicly available via Qld Globe / Qpatial and other Qld Government (DETSI) databases. As such no additional spatial information has been provided as part of this RFI response.

Response to RFI item C3) Desktop assessment

Information requested:

i. Conduct a desktop assessment for the area using a 50 kilometre-radius including but not limited to the following:
   a. WildNet / Queensland Government Species List;
   b. The Atlas of Living Australia, the Birdlife Atlas, Wildnet, Species Profile and Threats (SPRAT) databases and associated Recovery Plans; and

ii. Identify any species likely to occur that were not assessed in the EAR, quantify potential impacts, describe mitigation and avoidance measures, and provide an updated SRI assessment.

Boobook are suitably qualified third-party ecologists with significant experience (26+ years) undertaking ecological impact assessments in Queensland, particularly within the southern Brigalow Belt bioregion.

A 10 km search buffer was applied around the Project Area to interrogate a comprehensive range of online biological databases, as detailed in the EAR. This buffer is well-established as the appropriate

scale for projects of this nature - localised developments with relatively small disturbance footprints situated within highly modified and fragmented landscapes with limited connectivity to larger vegetation patches. This approach is consistent with the EAR submitted to DCCEEW for assessment under the EPBC Act, and is standard practice applied by Boobook across State and Commonwealth ecological impact assessments.

The 10 km buffer successfully captured predictive and confirmed records of a broad range of species, including highly mobile and wide-ranging fauna, all of which have been assessed in the EAR (attached to the Supporting Information Report as Appendix D). Boobook's expert knowledge of the region further supplemented the database searches to ensure a robust assessment of likelihood of occurrence for listed flora and fauna species and communities.

It is important to note that biological database searches provide an initial baseline only. Field ecological assessment - which has been undertaken - verifies presence or absence of potential habitat for listed flora and fauna within the Project Area. A larger search radius would not materially alter the outcomes of the assessment given the landscape context and the comprehensive field verification already completed.

On this basis, the ecological assessment as presented is considered thorough and fit for purpose, and no additional desktop or field assessment is warranted.

Response to RFI item C4) Targeted fauna surveys

Information requested:

a. Conduct targeted fauna surveys in accordance with Terrestrial Vertebrate Fauna Survey Guidelines for Queensland for species determined likely to occur;
   i. Provide spatial data identifying any occurrences of threatened species;
   ii. Based on the results of the surveys, provide updated avoidance and mitigation measures, and an updated SRI assessment; or
b. Provide justification for not conducting targeted surveys;
   i. Include details of any existing ecological data, including vegetation and habitat assessments, to demonstrate that targeted fauna surveys are not required;
   ii. Outline the avoidance and mitigation measures incorporated into the proposal to minimise potential impacts on threatened species;
   iii. Demonstrate how these measures are sufficient to address potential risks, in the absence of targeted fauna surveys; and
   iv. Describe proposed pre-clearance surveys, monitoring, and management strategies that will be implemented to address impacts to any identified individual or local populations during construction of activity.

Targeted fauna surveys yield limited support for determinations of species presence or absence, particularly for cryptic, mobile, or seasonally active species. The presence or absence of potentially suiTable habitat for a species is inherently more conservative - and therefore more protective - than a targeted detection-based approach for individual species, as it assumes the species presence wherever suiTable habitat exists. Cryptic, mobile, or seasonally active species may not be detected by intensive trapping or indirect survey methods – even where suiTable habitat exists. Santos therefore utilises the precautionary principle and assesses the presence of potentially suiTable habitat for listed species when undertaking ecological impact assessments. Potential habitat is assessed using several factors, including but not limited to, the presence or absence of certain vegetation and landform types, vegetation maturity, microhabitat features, levels of groundcover and type. Where potentially suiTable habitat for listed species is identified, the associated species are deemed to potentially occur in the Project Area,

regardless of whether individuals are detected during surveys. This approach is inherently more conservative than reliance on detection/non-detection data alone, because:

- It assumes species presence wherever suiTable habitat exists, rather than requiring a positive detection to trigger management responses.
- It accounts for survey limitations, including temporal variability, seasonal absence, low detection probabilities, and species crypticity.
- It ensures that avoidance, mitigation, and offset obligations are applied to all areas of potential habitat, not solely to confirmed occurrence locations; and
- It is consistent with the precautionary principle as applied in similar assessments across the Santos Gladstone Liquefied Natural Gas (GLNG) project and the broader CSG industry in Queensland; and
- Sections 2.2.3-2.2.4 EAR and 3.1.4.3 (attached to the Supporting Information Report as Appendix D) explicitly states that the results of desktop and field assessments of vegetation and microhabitat features within the Project Area, combined with published information and suitably qualified ecologist knowledge of fauna/flora distribution and habitat use in the region, were used to predict habitat suitability for nominated listed threatened species. The results of these assessments form the baseline assumption that underpins the findings of the SRI assessment.

The habitat mapping based survey approach utilised by the assessment is considered more conservative - and therefore more protective - than a targeted detection-based approach, as it assumes species presence wherever suiTable habitat exists.

The survey methodologies employed by the ecological field surveys undertaken to support the assessment are therefore deemed sufficient by Santos and Boobook for purposes of SRI assessment (given the size of the Project Area, species likely to be present, and scale of proposed impacts).

No revision of the proposed mitigation measures or the third-party SRI assessment is considered to be required.

Santos has attached spatial data of ground-truthed ecological values to this RFI response as per RFI Item C(2) (refer to shapefile attached as “ATP 2053_PDF_GDA2020” to Appendix 2).

No threatened fauna species were detected in the Project Area during multiple ecological field surveys conducted in March 2022, September 2023, or April 2024. Accordingly, no occurrence records of threatened species are available from site-specific surveys.

Santos has developed the attached *Santos Roma Phase 7-7B-SD20 Development Significant Species Management Plan* (SSMP) (included in Appendix 3 of this RFI) for the Project, which details a comprehensive suite of avoidance, mitigation, and management measures to be implemented during Project development to mitigate potential impacts on listed species.

The SSMP has been developed on the basis of this precautionary approach. It identifies 11 significant species (Nature Conservation (NC) Act and EPBC Act listed species) as potentially, likely, or known to occur within the Project Area and applies species-specific management measures to all, regardless of confirmed detection. This demonstrates that the absence of targeted survey data does not diminish the rigour of management responses applied to the Project.

Furthermore, key findings from the EAR (attached to Supporting Information Report as Appendix D) supporting the adequacy of the assessment include:

- No EPBC Act or NC Act listed threatened fauna were recorded within the Project Area (refer to Section 3.1.4.2 Field Survey Results and Section 3.2.7.2 Field Survey Results in the EAR).

- BioCondition scores ranged from 0.47 to 0.60 (out of 10), indicating disturbance. Woody debris scores averaged approximately 20% of benchmark values, reducing habitat suitability for ground-dwelling species (e.g., Yakka Skink, Grey Snake) (refer to Section 3.2.2 BioCondition Assessment, Table 8, and Tables 11 and 13 in the EAR).

- Hollow-bearing trees, logs, and other fauna habitat features were recorded at low abundances throughout the Project Area, limiting its capacity to support resident populations of hollow-dependent species (e.g., Glossy Black-Cockatoo) (refer to Section 3.2.8 Fauna Habitat Features & Potential Breeding Places and Section 4.1.1.3 Threatened Fauna, Table 11 in the EAR).

- The Project Area is situated within a heavily cleared and fragmented landscape. Vegetation occurs as small, disconnected patches with low connectivity (refer to Section 3.2.2 BioCondition Assessment, Table 8 and Section 3.2.12 Connectivity Areas, Table 13 in the EAR).

- The total PDF is proposed to disturb 0.30 ha of RE 11.3.2 (Of Concern) vegetation and 0.60 ha of ephemeral wetland habitat (non-remnant cleared paddock) (refer to the Executive Summary and Section 4.1.2.1 Regional Ecosystems in the EAR).

- No Essential Habitat is mapped for any NC Act-listed threatened fauna or flora within the Project Area (refer to Section 3.2.3 Threatened Flora & Essential Habitat and Section 3.2.6 Threatened Fauna in the EAR); and

- No Threatened Ecological Communities (TECs) occur within the PDF or will be disturbed by the proposed activities (refer to Section 4.1.1.1 Threatened Ecological Communities in the EAR).

Santos has developed an integrated environmental management framework comprising the following management plans (attached as Appendix 3 to this RFI) that collectively govern the avoidance, mitigation, management, and rehabilitation of potential impacts to threatened species throughout the Project lifecycle:

1. Environmental Protocol for Constraints Planning (Constraints Protocol) - Avoidance and minimisation - infrastructure siting).
2. Environmental Management Plan (EMP) - Mitigation and management - construction and operational controls).
3. Significant Species Management Plan (SSMP) - Species-specific mitigation.
4. Rehabilitation Monitoring Plan (RMP) - Rehabilitation - habitat restoration post-disturbance.

These documents implement a five-tier mitigation hierarchy as follows: **Avoid → Minimise → Mitigate & Manage → Rehabilitate → Offset.**

Furthermore, infrastructure disturbance planning for the Project Area is governed by a four-tier spatial constraints system including:

1. No-Go Areas (e.g. TECs).
2. Avoid Disturbance Areas (e.g. Category B ESAs).
3. Minimise Disturbance Areas (e.g. ESA protection zones).

4. Special Purpose Areas (e.g. landholder infrastructure).

All infrastructure siting is subject to Santos' 8-step Integrated Disturbance Planning (IDP) process:

1. Preliminary site selection - sub-surface targets identified.
2. Ecological field survey - broadscale assessment by qualified ecologist.
3. Desktop assessment - multi-disciplinary team reviews design against GIS constraints.
4. Field scout - on-ground verification with real-time design refinements to avoid habitat features.
5. GIS data verification - field-validated values uploaded to spatial layers.
6. Internal approval - assessed against EA and EPBC Act conditions where applicable.
7. Fauna Spotter/Catcher pre-clearance survey - immediately prior to clearing; and
8. Post-disturbance GIS tracking - cumulative disturbance recorded against maximum limits.

This process is applied to every development activity throughout the 30–50-year Project life, not as a one-off design exercise. Refer to the Constraints Protocol for further information on the above-mentioned disturbance planning process and criteria. As discussed in Section 1.4 (of this RFI response to RFI Item B), the PDF was developed through a multi-stage iterative process in accordance with the Constraints Protocol and abovementioned mitigation hierarchy, with each iteration progressively reducing impacts to threatened species habitat.

The PDF was developed following multiple ecological field surveys, preliminary scouting, and desktop planning revisions to avoid and mitigate impacts to MNES/MSES/PEMs and other environmental values. Santos undertook multiple revisions of the PDF (as summarised in Table 1 of Section 1.4 of this RFI response to RFI Item B) to refine the layout to avoid and mitigate disturbance to MNES/MSES/PEMs and other environmental values.

Santos also proposes to utilise existing disturbance areas (e.g. farm tracks / roads) to place linear infrastructure (e.g. pipelines) to avoid creation of new linear disturbances in the landscape – particularly where existing roads / tracks cross watercourses / riparian vegetation. For existing infrastructure, this has been completed in consultation with the underlying landholder, to ensure infrastructure does not interfere with agricultural activities and minimise disturbance to productive land i.e. cropping / grazing land.

It is important to note that detailed field scouting and formal landholder agreements have not yet been completed for all proposed infrastructure. Accordingly, the PDF layout presented may be subject to change.

Furthermore, given the nature of gas field development, it is typical that the PDF and planned infrastructure locations may require modifications after EA approval. Such changes may arise from unforeseen constraints - including environmental, cultural heritage and landholder constraints as well as engineering requirements, final EA conditions and/or other regulatory requirements. Any changes to the PDF would need to comply with maximum disturbance limits detailed in future EA amendment applications.

Due to the abovementioned planning process, the majority of existing authorised and proposed disturbance has been located in non-remnant vegetation or previously cleared areas.

Where disturbance to remnant and regrowth vegetation will be required, Santos has actively shifted or reduced disturbance widths and areas to avoid, minimise and mitigate disturbance to sensitivities wherever practicable.

More specifically, Santos has minimised disturbance to be limited to the following:

- 0.30 ha of remnant and regrowth Regional Ecosystem (RE) 11.3.2; and
- 0.60 ha of general ephemeral wetland habitat (non-remnant).

These disturbances represent the maximum disturbance proposed for threatened species habitat, tracked via Santos GIS and to be authorised in the new EA:

These maximum disturbance limits cannot be exceeded without further assessment and regulatory approval. Disturbance is tracked cumulatively via the Santos GIS.

Refer to the Constraints Protocol and SSMP for further detail on proposed pre-clearance surveys, monitoring, and management strategies that will be implemented to address impacts to identified listed species during construction of activity.

Table 3: Maximum Disturbance Limits

Habitat Type	Maximum Disturbance Limit	Context
General Wetland Habitat	0.60 ha	8.2% of 7.31 ha mapped in Project Area
RE 11.3.2 (remnant)	0.15 ha	<0.2% of 84.79 ha mapped in Project Area
RE 11.3.2 (regrowth)	0.15 ha	<0.2% of broader regrowth extent

Each revision of the disturbance footprint resulted in reduced disturbance to environmental values as summarised in Table 1. The disturbance planning process resulted in the following disturbance area reductions:

- 100% avoidance of disturbance to TECs (reduced from 5.24 ha to zero)
- 89% reduction in remnant/regrowth vegetation disturbance (from 2.78 ha to 0.30 ha); and
- 35% reduction in wetland habitat disturbance (from 0.93 ha to 0.60 ha).

Proposed infrastructure has predominantly been located in cleared agricultural land with only minor disturbance to MNES/MSES values required, and no disturbance to TECs. Existing watercourse crossings (e.g. existing landholder roads) have been utilised to locate roads and gathering lines. To further minimise land disturbance, some well pads will also host multiple CSG wells instead of establishing separate well pads for each well. The PDF is displayed in Figure 2 in the Supporting Information Report.

<u>Response to RFI item C5) Avoid, mitigate, offset' mitigation hierarchy</u>

Due to the lack of clarity in the maps and images provided in the EAR, certain areas of proposed disturbance that may impact protected wildlife habitat or vegetation appear to be avoidable. These areas include the crossing of Washpool Creek which contains RE 11.3.2, and the proposed intersection of the ground-truthed wetland near BG3-S01 which was identified in the EAR as Australian Painted Snipe habitat. There are nearby pre-existing disturbance areas that could be utilised, including Scotts Road and Seawrights Road, to avoid impacts.

<u>Information requested:</u>

For the particular matters identified above, demonstrate that avoidance of impacts to these areas is not possible.

Washpool Creek and its tributaries enter the Project Area from the north-west and north-east before converging in the centre of the southern side of the Project Area. Development of the Project Area will require crossing of Washpool Creek to connect the northern section of the Project Area to the south-western section (for vehicle access and gas/water/electricity and data transmission) (refer to Figure 1).

Santos purposely utilised an existing landholder access track that crosses Washpool Creek to locate an access track and co-located gathering infrastructure to connect the northern and southern sections of the Project Area. Santos purposefully modified its standard Right of Way (RoW) design to be narrower at certain sections (smallest width being ~15m at the crossing of Washpool Creek) to not require vegetation disturbance to cross through Washpool Creek as per Figure 2. Washpool Creek is vegetated with predominately RE 11.3.25 and RE 11.3.2. No disturbance to mapped remnant or regrowth RE 11.3.25 or RE 11.3.2 vegetation will be required at this location to facilitate the proposed development.

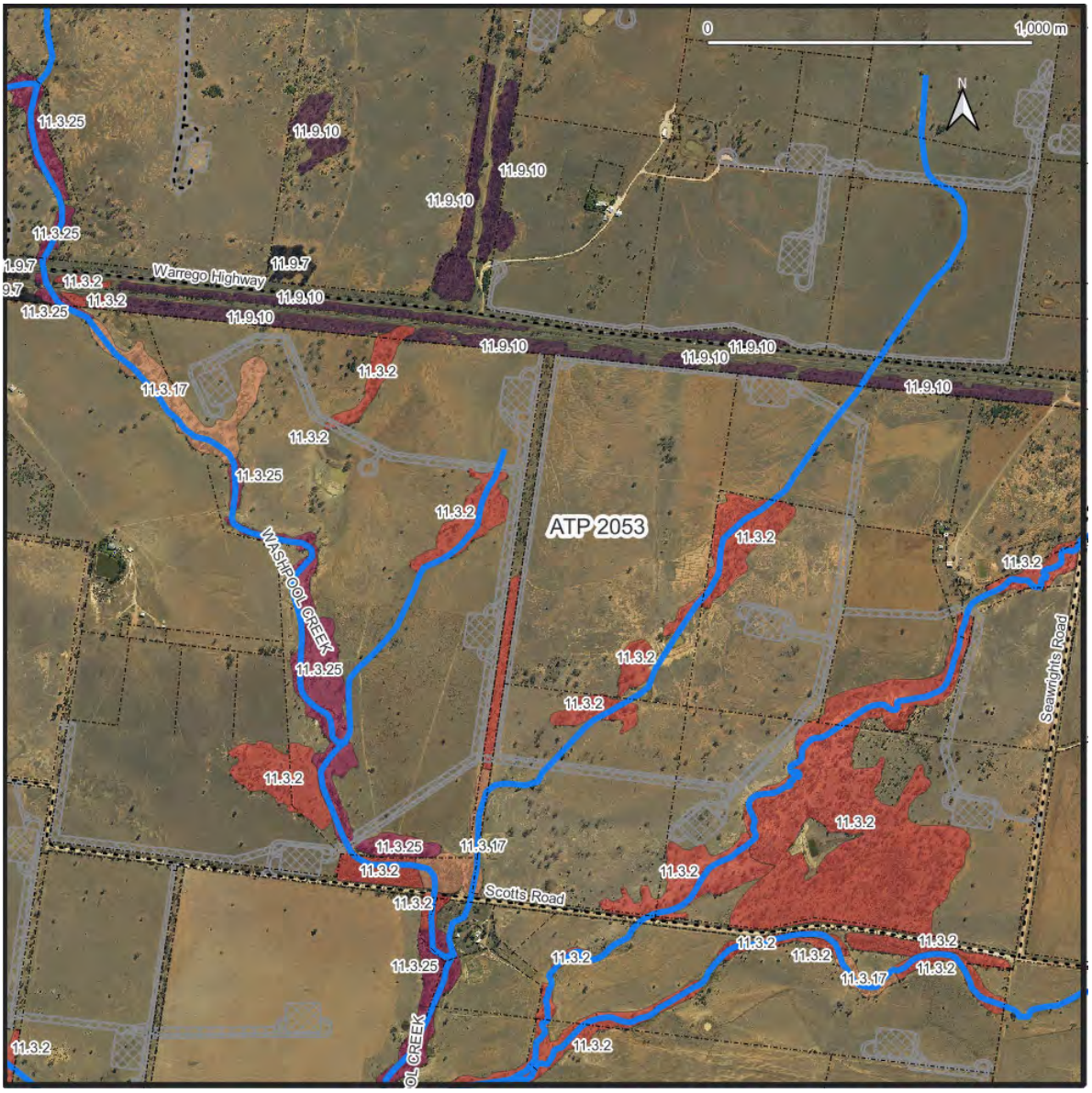

Figure 1: Project Area - Washpool Creek and tributaries

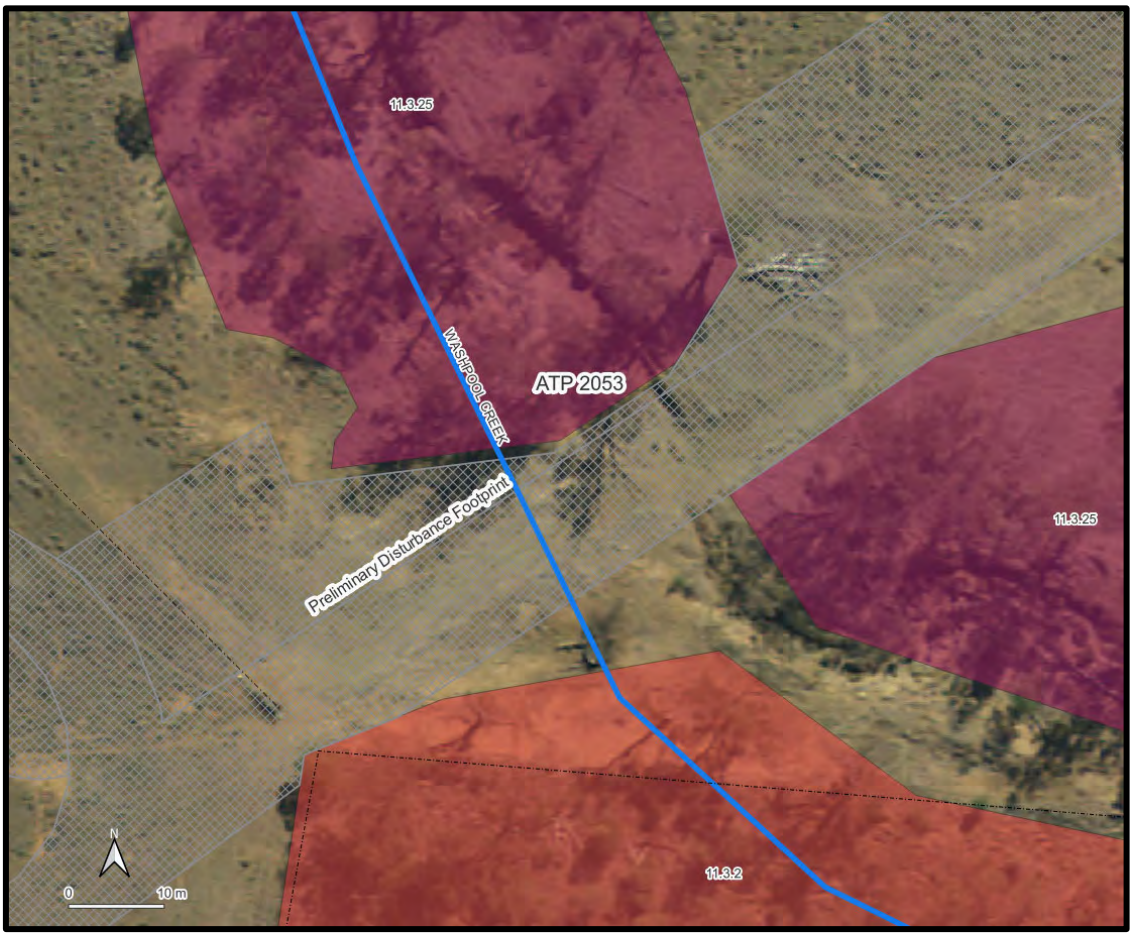

Figure 2: Proposed Washpool Creek Crossing

The ground-truthed wetland located near the 863-S01 (reference to 'BG3-S01') appears to be an error in the DETSI RFI. Vegetation Assessment Site 863-S01 (refer to Figure 3) is a low-lying non-remnant (cleared paddock) that supports ephemeral wetland habitat conditions following significant rainfall events. These areas may provide potential ephemeral habitat for wetland bird species such as Australian Painted Snipe (*Rostratula australis*) and Latham's Snipe (*Gallinago hardwickii*) from time to time.

Santos located proposed buried linear infrastructure (i.e., buried gas/water/electricity and communications – but no access track) in this location in accordance with landholder preferences (i.e. to align the RoW with an existing fenceline and to avoid clearing two large trees). Furthermore, following installation of the proposed buried infrastructure, surface disturbance will be rehabilitated, and the area will continue to function as an ephemeral wetland providing potential habitat for wetland bird species such as Australian Painted Snipe (*Rostratula australis*) and Latham's Snipe (*Gallinago hardwickii*) from time to time. No disturbance to mapped remnant or regrowth vegetation will be required at this location to facilitate the proposed development.

In response to use of pre-existing disturbance, including Scotts and Seawrights Roads, to avoid impacts. Santos evaluated use of these existing roads to locate linear infrastructure. However, as can be seen in Figure 1, use of these roads to locate linear infrastructure would require Santos to construct multiple crossings of Washpool Creek or its tributaries with associated riparian vegetation clearing.

For example, if Santos repositioned the proposed crossing of Washpool Creek (rather than using the existing landholder access track as discussed above), and instead utilised Scotts and Seawrights Roads, this would require construction of three creek crossings and associated riparian vegetation disturbance to areas of RE 11.3.2 and RE 11.3.17 that border Scotts Road. This would also cause substantial disturbance to local road users and landholders while Santos was undertaking construction activities on local roads. These alignments would also be considerably longer compared with proposed routes – requiring substantially more materials and larger disturbance areas.

Furthermore, Santos will utilise the existing Seawrights Road to provide vehicle access to the eastern section of the tenure, hence the reason why no access track is proposed to be located in the area of ground-truthed wetland located near the "863-S01" Vegetation Assessment Site (refer to Figure 3).

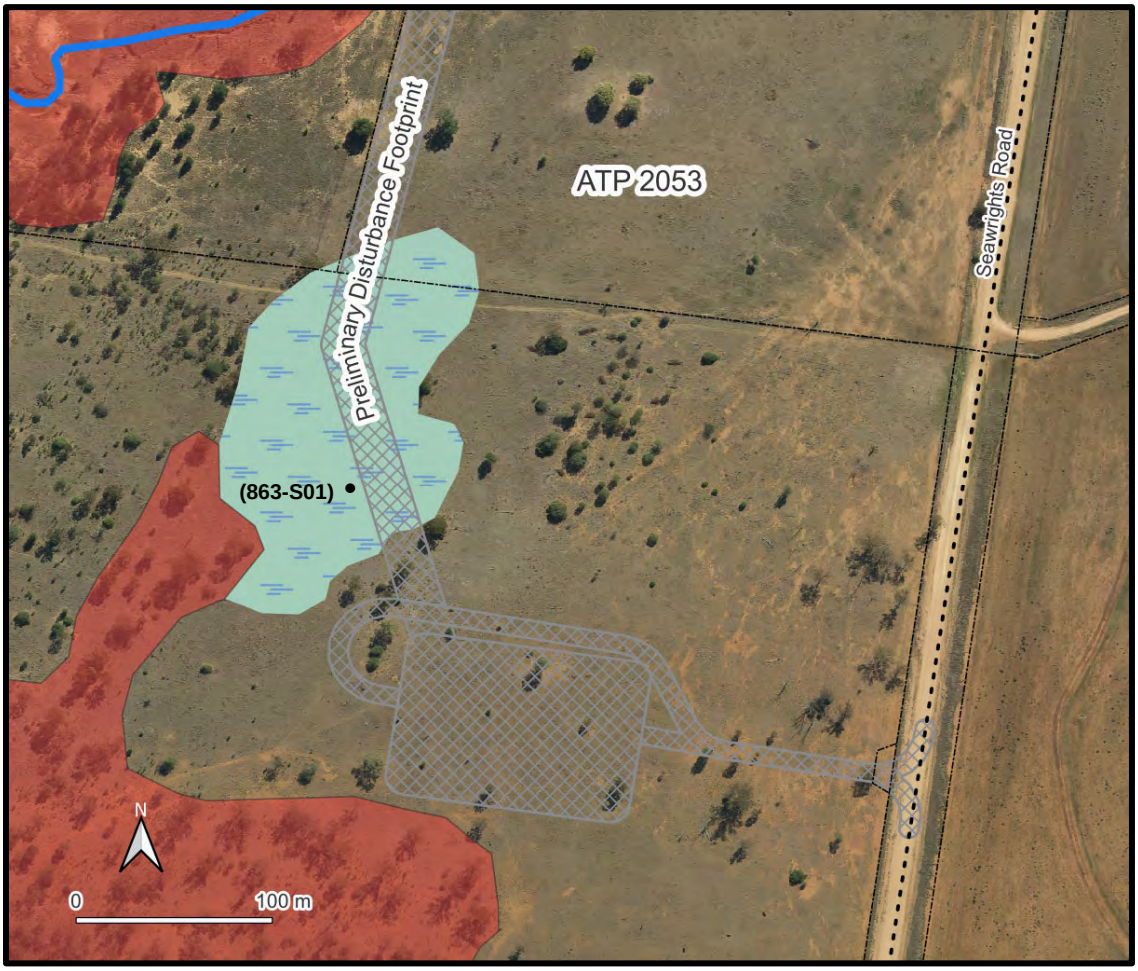

Figure 3: Ground-truthed wetland near BG3-S01

Disturbance to RE 11.3.2, totalling 0.30 ha, is required at three locations in the central section of the Project Area as per the red rings displayed on Figure 4. These small disturbance areas are required to ensure there is sufficient safe working area at these RoW locations to ensure light vehicles, construction personnel, and heavy machinery can operate and move safely along and past each other during construction of gathering infrastructure (e.g. digging of trenches and installation of linear infrastructure) and access tracks. These disturbance areas will require the potential removal of less than 15 mature trees.

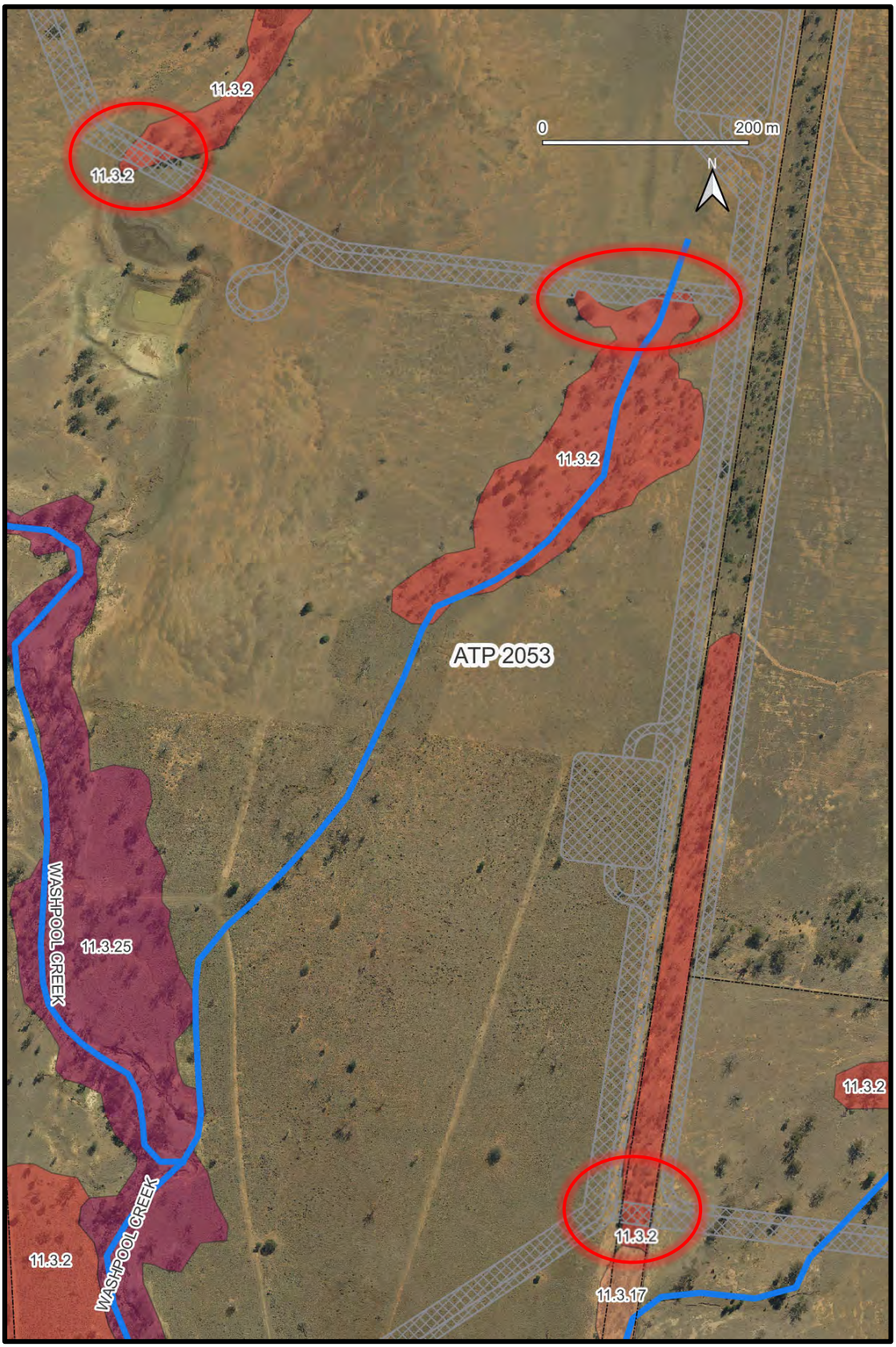

Figure 4: Locations of Proposed RE 11.3.2 Disturbance

1.7 RFI Item D

Waste

1) Low point drains

The application material states that the low point drains will be used at intervals on gathering lines to release condensate.

Information requested:

i. Describe the expected water quality to be released from these points;
ii. Quantify the expected amount of produced water to be released; and
iii. Describe the monitoring measures to be utilised and how produced water will be managed to meet irrigation trigger values from the ANZECC and ARMCANZ Water Quality Guidelines 2000.

2) Releases of wastewater to land

The proposed EA conditions seek to authorise irrigation of produced water (PW) whilst the application material states that PW would be predominantly captured in storage tanks and transferred to existing infrastructure on other tenures for treatment. The proposed conditions also seek to release treated effluent to land. The existing land uses are cropping and grazing, to which releases of wastewater could negatively impact if not managed appropriately.

Information requested:

i. Confirm whether PW will be irrigated to land or stored and removed.
ii. If irrigation is proposed, describe the circumstances in which irrigation of produced water would be required in lieu of transferring to existing treatment facilities:
    a. Demonstrate how EOW Code *Irrigation of Associated Water* (including coal seam gas water) (ENEW07546918) would be achieved;
    b. Quantify the expected amount of produced water to be released; and
    c. Identify any planned areas of irrigation, and how this is compatible with the existing land uses.
iii. Describe the circumstances in which irrigation of treated effluent would require in lieu of transferring to existing treatment facilities and provide the following information:
    a. description of the proposed system;
        - its peak design capacity in equivalent persons
        - proposed plant specification and performance
        - proposed operational parameters.
    b. The systems operation, maintenance, and management arrangements;
    c. The proposed method of disposal for treated effluent and biosolids including water, salt and nutrient balances if proposing to dispose treated effluent to land and the method of application (e.g. drip irrigation, spray irrigation); and
    d. Details of a monitoring program to assure the performance of the system and that adverse environmental impacts are prevented.

1.8 Santos Response to RFI Item D

Response to RFI item D1) Low point drains

Information requested:

i. Describe the expected water quality to be released from these points;
ii. Quantify the expected amount of produced water to be released; and
iii. Describe the monitoring measures to be utilised and how produced water will be managed to meet irrigation trigger values from the ANZECC and ARMCANZ Water Quality Guidelines 2000.

Preface to response to RFI items D1 i and ii - Historical Roma LPD monitoring

The Project Area (PL 1123) is located centrally within the existing Santos Roma gas fields, which consist of the Roma Shallow Gas Project Area (RSGPA) and the Roma Shallow Gas Project Area East (RSGPAE). Petroleum exploration and production (environmentally relevant activities) undertaken in RSGPA and RSGPAE are authorised by two Environmental Authorities (EAs) (EPPG00898213 and EPPG00662213, respectively) that detail consistent regulatory conditions across the Roma gas fields.

Gas and produced water management infrastructure located in RSGPA / RSGPAE is consistent in design and management to ensure compliance with EA conditions across multiple gas fields e.g. gas gathering infrastructure, operational practices and Low Point Drain (LPD) management systems.

Accordingly, the general environmental and operational settings, environmental and operational attributes and operational data collected from LPDs within the RSGPA / RSGPAE is considered representative of conditions likely to be encountered in the proposed development area (PL 1123).

Santos also operates the existing Fairview Arcadia Project Area (FAPA), located approximately 60 km north of the RSGPA (authorised under EA EPPG00928713). FAPA has a broadly similar environmental and operational setting and contains an extensive gas gathering network incorporating LPDs. While the gas-water separation infrastructure differs between project areas, the fundamental mechanisms that result in water accumulation within the gas gathering network and subsequent discharge from LPDs are comparable. The key operational difference is that the majority of wells within the Roma gas fields utilise downhole gas-water separation systems, whereas FAPA includes a greater proportion of wells equipped with surface gas-water separation infrastructure. Notwithstanding this difference, monitoring and inspection data collected from FAPA provides an additional line of evidence regarding the expected behaviour, management and environmental performance of LPD discharges.

All of the above-referenced EAs authorise the release of ‘pipeline waste water’ (as defined in the above-referenced EA) from LPDs to land, provided that specified outcome-based conditions are met.

Santos has undertaken and continues to undertake multiple monitoring and assessment programs relating to LPD operation across both RSGPA/RSGPAE and FAPA. These programs have been implemented, in part, to demonstrate compliance with conditions governing the release of water to land and to assess the environmental performance of LPD discharges. These programs include the following:

- Routine LPD inspections - RSGPA, RSGPAE and FAPA
- Targeted monitoring of LPD discharge volumes and water quality - FAPA
- Ongoing operational LPD discharge volume and water quality monitoring - RSGPA and RSGPAE.

Collectively, these programs provide multiple and independent lines of evidence regarding the characteristics, management and environmental performance of LPD discharges and provide a robust basis for understanding expected LPD behaviour within the proposed development area.

Routine LPD inspections - RSGPA, RSGPAE and FAPA

Santos has undertaken routine inspection and monitoring of LPDs and associated discharge areas across the RSGPA, RSGPAE and FAPA for several years as part of ongoing environmental and operational management. The primary purpose of these inspections is to verify compliance with authorised discharge-to-land EA conditions and to identify any evidence of adverse environmental effects associated with LPD operation.

The monitoring is undertaken on a representative and rotational basis across the LPD network and typically includes visual assessment of the LPD discharge area and surrounding environment, completion of standardised inspection records and photographic documentation. Key observations recorded as part of the monitoring program include evidence of ponding, runoff, erosion, soil dispersion, salt accumulation, vegetation stress and other indicators that may suggest impacts to soils, vegetation or surrounding environmental values associated with LPD discharges. Since 2016, Santos has completed approximately 1100 LPD inspections across the RSGPA / RSGPAE, representing inspection of approximately 10% of LPDs within these gas gathering networks each year.

The routine inspection program provides an ongoing mechanism for verifying the effectiveness of LPD management practices and identifying locations that may warrant further investigation or management intervention. Based on the outcomes of these inspections in RSGPA / RSGPE, no adverse environmental outcomes attributed to LPD discharges have been identified over approximately 10 years of monitoring.

Targeted monitoring of LPD discharge volumes and water quality - FAPA

Between 2022 and 2023, Santos undertook a targeted assessment of LPD discharges within the FAPA to better understand LPD discharge volumes, water quality characteristics and the potential for interactions with surrounding environmental values. The program included field inspections of approximately 244 representative LPDs, together with a targeted monitoring program involving 196 individual discharge volume measurements and detailed water quality monitoring at a representative subset of 29 LPDs.

The assessment included inspection of LPD discharge areas, evaluation of surrounding environmental settings, monitoring of discharge volumes, field water quality measurements and laboratory analysis of selected samples. Across the inspection and monitoring program, only one instance of pooling was identified that was directly attribuTable to an LPD discharge. In this case, no associated impacts to vegetation or evidence of soil degradation were observed.

Overall, field observations indicated that LPD discharges were generally confined to the immediate discharge area within the designated release area, and they had not resulted in apparent or visible impacts to riparian or upland vegetation. No empirical evidence was identified that would suggest that LPD discharges resulted in appreciable impacts to environmental values, including surface water quality or soils. Furthermore, no indicators of material, widespread or long-term impacts directly attribuTable to LPD discharges were observed during the assessment, including salt accumulation, vegetation stress, erosion or soil degradation.

Ongoing operational LPD discharge volume and water quality monitoring - RSGPA and RSGPAE

Santos has undertaken ongoing operational monitoring of LPD discharges across the RSGPA / RSGPAE since 2020 and continues to collect LPD discharge data as a routine part of LPD management.

As part of routine operational monitoring, during each LPD discharge event, operators measure the discharge volume and field water quality parameters, typically including electrical conductivity (EC) and in some instances, pH. These measurements together with other relevant operational information and observations are recorded in a central register. Where there is no water collected in the LPD, or only

negligible volumes of water (too small to collect a field measurement or sample) are present, a volume of "0 L" is recorded. These records therefore include both occasions where water was present in the LPD and discharged, and occasions where no discharge occurred. This provides important context regarding the behaviour of water discharges from LPDs.

In additional to routine operational LPD monitoring, Santos has also undertaken targeted water quality sampling and laboratory analysis of selected LPD discharges to further characterise water quality.

The information presented below regarding expected discharge volumes and water quality characteristics is based on these operational monitoring records. The monitoring undertaken across the RSGPA / RSGPAE is well-documented and provides a well-characterised understanding of LPD discharge frequency, discharge volumes and water quality, which is considered representative of and applicable to, the proposed PL 1123 development area as proposed infrastructure / target gas formations will be consistent with those employed / targeted across RSGPA and RSGPAE.

Nature and source of water discharged from LPDs

Gas produced from coal seam reservoirs contains water vapour that is initially in equilibrium with reservoir pressure and temperature conditions and is commonly referred to as "wet gas". As gas is extracted via production wells and transported through the gas gathering network, reductions in pressure and temperature result in condensation of water vapour and the formation of liquid water (condensate water) within the flowlines. Note that, in the context of CSG gathering systems, condensate water refers to water that forms through condensation of water vapour from the gas stream. It should not be confused with hydrocarbon condensate (light liquid hydrocarbons) that may be produced from conventional oil and gas reservoirs.

Over time, these liquids migrate along the gathering network and accumulate at hydraulic low points, where they may restrict gas flow if not periodically removed. LPDs are installed at these locations to enable periodic removal of accumulated liquids and maintain efficient operation of the gas gathering network.

Because condensate water is formed through the condensation of water vapour it contains low concentrations of dissolved salts and other ions, and is therefore characterised by low salinity and near-neutral pH levels. These characteristics make condensate water generally suiTable for discharge to grade.

Under normal operating conditions, condensate water is expected to be the dominant component of liquids discharged from LPDs. At the wellhead, gas and water streams are separated, either via downhole separation or a gas-water separator located at surface. The produced water is directed to the water gathering network and gas to the gas gathering network via separate flow paths. This separation process ensures that produced water is segregated from the gas stream, and managed through dedicated water gathering and treatment infrastructure downstream of the wellhead.

In addition to condensate water, produced water may enter the gas gathering network under abnormal and temporary process upset conditions (e.g., during slugging behaviour within a well, elevated gas or water flows or a separator-related fault, although the potential for carryover as a result of a fault is highly limited).

Where carryover events occur, the water is transported through the gas gathering network and accumulates at hydraulic low points in the same manner as condensate water. As a result, liquids removed from LPDs may comprise condensate water, produced water or a mixture of both (this water, whether derived from condensate water, produced water or both, is defined as 'pipeline waste water' under existing Santos RSGPA / RSGPAE EA definitions).

Produced water derived from coal seam formations typically contains elevated concentrations of dissolved salts relative to condensate. Consequently, where produced water carryover occurs, the salinity of the pipeline waste water accumulating within the gas gathering network may increase relative to pure condensate water.

The water quality of the pipeline waste water can be readily assessed to determine whether it is suiTable for release to land or whether it should be contained and managed through an alternative management pathway (e.g., off-site disposal or treatment).

Response to RFI item D1) i. - Describe the expected water quality to be released from these points

The water quality of pipeline waste water in CSG gas gathering networks is variable and reflects the operational conditions within the gas gathering network at the time water accumulates within the gathering system. The following monitoring data from the RSGPA / RSGPAE are considered representative of potential future LPD discharges within PL 1123 given proposed infrastructure and target gas formations will be consistent with that employed across RSGPA / RSGPAE.

Salinity (as electrical conductivity)

The *Irrigation water salinity ratings based on electrical conductivity* published in Table 9.2.5 of ANZECC and ARMCANZ (2000) provide a useful framework for interpreting the salinity of LPD discharges in the context of releases to land. The salinity ratings classify irrigation water as Very Low (<650 µS/cm), Low (650-1,300 µS/cm), Medium (1,300-2,900 µS/cm), High (2,900-5,200 µS/cm), Very High (5,200-8,100 µS/cm) and Extreme (>8,100 µS/cm) based on EC. These ratings provide context regarding the suitability of water for irrigation and the potential for salinity-related impacts to vegetation and soils. Within the Project Area, the vegetation along gas gathering lines and in the vicinity of LPDs will comprise grass species that generally exhibit a relatively high tolerance to salinity. The monitoring results are discussed below with reference to these salinity classes.

Based on operational monitoring undertaken across the adjacent RSGPA / RSGPAE since 2020, LPD discharges are typically characterised by Very Low to Medium salinity water, with Very Low salinity water being the single most common discharge type. Approximately 51% of recorded EC measurements were within the Very Low salinity category (<650 µS/cm). Approximately 11% of measurements were within the Low salinity category (650 to <1,300 µS/cm), and approximately 11% were within the Medium salinity category (1,300 to <2,900 µS/cm). Collectively, approximately 73% of recorded EC measurements were within the Very Low, Low or Medium salinity categories.

In the context of LPD discharges and the receiving environment (typically salt-tolerant pasture species), these salinity classes would not generally be expected to result in adverse impacts to vegetation, particularly when considered alongside the typically low volume and infrequent nature of LPD discharges.

Higher salinity values have also been recorded but occur relatively infrequently. Based on the monitoring dataset, approximately 11% of recorded measurements were within the High salinity classification (2,900 to <5,200 µS/cm), 10% were within the Very High salinity classification (5,200 to <8,100 µS/cm) and 6% were within an Extreme salinity classification (>8,100 µS/cm). Pipeline waste water corresponding to the 'Very High' and 'Extreme' salinity classifications has not been discharged from LPDs to land. Rather, these discharges were captured, contained and transported off-site for management through approved waste management arrangements.

Even where higher salinity values are recorded, including discharges within the High, Very High or in some cases the Extreme salinity classifications, this would not necessarily result in adverse impacts to vegetation or soils where LPD discharges are infrequent (i.e. the vast majority of LPDs). A potential exception is at LPDs that produce larger volumes of water and/or discharge more frequently. However, such locations can be readily identified through operational monitoring and managed accordingly to

ensure that highly saline water is not discharged to land in a manner that would result in adverse impacts to vegetation or soils.

pH

A smaller subset of monitoring records also included pH measurements. Available data indicate that water released from LPDs are generally near neutral, with a median pH of approximately 7.1. Approximately 90% of recorded pH measurements fell between 5.6 and 7.8, indicating that water released from LPDs are typically mildly acidic to slightly alkaline. Where recorded, pH values do not indicate that LPD discharges are typically characterised by unusually acidic or alkaline conditions.

Response to RFI item D1) ii. - Quantify the expected amount of produced water to be released

As discussed above, while the DETSI RFI refers to “produced water”, liquids discharged from LPDs mainly comprise condensate water, and during abnormal operating conditions contain produced water resulting from carryover events, or a mixture of both resulting in pipeline waste water. The information presented below describes the volumes of pipeline waste water historically discharged from LPDs and therefore represents the total volume of pipeline waste water potentially released from LPDs, irrespective of source.

Operational monitoring conducted since 2020 indicates that water accumulation within LPDs is generally limited and that discharge events occur infrequently across much of the gathering network. Of approximately 1,500 LPDs located within the RSGPA / RSGPAE, no historical discharge has been recorded from approximately 570 of the LPDs. This indicates that over the monitoring period (i.e., since 2020) water accumulation sufficient to adversely affect gas flow and require discharge has not occurred at many (39%) of the LPD locations.

For LPDs with recorded discharges (i.e. 930 of the 1,500 LPDs located within RSGPA / RSGPAE), discharge frequency and cumulative discharge volumes are generally low. The median number of recorded discharge events per LPD was two, while approximately 75% of LPDs recorded five or fewer discharge events during the monitoring period. This equates to an average discharge frequency of one discharge event or less per year for most LPDs over the monitoring period. Similarly, the median cumulative discharge volume per LPD was approximately 70 L, while approximately 75% of LPDs recorded cumulative discharge volumes of less than approximately 840 L between 2020 and 2025. On average, this equates to less than 200 L discharged per year over the monitoring period, indicating that discharges from most LPDs are limited in volume and infrequent, rather than representing frequent or sustained releases.

A relatively small proportion of LPDs account for most recorded discharge activity. For example, approximately 5% of LPDs with recorded discharges account for around 77% of the total recorded discharge volume. These represent LPDs located in parts of the gathering network that receive higher water inputs from connected wells, potentially due to higher rates of condensate generation or perhaps more frequent process upsets. Accordingly, the available monitoring data indicate that the majority of LPDs discharge infrequently and at relatively low volumes, while a comparatively small number of locations exhibit more frequent discharge behaviour. These higher-discharge and/or higher discharge frequency locations can be readily identified through operational monitoring, allowing discharge management measures to be implemented where required to avoid adverse impacts to land.

Discharge frequency and volume from future LPDs within PL 1123 are expected to be similar to those recorded for the RSGPA / RSGPAE, given consistent infrastructure and target gas formations across these project areas. Discharges are expected to occur infrequently from LPDs and volumes are expected to be minimal (less than 100 L) in the majority of events. In most cases, where abnormal conditions occur, measures can be implemented to limit discharges to land.

Response to RFI item D1 iii - Describe the monitoring measures to be utilised and how produced water will be managed to meet irrigation trigger values from the ANZECC and ARMCANZ Water Quality Guidelines 2000.

Management and treatment of produced water

Produced water generated during CSG production is separated from the gas stream at the wellhead, either through downhole separation systems or surface gas-water separation infrastructure. This separation process directs gas into the gas gathering network and produced water into the water gathering network via separate flow paths.

Produced water is routed through the water gathering network into aggregation storage infrastructure (typically aggregation ponds) and subsequently treated through dedicated water treatment infrastructure. Treatment processes typically include primary filtration to remove suspended solids, followed by reverse osmosis treatment to reduce salinity and remove dissolved constituents. The treatment process generates two separate streams: a treated water stream and a concentrated brine stream. The brine stream is directed to dedicated brine storage and management facilities, while the treated water stream is transferred to treated water storages pending subsequent beneficial use.

Where treated water is proposed to be supplied for irrigation or other beneficial uses, water quality is monitored and assessed against the relevant beneficial use requirements prior to use or transfer. This includes assessment against relevant water quality criteria and guidelines applicable to the intended end use, including irrigation water quality requirements where irrigation is proposed.

Where required, treated water may also be conditioned to improve its suitability for irrigation. For example, ameliorants such as calcium may be added to reduce sodium-related soil management risks and improve irrigation suitability.

Accordingly, water used for irrigation will not comprise untreated produced water. Rather, it will comprise treated water that has undergone processing through dedicated water treatment infrastructure and has been assessed against the relevant water quality requirements for its intended use prior to application. Assessment would be undertaken prior to use by Santos for an approved purpose or prior to transfer to a third party for beneficial use.

However, please note that any irrigation of produced water generated from the Project Area will occur under the authorisations applicable to the receiving tenures, and is not within the scope of this EA application as the activity is not proposed for the new PL 1123 EA.

Management of LPD discharges

In contrast to produced water intended for beneficial reuse, LPD discharges arise from the operational management of liquids that have accumulated within the gas gathering network and are managed through a range of operational controls.

As discussed above, operational monitoring indicates that LPD discharges are typically characterised by low salinity water, relatively small discharge volumes and infrequent discharge events. Under normal operating conditions, water discharged from LPDs principally comprises condensate water that has accumulated within the gas gathering network. The available monitoring data indicates that the salinity and pH of the water are generally suiTable for release to land and would not be expected to result in adverse impacts to vegetation or soils under the conditions typically encountered at LPDs.

While condensate water represents the expected discharge type under normal operating conditions, temporary process upset conditions can result in produced water being carried over into the gas gathering network, which also accumulates at downstream LPDs.

Santos implements a range of operational measures to reduce the potential for such events to occur. Gas and water flow rates are monitored and managed to ensure that they are maintained within the gas-

water separation design capacity, minimising the potential for carryover. Monitoring of pipeline backpressure is also undertaken to identify locations where water may be accumulating within the system and to assist in the identification of abnormal operating conditions or process upset events.

Where activities or operating conditions indicate an increased risk of produced water carryover, additional monitoring and management measures can be implemented to limit discharges to land. This may include verification of water quality prior to discharge, and, where required, implementation of alternative water management measures to ensure that water is managed appropriately.

Response to RFI item D2) Releases of wastewater to land

Information requested:

i. Confirm whether PW will be irrigated to land or stored and removed.

ii. If irrigation is proposed, describe the circumstances in which irrigation of produced water would be required in lieu of transferring to existing treatment facilities:

   a. Demonstrate how EOW Code *Irrigation of Associated Water* (including coal seam gas water) (ENEW07546918) would be achieved;

   b. Quantify the expected amount of produced water to be released; and

   c. Identify any planned areas of irrigation, and how this is compatible with the existing land uses.

iii. Describe the circumstances in which irrigation of treated effluent would require in lieu of transferring to existing treatment facilities and provide the following information:

   a. description of the proposed system;

      - its peak design capacity in equivalent persons
      - proposed plant specification and performance
      - proposed operational parameters.

   b. The systems operation, maintenance, and management arrangements;

   c. The proposed method of disposal for treated effluent and biosolids including water, salt and nutrient balances if proposing to dispose treated effluent to land and the method of application (e.g. drip irrigation, spray irrigation); and

   d. Details of a monitoring program to assure the performance of the system and that adverse environmental impacts are prevented.

As discussed in the Supporting Information Report at Sections 2.2 and 4.8.1, irrigation of produced water (PW) is not proposed in the Project Area, and the majority of PW generated in the Project Area will be transferred to existing approved centralised PW processing and storage facilities located on adjoining Santos operated tenures (PLs 314 and 315 via new and existing water gathering and storage infrastructure).

This is inclusive of beneficial reuse through existing irrigation schemes authorised under the *End of Waste Code Irrigation of Associated Water (including coal seam gas water) (ENEW07546918, Version 1.07)* (DETSI, 2025a). These surrounding tenures, infrastructure and petroleum activities are authorised under existing Santos EAs and EPBC Act decisions/approvals, those being EAs EPPG00898213 (RSGPA), EPPG00662213 (RSGPAE) and EPPG04323316 (Roma Backbone)), and EPBC Act approvals 2008/4059 and 2012/6615.

Small volumes of PW may be stored within the Project Area in porTable tanks. A proportion of PW stored in tanks on site will be used for on-site activities such as water supply for drilling and hydraulic fracturing purposes, and/or to provide a water source for dust suppression / construction activities (where the water use meets proposed EA conditions and criteria). Design and operation of porTable tanks will follow Queensland regulatory conditions and guidelines.

Approximately 158 ML of water will be required to develop the Project (this represents ~24% of estimated PW volume). Adequate water and brine storage and treatment capacity have been assessed to be available on adjacent tenures to manage peak water and brine production from the Project.

Table 23 in the Supporting Information Report outlines the expected water quality for the Project, based on Myalla (PL 282: neighbours the Project Area diagonally to the northeast) and Washpool Creek (PL 318: neighbours the Project Area to the south) well data. PW quality is slightly alkaline with elevated chloride and sodium concentrations, which contribute to elevated total dissolved solids (TDS) / electrical conductivity (EC) levels (KCB, 2025).

Peak water production is predicted to occur in January 2028 at 0.24 ML/day. The total volume of PW for the duration of the Project is estimated to be 645 ML (KCB, 2025). Adequate water and brine storage and treatment capacity has been assessed to be available on adjacent tenures to manage peak water and brine production from the Project.

Furthermore, Santos has established procedures to prevent uncontrolled discharge of PW (i.e. restriction of production by “turning down” or “shutting-in” wells). Site water balances are undertaken for all project phases at these water management facilities to ensure adequate storage and treatment capacity is available, and this will include consideration of PW transferred from the Project Area.

Beneficial use of PW in the Project Area (e.g. for construction, drilling and dust suppression purposes) would be carried out to achieve the following outcomes:

- Vegetation is not damaged.
- Soil quality is not adversely impacted.
- There is no surface ponding or runoff beyond the designated release area.
- There are no aerosols or odours.
- Deep drainage below the root zone of any vegetation is minimised; and
- The quality of shallow aquifers is not adversely affected.

Material changes to the quality of PW are not reasonably expected to occur while the activity is being carried out. PW quality will be monitored in accordance with relevant EA conditions and the requirements of the Stimulation Impact Monitoring Plan (SIMP). Furthermore, as per the requirements outlined in the *Petroleum and Gas (Production and Safety) Act 2004*, the volume of PW will be monitored and recorded and provided to the Department of Natural Resources and Mines, Manufacturing and Regional and Rural Development (DNRRMMRRD) in accordance with statutory obligations.

To minimise impacts to shallow groundwater quality, as a result of beneficial use activities such as dust suppression and off tenement irrigation, water quality will be monitored to confirm compliance with water quality objectives stated in the *End of Waste Code Irrigation of Associated Water (including coal seam gas water) (ENEW07546918, Version 1.07)* (DETSI, 2025a) and *End of Waste Code Associated Water (including coal seam gas water) (ENEW07547018, Version 1.06)* (DETSI, 2025b).

As discussed in Sections 2.2 and 4.8 of the Supporting Information Report, irrigation of treated effluent from the temporary workers camps’ small-scale sewage treatment plant (STP) (with a peak design capacity of <21 EP) would be required within the Project Area from time to time. These temporary mobile facilities are typically required to support drilling and well maintenance activities.

Plant specification, performance and operational parameters cannot be specified at this time as these STPs will be procured on an as needed basis. However, the STPs will be designed, operated and maintained to comply with proposed EA conditions C14, C15 and C16, which are consistent with EA conditions authorised for surrounding Santos’ tenures for the RSGPA EA EPPG00898213. The STPs would be monitored and maintained to meet manufacturer specifications to ensure they comply with proposed EA conditions and to mitigate risk of adverse environmental impacts.

Santos would only release greywater or treated STP effluent to land by sub-surface or spray irrigation - provided the irrigation area is a fenced and signed “contaminant release area” and located a minimum distance of 50 m from any watercourse, wetland or protected area, and a minimum distance of 100 m from any poTable water supply or stock drinking water supply, and kept vegetated with groundcover that is not a prohibited or restricted pest species.

The reuse of greywater and/or treated STP effluent would only be considered for dust suppression, construction and operational purposes subject to relevant EA conditions (i.e. proposed EA condition C16). Treated STP effluent would only be used for dust suppression subject to the following considerations:

- Construction and operational purposes, provided that it has not been stored in a dam or tank prior to use.
- On local government-controlled roads, provided that written approval from the relevant Local Government has been provided to Santos; and
- The treated STP effluent quality is monitored at the location and frequency to meet the release limits for each quality characteristic specified in proposed EA conditions at Schedule C, Table 2 – Treated Sewage Effluent Standards for Dust Suppression, Construction and Operational Purposes.

Santos does not propose to release biosolids to land. Any generated biosolids would be disposed of in accordance with regulated waste requirements e.g. the contaminants will be directed to lawful off-site disposal.

When circumstances prevent the irrigation of greywater or treated STP effluent to land, the contaminants will be directed to on-site storage or lawfully disposed of off-site.

1.9 RFI Item E

Noise

The application material identifies that there are eleven potential sensitive receptors, including five residences located in within the project area and a further six within 1km of the project area boundary. The application material provides general potential impacts and mitigation measures for noise but does not provide site-specific predicted noise levels, predicted impacts to sensitive receptors and site-specific mitigation measures.

Information requested:

Utilising the guidelines Application requirements for petroleum activities and Prescribing noise conditions for environmental authorities for petroleum activities and/or any other prescribed guidelines or standards, develop a noise impact assessment and management report that at minimum provides:

- An inventory of all noise sources and sound power levels associated with all activities and plant and equipment (reference can be made to Table 1 to ensure all noise sources are listed);
- Identification of all sensitive receptors in the surrounding environment (preferably indicated on maps);
- Details of background monitoring data measured over time and across different locations, including at sensitive receptors;
- An assessment, preferably by noise modelling and contour maps, of expected noise emissions at sensitive receptors; and
- A description of the extent to which the predicted noise emissions will protect acoustic values.

1.10 Santos Response to RFI Item E

Response to RFI item E) Noise

Information requested:

Utilising the guidelines Application requirements for petroleum activities and Prescribing noise conditions for environmental authorities for petroleum activities and/or any other prescribed guidelines or standards, develop a noise impact assessment and management report that at minimum provides:

- An inventory of all noise sources and sound power levels associated with all activities and plant and equipment (reference can be made to Table 1 to ensure all noise sources are listed);
- Identification of all sensitive receptors in the surrounding environment (preferably indicated on maps);
- Details of background monitoring data measured over time and across different locations, including at sensitive receptors;
- An assessment, preferably by noise modelling and contour maps, of expected noise emissions at sensitive receptors; and
- A description of the extent to which the predicted noise emissions will protect acoustic values.

This response has been prepared in accordance with the following guidelines and standards:

- *ESR/2016/2357 - Application requirements for petroleum activities, Version 4.01.*
- *ESR/2016/1935 - Prescribing noise conditions for environmental authorities for petroleum activities, Version 2.06.*
- *EP Act - Environmental Protection Act 1994; and*
- *EPP Noise - Environmental Protection (Noise) Policy 2019.*

The EPP Noise establishes a noise management hierarchy for all activities involving noise as follows: (1) Avoid; (2) Minimise (firstly orientate, secondly use best available technology); and (3) Manage.

Santos will implement noise management measures in accordance with this prescribed hierarchy throughout all phases of petroleum activities. The existing noise environment for the Project Area is typical of rural areas, with low levels of background noise generally comprised of noise sources associated with rural based human occupation. Noise levels in the vicinity of the Project Area are likely to be influenced by the following:

- The use of equipment and machinery during both agricultural activities and oil and gas exploration and production activities in the area.
- Traffic noise from project vehicles and other users of, including heavy transport vehicles, the adjacent local road network.
- Vehicles using the nearby Warrego Highway on a 24-hour basis.
- Natural sources such as birds, insects, wind and other meteorological events.
- Livestock; and
- Resource exploration and development activities.

Consistent with the objectives of the EPP Noise, the EVs for the Project Area include:

- The qualities of the acoustic environment that are conducive to protecting the health and biodiversity of ecosystems.
- The qualities of the acoustic environment that are conducive to human health and well-being:
    - by ensuring a suiTable acoustic environment for individuals to sleep, study or learn, or

- o be involved in recreation (including relaxation and conversation); and
- The qualities of the acoustic environment, which are conducive to protecting the amenity of the community.

Table 4 provides an inventory of all typical noise sources and associated sound power levels for activities, plant and equipment associated with the proposed petroleum activities. This inventory references Table 1 of the DETSI guideline *Prescribing noise conditions for environmental authorities for petroleum activities* (ESR/2016/1935, Version 2.06).

Table 4: Inventory of Typical Noise Sources and Sound Power Levels

Noise Source	Sound Power Level (LwA)	Metric	Activity Duration
Drill Rig (hydraulic pack)	95–100 dB(A)w	LAeq	Short to medium term
Drill Rig (air compressor)	95–100 dB(A)w	LAeq	Short to medium term
Drill Rig (mud pump)	100–105 dB(A)w	LAeq	Short to medium term
Field Compressor Station (screw drive engines)	110–115 dB(A)w	LAeq	Long term
Central Compressor Station (reciprocating engines)	120-125 dB(A)W	LAeq	Long term
Well Head Power Pack	95–105 dB(A)w	LAeq	Long term
Generator (500 kVA)	100–110 dB(A)w	LAeq	Short to long term
Stimulation Activity (fraccing) – combined sources	110–120 dB(A)w	LAeq	Short term
Impacts of Drill Rods / Casings	100–110 dB(A)w	LAmax	Impulsive / intermittent
Cavitation / Air Release	115–120 dB(A)w	LAmax	Impulsive / intermittent
Engine Brakes	110–115 dB(A)w	LAmax	Impulsive / intermittent
Reversing Beeper	100–105 dB(A)w	LAmax	Impulsive / intermittent

Notes:

(1) Sources with continuous noise output (LAeq) are generally tonal in nature, predominantly generated from plant and equipment powered by internal combustion engines.

(2) Impulsive noise sources (LAmax) are intermittent and require varied management solutions such as controlled braking behaviour and broadband reverse beepers.

(3) Not all noise sources listed above will operate concurrently at any given time. The dominant noise sources during production operations will be well head power packs and field compressor stations (if applicable). Drilling activities are short to medium term in duration.

Background noise monitoring has not been undertaken for the proposed activities given that the development occurs within the existing operational area for the Gladstone Liquefied Natural Gas - Gas Field Development Project (GLNG-GFD) tenure areas (RSGPA and RSGPAE EAs' tenure areas). In the absence of background noise monitoring, the deemed background levels nominated in the proposed conditions for the new EA (refer to Table 5) align with that included in Table 1 of the DETSI's '*Guideline Prescribing noise conditions for environmental authorities for petroleum activities*' (ESR/2016/1935, Version 2.06) (DETSI, 2025) and are considered to be representative of the ambient acoustic environment associated with a rural setting.

Table 5: Deemed Background Noise Levels

Time period	Deemed background noise level (dB(A))
7:00 am – 6:00 pm	35
6:00 pm – 10:00 pm	30
10:00 pm – 6:00 am	25
6:00 am – 7:00 am	30

The Project Area is located in a rural setting with a low population density. As identified in Section 5 of the DETSI's guideline (ESR/2016/1935), noise levels become difficult to regulate where an area has exceptionally low background noise levels, such as isolated rural areas which may have backgrounds as low as 15–20 dB(A) at certain times of the year. The Guideline recognises that in these circumstances, the usual approach of limiting intrusive noise to not more than 3 dB above background noise levels during night time periods would lead to unreasonably low emission limits and would not be consistent with the balance between economic development and environmental protection required by the objects of the EP Act.

Accordingly, the deemed background noise levels in Table 5 are adopted for the purposes of this noise impact assessment, whilst still being consistent with the approach prescribed in the DETSI's guideline (ESR/2016/1935) and the noise nuisance limits proposed in Schedule F, Table 1 of the proposed EA conditions.

The majority of potential noise impacts associated with the proposed activities would be temporary and limited to the initial construction period. The proposed activities (and potential noise and air quality impacts) are also consistent with those associated with existing petroleum activities authorised by the nearby Backbone (EPPG04323316), RSGPA (EPPG00898213) and RSGPAE (EPPG00662213) EAs, and existing land use (pastoral / grazing / cropping activities). Construction activities associated with the proposed development would typically occur from 6am to 6pm, seven days per week for a relatively limited period of time i.e. limited to a number of weeks.

Prior to commencing authorised activities within the Project Area, Santos will conduct noise modelling to predict noise levels associated with proposed activities, having regard to the location and nature of surrounding sensitive receptors. Modelling outcomes will be used to assess potential noise impacts and nuisance, and to inform the design, scheduling and mitigation of activities where required.

Noise modelling is undertaken in accordance with established internal Santos environmental procedures, which set out the process for identifying sensitive receptors and interpreting modelling results. This process forms an integral component of Santos' integrated disturbance planning approach, applied consistently across all new developments to ensure activities are planned and managed to avoid or minimise environmental harm, and comply with the proposed EA conditions.

Where modelling identifies a risk of noise nuisance at a receptor, Santos will implement appropriate mitigation measures prior to or during the conduct of activities. Where noise nuisance is expected and mitigation measures are insufficient to address the impact, Santos will, in accordance with proposed EA conditions, enter into negotiations with the relevant landholder for an Accommodation Agreement (AA).

In accordance with the proposed EA conditions, petroleum activities must not cause environmental nuisance at a sensitive place, other than where an alternative arrangement is in place. Notwithstanding, emission of any low frequency noise must not exceed noise levels specified in EA conditions such as those proposed in Schedule F. Only one sensitive receptor is located within the Project Area – a landholder residence. Santos has an agreement / alternative arrangement in place (i.e. Conduct and

Compensation Agreement (CCA)) with this landholder, as required by the *Mineral and Energy Resources (Common Provisions) Act 2014*. Santos liaises with the landholder on an ongoing basis to ensure authorised petroleum activities are conducted in coexistence with the landholder's requirements, that impacts on their land are mitigated, and that the landholder is appropriately compensated for the effects of those activities.

The proposed EA conditions for noise (Schedule F) are consistent with conditions of the surrounding tenures authorised by the RSGPA EA (EPPG00898213) and RSGPAE EA (EPPG00662213), and the DETSI *Streamlined Model Conditions for Petroleum Activities* and provide a framework for protection of acoustic values as detailed in Table 6.

Table 6: Framework for the Protection of Acoustic Values

Proposed EA Condition	Subject	Summary
F1	Environmental Nuisance	Petroleum activities must not cause environmental nuisance at a sensitive place, other than where an alternative arrangement is in place.
F2	Noise Nuisance Limits	Emission of noise at levels less than those specified in Schedule F, Table 1 are not considered to be environmental nuisance.
F3	Tonal / Impulsive Adjustments	Where noise is tonal or impulsive, adjustments per Schedule F, Table 2 are to be added to measured noise levels to derive LAeq, adj, 15 min.
F4	Low Frequency Noise	Low frequency noise must not exceed 60 dB(C) external or 50 dB(Z) internal, with A/C differential ≤20 dB or A/Z differential ≤15 dB, respectively.

1.11 RFI Item F

Air

The application material identifies that the proposal will likely result in air emissions relating to fuel combustion, flaring, venting, fugitive emissions and dust emissions during construction. The impact of these air emissions on nearby sensitive receptors has not been quantified or modelled. It needs to be demonstrated that the proposed activity can be carried out in a manner that protects the environmental values of air.

Information requested:

Utilising the Application requirements for petroleum activities and Application requirements for activities with impacts to air and/or other prescribed guidelines or standards, develop an air impact assessment and management report that at minimum provides:

- All sensitive places that may be adversely affected by the release of contaminants must be identified;
- The report should also provide details of contaminant concentrations and mass loads likely to be released to the atmosphere from venting and flaring, and discuss any impacts from these processes on sensitive receptors;
- Quantifies worst-case ground level concentrations for expected contaminants; and
- Demonstrates how EPP Air and NEPM Air objectives are achieved.

1.12 Santos Response to RFI Item F

Response to RFI item F) Air

Santos has engaged suitably qualified third-party air quality consultants Virid ArdentAU (VAAU) to develop an air impact assessment and management report (Report) to address RFI item F. The Report is attached to this RFI response as Appendix 4.

The Report has been prepared in accordance with the DETSI's '*Guideline - Application requirements for petroleum activities'* (ESR/2015/2357, Version 4.01) and '*Guideline - Application requirements for activities with impacts to air'* (ESR/2015/1840, Version 5.05), and/or other prescribed guidelines or standards.

The Report addresses potential air quality impacts associated with the construction and operational phases of the proposed development qualitatively, and includes a discussion of the nature, extent and magnitude of the identified air emission sources, together with a rationale for adopting a qualitative approach having regard to the nature of the proposed activities, expected air emission sources and the characteristics of the receiving environment.

The air quality impact assessment for the Roma Phase 7-7B-SD20 Development (ATP 2053/PL 1123) confirms that the proposed activities can be carried out in a manner that protects the environmental values of air as summarised below (refer to the Report attached to this RFI response as Appendix 4 for further detailed information):

- Sensitive receptors - eleven sensitive receptors have been identified in and around the Project Area, comprising five residential dwellings within PL 1123 and six within approximately 1 km of the boundary. The nearest township of Wallumbilla is approximately 5 km to the west.
- Emissions profile - air emissions from the project are limited to intermittent production flaring (during well commissioning and periodic workovers), minor fugitive emissions (predominantly methane), diesel combustion from mobile equipment, and localised dust. Notably, no gas

compression, processing, or permanent water treatment facilities are proposed within PL 1123; all gas is transferred to existing downstream infrastructure on other leases.

- Ambient air quality - Existing background monitoring data demonstrates that gaseous pollutant concentrations (CO, NO_2) are below EPP Air and NEPM Air objectives.
- Environmental protection - with implementation of standard environmental management measures - including dust suppression, speed restrictions, progressive staging of construction, and routine inspection and maintenance programs during operations - the assessment concludes that air quality impacts from both construction and operational phases will be low and are not expected to result in adverse impacts at surrounding sensitive receptors.

Santos

Appendix 1:

DETSI Information Request

Notice

Environmental Protection Act 1994

Information request

This information request is issued by the administering authority under section 140 of the Environmental Protection Act 1994 *to request further information needed to assess an application for a site-specific environmental authority.*

To: SANTOS VENTURES PTY LTD
KGLNG E&P PTY LTD
PAPL (UPSTREAM II) PTY LIMITED
TOTALENERGIES EP AUSTRALIA
TOTALENERGIES EP AUSTRALIA II

C/- SANTOS VENTURE PTY LTD
60 Flinders Street, Ground Floor, Santos Centre
ADELAIDE, SA 5000

ATTN: Alexander Clarke, alex.clarke@santos.com

Our reference: P-EA-101038837

Further information is required to assess an application for environmental authority

1 Application details

The application for a site-specific environmental authority was received by the administering authority on 2 February 2026.

The application reference number is: A-EA-NEW-101038827.

Land description: PL1123.

2 Information request

The administering authority has considered the abovementioned application and is writing to inform you that further information is required to assess the application (an information request).

The information requested is provided below:

A. <u>Maps and images in application documents are not legible</u>

The reports provided as part of the application contain maps and images that have a low resolution which makes it difficult to verify and assess the information provided.

<u>Information requested:</u> Provide updated application documents in a higher quality pdf format in which the maps and images are legible.

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B. Disturbance Footprint

The proposed activity comprises proposed disturbance under Petroleum Lease (PL) 1123 and existing disturbance under Authority to Prospect (ATP) 2053. DETSI seeks to understand and condition the existing and proposed disturbance footprint of the activity.

Information requested: Provide all existing and proposed infrastructure in a table format below, accompanied by associated GIS (shapefile) data.

Infrastructure on ATP2053 & PL1123	Existing infrastructure (at the time of the RFI response)			Proposed infrastructure		
	Number	Total area of impact (ha; length and size for linear infrastructure)	Spatial data file reference	Number	Total area of impact (ha; length and size for linear infrastructure)	Spatial data file reference
Wells						
Well pads						
Access tracks						
Gathering lines						
Borrow Pits						
Pipelines						
Right of way						
Laydown areas						
Temporary workers camp						

C. Prescribed Environmental Matters (PEMs) & Matters of State Environmental Significance (MSES)

The *Ecological Assessment Report* (EAR) by Boobook Ecological Consulting provides an assessment of ground-truthed vegetation and habitat assessment surveys to inform potential impacts to PEMs, however, there are gaps of information that need to be addressed requiring further justification.

1) Cumulative Impacts

The EAR refers to field surveys conducted since 2022 and provides ground-truthed mapping which identifies regional ecosystems (REs) and environmentally sensitive areas (ESAs) as well as reflects pre-disturbance vegetation. It is unclear whether the quantified impacts to PEMs are inclusive of existing disturbance conducted under EA0002052. Figure 1 below represents an area which could potentially be protected wildlife habitat and subsequently Category C ESA, which has been disturbed, as show in Figure 2.

Information requested: Confirm if the quantified impacts to PEMs and ESAs in the EAR are inclusive of existing disturbance conducted under EA0002052;

i. If so, demonstrate that desktop surveys and ground-truthing was conducting prior to disturbance, and provide a breakdown of existing impacts and proposed impacts; or

ii. If the EAR is not inclusive of impacts from existing disturbance, conduct a desktop assessment using pre-disturbance mapping and identify all potential PEMs and ESAs. Update the findings of the EAR to include any impacts identified in this process.

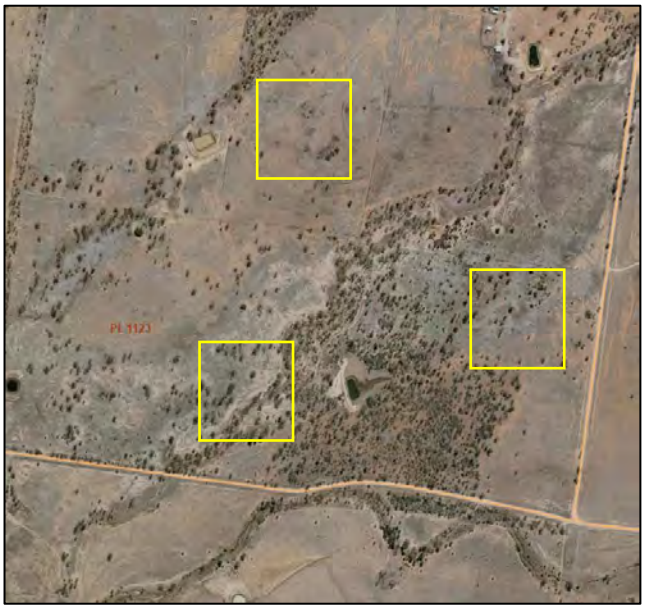

Figure 1. Example of pre-disturbance vegetation in southeast of PL1123 (QGlobe, Jul 2020)

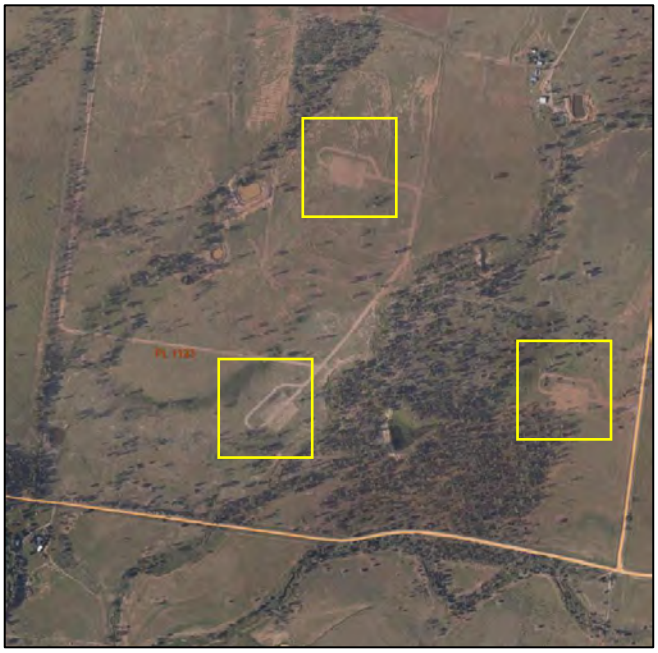

Figure 2. Example of disturbance conducted under ATP 2053 in southeast of PL1123 (QGlobe, current data)

2) **Spatial data**

Information requested: Provide spatial data, in a shapefile format as per the department's guideline 'Spatial information submission' (ESR/2018/43337) , with each layer as a separate zip file clearly labelled for:

i. the existing disturbance carried out under EA0002052;

ii. the proposed disturbance (24 wells) and ancillary infrastructure required (RoW, access tracks, gathering lines, water pipelines etc.) at the maximum extent of disturbance;

iii. all relevant environmentally sensitive area mapping layers;

iv. all groundtruthed prescribed environmental matters that would be impacted by the proposal, notwithstanding whether this impact triggers an SRI;

v. all groundtruthed RE mapping identified during ecological surveys;

vi. all groundtruthed protected wildlife, or protected wildlife habitat identified during ecological surveys; and

vii. all PEMs sourced from Government databases that would be impacted by the proposal notwithstanding whether this impact triggers an SRI.

3) **Desktop assessment**

The desktop assessment in the EAR conducted a likelihood of occurrence assessment using results of online databases utilising a 10km buffer. To ensure that all threatened fauna and flora species potential habitat is identified, a 50km search buffer is more appropriate as it will capture species that have larger habitat ranges or dispersal areas.

Information requested:

i. Conduct a desktop assessment for the area using a 50 kilometre-radius including but not limited to the following:

- WildNet / Queensland Government Species List;
- The Atlas of Living Australia, the Birdlife Atlas, Wildnet, Species Profile and Threats (SPRAT) databases and associated Recovery Plans; and

ii. Identify any species likely to occur that were not assessed in the EAR, quantify potential impacts, describe mitigation and avoidance measures, and provide an updated SRI assessment.

4) **Targeted fauna surveys**

The proposal seeks to disturb up to 0.9 hectares (ha) of protected wildlife habitat for a range of threatened species. It is recognised that vegetation and habitat assessments were conducted, however, the ground-truthed surveys did not conduct targeted fauna surveys in accordance with Terrestrial Vertebrate Fauna Survey Guidelines for Queensland. To mitigate and avoid impacts to threatened species, there has to be an understanding of any individuals or local populations that may occur within the disturbance footprint and surrounding areas. This information is also utilised in evaluating the project against the significant residual impact criteria and without targeted surveys to inform the extent of local populations, the administering authority may opt for a conservative approach when assessing potential impacts.

Information requested:

a) Conduct targeted fauna surveys in accordance with Terrestrial Vertebrate Fauna Survey Guidelines for Queensland for species determined likely to occur;

i. Provide spatial data identifying any occurrences of threatened species;

ii. Based on the results of the surveys, provide updated avoidance and mitigation measures, and an updated SRI assessment; or

b) Provide justification for not conducting targeted surveys;

i. Include details of any existing ecological data, including vegetation and habitat assessments, to demonstrate that targeted fauna surveys are not required;

ii. Outline the avoidance and mitigation measures incorporated into the proposal to minimise potential impacts on threatened species;

iii. Demonstrate how these measures are sufficient to address potential risks, in the absence of targeted fauna surveys; and

iv. Describe proposed pre-clearance surveys, monitoring, and management strategies that will be implemented to address impacts to any identified individual or local populations during construction of activity.

5) **Avoid, mitigate, offset' mitigation hierarchy**

Due to the lack of clarity in the maps and images provided in the EAR, certain areas of proposed disturbance that may impact protected wildlife habitat or vegetation appear to be avoidable. These areas include the crossing of Washpool Creek which contains RE 11.3.2, and the proposed intersection of the ground-truthed wetland near BG3-S01 which was identified in the EAR as Australian Painted Snipe habitat. There are nearby pre-existing disturbance areas that could be utilised, including Scotts Road and Seawrights Road, to avoid impacts.

Information requested: For the particular matters identified above, demonstrate that avoidance of impacts to these areas is not possible.

D. Waste

1) **Low point drains**

The application material states that the low point drains will be used at intervals on gathering lines to release condensate.

Information requested:

i. Describe the expected water quality to be released from these points;

ii. Quantify the expected amount of produced water to be released; and

iii. Describe the monitoring measures to be utilised and how produced water will be managed to meet irrigation trigger values from the ANZECC and ARMCANZ Water Quality Guidelines 2000.

2) **Releases of wastewater to land**

The proposed EA conditions seek to authorise irrigation of produced water (PW) whilst the application material states that PW would be predominantly captured in storage tanks and transferred to existing infrastructure on other tenures for treatment. The proposed conditions also seek to release treated effluent to land. The existing land uses are cropping and grazing, to which releases of wastewater could negatively impact if not managed appropriately.

Information requested:

i. Confirm whether PW will be irrigated to land or stored and removed.

ii. If irrigation is proposed, describe the circumstances in which irrigation of produced water would be required in lieu of transferring to existing treatment facilities:

a. Demonstrate how EOW Code *Irrigation of Associated Water* (including coal seam gas water) (ENEW07546918) would be achieved;

b. Quantify the expected amount of produced water to be released; and

c. Identify any planned areas of irrigation, and how this is compatible with the existing land uses.

iii. Describe the circumstances in which irrigation of treated effluent would require in lieu of transferring to existing treatment facilities and provide the following information:

a. description of the proposed system;

- its peak design capacity in equivalent persons
- proposed plant specification and performance
- proposed operational parameters.

b. The systems operation, maintenance, and management arrangements;

c. The proposed method of disposal for treated effluent and biosolids including water, salt and nutrient balances if proposing to dispose treated effluent to land and the method of application (e.g. drip irrigation, spray irrigation); and

d. Details of a monitoring program to assure the performance of the system and that adverse environmental impacts are prevented.

E. Noise

The application material identifies that there are eleven potential sensitive receptors, including five residences located in within the project area and a further six within 1km of the project area boundary. The application material provides general potential impacts and mitigation measures for noise but does not provide site-specific predicted noise levels, predicted impacts to sensitive receptors and site-specific mitigation measures.

Information requested: Utilising the guidelines Application requirements for petroleum activities and Prescribing noise conditions for environmental authorities for petroleum activities and/or any other prescribed guidelines or standards, develop a noise impact assessment and management report that at minimum provides:

- An inventory of all noise sources and sound power levels associated with all activities and plant and equipment (reference can be made to Table 1 to ensure all noise sources are listed);
- Identification of all sensitive receptors in the surrounding environment (preferably indicated on maps);
- Details of background monitoring data measured over time and across different locations, including at sensitive receptors;
- An assessment, preferably by noise modelling and contour maps, of expected noise emissions at sensitive receptors; and
- A description of the extent to which the predicted noise emissions will protect acoustic values.

F. Air

The application material identifies that the proposal will likely result in air emissions relating to fuel combustion, flaring, venting, fugitive emissions and dust emissions during construction. The impact of these air emissions on nearby sensitive receptors has not been quantified or modelled. It needs to be demonstrated that the proposed activity can be carried out in a manner that protects the environmental values of air.

Information requested: Utilising the Application requirements for petroleum activities and Application requirements for activities with impacts to air and/or other prescribed guidelines or standards, develop an air impact assessment and management report that at minimum provides:

- All sensitive places that may be adversely affected by the release of contaminants must be identified;
- The report should also provide details of contaminant concentrations and mass loads likely to be released to the atmosphere from venting and flaring, and discuss any impacts from these processes on sensitive receptors;
- Quantifies worst-case ground level concentrations for expected contaminants; and
- Demonstrates how EPP Air and NEPM Air objectives are achieved.

3 Actions

The abovementioned application will lapse unless you respond by giving the administering authority -

(a) all of the information requested; or

(b) part of the information requested together with a written notice asking the authority to proceed with the assessment of the application; or

(c) a written notice –

i. stating that you do not intend to supply any of the information requested; and

ii. asking the administering authority to proceed with the assessment of the application.

A response to the information requested must be provided by 26 October 2026 (the information response period). If you wish to extend the information response period, a request to extend the period must be made at least 10 business days before the last day of the information response period.

The response to this information request or a request to extend the information response period can be submitted to the administering authority by email to EnergyandExtractive@detsi.qld.gov.au.

If the information provided in response to this information request is still not adequate for the administering authority to make a decision, your application may be refused as a result of section 176 of the *Environmental Protection Act 1994,* where the administering authority must have regard to any response given for an information request.

4 Human rights

A human rights assessment was carried out in relation to this decision, and it was determined that no human rights are limited.

Should you have any questions about the notice, please contact Micheal Thouard, Senior Environmental Officer, using the details provided below.

	2 April 2026
Signature	Date

Scott Sullivan

Executive Director
Department of the Environment, Tourism, Science and Innovation
Delegate of the administering authority
Environmental Protection Act 1994

Enquiries:

Energy and Extractive Resources Business Centre
GPO Box 2454, Brisbane QLD 4001
Phone: (07) 3330 5715
Email: EnergyandExtractive@detsi.qld.gov.au

Appendix 2:

Spatial Data

Appendix 3:

Santos Roma Phase 7-7B-SD20 Development – Supporting Management Plans

Santos

Santos Roma Phase 7-7B-SD20 Development

ENVIRONMENTAL PROTOCOL FOR CONSTRAINTS PLANNING AND FIELD DEVELOPMENT

February 2025

Document Status

Date	Rev	Reason For Issue	Author	Checked	Approved
21/02/2025	0	Submission to Department of Climate Change, Energy, the Environment and Water	Santos / AECOM	AC / AB	BW

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Glossary

Abbreviation	Description
ATP	Authority to Prospect
CSG	Coal Seam Gas
CRAF	Roma Phase 7-7B-SD20 Chemical Risk Assessment Framework
DESI	Department of Environment, Science and Innovation (now DETSI)
DETSI	Department of Environment, Tourism, Science and Innovation
EA	Environmental Authority
EP Act	*Environmental Protection Act 1994* (Qld)
EPBC Act	Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*
EMP	Roma Phase 7-7B-SD20 Environmental Management Plan
ESA	Environmentally Sensitive Area

Essential petroleum activities	Essential petroleum activities means activities that are essential to bringing the resource to the surface and are only the following:
	• low impact petroleum activities
	• geophysical, geotechnical, geological, topographic and cadastral surveys (including seismic, sample / test / geotechnical pits, core holes)
	• single well sites not exceeding 1 hectare disturbance and multi-well sites not exceeding 1.5 hectare (ha) disturbance
	• well sites with monitoring equipment (including monitoring bores):
	  o for single well sites, not exceeding 1.25 ha disturbance or for multi-well sites, not exceeding 1.75 ha disturbance
	• well sites with monitoring equipment (including monitoring bores) and tanks (minimum 1 Megalitre (ML)) for above ground fluid storage:
	  o for single well sites, not exceeding 1.5 ha disturbance
	  o for multi-well sites, not exceeding 2.0 ha disturbance
	• associated infrastructure located on a well site necessary for the construction and operations of wells:
	  o water pumps and generators
	  o flare pits
	  o chemical / fuel storages
	  o sumps for residual drilling material and drilling fluids
	  o tanks, or dams which are not significant or high consequence dams to contain wastewater (e.g. stimulation flow back waters, produced water)
	  o pipe laydown areas
	  o soil and vegetation stockpile areas
	  o a temporary camp associated with a drilling rig that may involve sewage treatment works that are no release works
	  o temporary administration sites and warehouses
	  o dust suppression activities using water that meets the quality and operational standards approved under the environmental authority
	• communication and power lines that are necessary for the undertaking of petroleum activities and that are located within well sites, well pads and pipeline right of ways without increasing the disturbance area of petroleum activities
	• supporting access tracks
	• gathering / flow pipelines from a well head to the initial compression facility
	• activities necessary to achieve compliance with the conditions of the environmental authority in relation to another essential petroleum activity (e.g. sediment and erosion control measures, rehabilitation) (DESI, 2024).

GFD	Gas Field Development
GIS	Geographical Information System
GLNG	Gladstone Liquefied Natural Gas
ha	hectares

Abbreviation	Description
IDP	Integrated Development Planning
km	kilometres
Linear infrastructure	Infrastructure including (but not limited to) gas and water gathering lines, low and high pressure gas and water pipelines, roads and tracks, power lines and other service lines.
Low impact petroleum activities	Petroleum activities which do not result in the clearing of native vegetation, cause disruption to soil profiles through earthworks or excavation or result in significant disturbance to land which cannot be rehabilitated immediately using hand tools after the activity is completed. Examples of such activities include but are not necessarily limited to soil surveys (excluding test pits), topographic surveys, cadastral surveys and ecological surveys, may include installation of monitoring equipment provided that it is within the meaning of low impact and traversing land by car or foot via existing access tracks or routes or in such a way that does not result in permanent damage to vegetation (DESI, 2024).
m	metres
MNES	Matters of National Environmental Significance, being the relevant matters protected under Part 3 of the EPBC Act.
MSES	Matters of State Environmental Significance
NC Act	*Nature Conservation Act 1992* (Qld)
PEM	Prescribed environmental matter
PL	Petroleum Lease
PDF	Preliminary disturbance footprint – the current refined disturbance footprint for the Project that avoids and minimises disturbance to Matters of National Environmental Significance (MNES) and other environmental values.
Project Area	The bounds of ATP 2053
The Project	The Santos Roma Phase 7-7B-SD20 CSG Development – which includes the progressive construction and operation of up to 24 CSG wells and associated infrastructure located in the Project Area.
RE	Regional Ecosystem
RMP	Roma Phase 7-7B-SD20 Rehabilitation Monitoring Plan
SPRAT	Species Profile and Threats Database
SSMP	Significant Species Management Plan
TEC	Threatened Ecological Community listed under the EPBC Act

1. Introduction

Santos and its joint venture partners are proposing a new gas field development located in central-eastern Queensland to supply natural gas to commercial markets. The proposed development will be known as the 'Santos Roma Phase 7-7B-SD20 Development' (the Project).

1.1. Overview

The Project will involve the progressive construction, operation, decommissioning and rehabilitation of up to 24 coal seam gas (CSG) wells, gas and water gathering flowlines and access track infrastructure in petroleum exploration tenure Authority to Prospect (ATP) 2053 (the Project Area). The Project Area is located in central-eastern Queensland, approximately 5 kilometres (km) east of the regional town of Wallumbilla. The regional location of the Project Area is shown in Figure 1.

The Project footprint located in the Project Area will cover approximately 66 hectares (ha) of land. Petroleum exploration activities undertaken by the Santos in the Project Area to date include the drilling and completion of 5 CSG appraisal wells and construction of associated infrastructure in 2022-2024. These activities are authorised under existing approved Queensland Environmental Authority (EA) 0002052. The existing 5 wells form part of the proposed 24 CSG wells.

CSG and water produced from the Project Area will be sent to existing approved centralised gas and water storage / processing and gas compression facilities located on adjacent Santos owned and operated petroleum tenures. Petroleum activities on adjacent tenures are authorised under existing *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) approvals for the Gladstone Liquified Natural Gas Field Development Project (GLNG GFD) (EPBC Act Numbers 2008/4059 and 2012/6615) and EAs EPPG00898213 and EPPG00662213. No gas compression or water treatment facilities are proposed to be constructed or operated within the Project Area, and no significant water storage structures will be constructed or operated within the Project Area. Where required, prefabricated water storage tanks (concrete panel tanks or similar) will be assembled for water storage.

The Project will include the following components (but not limited to):

- well leases (typically 1.25 hectares (ha) for single wells and 3 ha for multi-wells)
- water / gas gathering lines, trunklines and pipelines (typically 20 - 35 metres (m) wide)
- roads and access tracks (typically 10 – 15 m wide)
- other supporting infrastructure:
  - temporary water storage tanks
  - temporary workers camps
  - power and communications lines; and
  - other incidental and ancillary petroleum activities required to support the authorised activity.

Well development will be phased to optimise gas production to meet Santos' gas supply obligations and opportunities. Once operational, gas produced from the Project Area will supply commercial markets. Once completed and connected to gas and water gathering infrastructure, operational wells will operate continuously on a 24-hour basis for an anticipated operational life of 30-50 years. Progressive decommissioning and rehabilitation of activities and infrastructure will occur over the life of the Project, thereby reducing disturbance areas for the duration of operation, until final decommissioning and rehabilitation at end of project life.

1.2. Background

Santos has developed a preliminary disturbance footprint (PDF) for the Project to locate infrastructure to avoid and minimise disturbance to Matters of National Environmental Significance (MNES) and other environmental values. The PDF is displayed in Figure 2.

The PDF was developed following multiple ecological surveys, field scouting, and desktop planning revisions to avoid impacts to MNES and other environmental values. The process for locating infrastructure, developing the PDF, and defining environmental constraints is described in the following sections of this document – that being the *Santos Roma Phase 7-7B-SD20 Development Environmental Protocol for Constraints Planning and Field Development Constraints Protocol* (Constraints Protocol).

This Constraints Protocol was informed by multiple field-based scouting and ecological surveys undertaken in 2022-2024 (refer to the *Roma Phase 7-7B SD20 Development Matters of National Environmental Significance Ecological Assessment Report* (Boobook, 2025)) for further detail.

Santos undertook multiple revisions of the PDF to refine the layout to avoid disturbance to MNES and other environmental values. Proposed infrastructure has largely been located in cleared agricultural land with minimal disturbance to MNES values proposed. No disturbance to Threatened Ecological Communities (TECs) is proposed. Disturbance footprint iterations (and associated disturbance areas) are displayed in Figure 3 and detailed in Table 1.

Table 1: Disturbance footprint iterations and disturbance areas

Footprint Version	Constraints and Disturbance Areas		
	TEC	Other Remnant / Regrowth Vegetation	General Ephemeral Wetland Habitat
Original	5.24 ha	2.78 ha	NA*
Desktop Review	3.41 ha	1.90 ha	NA*
Field Scouted	0.11 ha	0.30 ha	0.93 ha
Final (PDF)	**Nil**	**0.30 ha**	**0.60 ha**

*General ephemeral wetland habitat was not ground-truthed in the Project Area until after the scouting phase.

1.3. Purpose and scope

As discussed in Section 1.2, Santos has developed a PDF for the Project Area to locate infrastructure to avoid and minimise disturbance to MNES and other environmental values.

However, due to the nature of gas field development, there is a possibility that the PDF and planned infrastructure locations may need to be modified in future (post-EPBC Act approval) due to unforeseen constraints (e.g. environmental, cultural heritage and landholder constraints), engineering requirements, or changes to EA conditions and regulatory requirements.

Any changes to the PDF would need to comply with maximum disturbance limits specified in Section 2.1.1, Table 3 (and any EPBC Act approval requirements or conditions).

Therefore, the purpose of this document is to:

a) describe the constraints framework for the Project Area (refer to Section 3)
b) ensure any future changes to PDF throughout the life of the Project are undertaken in accordance with this Constraints Protocol (as described in Section 3)
c) undertaken in accordance with maximum disturbance limits (refer to Section 2.1.1, Table 3); and

d) ensure development is undertaken in accordance with the following legislative requirements and supporting documents:

- EPBC Act, including:
  - maximum disturbance limits to MNES as described in Section 2.1; and
  - any post-EPBC Act approval authorised disturbance limits and conditions.
- EP Act, including:
  - compliance with relevant EA conditions as described in Section 3; and
- project commitments identified in the relevant supporting documentation, including the following:
  - Santos Roma Phase 7-7B-SD20 Development -
    - *MNES Ecological Assessment Report (Boobook, 2025)*
    - *Environmental Management Plan (EMP) (Santos, 2025a)*
    - *Rehabilitation and Monitoring Plan (RMP) (Santos, 2025b)*
    - *Significant Species Management Plan (SSMP) (Santos, 2025c)*
    - *Water Resource Impact Assessment Report (WRA) (KCB, 2025); and*
    - *Chemical Risk Assessment Framework (CRAF) (Santos, 2025d).*

This Constraints Protocol will be applied throughout the life of the Project for each stage of development including infrastructure planning and design, construction, operation, and decommissioning and rehabilitation. It is most important during infrastructure planning and design when development activities are sited and provides an effective method to locate wells and infrastructure in the most unconstrained areas of a project area.

This Constraints Protocol will be revised or updated from time-to-time to align with regulatory requirements. Revised versions of the Constraints Protocol will be made available upon request to Department of Climate Change, Energy, the Environment and Water (DCCEEW) or as otherwise required under conditions of a regulatory approval, whether under the EPBC Act or any other applicable legislation.

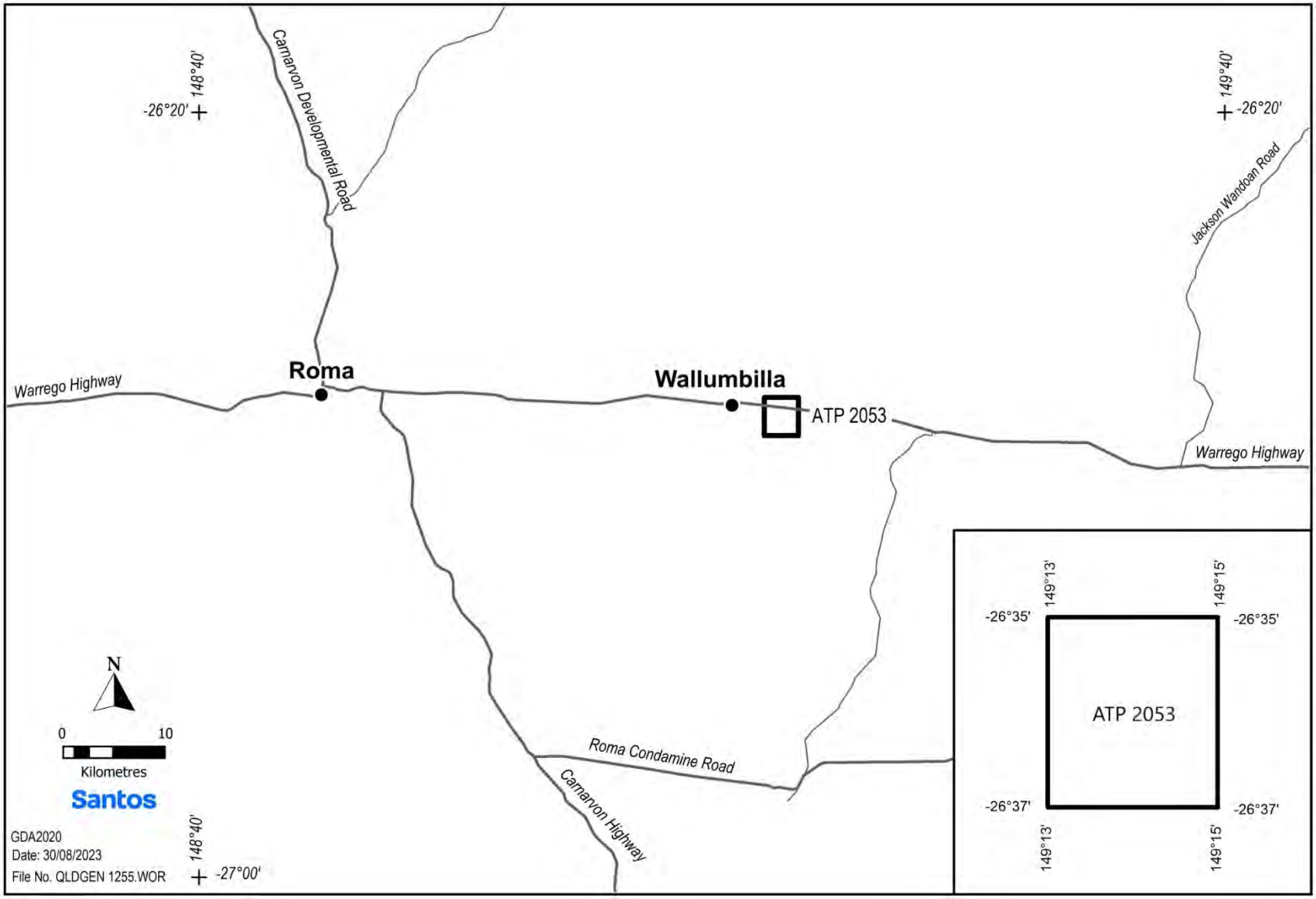

Figure 1: Santos Roma Phase 7-7B-SD20 – Project Area (ATP 2053)

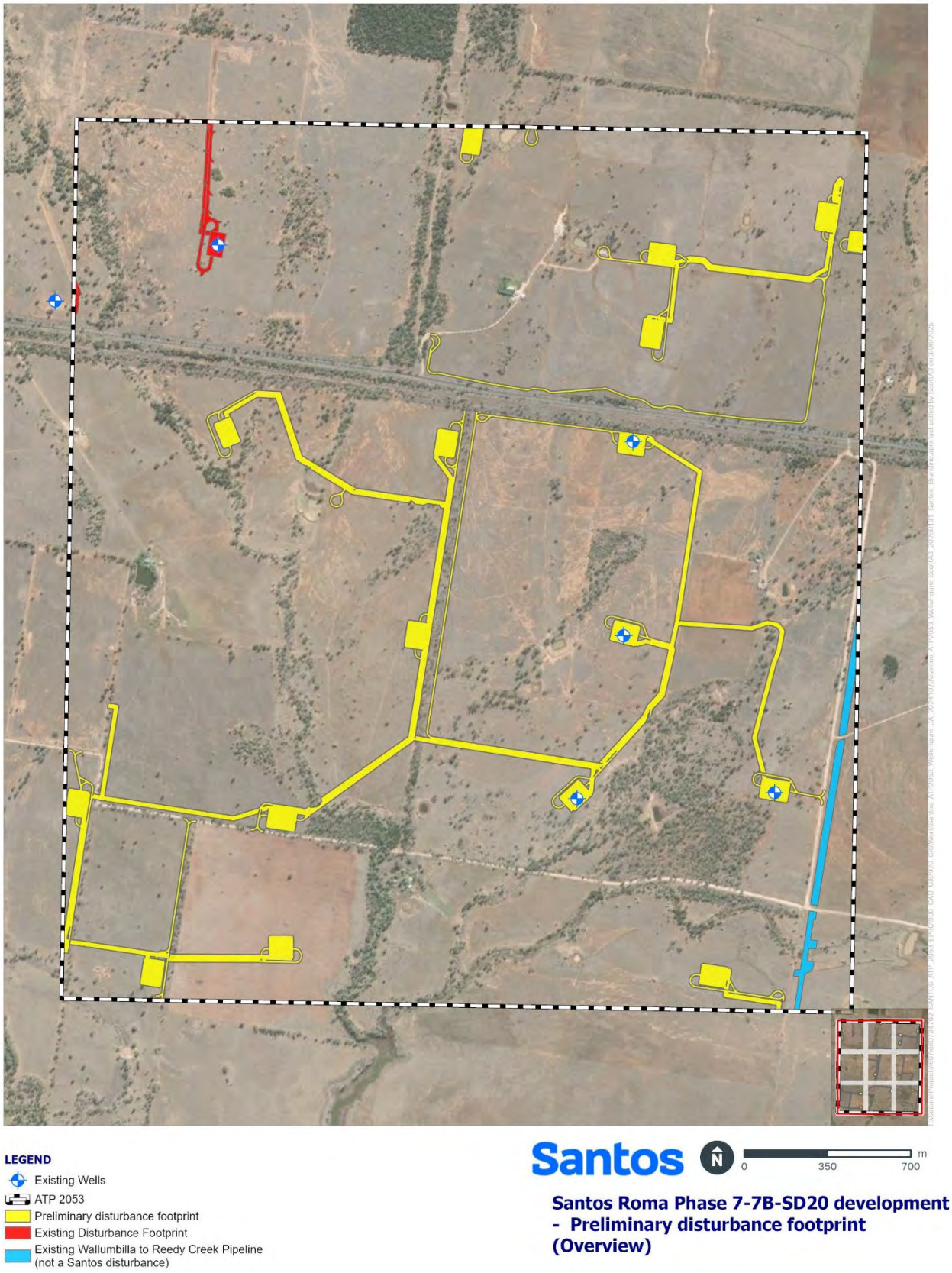

Figure 2: Santos Roma Phase 7-7B-SD20 – Preliminary Disturbance Footprint

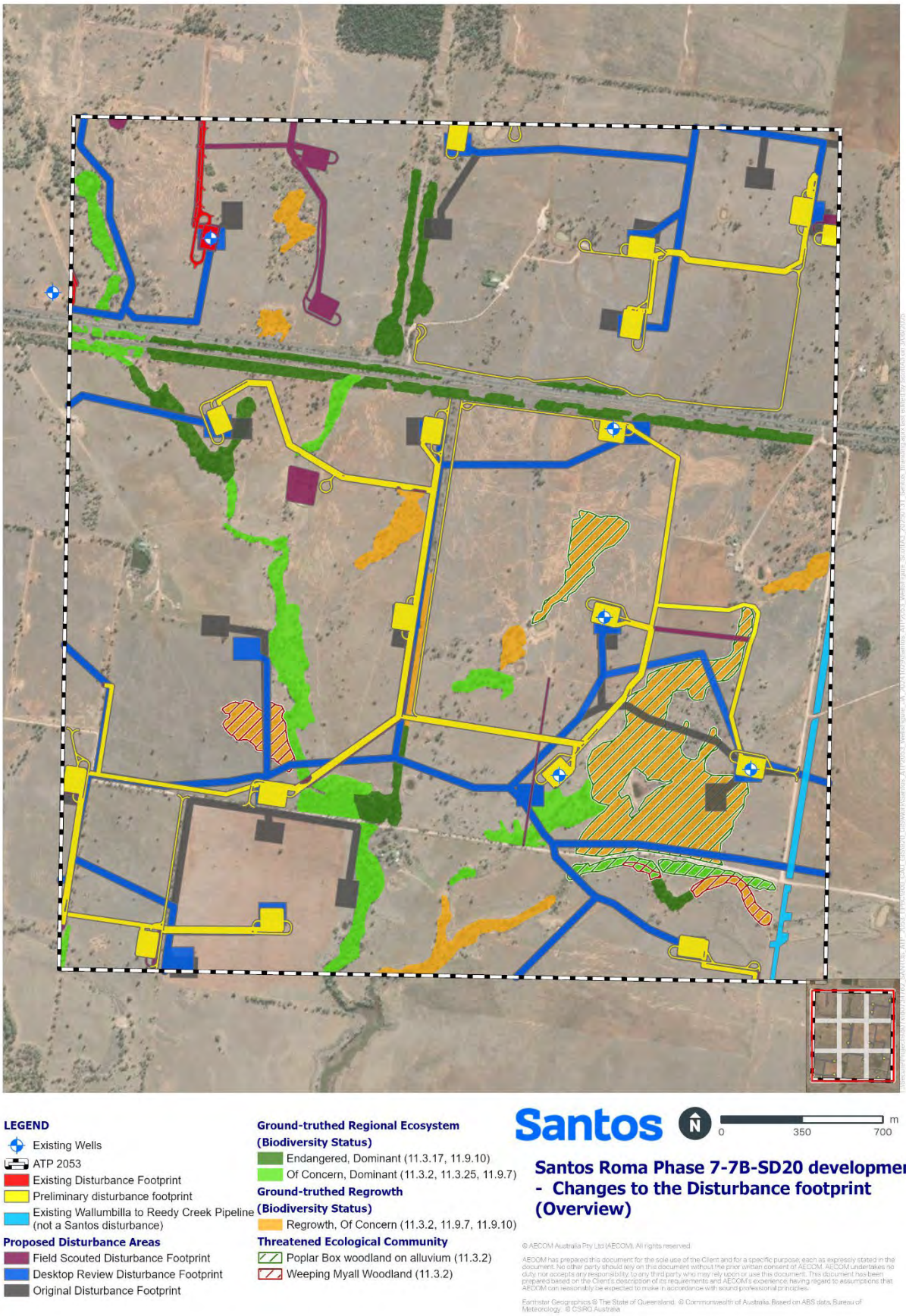

Figure 3: Santos Roma Phase 7-7B-SD20 – Disturbance footprint iterations

2. Existing Environment and MNES

The Project Area is located in central-eastern Qld in the southern extent of the Brigalow Belt Bioregion (BRB). The BRB is characterised by *Acacia harpophylla* (Brigalow) forests and woodlands on clay soils, however large areas of Brigalow have been historically cleared for agricultural purposes (Sattler & Williams, 1999).

The Project Area is predominantly rural land characterised non-remnant derived grasslands dominated by introduced pastoral grasses with occasional native trees and shrubs. Much of the Project Area has been cleared of native vegetation to form non-remnant derived grassland dominated by introduced pastoral grasses with occasional native trees and shrubs.

Areas of remnant and regrowth native vegetation occur as irregular, discontinuous corridors along streamlines or as small, isolated fragments. River Red Gum (*Eucalyptus camaldulensis*) dominates riparian woodland along the banks of larger streams, while Poplar Box (*E. populnea*) dominates floodplain woodlands. Brigalow (*Acacia harpophylla*) and /or Belah (*Casuarina cristata*) are prominent in areas of heavy soil and patches of Weeping Myall (*A. pendula*) occur on floodplains. Some low-lying areas have groundcover dominated by characteristic wetland fringe plants including sedges, Nardoo (*Marsilea* spp.), forbs and grasses. These floodplain wetlands include areas of non-remnant vegetation and modified drainage structures such as channels and overflow areas around dams (Boobook, 2025).

The likelihood of MNES values occurring in the Project Area was determined through detailed review of multiple resources including:

- State and Commonwealth databases and Geographical Information System (GIS) data
- peer-reviewed literature and previous studies
- results of ecological field assessments; and
- current (known) distribution range and the presence and condition of suitable habitat within the Project Area.

Refer to Boobook (2025) for further detailed information on the ecological assessment methodology, including the likelihood of occurrence assessment methodology.

MNES assessed to potentially, likely or be known to occur within the Project Area were limited to EPBC Act listed threatened fauna species and migratory species and their potential habitat. Two TECs are known to occur in the Project Area. MNES determined to potentially, likely or be known to occur within the Project Area are listed in Table 2. Predicted mapping of threatened species habitat where it intercepts the PDF is displayed on Figure 4. No MNES threatened plant species or habitat were detected during field surveys, and no MNES threatened flora species are expected to occur within the Project Area. No Wetlands of International or National Significance occur within the Project Area, however limited general ephemeral wetland areas are present.

The Project Area is unlikely to harbour an ecologically significant proportion of any listed migratory species' population. Development of the Project is unlikely to reduce the geographic range of any of these species and the Project Area does not otherwise contain or constitute important habitat for these species. Therefore, the proposed action is unlikely to result in significant impacts on any listed migratory species (Boobook, 2025).

Refer to Boobook (2025) for further detailed information on the ecology of the Project Area.

Table 2: MNES – Likelihood of occurrence in the Project Area (adapted from Boobook, 2025)

MNES	EPBC Act Status	Likelihood of Occurrence[1]
Threatened Ecological Communities		
Poplar Box Grassy Woodlands on Alluvial Plains	Endangered	Known / Present
Weeping Myall Woodlands	Endangered	Known / Present
Birds		
Sharp-tailed sandpiper (*Calidris acuminata*)	Vulnerable, Migratory	Potential
Glossy black-cockatoo (eastern) (*Calyptorhynchus lathami lathami*)	Vulnerable	Potential
Latham's snipe (*Gallinago hardwickii*)	Vulnerable, Migratory	Potential
White-throated needletail (*Hirundapus caudacutus*)	Vulnerable, Migratory	Likely
Australian painted snipe (*Rostratula australis*)	Endangered	Potential
Migratory Birds		
Fork-tailed swift (*Apus pacificus*)	Migratory	Likely
White-throated Needletail (*Hirundapus caudacutus*)	Migratory, Vulnerable	Likely
Common Sandpiper (*Actitis hypoleucos*)	Migratory	Potential
Sharp-tailed Sandpiper (*Calidris acuminata*)	Migratory	Potential
Pectoral Sandpiper (*Calidris melanotos*)	Migratory	Potential
Latham's Snipe (*Gallinago hardwickii*)	Migratory, Vulnerable	Potential
Mammals		
Koala (*Phascolarctos cinereus*)	Endangered	Potential
Reptiles		
Yakka skink (*Egernia rugosa*)	Vulnerable	Potential
Grey snake (*Hemiaspis damelii*)	Endangered	Potential

Note: EPBC Act 'Marine' listed species, and species identified unlikely to be present within the Project Area, have been excluded from Table 2.

Figure 4: Predicted threatened species habitat mapping where it intercepts the PDF (adapted from Boobook, 2025)

2.1. Proposed disturbance

The PDF for the development covers approximately 66 hectares (ha) of land highly disturbed due to agriculture.

This disturbance area is inclusive of existing petroleum activities undertaken by Santos in the Project Area to date, that is, the drilling and completion of 5 CSG appraisal wells (RM23-21-1, RM23-43-1, RM23-42-1, RM23-41-1 and RM23-46-1) and construction of associated infrastructure in 2022-2024.

As discussed in Section 1.2, Santos undertook multiple revisions of the PDF to refine the layout to avoid disturbance to MNES and other environmental values. Refer to Figure 3 and detailed in Table 1 for a detailed description of the disturbance footprint iterations and associated disturbance areas.

2.1.1. Maximum disturbance limits – MNES

The PDF intersects small areas of potential habitat for EPBC Act-listed threatened fauna species (MNES). These small disturbance areas could not be avoided due to engineering and construction requirements.

MNES that will be disturbed in the Project Area are summarised in Table 3, and further detailed in Table 4.

No TECs occur within the PDF, and therefore no impact on TECs is proposed.

Direct impacts to MNES must not exceed the maximum disturbance limits stated in Table 3.

Table 3: Maximum disturbance limits

Habitat Type / Potentially Suitable REs	Maximum Disturbance Limit	Reference Santos GIS Dataset
General Wetland Habitat^	0.60 ha	Environmental Fauna Habitat Features Layer (Regions)
RE 11.3.2 (remnant)	0.15 ha	Remnant Vegetation Bio Ground Truth Layer
RE 11.3.2 (regrowth)	0.15 ha	

Key / Notes:

- ^Definition of General Wetland Habitat as per Boobook (2025).
- Geographical Information System (GIS)
- Regional Ecosystems (REs)
- Maximum Disturbance Limits are equivalent to the mapped extent of potential habitat (ha) located within the PDF.

Table 4: Extent and maximum disturbance limits for Fauna in the Project Area (adapted from Boobook, 2025)

Species Name	Habitat Type / Potentially Suitable REs	Mapped Extent of Habitat within the Project Area (ha)	Maximum Disturbance Limit (ha)	Habitat Mapping Rules
Calidris acuminata Sharp-tailed Sandpiper	N/A (No ground-truthed RE in the Project Area are wetland REs)	General Wetland Habitat: 7.31	General Wetland Habitat: 0.60	No ground-truthed RE located in the Project Area are wetland REs. Mapped General Wetland Habitat includes any ground-truthed wetlands and farm dams.
Calyptorhynchus lathami lathami Glossy Black-Cockatoo	Primary Habitat Habitat: REs 11.3.17, 11.9.10 General Habitat: REs 11.3.2, 11.3.25, 11.9.7 (Remnant and regrowth REs)	Primary Habitat: 37.12 General Habitat: 107.61	Primary Habitat: Nil General Habitat: 0.30 (RE 11.3.2)	This species requires suitable Casuarina or Allocasuarina feed trees and large hollow-bearing eucalypts for nesting and roost sites. Primary Habitat includes remnant and regrowth RE with moderate to high abundance of food trees being Casuarina and / or Allocasuarina spp. Mapped General Habitat includes remnant and regrowth RE that may contain suitable nesting features and / or a lower abundance of food trees and / or presence lesser utilised food trees.
Gallinago hardwickii Latham's Snipe	N/A (No ground-truthed RE in the Project Area are wetland REs)	General Wetland Habitat: 7.31	General Wetland Habitat: 0.60	No ground-truthed RE located in the Project Area are wetland REs. Mapped General Habitat includes any ground-truthed wetlands and dams.
Hirundapus caudacutus White-throated Needletail	Primary Habitat: N/A General Habitat: REs 11.3.2, 11.3.17, 11.3.25, 11.9.7, 11.9.10 (Remnant and regrowth REs)	Primary Habitat: Nil General Habitat: 144.72	Primary Habitat: Nil General Habitat: 0.30 (RE 11.3.2)	This species feeds aerially over all habitat types. Mapped General Habitat includes all remnant and regrowth REs.
Rostratula australis Australian Painted Snipe	N/A (No ground-truthed RE in the Project Area are wetland REs)	General Habitat: 7.31	General Habitat: 0.60	No ground-truthed RE located in the Project Area are wetland REs. Mapped General Habitat includes any ground-truthed wetlands and dams.

Species Name	Habitat Type / Potentially Suitable REs	Mapped Extent of Habitat within the Project Area (ha)	Maximum Disturbance Limit (ha)	Habitat Mapping Rules
Phascolarctos cinereus Koala	Primary Habitat: REs 11.3.2, 11.3.25, 11.9.7 General Habitat: REs 11.3.17, 11.9.10 (Remnant and regrowth REs)	Primary Habitat: 107.62 General Habitat: 37.12	Primary Habitat: 0.30 (RE 11.3.2) General Habitat: Nil	Mapped Primary Habitat includes all remnant and regrowth RE dominated by *Myrtaceae* species containing known food trees e.g. *Eucalyptus populnea, E. camaldulensis*. General Habitat comprises other RE that may contain a lower abundance of food trees or less preferred food species within the family *Myrtaceae*.
Egernia rugosa Yakka Skink	Primary Habitat: RE 11.3.2 General Habitat: REs 11.3.17, 11.9.10 (Remnant and regrowth REs)	Primary Habitat: 84.79 General Habitat: 37.12	Primary Habitat: 0.30 (RE 11.3.2) General Habitat: Nil	Mapped Primary Habitat is based on known records within the nominated RE and includes all remnant and regrowth of the nominated RE. Mapped General Habitat includes all remnant vegetation and regrowth of the nominated RE. This may include sub-
Hemiaspis damelii Grey Snake	Primary Habitat: N/A General Habitat: REs 11.3.2, 11.3.17, 11.3.25 (Remnant and regrowth REs)	Primary Habitat: Nil General Habitat: 144.72	Primary Habitat: Nil General Habitat: 0.30 (RE 11.3.2)	Mapped General Habitat includes all remnant and regrowth of the nominated REs.

Key / Notes:

- Regional Ecosystems (REs)
- Maximum Disturbance Limit is equivalent to the mapped extent of potential habitat (ha) located within the PDF.

3. Constraints Framework

3.1. Streamlined model EA conditions

To enable commercial gas production activities within the Project Area, a new Petroleum Lease (PL) will need to be applied for and granted under the requirements of Chapter 2 of the *Petroleum and Gas (Production and Safety) Act 2004* (Qld) (P&G Act) to replace the existing ATP. Further, to authorise commercial gas production activities in the PL, a new EA under the EP Act will also need to be applied for and granted.

The Queensland Government's streamlined model conditions (ESR/2016/1989 Version 2.04) published by the Department of Environment, Science and Innovation (DESI) (2024) describe standard EA conditions to be included in new EAs to authorise petroleum activities / commercial gas production on new ATPs and PLs.

These conditions are likely to be included in the new EA (once granted) to enable commercial petroleum production activities in the Project Area. EA conditions (as per *ESR/2016/1989 - Biodiversity Conditions 4 and 5*, (DESI, 2024)) require disturbances associated with petroleum developments to be selected in accordance with the following site planning principles:

- maximise use of areas of pre-existing disturbance
- in order of preference, avoid, minimise or mitigate any impacts, including cumulative impacts, on areas of native vegetation or other areas of ecological value
- minimise disturbance to land that may result in land degradation
- in order of preference, avoid then minimise isolation, fragmentation, edge effects or dissection of tracts of native vegetation; and
- in order of preference avoid then minimise clearing of native mature trees.

Linear infrastructure construction Right of Ways (RoW) must:

- maximise co-location
- be minimised in width to the greatest possible extent; and
- for linear infrastructure that is an essential petroleum activity authorised in an Environmentally Sensitive Area (ESA) or its protection zone, be no greater than 40 m in total width.

The abovementioned EA conditions described in this Constraints Protocol will be revised and updated as required (e.g. following granting of the new EA to authorise commercial gas production activities in the Project Area).

This Constraints Protocol will be revised or updated from time-to-time to align with regulatory requirements. Revised versions of the Constraints Protocol will be made available upon request to DCCEEW or as otherwise required under conditions of a regulatory approval, whether under the EPBC Act or any other applicable legislation.

3.2. Avoid, minimise and mitigate

The constraints framework is based on the hierarchy of management principles to avoid, minimise and mitigate land disturbance and impacts on MNES when planning for and implementing petroleum activities in the Project Area:

1. avoid – avoiding direct and indirect adverse environmental impacts where practicable
2. minimise – minimise direct and indirect adverse environmental impacts where these cannot be avoided

3. mitigate – implement mitigation and management measures to minimise direct, indirect and cumulative adverse impacts; and
4. remediate and rehabilitate – actively remediate and rehabilitate impacted areas to promote and maintain long-term recovery.

Following implementation of the above principles, where required, provide suitable environmental offsets for activities that result in significant impacts to MNES (note that Environmental offsets are not expected to be required for this project).

Actions taken to follow the mitigation hierarchy are highlighted in Figure 5.

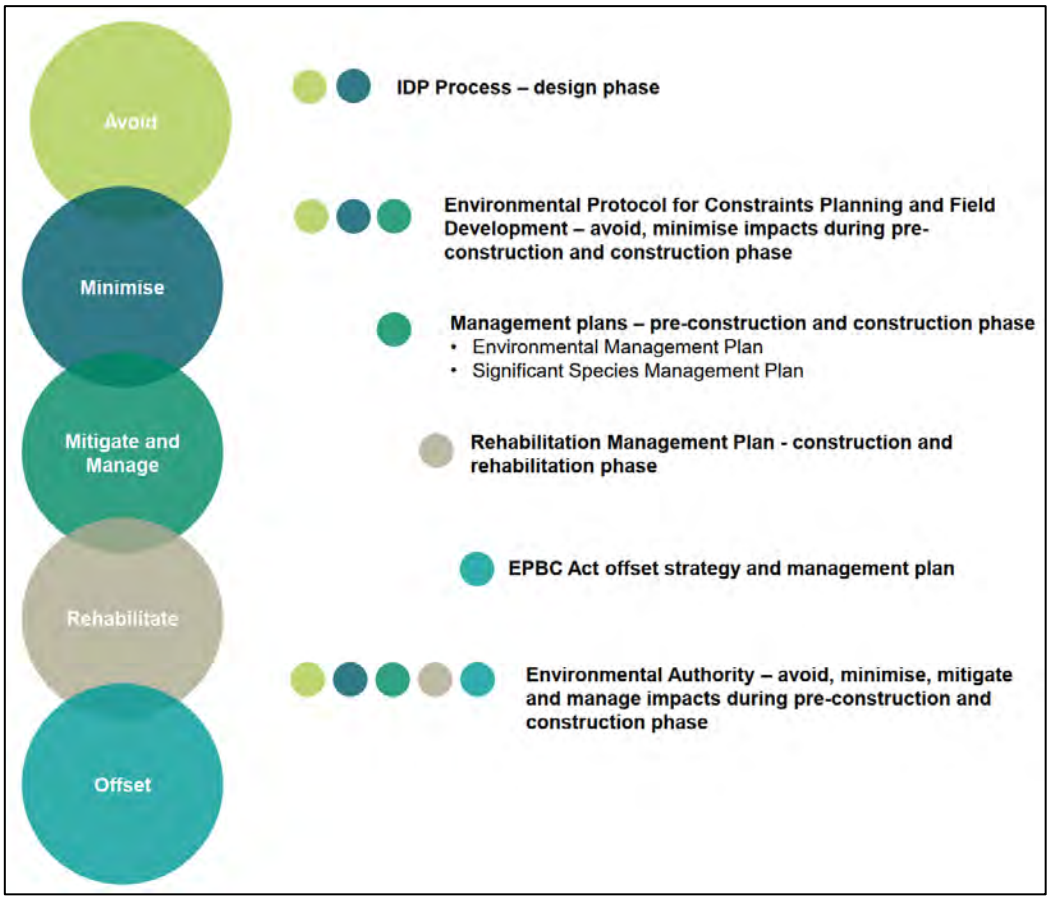

Figure 5: Mitigation hierarchy actions for the Project

The following sections describe the key components of the constraints framework and how they have been utilised in the planning of development to ensure minimal impact, and in particular, avoidance of impacts to MNES. The key inputs to this process are MNES habitat and constraints mapping, and the Queensland Government's streamlined model conditions for petroleum activities in relation to biodiversity (ESR/2016/1989, DESI, 2024).

Whilst these inputs have been used in the early planning stages of the Project, such as defining the 'No-go areas', avoidance areas, buffers and the development of maximum disturbance limits, they will also be integral to implementation of the constraints framework during the Project's detailed infrastructure design and siting stage (as further described in Section 4). This constraints framework may also be updated following the EPBC Act decision and / or approval conditions, and when final EA conditions are granted.

3.3. Habitat mapping

Habitat mapping for the Project Area forms the basis of the constraints mapping and includes all potential habitat for MNES fauna species and TECs identified as known, likely or potentially occurring in the Project Area (Boobook, 2025). It was developed by applying ecological field-validated data (e.g. ground-truthed RE, TEC and wetland mapping areas) to habitat definitions that were formulated for each relevant MNES utilising relevant ecological guidance. The methodology used to create the habitat mapping utilised information contained in the DCCEE) Species Profile and Threats Database (SPRAT) (DCCEEW, 2024), conservation advice and recovery plans. Refer to Boobook (2025) for further details on the MNES habitat mapping methodology.

Where ecological field validation surveys have occurred in the Project Area, there is high confidence in the habitat mapping. As such, habitat mapping should be treated as the point of truth and may only be altered following further detailed ecological assessment by a suitably qualified ecologist as described in Section 4.2.

3.4. Streamlined model biodiversity conditions

Queensland Government streamlined model conditions (ESR/2016/1989 Version 2.04) (DESI, 2024), describe activities that are permissible in different ESA's and the limits of impact to the prescribed environmental matters (PEMs). These are discussed below and will be updated when final EA conditions are granted.

3.4.1. Environmentally Sensitive Areas

Development of the PDF considered ESAs and their corresponding primary and secondary protection zones (PPZs and SPZs, respectively). This also involved reviewing public domain data sets and then applying the ecological field-validated data.

As for MNES, where ecological field validation surveys have occurred in the Project Area, there is high confidence in the ecological receptor mapping. Consequently, ecological receptor mapping should be treated as the point of truth and may only be altered following further detailed ecological assessment by a suitably qualified ecologist as described further in Section 4.2.

In accordance with the streamlined model conditions for petroleum activities, where petroleum activities are to be carried out in ESA's and their protection zones, the petroleum activities must be carried out in accordance with Table 5 below (ESR/2016/1989 Biodiversity Condition 8, DESI, 2024)) unless otherwise authorised in the EA.

Proponents can apply to Department of Environment, Tourism, Science and Innovation (DETSI) for site-specific authorisations to disturb ESAs (and PEMs / Matters of State Environmental Significance (MSES)). This is authorised via approval of an application to amend the EA with DETSI under the requirements of the EP Act.

This Constraints Protocol will be revised or updated from time-to-time to align with regulatory requirements. Revised versions of the Constraints Protocol will be made available upon request to DCCEEW or as otherwise required under conditions of a regulatory approval, whether under the EPBC Act or any other applicable legislation.

Table 5: Petroleum activities in Environmentally Sensitive Areas

ESA Category	Within the ESA	PPZ	SPZ
Category A ESAs	No petroleum activities permitted	Only low impact petroleum activities permitted	Only essential petroleum activities permitted
Category B environmentally sensitive areas that are other than 'endangered' regional ecosystems	Only low impact petroleum activities permitted	Only low impact petroleum activities permitted	Only essential petroleum activities permitted
Category B environmentally sensitive areas that are 'endangered' regional ecosystems	Only low impact petroleum activities permitted	Only essential petroleum activities permitted	Only essential petroleum activities permitted

ESA Category	Within the ESA	PPZ	SPZ
Category C environmentally sensitive areas that are 'nature refuges' or 'koala habitat'	Only low impact petroleum activities permitted	Only low impact petroleum activities permitted	-
Category C environmentally sensitive areas that are 'essential habitat', 'essential regrowth habitat', or 'of concern' regional ecosystems	Only low impact petroleum activities permitted	Only essential petroleum activities	-
Category C environmentally sensitive areas that are 'regional parks' (previously known as 'resources reserves')	Only essential petroleum activities permitted	Only essential petroleum activities permitted	-
Category C environmentally sensitive areas that are 'state forests' or 'timber reserves')	Only essential petroleum activities permitted	Petroleum activities permitted	-
Areas of vegetation that are 'critically limited'	Only low impact petroleum activities permitted	Only essential petroleum activities permitted.	-

Note:

- Primary protection zone (PPZ) means an area within 200m from the boundary of any Category A, B or C ESA.
- Secondary protection zone (SPZ) means an area within 100 metres from the boundary of the primary protection zone.

3.5. Other constraints

There are several other constraints relevant to the Project Area that fall outside the scope of this Constraints Protocol. These constraints include considerations such as landholder preferences and legal agreement requirements, presence of sensitive receptors (e.g. residential houses) and constructability restrictions as well as those prescribed through other legislative mechanisms, cultural heritage sensitivities and requirements, and land use and tenure-based constraints.

These constraints must be considered when planning field development activities, and they have differing levels of influence on the disturbance footprint layout (from outright exclusion to preferential avoidance), and they are not always known until detailed infrastructure design and infrastructure siting / scouting are undertaken.

Santos has undertaken field scouting as part of development of the PDF, however this process cannot identify all possible constraints.

Santos will balance development needs against all constraints (including MNES), ensuring firstly, that activities are compliant with legal obligations including those imposed by a decision on the Project under the EPBC Act and the EA conditions. Notwithstanding, Santos will preferentially locate infrastructure in the lowest ranked constraint category wherever practicable.

3.6. Constraints mapping

Constraints mapping includes environmental, land use, administrative boundaries and existing infrastructure GIS layers.

Detailed ecological assessment has been undertaken across the Project Area. Mapped vegetation communities, habitat types, and associated MNES across the Project Area, as well as potential Biodiversity conditions to be defined in the EA inform the primary constraints data sources for the model.

The constraints mapping has designated areas within the Project Area into four categories to control what infrastructure and activities are permitted to protect inherent values and risks, including:

- no-go areas
- avoid disturbance areas
- minimise disturbance areas; and

- special purpose areas (e.g. farm dams, existing public infrastructure).

Using a GIS, locations of ground-truthed environmental and other values (derived from the Santos GIS and public domain data sets) were plotted for purposes of constraints mapping. The constraints mapping layers will be maintained and updated as required in the Santos GIS. The following sections describe what each constraint area consists of.

3.6.1. No-go areas

No-go areas consist of the following constraints:

- Threatened Ecological Communities (TECs)
- REs 11.9.7 / 11.9.10 / 11.3.17 (Remnant and Regrowth) (no disturbance limit is provided for these REs)
- Waterholes (+100m buffer)
- Watercourses (+100m buffer) (linear infrastructure permitted only)
- High Ecological Significance (HES) Wetlands (+100m buffer); and
- Category A ESAs.

Avoidance and mitigation measures:

- petroleum activities are prohibited from being carried out in No-go areas (unless explicitly authorised in Section 3.6.1 i.e. linear infrastructure permitted only); and
- implementation of mitigation measures and monitoring described in the EMP (Santos 2025a) and SSMP (Santos 2025c).

3.6.2. Avoid disturbance areas

Avoid disturbance areas include the following constraints:

- watercourses (+100m buffer) (linear infrastructure permitted only
- General Ecological Significance (GES) Wetlands (+100m buffer) (linear infrastructure permitted only)
- general wetland habitat (linear infrastructure permitted only)
- REs 11.3.2 / 11.3.25 (Remnant and Regrowth)
- Category B and C ESAs; and
- Category A ESA PPZs.

Avoidance and mitigation measures:

- shifting, reducing, rationalising and co-locating disturbances wherever practicable
- preferentially locating disturbance in pre-existing areas of disturbance
- utilising existing watercourse crossings wherever practicable
- disturbance must not exceed maximum disturbance limits identified in Section 2.1.1, Table 3; and
- implementation of mitigation measures and monitoring described in the EMP (Santos 2025a) and SSMP (Santos 2025c).

3.6.3. Minimise disturbance areas

Minimise disturbance areas include the following constraints:

- all ESA PPZs and SPZs; and

- areas of importance to landholders e.g. cropping land, stock yards, water bores and dams.

Avoidance and mitigation measures

- while all petroleum activities are typically permitted in this constraint area, disturbance will be:
  - rationalised and co-located wherever practicable
  - preferentially located in pre-existing disturbed areas; and
  - discussed with landholders to ensure any impacts to their operations are minimised.
- disturbance must not exceed maximum disturbance limits identified in Section 2.1.1, Table 3; and
- implementation of mitigation measures and monitoring described in the EMP (Santos 2025a) and SSMP (Santos 2025c).

3.6.4. Special purpose areas - dams and constructed wetlands

Dams and constructed wetlands include waterbodies located in the Project Area used for agricultural water supply, where Santos may extract and use water where lawful and permitted by the landholder for construction of the Roma Phase 7-7B-SD20 Development.

Water supply will be needed for construction, dust suppression, vehicle wash down, operations and maintenance activities. Santos estimates it will require approx. 158 megalitres (ML) of water to develop the Project. Water will be required during construction and operation to support development, maintenance, dust suppression, drilling and construction activities.

Produced water (as a byproduct of the CSG extraction process) will be preferentially utilised for these purposes and may be extracted from existing approved dams and portable tanks located in the Project Area and on adjacent tenures in accordance with EA conditions.

In accordance with landholder agreements and regulatory approval requirements, Santos may use water from existing farm dams when supply is abundant and of appropriate quality for the proposed use / activities.

It is noted that some landholders may require Santos to use water sourced on site for construction activities, particularly where a landholder holds organic certification for the property.

Avoidance and mitigation measures:

- preferential use of produced water over other water sources
- extraction from a waterbody will only occur where lawful and permitted by landholder
- a single access point will be used per waterbody (wherever practicable); and
- implementation of mitigation measures and monitoring described in the EMP (Santos, 2025a).

3.6.5. EPBC Act and EP Act

Notwithstanding the constraints detailed in Sections 3.6.1 to 3.6.4 above, all petroleum activities will be undertaken in accordance with obligations imposed by a decision on the proposed action under the EPBC Act and EP Act (i.e. the EA conditions).

This Constraints Protocol will be revised or updated from time-to-time to align with regulatory requirements. Revised versions of the Constraints Protocol will be made available upon request to DCCEEW or as otherwise required under conditions of a regulatory approval, whether under the EPBC Act or any other applicable legislation.

4. Implementation of the Constraints Protocol

The Constraints Protocol will be implemented through Santos' internal development planning, assessment and approval process, known as Integrated Development Planning (IDP).

The IDP process aims to ensure Santos' activities are designed and executed in compliance with relevant State and Commonwealth legislation, regulatory approvals, authorities and other permits, and takes into account environmental, social and other constraints.

The IDP process is carried out for all field development and land disturbance activities during the infrastructure planning and design stage (pre-disturbance) and includes the steps shown in Figure 6.

This process will be applied for every development phase of the Project's development and is key to the avoidance of MNES values for the duration of the proposed action. Each of these steps is described further in the sections below.

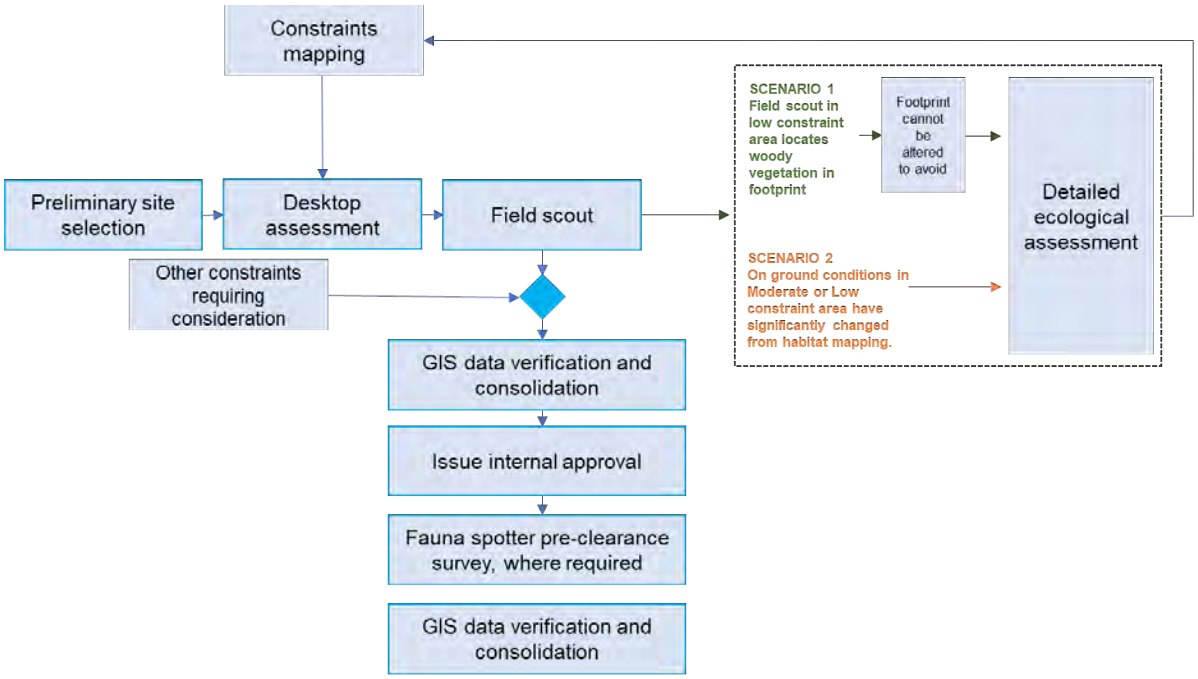

Figure 6: Implementation of the Constraints Protocol via IDP process

4.1. Infrastructure planning and design (pre-disturbance)

The Constraints Protocol is most important during the planning and design phases of a project because it provides an effective method to locate wells and infrastructure in the most unconstrained areas of a project area. Key steps in this phase are outlined in the sections below.

As Santos has already developed a PDF and maximum disturbance limits for the Project, this Constraints Protocol will predominantly be utilised when post-approval changes are required to the PDF. Further, any changes to the PDF must not exceed the maximum disturbance limits identified in Section 2.1.1, Table 3. Further, where a deviation from the PDF is proposed (i.e. placement of infrastructure outside the PDF), a third-party ecological field survey and assessment (as described in Section 4.2) will be required to document compliance

with the maximum disturbance limits. Where no deviation from the PDF is proposed for the Project, the initial IDP steps described below may be bypassed as they have already been undertaken during development of the PDF.

4.1.1. Preliminary site selection

Santos' disturbance initiation process starts with the determination of the area subject to internal approval. The internal approval area determination can be for a large-scale program or for smaller discrete work packages.

Initial well locations, as well as the number and configuration of wells, are identified based on sub-surface targets, and knowledge of and demand for the resource. Preliminary gas and water gathering lines are designed to link wells to connector or transmission pipelines.

4.1.2. Ecological field survey

Prior to undertaking the desktop assessment process (and sometimes also before preliminary site selection), Santos typically engages a suitably qualified ecologist to undertake broadscale ecological field survey of the project area as described in Section 4.2. The outputs of this survey/s include a detailed ecological assessment report and creation of GIS data of ground-truthed environmental values. This information is then utilised during the desktop assessment (refer to Section 4.1.3) to position infrastructure to avoid constraints in accordance with this Constraints Protocol.

4.1.3. Desktop assessment

Preliminary well locations and linear infrastructure designs are assessed using available desktop information by a multi-disciplinary team.

The team typically includes representatives from GIS, environment, cultural heritage, land access, geology / subsurface, engineering and project management teams.

The desktop assessment involves:

- identifying the appropriate external approvals and regulatory permits that the activities must be assessed against
- assessing the preliminary well locations and linear infrastructure designs against mapped constraints in the GIS, high resolution aerial imagery and the Constraints Protocol
- refining well locations and linear infrastructure to ensure compliance with the Constraints Protocol and minimise impacts on known constraints, including mapped MNES and EA conditions; and
- identifying potential access points.

Opportunities to further reduce impacts to MNES and comply with EA conditions will be maximised during the desktop phase by prioritising avoidance in accordance with this Constraints Protocol.

When refining well locations and linear infrastructure the priorities for avoidance outlined in this Constraints Protocol will be implemented. The output of the desktop assessment will be the concept infrastructure (desktop) IDP layer and will be available in the Santos GIS.

4.1.4. Field scout / supplementary ecological field survey

Following the desktop assessment, Santos representatives carry out a detailed field scout of the concept infrastructure (desktop) IDP layer. Further, if present, the landholder will be consulted on the proposed layout and site access, and any requests to reduce impacts to property operations or infrastructure.

Where a deviation from the PDF is proposed (that would comply or result in less disturbance to MNES maximum disturbance limits as identified in Section 2.1.1, Table 3), a supplementary ecological field survey will be undertaken to confirm on-ground biodiversity values (as detailed in Section 4.2).

During the field scout / ecological survey, site conditions are recorded including any environmental constraints and existing infrastructure. Draft refinements to the design will be made, if possible, to mitigate disturbance to constraints areas and other environmental features such as hollow bearing trees and koala food trees.

If the field scout / ecological survey identifies environmental constraints that would prohibit compliance with the MNES maximum disturbance limits (refer to Section 2.1.1, Table 3), then the infrastructure would be re-located to an alternative location in real-time, or the IDP desktop assessment process would be restarted to identify a suitable alternative location to minimise disturbance to MNES. Confirmation of on-ground environmental values / MNES will be provided in a detailed ecological assessment report in accordance with Section 4.2.

4.1.5. GIS data verification and consolidation

Following completion of the field scout / ecological survey, the field validated values and any refinements made to the design / layout are uploaded into relevant spatial layers the Santos GIS e.g. the Remnant Vegetation Bio Ground Truth Layer.

4.1.6. Issue internal approval

After design refinements based on field scouting and ecological assessments are complete, the final design / layout of the proposed activity is issued to Santos' internal approval teams for final review against relevant environmental, land access and other approval requirements, including any obligations imposed by a decision on the proposed action under the EPBC Act and EP Act (i.e. the EA conditions).

The internal approval will identify the authorised activities under the approval, extent and limits of disturbance permitted for those activities, any environmental exclusion zones and environmental mitigations required. Once the internal approval has been granted, development activities can proceed subject to requirements of the internal approval.

4.1.7. Fauna Spotter / Catcher pre-clearance survey

For development that receives internal approval in any areas containing woody vegetation, a pre-clearance survey will be undertaken by a suitably qualified fauna spotter catcher.

Pre-clearance surveys are to be undertaken just prior to clearing activities. The Fauna Spotter / Catcher will also be present and supervise all clearing works. The management and relocation of any captured fauna is to be undertaken in accordance with the EMP (Santos 2025a) and SSMP (Santos 2025c).

4.2. Ecological Assessment Requirements

Ecological field surveys and associated reporting and GIS mapping of MNES have been undertaken for the Project Area (as described in Section 2).

Where a deviation from the PDF is proposed (i.e. placement of infrastructure outside the PDF), a third-party ecological field survey, report and updated GIS mapping will be required to document compliance with the maximum disturbance limits in Section 2.1.1, Table 3.

Ecological field surveys, reporting and GIS mapping undertaken for the Project Area must comply with the methodology outlined in Boobook (2025), which is consistent with DETSI and DCCEEW ecological survey and reporting requirements and relevant guidelines and criteria e.g. TEC threshold criteria, RE survey and mapping requirements.

The findings of any supplementary ecological assessments will be document in ecological assessment reports, and reflected in updated constraints mapping for the Project Area, as well as in this Constraints Protocol and other supporting documents as necessary. Santos will maintain accurate records (e.g. ecological assessment reports and GIS mapping data) to demonstrate ecological field surveys and assessments were conducted in a manner consistent with this Constraints Protocol.

4.3. Post-disturbance requirements

4.3.1. Recording and tracking disturbances

Disturbance to MNES will be recorded in the Santos GIS and tracked relative to the maximum disturbance limits in Section 2.1.1, Table 3. Where disturbance to MNES values is required, the following details will be recorded:

- location and type of infrastructure or activity
- internal approval reference (IDP reference number)
- environmental constraint / MNES value disturbed; and
- extent of disturbance in relation to the maximum disturbance limits.

The information will be recorded and maintained so that it can be audited. Disturbance data will be regularly updated in the Santos GIS to allow tracking of cumulative disturbances against the maximum disturbance limits.

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Santos Roma Phase 7-7B-SD20 Development

REHABILITATION MONITORING PLAN

February 2025

Document Status

Date	Rev	Reason For Issue	Author	Checked	Approved
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Glossary

Term	Definition
ADP	Advanced Depletion Pilots
AHD	Australian Height Datum
ATP	Authority to Prospect
BD	Biodiversity
CCA	Conduct and Compensation Agreements
CSG	Coal Seam Gas
DESI	Department of Environment, Science and Innovation, Queensland Government (now DETSI)
DETSI	Department of the Environment, Tourism, Science and Innovation, Queensland Government
EA	Environmental Authority
EMP	Santos Roma Phase 7-7B-SD20 Development Environmental Management Plan
EP Act	Environmental Protection Act 1994
EPBC Act	Commonwealth Environment Protection and Biodiversity Conservation Act 1999
EPQ	Exploration Permit Greenhouse Gas
ESA	Environmentally Sensitive Area
ESC	Erosion and sediment controls
FRC	Final Rehabilitation acceptance Criteria
FRR	Final Rehabilitation Register
GDE	Groundwater Dependent Ecosystem
GFD	Gas Field Development
GIS	Geographic Information System
GLNG	Gladstone Liquefied Natural Gas
ha	hectares
HES	High Ecological Significance
HEV	High Ecological Value
JV	Join Venture
km	kilometres
m	metres
MNES	Matters of National Environmental Significance, being the relevant matters protected under Part 3 of the EPBC Act.
PESCC	Petroleum Exploration Standard Condition (Schedule C)
PESCD	Petroleum Exploration Standard Condition (Schedule D)
PL	Petroleum Lease
Project Area	The bounds of ATP 2053
RE	Regional Ecosystem
RMP	Santos Roma Phase 7-7B-SD20 Development Rehabilitation Monitoring Plan
RoW	Right of Way
SDS	Safety Data Sheet
SF	State Forests
SSMP	Santos Roma Phase 7-7B-SD20 Development Significant Species Management Plan
TRC	Transitional Rehabilitation Criteria
VMA	Vegetation Management Act 1999

1. Introduction

Santos and its joint venture partners are proposing a new gas field development located in central-eastern Queensland to supply natural gas to commercial markets. The proposed development will be known as the 'Santos Roma Phase 7-7B-SD20 Development' (the Project).

1.1. Overview

The Project will involve the progressive construction, operation, decommissioning and rehabilitation of up to 24 coal seam gas (CSG) wells, gas and water gathering flowlines and access track infrastructure in petroleum exploration tenure Authority to Prospect (ATP) 2053 (the Project Area). The Project Area is located in central-eastern Queensland, approximately 5 kilometres (km) east of the regional town of Wallumbilla. The regional location of the Project Area is shown in Figure 1.

The Project footprint located in the Project Area will cover approximately 66 hectares (ha) of land. Petroleum exploration activities undertaken by the Santos in the Project Area to date include the drilling and completion of 5 CSG appraisal wells and construction of associated infrastructure in 2022-2024. These activities are authorised under existing approved Queensland Environmental Authority (EA) 0002052. The existing 5 wells form part of the proposed 24 CSG wells.

CSG and water produced from the Project Area will be sent to existing approved centralised gas and water storage / processing and gas compression facilities located on adjacent Santos owned and operated petroleum tenures. Petroleum activities on adjacent tenures are authorised under existing EPBC Act approvals for the Gladstone Liquified Natural Gas Field Development Project (GLNG GFD) (EPBC Numbers 2008/4059 and 2012/6615) and EAs EPPG00898213 and EPPG00662213.

No gas compression or water treatment facilities are proposed to be constructed or operated within the Project Area, and no significant water storage structures will be constructed or operated within the Project Area. Where required, prefabricated water storage tanks (concrete panel tanks or similar) will be assembled for water storage.

The Project will include the following components (but not limited to):

- well leases (typically 1.25 ha for single wells and 3 ha for multi-wells)
- water / gas gathering lines, trunklines and pipelines (typically 20 - 35 metres (m) wide)
- roads and access tracks (typically 10 - 15 m wide)
- other supporting infrastructure:
  - temporary water storage tanks
  - temporary workers camps
  - power and communications lines; and
  - other incidental and ancillary petroleum activities required to support the authorised activity.

Well development will be phased to optimise gas production to meet Santos' gas supply obligations and opportunities. Once operational, gas produced from the Project will supply commercial markets.

Once completed and connected to gas and water gathering infrastructure, operational wells will operate continuously on a 24-hour basis for an anticipated operational life of 30 - 50 years. Progressive decommissioning and rehabilitation of activities and infrastructure will occur over the life of the Project, thereby reducing disturbance areas for the duration of operation, until final decommissioning and rehabilitation at end of project life.

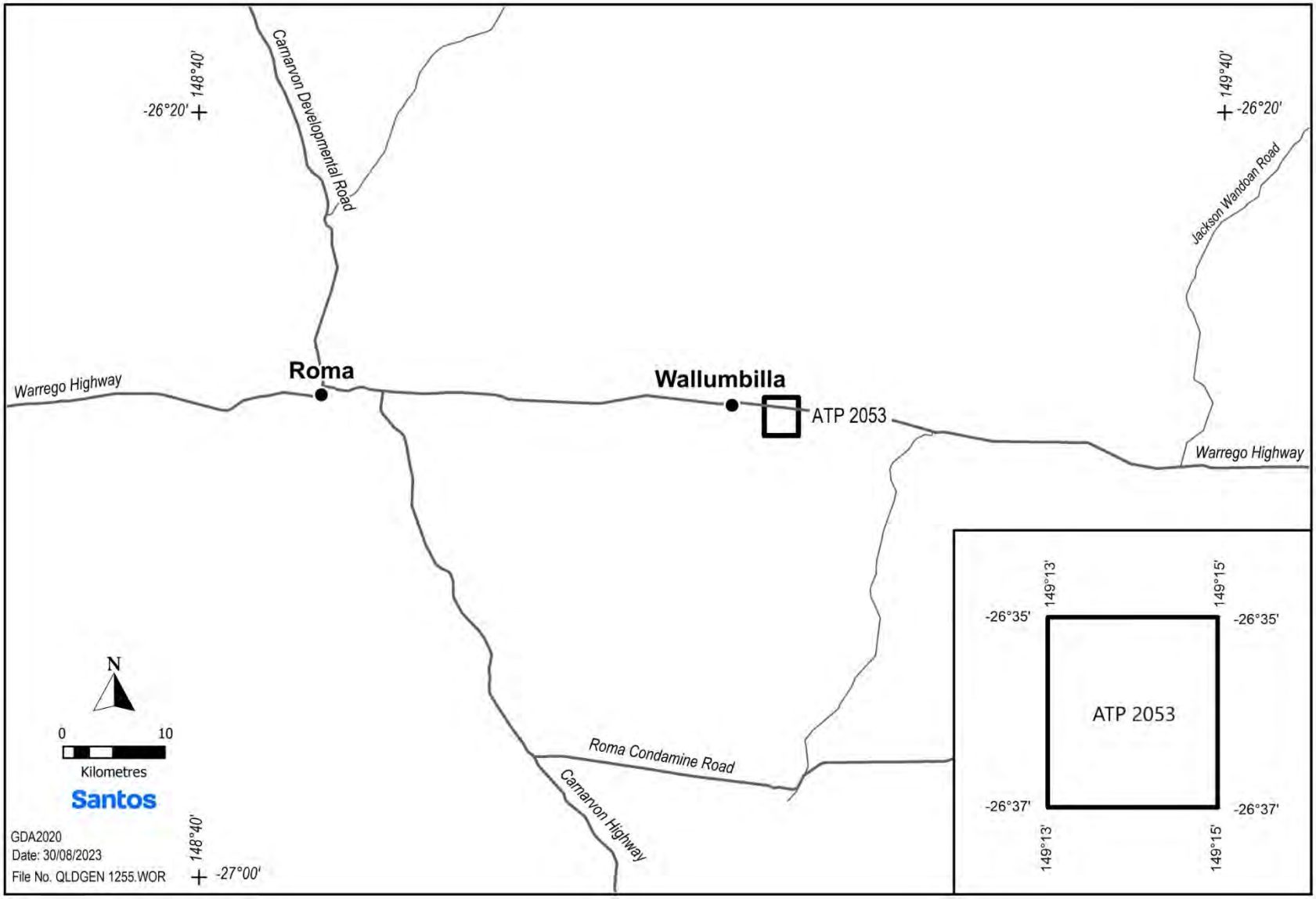

Figure 1: Santos Roma Phase 7-7B-SD20 – Project Area (ATP 2053)

1.2. Purpose and scope

This Rehabilitation Monitoring Plan (RMP) identifies a range of rehabilitation methods required to successfully undertake rehabilitation of land to pre-disturbance land use. This RMP has been developed to meet the requirements of the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act) and *Environmental Protection Act 1994* (Qld) (EP Act).

The RMP identifies rehabilitation monitoring, indicators and acceptance criteria to be met in returning land to a pre-disturbance land use and ecological condition, and it will assist to minimise impacts to MNES through the restoration of land to pre-disturbance land use and ecological condition. This RMP has been written by a suitably qualified person to meet and / or exceed final rehabilitation requirements set out in the Streamlined model conditions for petroleum activities (ESR/2016/1989) (DESI, 2024) (refer to Section 1.3.2).

Santos plans to convert the current exploration tenure for the Project Area (ATP 2053) from an ATP to a new Petroleum Lease (PL). Santos will need to apply for new a PL, granted under Chapter 2 of the Queensland *Petroleum and Gas (Production and Safety) Act 2004* (P&G Act) to replace the existing ATP. To authorise petroleum production activities on the new PL, Santos will also need to apply for a new EA under the EP Act.

By referencing the Streamlined model conditions (DESI, 2024), this RMP has been written to consider likely final rehabilitation requirements (conditions) of the new EA, however it will be revised or updated once the new EA is granted to ensure it complies with any additional conditions.

In addition, this RMP will be revised or updated from time-to-time to align with regulatory requirements. Revised versions of the RMP will be made available upon request to DCCEEW or as otherwise required under conditions of a regulatory approval, whether under the EPBC Act or any other applicable legislation.

1.3. Project approvals

1.3.1. EPBC Act

This Plan has been prepared with consideration to the MNES values potentially impacted by the Project and operates in conjunction with other key documentation including the *Santos Roma Phase 7-7B-SD20 Development Environmental Protocol for Constraints Planning and Field Development* (Constraints Protocol) (Santos, 2024a), *Santos Roma Phase 7-7B-SD20 Development Significant Species Management Plan* (SSMP) (Santos, 2024b) for the implementation of the hierarchy of management principles to avoid, minimise and manage land disturbance impacts on MNES during the Project.

The Project will avoid disturbance to areas confirmed as MNES (as detailed in the Constraints Protocol). Refer to the *Roma Phase 7-7B SD20 Development Matters of National Environmental Significance Ecological Assessment Report* (Boobook, 2025) for a detailed description of MNES present in the Project Area.

This Plan focuses on the following management principle:

- actively rehabilitate disturbed areas to promote and maintain long-term recovery of the values unavoidably impacted by the Project.

1.3.2. EP Act - Streamlined Conditions

As discussed in Section 1.2, this RMP has been developed to achieve compliance with rehabilitation conditions contained in ESR/2016/1989 (and the expected conditions to be contained in a new EA following conversion of the Project Area from an ATP to a PL). Table 1 identifies relevant ESR/2016/1989 conditions as they relate to rehabilitation for this RMP.

For the purposes of this RMP, rehabilitation means:

> "*the process of reshaping and revegetating land to restore it to a stable landform and in accordance with acceptance criteria and, where relevant, includes remediation of contaminated land. For the purposes of pipeline rehabilitation, rehabilitation includes reinstatement, revegetation and restoration*".

Table 1: Relevant Streamlined conditions for rehabilitation

EA Condition Number	Requirement	RMP Section Addressed
Rehabilitation 1	A rehabilitation Plan must be developed by a suitably qualified person and must include the: a) rehabilitation goals; and b) procedures to be undertaken for rehabilitation that will: i. achieve the requirements of conditions (Rehabilitation 2) and (Rehabilitation 8)[1], inclusive; and ii. provide for appropriate monitoring and maintenance	1.2 above
Rehabilitation 2	Significantly disturbed areas that are no longer required for the on-going petroleum activities, must be rehabilitated within 12 months (unless an exceptional circumstance in the area to be rehabilitated (e.g. a flood event) prevents this timeframe being met) and be maintained to meet the following acceptance criteria: a) contaminated land resulting from petroleum activities is remediated and rehabilitated b) the areas are: i. non-polluting ii. a stable landform iii. re-profiled to contours consistent with the surrounding landform c) surface drainage lines are re-established d) top soil is reinstated; and e) either	6.1 below

EA Condition Number	Requirement	RMP Section Addressed
	i. groundcover, that is not declared pest species, is growing; or ii. an alternative soil stabilisation methodology that achieves effective stabilisation is implemented and maintained	
Rehabilitation 3	All significantly disturbed areas caused by petroleum activities which are not being or intended to be utilised by the landholder or overlapping tenure holder, must be rehabilitated to meet the following final acceptance criteria measured either against the highest ecological value adjacent land use or the pre-disturbed land use: a) greater than or equal to 70% of native ground cover species richness b) greater than or equal to the total per cent of ground cover c) less than or equal to the per cent species richness of declared plant pes species; and d) where the adjacent land use contains, or the pre-clearing land use contained, one or more regional ecosystem(s), then at least one regional ecosystem(s) from the same broad vegetation group, and with the equivalent biodiversity status or a biodiversity status with a higher conservation value as any of the regional ecosystem(s) in either the adjacent land or pre-disturbed land, must be present.	4 below 5 below
Rehabilitation 4	Where significant disturbance to land has occurred in an environmentally sensitive area, the following final rehabilitation criteria as measured against the pre- disturbance biodiversity values assessment (required by conditions (Biodiversity 1)[2] and (Biodiversity 2)[3]) must be met: a) greater than or equal to 70% of native ground cover species richness b) greater than or equal to the total per cent ground cover c) less than or equal to the per cent species richness of declared plant pest species d) greater than or equal to 50% of organic litter cover e) greater than or equal to 50% of total density of coarse woody material; and f) all predominant species in the ecologically dominant layer, that define the pre-disturbance regional ecosystem(s) are present.	6 below 7 below
Notes on Final Acceptance Criteria:	Notes on Final Acceptance Criteria: Final acceptance criteria are required in order to provide certainty and finality about when criteria are met. These conditions are critical in order to declare that rehabilitation standards have been met. Final acceptance criteria must be met before the EA can be surrendered. A final rehabilitation report, required to be submitted with a surrender application will demonstrate this. There are no prescribed monitoring standards for rehabilitation as this is inherently required in order to demonstrate compliance with conditions (Rehabilitation 3) and (Rehabilitation 4). The plan of Operations also must contain a program for rehabilitation that sets out how rehabilitation will be carried out. The action program within the Plan of Operations will necessarily include monitoring as this will be the primary means to demonstrate compliance with the rehabilitation and financial assurance conditions of the environmental authority. The onus of proof in relation to the data presented to demonstrate that final acceptance criteria have been met lies with the holder of the environmental authority.	

Table note:

[1] Rehabilitation 8 pertains to remaining dams:

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

[2] Biodiversity 1 pertains to protecting biodiversity values:

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

[3] Biodiversity 2 pertains to protecting biodiversity values:

- A suitably qualified person must develop and certify a methodology so that condition (Biodiversity 1) can be complied with and which is appropriate to confirm on-the-ground biodiversity values.

2. Roles and Responsibilities

Santos's personnel are responsible for the environmental performance of their activities, for complying with relevant approval / permit requirements and for ensuring that all environmental objectives associated with the work are achieved.

Personnel must also be mindful of the General Environmental Duty as outlined in the EP Act. Section 319 of the EP Act states that "*a person must not carry out any activity that causes, or is likely to cause, environmental harm unless the person takes all reasonable and practical measures to prevent or minimise the harm*".

3. Existing Environment

The Project Area is located approximately 5 km east of the regional town of Wallumbilla in central Queensland in the Maranoa Regional Local Government Area (LGA). This Project Area is located in the southern extent of the Brigalow Belt Bioregion (BRB).

3.1. Land use

The Project Area is predominantly rural land characterised non-remnant derived grasslands dominated by introduced pastoral grasses with occasional native trees and shrubs. The area is used largely for agricultural development, primarily cattle grazing. The findings of ecological field surveys and review of aerial imagery indicate that vegetation and fauna habitats within the local area are generally disturbed and highly fragmented as a result of land use practices (Boobook, 2025).

The agricultural land uses of the region coexist with existing petroleum, energy and mining activities. Existing permits overlapping the Project Area include:

- EPC 1763 held by Wanbei Coal Electricity International Mining (Australia) Pty Ltd
- EPG 2034 held by Within Energy Pty Ltd
- Wallumbilla to Reedy Creek Pipeline (Petroleum Pipeline Licence (PPL) 2023) held by APA Reedy Creek Wallumbilla Pty Ltd; and
- a powerline easement crossing the northern portion of the Project Area held by Ergon Energy.

Two State-controlled roads are in the vicinity of the Project Area, including the Warrego Highway running east to west through the northern half of the Project Area, and Wallumbilla South Road located approximately 3 km west of the Project Area, providing efficient access for local and heavy vehicle traffic.

In the wider local area, a number of State Forests (SF) occur within 20 km of the Project Area, including Inglebogie SF approximately 15 km east of the Project Area, Yuleba SF approx. 20 km to the east and Wallabella SF 16 km to the south.

3.2. Topography

This is a landscape of low relief comprising a broad floodplain with meandering streamlines flanked by slightly elevated areas. Ground elevations within the Project Area range from approximately 300 m to 350 m Australian Height Datum (AHD). Beyond the Project Area, to the east, an abrupt north-south trending plateau rises up to 50 m above the surrounds, forming the Grafton Range.

3.3. Climate

The climate of the Project Area is classified as subtropical with a moderately dry winter. Mean maximum temperatures range between 34.6°C in the summer months and 20.4°C in the winter months (Bureau of Meteorology station 043091, Roma Airport) (Bureau of Meteorology, 2024). Mean minimum temperatures range between 21.1°C in the summer months and 3.7°C in the winter months. The highest rainfall occurs during December to February with an average highest rainfall of 75.2 mm in December, the lowest rainfall occurs during June to September with a lowest average rainfall of 24.9 mm in August (Bureau of Meteorology, 2024).

The average annual evaporation in the vicinity of the Project Area is between 2,000 millimetres (mm) and 2,400 mm. The highest evaporation occurs during the summer months (average monthly pan evaporation 300 mm), while the lowest evaporation occurs during the winter months (average monthly pan evaporation 80 mm) (Bureau of Meteorology, 2024) (Bureau of Meteorology, 2024).

3.4. Regional catchment and surface water quality

The Project Area is located within the Bungil Creek catchment of the Maranoa-Balonne Rivers Basin (WQ4222) as described by the Environmental Protection (Water and Wetland Biodiversity) Policy 2019 (DESI, 2023). The Maranoa–Balonne Basin is a subset of the broader Condamine-Balonne catchment of the Murray-Darling Basin. Environmental values and water use associated with the Bungil Creek catchment include aquatic ecosystems, irrigation, farm supply / use, stock water, aquaculture, human consumption, primary recreation, secondary recreation, visual recreation, drinking water, industrial use and cultural, spiritual and ceremonial values. No High Ecological Value (HEV) waters are mapped within the Project Area. While the Project Area generally has a uniform elevation, ranges in the surrounding region include the Great Dividing Range to the north, Grafton Range to the west, and the Dulacca Range to the south-east. Most watercourses in the Project Area are ephemeral. There are no watercourses mapped within the Project Area, the closest major watercourses include:

- Washpool Creek: is a minor creek, which originates 5 km north of the Project and flows through the Project before joining Wallumbilla Creek 2 km south of the Project
- Wallumbilla Creek: originates 16 km northwest of the Project and flows south – southeast close to the township of Wallumbilla. The creek continues to flow south before reaching the Balonne River confluence downstream of Yuleba Creek, 54 km south of the Project; and
- Middle Creek: is a tributary of Wallumbilla Creek, which originates 15 km northwest of the Project and flows south between the township of Wallumbilla and the Project before joining Wallumbilla Creek 2 km west of the Project.
- Yuleba Ck (consists of SO 1-5 tributaries) is identified by the *Qld Water Act 2000* as a major watercourse and flows for approx. 187 km from near the Great Dividing Range before joining the Balonne River 45 km south of Yuleba. Yuleba Ck flows predominately south, close to the township of Yuleba, located 13 km east of the Project Area and joins the Balonne River, 46 km southeast of the Project Area.

Other minor, unnamed watercourses occur within the Project Area, almost all of which drain into one of the watercourses listed above.

The Sustainable Rivers Audit 2 (SRA 2) for rivers within the Murray-Darling basin (Murray–Darling Basin Authority, 2012) found that the Condamine Valley, which includes the region around the Project Area, had an overall poor ecosystem health rating. The physical form of the Condamine Valley river system was rated as being in moderate condition, characterised by enlarged channels and evidence of widening and channel bed degradation. The cause of this condition was not specified. According to desktop assessment (Queensland Government, 2024), there are no wetlands of High Ecological Significance (HES) or HEV within or immediately adjacent to the Project Area, with the nearest mapped HEV wetland located approximately 39 km south-west of the Project Area. There are no active springs mapped within 30 km of the Project Area. There are no known or mapped terrestrial groundwater dependent ecosystems (GDEs) located within the Project Area. There are no known or mapped subterranean GDEs or groundwater-dependent spring ecosystems located within the Project Area. There are two registered groundwater bores located in the Project Area, these bores are recorded as Registered bore Numbers (RNs) 123195 and 208460 in the Groundwater Database - Queensland, which are sub-artesian bores for private water supply.

3.5. Regional geology

The regional geology of the Project Area comprises sediments from the Early Cretaceous to Quaternary age Surat Basin. Stratigraphic units of relevance to the Project include:

- quaternary alluvial systems within majority of the Project area
- early cretaceous age mudrock along the mid-eastern border of the Project area; and
- fine grained sedimentary rock north-eastern corner of the Project area.

Land zones are categories that describe the major geologies, the associated landforms and geomorphic processes in Queensland, and are a critical component of the RE classification scheme. Land zones identified within the Project Area using state mapping (Department of Resources, 2023) are detailed in Table 2.

Table 2: Land zones occurring within the Project Area (Department of Resources, 2023)

Land zone	Description as per Wilson & Taylor (2012)
3	Recent Quaternary alluvial systems, including closed depressions, paleo-estuarine deposits currently under freshwater influence, inland lakes and associated wave built lunettes. Excludes colluvial deposits such as talus slopes and pediments. Includes a diverse range of soils, predominantly Vertosols and Sodosols; also with Dermosols, Kurosols, Chromosols, Kandosols, Tenosols, Rudosols and Hydrosols; and Organosols in high rainfall areas.
4	Tertiary-early Quaternary clay deposits, usually forming level to gently undulating plains not related to recent Quaternary alluvial systems. Excludes clay plains formed in-situ on bedrock. Mainly Vertosols with gilgai microrelief, but includes thin sandy or loamy surfaced Sodosols and Chromosols with the same paleo-clay subsoil deposits.
9	Fine grained sedimentary rocks, generally with little or no deformation and usually forming undulating landscapes. Siltstones, mudstones, shales, calcareous sediments, and labile sandstones are typical rock types although minor interbedded volcanics may occur. Includes a diverse range of fine textured soils of moderate to high fertility, predominantly Vertosols, Sodosols, and Chromosols.

3.6. Vegetation

The extent, condition, dominant species and conservation significance of vegetation communities in the project area are identified in Table 3. Refer to the *Roma Phase 7-7B SD20 Development Matters of National Environmental Significance Ecological Assessment Report* (Boobook, 2025) for further information on the vegetation and ecology of the Project Area.

Table 3: Vegetation communities within the Project Area and PDF

RE Code	VMA Class	BD Status	Short RE Description	Extent in Project Area – remnant (ha)	Extent in Project Area – regrowth (ha)	Extent in PDF – remnant (ha)	Extent in PDF – regrowth (ha)
11.3.2	OC	OC	*Eucalyptus populnea* woodland on alluvial plains	19.41	65.57	0.15	0.15
11.3.17	OC	E	*E. populnea* woodland with *Acacia harpophylla* and / or *Casuarina cristata* on alluvial plains	10.81	0.00	0.00	0.00
11.3.25	LC	OC	*E. tereticornis* or *E. camaldulensis* woodland fringing drainage lines	20.94	0.00	0.00	0.00
11.9.7	OC	OC	*E.populnea*, *Eremophila mitchellii* shrubby woodland on fine-grained sedimentary rocks	0.61	1.30	0.00	0.00
11.9.10	OC	E	*E. populnea* open forest with a secondary tree layer of *A. harpophylla* and sometimes *C.cristata* on fine-grained sedimentary rocks	23.96	2.34	0.00	0.00

Notes: RE is 'Regional Ecosystem'. 'VMA Class is 'Vegetation Management Act Class' as per QLD *Vegetation Management Act 1999.* BD Status is 'Biodiversity Status' as per QLD *Environmental Protection Act 1994*. E: Endangered, OC: Of concern.

3.7. Environmentally Sensitive Areas

Environmentally sensitive areas (ESAs) are defined as Category A or B as per Schedule 19, Part 1 of the *Environmental Protection Regulation 2019* (*Environmental Protection Act 1994*) (EP Regulation) (which supersedes the *Environmental Protection Regulation* 2008 (Qld)) and Category C as per Section 20 AN, Division 5AA of the *Vegetation Management Act 1999* (VMA).

Maps will be developed to determine if Category A, B or C are present within the Project Area. Definitions for these categories are included in Table 4.

Table 4: Environmentally Sensitive Area category definitions

ESA category	EP Regulation Definition
Category A	A Category A ESA means any of the following: *a)* any of the areas under the *Nature Conservation Act 1992* b) the wet tropics area under the *Wet Tropics World Heritage Protection and Management Act 1993* c) the Great Barrier Reef Region under the Great Barrier Reef Marine Park Act 1975 d) a marine park under the *Marine Parks Act 2004*, other than a part of the park that is general use zone under the Act
Category B	A Category B ESA means any of the following: a) any of the areas under the *Nature Conservation Act 1992:* b) an area subject to the following conventions to which Australia is a signatory: i. A 'Convention on the Conservation of Migratory Species of Wild Animals' (Bonn, 23 June 1979) ii. The 'Convention on Wetlands of International Importance, especially as Waterfowl Habitat' (Ramsar, Iran, 2 February 1971) iii. The 'Convention Concerning the Protection of the World Cultural and Natural Heritage' (Paris, 23 November 1972) c) a zone of a marine park under the *Marine Parks Act 2004* that is within a general use zone of the marine park under the Act; d) an area to the seaward side of the highest astronomical tide; e) the following under the *Queensland Heritage Act 1992* i. a place of cultural heritage significance ii. a Queensland heritage place, unless there is an exemption certificate issued under that Act; f) an area recorded in the Aboriginal Cultural Heritage Register established under the Aboriginal Cultural Heritage Act 2003, section 46, other than the area known as the 'Stranbroke Pastoral Development Holding', leased under the *Land Act 1994* by lease number PH 13/5398; g) a feature protection area, State forest park or scientific area under the *Forestry Act 1959* h) a declared fish habitat area under the *Fisheries Act 1994* i) a place in which a marine plant under the *Fisheries Act 1994* is situated; j) an endangered regional ecosystem identified in the database known as the 'Regional ecosystem description database' published on the departments website
Category C	A Category C area is an area, other than a category A area, category B area, Category R area or Category X area, shown on regulated vegetation management maps as Category C area that: a) contains high value regrowth vegetation; or b) the chief executive decides to show on the regulated vegetation management map as a category C area *Note: the chief executive may decide under section 20AI to show an area on the regulated vegetation management map as a category C area even through the vegetation is not high value regrowth vegetation.*

4. Rehabilitation Techniques

There are a number of techniques available to Santos to carry out rehabilitation works. Regardless of the technique employed, monitoring is key to understanding the success of rehabilitation across the asset lifecycle. Further details of the rehabilitation techniques are provided below.

4.1. Topsoil management

Topsoil that is stripped and stored as part of construction activities is to be re-spread as part of stabilisation and rehabilitation activities. Correctly preserved topsoil resources can provide viable sources of seed-stock, biological life and nutrient conditions that assist with soil productivity and fertility, and thereby vegetation establishment.

4.2. Sodic soil amelioration

Sodic soils, when encountered, will be blended with an appropriate soil ameliorant (i.e. gypsum, lime) during rehabilitation processes (if required) to maintain soil structures and reduce dispersiveness (e.g. reduce dispersiveness in sodic soils). Amelioration with gypsum and / or lime or addition of organic mulch can improve soil structure, infiltration and soil aeration can promote vegetation establishment.

4.3. Soil compaction

For long-term disturbances such as well leases, it is likely that the soil will have become compacted over time. Where necessary, the soil will be treated (i.e. deep ripped) to alleviate the soil compaction. This will occur prior to reshaping the upper layers of the soil stratum.

4.4. Contaminated land

Where there is a risk of contaminated land occurring, a site-specific contaminated land assessment may be undertaken. The scale and type of contamination will determine the chosen management strategy. Small volumes may be disposed offsite via facilities licenced to accept the waste whereas larger volumes may be managed on site using landfarming techniques.

4.5. Watercourse crossings

Where clearing of riparian vegetation is unavoidable, the objective will be to reinstate the creek banks and riparian vegetation, as soon as practical post-construction. To minimise erosion and destabilisation of creek banks, erosion controls will be constructed or installed, where necessary. The surface will typically be lightly scarified before spreading the topsoil, to promote regeneration of native vegetation and prevent loss of topsoil. Where higher velocity water flows are designed for, engineered controls such as coir mesh or rock protection will be installed (see Section 5.1).

4.6. Landform management

Sites will be reprofiled to a safe and stable landform, with surface drainage lines and topsoil profile re-instated. Where practical, sites will be reprofiled to contours consistent with the surrounding landform. However, where this is not practical (i.e. cut and fill operations on slopes, or within highly dispersive soils), a stable landform will be reinstated by surface re-profiling, contouring or benching. Methods to reshape the landform will vary depending on the level of disturbance.

4.7. Revegetation

Active seeding will be completed on all areas of disturbance where revegetation is required to facilitate stability during operations or to meet transitional and / or final rehabilitation criteria. Within areas of native vegetation, a combination of tube-stock and seeding may be implemented. Tube-stock will be used for canopy and shrub species, while a combination of tube-stock and seeding is appropriate for herbs, forbs and grasses. Species will be selected based on assessments of the adjacent vegetation community composition and other appropriate benchmark guidelines.

4.8. Mulching and placement of vegetation

Vegetation cleared during construction phases, will be retained on-site for use during stabilisation and / or rehabilitation activities. Mulch and vegetation may be respread over the site as required. This will assist in site stabilisation, revegetation and suppressing weed growth.

4.9. Weed management

Weed management will be required to enable the regeneration of pre-disturbance land uses and to ensure that the disturbance does not allow for the introduction of new species to an area or increase the localised population of a species.

Weed control requiring chemicals will be undertaken by licenced contractors under the Queensland *Agricultural Chemicals Distribution Control Act 1966*. All chemical application will be carried out in strict accordance with registered labels and safety data sheet (SDS) requirements and considering any Minor Use Permit PER11463 requirements as issued by the Australian Pesticides and Veterinary Medicines Authority for ground-based herbicide application in non-agricultural areas (i.e. bushland areas).

4.10. Pest and livestock management

Where livestock occur within areas undergoing rehabilitation, temporary stock fencing may be erected to ensure cattle / feral animals (pigs) etc cannot damage rehabilitation works. Fencing will be erected primarily to well pads, laydowns etc., where there is a localised disturbance footprint.

5. Disturbance Lifecycle and Maintenance Monitoring

The disturbance lifecycle can be defined by three distinct stages: construction, operation and final rehabilitation. Regardless of the stage, all works aim to achieve a safe, stable, non-polluting landform. All disturbance works are planned, approved and recorded in a Geographic Information System (GIS) database.

Construction is undertaken using standardised designs for the majority of works. These designs include both temporary (construction) and long-term erosion and sediment controls (ESC).

During the operational stage, a risk-based inspection program is implemented to ensure installed ESC is functioning and disturbed areas are stabilising through vegetation growth. Maintenance actions will be implemented where monitoring identifies that performance criteria are not being met. Maintenance repairs are scheduled and prioritised using a risk-based approach.

Final rehabilitation is undertaken once an asset is assessed to be no longer required for the petroleum activity. Section 6 provides specific detail on the final rehabilitation process to ensure final rehabilitation criteria are met.

5.1. Pipelines

Pipeline right of ways (RoWs) are cleared, pipelines installed and land reinstated in quick succession. This methodology reduces exposure of unprotected subsoils, preserves topsoil characteristics e.g. structure, native seed bank etc, and minimises potential impacts from significant rainfall events.

Reinstatement is undertaken to ensure:

- a stable landform
- re-profiled to a level consistent with surrounding soils
- re-profiled to original contours and established drainage lines; and
- vegetated with groundcover which is not a declared pest species, and which is established and growing.

In addition, RoWs are reinstated immediately following pipeline construction (typically within 3 months, or in accordance with relevant EA conditions), with considerations made for a range of factors including ESC, soil amelioration, fertiliser and seeding. These considerations are applied to ensure timely reinstatement of the pipeline RoWs.

Santos has standardised watercourse reinstatement designs for pipeline crossings that are assigned to crossings based on the site-specific risk profile. Watercourses are assessed as part of the planning phase and designs advised for each crossing based on several inputs (e.g. soil type, catchment, modelled flows, bank profiles). There are five key options for reinstatement, three standard reinstatement designs (low, medium and high), a fourth site-specific design, and a fifth where standard pipeline reinstatement is deemed adequate.

Regular desktop assessments are undertaken using up-to-date aerial imagery to identify potential ESC and integrity issues. The potential issue locations are inspected onsite, and maintenance repairs are prioritised based on risk. In addition to the desktop assessments, issues identified during standard work schedules are recorded within a central database to capture, monitor, maintain and / or schedule repair issues as they arise.

5.2. Wells leases

Santos has developed a catalogue of standardised well lease (i.e. the prepared surface / hard stand area around a CSG well head to enable well drilling and operational activities) construction designs that focus on long-term stability

for the operational life of the well, generally greater than 20 years. Using standardised designs Santos achieves consistent and high-quality execution whilst minimising future disturbances. Where standard designs are deemed not fit for purpose, site specific designs are developed.

All well leases are monitored throughout operations using a risk-based inspection and maintenance program. Santos has a standardised well inspection program, whereby every well lease is typically inspected every 2 years. Inspections target a range of environmental aspects / criteria for assessment.

Further, the inspections utilise a scoring system that assists in prioritising corrective actions via the civil works request system. Maintenance works are then prioritised by the civil works team based on the final inspection score e.g. well pads with high inspection scores hold the most environmental risk and are prioritised for maintenance. This allows maintenance works to be prioritised using the most up-to-date data and ensures Santos' environmental risk is the lowest possible at any given time.

5.3. Facilities

These assets typically cover a large disturbance footprint whereby the risk of erosion and sediment issues is elevated. To reduce risk and ensure long-term stability, all facilities (e.g. laydown areas and camps) are constructed using site specific designs that are prepared during the early planning phase.

Post-construction, environmental inspections are scheduled annually and assessed against rehabilitation and stability criteria. Any identified issues are recorded with a central database to monitor, maintain and / or repair.

5.4. Roads and tracks

For unsealed roads and tracks the key techniques to minimise erosion and damage are good shaping (camber, elevation etc) and good drainage. These techniques are imbedded in the standardised construction designs.

Watercourse crossings are assessed as part of the early planning phase and designs advised for each crossing based on several inputs (e.g. soil type, catchment, modelled flows, bank profiles). In some instances, the standardised design is deemed unsuitable, and a site-specific design will be developed.

When planning for roads, considerations are made for existing and / or proposed adjacent infrastructure. Where construction occurs alongside adjacent infrastructure, the erosion and sediment controls marry into both pieces of infrastructure to not cause unwanted drainage, or erosion impacts from one to the other i.e. surface waters are controlled across the entire disturbance footprint.

Roads will undergo routine maintenance grades throughout the life of the infrastructure. These will typically follow high vehicle traffic and / or wet weather. In addition to the routine maintenance, any unforeseen issues are captured and stored within a central database for priority maintenance.

Once roads are no longer required for petroleum activities, they will be offered to the landholder as an asset. Any roads unwanted by the landholder will be rehabilitated. This may include removal of any gravel, ripping, levelling and re-profiling to reinstate natural contours of the land (including any watercourses) and revegetating to match the surrounding land-use or landholder requirements.

6. Rehabilitation Acceptance Requirements

Transitional rehabilitation requirements apply when assets are no longer required for ongoing petroleum activities.

Final rehabilitation requirements apply when significantly disturbed areas have either occurred in an ESAs, or when assets are being retained by the landholder (which are not located in ESAs) as detailed in Section 6.3.

Areas classified as ESA are excluded from being transferred to landholders. In all instances, transitional rehabilitation requirements must be met once the asset is no longer required for ongoing petroleum activities, as shown in Figure 2.

The transfer of infrastructure assets to landholders will be undertaken in compliance with the *Guideline for Petroleum Activities Transferring petroleum infrastructure to landholders* (ESR/2020/5403) (DESI, 2024) before the surrender of the EA or petroleum tenure.

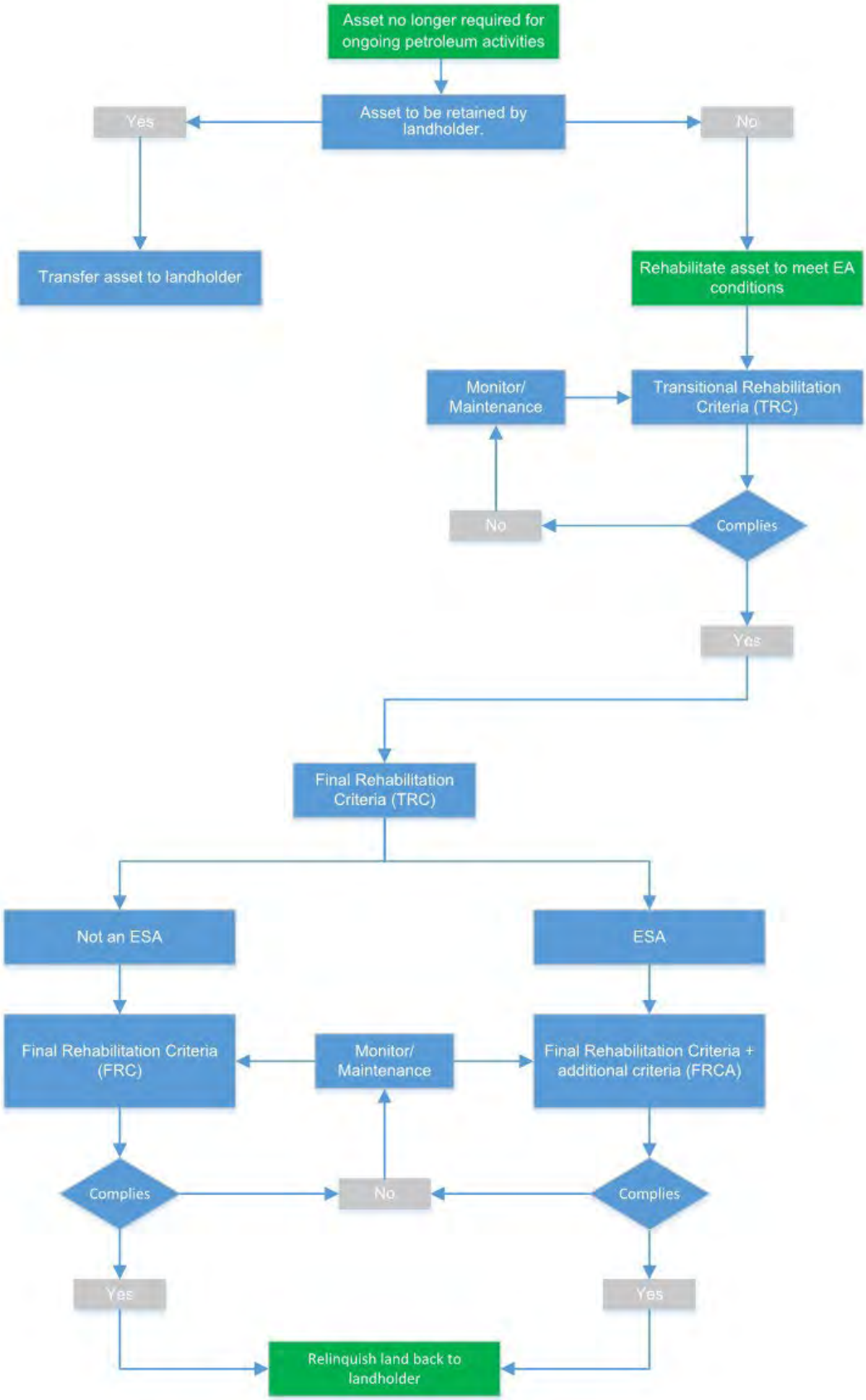

Figure 2: Rehabilitation acceptance requirements – internal approval process

6.1. Transitional rehabilitation and monitoring

Transitional rehabilitation is defined as the minimum rehabilitation criteria to which each disturbed area must comply with following decommissioning. The transitional rehabilitation criteria (TRC) are:

- contaminated land resulting from petroleum activities is remediated and rehabilitated
- the areas are:
  - non-polluting
  - stable landform
  - re-profiled to contours consistent with the surrounding landform
- surface drainage lines are re-established
- topsoil is reinstated; and
- either:
  - groundcover, that is not a declared pest species, is growing; or
  - an alternative soil stabilisation methodology that achieves effective stabilisation is implemented and maintained.

All transitional rehabilitation activities will be undertaken in accordance with the site-specific requirements and relevant EA conditions.

Immediately upon decommissioning sites will be monitored for compliance against the transitional rehabilitation criteria and may require a combination of techniques as described in Section 4.

6.1.1. Re-profiling and topsoil

Where re-profiling and topsoil has been demonstrated as stable (has constructed drainage, rock reinforcement, stable cover and / or no evidence of erosion) data and geo-located photos should be gathered during monitoring. Areas which have not been re-profiled and demonstrated as stable will need to be maintained or reworked according to the extent of instability.

If problematic soils are identified, remediation actions may be required to decrease the area of bare ground. This may include reworking, capping / reburial of poor substrates or the improvement of soils using suitable materials.

6.1.2. Groundcover

In areas of poor groundcover, assessments should be made to determine if the soil needs amelioration and possible re-seeding.

6.1.3. Erosion

Where erosion has been identified the area may require rework and maintenance. Erosion should be monitored to ensure that any rehabilitated area is stable. If erosion monitoring shows that the erosion is unstable and continuing to get worse, the area will need to be maintained or reworked depending on the extent of the instability. If erosion is unchanging and has good vegetation cover the area may not need any further maintenance or re-work, especially if it has been identified as well-established rehabilitation.

When a site is assessed as compliant with the TRC it can then progress to the final rehabilitation stage.

6.2. Final rehabilitation acceptance criteria

Once areas of disturbance are assessed to meet the TRC, they are then to be rehabilitated to meet the following final rehabilitation acceptance criteria (FRC), which are either measured against the highest ecological value adjacent land use, or the pre-disturbed land use:

- greater than or equal to 70 per cent of native ground cover species richness
- greater than or equal to the total per cent ground cover
- less than or equal to the per cent species richness of declared plant pest species
- where the adjacent land use contains, or the pre-clearing land use contained, one or more regional ecosystem(s), then:
  - at least one RE from the same broad vegetation group, as demonstrated by the predominant species in the ecologically dominant layer, must be present; and
  - the RE present must possess an equivalent or higher conservation value (biodiversity status) than the REs in either the adjacent land or pre-disturbed land.

All rehabilitation during the FRC stage will be undertaken in accordance with the site-specific requirements and relevant EA conditions.

6.2.1. Groundcover

The area may require direct seeding and / or planting of ground layer, shrub and tree species depending on the final post-disturbance land use. Weed control methods may also be required.

6.2.2. Revegetation

The selection of species to be used in rehabilitation where native vegetation is the final land use should consider structural and floristic composition of the pre-disturbed land use or the ecological value of an adjacent land use.

6.3. Environmentally sensitive areas

Of the ESAs located in the Project Area, some may include ‘Endangered’ and ‘Of Concern’ REs.

Where petroleum activities have resulted in disturbance to land in an ESA, the following final additional rehabilitation criteria (and / or relevant EA conditions), as measured against the pre-disturbance biodiversity values assessment, must be met:

- greater than or equal to 50 per cent of organic litter cover
- greater than or equal to 50 per cent of total density of coarse woody material; and
- all predominant species in the ecologically dominant layer, that define the pre-disturbance REs are present.

7. Rehabilitation Monitoring

Monitoring will inform rectification where non-conformances with transitional criteria are reported. Where required, data will be compared to the pre-disturbed land use data or an analogue site in the highest ecological value adjacent land use.

7.1. Final rehabilitation register

A Final Rehabilitation Register (FRR) captures the results of rehabilitation monitoring against relevant rehabilitation criteria and EA conditions. All monitoring data is be captured in a GIS database. GIS data is captured at the location of the relevant disturbance, and the GIS database is regularly updated to inform a monitoring schedule for final rehabilitation. Reporting and filtering of GIS database records are utilised to inform monitoring schedule, disturbance rehabilitation status, and required actions.

7.2. Risk based methodology

Upon decommissioning, a risk-based approach will be used to proactively identify the risk level based on the intended final land use and progress towards the FRC. A site may contain a combination of the below risk profiles.

7.2.1. High risk areas – rework / rectify

High risk areas are classified as areas requiring re-work or rectification in order to meet the TRC and / or FRC.

High risk areas (rework / rectification) may require a combination of stabilisation works, re-profiling and / or reseeding / revegetation works on decommissioning. An area that is deemed high risk will require a review of the rehabilitation works based on the final land use requirements. Fencing, where practical, should remain intact until FRC are met.

7.2.2. Medium risk areas – maintain / monitor

Medium risk areas are those areas meeting the TRC but require time and potentially maintenance to meet the FRC. Fencing, where practical, should remain intact until FRC are met.

7.2.3. Low risk areas – relinquish

Low risk areas are defined as rehabilitated areas meeting the TRC and FRC and are ready for final acceptance and site relinquishment.

7.3. Decommissioning Monitoring

On decommissioning, formal monitoring should be undertaken against the TRC and FRC. The status of sites should be entered into the FRR along with any recommended rehabilitation requirements. Based on this initial assessment, formal monitoring frequency will be assessed on a case-by-case basis and may depend on weather conditions and predicted time to meet the rehabilitation criteria. As a guide the following formal monitoring schedule is proposed as a minimum to inform rehabilitation requirements (refer Table 5).

Table 5: Proposed monitoring frequency

Risk rating	Rehabilitation Status	Monitoring frequency	Method
High risk areas	Rework / rectify	Annually	Remote sensing / ground survey / sampling

Risk rating	Rehabilitation Status	Monitoring frequency	Method
Medium risk areas	Maintain / monitor	Annually (pending weather conditions)	Remote sensing / ground survey / sampling
Low risk areas	Meets FRC	Based on previously collected data	On-ground Third Party Rehabilitation Assessment and Reporting

7.3.1. Data capture

Monitoring data indicators for TRC and FRC are shown in Table 6 and Table 7, respectively.

Table 6: TRC monitoring parameters

Land use	TRC	Monitoring data indicators
All	Contaminated land resulting from petroleum activities is remediated and rehabilitated.	Where there is a risk, or records confirming contaminated land (i.e. hydrocarbon/chemicals) occurring from petroleum activities, remediate to meet legislative requirements.
	Stable landform, non-polluting and re-profiled to contours consistent with the surrounding landform.	No run-off or subsidence caused by the decommissioning of petroleum activities. Rate of erosion to be no more that surrounding landscape. Re-profiled to natural landform or where not practical re-profiled to ensure stability and ESC.
	Surface drainage lines are re- established.	No evidence of ponding, landform reinstated to be consistent with drainage in surrounding landscape
	Topsoil is reinstated.	Where disturbed during decommissioning, reinstated topsoil is consistent with surrounding soil profile of the site. No evidence of soil profile mixing or compaction.
	Groundcover, that is not a declared pest species, is growing; or An alternative soil stabilisation methodology that achieves effective stabilisation is implemented and maintained.	No restricted species present on site. Ground cover stable across site.

Table 7: FRC monitoring programs

Land use	FRC	Monitoring data indicators / methodology
All	Greater than or equal to 70 per cent of native ground cover species richness.	Comparison with analogue site in either adjacent ecological value land use or the pre-disturbed land use. The 50 x 10 m plot method of the BioCondition Assessment methodology V2.2 as per Eyre *et al*. (2015) or any subsequent updated version is to be used in the rehabilitated area in comparison to the analogue site.
	Greater than or equal to the total per cent ground cover.	Comparison with analogue site in either ecological value adjacent land use or the pre-disturbed land use. The 1 x 1 m quadrats method of the BioCondition Assessment methodology V2.2 as per Eyre *et al*. (2015) or any subsequent updated version is to be used in the rehabilitated area in comparison to the analogue site.

Land use	FRC	Monitoring data indicators / methodology
	Less than or equal to the per cent species richness of declared plant pest species.	Comparison with analogue site in either ecological value adjacent land use or the pre-disturbed land use. The 50 x 10 m plot method of the BioCondition Assessment methodology V2.2 as per Eyre *et al*. (2015) or any subsequent updated version is to be used in the rehabilitated area in comparison to the analogue site.
Non-ESA areas only	Where the adjacent land use contains, or the pre-clearing land use contained, one or more regional ecosystem(s), then: - at least one REs from the same broad vegetation group, as demonstrated by the predominant species in the ecologically dominant layer, must be present; and, - the RE present must possess an equivalent or higher conservation value (biodiversity status) than the REs in either the adjacent land or pre-disturbed land.	Comparison with analogue site in either ecological value adjacent land use or the pre-disturbed land use. RE delineation following the "*Methodology for survey and mapping of regional ecosystems and vegetation communities in Queensland. Version 5.0*" (Neldner *et al*, 2019) or any subsequent updated version of this methodology. Once RE has been confirmed it will require confirmation of its Broad Vegetation Group, as well as the Biodiversity status.
ESA Only	Greater than or equal to 50 per cent of organic litter cover.	Comparison with analogue site in either ecological value adjacent land use or the pre-disturbed land use The 1x1 m quadrats method of the BioCondition Assessment methodology V2.2 as per Eyre *et al.* (2015) or any subsequent updated version is to be used in the rehabilitated area in comparison to the analogue site.
	Greater than or equal to 50 per cent of total density of coarse woody material.	Comparison with analogue site in either ecological value adjacent land use or the pre-disturbed land use The 50x20 m plot method of the BioCondition Assessment methodology V2.2 as per Eyre *et al.* (2015) or any subsequent updated version is to be used in the rehabilitated area in comparison to the analogue site.
	All predominant species in the ecologically dominant layer, that define the pre-disturbance REs are present.	Comparison with analogue site in either ecological value adjacent land use or the pre-disturbed land use The 100x50 m plot method of the BioCondition Assessment methodology V2.2 as per Eyre *et al.* (2015) or any subsequent updated version is to be used in the rehabilitated area in comparison to the analogue site.

Note: where plot sizes are reduced, adjustments to calculations will be required to adequately scale up data from plots to hectare rates.

7.4. Final acceptance reporting

As part of the asset relinquishment process, areas of rehabilitated land that meet the final rehabilitation acceptance criteria (deemed low risk). To support this process, a final acceptance report will be completed by a suitably qualified third party / in accordance with relevant EA conditions and EP Act requirements.

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Santos Roma Phase 7-7B-SD20 Development

ENVIRONMENTAL MANAGEMENT PLAN

February 2025

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Glossary

Abbreviation	Description
ACH Act	Aboriginal Cultural Heritage Act 2003 (Qld)
ADG Code	Australian Dangerous Goods Code
ADP	Advanced Depletion Pilots
ADR	Accepted Development Requirements
APGA	Australian Pipelines and Gas Association
API	American Petroleum Institute
AHD	Australian Height Datum
APIA	Australian Pipeline Industry Association
AS	Australian Standard
ATP	Authority to Prospect
BOP	Blowout Preventer
BRB	Brigalow Belt Bioregion
CBL	Cement Bond Logs
CHMP	Cultural Heritage Management Plan
CMA	Cumulative Management Area
CRAF	Chemical Risk Assessment Framework
CSG	Coal Seam Gas
DA	Development Approval
DAF	Department of Agriculture and Fisheries (Biosecurity Queensland), Queensland Government
DOA	Delegation of Authority
DTATSIPCA	Department of Treaty, Aboriginal and Torres Strait Islander Partnerships, Communities and the Arts, Queensland Government
DCCEEW	Department of Climate Change, Energy, the Environment and Water, Federal Government
DEHP	Department of Environment and Heritage Protection, Queensland Government (now DETSI)
DESI	Department of Environment, Science and Innovation, Queensland Government (now DETSI)
DETSI	Department of the Environment, Tourism, Science and Innovation, Queensland Government
DNRME	Department of Natural Resources, Mines and Energy, Queensland Government (now DNRMMRRD)
DNRMMRRD	Department of Natural Resources and Mines, Manufacturing, and Regional and Rural Development
DSDILGP	Department of State Development, Infrastructure, Local Government and Planning, Queensland Government (now DSDIP)
DSDIP	Department of State Development, Infrastructure and Planning, Queensland Government
DTMR	Department of Transport and Main Roads, Queensland Government
EA	Environmental Authority
ECP	Environmental Control Plans
EHS	Environment, Health and Safety
EMP	Santos Roma Phase 7-7B-SD20 Development Environmental Management Plan
EO Act	Environmental Offsets Act (Qld)
EOW	End of Waste
EP Act	Environmental Protection Act 1994 (Qld) and its subordinate legislation

Abbreviation	Description
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999 (Cth)
EPQ	Exploration Permit Greenhouse Gas
ESC	Erosion and Sediment Control
FIT	Formation Integrity Test
GBO	General Biosecurity Obligation
GDE	Groundwater Dependant Ecosystems
GFD	Gas Field Development
GLNG	Gladstone Liquefied Natural Gas
HDPE	High-Density Polyethylene
HES	High Ecological Significance
HEV	High Ecological Value
IESC	Independent Expert Scientific Committee (on coal seam gas and large coal mining development)
IECA	International Erosion Control Association
ILUA	Indigenous Land Use Agreements
IMS	Incident Management System
IVMS	In Vehicle Monitoring Systems
JV	Joint Venture
LAI	Land Amendment Irrigation
LGA	Local Government Area
LOT	Leak Off Test
ML	Megalitre
MNES	Matters of National Environmental Significance
NC Act	Nature Conservation Act 1992 (Qld)
NT Act	Native Title Act 1993 (Qld)
OGIA	Office of Groundwater Impact Assessment
P&G Act	Petroleum and Gas (Production and Safety) Act (Qld)
PCE	Pressure Control Equipment
PDF	Preliminary Disturbance Footprint
PE	Polyethylene
PL	Petroleum Lease
PPL	Petroleum Pipeline Licence
QA/QC	Quality Assurance / Quality Control
QH Act	Queensland Heritage Act 1992 (Qld)
QLD	Queensland
RDM	Residual drilling material
RE	Regional Ecosystem
RIDA	Regional Interest Development Approval
RMP	Santos Roma Phase 7-7B-SD20 Development Rehabilitation Monitoring Plan
RN	Registered bore Number
RO	Reverse Osmosis
ROP	Reverse Osmosis Plant

Abbreviation	Description
RoW	Right-of-way
RPI Act	Regional Planning Interests Act 2014 (Qld)
SDS	Safety Data Sheets
SF	State Forest
SIMP	Social Impact Management Plan
SMS	Santos Management System
SQP	Suitably Qualified Person
SRMS	Stakeholder Relationship Management System
SSMP	Santos Roma Phase 7-7B-SD20 Development Significant Species Management Plan
SWMS	Safe Work Method Statement
TEC	Threatened Ecological Community
UWIR	Underground Water Impact Report
VM Act	Vegetation Management Act 1999 (Qld)
WMS	Water Monitoring Strategy
WRA	Water Resources Assessment
WRR Act	Waste Reduction and Recycling Act 2011 (Qld)

1. Introduction

Santos and its joint venture partners are proposing a new gas field development located in central-eastern Queensland to supply natural gas to commercial markets. The proposed development will be known as the 'Santos Roma Phase 7-7B-SD20 Development' (the Project).

1.1. Overview

The Project will involve the progressive construction, operation, decommissioning and rehabilitation of up to 24 coal seam gas (CSG) wells, gas and water gathering flowlines and access track infrastructure in petroleum exploration tenure Authority to Prospect (ATP) 2053 (the Project Area). The Project Area is located in central-eastern Queensland, approximately 5 kilometres (km) east of the regional town of Wallumbilla. The regional location of the Project Area is shown in Figure 1.

The Project footprint located in the Project Area will cover approximately 66 hectares (ha) of land. Petroleum exploration activities undertaken by the Santos in the Project Area to date include the drilling and completion of 5 CSG appraisal wells and construction of associated infrastructure in 2022-2024. These activities are authorised under existing approved Queensland Environmental Authority (EA) 0002052. The existing 5 wells form part of the proposed 24 CSG wells.

CSG and water produced from the Project Area will be sent to existing approved centralised gas and water storage / processing and gas compression facilities located on adjacent Santos owned and operated petroleum tenures. Petroleum activities on adjacent tenures are authorised under existing EPBC Act approvals for the Gladstone Liquified Natural Gas Field Development Project (GLNG GFD) (EPBC Numbers 2008/4059 and 2012/6615) and EAs EPPG00898213 and EPPG00662213. No gas compression or water treatment facilities are proposed to be constructed or operated within the Project Area, and no significant water storage structures will be constructed or operated within the Project Area. Where required, prefabricated water storage tanks (concrete panel tanks or similar) will be assembled for water storage.

The Project will include the following components (but not limited to):

- well leases (typically 1.25 ha for single wells and 3 ha for multi-wells);
- water / gas gathering lines, trunklines and pipelines (typically 20 – 35 metres (m) wide);
- roads and access tracks (typically 10 – 15 m wide);
- other supporting infrastructure:
  - temporary water storage tanks;
  - temporary workers camps;
  - power and communications lines; and
  - other incidental and ancillary petroleum activities required to support the authorised activity.

Santos has developed a preliminary disturbance footprint (PDF) for the project to locate infrastructure to avoid disturbance to Matters of National Environmental Significance (MNES) and other environmental values. The PDF is displayed in Figure 2. The PDF was developed following multiple ecological surveys, field scouting, and desktop planning revisions to avoid impacts to MNES / other environmental values. The process for locating infrastructure, developing the PDF, and defining environmental constraints is described in the Roma Phase 7-7B-SD20 Development Environmental Protocol for Constraints Planning and Field Development Constraints Protocol (Constraints Protocol). The Constraints Protocol was informed by ecological surveys undertaken in 2022-2024 (refer to the *Roma Phase 7-7B SD20 Development Matters of National Environmental Significance Ecological Assessment Report* (Boobook, 2025)).

Design iterations as a result of these surveys and planning assessments are shown in Figure 3. Proposed infrastructure has largely been located in cleared agricultural land. No disturbance to Threatened Ecological Communities (TEC) is proposed. Any minor changes to the disturbance footprint or infrastructure locations would be subject to the requirements of the Constraints Protocol.

Well development will be phased to optimise gas production to meet Santos' gas supply obligations and opportunities. Once operational, gas produced from the Project will supply commercial markets.

Once completed and connected to gas and water gathering infrastructure, operational wells will operate continuously on a 24-hour basis for an anticipated operational life of 30-50 years. Progressive decommissioning and rehabilitation of activities and infrastructure will occur over the life of the Project, thereby reducing disturbance areas for the duration of operation, until final decommissioning and rehabilitation at end of project life.

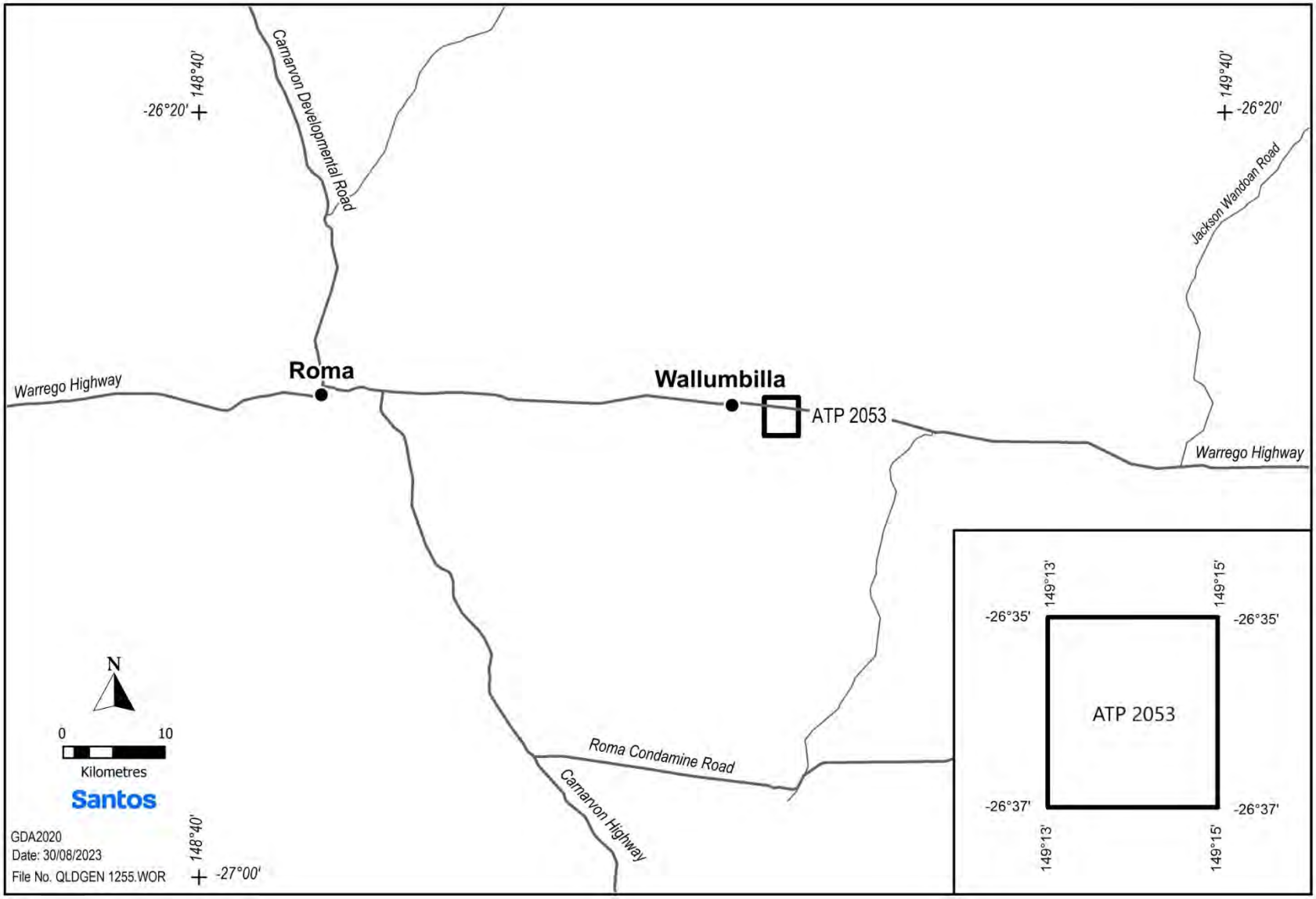


Figure 1: Santos Roma Phase 7-7B-SD20 – Project Area (ATP 2053)

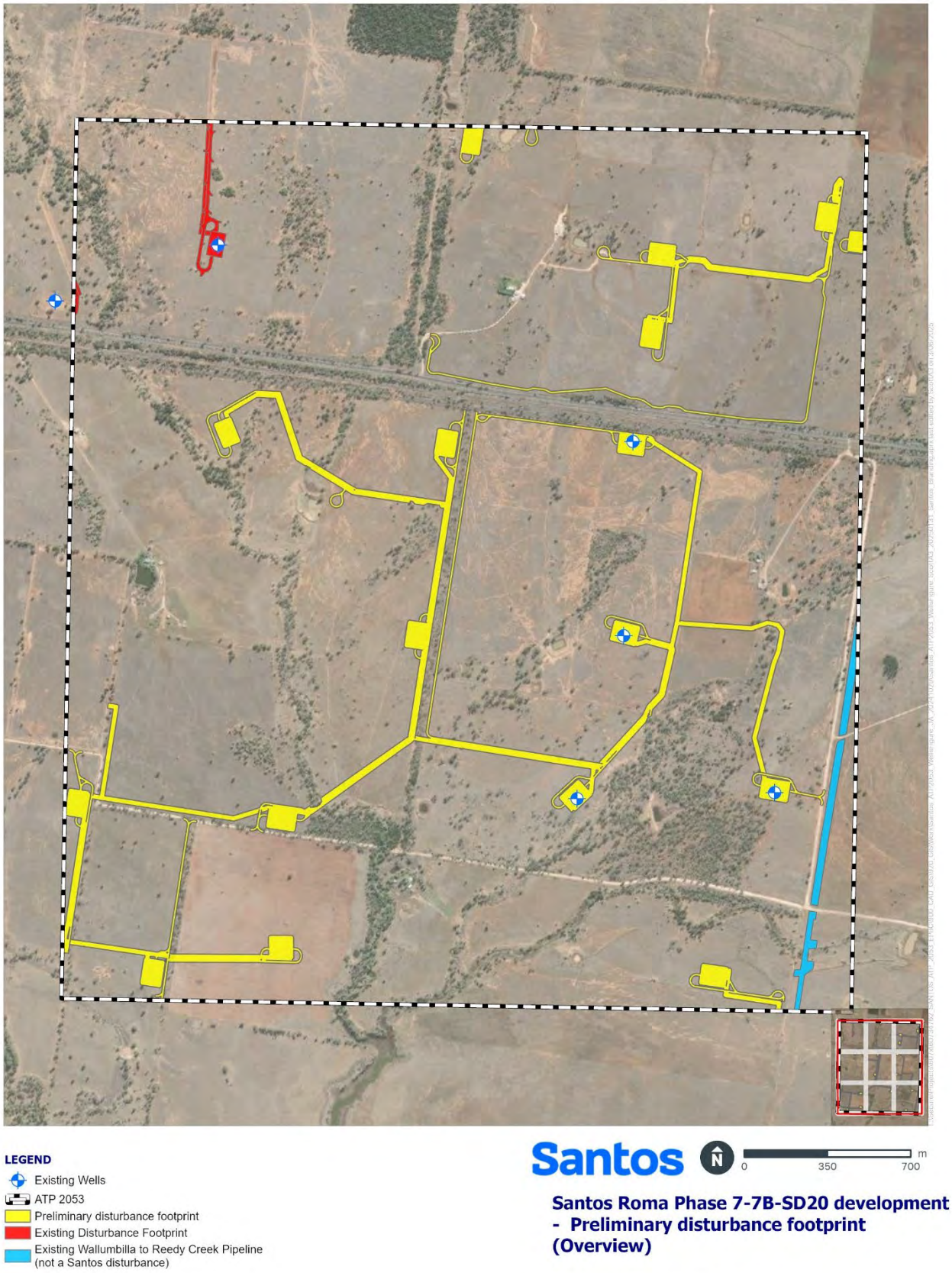


Figure 2: Santos Roma Phase 7-7B-SD20 – Preliminary Disturbance Footprint

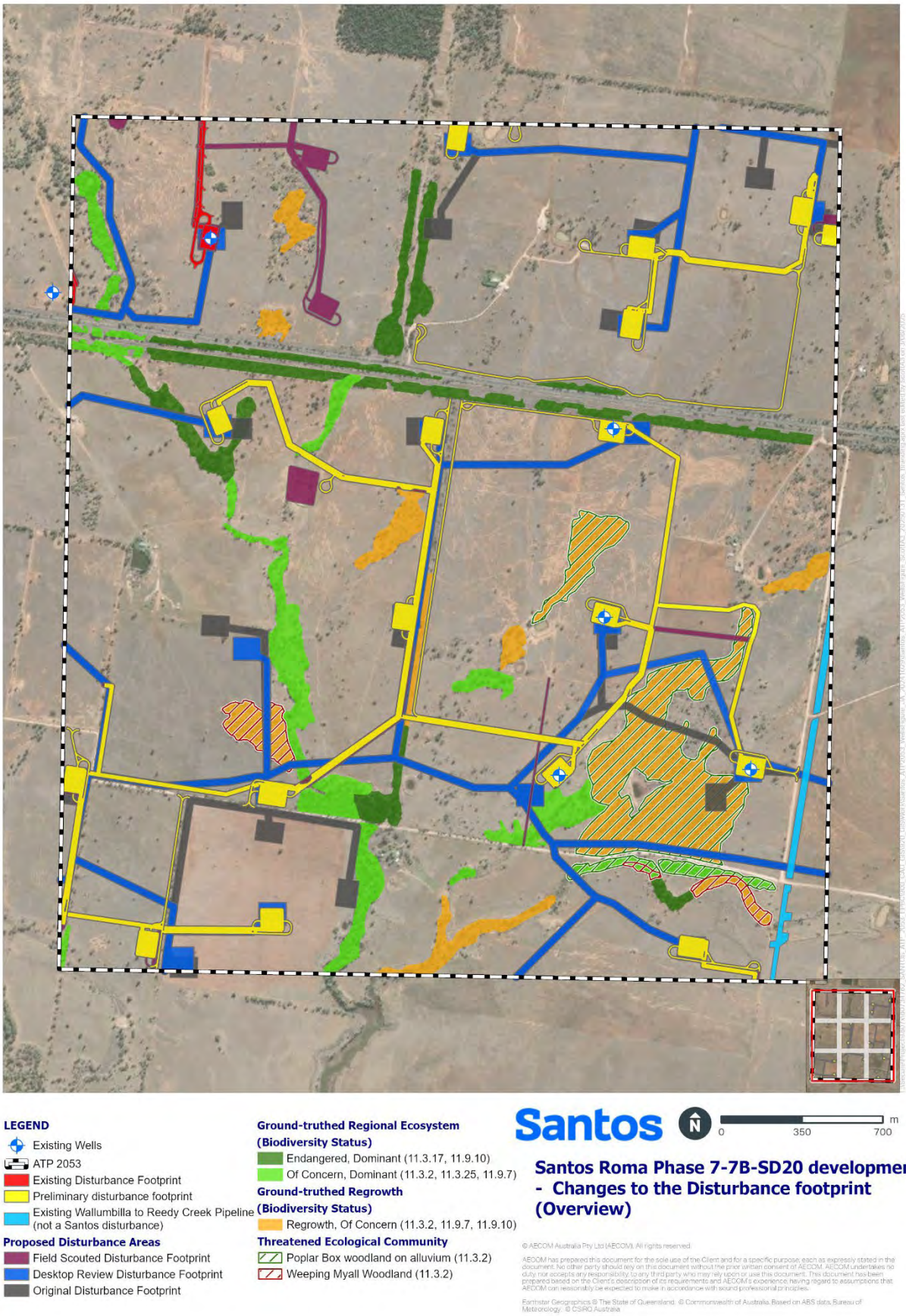


Figure 3: Santos Roma Phase 7-7B-SD20 – Disturbance footprint iterations

1.2. Purpose and scope

This Environmental Management Plan (EMP) has been developed to:

- provide a structured high-level approach to the management of environmental issues over the life of the Project;
- meet the requirements of the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act) and *Environmental Protection Act 1994* (QLD) (EP Act) (that being the conditions of the relevant EA), industry guidelines and other regulatory requirements;
- provide appropriate environmental management measures and controls to be implemented to avoid, minimise and mitigate environmental impacts; and
- document the environmental outcomes for the Project.

Effective implementation of this EMP and associated environmental control plans (ECPs) will ensure the Project meets regulatory and conditional requirements in a systematic manner with the aim to continually improve environmental performance.

Santos plans to convert the current exploration tenure for the Project Area (ATP 2053) from an ATP to a new Petroleum Lease (PL). Santos will need to apply for new a PL, granted under Chapter 2 of the Queensland *Petroleum and Gas (Production and Safety) Act 2004* (P&G Act) to replace the existing ATP. To authorise petroleum production activities on the new PL, Santos will also need to apply for a new EA under the EP Act. This EMP has been written to consider likely conditions of the new EA, however it will be revised or updated once the new EA is granted to ensure it complies with any additional conditions.

This EMP will be revised or updated from time-to-time to align with regulatory requirements. Revised versions of the EMP will be made available upon request to DCCEEW or as otherwise required under conditions of a regulatory approval, whether under the EPBC Act or any other applicable legislation.

2. Environmental Management Framework

2.1. Environmental policy

Santos has an Environment, Health and Safety (EHS) Policy which makes commitments relating to environmental responsibilities in managing the impact of our operations. The Santos EHS policy is attached in Appendix 1**.**

2.2. Santos Management System

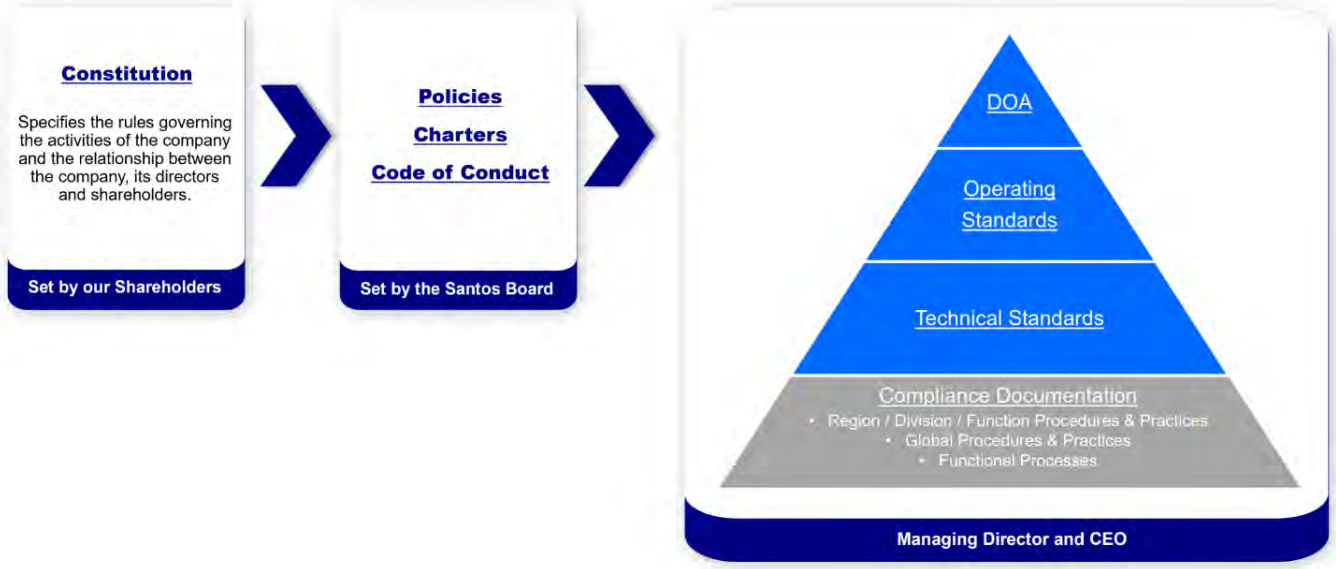
Santos will use its company-wide Santos Management System (SMS) to provide a structured framework for environmental and safety practices across Santos' activities and operations and is based on industry and Australian Standards (AS).

The SMS comprises four key parts that underpin the EHS framework and describe requirements such as organisation structure / Delegation of Authority (DOA), operating and technical standards, and compliance documentation for meeting the objectives of Santos' EHS policies. These are:

- **Delegation of Authority:**
  - the Santos Board delegates specific decision authorities to the Chief Executive Office, who in turn delegates specific authorities to members of management. These authorities are set out in the Santos DOA.
- **Operating Standards:**
  - consisting of several operating standards structured around key business activities. Compliance with the operating standards is mandatory.
- **Technical Standards**
  - detailed technical requirements or specifications that must be achieved in a consistent manner and must be followed.
- **Compliance Documentation:**
  - procedures and practices developed by and for a specific Region, Division, or Function to comply with Operating and Technical Standards.

This EMP has been developed to align with the SMS. The structure of the SMS and other system elements is depicted in Figure 4. The SMS is maintained in electronic form on Santos' central server and is accessible to all employees and contractors.

Figure 4: Santos Management System



2.3. Objectives, targets and performance indicators

The SMS operating standards require annual EHS objectives and targets to measure and drive continuous improvement in EHS, process safety, and performance across Santos.

Santos has developed lead and lag indicators for both environment and safety performance across all its assets. This enables Santos to set improvement goals and targets for continual improvement in environmental and safety performance.

Specific objectives and performance indicators have been developed for each environmental aspect and are included in Section 6.1.

2.4. Legislative requirements

Santos manages compliance with significant legal obligations in accordance with SMS operating standards, which set down requirements to ensure obligations are identified, communicated, accessible and kept up to date to achieve compliance. The standard and accompanying procedure require Santos to record the following information for each significant compliance obligation using an appropriate compliance tool:

- the requirements of the obligation and its status;
- person responsible; and
- source documents.

Non-compliances are reported internally and, if not resolved within a reasonable timeframe, escalated for appropriate resolution. Further information is available in Section 5.4.

As operator of the Project Area, Santos must comply with State and Commonwealth legislation applicable to the Project (as detailed in Sections 2.4.1 and 2.4.2), including relevant regulatory approvals / authorisations, permits and other requirements as listed in Table 1.

2.4.1. State legislation

The principal state legislation regulating petroleum and gas activities for the Project is the *Petroleum and Gas (Production and Safety) Act 2004* (Qld) (P&G Act). The principal state environmental legislation is the EP Act and associated regulation and protection policies. The EP Act introduces the "*General Environmental Duty*" (as

described in Section 319 and 320, chapter 7), which specifies that a person must not perform their duties in a manner which will cause, or is likely to cause, environmental harm unless the person takes all reasonable and practical measures to prevent or minimise the harm.

Petroleum exploration, appraisal and production testing activities are currently authorised to occur in the Project Area under the requirements of the EP Act via the existing Queensland Environmental Authority (EA) 0002052. Santos and all contractors undertaking petroleum activities within the Project Area must comply with the conditions of the EA, to meet their respective obligations under the EP Act.

Further, as discussed in Section 1.2, to enable commercial gas production activities within the Project Area, a new PL will need to be applied for and granted under the requirements of Chapter 2 of the P&G Act to replace the existing ATP. Further, to authorise commercial gas production activities in the PL, a new EA under the EP Act will also need to be applied for and granted.

2.4.2. Commonwealth legislation

The EPBC Act is the principal environmental legislation administered by the Commonwealth Government. It provides a legal framework to protect and manage, among other matters, nationally and internationally important flora, fauna, threatened ecological communities and heritage places defined under the EPBC Act as MNES.

The EPBC Act requires the principles of ecologically sustainable development to be considered for a new development proposal if that proposal is likely to a result in a significant impact on the environment.

Table 1: Applicable legislation

Name	Administering Authority	Specific Considerations
Commonwealth		
Environment Protection and Biodiversity Conservation Act 1999 (Cth) (EPBC Act)	Department of Climate Change, Energy, the Environment and Water (DCCEEW)	The EPBC Act establishes a process for environmental assessment and approval of proposed actions that have, will have or are likely to have a significant impact on MNES or on Commonwealth land. Under the EPBC Act, a referral to DCCEEW is required if the Project has the potential to cause a 'significant impact' on MNES. The Constraints Protocol will direct the siting of infrastructure and activities to avoid and minimise impacts to MNES that have the potential to occur within the Project Area. Further, a Roma Phase 7-7B-SD20 Development *Significant Species Management Plan* (SSMP) has been prepared to mitigate impacts on a threatened ecological community (TEC) or species (EPBC listed) habitat from the Project.
Native Title Act 1993 (Cth) (NT Act)	National Native Title Tribunal	The NT Act regulates recognition and protection of native title. Indigenous Land Use Agreements (ILUA) are in place.
State		
Aboriginal Cultural Heritage Act 2003 (Qld) (ACH Act)	Department of Treaty, Aboriginal and Torres Strait Islander Partnerships, Communities and the Arts, Queensland Government (DTATSIPCA)	The ACH Act provides recognition, protection and conservation of cultural heritage in Queensland and outlines duty of care obligations for issues compromising Indigenous heritage. Santos engages Traditional Owners and implements measures to protect Aboriginal cultural heritage including the development of a Santos Cultural Heritage Management Plan (CHMP) and implementing a Find Stop Notify Manage procedure.
Biosecurity Act (Qld) 2014 and its subordinate legislation	Department of Agriculture and Fisheries (DAF) – Biosecurity Queensland	Santos and all persons onsite must meet their General Biosecurity Obligation (GBO). This means taking all reasonable and practical steps to prevent biosecurity risks or events such as invasive weed and animal introductions.

Name	Administering Authority	Specific Considerations
Environmental Protection Act 1994 (Qld) (EP Act) and its subordinate legislation	Department of Environment, Tourism, Science and Innovation (DETSI)	The EP Act is the overarching environmental regulatory framework for governing the environmental management of resource activities in Queensland. Prior to the granting of a PL under the *Petroleum and Gas (Production and Safety) Act 2004* (see below), DETSI must grant an Environmental Authority (EA) that authorises resource activities subject to conditions to protect environmental values including acoustic, biodiversity, land, air, surface water, groundwater and wetlands. Petroleum exploration and production testing activities are currently authorised to occur in the Project Area under the requirements of EA 0002052. To enable future commercial gas production activities within the Project Area, a new EA to authorise petroleum production activities will need to be applied for and granted under the requirements of the EP Act. Further to the above, under the requirements of the EP Act: • all persons must implement all reasonable and practicable measures to prevent environmental harm (i.e. General Environmental Duty) • material or serious environmental harm must be reported to the DETSI • controls must be implemented for prescribed water contaminants (e.g., soil and sediment, concrete washout, fuel / oil etc.) • wastes must be managed to prevent environmental harm. Regulated waste must only be carried by licensed transporters and disposed of at appropriately licensed waste receiving facilities; and • contaminated land must be managed in accordance with State and National guidance to protect human health and the environment.
Environmental Offsets Act (Qld) *2014* (EO Act)	DETSI	Under the EO Act an environmental offset is defined as an activity undertaken to counterbalance a significant residual impact on a prescribed environmental matter, including endangered or of concern regional ecosystems (REs), riparian vegetation, connectivity areas, wetlands and watercourses and protected wildlife habitat.
Fisheries Act 1999 (Qld) (Fisheries Act)	DAF	The Fisheries Act regulates and controls waterway barrier works and marine plants. Where works within mapped waterways constitute waterway barrier works, works are to comply with the departments code for Accepted development requirements (ADR) for operational work that is constructing or raising waterway barrier works, including any temporary works. Works that cannot comply with this code are considered assessable development requiring development approval (DA) under the *Planning Act 2016*. The Project Area intersects the following waterways all associated with Washpool Creek: • 8 high impact waterways • 1 moderate impact waterway; and • 10 low-impact waterways.

Name	Administering Authority	Specific Considerations
Nature Conservation Act 1992 (Qld) (NC Act) and its subordinate legislation	DETSI	The primary purpose of the NC Act is to conserve biodiversity by protecting wildlife and its habitat. Permits are required under the NC Act for interfering with protected wildlife and their habitat requiring DETSI approval of a species management plan or other mitigation measures. Additional permits are required for clearing protected plants requiring DETSI approval of an impact management plan for the clearing and offsets for the species if required. Where wildlife listed under the *Nature Conservation (Animals) Regulation 2020* (Qld) or the *Nature Conservation (Plants) Regulation 2020* (Qld) are proposed to be disturbed, relevant NC Act management, assessment and approval requirements will apply. Requirements for managing fauna including the responsibilities of fauna catchers and spotters during clearing and construction activities are documented in the Project's Significant Species Management Plan.
Petroleum and Gas (Production and Safety) Act 2004 (Qld) (P&G Act)	Department of Natural Resources and Mines, Manufacturing, and Regional and Rural Development (DNRMMRRD)	The P&G Act facilitates and regulates activities associated with the safe exploration, development and production of petroleum and gas resources in Queensland. Petroleum tenure granted by the DNRMMRRD under the P&G Act relevant to the Project include ATP, PL and Petroleum Pipeline Licence (PPL). Prior to commencing commercial gas production activities within the Project Area, a PL to authorise petroleum production activities will need to be applied for and granted under the requirements of the P&G Act.
Planning Act 2016 (Qld) (Planning Act)	Department of State Development, Infrastructure and Planning (DSDIP)	The Planning Act establishes an efficient, effective, transparent, integrated, coordinated, and accountable system of land use planning, development assessment and related matters that facilitates the achievement of ecological sustainability. Activities outside of the area of a petroleum tenure (e.g., depots) will require assessment and approval under the Planning Act, including any DA for operational works.
Queensland Heritage Act1992 (Qld)	DETSI	The Queensland Heritage Act (QH Act) operates in tandem with the ACH Act and the *Torres Strait Islander Cultural Heritage Act 2003* (Qld) to protect Queensland's cultural heritage. The act creates a framework to protect places or objects of cultural heritage significance for aesthetic, architectural, historic, scientific, social or technological reasons. The principal mechanism through which the Act operates is the 'Queensland Heritage Register', which is administered by DETSI. The Project Area does not intersect any heritage places listed by the Queensland Heritage Register'.
Regional Planning Interests Act 2014 (Qld) (RPI Act)	DSDIP	The RPI Act provides a level of protection for agricultural land from impacts associated with development and resource activities in Queensland. These protections seek to manage the impact of resource activities and other regulated activities on areas of regional interest; and support coexistence of resource activities with other activities, including highly productive agricultural activities. The RPI Act identifies and protects areas of regional interest throughout Queensland. Under the RPI Act and associated statutory regional plans, areas are classified as 'areas of regional interest' in order to recognise their unique characteristics from a land use perspective. Key areas of regional interest relevant to resource development are identified as Priority Agricultural Areas (PAAs), Strategic Cropping Areas (SCAs), and Strategic Environmental Areas (SEAs). For a resource activity to be undertaken on an area of regional

Name	Administering Authority	Specific Considerations
		interest, in addition to other approvals, a resource company is required to have a Regional Interest Development Approval (RIDA), or an exemption prior to the activity being undertaken. Where activities are proposed in areas of regional interest, they must comply with the requirements of the RPI Act.
Vegetation Management Act 1999 (Qld) (VM Act) and its subordinate legislation	DNRMMRRD	The VM Act regulates the clearing of vegetation in Queensland in a way that allows for sustainable land use, conserves remnant vegetation, ensures land clearing does not cause land degradation, prevents loss of biodiversity, and maintains ecological processes. Further, the Act regulates the clearing of vegetation in a way that reduces greenhouse gas emissions. The purpose of the VM Act is to primarily regulate the clearing of native vegetation on freehold and leasehold land, however its requirements and definitions are linked to several other environmental Queensland environmental Acts, Regulations, and other legislative instruments including Guidelines and Environmental Authorities.
Water Act 2000 (Qld) (Water Act) and its subordinate legislation	DNRMMRRD	The Water Act provides a framework for the planning, allocation and use of surface water and groundwater in Queensland, including regulating major water impoundments (e.g. dams and weirs) and extraction through pumping for irrigation and other uses. The Project Area is located within the Surat Cumulative Management Area (CMA) and will be assessed by the Office of Groundwater Impact Assessment (OGIA) in the Underground Water Impact Report (UWIR) for the Surat CMA. Section 370 of the Water Act requires an UWIR be prepared for approval. The Surat UWIR assesses the cumulative groundwater impacts from resource operations in the Surat and Southern Bowen basins. OGIA prepared the first Surat UWIR in 2012 and updated it in 2016, 2019 and 2021. The UWIR identifies responsible tenure holder obligations under the Water Act that include 'make good' agreements, undertaking baseline assessments and implementing the water management strategy and the spring impact management strategy. Further, water licences under the Water Act may be required for other activities (e.g. licence to take water from a bore) associated with the Project.
Waste Reduction and Recycling Act 2011 (Qld) (WRR Act) and its subordinate legislation	DETSI	The WRR Act promotes resource recovery through End of Waste (EOW) codes, including EOW Code *Irrigation of Associated Water (including CSG produced water),* EOW Code *Associated Water (including CSG produced water)* and EOW Code *CSG Drilling Mud.*

3. Existing Environment

The Project Area is located approximately 5 km east of the regional town of Wallumbilla in central Queensland in the Maranoa Regional Local Government Area (LGA). This Project Area is located in the southern extent of the Brigalow Belt Bioregion (BRB).

3.1. Land use

The Project Area is predominantly rural land characterised non-remnant derived grasslands dominated by introduced pastoral grasses with occasional native trees and shrubs. The area is used largely for agricultural development, primarily cattle grazing. The Project Area is comprised of predominantly non-remnant vegetation that is generally disturbed and fragmented as a result of land use practices (Boobook, 2025).

The agricultural land uses of the region coexist with existing petroleum, energy and mining activities. Existing permits overlapping the Project Area include:

- EPC 1763 held by Wanbei Coal Electricity International Mining (Australia) Pty Ltd;
- EPG 2034 held by Within Energy Pty Ltd;
- Wallumbilla to Reedy Creek Pipeline (Petroleum Pipeline Licence (PPL) 2023) held by APA Reedy Creek Wallumbilla Pty Ltd; and
- a powerline easement crossing the northern portion of the Project Area held by Ergon Energy.

Two State-controlled roads are in the vicinity of the Project Area, including the Warrego Highway running east to west through the northern half of the Project Area, and Wallumbilla South Road located approximately 3 km west of the Project Area, providing efficient access for local and heavy vehicle traffic.

In the wider local area, a number of State Forests (SF) occur within 20 km of the Project Area, including Inglebogie, Yuleba and Wallabella SF, which are located approximately 15-20 km east, east and south of the Project Area, respectively.

3.2. Topography

This is a landscape of low relief comprising a broad floodplain with meandering streamlines flanked by slightly elevated areas. Ground elevations within the Project Area range from approximately 300 m to 350 m Australian Height Datum (AHD). Beyond the Project Area, to the east, an abrupt north-south trending plateau rises up to 50 m above the surrounds, forming the Grafton Range.

3.3. Climate

The climate of the Project Area is classified as subtropical with hot, wet summers and moderately dry, cold winters. Mean maximum temperatures range between 34.6°C in the summer months and 20.4°C in the winter months (Bureau of Meteorology station 043091, Roma Airport) (Bureau of Meteorology, 2024). Mean minimum temperatures range between 21.1°C in the summer months and 3.7°C in the winter months. The highest rainfall occurs during December to February, with an average highest rainfall of 75.2 mm in December, the lowest rainfall occurs during June to September with a lowest average rainfall of 24.9 mm in August.

The average annual evaporation in the vicinity of the Project Area is between 2,000 millimetres (mm) and 2,400 mm. The highest evaporation occurs during the summer months (average monthly pan evaporation 300 mm), while the lowest evaporation occurs during the winter months (average monthly pan evaporation 80 mm) (Bureau of Meteorology, 2024).

3.4. Regional catchment and surface water quality

The Project Area is located within the Bungil Creek catchment of the Maranoa-Balonne Rivers Basin (WQ4222) as described by the Environmental Protection (Water and Wetland Biodiversity) Policy 2019 (DESI, 2023). The Maranoa–Balonne Basin is a subset of the broader Condamine-Balonne catchment of the Murray-Darling Basin. Environmental values and water use associated with the Bungil Creek catchment include aquatic ecosystems, irrigation, farm supply / use, stock water, aquaculture, human consumption, primary recreation, secondary recreation, visual recreation, drinking water, industrial use and cultural, spiritual and ceremonial values. No High Ecological Value (HEV) waters are mapped within the Project Area.

While the Project Area generally has a uniform low elevation, ranges in the surrounding region include the Great Dividing Range to the north, Grafton Range to the west, and the Dulacca Range to the south-east. Most watercourses in the Project Area are ephemeral. There are no major watercourses mapped within the Project footprint, only one watercourse mapped within the Project Area, the closest major watercourses include:

- Washpool Creek: is a minor creek, which originates 5km north of the Project and flows through the Project before joining Wallumbilla Creek 2 km south of the Project;
- Wallumbilla Creek: originates 16 km northwest of the Project and flows south – southwest close to the township of Wallumbilla. The creek continues to flow south before reaching the Balonne River confluence downstream of Yuleba Creek, 54 km south of the Project; and
- Middle Creek: is a tributary of Wallumbilla Creek, which originates 15 km northwest of the Project and flows south between the township of Wallumbilla and the Project before joining Wallumbilla Creek 2 km west of the Project.
- Yuleba Ck (consists of SO 1-5 tributaries) is identified by the *Qld Water Act 2000* as a major watercourse and flows for approx. 187 km from near the Great Dividing Range before joining the Balonne River 45 km south of Yuleba. Yuleba Ck flows predominately south, close to the township of Yuleba, located 13 km east of the Project Area and joins the Balonne River, 46 km southeast of the Project Area.

Other minor, unnamed watercourses occur within the Project Area, almost all of which drain into one of the watercourses listed above.

The Sustainable Rivers Audit 2 for rivers within the Murray-Darling basin (Murray–Darling Basin Authority, 2012) found that the Condamine Valley, which includes the region around the Project Area, had an overall poor ecosystem health rating. The physical form of the Condamine Valley river system was rated as being in moderate condition, characterised by enlarged channels and evidence of widening and channel bed degradation. The cause of this condition was not specified.

According to assessment (Queensland Government, 2024), there are no wetlands of High Ecological Significance (HES) or HEV within or immediately adjacent to the Project Area, with the nearest mapped HEV wetland located approximately 39 km south-west of the Project Area.

There are no active springs mapped within 30 km of the Project Area. There is a low confidence of mapped terrestrial groundwater-dependent ecosystems (GDE) within and near the Project Area. There are no known or mapped subterranean GDEs or groundwater-dependent spring ecosystems located within the Project Area.

There are two registered groundwater bores located in the Project Area, these bores are recorded as Registered bore Numbers (RNs) 123195 and 208460 in the Groundwater Database - Queensland, which are sub-artesian bores for private water supply.

3.5. Regional geology

The regional geology of the Project Area comprises sediments from the Early Cretaceous to Quaternary age Surat Basin. Stratigraphic units of relevance to the Project Area include:

- quaternary alluvial systems within majority of the Project Area;
- early cretaceous age mudrock along the mid-eastern border of the Project Area; and

- fine grained sedimentary rock north-eastern corner of the Project Area.

Land zones are categories that describe the major geologies, the associated landforms and geomorphic processes in Queensland, and are a critical component of the RE classification scheme. The land zones identified within the Project Area using state mapping (Queensland Government, 2023) are detailed in Table 2.

Table 2: Land zones occurring within the Project Area

Land zone	Description as per Wilson & Taylor (2012)
3	Recent Quaternary alluvial systems, including closed depressions, paleo-estuarine deposits currently under freshwater influence, inland lakes and associated wave built lunettes. Excludes colluvial deposits such as talus slopes and pediments. Includes a diverse range of soils, predominantly Vertosols and Sodosols; also with Dermosols, Kurosols, Chromosols, Kandosols, Tenosols, Rudosols and Hydrosols; and Organosols in high rainfall areas.
4	Tertiary-early Quaternary clay deposits, usually forming level to gently undulating plains not related to recent Quaternary alluvial systems. Excludes clay plains formed in-situ on bedrock. Mainly Vertosols with gilgai microrelief, but includes thin sandy or loamy surfaced Sodosols and Chromosols with the same paleo-clay subsoil deposits.
9	Fine grained sedimentary rocks, generally with little or no deformation and usually forming undulating landscapes. Siltstones, mudstones, shales, calcareous sediments, and labile sandstones are typical rock types although minor interbedded volcanics may occur. Includes a diverse range of fine textured soils of moderate to high fertility, predominantly Vertosols, Sodosols, and Chromosols.

3.6. Regional ecology

The BRB bioregion is characterised by *Acacia harpophylla* (brigalow) forests and woodlands on clay soils (Sattler & Williams, 1999). Other ecosystems that are widespread throughout the bioregion include eucalypt forest and woodland, grassland, dry rainforest, cypress pine woodland and riparian communities (Sattler & Williams, 1999).

The majority of the Project Area has been cleared of native vegetation to form non-remnant derived grassland dominated by introduced pastoral grasses with occasional native trees and shrubs. Areas of remnant and regrowth native vegetation occur as irregular, discontinuous corridors along streamlines or as small, isolated fragments. River Red Gum (*Eucalyptus camaldulensis*) dominates riparian woodland along the banks of larger streams, while Poplar Box (*E. populnea*) dominates floodplain woodlands (Boobook, 2025).

The likelihood of occurrence of threatened flora, fauna, Threatened Ecological Communities (TECs), migratory fauna, fish and gastropod species listed under the EPBC Act within the Project Area are listed in Table 3. No threatened flora were identified to have potential to, or are likely, to occur within the Project Area.

Refer to the *Roma Phase 7-7B SD20 Development Matters of National Environmental Significance Ecological Assessment Report* (Boobook, 2025) for further information on the ecology of the Project Area.

Table 3: Likelihood of occurrence of MNES within the Project Area

MNES	EPBC Act Status	NC Act Status	Likelihood of Occurrence[1]
Threatened Ecological Communities			
Poplar Box Grassy Woodlands on Alluvial Plains TEC	Endangered	-	Known
Weeping Myall Woodlands	Endangered	-	Known
Birds			
Sharp-tailed sandpiper (*Calidris acuminata*)	Vulnerable, Migratory	Special Least Concern	Potential
Glossy black-cockatoo (eastern) (*Calyptorhynchus lathami lathami*)	Vulnerable	Vulnerable	Potential
Latham's snipe (*Gallinago hardwickii*)	Vulnerable, Migratory	Special Least Concern	Potential
White-throated needletail (*Hirundapus caudacutus*)	Vulnerable, Migratory	Vulnerable	Likely
Australian painted snipe (*Rostratula australis*)	Endangered	Endangered	Potential
Migratory Birds			
Fork-tailed swift (*Apus pacificus*)	Migratory	Special Least Concern	Likely
White-throated Needletail (*Hirundapus caudacutus*)	Migratory, Vulnerable	Vulnerable	Likely
Common Sandpiper (*Actitis hypoleucos*)	Migratory	Special Least Concern	Potential
Sharp-tailed Sandpiper (*Calidris acuminata*)	Migratory	Special Least Concern	Potential
Pectoral Sandpiper (*Calidris melanotos*)	Migratory	Special Least Concern	Potential
Latham's Snipe (*Gallinago hardwickii*)	Migratory, Vulnerable	Vulnerable	Potential
Mammals			
Koala (*Phascolarctos cinereus*)	Endangered	Endangered	Potential
Reptiles			
Yakka skink (*Egernia rugosa*)	Vulnerable	Vulnerable	Potential
Grey snake (*Hemiaspis damelii*)	Endangered	Endangered	Potential

Notes: EPBC Act 'Marine' listed species, and species unlikely to be present within the Project Area, have been excluded from Table 3. Likelihood of occurrence determination made in Boobook 2025.

4. Project Activities

4.1. Gas field infrastructure

4.1.1. Wells

Santos proposes to drill and operate up to 24 CSG production wells in the Project Area.

A well lease will be constructed to accommodate drilling, well completion equipment and support services. Typically, well construction will involve a drill rig and other equipment including storage for fuel, chemicals, drilling fluids, produced water and raw water supply. An operational production well lease will generally include gas and water metering, separation and filtering equipment, electrical and control systems and water and gas pipeline connections.

Well locations will be selected based on proximity to the subsurface target location and with consideration to environmental, cultural heritage, landholder and access constraints on the surface. Locating and developing a new well and supporting infrastructure will also take into account and ensure compliance with relevant environmental legislation and Federal and State government approvals.

Hydraulic fracture stimulation will be used to complete all wells (where required). On well completion, a pump will be installed to depressurise the coal seam and facilitate gas production. Well construction will involve the use of drilling muds, and hydraulic fracturing fluids where hydraulic fracturing stimulation is required (refer to Section 4.2 for further detail). Produced water and waste drilling muds, hydraulic fracturing fluids will be generated and managed in accordance with Section 4.3.4.

CSG production wells will be designed, constructed and decommissioned in accordance with the "*Code of Practice for the construction and abandonment of coal seam gas and petroleum wells, and associated bores in Queensland Version 2*" (the Code). The Code outlines mandatory requirements and good practice to reduce the risk of environmental harm. Production wells will be designed to:

- prevent any interconnection between target hydrocarbon-bearing formations and aquifers;
- ensure that gas is contained within the well and associated pipework and equipment without leakage;
- ensure zonal isolation between different aquifers is achieved;
- not introduce substances that may cause environmental harm; and
- production wells will not be installed within 90 metres (m) of a landholder bore.

Well leases will be constructed for each well to create a stable working platform suitable for safely undertaking drilling, and completions and well operations. The lease incorporates safe access and areas for the drilling rig, generators, fuel, chemical, casing and pipe storage, and associated portable buildings. Each well pad is also designed for subsequent operations like hydraulic stimulation generally incorporates the following standard features:

- a compacted and stable drilling rig hard stand area;
- tanks for management and disposal of drill cuttings and the recirculation of water into the mud system;
- an access road or track with clear entry and exit points for vehicles;
- mobile wastewater treatment systems for the disposal of ablutions waste from well site offices and accommodation;
- water storage tanks or ponds for drilling and / or hydraulic fracturing water and flowback fluid; and
- proppant and chemical storage for drilling and / or hydraulic fracturing operations.

The size and layout of the well lease will vary depending on a number of factors such as the number of wells to be drilled (multi-well leases), the size and type of drilling rig, the number of hydraulic stimulation stages, the need for on lease water storage, the program for completion of the well(s) and the surrounding environment / topography.

The lease size required to accommodate a single petroleum well is typically 1 to 1.25 ha. Minimum disturbance leases (consisting of matting placed on the ground to create a hardstand surface) would be used where topography and vegetative cover allows. Minimum disturbance leases can be less than one ha. Where additional area is needed to accommodate infrastructure such as a water tank, single well leases may be up to 1.5 ha in size. Well leases located on native slopes exceeding 4% require cut and fill construction techniques, and these areas will require leases greater than 1 ha in size.

Multi-well leases may be necessary to maximise gas recovery, reduce overall disturbance associated with multiple single leases, and / or accommodate landholder requirements. These may be up to a maximum 3 ha in size, resulting in a larger footprint per lease area but a reduced footprint per well.

Well lease construction methods vary depending upon the land system and soil type on which the well is to be drilled. Typically, topsoil with rootstock and vegetation is cleared and stockpiled for use later in restoration. Material sourced from borrow pits is imported where required to construct the lease pad, access roads and associated infrastructure. Borrow material is watered and rolled to achieve adequate compaction, provide a stable and trafficable surface and reduce dust. The risk of erosion is managed through the well pad design (i.e. surface water run-on and run-off) and engineered management controls. Considerations for siting and constructing well leases and associated infrastructure include:

- selection of non-sloping well leases is preferable (this minimises the requirements for cut and fill or importation of borrow material to level the site);
- employment of additional management controls in sensitive areas such as floodplains and proximity watercourses (where required);
- constructing erosion control measures where appropriate (i.e. diversion banks or berms);
- capping of sensitive terrain to preserve the underlying soils where required;
- avoiding environmentally sensitive and restricted areas and ensuring compliance with terms of the Santos Cultural Heritage Management Plan (CHMP); and
- minimising disturbance of native vegetation and fauna habitat.

Where practicable, minimum disturbance leases may be used as an alternative to traditional lease construction.

4.1.2. Access tracks

Construction of typical access roads (typically 10 - 15 m wide) will be required to accommodate heavy and light vehicles associated with project activities. Wherever practicable, existing access tracks will be upgraded for use, and new access roads will be co-located with gas and water gathering (and electrical and communications infrastructure) corridors wherever practicable to reduce the overall construction footprint.

Access tracks are required for construction activities. Where practicable, existing access tracks would be upgraded for use and new access tracks would be co-located with gas and water gathering (and electrical and communications infrastructure) corridors to reduce the overall construction width required. Co-located linear infrastructure corridors may be wider than 20 - 35 m where several services are co-located, and they typically do not exceed greater than 40 m total width, other than when several services are co-located.

Typically, bed level crossings are used for access tracks. Design and construction vary depending on the land system, expected frequency of use, traffic loadings and safety requirements. Where required they are constructed to withstand heavy and light vehicles associated with the activities and would typically be 10 - 15 m in width.

Access track crossings would be designed to comply with Queensland's existing framework for "waterway barrier works" under the *Planning Act 2016* (Qld), which is administered by DAF; only "accepted development" which

complies with specific standards may be carried out without a permit from the DAF. These standards include (but are not limited to):

- development work minimises impacts to waterways and fish habitat through the following actions:
  - minimise disturbance to the instream bed and banks e.g. use geofabric as a work base;
  - if it is necessary to remove vegetation, aim to cut vegetation no lower than ground level and leave the root in the ground to aid in stabilisation. If deep excavation is required during construction the roots may only be removed within the construction footprint area;
  - minimise the area of land disturbed or compacted;
  - ensure the least volume of soil or sediment is disturbed;
  - limit the use of machinery within waterways;
  - use machinery no greater than the capacity required for the purpose;
  - implement sediment and erosion protection measures; and
  - undertake works at times that minimise disruption to fish migration and fish habitat.
- impacts on water quality are to be minimised by undertaking the works to the standard set out in the current version of the Best Practice Erosion and Sediment Control, published by the International Erosion Control Association (IECA), Australasia (and in accordance with relevant EA conditions).
- for any part of the waterway bed or banks adjacent to the works that has been altered by the waterway barrier works, the site is restored and / or rehabilitated so that as a minimum:
  - stability and profiles of the bed and banks are re-instated to natural stream profiles and stability upon completion of the works;
  - the waterway bed is retained with natural substrate or reconstructed with substrate comparable to the natural substrate size and consistency; and
  - site conditions allow the rapid re-establishment of native vegetation and cover or native species are replanted to re-establish the natural plant community.

4.1.3. Gas and water gathering network

A construction right-of-way (RoW) approximately 20 - 35 m wide will be required for standard gathering line / pipeline construction including the excavation of a trench, pipeline laying, backfilling the trench, and reinstatement of the RoW.

Santos will utilise new and existing water and gas gathering lines / pipelines to transfer produced gas and water from the proposed CSG wells to existing approved water and gas processing facilities. These facilities are located on adjoining Santos owned and operated tenures in the broader Roma Gas Field. Gathering infrastructure RoW corridors are typically 20 - 35 m in width for individual services. As discussed in Section 4.1.2, where practicable, access tracks will be co-located with gas and water gathering (and electrical and communications infrastructure) corridors to reduce the overall construction width required. Co-located linear infrastructure corridors may be wider than 20 - 35 m where several services are co-located, and they typically do not exceed greater than 40 m total width, other than when several services are co-located.

During the field development planning process, Santos will assess stabilisation risks for pipeline watercourse crossings to inform crossing design. The assessment considers:

- watercourse cross-section geometry at the crossing location;
- watercourse catchment area; and
- watercourse longitudinal slope (bed slope / channel slope) at the crossing location.

The assigned risk level is a function of cross section geometry and flow erosivity (i.e. crossings with steeper banks and larger catchment areas / greater flow have higher risk levels). The crossing design is chosen based on assigned risk. Standard designs for low, medium and high-risk crossings are appended to this EMP in Appendix 2.

Gathering lines and pipelines would be constructed of high-density polyethylene (HDPE) pipe of 100 - 1000 millimetres (mm) in diameter. Low point drains and high point vents would be installed at intervals along the gathering lines to allow drainage of condensate from gas, and the release of minor entrained gas from produced water as required.

Gas gathering lines would be designed and constructed to comply with Australian Standard *AS/NZS 2885 – Pipelines Gas and Liquid Petroleum* (Standards Australia, 2018) and the Australian Pipeline and Gas Association (APGA) *Code of Practice Upstream PE Gathering Networks – CSG Industry*, *Version 6* (2024).

Gathering lines would be constructed using a combination of conventional earthmoving equipment and specialist pipeline trenching and lifting equipment. Gathering lines would be constructed using a standard construction methodology including:

- clearing and grading;
- trenching and padding;
- pipe stringing, laying and welding;
- backfilling and reinstating natural ground level; and
- installing marker signs as required.

Pipelines would be preferentially built during periods of no stream flow; as such, no impacts to natural stream flows are expected.

Once installed, the construction corridor would be rehabilitated back to the minimum width (termed the 'operational RoW') required for operation and regular inspection of the pipeline. Groundcover would be re-established along the operational RoW.

4.1.4. Other incidental activities

Supporting infrastructure, which may include small temporary workers camps (less than 2 ha), power and communications lines (co-located with gas gathering lines and pipelines) and other incidental petroleum activities such as borrow pits and laydown areas (less than 1 ha).

A small, temporary camp site may be required to provide accommodation for drilling, completions and associated support personnel. Camp sites are located within proximity to well leases to minimise travel related risks. Construction methods for camps are similar to those employed for laydown areas. The camp site location is flexible and will be constructed in an area where disturbance of native vegetation, particularly woody vegetation can be avoided or minimised. The camp location will also take into consideration landholder requirements, such as the potential for noise and dust generation and other operational hazards such as traffic. The camp will include a sewage treatment plant and associated irrigation area.

Other ancillary infrastructure and incidental petroleum activities required to support the construction activities for the Project may include:

- laydown, stockpile, storage and vehicle cleaning areas;
- storage tanks;
- power and communication lines;
- borrow pits;
- fencing;
- environmental monitoring equipment and management controls;

- geophysical, geotechnical, geological, topographic, cadastral and ecological surveys; and
- external infrastructure, such as transport, energy supply, water supply and communications.

4.2. Well drilling and completions

4.2.1. Site set up

The well lease needs to provide a stable working platform suitable for safely undertaking drilling and associated activities such as hydraulic fracturing and well workover (i.e. well maintenance) operations. The lease area provides adequate space for the drilling and hydraulic fracturing vehicles and equipment, generators, fuel and chemical storage, casing and pipe storage and associated portable buildings. The well lease area generally incorporates the following standard features:

- a compacted and stable hard stand area;
- an access road or track with clear entry and exit points for vehicles;
- mobile wastewater treatment systems for the disposal of ablutions waste from well site offices and accommodation;
- water storage tanks or ponds for hydraulic fracturing make up water and flowback fluid; and
- proppant and chemical storage for drilling and / or hydraulic fracturing operations.

4.2.2. Drilling

Wells would be constructed in accordance with the Code. The Code mandates that the design basis for wells must:

- consider casing setting depths that take into account aquifer and production zone locations;
- provide for installation of pressure control equipment (PCE) based on risk assessment, e.g. Blowout Preventor (BOP) equipment to American Petroleum Institute (API) standard 53;
- use appropriate casing weight and grade with appropriate casing running procedures. This includes consideration for casing corrosion risk and connection suitability;
- use appropriate well design and construction materials;
- use appropriate casing centralisation;
- use engineered cement slurries with both appropriate and effective cement placement techniques;
- ensure all fluids produced from the well travel directly from the production zone to the surface without cross contamination; and
- ensure they are constructed, maintained and abandoned in such a manner that it can be demonstrated there are two verified well barriers between a hydrocarbon bearing or abnormally pressured formation and the surface.

Drilling fluids and additives used during drilling activities will be used in accordance with the mandatory requirements and good practice guidelines outlined in the Code as well as the Safety Data Sheets (SDS) provided with each fluid / additive. With relation to drilling fluids, the mandatory requirements include:

- drilling fluids must be selected and managed to ensure all manufactured products used during well procedures are in accordance with the manufacturer’s recommendations and relevant SDS; and
- the name, type and quantity of each chemical used on each well throughout the life of the well must be recorded.

Good industry practice for drilling includes:

- drilling fluid should be a carefully monitored and controlled mixture designed to achieve best drilling results and ensure efficient removal of formation cuttings;
- control formation pressures;
- minimise damage to formations;
- petroleum tenure holders should ensure that the drilling fluid selected is appropriate for the well design to manage any locally experienced drilling problems and the geological conditions likely to be encountered;
- the use of biodegradable substances in the drilling fluid is preferred;
- the source of water for all well procedures (drilling, completion, workover and abandonment) should be recorded for future well monitoring purposes;
- products should be chosen, stored, and used at concentrations that minimise the risk of causing environmental harm;
- personnel, including contractors, should be aware of the environmental impact and emergency spill procedures for the products and substances in use on site; and
- petroleum tenure holders should use established, effective drilling practices to achieve a stable, uniform and, as far as possible, in-gauge hole.

During drilling, fluid is pumped through the inside of the drill string to the drill bit and back up the outside of the drill string to lift drill cuttings out of the hole. The drilling fluid / drill cuttings are then channelled into tanks where the drill cuttings are separated from the drilling fluid, and then drilling fluid is recycled down hole in a continuous process. Drilling fluids are also typically recycled onto other wells in a multi well scenario. Casing, which is concentric steel pipe, is installed into the well and cemented in place to provide the structural integrity and well integrity barriers for the life of the well. A typical drilling rig layout and lease and access roads required for drilling operations is shown in Figure 5.

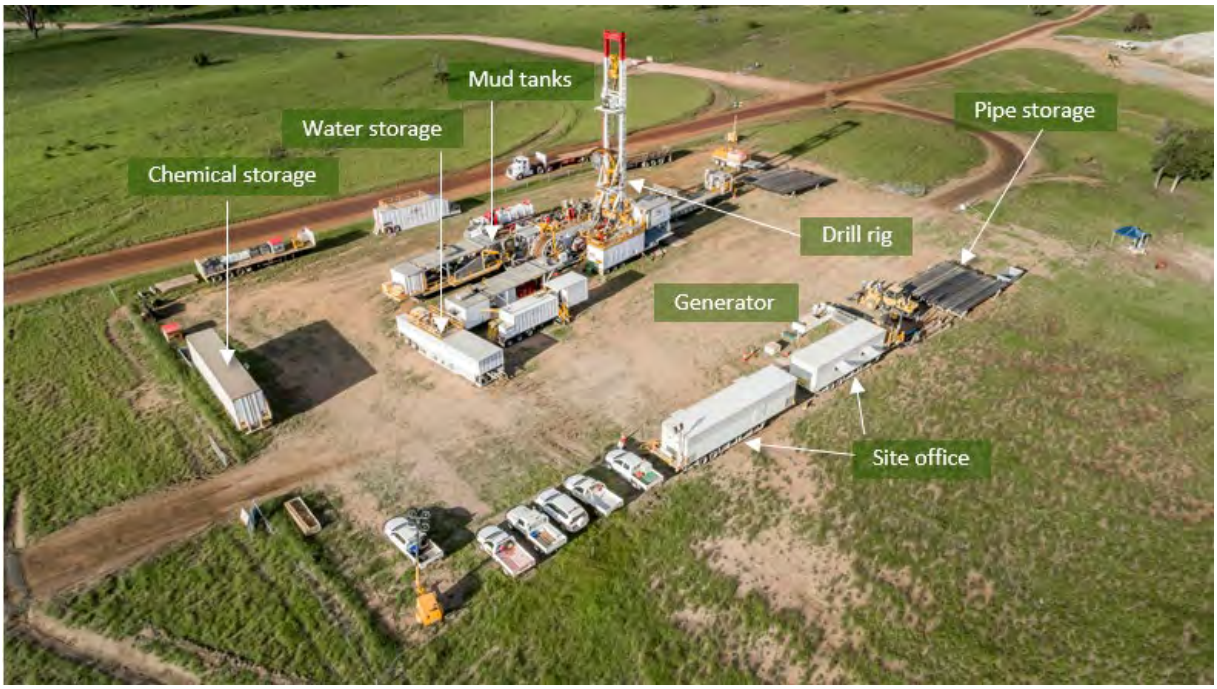


Figure 5: Example of well lease and drilling rig

Wells are drilled to such a depth as to reach the gas formation targets through a series of ‘hole sections’. Each hole section serves a specific purpose for well construction and well integrity as outlined below.

1. A shallow Conductor Hole Section may be drilled and cased to stabilise shallow surface sediments from the drilling of subsequent drilling phases (i.e. it prevents the loose soils from caving into the borehole). A conductor casing string is installed by exception and only if required based on local conditions for well construction purposes.
2. The Surface Hole Section is drilled and cased to achieve regulatory requirements for isolating shallow aquifer systems (if present) and to stabilise the well for subsequent hole sections. The hole section is drilled with drilling fluid that exerts a higher hydrostatic pressure on the rock face, than what is present naturally in the rock pore space, ensuring formation fluids do not enter the wellbore. The surface casing is cemented in place from bottom to top to ensure effective pressure isolation of shallow aquifers (if present) from deeper hydrocarbon bearing zones encountered in subsequent hole sections. Finally, it is pressure tested to simulate well life design specifications.
3. After the surface casing is installed, a Blowout Preventer (BOP) is installed onto the well at surface to provide a second barrier along with the drilling fluid. At the commencement of drilling the next hole section (i.e. after approximately 3m of new hole drilled), a Leak Off Test (LOT) or Formation Integrity Test (FIT) is conducted on selected representative wells to determine the rock strength in the local area. This will ensure the well is drilled without risk of the rock failing due to exerted pressure.
4. The Production Hole Section is drilled to intersect formation targets and is drilled to a depth below the lowest hydrocarbon bearing target. The hole section is typically drilled with drilling fluid that exerts a higher hydrostatic pressure on the rock face, than what is present naturally in the rock pore space, ensuring formation fluids do not enter the wellbore.
5. Open hole logging may be performed after the production hole section has been drilled and prior to the production casing being run. Wireline logging operations for Santos are undertaken by a number of different industry recognised specialist service companies. Different energy sources are lowered into the well via wireline including density, neutron, acoustic and electrical logging tools. Calculations based on the received signals are undertaken to evaluate the different parameters of the formation such as porosity, permeability, rock type and hydrocarbon saturation.
6. After the production hole is drilled and logged, production casing is installed to the total depth of the wellbore, cemented in place and pressure tested. The purpose of the production casing is to provide hydraulic isolation between the hydrocarbon reservoirs and all other overlying formations, to contain the pressurised fluid used to hydraulically stimulate the target zones, and to provide effective wellbore integrity for well production. The steel casing is manufactured and certified to strict Quality Assurance / Quality Control (QA / QC) standards and installed in a configuration specific for each well.

4.2.3. Casing and cementing

Casing design scenarios are modelled through specialist software to simulate the design loads for collapse, burst, tensile failures, and tri-axial failures observed during the operational, stimulation and production phases. Results of this analysis direct the selection of casing grade and weight. All casing is tested by Santos and the contractor using specific Quality Assessment and Quality Control (QA / QC) procedures prior to installation to ensure compliance with the Santos engineering and regulatory specifications.

After each hole section is drilled, the steel casing is cemented in place. The correct composition, volume and placement of cement is the construction aspect that is most important for well integrity. The cement serves two purposes – it provides protection and structural support to the casing while also providing zonal isolation between different formations, including aquifers (if present). The cement and required additives are high quality materials produced specifically for oil and gas operations with the materials selected designed to address the specific conditions of a particular well.

Santos and the cementing contractor must ensure the cementing material and equipment is adequate to achieve the well design objectives and ensure effective isolation. Prior to pumping the cement, it must be lab tested against the engineering design and actual downhole conditions such as temperature. The cement is tested using specific QA / QC procedures and includes the following:

- slurry density;
- thickening time;
- fluid loss control;
- free fluid;
- compressive strength development;
- fluid compatibility (cement, mix fluid, mud);
- sedimentation control;
- expansion or shrinkage characteristics of the set cement;
- static gel strength development; and
- mechanical properties.

Cased hole logs may be run on selected wells as required inside the cemented casing to validate the quality and integrity of the cement sheath bond to the casing and to the formation. Typically, these logs include:

- gamma ray - measures naturally occurring gamma radiation to characterise the rock or sediment in a borehole;
- casing collar locator - a magnetic device that detects the casing collars; and
- cement bond log - an acoustic device used to measure the properties of the cement sheath and the quality of the cement bond between the casing and the formation.

The cement bond log is an acoustic device that can detect cemented or non-cemented casing. It works by transmitting a sound or vibration signal into the casing, and then recording the amplitude of the arrival signal. Casing that has no or poor-quality cement surrounding it (i.e. free pipe) will have large amplitude acoustic signal because the energy remains in the pipe and isn't transmitted to the formation. Casing that has a good cement sheath (fills the annular space between the casing and the formation and effectively couples the two) will have a much smaller acoustic amplitude signal as the energy is absorbed by the formation due to effective acoustically coupling.

Santos uses experienced contractors to identify the key features of the cement quality to ensure the integrity of the cement seal for each casing pipe sheath. If cement is not of sufficient height or quality and deemed by the operator to be unsafe for continued operations, hydraulic stimulation will not proceed until it can be effectively remediated.

4.2.4. Hydraulic fracture stimulation

Due to the characteristic of the geological formations located within the Project Area, all proposed CSG wells will require hydraulic fracturing to produce commercially viable gas volumes / rates.

This process has been used extensively in the petroleum industry since 1947. Santos has successfully used this technique on wells in the Cooper Basin for over 50 years. Santos is currently performing the process in many basins around Australia, including for CSG wells within Santos' approved GLNG (EPBC No. 2008/4059), GFD (EPBC No. 2012/6615) and Towrie (EPBC No. 2021/8979) projects in the Surat Basin.

Hydraulic fracture stimulation is not part of the drilling process but is a completion technique applied after the well is drilled and is typically performed on newly installed production wells. The intent of hydraulic stimulation is to place highly conductive channels into the target reservoir that increase the permeability of the coal seam immediately adjacent to the well and improve flow of groundwater and gas into the well bore. Production wells may be subject to multiple fracturing events over their operational life.

The stimulation process involves injecting hydraulic fracturing fluids (water, sand / proppant and minor chemical additives) at high pressure into a cased wellbore. It is usually conducted over a number of intervals along the

production zone of the well. The proppant keeps the fractures open once the pump pressure is released which improves the productive potential of the well.

Hydraulic fracturing is a predominantly physical process in which hydraulic pressure is applied to a fluid to increase the effective permeability of the formation rock. The process creates narrow pathways (fractures) in the target formation to improve its ability to transmit gas back to and then out of the well.

After a pre-fracturing assessment and hydraulic fracturing design, onsite activities include site setup, perforation of the well casing and cement into discrete targeted sections of the cased bore (to access most viable gas bearing formation), injection of hydraulic fracturing fluid and flowback of the injected fluid. These processes are described in the following sections.

4.2.5. Pre-fracturing assessment and design

Operators investigate the subsurface conditions, including hydrogeological and mechanical properties of the target and surrounding geological units, to design the hydraulic fracturing program to strategically identify and reduce the possible risks involved (IESC, 2014).

To understand the geological formation and priorities for the hydraulic fracturing program, key aspects of subsurface characterisation (Beckwith, 2010) include:

- describing all geological units;
- assessing target formation permeability;
- analysing subsurface distribution of stresses and faults; and
- assessing fluid loss characteristics.

The hydraulic fracturing program is designed after the subsurface characterisation is complete. Part of this design is the prediction of fracture growth within the target zone. Specific hydraulic fracture simulation software is used to predict the geometry of fractures (fracture length, conductivity and height), while the orientation is determined from the in-situ stress field (IESC, 2014). Typical inputs to numerical models include volume and properties of the fluid and proppant, closure stress, pressures within pores, permeability, mechanical properties and layer geometry.

A number of considerations influence the final design for each stimulation treatment, including:

- depth and thickness of the formation target;
- lithology of formation target and bounding layers;
- minimum and maximum horizontal stress across all layers (target and bounding);
- thickness of the seals above and below the target reservoir formation;
- porosity and permeability of the formation;
- pore fluid saturations (percentage of formation pore volume occupied by oil, gas or water);
- pore fluid properties (e.g. density, water salinity);
- well performance data, including flow rates, formation pressure and produced fluid properties;
- formation boundaries (as identified from seismic data);
- bulk rock density, elastic properties and compressibility;
- natural fracture networks; and
- stress field analysis to determine the maximum principle stress direction and the minimum principle stress direction.

4.2.6. Well perforation

Holes are created in the well casing pipe at locations which align to the centre of the coal seams targeted for gas production (these are referred to as 'perforations'). A section of the casing pipe typically less than one metre long is selected for perforation to allow the well to discretely access the coal seam. They are generally aligned slightly below the midpoint of the coal seam being fractured to accommodate the tendency for upward propagation of the fracture (in the direction of least stress).

The perforations, or holes, are created by blasting a jet of water or fine sand / water mix at high pressure at the pipe wall or using small explosives. The perforations penetrate the steel casing and the cement grout layer, and into the coal seam by up to half a metre.

4.2.7. Acid injection

If the coal seam cleats[1] are found to be naturally filled with calcite mineral (calcium carbonate) then a diluted acid mix is injected through the perforation holes into the coal seam to dissolve the calcite away prior to hydraulic fracturing. This is found to be necessary in less than 10% of CSG wells only. It is carried out after completion of the well casing and directly prior to hydraulic fracturing operations, typically completed by the fracturing spread.

The selected coal seam can be pressurised with a 15% solution of hydrochloric acid (with preservatives), with typical volumes pumped of approximate 1 cubic metre (m^3). Hydraulic fracturing can then be carried out.

4.2.8. Hydraulic fracturing fluid

Hydraulic fracturing fluid generally consists of three parts: base fluid (the largest constituent by volume), additives and proppant. Base fluid (water) and proppant (sand) make up around 99% of the hydraulic fracturing fluid, with additives making up the remaining 1%. The purpose of the proppant is to keep the fractures open once the pump pressure is released which improves the productive potential of the well. Each chemical additive serves a specific, engineered purpose such as:

- viscosity: gelling agents and crosslinkers are added to the water to provide viscosity to enable the proppant material such as sand or ceramic beads to be transported down the well and into the created fractures;
- breakers: added to reduce the viscosity of the fluid when flowing back the well, enhancing recovery of fracturing fluid and additives to surface;
- friction reduction: to reduce the force required to pump the fluid, friction reducers are added, making the fluid more 'slippery' and easier to pump at the high pressures and rates required to create the fracture network;
- biocide: biocides or disinfectants are added to reduce the amount of naturally occurring microbes or organisms present in the water which can impact fluid stability and also to ensure they will not enter and contaminate the reservoir;
- scale and corrosion: scale and corrosion inhibitors are added to prevent deposition of mineral scales and to prevent corrosion of the steel casing or tubing; and
- surface tension: surfactants or surface tension modifiers are added to assist the back flow of fluids from the formation.

The chemicals used in hydraulic fracturing (and drilling) are subject to a chemical risk assessment process (under the *Roma Phase 7-7B-SD20 Development Chemical Risk Assessment Framework* (CRAF) (Santos, 2025a)).

4.2.9. Stimulation process

A number of steps are involved in the hydraulic stimulation process to pump the designed fracture treatment. These include:

[1] Coal seams have natural fractures, known as cleats. Cleats act as a major transport system for gas and water flow within a coal seam.

- Diagnostic Fracture Injection Test (DFIT) to validate and update the proposed stimulation design. This involves injecting a small volume of water, shutting down the surface pumps and monitoring pressure decline to evaluate near wellbore entry friction, fracture gradient, fluid leak off, and minimum horizontal stress. This stage is typically only performed in the exploratory/ appraisal stages of development, or until localised fracture characteristics are defined;
- drift run to check there are no obstructions in the wellbore;
- in the case of Plug and Perforation stimulation conveyance method, perforation of stimulation stage one (deepest stage) to gain access to the reservoir from the wellbore;
- in the case of coiled tubing stimulation conveyance method, all stimulation stages are perforated before the fracturing crew and equipment arrive at the wellsite;
- main stimulation treatment consisting of pad volume injection, slurry stage injection(s) with increasing proppant concentrations, and flush stage to displace last slurry stage through the perforations and into the fracture;
- mechanical isolation of the completed fracture stimulation stage;
- perforate the next stage to be hydraulically stimulated and repeat the processes above until the final fracture stimulation stage is completed;
- remove all mechanical isolation devices by milling out the mechanical isolations; and
- flowback well to clean up fracture stimulation fluids and monitor hydrocarbon production.

Hydraulic stimulation operations typically take 1 to 2 days to complete at a CSG well. Hydraulic fracture stimulation initial fluid flowback may occur for a period of 1 to 30 days, depending on the reservoir and clean up profile before being connected into gathering network.

4.2.10. Injection and isolation of hydraulic fracturing fluid

Once the well has been perforated in the depth interval that is to be hydraulically fractured, fluid injection is performed.

Hydraulic fracturing fluid is injected into the well at the surface through the wellhead. The perforation zones are isolated by either a coiled tubing unit with packers, a bridge or frac plug set by a wireline operator, or by a baffle and ball-drop system.

Following isolation of the perforated zone, injection of fluid commences. The hydraulic fracturing fluid is forced into fractures and remains within the target reservoir. The bore design and construction, comprising multiple physical barriers such as cement and steel casing, ensure that the hydraulic fracturing fluid does not come into contact with overlying strata, including aquifers. The integrity of these barriers is tested before hydraulic fracturing activities are undertaken.

The injection pressure, injection rates, slurry volumes, fluid viscosity, additive concentrations and proppant concentration are monitored in real-time during each injection. Downhole pressure information is also recorded and reviewed during the hydraulic fracture stimulation operation. Down-hole pressures are calculated based on wellhead pressure, fluid density, casing diameter and the depth to the target formation. When a coiled tubing unit is used as part of the operation pressure is monitored: inside the casing above the top packer of the tool, inside the coiled tubing delivering the fluid and inside the wellhead at surface.

Once the entire hydraulic fracturing operation is complete for a well, a completions rig or coiled tubing unit will generally mill out the bridge plugs or baffles that were installed for the hydraulic fracturing operation, to clear them from the well.

4.2.11. Return of injected fluid and water (flowback)

Once the injection process is complete, the internal pressure of the rock formation typically causes fluid to return or “flowback” to the surface through the gas well. Flowback fluid contains the dissociation or broken-down products of the injected chemicals plus naturally occurring geogenic compounds.

The volume of the injected fluids which is recovered as flowback is variable depending on the formation, treatment execution, and fluid type used. Immediately after stimulation, typically 0% to 20% of the stimulation volume is recovered within a few days of the completion of the fracturing operation. The well then continues to flowback once connected into the gathering network, where often >100% of the stimulation volume is recovered.

The flowback water is typically temporarily stored tanks before treatment for reuse or disposal.

4.2.12. Flowback fluid management

The recovered fluid, or flowback, may be treated and stored for reuse in the next hydraulic fracturing event. Flowback fluid unable to be reused would be disposed of at a licensed facility or transferred to one of Santos’ engineered treatment facilities for treatment and management under existing approvals for those facilities.

4.2.13. Wells

Once completed and connected to gas and water gathering infrastructure, wells would operate continuously on a 24-hour basis. Operating wells would be monitored and controlled remotely. The wells would also have automated shutdown systems in the event of non-routine operating conditions. As per the requirements outlined in the P&G Act, the volume of produced water will be monitored and recorded and provided to the DNRMMRRD in accordance with statutory obligations.

Ongoing activities at well sites during operations would include routine inspections and maintenance of wellhead infrastructure. Maintenance activities would include repair or replacement of downhole pumps and pump components, clearing of blockages from within the wells that may be limiting production capacity, and other actions as necessary to improve production efficiency.

Well maintenance activities usually require the use of a workover rig (which is smaller than a drilling rig) and are contained within the fenced lease area for the well.

4.2.14. Completions and connections

At the end of the clean-up phase, a workover rig would be required to install the production tubing and associated completion equipment such as packers, nipple profiles, tubing hanger, and the production tree, in preparation for connecting the well for inline production flow.

Production from each well is controlled with a metering skid which includes features such as overpressure protection, flow rate control, well safety shut-in, pressure and temperature monitoring.

After the drilling, stimulation, completion and connection activities are complete, the well lease is transitioned towards the operational phase which involves:

- backfilling the well conduits
- removal of drilling and completions equipment and waste; and
- pumping out additional water from the turkey’s nest (if installed) and removing the liner or removal of the temporary storage tank.

4.3. Production Operations

4.3.1. Wells

Once completed and connected to gas and water gathering infrastructure, wells will operate continuously on a 24-hour basis for an anticipated 30 - 50 years.

An operational production well lease will generally include gas and water metering, initial gas and water separation and filtering equipment, electrical and control systems, and water and gas pipeline connections (and tanks where on site water storage is required).

Operating wells will be monitored and controlled remotely. Each well has an automated shutdown system in the event of non-routine operating conditions.

Ongoing activities at well sites during operations will include routine inspections and maintenance of wellhead infrastructure. Maintenance activities will include repair or replacement of downhole pumps and pump components, clearing of blockages from within the wells that may be limiting production capacity, and other actions as necessary to improve production efficiency.

Well maintenance activities usually require the use of a CSG well workover rig (which is smaller than a CSG well drilling rig) and are contained within the established lease area for the well.

4.3.2. Gas processing

Gas produced from the Project Area is planned to be transferred to the existing Roma Hub Compressor Station 2 (R-HCS-02) located on PL 314 via new and existing gas gathering infrastructure.

R-HCS-02 and PL 314 are owned and operated by Santos. Petroleum activities located on PL 314 (including compression) are authorised be EA EPPG00898213 and EPBC Act Approvals 2008/4059 and 2012/6615. In the future, gas from the Project Area may potentially be processed elsewhere, subject to environmental approvals.

4.3.3. Gathering lines and pipelines

Gas and water gathering lines and pipelines will be monitored, inspected, and maintained during operation. This may include inspection of low point drains and high point vents as part of routine field maintenance activities, and vegetation slashing within operational RoWs.

4.3.4. Produced water management

The Project peak produced water forecast is estimated at 0.24 Mega L/day in 2028. The majority of produced water generated from the Project is proposed to be transferred to existing approved water storages and treatment facilities located adjacent to the Project Area, namely on PLs 314 and 315, via new and existing water gathering infrastructure. Produced water is then proposed to be transferred to existing approved water treatment facilities located on PL 314, where the water will be processed through a fines and sludge removal facility before being further processed, or bypassed around, the Roma Reverse Osmosis Plant (ROP) to meet re-use criteria in accordance with Qld End of Waste Code Irrigation of Associated Water (ENEW07546918). The Roma ROP is located approximately 25 km northwest of the Project Area.

Adequate water and brine storage and treatment capacity has been assessed by the WMP to be available on adjacent tenures to manage peak water and brine production from the Project. Further, Santos have established procedures to prevent uncontrolled discharge of produced water (i.e. restriction of production by “turning down” or “shutting-in” wells). In future, produced water from the Project Area may be processed or sent elsewhere, subject to relevant approvals.

4.3.5. Waste management

Drilling fluids would be contained on the well lease in tanks during drilling and then either re-used (or recycled and reused) at another well site or disposed of offsite at a licenced waste management facility. Residual drilling

material (RDM) would be stored in tanks during drilling and then, if agreed with the landholder, may be disposed of on-site in accordance with EA conditions, where:

- RDM meets approved quality criteria, and the mix-bury-cover method is used; or
- RDM is certified by a suitably qualified third party as being of acceptable quality for disposal to land by a proposed method, and that environmental harm will not result from the proposed disposal.

The potential risk to MNES receptors from application of RDM to land has been assessed to be low given the following:

- EA conditions adequately regulate land application techniques and a methodology to avoid environmental harm has been developed by a suitable qualified third-party
- the physical and chemical properties of the RDM is largely benign (The Project's CRAF, Santos, 2025a)
- potential application areas will be remote from surface water receptors, and surface watercourses are ephemeral; and
- there is large vertical separation of groundwater receptors from surface activities.

Although no environmental receptors are predicted to be at risk of being impacted from application of RDM, assessments and monitoring will occur to demonstrate that environmental outcomes have been achieved. Assessments and monitoring will include:

- sampling and characterisation of the RDM; and
- soil samples to characterise baseline conditions of each representative soil type within the Project Area for which land application of RDM is proposed.

Alternatively, RDM may be transferred by road to existing approved waste management facilities on adjoining tenures, or to another licensed waste facility for management.

Further, early warning, trigger thresholds and limits for managing the risk of adverse impacts to surface water and groundwater resources from the beneficial reuse of produced water or from land application of RDM is provided in Section 6.1.

4.4. Decommissioning and Rehabilitation

Santos will undertake rehabilitation in accordance with the *Santos Roma Phase 7-7B-SD20 Development Rehabilitation Monitoring Plan* (RMP) (Santos, 2025b).

4.4.1. Wells and well pad rehabilitation

Santos has developed a catalogue of standardised construction designs that focus on long-term stability for the operational life of the well, generally greater than 20 years. Using standardised designs Santos achieves consistent and high-quality execution whilst minimising future disturbances. Where standard designs are deemed not fit for purpose, site-specific designs are developed.

All wells are monitored throughout operations using a risk-based inspection and maintenance program. Santos has a standardised well inspection program, whereby every well lease is inspected on a planned / scheduled basis. Inspections target a range of environmental aspects / criteria for assessment. Maintenance works are scheduled by the civil works team based on priority / severity of maintenance issue.

When a well comes to the end of its productive life or if the well is drilled and deemed uneconomic to move to the 'complete' phase, a decision is made to decommission the well. The primary objective of well decommissioning is to isolate hydrocarbon and water bearing formations and eliminate migration pathways (between the reservoir, other formation / aquifers and surface). Wells earmarked for decommissioning are subject to individual evaluation to determine the most appropriate decommissioning program.

Perforated hydrocarbon zones are isolated with cement plugs and / or bridge plugs and cement bond logs (CBL) used and assessed to ensure that the cement behind the production casing is adequate to avoid migration pathways. If isolation is not evident behind the production casing following CBL integrity checking, the casing will be perforated and squeezed (with cement) to effect isolation. An additional cement plug is placed in the surface casing prior to cutting off the well head below ground level.

Consideration of the following is taken into account when plugging and decommissioning the well:

- isolate all formations that have hydrocarbon shows;
- isolate formations with different pressure regimes;
- set plugs across intermediate casing shoe (if present) to minimise the potential for cross flow between aquifer systems and hydrocarbon bearing intervals;
- set plugs across surface casing shoe; and
- at the surface set a plug in the well prior to cutting off the surface casing bowl.

Final rehabilitation of the well and lease area would include removing the well head, surface infrastructure and fencing; capping the well; filling in pits; respreading topsoil (after preparation) and revegetating the site to match its pre-disturbance vegetation type. Infrastructure that is useful to the landowner (for example pits or hardstand areas) may be handed over to the landowner in accordance with EA conditions.

4.4.2. Gathering line and pipeline RoW rehabilitation (following installation)

Gathering line and pipeline RoWs are cleared, gathering and pipelines installed, and the trench and RoW is reinstated in quick succession.

This methodology reduces exposure of unprotected subsoils, preserves topsoil characteristics e.g. structure, native seed bank etc, and minimises potential impacts from significant rainfall events.

As per relevant EA conditions, gathering line and pipeline trenches must be backfilled, and topsoils reinstated within three months after pipe laying.

RoW reinstatement is undertaken to ensure the following:

- a stable landform;
- re-profiled to a level consistent with surrounding soils;
- re-profiled to original contours and established drainage lines; and
- vegetated with groundcover which is not a declared pest species, and which is established and growing.

In addition, RoWs (including ancillary infrastructure i.e. temporary laydowns) are reinstated immediately following pipeline construction (typically within 3 months or in accordance with EA conditions) with considerations made for a range of factors including Erosion and Sediment Control (ESC), soil amelioration, fertiliser and seeding. These considerations are applied to ensure timely (within 6 months) revegetation of the pipeline RoW.

Santos has standardised watercourse reinstatement designs that are assigned to crossings based the site-specific risk profile (refer to standard watercourse designs drawings in Appendix 2). Watercourses are assessed as part of the planning phase and designs advised for each crossing based on several inputs e.g. soil type, catchment, modelled flows, bank profiles. There are five key options for reinstatement, three standard reinstatement designs (low, medium and high), a fourth site-specific design and a fifth where standard pipeline reinstatement is deemed adequate.

4.4.3. Gathering line and pipeline decommissioning

At the cessation of production, gas and water gathering lines and pipelines are isolated from the wellhead and other connection points i.e. risers and tie-in locations. Once isolated, gathering lines are drained/purged, vented and capped in accordance with the *Australian Pipeline Industry* (APIA) *Code of Environmental Practice - Onshore*

Pipelines (Revision 5) (2022) or applicable code in place at the time of decommissioning. Subsurface components of the gathering network are drained / purged, cleaned and left in-situ, and the RoW is then rehabilitated in accordance with relevant EA conditions. Subsurface pipelines proposed to be abandoned in-situ will be decommissioned in such a way to ensure that ground subsidence and the risk of contamination of the soil or groundwater is minimised. Further, where there is a potential risk of collapse or subsidence, consideration will be given to filling the abandoned pipeline with an inert substance e.g. filling the pipeline with cement to mitigate collapse at road crossing locations.

4.4.4. Access tracks

Access tracks and roads no longer required for petroleum activities will be initially offered to the underlying landholder as an asset. Any access tracks and roads unwanted by the landholder will be rehabilitated.

Access tracks would be rehabilitated or handed over to the landowner in accordance with relevant EA conditions (and State requirements i.e. in accordance with DETSI Guideline *Petroleum activities Transferring petroleum infrastructure to landholders Versions 2.01 - ESR/2020/5403*). If rehabilitation is required, rehabilitation will include removal of any gravel, ripping, levelling and re-profiling to reinstate natural contours of the land (including any watercourses) and revegetating to match the surrounding land-use. For unsealed roads and tracks the key techniques to minimise erosion and damage are good shaping (camber, elevation etc.) and good drainage. These techniques are imbedded in the standardised construction designs.

Watercourse crossings are assessed as part of the early planning phase and designs advised for each crossing based on several inputs e.g. soil type, catchment, modelled flows, bank profiles. In some instances, the standardised design is deemed unsuitable, and a site-specific design will be developed.

When planning for roads, considerations are made for existing and / or proposed adjacent infrastructure. Where construction occurs alongside adjacent infrastructure, the erosion and sediment controls marry into both pieces of infrastructure so as to not cause unwanted drainage or erosion impacts from one to the other i.e. surface waters are controlled across the entire disturbance footprint.

Roads will undergo routine maintenance grades throughout the life of the infrastructure. These will typically follow high vehicle traffic and / or wet weather. In addition to the routine maintenance, any unforeseen issues are captured and stored within a central database for priority maintenance.

4.5. Water Management and Monitoring

4.5.1. Groundwater monitoring

The groundwater monitoring requirements for petroleum tenure holders within the Surat CMA are provided as part of the UWIR Water Monitoring Strategy (WMS) which establishes baseline trends, identifies any changes within or near petroleum development areas or locations of interest and informs future improvement of groundwater modelling.

Santos under the *Water Act 2000* (QLD) developed and implemented a WMS as stipulated in the UWIR for the Surat CMA. This comprises of groundwater monitoring at over 150 monitoring locations throughout the Surat CMA. Revisions of the UWIR may amend the WMS according to the improved understanding and certainty of groundwater risks. Further, Santos undertakes baseline assessments for relevant water bores in accordance with the requirements of the Baseline Assessments Guideline (ESR/2016/1999) and *Water Act 2000* (QLD).

4.5.2. Water supply

Preference would be given to the use of non-potable water supplies for washdown, dust suppression and construction activities where economically and practically feasible.

Santos would only extract water from constructed wetlands and other farm dams for construction purposes with the permission from the landholder when water supplies are abundant. No specific monitoring of water quality within the constructed wetland is proposed given Santos' minimal use.

4.5.3. Water management

Water management will be undertaken in accordance with this EMP which has been developed to meet the requirements of the Queensland government's *CSG Water Management Policy 2012* (DESI, 2023). The *CSG Water Management Policy* guides operators in managing CSG water to comply with their EA requirements and encourages the beneficial use of CSG water in a way that protects the environment and maximises its productive use as a valuable resource.

Portable tanks used to temporarily hold produced water on site will be designed and constructed in accordance with relevant Australian Standards.

4.5.4. Produced water monitoring

Produced water quality will be monitored in accordance with the EMP, *Stimulation Impact Monitoring Program*, and as required by relevant EA conditions and the EoW Code *Irrigation of Associated Water (including coal seam gas water)* (ENEW07546918).

4.5.5. Surface water monitoring

Turbidity monitoring will be carried out during the construction and maintenance of linear infrastructure crossings of watercourses to ensure water release limits specified in relevant EA conditions are complied with. However, in accordance with EA conditions, Santos preferentially undertakes construction and maintenance of linear infrastructure crossings of watercourses during periods of no or very low flows.

4.6. Bore management

The *Water Act 2000* outlines requirements for make good obligations of a resource tenure holder for a bore located in immediately affected areas. Tenure holders must carry out a bore assessment and enter into a make good agreement with the bore owner if the bores are located within an immediately affected area. The UWIR assigns bores to tenure holders located within immediately affected areas.

Santos will comply with make good agreements required in future updates of the UWIR and undertake bore assessments as required as a result of make good obligations. Any required bore assessments will be undertaken in accordance with the Queensland government's *Bore Assessment Guideline* (ESR/2016/2005). If it is determined through the bore assessment that a bore has, or is likely to have, an 'impaired capacity' the make good agreement must provide details on the make good measures to be undertaken by the resource tenure holder to 'make good' the impact. Santos will comply with the *Bore Assessment Guideline* and any make good agreements that are determined to be required for the Project Area.

5. Implementation of EMP

This EMP will be implemented by Santos from the commencement of site mobilisations until completion of Project activities.

5.1. General environmental duty

All persons have a responsibility for their own environmental performance and compliance with the "*General Environmental Duty*" as described in section 319 and 320, chapter 7 of the EP Act:

All Santos staff, contractors, and subcontractors, are required to:

- comply with all requirements of environmental legislation;
- comply with specific requirements of the relevant EA and associated approvals / licences;

- undertake all activities in accordance with the agreed management plans, procedures, work method statements and safe work method statements (SWMS);
- ensure they are aware of the contact person regarding environmental matters;
- report any activity that has resulted in, or has the potential to result in an environmental incident or non-compliance;
- participate in investigations and undertake corrective actions (where required) to reduce or remediate environmental harm or to prevent the re-occurrence of an incident; and
- ensure they attend any environmental training provided.

5.2. Roles and responsibilities

Santos will be responsible for the implementation of environmental management procedures and mitigation measures contained in the relevant EA and its conditions, any EPBC Act decision / approval and conditions, and this EMP. All employees and contractors will meet the requirements of these documents.

Responsibility for a particular piece of infrastructure, such as a well lease, will depend on the phase of development and activities being carried out on the infrastructure at the time.

SMS operating standards and related procedures require all role levels at Santos to have an applicable role description which defines responsibilities and accountabilities including those relating to environmental and safety compliance.

Please see below the roles and responsibilities of personnel.

5.2.1. Project Director

The Project Director is responsible for:

- ensuring the SMS operating standards and EMP are established and implemented effectively throughout the life of the Project to achieve legislative compliance and acceptable standards for safety, health and environment performance;
- providing appropriate training to foster awareness of risks, ensure implementation of relevant controls and maintain acceptable standards of health, safety and environmental performance;
- encouraging all personnel to maintain acceptable standards of health, safety and environmental work practices and foster awareness of health, safety and environmental matters; and
- encouraging all incidents, events and other concerns to be reported and ensuring appropriate feedback on proposed corrective actions.

5.2.2. Construction Manager

The Construction Manager will be responsible for:

- preparation, review and approval of environmental documentation (including management plans, procedures and work instructions) prior to commencement of work;
- incorporation of key environmental aspects and associated impacts in the ECPs to maintain safety, quality and environmental standards to the highest level across the works;
- overall planning, coordination and control of the Project from inception to completion;
- maintaining safety, quality and environmental standards to the highest level across the works;
- environmentally acceptable work methods and practices and proper operation and maintenance of plant and equipment to maintain safety, quality and environmental standards to the highest level across the works;

- leading and managing all aspects of each site on a daily basis to ensure all personnel implement and adhere to the requirements of this EMP;
- promoting environmental awareness of all personnel on site;
- ensuring construction activities are undertaken in accordance with the requirements of the EMP including timely planning and effective communication;
- ensuring potential hazards are identified, risk-assessed and control measures are planned and implemented in consultation with all relevant personnel; and
- participating in environmental incident and non-conformance report investigations and ensuring that any proposed corrective and preventative action effectively implemented.

5.2.3. Environment Adviser

The Environmental Advisor is responsible for:

- ensuring that all relevant environmental approvals and permits are in place for the scope of work, prior to commencing construction activities;
- assurance for implementation and effectiveness of environmental controls and reporting required to achieve legislative compliance;
- reviewing performance against environmental objectives and performance indicators;
- reviewing implementation of ECPs to effectively minimise the potential impact to the environment as a result of construction activities;
- undertaking periodic assurance inspections to review suitable control measures were implemented in line with commitments in this EMP and provide feedback to improve ongoing implementation;
- ensuring all environmental monitoring activities and processes occur as required;
- assist in the review of environmental control measures to assess their ongoing applicability and effectiveness;
- assist all staff and contractors engaged to work on site are appropriately inducted and trained in the environmental issues and controls relevant to the Project, and provide assurance function for the following tasks:
  - being the principal source of functional environmental expertise available to Santos personnel;
  - facilitate environmental reporting requirements for the duration of the Project;
  - facilitate reporting of significant environmental incidents internally and externally (as required by regulator); and
  - participating in environmental incident and non-conformance report investigations and ensure that any proposed corrective and preventative action effectively implemented.

5.2.4. Contractors and subcontractors

All Santos contractors, and subcontractors, are required to:

- comply with legislative requirements, conditions of approval, including EA and EPBC Act conditions and other permits;
- undertake all activities in accordance with the agreed management plans, procedures, work method statements and SWMS;
- report any activity that has resulted in, or has the potential to result in an environmental incident or non-compliance;

- participate in investigations and undertaking corrective actions (where required) to reduce or remediate environmental harm or to prevent the re-occurrence of an incident; and
- attend any environmental training provided.

5.3. Inductions and training

The SMS operating standard defines expectations for ensuring employees, contractors and visitors have the necessary knowledge and skills to conduct their activities safely, in an environmentally responsible manner and without damaging plant and equipment.

All personnel working or visiting a Santos site or premise must complete the appropriate EHS inductions. Training and induction records are maintained for staff and contractors.

The following levels of induction are required:

Applicable Personnel	Induction Requirements
Santos personnel and contractors working on Eastern Queensland assets	Level 2 Onshore Induction Level 2 Environment, Health and Safety induction for Eastern Queensland
Santos personnel and contractors working in Eastern Queensland operational sites	Level 3 Site-Specific induction for staff and contractors attending the field Land Access - QLD induction Biosecurity Management at Santos
If working or driving in the field	Heat Stress training Safe Driver Training

Level Two inductions are maintained by a delegate of the sites / premises and provide information on the location's significant EHS hazards and controls implemented to minimise risk as well as the location's generic emergency response protocols. The Level Two induction is available on-line.

Level Three inductions are maintained by a delegate of the location / activity and provide information on significant EHS hazards and controls implemented to minimise risk as well as site-specific emergency response protocols. The Level Three Induction is specific to the field location.

5.3.1. Environmental awareness training

Santos and contractors must facilitate employees and subcontractors to undergo environmental awareness training through a site induction prior to the commencement of construction activities. The environmental awareness training will cover significant environmental aspects, actual or potential impacts associated with the construction activities (e.g. flora & fauna management, erosion and sediment control, waste management and hydrocarbon and chemical management) and environmental management processes, controls and onsite responsibilities.

5.3.2. Pre-start meetings

Pre-start meetings with site personnel will be convened throughout construction activities. The meetings will detail work planned for the day and cover weather forecast, site conditions, recent environmental issues / incidents and future environmental requirements to be planned / scheduled and responsibility assigned.

5.3.3. Toolbox talks

As a minimum toolbox talks will be conducted on a monthly basis, to discuss construction relevant environment matters and will be attended by staff, contractor personnel and sub-contractors. Additional site toolbox talks may also occur in the field with specific crews and may cover topics outlined for specific tasks, or as identified by the Construction workers themselves. Environmental toolbox topics may include, but are not limited to, Santos's legislative commitments, contractual requirements, emergency spill response an incident management, soil

management and erosion and sediment control, flora and fauna, water, dust, fuel and chemical management. All records of such toolbox talks and attendees register must be kept on file for auditing purposes.

5.4. Incidents and emergencies

Santos has developed the operating standards and procedures relating to incident and crisis management. These documents require a risk-based emergency and crisis management framework be in place which includes:

- a tiered response and management structure with defined criteria and authority levels for enacting each level of response;
- emergency preparedness and response plans based on credible scenarios and risks where required by legislation;
- sufficient equipment, facilities and trained personnel available to enact plans;
- scheduled emergency and crisis preparedness activities; and
- review of findings from exercises and actual events to identify learnings and opportunities for improvement.

All incidents including environmental incidents, non-conformance events and complaints are recorded electronically and managed through the Santos Incident Management System (IMS) in EHS Toolbox.

EHS incidents and near misses are investigated in order to identify the causal factors and associated underlying systemic weaknesses (root causes). The process to determine the correct level of incident investigation is outlined in the relevant SMS Operating Standard.

The DETSI Pollution Hotline will be notified by the relevant environmental advisor within 48 hours of becoming aware of various prescribed incidents including, but not limited to:

- unauthorised significant disturbance to land;
- unauthorised release of contaminants above thresholds described in the EA; and
- potential or actual loss of well integrity.

Depending on the risk, and in addition to the contractors investigation (if involved), environmental incidents may be investigated by Santos in accordance with Santos' incident investigation process.

Upon completion of the investigation, the findings and recommendations will be distributed to relevant personnel force via daily prestart meetings. Where lessons are learnt from the investigation or current procedures are identified as being ineffective or inadequate, the EMP or other pertinent documentation will be revised to include the improved procedures or requirements.

In the event a contractor performing works on behalf of Santos is involved in an environmental hazard, near miss or incident, the Santos Construction Manager must be notified. Where an environmental incident occurs, verbal notification to the Santos Construction Manager must be given as soon as possible. An incident response report is to be completed by the contractor detailing the incident itself and all identified corrective and preventative actions. Where incidents are classified as moderate or higher a more detailed investigation is to be completed with a final report provided to Santos. All reporting must be completed in accordance with the requirements and timeframes outlined in the relevant operating standard.

5.5. Complaints management

Santos records and manages responses to complaints within a Stakeholder Relationship Management System (SRMS). All complaints received are recorded in the SRMS and assigned a Complaints Handling Officer to manage the complaint. The Complaints Handling Officer is responsible for ensuring the complaint is adequately investigated, gathering facts and information to inform a recommended course of action and communicating with the complainant. All complainants are responded to verbally and then in writing with an appropriate plan to

address the complaint including remedial action if necessary. Once the complaint has been resolved Santos checks whether the complainant is satisfied. It is only then that the complaint is closed out.

All complaints received by any contractor performing works on behalf of Santos must be referred to the Santos Construction Supervisor and Environmental Advisor as soon as practicable.

5.6. Monitoring, inspections, audits and corrective actions

The Santos *Risk Management, Investigation and Assurance Operating Standard* (Standard) outlines the requirements to provide assurance that EHS systems and processes are effectively implemented, fit for purpose and are meeting relevant statutory requirements. The key assurance levels of the Standard are summarised below:

- **Level one** assurance activities performed by frontline leadership, must be conducted to ensure that front-line controls are in place and operating effectively for the management of risk; and compliance with controls is monitored and maintained.
- **Level two** assurance must be performed by management and senior management on planned basis and within defined timeframe must occur to confirm effectiveness of level one assurance and must also establish an escalation mechanism to receive reports on any material or systemic control failures or weaknesses.
- **Level three** assurance must only be conducted by independent internal parties (Functions / Divisions) and external third parties, such as the statutory financial external audit or other independent audits commissioned by Santos. This includes annual internal audit plans approved by the Audit & Risk Committee of the Board.

Assurance must be built into processes, including Core Business Processes, at appropriate intervals rather than leaving to the end of the process. Control improvement actions arising from assurance activities must be recorded, monitored, and tracked to completion. Lookbacks must be conducted for transactions approved by the Board as identified by the Managing Director and CEO.

Monitoring will be carried out in accordance with relevant EA conditions and EPBC Act approval conditions (once granted), and other relevant environmental approvals / permits.

5.6.1. Environmental inspections

Inspections will be documented on a checklist that will record whether the performance requirement for each item was achieved, and corrective actions required to achieve the performance requirement. Where the non-conformance does not present a significant risk of environmental harm, and can be corrected promptly, the corrective action will be closed out on the checklist. Where the risk of environmental harm is more significant and / or the corrective action cannot be undertaken promptly, the action will be recorded in the corrective action register.

The corrective action process consists of the following steps:

- identification of a problem (failure or deficiency);
- root cause analysis to identify causes and determine solutions;
- decision as to the appropriate action;
- application and documentation of corrective or preventative action; and
- follow-up and evaluation.

Corrective actions in relation to environmental management may arise from:

- recommendations and outcomes of incident investigation reports, including investigations into incidents, near misses and non-compliances;
- reviews of monitoring results indicating that performance requirements are not being met and / or that trends indicate that environmental degradation may be occurring;
- checks and inspections (note that minor corrective actions identified through checks and inspections will generally be resolved on the spot);
- identification of hazards or improvement opportunities;
- audit recommendations; and
- complaints.

5.6.2. Internal (Santos) assurance inspections

Site inspections will be conducted regularly by Santos during active works. Inspections will be carried out to assess activities against compliance requirements set out in this EMP, EA conditions and EPBC Act approval conditions (once granted), and other relevant environmental approvals / permits.

Additional environmental inspections will be carried out to monitor work practices and conformance to the EMP requirements and any relevant overarching legislative criteria. Non-conformances identified will be issued to the contractor through the relevant contractual communication mechanism for action e.g. Site Instruction.

5.6.3. Contractor and subcontractor inspections

Environmental monitoring and inspections must be undertaken by contractor personnel to ensure compliance against applicable legislation and EMP requirements. All inspection and monitoring data is to be made readily accessible and available to Santos.

Inspections must be conducted, documented and results provided to relevant Santos personnel. Areas identified as requiring corrective and preventive action must be raised within the Contractor's management system and relevant contractor personnel issued corrective actions for close out. This process must be managed by the Contractor.

Inspections must be carried out by the Contractor regularly throughout the construction period to adequately address inherent environmental risks present throughout construction.

5.6.4. Plant and equipment inspections

Prior to mobilising plant to site, a pre-mobilisation plant checklist, including environmental checks is to be completed by the contractor. Prior to arrival at the site, a declaration regarding the weed status of all plant and mechanical equipment is to be made, by completing a Vehicle Hygiene Report. All plant, including tracked or wheeled mechanical equipment is to be inspected on arrival at the site and before commencing construction work.

Additionally, plant operators must conduct their own daily inspections and routine maintenance checks throughout construction.

5.7. Reporting and record keeping

This EMP and all associated, documents and registers will be controlled documents subject to unique document identifiers and version control. Corrective actions will be tracked on a register / database to ensure that updates on the status of corrective actions are available to managers and supervisors.

Other documentation and records to be retained will include:

- incident investigation reports;
- remedial actions taken following incident reports;

- completed site checklists;
- records of training and induction;
- audit reports;
- records of waste removal including waste tracking certificates; and
- all monitoring records.

Reporting will be carried out in accordance with relevant EA conditions and EPBC Act approval conditions (once granted), and other relevant environmental approvals / permits.

All records and data required to be maintained by relevant approval conditions will be retained as specifically required, or for a minimum of 5 years.

6. Environmental Management

6.1. Environmental objectives and performance outcomes

Table 4 identifies environmental objectives and performance indicators (and compliance requirements) for each environmental aspect in the Project Area.

Planning, Objectives and Targets aim to be:

- quantified and measurable;
- realistic and achievable;
- focused on continual improvement;
- consistent with, and related to, Santos's Environment Policy and management standards;
- periodically reviewed and, if required, revised; and
- performance indicators will be reviewed as part of the EMP review.

Table 4: Environmental objectives and performance indicators (and compliance requirements)

Aspect	Objectives	Performance indicators (and compliance requirements)
Water resources	• avoid or minimise impacts to groundwater and surface water values. • avoid or minimise impacts to the physical integrity, fluvial processes and morphology of watercourses and wetlands. • for ephemeral watercourses, undertake works as a priority during periods with no flow to very low flow. • erosion and sediment control devices maintained and fit for purpose as required. • no water contamination by wastes, hydrocarbons or other chemicals used during petroleum activities that result in serious or material environmental harm. • implementation of (as applicable): – Constraints Protocol (Santos, 2025c). – Code of Practice for the construction and abandonment of petroleum wells and associated bores in Queensland Version 2 QLD, Australia (DNRME, 2019) (The Code). – Roma Phase 7-7B-SD20 EPBC Act Water Resource Impact Assessment Report (WRA) (KCB, 2025). – relevant EA and EPBC Act decision conditions (once granted) – Roma Phase 7-7B-SD20 CRAF (Santos). – EOW Irrigation of Associated Water (including coal seam gas water) (ENEW07546918); and – no production wells installed within 90m of a landholder bore.	• erosion and sediment controls are implemented. • no release of produced water to surface waters. • turbidity monitoring undertaken in accordance with relevant EA conditions. • works involving significant disturbance near watercourses and wetlands are in accordance with relevant EA conditions. • impacts to existing groundwater bores are managed in accordance with 'make good' provisions in the *Water Act 2000.* • produced water utilised onsite in accordance with relevant EA conditions / EOW ENEW07546918. • compliance with (as applicable): – Constraints Protocol. – The Code. – WRA. – EA and EPBC Act decision conditions (once granted). – CRAF. – EOW ENEW07546918; and – no production wells installed within 90m of a landholder bore.

Aspect	Objectives	Performance indicators (and compliance requirements)
Soil and land resources	• avoid or minimise adverse impacts to the quality and stability of soils. • reinstate and rehabilitate authorised disturbances to a safe, stable and non-polluting landform suitable for its intended ongoing land use. • avoid or minimise adverse impacts to the quality and stability of soils. • ground disturbance minimised as far as practicable. • no soil contamination by wastes, hydrocarbons or other chemicals used during petroleum activities that result in serious or material environmental harm. • implementation of: – RMP. – Constraints Protocol. – The Code. – WRA. – EA and EPBC Act decision conditions (once granted); and – this EMP.	• erosion and sediment controls are implemented. • release of contaminants to land (including treated sewage effluent and RDM) is in accordance with EA conditions. • fuels and chemicals are stored in accordance with relevant Australian Standards. • produced water utilised onsite in accordance with EA conditions / EOW ENEW07546918. • significantly disturbed land is rehabilitated to a safe, stable and non-polluting landform suitable for its intended ongoing land use. • compliance with: – RMP. – Constraints Protocol. – WRA. – The Code. – WRA. – EA and EPBC Act decision conditions (once granted); and – this EMP.
Flora and fauna	• avoid or minimise impacts to terrestrial and aquatic ecosystems and associated flora, fauna and habitat of state (Matters of State Environmental Significance) and national significance (MNES). • avoid or minimise habitat loss and fauna mortality. • a suitably qualified Fauna Spotter / Catcher will be present during vegetation clearing activities where required; and fauna found to be present within areas to be cleared shall be managed, removed and / or relocated by the Fauna Spotter / Catcher where appropriate, and in accordance with the requirements of this EMP and the SSMP. • hollow logs (located on ground) within disturbance areas retained and shifted to adjacent undisturbed areas where practicable. • measures implemented to reduce risks to fauna from earthworks, vegetation clearing, and entrapment in excavations in accordance with the SSMP. For example, checking open trenches for trapped fauna, use of hessian bags, trench ladders, ramps, sticks, ropes (or similar) to assist trapped fauna escape / survive until they are removed by a Fauna Spotter / Catcher.	• compliance with: – EA and EPBC Act decision conditions (once granted). – Constraints Protocol (including post-EPBC Act approval authorised disturbance limits); and – SSMP.

Aspect	Objectives	Performance indicators (and compliance requirements)
	• active work areas, pits, and other areas hazardous to fauna and stock must be fenced or covered to prevent access. • implementation of: – EA and EPBC Act decision conditions (once granted). – Constraints Protocol (including post-EPBC Act approval authorised disturbance limits); and – SSMP (Santos, 2025d).	
Weeds and pests	• to prevent the introduction, and spread, of invasive weeds and pest animals to the Project Area. • all reasonable and practicable measures will be taken to prevent the introduction, and spread, of invasive weeds and pest animals to the Project Area. • implementation of: – EA and EPBC Act decision conditions (once granted); and – this EMP.	• no introduction of invasive weeds or animals that are classified as Prohibited or Restricted Matter by the Biosecurity Act to the Project Area as a result of authorised activities. • valid weed hygiene certification maintained at all times for vehicles, plant, machinery and equipment. • compliance with: – EA and EPBC Act decision conditions (once granted); and – this EMP.
Rehabilitation	• all significantly disturbed areas caused by petroleum activities are to be rehabilitated to be non-polluting, stable, re-profiled to have contours consistent with surrounding land, surface drainage lines re-established, topsoil reinstated, and groundcover and vegetation is to be consistent with surrounding vegetation cover and species richness. • significantly disturbed areas that may be of value as an asset to the underlying landholder (i.e. access tracks) will be offered to the landholder prior to rehabilitation commencing. Any significantly disturbed areas unwanted by the landholder will be rehabilitated.	• significantly disturbed land is rehabilitated to a safe, stable and non-polluting landform suitable for its intended ongoing land use. • significantly disturbed land is rehabilitated to meet the final rehabilitation criteria specified in the Project's RMP and EA, or otherwise be handed over to the landholder.
Noise	• protect noise environmental values within and around the Project Area.	• noise emissions are avoided, reduced and mitigated wherever practicable. • noise emissions generated by petroleum activities do not exceed relevant noise nuisance limits stipulated by the EA, other than where an alternative arrangement is in place. • noise emissions do not cause environmental nuisance at a sensitive place, other than where an alternative arrangement is in place. • noise complaints are investigated, monitored and resolved in accordance with environmental nuisance monitoring requirements of the EA. • compliance with:

Aspect	Objectives	Performance indicators (and compliance requirements)
		– EA and EPBC Act decision conditions (once granted).
Air	• protect air environmental values and around the Project Area.	• air emissions are avoided and reduced wherever practicable. • dust emissions are adequately suppressed i.e. via road watering. • air quality complaints are investigated, monitored and resolved in accordance with the environmental nuisance monitoring requirements of the EA. • compliance with: – EA and EPBC Act decision conditions (once granted). – Air quality objectives (measured at a sensitive receptor) prescribed by Schedule 1 of the Environmental Protection (Air) Policy 2019.
Hazardous Substances	• to minimise the risk of environmental contamination or harm by correctly storing, handling, using, recycling and disposing of hazardous substances.	• all chemicals, oil and fuel must be labelled, handled, stored and effectively contained, and transported in accordance with relevant Australian Standards and Australian Dangerous Goods Code (ADG Code). • register and SDS for all hazardous substances available on site. • spill kits available on site and maintained. • no uncontrolled release of chemicals, oil or fuel is to occur to the environment.
Liquid and solid waste	• minimise generation of waste and avoid or minimise impacts associated with waste generation and storage. • apply the waste management hierarchy and principles based on waste avoidance, reduction, reuse, recycling, treatment and disposal. • implementation of: – CRAF. – EOW ENEW07546918. – EA and EPBC Act decision conditions (once granted). – waste transport and tracking requirements under the EP Act.	• produced water used in accordance with EA conditions and EOW ENEW07546918. • produced water that cannot be beneficially reused in the Project Area is transferred to existing waste management facilities on adjoining tenures for management and beneficial reuse in accordance with the EA conditions and EOW ENEW07546918. • general and regulated waste is separated and managed in accordance with the requirements of the EP Act. • land application of RDM is in accordance with EA conditions. • regulated waste is transported by a person who holds the appropriate authority under the EP Act. • waste tracking certificates and / or log books are maintained as required under the EP Act. • odour or other complaints relating to waste management are investigated, monitored and resolved in accordance with the relevant nuisance monitoring requirements of the EA.

Aspect	Objectives	Performance indicators (and compliance requirements)
Plant and equipment	• ensure plant and equipment are operated and maintained to minimise environmental impacts / noise and air emissions/ incidents. • ensure plant and equipment are cleaned to minimise weed spread and comply with landholder agreement requirements.	• plant and equipment maintained in accordance with the manufacturer's recommendations. • daily pre-start checks completed for all plant and equipment. • weed hygiene certificates available for all applicable plant and equipment. • all access to private property must be in accordance with landholder agreements.
Stimulation activities	• avoid or minimise impacts to groundwater, surface water and aquatic ecology environmental values. • manage stimulation activities to minimise the risk of adverse environmental impacts. • implementation of a stimulation impact monitoring program in accordance with EA conditions.	• stimulation activities do not negatively affect water quality, other than that within the stimulation impact zone of the target gas producing formation. • a stimulation impact monitoring program is implemented in accordance with the EA conditions. • stimulation activities do not cause a connection of the target gas producing formation and another aquifer. • a stimulation risk assessment is carried out for wells prior to stimulation in accordance with relevant EA conditions.
Community and social	• avoid or minimise adverse impacts on community and social values. • implementation of: – Santos Social Impact Management Plan (SIMP) (Santos, 2012).	• consultation with directly and indirectly affected stakeholders is undertaken. • minimal community complaints are made and those received are effectively resolved. • emergencies and other incidents are infrequent and managed effectively to ensure limited impacts on the community. • implementation of relevant initiatives and actions in the SIMP.
Cultural heritage	• avoid impacts to known places of cultural heritage value. • avoid or minimise impacts to unknown places of unknown heritage value. • no unauthorised harm to areas or items of cultural heritage value at the site. This includes both indigenous and non-indigenous cultural heritage values. • implementation of: – Santos Cultural Heritage Management Plan (CHMP) (Santos, 2009).	• comply with requirements of the CHMP. • correct procedures are followed in event an item of cultural heritage significance is found. • no avoidable loss or disturbance of items or areas of cultural value due to Santos' activities. • no valid complaints related to impacts on cultural heritage from the local community or traditional owners.
Traffic	• minimise impacts on the road network and infrastructure. • ensure safe operation of vehicles and machinery by Santos and maintain road user safety for all.	• Santos safe driving programs are implemented (including training and use of In Vehicle Monitoring Systems (IVMS)).

Aspect	Objectives	Performance indicators (and compliance requirements)
		• comply with Queensland Department of Transport and Main Roads (DTMR) and Maranoa Council road construction, use and permit notification requirements i.e. road corridor permit, road works approval.
Environmental emergency preparedness and response	• minimise the potential for environmental emergencies and be able to respond effectively in the event of an environmental emergency.	• spill kits available and maintained. • daily pre-start checks completed for all plant and equipment. • plant and equipment maintained in accordance with the manufacturer's recommendations. • undertaking of regular inspections, maintenance and integrity checks. • regular monitoring of weather and fire conditions. • fire controls in place for hot works. • no burning of wastes on site. • site tidy and maintained at all times. • smoking only in designated areas. • emergency response procedures in place. • compliance with: – EA and EPBC Act decision conditions (once granted).

6.2. Environmental control plans

The following section comprises the ECPs, which have been developed to document site-specific environmental management measures to be implemented throughout development of the Project.

The ECPs have been developed to achieve ongoing environmental compliance with regulatory requirements and ensure implementation of best practice environmental management strategies.

A brief summary of each ECP is available in Table 5.

Table 5: Environmental Control Plans

ECP	Key Content
1. Construction site management	Measures for general construction site management to minimise risks to environmental values from site establishment through to demobilisation and handover
2. Soil resource management	Management measures to minimise the risk of degrading soil resources during construction works. Includes consideration of erosion and sediment control, contaminated land and acid sulfate soils
3. Water resource management	Management measures to minimise the risk of degrading the quantity and quality of water (surface water and groundwater) resources during construction works
4. Flora and fauna management	Measures to protect the flora and fauna of the local area during construction works
5. Weed and pest management	Measures to reduce the risk of invasive plant and animal introduction and spread at the site or onto surrounding lands
6. Air, vibration, light and noise management	Measures to reduce the risk of environmental harm from air, light, vibration and noise emissions during construction works
7. Liquid and solid waste management	Measures to manage regulated, general and recyclable wastes from the construction works in accordance with the waste management hierarchy
8. Cultural heritage management	Measures to protect the cultural heritage values of the site and surrounding area
9. Hazardous substances use and management	Measures for hazardous substance storage, handling, use and disposal to minimise the risks of environmental contamination
10. Plant and equipment management	Measures for the maintenance and operation of plant and equipment during construction to minimise the risk of environmental harm
11. Environmental emergency preparedness and response	Measures to minimise the impacts of the three environmental emergencies that could reasonably be expected to occur at the site at some time: major chemical spill (fuel), dangerous weather events (heavy rainfall / flooding / cyclone) and bushfire.

Table 6: ECP 1 – Construction site management

ECP 1 – Construction Site Management		
Aspect		
The development has the potential to have an adverse impact on environmental values.		
Key References		
• *Environmental Protection Act 1994.*		
Potential Impacts		
• adverse impact to surrounding environmental values from construction activities.		
Management Actions	**Responsibility**	**Timing**
General		
Works will not be undertaken outside the limits of the approved plans of development.	Construction Manager	At all times
The limits of works will be clearly marked or communicated to all personnel to minimise the potential for disturbance to environmental values outside the approved development area.	Construction Manager / Environment Advisor	Prior to starting works in each area
All personnel will receive training in project-related environmental awareness as part of site induction.	Construction Manager	Prior to starting on site
Environmental exclusion zones established where necessary prior to works commencing in the surrounding area to ensure environmental or cultural heritage values (including MNES values) are protected.	Environment Advisor	As required
No unauthorised entry or works by personnel, vehicles, plant or equipment in environmental exclusion zones.	All personnel	At all times
No stockpiling or storage of any materials, plant or equipment in environmental exclusion zones.	All personnel	At all times
Environmental controls will be installed prior to the relevant activity / task commencing and maintained for the duration of its use.	Construction Manager	As required
All environmental plans, policies, procedures and other relevant information will be communicated, implemented and made available to all personnel.	Construction Manager	As required
Fuel and oil storage tanks will be self-bunded and not stored adjacent to watercourse.	Construction Manager	During site planning
Refuelling will not occur in close proximity of a watercourse	Construction Manager	During site planning
Monitoring	**Responsibility**	**Timing**
Routine site inspections.	Construction Manager	Dependent on activity levels / work schedules
Rainfall based site inspections.	Construction Manager	Prior to and following significant rainfall
All monitoring, inspection and audit data will be managed in accordance with Section 5.6 of the EMP.	Environment Advisor / Construction Manager	At all times
Reporting	**Responsibility**	**Timing**
Near misses or non-compliances with Performance Targets will be reported and managed in accordance with Section 5.4 of the EMP.	All personnel	As required
Corrective Action		
Near misses and incidents in relation to construction site management will be investigated in accordance with Section 5.4 of the EMP to identify necessary corrective actions for implementation.		

Table 7: ECP 2 – Soil resource management

ECP 2 – Soil Resource Management		
Aspect		
Construction activities have the potential to impact soil resources on or adjoining the construction site.		
Key References		
• *Environmental Protection Act 1994.* • *National Environmental Protection (Assessment of Site Contamination) Measure 1999 (amended in 2013).* • International Erosion Control Association (IECA) *Best Practice Erosion and Sediment Control 2008*.		
Potential Impacts		
• soil contamination from poor waste management, use of chemicals (namely hydrocarbons) and plant and equipment maintenance (spills and leaks of hydrocarbons). • erosion (loss of soil resource). • altered geological setting. • change to landform. • degradation of soil resources. • unauthorised / accidental release to land. • temporary reduction in land available for agriculture.		
Management Actions	**Responsibility**	**Timing**
Erosion and Sediment Control		
Erosion and sediment control will be managed so as to: • erosion: minimise the area and duration of soil exposure. • sediment: sediment controls to be suited to soils, climate and catchment size. • drainage: divert clean runoff around disturbed areas and convey drainage in a non-erosion manner.	Construction Manager	As required
Erosion and sediment controls will be installed prior to the start of ground disturbing works and maintained until the area of disturbance has been stabilised.	Construction Manager	As required
Progressive rehabilitation / reinstatement of significant disturbances in accordance with relevant EA conditions.	Construction Manager	As required.
Soil Contamination Prevention and Management		
Notify DETSI of any Notifiable Activities that are to be undertaken at the site.	Environment Advisor	Prior to undertaking a Notifiable Activity
Works will be excluded from areas where soil contamination is encountered that presents a risk of actual or potential material or serious environmental.	Environment Advisor	As required
The construction will be managed and designed in accordance with ECP 1: Construction Site Management to minimise the risk of soil contamination.	Construction Manager	At all times
Liquid and solid wastes will be managed in accordance with ECP 7: *Liquid and Solid Waste Management* to minimise the risk of soil contamination.	Construction Manager / Environment Advisor	At all times
Hazardous substances (including fuel) will be used and managed in accordance with ECP 9: *Hazardous Substances Use and Management* to minimise the risk of soil contamination.	Construction Manager / Environment Advisor	At all times
Plant and equipment maintenance will be undertaken in accordance with ECP 10: *Plant and Equipment Management* to minimise the risk of soil or water contamination.	Construction Manager	At all times

ECP 2 – Soil Resource Management		
Soil and water contamination from emergency situations will be minimised by implementing ECP 11: *Environmental Emergency Preparedness and Response*.	Environment Advisor	At all times
If soil contamination presenting a risk of material or serious environmental harm is encountered at the site or occurs during construction, it will be investigated, and appropriate management / remediation strategies and notification requirements developed and implemented.	Construction Manager / Environment Advisor	At all times
The Project's RMP will be implemented to meet the final rehabilitation requirements required under the EA. This Plan may be updated when the EA is issued or amended from time to time.	Construction Manager / Environment Advisor	During and post construction activities
Monitoring	**Responsibility**	**Timing**
Site inspections.	Environment Advisor	Dependent on activity levels / work schedules
Rainfall based site inspections.	Environment Advisor	Prior to and following significant rainfall
Soil contamination testing (if required).	Environment Advisor	As required
Reporting	**Responsibility**	**Timing**
Near misses or non-compliances with Performance Targets for soil resource management will be reported and managed in accordance with Section 5.4 of the EMP.	All personnel	As required
Damage to or maintenance required by ESC measures will be reported to the Construction Manager.	All personnel	Within 24 hours
Corrective Action		
Near misses and incidents in relation to soil resource management will be investigated in accordance with Section 5.4 of the EMP to identify necessary corrective actions for implementation.		

Table 8: ECP 3 – Water resource management

ECP 3 – Water Resource Management		
Aspect		
Construction activities have the potential to impact water resources (surface water or groundwater) on or adjoining the construction site.		
Key References		
• *National Environmental Protection (Assessment of Site Contamination) Measure 1999 (amended in 2013).* • IECA *Best Practice Erosion and Sediment Control* (IECA, 2008). • *Monitoring and Sampling Manual Environmental Protection (Water) Policy 2009* (DESI, 2018). • *Environmental Protection Act 1994.*		
Potential Impacts		
• aquifer depressurisation resulting in change in groundwater flow paths and storage, decline in groundwater levels / pressure in bores and reduced supply to groundwater users, and reduced stream baseflow for groundwater dependent watercourses or springs. • subsidence altering groundwater flow paths and aquifer storage or causing ground surface displacement and altering surface water flow paths. • changes to groundwater quality resulting in degradation of groundwater supply value for beneficial use or groundwater dependent ecosystems. • increased sedimentation (effects on water quality and geomorphology). • erosion of stream banks. • surface water quality impacts. • altered surface water flow regime (risk to overland flow paths, riparian vegetation, terrestrial ecosystems and environmental flow regime).		
Management Actions	**Responsibility**	**Timing**
Surface Water Flow		
Based on the assigned risk, adopt standard crossing designs for low, medium and high-risk crossings (refer to Appendix 2).	Construction Manager	As required
Pipelines will be buried and preferentially built during periods of no flow to very low flow.	Construction Manager	As required
Erosion and Sediment Control		
Erosion and sediment control will be managed so as to: • erosion: minimise the area and duration of soil exposure. • sediment: sediment controls to be suited to soils, climate and catchment size. • drainage: divert clean runoff around disturbed areas and convey drainage in a non-erosion manner.	Construction Manager	As required
Erosion and sediment controls will be staged in line with ground disturbing works and maintained until the area of disturbance has been stabilised.	Construction Manager	As required
Erosion and sediment controls and works undertaken onsite will reference the IECA Best Practice Erosion and Sediment Control principles.	Construction Manager	As required
Minimise area of land disturbed or compacted. Minimise disturbance to instream bed and banks e.g. use geofabric as a work base.	Construction Manager	As required
Limit use of machinery in waterways.	Construction Manager	As required
Progressively reinstating / rehabilitating significant disturbances in accordance with the EA.	Construction Manager	As required

ECP 3 – Water Resource Management		
For any part of the waterway bed or banks adjacent to the works that has been altered by the waterway barrier works, the site is restored and / or rehabilitated so that as a minimum: • stability and profiles of the bed and banks are re-instated to natural stream profiles and stability. • the waterway bed is retained with natural substrate or reconstructed with substrate comparable to the natural substrate size and consistency. • site conditions allow the rapid re-establishment of native vegetation and cover or native species are replanted to re-establish the natural plant community.	Construction Manager	As required
Water Contamination Prevention and Management		
Notify DETSI of any Notifiable Activities that are to be undertaken at the site.	Environment Advisor	Prior to undertaking a Notifiable Activity
The construction will be managed and designed in accordance with ECP 1: *Construction Site Management* to minimise the risk of soil contamination.	Environment Advisor	At all times
Liquid and solid wastes will be managed in accordance with ECP 7: *Liquid and Solid Waste Management* to minimise the risk of water contamination.	Environment Advisor	At all times
Hazardous substances (including fuel) will be used and managed in accordance with ECP 9: *Hazardous Substance Uses and Management* to minimise the risk of water contamination.	Environment Advisor	At all times
Plant and equipment maintenance will be undertaken in accordance with ECP 10: *Plant and Equipment Management* to minimise the risk of water contamination.	Environment Advisor	At all times
Water contamination from emergency situations will be minimised by implementing ECP 11: *Environmental Emergency Preparedness and Response*.	Environment Advisor	At all times
If water contamination that presents a risk of material or serious environmental harm, is encountered at the site or occurs during construction, it will be investigated, and appropriate management / remediation strategies and notification requirements developed and implemented.	Environment Advisor	As required
Where minor volumes of produced water are to be beneficially reused on site, it will be stored in manufactured tanks, that are designed, constructed and operated in accordance with relevant Australian Standards and State regulations.	Construction Manager	As required
No production wells will be installed within 90 m of a landholder bore unless a site-specific assessment determines that a closer distance is appropriate.	Construction Manager	At all times
Well integrity to be verified prior to stimulation to ensure that there is no significant leakage in the casing, tubing or packer and there is no significant movement into another aquifer through vertical channels adjacent to the well bore hole.	Drilling and Completions Manager	Prior to stimulation
Authorised releases in a manner that ensures (unless otherwise authorised): • no damage to vegetation. • no adverse impact to soil quality and structure. • no ponding or runoff to surface waters. • no aerosols or odours. • deep drainage below root zone is minimised. • no adverse impact to the quality of shallow aquifers.	Construction Manager / Environment Advisor	As required

ECP 3 – Water Resource Management		
A 50 m buffer will be maintained between sewage effluent irrigation areas and watercourses, wetlands or significant vegetation and a 100 m buffer from potable water supply or stock drinking water.	Construction Manager / Environment Advisor	At all times
Use of Water Resources		
Preference will be given to the use of non-potable water supplies for washdown, dust suppression and construction activities where economically and practically feasible.	Environment Advisor	During construction planning
Only extract water from constructed wetland and other farm dams for construction purposes with the permission from the landholder and when water supplies are abundant.	Construction Manager / Environment Advisor	As required
Road watering will only be undertaken when necessary to control dust emissions.	Construction Manager / Environment Advisor	As required
Water use for dust suppression and vehicle washing will be minimised as far as practicable.	Construction Manager / Environment Advisor	At all times
Monitoring	**Responsibility**	**Timing**
Routine site inspections.	Construction Manager / Environment Advisor	Dependent on activity levels / work schedules
Rainfall based site inspections.	Construction Manager / Environment Advisor	Prior to and following significant rainfall
Water quality monitoring downstream of works in watercourses to confirm compliance with release limits specified under the EA.	Construction Manager / Environment Advisor	As specified under EA
Water quality testing of contaminated water (if required).	Environment Advisor	As required
Water use in the vehicle wash and for dust suppression will be monitored and recorded.	Construction Manager / Environment Advisor	At all times
Regular inspections, maintenance and integrity checks on produced water storage tanks will be undertaken.	Construction Manager / Environment Advisor	As required
All monitoring, inspection and audit data will be managed in accordance with Section 5.6 of the EMP.	Construction Manager / Environment Advisor	At all times
Reporting	**Responsibility**	**Timing**
Near misses or non-compliances with Performance Targets or for water management will be reported and managed in accordance with Section 5.4 of the EMP.	All personnel	As required
Damage to or maintenance required by ESC measures will be reported to the relevant Project Engineer.	All personnel	Within 24 hours
Corrective Action		
Near misses and incidents in relation to water resource management will be investigated in accordance with Section 5.4 of the EMP to identify necessary corrective actions for implementation.		

Table 9: ECP 4 – Flora and fauna management

Santos has developed a Significant Species Management Plan (SSMP) (Santos, 2025d) for the Project to guide the management of potential impacts to MNES values located in the Project Area. This SSMP in conjunction with the Constraints Protocol (Santos, 2025c) provides Santos with the tools to systematically identify relevant significant species and implement management measures during the course of conducting petroleum activities in the Project Area. Refer to the SSMP for further information.

ECP 4 – Flora and Fauna Management		
Aspect		
Construction works near or within environmentally sensitive areas		
Key References		
• *Animal Care and Protection Act 2001.* • *Environmental Protection Regulation 2018.* • *Stock Route Management Act 2002.* • *Nature Conservation Act 1992.* • *Nature Conservation (Animals) Regulation 2020 (NCA Regulation).*		
Potential Impacts		
• unnecessary loss of vegetation and habitats. • temporary changes in hydrology which result in vegetation loss. • accidental entrapment of fauna in open voids i.e. excavations and trenches. • mortality from moving vehicles and machinery. • erosion and sedimentation. • light disturbance.		
Mitigation Strategy / Action	**Responsibility**	**Timing**
All clearing must be internally approved and undertaken as per the requirements of the Constraints Protocol and the SSMP.	Principal Contractor / Environment Advisor	Prior to the commencement of any construction activity
Clearing areas should be clearly delineated.[2]	Principal Contractor / Environment Advisor	Prior to the commencement and during any construction activity
Reinforce need to conduct activity in designated and approved areas during site toolbox / induction meetings.	Principal Contractor / Environment Advisor	Prior to the commencement and during any construction activity
A suitably qualified Fauna Spotter / Catcher will be present during vegetation clearing activities where required; and fauna found to be present within areas to be cleared shall be managed, removed and / or relocated by the Fauna Spotter / Catcher where appropriate, and in accordance with the requirements of this EMP and the SSMP.	Principal Contractor / Environment Advisor	Prior to the commencement of and during any construction activity
Hollow logs (located on ground) / potential habitat features within disturbance areas will be retained and shifted to adjacent undisturbed areas where practicable	Principal Contractor / Environment Advisor	Prior to the commencement of any construction activity

[2] Areas can be delineated spatially using GPS technology or physically using visual markers / tape.

ECP 4 – Flora and Fauna Management		
Measures implemented to reduce risks to fauna from earthworks, vegetation clearing, and entrapment in voids. For example, checking on open trench for trapped fauna, use of hessian bags, trench ladders, ramps, sticks, ropes (or similar) to assist trapped fauna escape / survive until removed	Principal Contractor / Environment Advisor	Prior to the commencement of and during any construction activity
Open voids must be fenced or covered where practicable to prevent access or harm to the fauna. Where this is not practicable, the focus should be on regularly checking open voids for entrapped fauna and installing measures to reduce risks to potentially entrapped fauna.	Principal Contractor / Environment Advisor	During construction activities that require open voids
During construction, work areas and open voids will be regularly checked for potentially entrapped fauna.	Principal Contractor / Environment Advisor	During construction activities that require open voids
Open voids will be backfilled as soon as practicable following completion of works.	Principal Contractor / Environment Advisor	As required
Avoid providing artificial food and water sources or shelter within the construction footprint that may attract fauna.	Principal Contractor / Environment Advisor	At all times
Monitoring and Reporting	**Responsibility**	**Timing**
Unauthorised clearing will be immediately communicated to the Site Supervisor and Environmental Advisor.	Principal Contractor	As required
Fauna and stock deaths will be reported in accordance with the Santos SMS reporting procedure.	Principal Contractor	As required
Fauna Spotter / Catcher updates on interactions and reporting will be regularly provided to the Site Supervisor and Environmental Advisor.	Principal Contractor	As required

Table 10: ECP 5 – Weed and pest management

ECP 5 – Weed and Pest Management		
Aspect		
Vehicles, plant, equipment and materials required for construction may introduce invasive weeds or animals to the site.		
Key References		
• *Biosecurity Act 2014.* • DAF (2019) *Vehicle and machinery cleandown procedures.*		
Potential Impacts		
• introduction or spread of invasive weeds or pest animal species.		
Management Actions	**Responsibility**	**Timing**
All site-based personnel will receive General Biosecurity Obligation (under the *Biosecurity Act 2014*) and weed hygiene awareness training. This allows the site-based personnel to be considered a competent and trained person.	Principal Contractor / Environment Advisor	Induction
• all work vehicles, plant and equipment will be inspected and certified as clean by a competent and trained person prior to first entry to the site. This does not apply to road-only vehicles that only use well-formed and maintained tracks and roads on the site that are clear and free of vegetation, have not been contact with invasive plants and only visit the site to deliver materials or perform a particular service (e.g. septic pump out truck). • if wash down is required, this will be undertaken by a competent and trained person in accordance with DAF (2019) *Vehicle and machinery cleandown procedures*. • records of weed washdown and certification will be kept in the vehicle at all times and made available to landholders on request and presented to the Santos Site Supervisor upon initial entry to site. • the certification will remain valid as long as the vehicle/equipment: o has a current weed hygiene declaration dated within the last 30 days. o does not travel off sealed roads and well-maintained unsealed roads (other than within the site). o does not come into direct contact with invasive plants. o does not operate after coming into direct contact with invasive plants. o if operating off-road, stays within the designated work area and does not cross a property boundary or other designated boundary.	Principal Contractor / Environment Advisor	Prior to first entry to site. To be repeated as required
A Weed Hygiene Declaration will be provided by the supplier of all organic materials (soil, sand, mulch, gravel, road base, ballast etc.) brought to site.	Principal Contractor	At the time of delivery
Only registered herbicides to be used in accordance with the *Agricultural Chemicals Distribution Control Act 1966* and regulations.	Principal Contractor	As required
All personnel managing and using pesticides will be appropriately trained and licensed in accordance with the *Agricultural Chemicals Distribution Control Act 1966* and regulations.	Principal Contractor	As required
Should spraying near water be required, only pesticides registered for use near water will be used.	Principal Contractor	As required

ECP 5 – Weed and Pest Management		
Prior to the commencement of activities, personnel undertaking spraying activities will consider the potential impacts of the activities to adjoining properties, livestock, flora, fauna, and sensitive vegetation communities. Personnel will ensure there is confirmation that adjacent land users / holders have been notified of the activity, the appropriate choice of pesticide for the application, wind factor on the day, appropriate methods of targeted spraying, and access to treated plants by livestock.	Principal Contractor	As required
No domestic animals or pets will be brought to site.	All persons	At all times
Putrescible wastes (e.g. food wastes) will be covered to prevent access by vermin and removed regularly from site.	Principal Contractor	At all times
Feeding of wild animals is prohibited.	All persons.	At all times
Pest animal control will only be undertaken by contractors with appropriate permits and licenses.	Principal Contractor	As required
Mud or debris from wheels and bodies of vehicles and equipment will be removed prior to entering public roads or other sealed pavements (by means of vehicle washdown bays).	Site Supervisors	As required
Vehicles will not drive in vegetated areas that are a high risk for weed occurrence if they do not have to, stay on established tracks and roads.	All personnel	At all times
Monitoring	**Responsibility**	**Timing**
Site inspections will include identifying evidence of significant infestations of invasive plants or animals.	Principal Contractor / Environment Advisor	Dependent on activity levels / work schedules
All monitoring, inspection and audit data will be managed in accordance with Section 5.6 of the EMP.	Environment Advisor / Construction Manager	At all times
Reporting	**Responsibility**	**Timing**
Records of all weed and pest inspections and certification to be kept.	Environment Advisor and drivers and operators.	At all times
Application of any pesticide will be recorded and kept.	Environment Advisor	Within 24-hours of application of pesticide
Near misses or non-compliances with Performance Targets will be reported and managed in accordance with Section 5.4 of the EMP.	All personnel	As required
Copies of all weed hygiene certifications and declarations will be kept on the electronic record management system.	Environment Advisor and drivers and operators	At all times
If Class 1 or 2 restricted matter invasive plants or animals listed under the *Biosecurity Act 2014* are identified as present on site these will be reported to the administrating authority.	Environment Advisor	Within 2 hours of becoming aware of the matter
Corrective Action		
Near misses and incidents in relation to biosecurity will be investigated in accordance with Section 5.4 of the EMP to identify necessary corrective actions for implementation.		

Table 11: ECP 6 – Air, vibration, light and noise management

ECP 6 – Air, Vibration, Light and Noise Management		
Aspect		
Air emissions (dust), vibration emissions, light emissions and noise emissions resulting from construction activities may impact amenity at sensitive receptors.		
Key References		
• *Environmental Protection (Air) Policy 2019.* • *Environmental Protection (Noise) Policy 2019.* • *AS 2436-2010 Guide to Noise and Vibration Control on Construction, Demolition and Maintenance Sites.* • *Noise Measurement Manual* (Department of Environment and Science, 2020). • *AS 1055:2018 Acoustics - Description and Measurement of Environmental Noise.* • *Monitoring and Sampling Manual* (DES, 2018) • *AS/NZS 3580.10.1:2016 Methods for Sampling and Analysis of Ambient Air: Determination of Particulate Matter - Deposited Matter - Gravimetric Method.* • *AS/NZS 4282-2023 Control of the Obtrusive Effects of Outdoor Lighting/*		
Potential Impacts		
• reduction in noise amenity. • noise nuisance to sensitive receptors. • reduction in air quality. • generation of dust and fine particulates causing nuisance to sensitive receptors. • light nuisance to sensitive receptors.		
Management Actions	**Responsibility**	**Timing**
Dust, vibration, light and noise management awareness training will be provided as part of the site induction.	Construction Manager / Environment Advisor	Induction
No unnecessary use of horns or other audible signals on mobile plant or equipment.	All personnel	At all times
No unnecessary revving or idling of engines on mobile and stationary machines and shut down any equipment not in use.		
Use of manually adjustable or ambient noise sensitive or 'squawker' type reversing alarms on plant and vehicles.		
Use silenced generators where possible.	Construction Manager	At all times
Maintain all vehicles, plant and equipment to reduce the potential for noise emissions.	Drivers and operators	Manufacturer specifications
Ensure trucks, trailers and loads are secured to minimise dust (from load), rattling and other noise emissions when on public roads.	Drivers and operators	At all times
Site speed limits to be implemented and monitored through the IVMS.	All personnel	At all times
Vehicles limited to a reduced speed limit on unsealed roads and haulage routes to reduce dust impacts.	Construction Manager	At all times
Suppress dust emissions from road surfaces with water or chemical dust suppressants.	Environment Advisor	As required
All outdoor lighting designed, built and operated in accordance with *AS/NZS 4282 – 2023 Control of the Obtrusive Effects of Outdoor Lighting*.	Construction Manager	At all times
Do not direct high-beam lighting on vehicles into sensitive receptors.	All personnel	At all times
Progressively rehabilitating significant disturbances where possible.	Construction Manager	As required
Design and operation of flares and vents to be in accordance with petroleum legislation and Australian Standards.	Construction Manager	As required
Landholders or residents of any adjacent sensitive places will be advised of planned works prior to the commencement of activities.	Environment Advisor	As required
Comply with noise nuisance limits stipulated by the EA.	All personnel	At all times
Monitoring	**Responsibility**	**Timing**

ECP 6 – Air, Vibration, Light and Noise Management		
Where required: • noise monitoring will be undertaken by a Suitably Qualified Person (SQP) in accordance with the *Noise Measurement Manual* (D) and *AS 1055:2018 Acoustics – Description and Measurement of Environmental Noise*. • vibration monitoring will be undertaken by SQP in accordance with *AS 2436-2010 Guide to Noise and Vibration Control on Construction, Demolition and Maintenance Sites*. • dust monitoring will be undertaken by SQP in accordance with the *Monitoring and Sampling Manual (*DES, 2018*)* and *AS/NZS 3580.10.1:2016 Methods for Sampling and Analysis of Ambient Air: Determination of Particulate Matter – Deposited Matter – Gravimetric Method*. • illumination (light) monitoring will be undertaken by SQP in accordance with the *AS/NZS 4282-2023 Control of the Obtrusive Effects of Outdoor Lighting*.	SQP and Environment Advisor	Monitoring will be conducted if a written request is made by a regulatory authority or investigate a complaint of nuisance
Site inspections will include inspection of noise, dust, light and vibration controls.	Construction Manager / Environment Advisor	Dependent on activity levels/ work schedules
All monitoring, inspection and audit data will be managed in accordance with Section 5.6 of the EMP.	Environment Advisor	At all times
Reporting	**Responsibility**	**Timing**
Monitoring results will be provided to the regulatory authority within 10 business days of the completion of nuisance-based monitoring.	Environment Advisor	As required
Near misses or non-compliances with Performance Targets will be reported and managed in accordance with Section 5.6 of the EMP.	All personnel	As required
Corrective Action		
Near misses and incidents in relation to noise, dust, light and vibration management will be investigated in accordance with Section 5.4 of the EMP to identify necessary corrective actions for implementation.		

Table 12: ECP 7 – Liquid and solid waste management

ECP 7 – Liquid and Solid Waste Management		
Aspect		
Management of solid and liquid wastes generated by Santos's construction activities.		
Objective		
• to minimise environmental harm to environmental values (land, air quality, surface water and groundwater) by managing all wastes correctly and minimising waste disposal where practicable. • minimise generation of waste and avoid or minimise impacts associated with waste generation. • apply the waste management hierarchy and principles based on waste avoidance, reduction, reuse, recycling, treatment and disposal.		
Performance Targets		
• wastes correctly segregated and stored. • no onsite waste disposal or burning of wastes. • all wastes transported by appropriately licensed waste transporters to licensed waste facilities. • all waste tracking documents and receipts retained for 5 years. • concrete washout restricted to designated areas. • monthly waste statistics recorded and reported. • produced water will be beneficially reused in accordance with EA conditions and the EOW *Irrigation of Associated Water (including coal seam gas water)* (ENEW07546918). • produced water that cannot be beneficially reused will be transferred to existing water / waste management facilities located on adjoining tenures for management and beneficial reuse in accordance with EA conditions or EOW *Irrigation of Associated Water (including coal seam gas water) (ENEW07546918).* • general and regulated waste is separated and managed in accordance with the requirements of the EP Act. • land application of RDM is in accordance with the EA conditions. • regulated waste is transported by a person who holds the appropriate authority under the EP Act. • waste tracking certificates and / or log books are maintained as required under the EP Act. • odour or other complaints relating to waste management are investigated, monitored and resolved in accordance with the environmental nuisance monitoring requirements of the EA.		
Key References		
• *Waste Reduction and Recycling Act 2011* (and Regulation). • *Environmental Protection Regulation 2019.*		
Potential Impacts		
• generation of variety of waste types. • excessive waste generation from inefficient use of resources, and improper management or storage of wastes generated by petroleum activities. • associated environmental impacts of waste generation and management.		
Management Actions	**Responsibility**	**Timing**
The site will be kept in a clean and tidy state at all times.	All personnel	At all times
All personnel will receive waste management awareness training as part of the site induction.	Environment Advisor	Induction
No wastes will be disposed of or burnt at the site.	All personnel	At all times
Wastes will not be stored in environmental exclusion zones.	All personnel	At all times
Wastes will be segregated correctly.	All personnel	At all times
General waste and recycling bins (with lids) will be provided within and near amenities.	Environment Advisor	At all times
Covered bins / skips will be provided for general and recyclable wastes to prevent windblown litter, access by birds / vermin, odour emissions and rainfall ingress.	Environment Advisor	At all times
Regulated Waste (e.g. waste oil, washbay wastewater and blackwater from amenities) will only be removed from site by a Regulated Waste contractor.	Environment Advisor	As required
Wastes will only be transported by appropriately licensed waste transporters to licensed waste facilities.	Environment Advisor	At all times

ECP 7 – Liquid and Solid Waste Management		
Excess batched concrete and concrete washout wastes will be managed in accordance with the relevant SWMS.	Construction Manager	As required
All waste or excess materials (e.g. ballast, sleepers etc), other than waste that has been or will be lawfully reused onsite in accordance with the waste management hierarchy, will be removed from site at the completion of works.	Construction Manager	Prior to demobilisation
Soil or water that is contaminated by an emergency will be managed in accordance with ECP 2: *Soil Resource Management* and ECP 3: *Water Resource Management.*	Environment Advisor	As required
Stimulation flow back fluids will be managed, contained and recycled / reused in accordance with regulatory requirements.	Drilling and Completions Team / Construction Manager	As required
When applying RDM to land: • select suitable locations. • design and control application area size and rates to avoid run-off. • visual monitoring to avoid run-off. • apply adaptive management of application rates and RDM quality.	Drilling and Completions Manager	As required.
All sites will be kept free from litter.	All personnel	At all times
Green waste may be used on site for both rehabilitation and sediment and erosion control.	Environment Advisor	As required
Monitoring	**Responsibility**	**Timing**
Site inspections will include assessment of waste management practices.	Construction Manager / Environment Advisor	Dependent on activity levels / work schedules
All monitoring, inspection and audit data will be managed in accordance with Section 5.6 of the EMP.	Construction Manager / Environment Advisor	At all times
Implementation of a stimulation impact monitoring program, in accordance with EA conditions, which will require monitoring of stimulation fluids and flow back waters.	Drilling and Completion Manager / Environmental Advisor	As required
All waste records will be provided to the Environment Advisor on a monthly basis or upon request.	Construction Manager / Environment Advisor	As required
Reporting	**Responsibility**	**Timing**
Near misses or non-compliances with Performance Targets will be reported and managed in accordance with Section 5.4 of the EMP.	All personnel	As required
All waste-tracking forms and waste disposal receipts will be managed in accordance with Section 5.7 of the EMP and recorded in the Waste Management Register.	Construction Manager / Environment Advisor	Duration of project
Records of all wastes generated will be retained and the quantities and management strategy reported in the monthly environmental report.	Construction Manager / Environment Advisor	Monthly
Corrective Action		
Near misses and incidents in relation to waste management will be investigated in accordance with Section 5.6 of the EMP to identify necessary corrective actions for implementation.		

Table 13: ECP 8 – Cultural heritage management

ECP 8 – Cultural Heritage Management		
Aspect		
Construction works near or within areas of cultural heritage value.		
Key References		
• *Cultural Heritage Act 2003* Duty of Care Guidelines. • *Aboriginal Cultural Heritage Act 2003 and Torres Strait Islander Cultural Heritage Act 2003* Guidelines for the discovery, handling, and management of human remains. • Santos *Cultural Heritage Management Plan* (CHMP) (Santos, 2009).		
Mitigation Strategy / Action	**Responsibility**	**Timing**
Cultural heritage awareness and duty of care training provided to all personnel in the site induction and as required by the CHMP.	Construction Manager / Cultural Heritage Advisor	Induction
Undertake all works with a cultural heritage duty of care.	All personnel	At all times
Environmental exclusion zones established where necessary prior to works commencing in the surrounding area to ensure cultural heritage values are protected on site.	Construction Manager / Cultural Heritage Advisor	As required
No unauthorised entry or works by personnel, vehicles, plant or equipment in environmental exclusion zones.	Construction Manager / All personnel	At all times
No stockpiling or storage of any materials, plant or equipment in environmental exclusion zones.	All personnel	At all times
In the event that an item of cultural heritage significance is found, works in the immediate vicinity would cease and further action would be taken in accordance with the CHMP.	Construction Manager / Cultural Heritage Advisor	Immediately in response to a find
If human remains are found: • immediately cease all works on site • notify in accordance with relevant procedure and CHMP.	Construction Manager / Cultural Heritage Advisor	Immediately in response to a find
Monitoring	**Responsibility**	**Timing**
Site inspections will include inspection of cultural heritage management measures.	Construction Manager / Cultural Heritage Advisor	Monthly
All monitoring, inspection and audit data will be managed in accordance with Section 5.6 of the EMP.	Construction Manager / Cultural Heritage Advisor	At all times
Reporting	**Responsibility**	**Timing**
All cultural heritage reporting, and monitoring data will be recorded and kept.	Construction Manager / Cultural Heritage Advisor	Dependent on activity levels / work schedules
Near misses or non-compliances with Performance Targets for cultural heritage will be reported and managed in accordance with Section 5.4 of the EMP.	All personnel	As required
If any items that are suspected of being of cultural heritage value are found or if human remains are found, the find will be reported in accordance with Section 5.6 of the EMP.	Construction Manager / Cultural Heritage Advisor	Immediately in response to a find
Corrective Action		
Near misses and incidents in relation to cultural heritage will be investigated in accordance with Section 5.4 of the EMP to identify necessary corrective actions for implementation.		

Table 14: ECP 9 – Hazardous substances use and management

ECP 9 – Hazardous Substances Use and Management		
Aspect		
Storage, handling, use and disposal of hazardous substances during construction activities.		
Key References		
• *AS1940-2017 The Storage and Handling of Flammable and Combustible Liquids* • Workplace Health and Safety Queensland's *Managing risks of hazardous chemicals in the workplace Code of Practice* (WHSQ, 2021)		
Management Actions	**Responsibility**	**Frequency**
General		
Hazardous substances awareness training will be provided to all personnel as part of the site induction. This will include a component on spill response and clean-up.	Construction Manager / Environment Advisor	Induction
All SDS will be kept on the intranet and in the chemical storage for all hazardous substances at the site.	Environment Advisor	At all times
A register of hazardous substances will be kept on the electronic record management system.	Construction Manager / Environment Advisor	At all times
All hazardous substances will be stored, handled, used and disposed in accordance with the SDS, manufacturer recommendations and applicable regulatory requirements including AS 1940-2004 The storage and handling of flammable and combustible liquids.	All personnel	At all times
Hazardous substances will only be stored with compatible products (with exceptions where segmentation and distance separation requirements are met).	All personnel	At all times
Hazardous substances will be stored undercover in a bunded area or container. The bund will have the capacity of 110% of the largest container.	All personnel	At all times
Water accumulated in bunds will be removed by a Regulated Waste contractor.	Construction Manager / Environment Advisor	As required
Appropriate fire extinguishers will be provided on site for flammable and combustible chemicals.	Construction Manager	At all times
Appropriate spill kits for the type and quantity of chemicals will be provided and maintained wherever chemicals are stored and used.	Construction Manager / Environment Advisor	At all times
No onsite disposal of chemical wastes.	All personnel	At all times
Spills will be cleaned up immediately using dry methods (not hosing)	All personnel	As required
Only registered herbicides will be used by a licensed weed sprayer in accordance with the *Agricultural Chemicals Distribution Control Act 1966.*	Construction Manager / Environment Advisor	As required
The construction will be managed and design in accordance with ECP 1: Construction Site Management to minimise the risk of contamination associated with hazardous substances.	Construction Manager / Environment Advisor	At all times
Pressure testing of well casing and cement to confirm well integrity and determine the presence / absence of leak potential or significant fluid movement.	Drilling and Completions Team / Construction Manager	As required
Stimulation flow back fluids will be managed, contained and recycled/reused in accordance with regulatory requirements.	Drilling and Completions Team / Construction Manager	As required
Monitoring	**Responsibility**	**Frequency**
Site inspections will include inspection of hazardous substance management measures.	Construction Manager / Environment Advisor	Dependent on activity levels / work schedules
All monitoring, inspection and audit data will be managed in accordance with Section 5.6 of the EMP.	Environment Advisor	At all times

ECP 9 – Hazardous Substances Use and Management		
Reporting	**Responsibility**	**Frequency**
Near misses or non-compliances with Performance Targets will be reported and managed in accordance with Section 5.4 of the EMP.	All personnel	As required
Corrective Action		
Near misses and incidents in relation for hazardous substance use and management will be investigated in accordance with Section 5.4 of the EMP to identify necessary corrective actions for implementation.		

Table 15: ECP 10 – Plant and equipment management

ECP 10 – Plant and Equipment Management		
Aspect		
Incorrect operation of plant and equipment has the potential to adversely impact the environment.		
Management Strategies		
Proactive management strategies to reduce the impacts of plant and equipment include daily pre-start checks, routine maintenance, covering loads of trucks where appropriate, and implementation of weed and pest hygiene measures such as cleaning, inspections and certifications.		
Key References		
• regulatory approval requirements for plant and equipment (Section 2.4)		
Management Actions	**Responsibility**	**Timing**
Daily pre-start checks will be completed on all plant and equipment.	Operators	Daily
Plant and equipment will be maintained in accordance with the manufacturer's recommendations.	Operators	As required
Maintenance and repair works to plant and / or equipment will be undertaken at the workshop. In-field repairs will only occur if the plant or equipment cannot be moved under its own power.	Construction Manager	As required
Spill kits and drip trays and any other necessary controls will be used during maintenance works or repairs to plant and equipment. This applies to the workshop and in-field repairs.	All personnel	As required
Wastes from plant and equipment maintenance undertaken in the workshop or in-field will be in accordance with ECP 7 – Liquid and Solid Waste Management.	All personnel	As required
Refuelling plant and equipment will be in accordance with the relevant SWMS. Suitable containment devices to be in place for refuelling activities involving volumes greater than 50 L.	Refuelling personnel	At all times
No unnecessary revving or idling of engines on mobile and stationary machines and shut down any equipment not in use.	All personnel	At all times
Weed and pest hygiene requirements for plant and equipment (i.e. washdown and certification requirements) are outlined in ECP 5 – Weed and Pest Management.	All personnel	At all times
Ensure trucks, trailers and loads are secured to minimise rattling and other noise emissions when on public roads.	Operators / drivers	At all times
Cover loads of organic materials (soil, gravel, sand, mulch) in trucks and trailers travelling on public roads to and from the site.	Operators / drivers	At all times
Clean tyres of mud before driving on public roads.	Operators / drivers	As required
Monitoring	**Responsibility**	**Timing**
Daily pre-start checks will monitor plant and equipment condition.	Operators	Daily
Plant and equipment management will be monitored as part of monthly site inspections	Environment Advisor	Dependent on activity levels / work schedules
All monitoring, inspection and audit data will be managed in accordance with Section 5.6 of the EMP.	Environment Advisor	At all times
Reporting	**Responsibility**	**Timing**
Daily pre-start forms will be kept with the plant and equipment.	Operators	At all times
Service records will be retained and made available upon request.	Sub-contractors	At all times
Near misses or non-compliances with Performance Targets will be reported and managed in accordance with Section 5.4 of the EMP.	All personnel	As required
Corrective Action		
Near misses and incidents in relation to plant and equipment management will be investigated in accordance with Section 5.4 of the EMP to identify necessary corrective actions for implementation.		

Table 16: ECP 11 – Environmental emergency preparedness and response

ECP 11 – Environmental Emergency Preparedness and Response		
Aspect		
Environmental emergencies at the site may cause harm to people and the natural environment.		
Key References		
• n/a		
Important Information		
The triggers for a spill emergency event are more than 50 litres to ground or any amount of spillage to a watercourse or drain. The region in which the site is located experiences heavy rain and flooding (mainly during the summer months). The area is a low-medium risk for bushfire.		
Management Actions	**Responsibility**	**Timing**
Spills		
All personnel will receive emergency response awareness training as part of the site induction. This will include spill clean-up and fire extinguisher use.	Environment Advisor	Duration of project
Hazardous substances will be managed in accordance with ECP 9: *Hazardous Substance Use and Management*.	All personnel	At all times
Refuelling and servicing of plant and equipment will be managed in accordance with ECP 10: *Plant and Equipment Management*.	Refuelling personnel / Construction Manager	At all times
Appropriate spill kits for the type and quantity of chemicals will be provided and maintained wherever chemicals are stored and used.	Environment Advisor	At all times
Immediately cease any hot works within 30 m of the spill and evacuate all personnel from the area.	All personnel / Construction Manager	Immediately after spill
Spills will be cleaned up immediately (isolate / stop, absorb / clean, dispose of contaminated materials).	All personnel	Immediately after spill if safe
Soil or water that is contaminated by an emergency will be managed in accordance with ECP 2: *Soil Resource Management* and ECP 3: *Water Resource Management.*	Environment Advisor	As required
Heavy Rain, Storms and Flooding		
If heavy rainfall or flooding is forecast, the site will be prepared by: • relocating any mobile plant or equipment to higher parts of the site or away from the site (as required). • removing potential contaminants such as wastes or chemicals from site or ensuring that potential contaminants are protected from rainfall or stormwater flows. • securing loose equipment and materials, ensure bin covers are secure. • ensuring all erosion and sediment control measures have been maintained and are in place.	Construction Manager Advisor	Prior to the event
Bushfire		
Plant and equipment will be maintained to minimise the risk of presenting an ignition source.	Plant operators	As required
Hot works will be undertaken in accordance with the relevant hot work permit requirements and SWMS.	All personnel	During hot works
Fire extinguishers will be provided at the site office, crib rooms, where flammable and combustible liquids are stored and in all vehicles.	Construction Manager / Environment Advisor	At all times
No burning of wastes on site.	All personnel	At all times
Smoking will only be allowed in designated smoking areas. Cigarette bins will be provided at designated smoking areas.	Construction Manager / Environment Advisor	At all times
Monitoring	**Responsibility**	**Timing**
Daily monitoring of forecast weather and fire hazard ratings provided by Bureau of Meteorology. This will be discussed in the daily pre-work brief meeting.	Construction Manager / Environment Advisor	Daily

ECP 11 – Environmental Emergency Preparedness and Response		
Routine and rainfall-based site inspections will determine if hazards are present at the site that could cause an environmental emergency.	Construction Manager / Environment Advisor	Prior to and following significant rainfall
All monitoring, inspection and audit data will be managed in accordance with Section 5.6 of the EMP.	Construction Manager / Environment Advisor	At all times
Reporting	**Responsibility**	**Timing**
Emergencies, near misses or non-compliances with Performance Targets will be reported and managed in accordance with Section 5.4 of the EMP.	All personnel	As required
Corrective Action		
Near misses and incidents will be investigated in accordance with Section 5.4 of the EMP to identify necessary corrective actions for implementation.		

7. EMP Review and Update

This EMP will be reviewed and updated as required by Santos following granting of the new EA and EPBC Act decision and approval conditions.

Updates will reflect changes to processes and procedures, new and / or amended approval conditions, updates to legislation, guidelines and standards, and / or changes to Santos requirements.

Reviews may also be more regularly scheduled (i.e. every 1 to 5 years) or occur in response to matters that affect environmental management (such as incidents, emergencies, changes in site conditions etc).

8. Key References

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Appendix 1: Santos EHS Policy

Santos

Environment, Health and Safety

Policy

Our Commitment

Santos is committed to being the safest gas company wherever we have a presence and preventing harm to people and the environment

Our Actions

We will:

1. Integrate environment, health and safety management requirements into the way we work
2. Comply with all relevant environmental, health and safety laws and continuously improve our management systems
3. Include environmental, health and safety considerations in business planning, decision making and asset management processes
4. Identify, control and monitor risks that have the potential for harm to people and the environment, so far as is reasonably practicable
5. Report, investigate and learn from our incidents
6. Consult and communicate with, and promote the participation of all workers to maintain a strong environment, health and safety culture
7. Empower our people, regardless of position, to "Stop the Job" when they feel it necessary to prevent harm to themselves, others or the environment
8. Work proactively and collaboratively with our stakeholders and the communities in which we operate
9. Set, measure, review and monitor objectives and targets to demonstrate proactive processes are in place to reduce the risk of harm to people and the environment
10. Report publicly on our environmental, health and safety performance

Governance

The Environment Health Safety and Sustainability Committee is responsible for reviewing the effectiveness of this policy.

This policy will be reviewed at appropriate intervals and revised when necessary to keep it current.

Kevin Gallagher

Managing Director and CEO

Document Owner:	David Banks, Chief Operating Officer		
Approved by:	The Board		
Date Approved:	15 August 2022	Version:	3

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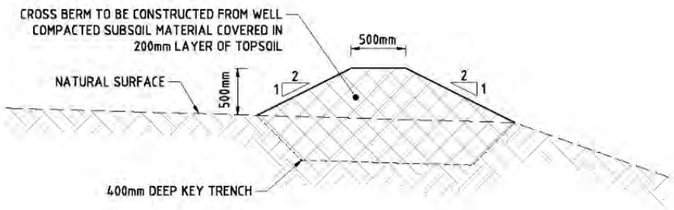
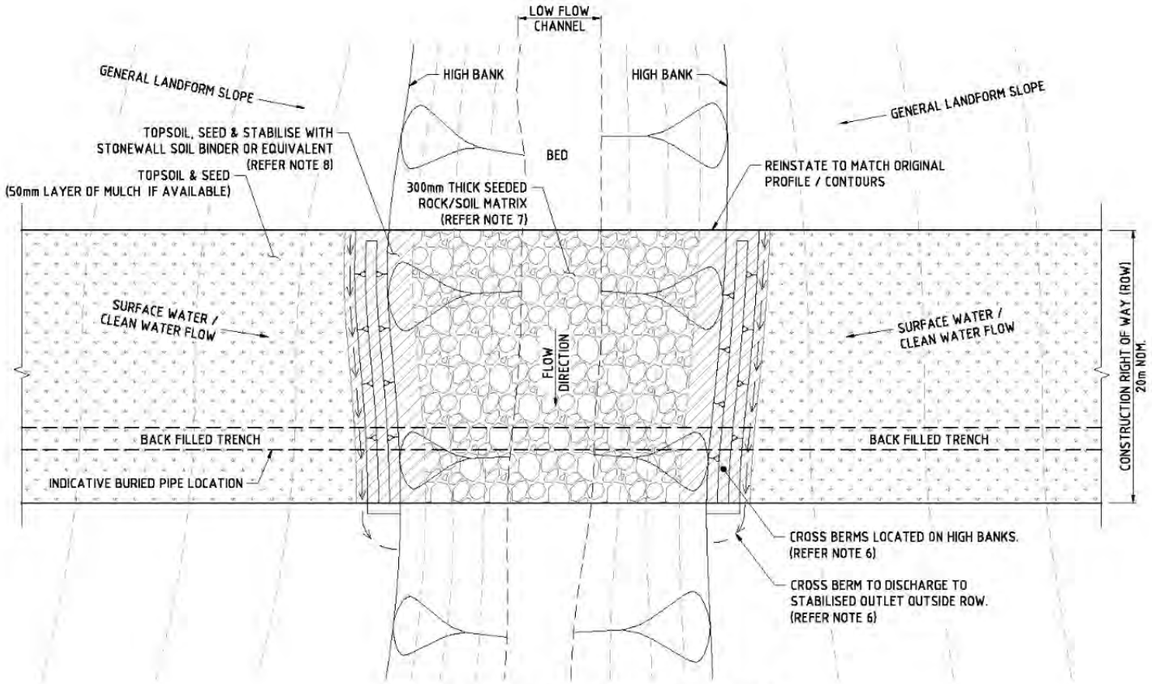
Appendix 2: Standard crossing designs

NOTES:

1. REFER TO DWG 0007-650-PLA-0097 FOR GENERAL NOTES
2. MINIMUM COVER TO BE TAKEN FROM BELOW LOOSE MATERIAL IN DRAINAGE FEATURE BED LIKELY TO BE SCOURED AWAY DURING HIGH FLOW EVENTS.
3. RETURN TO NORMAL DEPTH OF COVER AS PER PROJECT SPECIFIC PIPELINE DETAILED DESIGN.
4. FOR WARNING SIGN REFER TO DWG 1500-050-GAR-0012 AND 1500-050-GAR-0013.
5. BURIED PIPE WARNING SIGNS TO BE LOCATED A MINIMUM OF 3.0m FROM THE TOP OF BANK.
6. INSTALL FINAL BERM ACROSS ROW AT TOP OF THE BANKS. INSTALL ON A MAXIMUM GRADE OF 1.0%. ALL FINAL BERMS TO BE COVERED IN 200mm TOPSOIL. ENSURE BERMS DISCHARGE TO A STABLE LOCATION DOWNSTREAM OF THE WORK SITE (IE. GRASS OR ROCK AREA).
7. FOR FINAL DRAINAGE FEATURE TO HIGH WATER MARK:
   - 7.1. APPLY 300mm THICK LAYER OF SEEDED ROCK/SOIL MATRIX AS PER ORIGINAL SITE CONTOURS. ROCK/SOIL MATRIX TO BE 50% ORIGINAL BED MATERIAL (MIXED WITH SEED) & 50% 200mm RIP RAP ROCK. OR;
   - 7.2. WHERE INSUFFICIENT OR UNSUITABLE ORIGINAL BED MATERIAL EXISTS APPLY SOIL AMELIORANTS (GYPSUM, LIME, DOLOMITE, COMPOST ETC) TO PROVIDE SUITABLE GROWING MEDIUM AS PER SOIL AMENDMENT ADVICE. APPLY 300mm THICK LAYER OF SEEDED ROCK/SOIL MATRIX AS PER ORIGINAL SITE CONTOURS. ROCK/SOIL MATRIX TO BE 50% ORIGINAL BED MATERIAL (MIXED WITH SEED) & 50% 200mm RIP RAP ROCK.
8. FOR FINAL DRAINAGE FEATURE ABOVE HIGH WATER MARK:
   - 8.1. RESPREAD TOPSOIL AS PER ORIGINAL SITE CONTOURS. PROVIDE A MINIMUM OF 200mm TOPSOIL DEPTH. WHERE POSSIBLE, PLACE THE BALANCE OF TOPSOIL FOLLOWED BY THE TOP 50mm OF STRIPPED TOPSOIL. ADD REQUIRED FERTILISER AND SEED. STABILISE WITH STONEWALL SOIL BINDER OR EQUIVALENT. OR;
   - 8.2. WHERE INSUFFICIENT OR UNSUITABLE TOPSOIL EXISTS, APPLY SOIL AMELIORANTS (GYPSUM, LIME, DOLOMITE, COMPOST ETC) TO PROVIDE SUITABLE GROWING MEDIUM AS PER SOIL AMENDMENT ADVICE. RESPREAD AS PER ORIGINAL SITE CONTOURS. ADD FERTILISER AND SEED. STABILISE WITH STONEWALL SOIL BINDER OR EQUIVALENT.
9. SEED TO BE BROADCAST WITHIN TOP 50mm TOPSOIL OR ROCK/SOIL MATRIX. SEED MIX TO TO BE IN ACCORDANCE WITH SEEDING RECOMMENDATIONS.
10. TRENCH BREAKERS SHALL BE INSTALLED AS REQUIRED BY SANTOS SPECIFICATION 'CONSTRUCTION OF POLYETHYLENE GATHERING SYSTEMS' 1515-120-SPC-0008 AND IN ACCORDANCE WITH DRAWING 1500-040-GAR-0001.



TYPICAL CROSS BERM DETAIL
NOT TO SCALE



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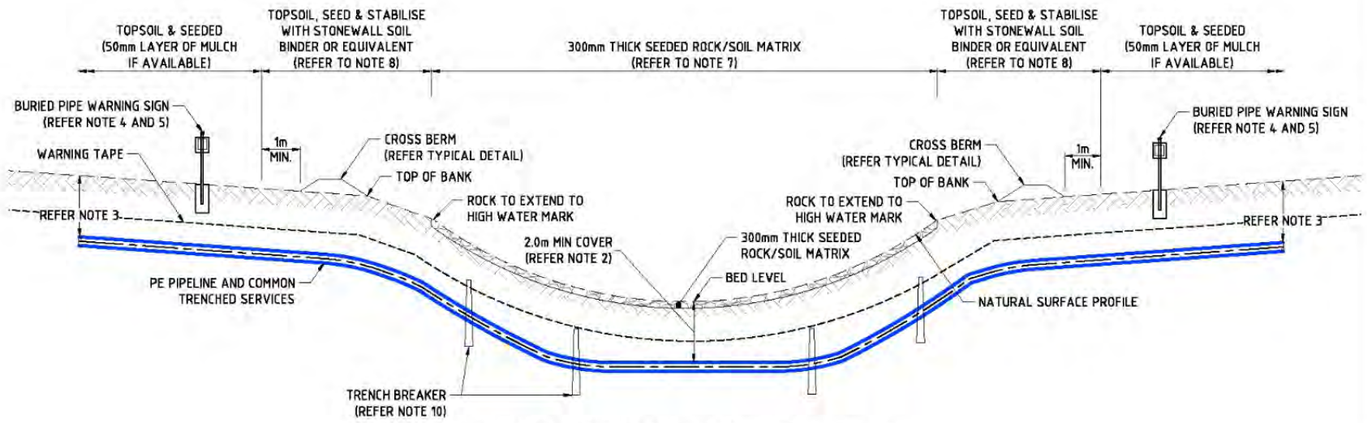

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1	LC	15.05.20	PIPELINE INSTALLATION DETAILS	AV
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REFERENCE DOCUMENTS	
0007-650-PLA-0097	General Notes
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1515-120-SPC-0008	Construction Of Polyethylene Gathering Systems
1500-050-GAR-0013	Warning Sign Details
1500-050-GAR-0012	Warning Sign Details
DOC. NUMBER	DOCUMENT TITLE

Santos

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STATUS: ISSUED FOR USE

DESIGNED	AV	CHECKED	MC
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Santos

Santos Roma Phase 7-7B-SD20 Development

SIGNIFICANT SPECIES MANAGEMENT PLAN

February 2025

Document Status

Date	Rev	Reason For Issue	Author	Checked	Approved
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Glossary

Abbreviation	Description
ALA	Atlas of Living Australia
ATP	Authority to Prospect
BRB	Brigalow Belt Bioregion
CE	Critically Endangered
CSG	Coal Seam Gas
DCCEEW	Department of Climate Change, Energy, the Environment and Water
DEHP	Department of Environment & Heritage Protection (now DETSI)
DETSI	Department of Environment, Tourism, Science and Innovation
E	Endangered
EA	Environmental Authority
ECP	Environmental Control Plan
EMP	Environmental Management Plan
EP Act	*Environmental Protection Act 1994*
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
GFD	Gas Field Development
GIS	Geographical Information System
GLNG	Gladstone Liquefied Natural Gas
ha	Hectare
IBRA	interim biogeographic regionalisation of Australia
IDP	Integrated Development Planning
m	Metre
M	Migratory
MNES	Matters of National Environmental Significance, being the relevant matters protected under Part 3 of the EPBC Act.
NC Act	*Nature Conservation Act 1992*
NT	Near Threatened
PDF	Preliminary Disturbance Footprint
PL	Petroleum Lease
Project Area	The bounds of ATP 2053
QLD	Queensland
RE	Regional Ecosystem
RMP	Rehabilitation Management Plan
SF	State Forest
Significant species	Significant species are MNES EPBC Act listed fauna species and their habitat determined to potentially, likely or be known to occur within the Project Area (as listed in Table 1).
SLC	Special Least Concern
SPRAT	Species Profile and Threats Database
SSMP	Significant Species Management Plan
TEC	Threatened Ecological Communities
V	Vulnerable

1. Introduction

Santos and its joint venture partners are proposing a new gas field development located in central-eastern Queensland to supply natural gas to commercial markets. The proposed development will be known as the 'Santos Roma Phase 7-7B-SD20 Development' (the Project).

1.1. Overview

The Project will involve the progressive construction, operation, decommissioning and rehabilitation of up to 24 coal seam gas (CSG) wells, gas and water gathering flowlines and access track infrastructure in petroleum exploration tenure Authority to Prospect (ATP) 2053 (the Project Area). The Project Area is located in central-eastern Queensland, approximately 5 kilometres (km) east of the regional town of Wallumbilla. The regional location of the Project Area is shown in Figure 1.

The Project footprint located in the Project Area will cover approximately 66 hectares (ha) of land. Petroleum exploration activities undertaken by the Santos in the Project Area to date include the drilling and completion of 5 CSG appraisal wells and construction of associated infrastructure in 2022-2024. These activities are authorised under existing approved Queensland Environmental Authority (EA) 0002052. The existing 5 wells form part of the proposed 24 CSG wells.

CSG and water produced from the Project Area will be sent to existing approved centralised gas and water storage / processing and gas compression facilities located on adjacent Santos owned and operated petroleum tenures. Petroleum activities on adjacent tenures are authorised under existing *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) approvals for the Gladstone Liquified Natural Gas Field Development Project (GLNG GFD) (EPBC Act Numbers 2008/4059 and 2012/6615) and EAs EPPG00898213 and EPPG00662213. No gas compression or water treatment facilities are proposed to be constructed or operated within the Project Area, and no significant water storage structures will be constructed or operated within the Project Area. Where required, prefabricated water storage tanks (concrete panel tanks or similar) will be assembled for temporary water storage.

The Project will include the following components (but not limited to):

- well leases (typically 1.25 ha for single wells and 3 ha for multi-wells)
- water / gas gathering lines, trunklines and pipelines (typically 20 – 35 (metres) m wide)
- roads and access tracks (typically 10 – 15 m wide);
- other supporting infrastructure:
  - temporary water storage tanks
  - temporary workers camps
  - power and communications lines
  - other incidental and ancillary petroleum activities required to support the authorised activity.

Well development will be phased to optimise gas production to meet Santos' gas supply obligations and opportunities. Once operational, gas produced from the Project Area will supply commercial markets.

Once completed and connected to gas and water gathering infrastructure, operational wells will operate continuously on a 24-hour basis for an anticipated operational life of 30-50 years. Progressive decommissioning and rehabilitation of activities and infrastructure will occur over the life of the Project, thereby reducing disturbance areas for the duration of operation, until final decommissioning and rehabilitation at end of project life.

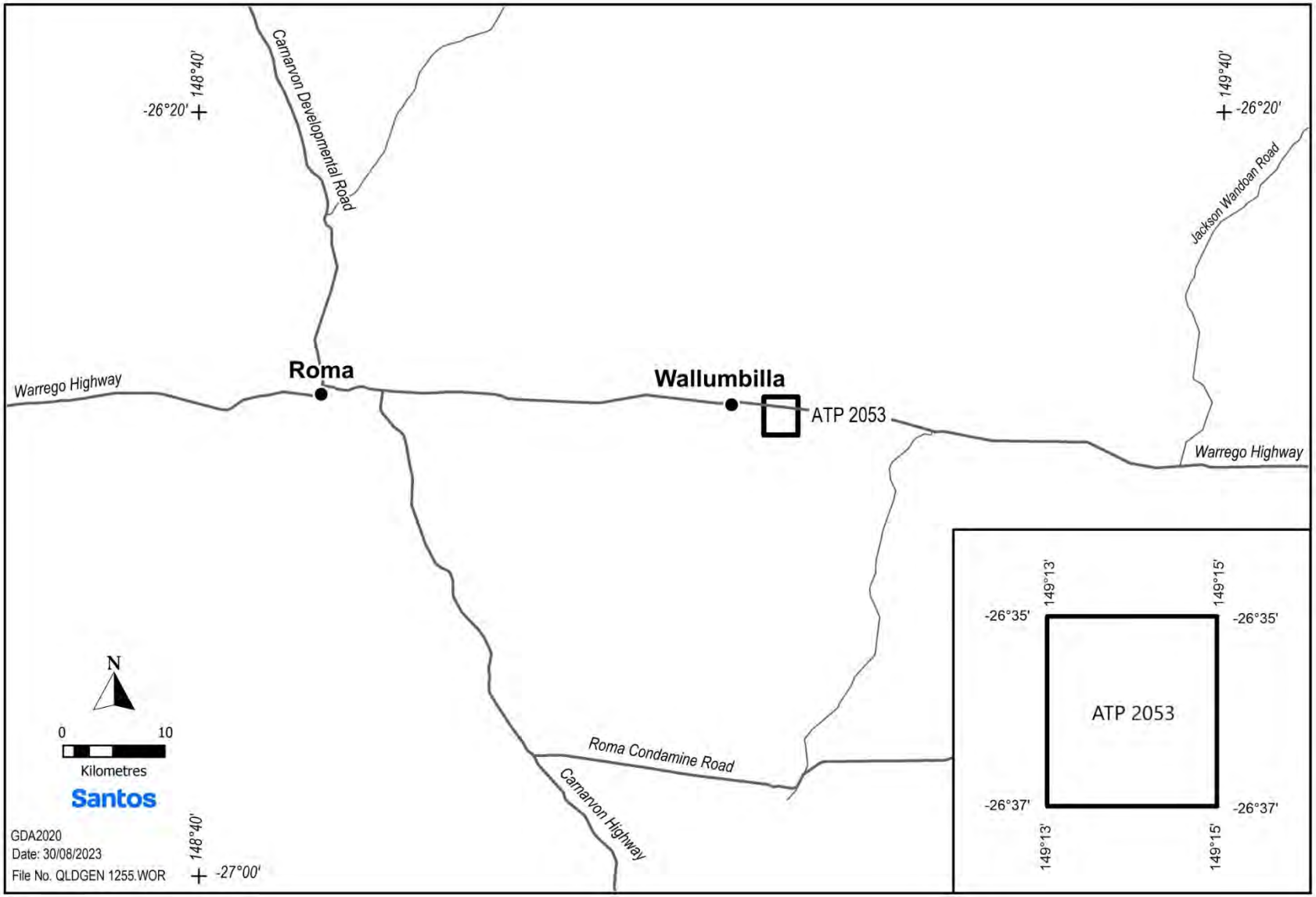

Figure 1: Santos Roma Phase 7-7B-SD20 – Project Area (ATP 2053)

1.2. Background

Santos has developed a preliminary disturbance footprint (PDF) for the Project to locate infrastructure in the Project Area to avoid disturbance to Matters of National Environmental Significance (MNES) and other environmental values. The PDF is displayed in Figure 3. The PDF was developed following multiple ecological surveys, field scouting, and desktop planning revisions to avoid impacts to MNES and other environmental values.

The process for locating infrastructure, developing the PDF, and defining environmental constraints is described in *Santos Roma Phase 7-7B-SD20 Development Environmental Protocol for Constraints Planning and Field Development Constraints Protocol* (Constraints Protocol) (Santos, 2025a). This Constraints Protocol was informed by multiple field-based scouting and ecological surveys undertaken in 2022-2024. Refer to the *Roma Phase 7-7B SD20 Development Matters of National Environmental Significance Ecological Assessment Report* (Boobook, 2025) for further detail.

1.3. Purpose and scope

This Significant Species Management Plan (SSMP) has been prepared for the Project to guide the management of potential impacts to significant species and their habitat located in the Project Area.

This SSMP, in conjunction with the Constraints Protocol, provides Santos with the tools to systematically identify relevant significant species and implement management measures during the course of conducting petroleum activities in the Project Area. All planning-related considerations and maximum disturbance limits to MNES, including measures to avoid ecological constraints, are addressed in the Constraints Protocol (Santos, 2025a).

This SSMP includes the following scope:

- definition of significant species for the Project (refer to the Glossary and Table 1);
- details of how management plans developed for the Project will be applied to avoid and minimise impacts to significant species and their habitat during construction, operation, decommissioning and rehabilitation of the Project (refer to Section 4);
- measures to be taken to avoid, mitigate and manage impacts to significant species, during construction, operation and decommissioning and rehabilitation of the Project (refer to Section 4.4);
- details of disturbance tracking, reporting and review timeframes for the SSMP (refer to Section 4.5); and
- provide a summary of relevant conservation advice, recovery plans and threat abatement plans for significant species.

This SSMP will be applied throughout the life of the Project for each active phase of the development including construction, operation, decommissioning and rehabilitation.

Santos plans to convert the current exploration tenure for the Project Area (ATP 2053) from an ATP to a new Petroleum Lease (PL). Santos will need to apply for a new PL, granted under Chapter 2 of the Queensland *Petroleum and Gas (Production and Safety) Act 2004* (P&G Act) to replace the existing ATP. To authorise petroleum production activities on the new PL, Santos will also need to apply for a new EA under the *Environmental Protection Act 1994* (Qld) (EP Act).

This SSMP has been written to consider likely conditions of the new EA, however it will be revised or updated once the new EA is granted to ensure it complies with any additional conditions.

This SSMP will be revised or updated from time-to-time to align with regulatory requirements. Revised versions of the SSMP will be made available upon request to DCCEEW or as otherwise required under conditions of a regulatory approval, whether under the EPBC Act or any other applicable legislation.

1.4. Existing environment and significant species

1.4.1. Existing environment and MNES

The Project Area is located in central-eastern Qld in the southern extent of the Brigalow Belt Bioregion (BRB). The BRB is characterised by *Acacia harpophylla* (Brigalow) forests and woodlands on clay soils, however large areas of Brigalow have been historically cleared for agricultural purposes (Sattler & Williams, 1999).

The Project Area is predominantly rural land characterised as non-remnant derived grasslands dominated by introduced pastoral grasses with occasional native trees and shrubs. Areas of remnant and regrowth native vegetation occur as irregular, discontinuous corridors along streamlines or as small, isolated fragments. River Red Gum (*Eucalyptus camaldulensis*) dominates riparian woodland along the banks of larger streams, while Poplar Box (*E. populnea*) dominates floodplain woodlands with occasional patches of Weeping Myall (*A. pendula*) occurring on floodplains. Brigalow (*A. harpophylla)* and / or Belah (*Casuarina cristata*) are prominent in areas of heavy soil. Some low-lying areas have groundcover dominated by characteristic wetland fringe plants including sedges, Nardoo (*Marsilea* spp.), forbs and grasses. These floodplain wetlands include areas of non-remnant vegetation and modified drainage structures such as channels and overflow areas around dams (Boobook, 2025).

The likelihood of MNES values occurring in the Project Area was determined through detailed review of multiple resources including:

- State and Commonwealth databases and Geographical Information System (GIS) data;
- peer-reviewed literature and previous studies;
- results of ecological field assessments; and
- current (known) distribution range and the presence and condition of suitable habitat within the Project Area.

Refer to Boobook (2025) for further detailed information on the ecology of the Project Area, including the ecological assessment and likelihood of occurrence assessment methodologies.

The EPBC Act Protected Matters Search Tool was used to establish a list of possible MNES species and values that may occur in the Project Area. These MNES were individually assessed for likelihood of occurrence. Only those MNES assessed as potentially, likely or known to occur within the Project Area are included in this SSMP. These MNES are detailed in Table 1, and potentially suitable habitat is displayed in Figure 2. Two Threatened Ecological Communities (TECs) are known to occur in the Project Area. These are described in Table 1 and displayed in Figure 3.

Boobook (2025) assessed koala (*Phascolarctos cinereus*) to be potentially present as transient individuals moving through the Project Area due to the presence of suitable habitat. The Project Area is heavily fragmented; however, koala are capable of dispersing over land using scattered paddock trees and corridors along streams. Koalas are sparsely distributed in the region, but there is a record from similar habitat located within 10 km of the Project Area. No scratches or other evidence of koala were observed in the Project Area during field surveys.

No MNES threatened plant species or habitat were detected during field surveys, and no MNES threatened flora species are expected to occur within the Project Area (Boobook, 2025). No Wetlands of International or National Significance occur within the Project Area; however, some areas of limited general ephemeral wetland habitat are present (refer to Figure 3) (Boobook, 2025).

The Project Area is unlikely to harbour an ecologically significant proportion of any listed migratory species' population. The proposed action is unlikely to reduce the geographic range of any migratory species and the Project Area does not otherwise contain or constitute important habitat for migratory species. Therefore, the proposed action is unlikely to result in significant impacts on any listed migratory species (Boobook, 2025).

Table 1: MNES – likelihood of occurrence in the Project Area (adapted from Boobook, 2025)

MNES	EPBC Act Status	Likelihood of Occurrence[1]
Threatened Ecological Communities		
Poplar Box Grassy Woodlands on Alluvial Plains	Endangered	Known / Present
Weeping Myall Woodlands	Endangered	Known / Present
Birds		
Sharp-tailed sandpiper (*Calidris acuminata*)	Vulnerable, Migratory	Potential
Glossy black-cockatoo (eastern) (*Calyptorhynchus lathami lathami*)	Vulnerable	Potential
Latham's snipe (*Gallinago hardwickii*)	Vulnerable, Migratory	Potential
White-throated needletail (*Hirundapus caudacutus*)	Vulnerable, Migratory	Likely
Australian painted snipe (*Rostratula australis*)	Endangered	Potential
Migratory Birds		
Fork-tailed swift (*Apus pacificus*)	Migratory	Likely
White-throated Needletail (*Hirundapus caudacutus*)	Migratory, Vulnerable	Likely
Common Sandpiper (*Actitis hypoleucos*)	Migratory	Potential
Sharp-tailed Sandpiper (*Calidris acuminata*)	Migratory	Potential
Pectoral Sandpiper (*Calidris melanotos*)	Migratory	Potential
Latham's Snipe (*Gallinago hardwickii*)	Migratory, Vulnerable	Potential
Mammals		
Koala (*Phascolarctos cinereus*)	Endangered	Potential
Reptiles		
Yakka skink (*Egernia rugosa*)	Vulnerable	Potential
Grey snake (*Hemiaspis damelii*)	Endangered	Potential

Note: EPBC Act 'Marine' listed species, and species unlikely to be present within the Project Area, have been excluded from Table 1.

Figure 2: Predicted threatened species habitat mapping where it intercepts the PDF (adapted from Boobook, 2025)

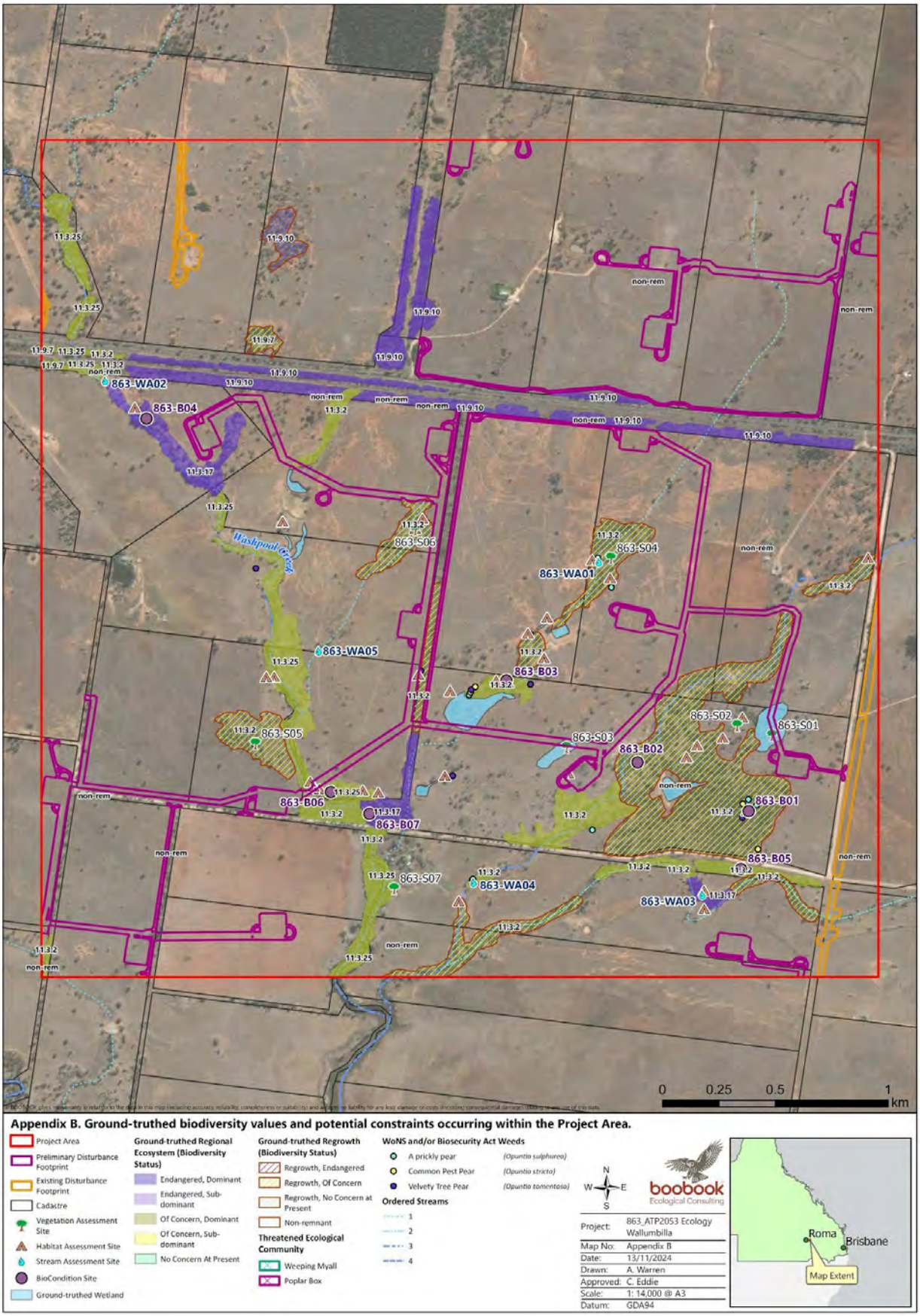

Figure 3: PDF and ground-truthed biodiversity values in the Project Area (adapted from Boobook, 2025)

1.4.2. Proposed disturbance and maximum disturbance limits

As discussed in Section 1.2, Santos undertook multiple revisions of the PDF to refine the layout to avoid disturbance to MNES and other environmental values. MNES proposed to be disturbed in the Project Area is limited to associated habitat for EPBC Act listed threatened fauna species as detailed in Table 2.

No TECs occur within the current PDF, and therefore no impact on TECs is proposed.

Direct impacts to MNES must not exceed the maximum disturbance limits stated in Table 2.

Table 2: Maximum disturbance limits

Species Name	Associated Habitat Type / Potentially Suitable REs	Maximum Disturbance Limit
• Sharp-tailed Sandpiper (*Calidris acuminata*) • Latham's Snipe (*Gallinago hardwickii*); and • Australian Painted Snipe (*Rostratula australis*).	General Wetland Habitat^	0.60 ha
• Glossy Black-Cockatoo (*Calyptorhynchus lathami lathami*) • White-throated Needletail (*Hirundapus caudacutus*) • Koala (*Phascolarctos cinereus*) • Yakka Skink (*Egernia rugosa*); and • Grey Snake (*Hemiaspis damelii*).	RE 11.3.2 (remnant)	0.15 ha
• Glossy Black-Cockatoo (*Calyptorhynchus lathami lathami*) • White-throated Needletail (*Hirundapus caudacutus*) • Koala (Phascolarctos cinereus) • Yakka Skink (*Egernia rugosa*); and • Grey Snake (*Hemiaspis damelii*).	RE 11.3.2 (regrowth)	0.15 ha

Key / Notes:

- Definition of General Wetland Habitat as per Boobook (2025)
- Regional Ecosystems (REs); and
- Maximum Disturbance Limits are equivalent to the mapped extent of potential habitat (ha) located within the PDF.

1.4.3. Significant species

For the purposes of this SSMP, significant species are MNES EPBC Act listed fauna species and their habitat determined to potentially, likely or be known to occur within the Project Area (as listed in Table 1).

This SSMP provides detailed profiles for each Significant species listed in Table 1 (refer to Section 5). Habitat descriptions for significant species have been developed based on information detailed in Boobook (2025), which is inclusive of available scientific information, expert advice contained in the Species Profile and Threats Database (SPRAT) and relevant EPBC Act conservation advice and listing advice documents.

2. Legal Requirements

As operator of the Project Area, Santos must comply with State and Commonwealth legislation applicable to the Project, including relevant regulatory approvals, authorisations, permits and other requirements. A summary of primary legislation applicable to the management of significant species is provided in Table 3.

Refer to the Project's Environmental Management Plan (EMP) (Santos 2025b) for further information on legislative requirements applicable to the Project.

Table 3: Primary legislation applicable to the Project

Act / Strategy/Policy	Summary of Act or Strategy
Environment Protection and Biodiversity Conservation Act 1999 (Cth) (EPBC Act)	The EPBC Act establishes a process for environmental assessment and approval of proposed actions that have, will have or are likely to have a significant impact on MNES or on Commonwealth land. Under the EPBC Act, a referral to DCCEEW is required if the Project has the potential to cause a 'significant impact' on MNES. The Constraints Protocol (Santos, 2025a) will direct the minor re-siting of infrastructure (if required) and activities to avoid and minimise impacts to MNES that have the potential to occur within the Project Area. Further, this SSMP has been prepared to mitigate impacts on significant species.
Environmental Protection Act 1994 (Qld) (EP Act) and its subordinate legislation	The EP Act is the overarching environmental regulatory framework for governing the environmental management of resource activities in Queensland. Prior to the granting of a PL under the *Petroleum and Gas (Production and Safety) Act 2004* (see below), DETSI must grant an Environmental Authority (EA) that authorises resource activities subject to conditions to protect environmental values including acoustic, biodiversity, land, air, surface water, groundwater and wetlands. Petroleum exploration and production testing activities are currently authorised to occur in the Project Area under the requirements of EA 0002052. To enable future commercial gas production activities within the Project Area, a new EA to authorise petroleum production activities will need to be applied for and granted under the requirements of the EP Act. Further to the above, under the requirements of the EP Act: • all persons must implement all reasonable and practicable measures to prevent environmental harm (i.e. General Environmental Duty) • material or serious environmental harm must be reported to the DETSI • controls must be implemented for prescribed water contaminants (e.g., soil and sediment, concrete washout, fuel / oil etc.) • wastes must be managed to prevent environmental harm. Regulated waste must only be carried by licensed transporters and disposed of at appropriately licensed waste receiving facilities; and • contaminated land must be managed in accordance with State and National guidance to protect human health and the environment.

3. Potential Impacts to Significant Species

Development of the Project has the potential to cause adverse impacts to significant species. The potential for adverse impacts to significant species is greatest during, and largely restricted to, the initial construction phase of Project development. This is because the construction phase requires greenfield vegetation clearing and earthworks to be carried out, and these activities have the greatest potential to directly impact significant species and their habitat. The subsequent project phases (i.e. operation, and decommissioning and rehabilitation) are unlikely to cause substantial direct impacts to significant species or their habitat, and impacts associated with these phases are largely characterised as minor indirect impacts.

Nonetheless, given the small disturbance areas required to develop the Project, impacts to significant species as a result of the Project development are considered to be minimal.

Potential impacts to significant species posed by development of the Project are summarised in Table 4.

Table 4: Potential impacts to significant species

Potential Impact	Description
Habitat Loss	The clearing of vegetation for the construction of infrastructure has the potential to result in a direct loss of habitat for significant species. Clearing also has the potential to degrade the quality of existing habitat if the construction of infrastructure results in fragmentation of habitat patches and the creation of edge effects. Clearing will predominantly occur during the construction phase and will be limited to the extent essential to allow for safe construction and operations. Clearing of vegetation and potential habitat for significant species will be undertaken in accordance with maximum disturbance limits detailed in Table 2.
Fragmentation	Clearing required for the construction of infrastructure within the Project Area has the potential to result in fragmentation of habitat and contiguous vegetation communities. This can interrupt species movements and result in the formation of 'islands' and thereby population fragmentation. The Project Area is already highly fragmented due to clearing associated with historic grazing practices. Project-related clearing will predominantly occur during the construction phase and will be limited to the extent essential to allow for safe construction and operations.
Injury / Mortality / Entrapment	The development of access track and road networks during the construction phase and their continued use throughout the operational phase has the potential to result in injury / mortality of fauna. Injury and mortality are likely to be limited to smaller, less mobile fauna such as reptiles, amphibians and small-bodied mammals, and some bird species. In addition, other infrastructure, including markers and fencing, pipeline trenches and fluid containment structures, has the potential to cause injury and / or mortality for some more active fauna species.
Introduction of pests and weeds	Pests and weeds can be spread across a landscape either intentionally or unintentionally via both anthropogenic and natural mechanisms. Activities conducted throughout the Project Area have the potential to inadvertently introduce and spread pest and weed species throughout the Project Area and surrounding region, primarily through poor weed hygiene practices and the movement of vehicles between 'clean' and 'dirty' regions. There is also potential for increased movement of pest fauna that are already present in the area through habitat modification, and supplementary food sources from wastes generated at facilities.
Disturbance of behaviour / movement	Construction and operations have the potential to disturb the behaviour and movements of some fauna. Disturbances may include some disruption of breeding activities. Some disturbance of fauna movement and behaviour is unlikely to have more than minimal impact on populations. However, when combined with the loss of habitat, changes in behaviour may increase the risk of predation and the sustainability of populations. Most disturbances will be short-term and occur predominantly during construction.
Dust	Prolonged deposition of dust on foliage can impact on a plant's ability to photosynthesise, thereby inducing stress in the plant and the potential for mortality. Potential impacts associated with dust are most likely to occur during the construction phase where there is significant vehicle movement and earth-breaking activities.

Potential Impact	Description
	Construction and clearing activities have the potential to create small areas of relatively high but localised airborne dust loads with implications for the surrounding flora and fauna. Dust from operational activities is envisaged to be minimal. Areas impacted by dust will predominantly be localised (i.e. areas directly bordering construction and clearing activities or track or road verge) and impacts will be short term. Impacts as a result of dust are likely to be limited to sensitive flora species, located close to dust sources and fauna with minimal mobility (e.g. aquatic fauna, amphibians and small reptiles).
Noise, Lighting, Vibration	Excessive noise, bright lighting and vibration have the potential to disturb fauna inhabiting the immediate vicinity of construction activity, particularly whilst breeding or preparing to breed. Potential impacts of noise, lighting and vibration will be more prevalent during the construction phase and will therefore be relatively short-term. Sensitive fauna are likely to temporarily leave impacted areas, but some acclimation may occur. Fauna are likely to return to impacted areas on cessation of the disturbance activities.
Sediment Transport	Clearing and construction activities have the potential to result in localised erosion and thereby sediment transport, particularly where activity occurs on slopes or in the vicinity of landform features such as gullies, outcrops and drainage lines. Following significant rain events, run-off from disturbed areas may result in the build-up of sediment in watercourses and waterholes. Sediment deposition to land or waterways has the potential to have an impact on flora, with some potential impact on aquatic fauna possible. Queensland EAs, inclusive of the current EA applicable to the Project Area (EA 0002052), contain a range of environmental conditions to ensure sedimentation and disturbance to surface waters are minimised when carrying out petroleum activities. Further, many surface waterways in the region have naturally high turbidity after significant rain events and under normal flow conditions, due to the nature of the soils and the existing disturbed nature of landscapes. Therefore, significant impacts are not anticipated.
Fire	Fire can result in the potential loss (either temporary or permanent) of vegetative cover or microhabitat, thereby impacting on terrestrial flora and fauna. Altered fire regimes (i.e. increased frequency) caused by development activities may over time also result in vegetation changes, further equating to the loss of habitat. The risk of fire associated with development activities is considered unlikely.
Soil Contamination	Soil contamination has the potential to occur as result of spillage of hydrocarbons from construction machinery, particularly during refuelling, or from fuel or chemical storage tanks. Flora and fauna can be adversely affected by soil contamination. Any soil contamination is expected to be infrequent and localised.
Surface Water Degradation	Construction near waterways and in particular the construction of linear infrastructure across waterways may result in alteration of flows and increased sedimentation and turbidity. This has the potential to adversely impact aquatic fauna and flora. Queensland EAs, inclusive of the current EA applicable to the Project Area (EA 0002052), contain a range of environmental conditions to ensure sedimentation and disturbance to surface waters are minimised when carrying out petroleum activities. Contamination of waterways resulting from the spillage of hydrocarbons or chemicals is unlikely, although some flow into waterways could occur following a large spill. Contamination of waterways will also pose a risk to aquatic flora and fauna. Impacts to waterways are most likely to occur during the construction phase and is anticipated that direct impacts would be small and localised.
Groundwater Degradation	Contamination of shallow groundwater has the potential to occur during the construction phase as a result of spillage of hydrocarbons and chemicals (fuels, hydraulic oils and lubricants), however this risk is considered to be localised and limited.

4. Mitigation and Management of Potential Impacts to Significant Species

Impact mitigation and management measures are proposed that avoid and then minimise potential impacts to significant species resulting from Project activities.

Development of CSG fields involves placing relatively localised disturbance areas for linear and non-linear infrastructure within extensive landscapes. Depending on the nature of the landscape, there is typically a reasonable level of flexibility in where infrastructure can be placed to avoid constraining features and sensitivities.

Santos have implemented the following hierarchy of management principles in the Constraints Protocol (Santos, 2025a) to place infrastructure in the Project Area:

a) avoid – avoiding direct and indirect adverse environmental impacts where practicable;
b) minimise – minimise direct and indirect adverse environmental impacts where these cannot be avoided;
c) mitigate – implement mitigation and management measures to minimise direct, indirect and cumulative adverse impacts; and
d) remediate and rehabilitate – actively remediate and rehabilitate impacted areas to promote and maintain long-term recovery.

Following implementation of the above principles, where required, Santos will provide suitable environmental offsets for activities that result in significant impacts to MNES (note that environmental offsets are not expected to be required for the Project given the small disturbances proposed).

Actions taken to follow the mitigation hierarchy are highlighted in Figure 4.

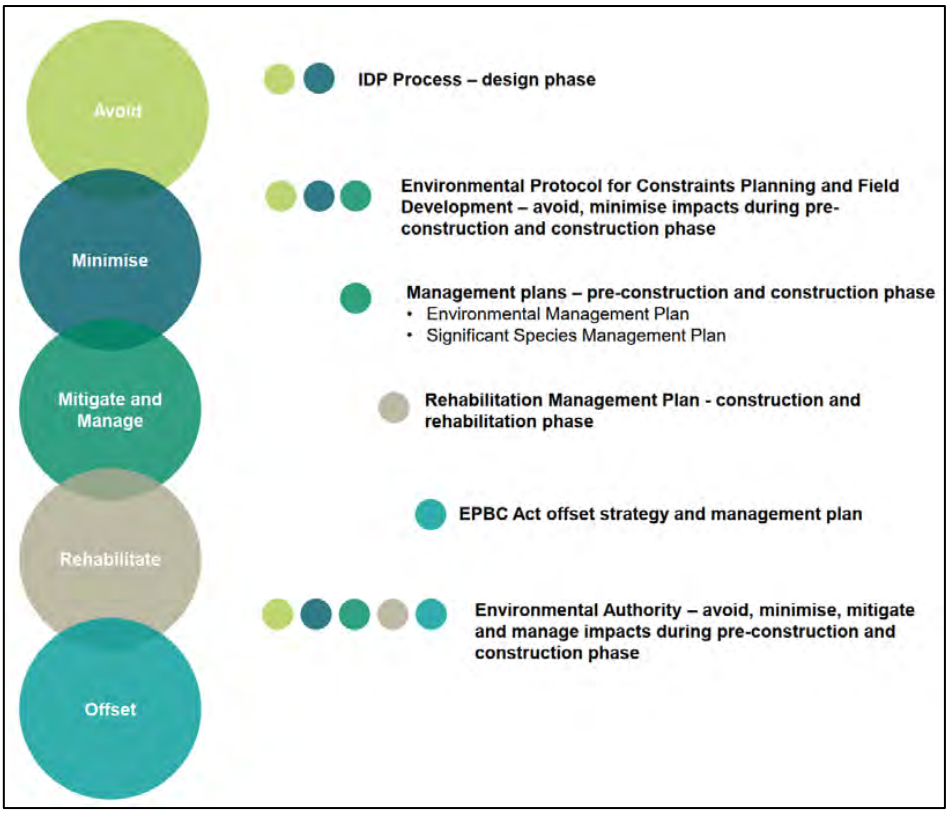

Figure 4: Mitigation hierarchy actions for the Project

Santos has developed several management plans to guide mitigation and management of potential impacts to environmental values in the Project Area based on the hierarchy of management principles detailed above.

These plans include - the *Roma Phase 7-7B-SD Development*:

- *Environmental Protocol for Constraints Planning and Field Development* (Constraints Protocol) (Santos, 2025a):
  - this document details how the above principles will be implemented throughout the project lifecycle but particularly during the planning and design of gas field infrastructure.
- *Environmental Management Plan* (EMP) (Santos, 2025b):
  - this document details how the proposed action will be carried out during the construction, operation, decommissioning and rehabilitation phases and mitigation measures to be applied during these phases. The EMP also details the environmental control plans and performance indicators for key environmental values including MNES.
- *Rehabilitation Monitoring Plan* (RMP) (Santos, 2025c):
  - this document outlines final rehabilitation completion criteria and monitoring requirements.
- *Significant Species Management Plan* (SSMP) (Santos, 2025d):
  - this document provides species-specific mitigation measures for relevant MNES, as well as descriptions of their habitat and range, biological information and presence in the Project Area.

Further, Santos must also ensure relevant conditions of the EA and any post-EPBC Act decision conditions are considered, implemented and complied with when undertaking the proposed activities.

The Constraints Protocol, EMP and RMP, and specific mitigation measures for significant species are discussed further in the following sections.

4.1. Constraints Protocol

Santos has developed a constraints planning framework (Constraints Protocol) to locate disturbances and infrastructure in the Project Area to avoid impacts to significant species, MNES, and other environmental values and regulatory requirements.

Santos implements the Constraints Protocol to guide all infrastructure placement via its established internal development planning, assessment and approval process, known as Integrated Development Planning (IDP). Refer to the Constraints Protocol for further information (Santos, 2025a).

4.2. Environmental Management Plan

Santos has developed an EMP for the Project to provide a structured high-level approach to the management of environmental issues over the life of the Project (refer to Santos, 2025b).

Effective implementation of the EMP and associated environmental control plans (ECPs) facilitates compliance with regulatory and conditional requirements in a systematic manner, continually improving environmental performance. The ECPs have been developed to document site-specific environmental management measures to be implemented throughout the life of the Project.

The ECPs have also been developed to facilitate ongoing environmental compliance with regulatory requirements and best practice environmental management strategies. A brief summary of each ECP included in the EMP is available in Table 5. Refer to the EMP for further information (Santos, 2025b).

Table 5: Environmental Control Plans

ECP	Key Content
1. Construction site management	Measures for general construction site management to minimise risks to environmental values from site establishment through to demobilisation and handover
2. Soil resource management	Management measures to minimise the risk of degrading soil resources during construction works. Includes consideration of erosion and sediment control, contaminated land and acid sulfate soils
3. Water resource management	Management measures to minimise the risk of degrading the quantity and quality of water (surface water and groundwater) resources during construction works
4. Flora and fauna management	Measures to protect the flora and fauna of the local area during construction works
5. Weed and pest management	Measures to reduce the risk of invasive plant and animal introduction and spread at the site or onto surrounding lands
6. Air, vibration, light and noise management	Measures to reduce the risk of environmental harm from air, light, vibration and noise emissions during construction works
7. Liquid and solid waste management	Measures to manage regulated, general and recyclable wastes from the construction works in accordance with the waste management hierarchy
8. Cultural heritage management	Measures to protect the cultural heritage values of the site and surrounding area
9. Hazardous substances use and management	Measures for hazardous substance storage, handling, use and disposal to minimise the risks of environmental contamination
10. Plant and equipment management	Measures for the maintenance and operation of plant and equipment during construction to minimise the risk of environmental harm
11. Environmental emergency preparedness and response	Measures to minimise the impacts of the three environmental emergencies that could reasonably be expected to occur at the site at some time: major chemical spill (fuel), dangerous weather events (heavy rainfall / flooding / cyclone) and bushfire.

4.3. Rehabilitation Monitoring Plan

Santos will undertake decommissioning and rehabilitation of Project disturbances in accordance with the RMP (Santos, 2025c). The Project disturbance lifecycle can be defined by three distinct stages: construction, operation, and transitional and final rehabilitation. Regardless of the stage, all works aim to achieve a safe, stable, non-polluting landform.

Transitional rehabilitation requirements apply when assets are no longer required for ongoing petroleum activities, and final rehabilitation is undertaken once an asset is assessed to be no longer required for the petroleum activity.

In all instances, transitional rehabilitation requirements will be met once the asset is no longer required for ongoing petroleum activities. Refer to the RMP (Santos, 2025c) for further detail on the decommissioning and rehabilitation process.

4.4. Impact mitigation measures

This section outlines mitigation measures to be implemented to mitigate and manage potential adverse impacts to significant species and their habitat. These measures are consistent with, and in additional to, mitigation measures detailed in the EMP (Santos, 2025b).

Mitigation measures have been grouped into phases to match Project development as below:

- pre-construction and construction;
- operation; and
- rehabilitation.

The majority of mitigation measures fall into the pre-construction and construction phases. As discussed in Section 3, this is because the potential for adverse impacts to significant species is greatest during, and largely restricted to, the initial construction phase of Project development. Table 6 identifies measures to mitigate potential impacts on significant species. Review and monitoring of the effectiveness of these measures will be undertaken as part of regular Santos internal and third-party monitoring and auditing activities against relevant conditions of the EA and any post-EPBC Act decision conditions.

Table 6: Mitigation measures for significant species

Activity	Mitigation Measure
Pre-Construction and Construction	
Site Preparation	All clearing and disturbance must be internally approved via the Santos IDP process prior to commencement of construction activities (as per the requirements of the Constraints Protocol (Santos, 2025a)).
	Areas proposed to be disturbed / cleared shall be clearly delineated[1], and the need to conduct the proposed activity in designated and approved areas will be reinforced during site toolbox / induction meetings.
	Clearing and construction activities will be scheduled to avoid breeding periods for significant species, where work delivery schedules are sufficiently flexible to do so.
	Disturbance in and around ephemeral wetlands will be avoided or minimised wherever practicable, or otherwise preferentially scheduled to occur when the areas are dry, and otherwise in accordance with EA conditions and maximum disturbance limits (refer to Table 2).
	Existing areas of disturbance will be utilised wherever practicable to locate proposed disturbances to minimise habitat fragmentation / disturbance.
	Mature trees will be avoided wherever practicable (and tree limbs will be loped in preference to removing entire trees wherever practicable).
	A suitably qualified Fauna Spotter / Catcher will be present during woody vegetation clearing activities where required. Prior to construction activities commencing, the Fauna Spotter / Catcher will survey for the presence of fauna and significant species located in or near the proposed disturbance area. Fauna and significant habitat features will be avoided or relocated outside the proposed disturbance area.
	Relocation of breeding species may be a suitable option, but this can only occur where deemed appropriate for the species by the Fauna Spotter / Catcher. Disturbance to active breeding locations for significant species will be avoided. At sites where arboreal mammals are observed, construction activities will be delayed until the mammal moves outside the impact site. In the highly unlikely event that a koala is observed in the disturbance footprint, clearing will be delayed until the koala moves outside the impact site.
Access	Movement within the Project Area will be via approved access tracks only with speed limits enforced.
	Night works within or adjacent to areas of MNES will be avoided where possible. Where night works are required, lights will be directed to minimise light spill into adjacent habitats.
Clearing and Construction	Clearing must occur only within the approved and delineated areas. The clearing footprint will remain adequately marked for the duration of the clearing activities.
	All vegetation clearing must comply with relevant EA and EPBC Act permit conditions and maximum disturbance limits (refer to Table 2).
	Clearing will be conducted in a sequential manner and in a way that directs escaping wildlife away from the clearing activities and into adjacent natural areas wherever practicable.

[1] Areas can be delineated spatially using GPS technology or physically using visual markers / tape.

Activity	Mitigation Measure
	Maximum clearance widths for linear and non-linear infrastructure will be in accordance with the EMP (Santos, 2025b) and relevant EA conditions.
	Where habitat trees need to be removed the following measures will be implemented: • habitat trees will be inspected by the Fauna Spotter / Catcher to determine occupancy. Where fauna is present, the Fauna Spotter / Catcher will encourage the fauna to leave by reasonable means or capture and relocate it in the local environment prior to felling and trimming; • habitat trees will be felled gently or lowered to the ground and trees will be left on the ground for a period of time adequate to give any fauna trapped in the trees an opportunity to escape before further processing of the trees. After this time the Fauna Spotter / Catcher will thoroughly check the tree to ensure there are no injured animals; and • displaced fauna will then be relocated to a suitable, previously identified recipient site provided the animal did not sustain any injuries. Any injured animals (native or introduced) will be taken to receive veterinary attention immediately. Once recovered, animals will be relocated to an area of similar habitat in proximity to the disturbance area.
	The period of time that trenches and other excavations are open will be minimised, and open voids will be backfilled as soon as practicable following completion of works. During construction, open trenches and other open voids will be regularly checked for potentially entrapped fauna.
	Open voids must also be fenced or covered wherever practicable to prevent access or harm to fauna and stock. Where this is not practicable, the focus should be on regularly checking open voids for entrapped fauna and installing measures such as escape routes to reduce risks to potentially entrapped fauna.
	Pipe string ends will be capped nightly to prevent fauna ingress.
	Prior to backfilling, trenches and voids will be checked for fauna and any found will be removed.
Water Management / Erosion Sediment Control	Preference would be given to the use of non-potable water supplies for washdown, dust suppression and construction activities where economically and practically feasible. Santos will only extract water from constructed wetlands and other farm dams for construction purposes with the permission from the landholder and when natural water supplies are abundant.
	Appropriate erosion and sediment controls will be installed and maintained in accordance with the EMP (Santos, 2025b) and relevant EA conditions.
	Construction activities in watercourses will be undertaken in accordance with the EMP (Santos, 2025b) and relevant EA conditions.
Dust Management	Dust suppression strategies will be implemented to mitigate adverse impacts associated with excessive dust deposition on threatened fauna habitat in accordance with the EMP (Santos, 2025b) and relevant EA conditions. Road watering will be undertaken in disturbed areas during construction and operational activities to suppress dust emissions. Vehicles will be limited to a reduced speed limit on unsealed roads and haulage routes to reduce dust impacts.
Pest and Weed Management	Pest and weed management strategies will be implemented in accordance with the EMP (Santos, 2025b) to minimise the introduction and / or spread of pest and weed species associated with construction activities.
	Vehicles and other equipment will be assessed to determine the necessary level of inspection, washdown and certification when travelling to or between locations within the Project Area.
	Valid weed hygiene certification maintained at all times for vehicles, plant, machinery and equipment (as per the requirements of the EMP (Santos, 2025b) and any relevant land access conditions).
	Putrescible waste storages will be covered to minimise pest animal access.
Hazardous Substances Management	Hazardous substances will be handled and stored within contained areas, designed and managed in accordance with relevant regulatory requirements and Australian standards.
	Residual drilling materials will be applied to the Project Area in accordance with the EMP (Santos, 2025b) and relevant EA conditions.

Activity	Mitigation Measure
	Permanent and / or mobile spill kits will be available on sites where required and in accordance with the EMP (Santos, 2025b).
	Fuel storage and refuelling stations will be located and operated in accordance with the EMP (ECP 10) (Santos, 2025b) and relevant regulatory requirements and Australian standards.
	Emergency response procedures will be implemented in the event of a large spill. Refer to ECP 11 (Environmental Emergency Preparedness and Response) in the EMP for further detail on emergency response requirements (Santos, 2025b).
Fire Management	Threat of bushfire caused by Santos activities will be managed in accordance with the requirements of the EMP (ECP 11 - Environmental Emergency Preparedness and Response) (Santos, 2025b).
	All personnel will receive emergency response awareness training as part of the site induction. This will include spill clean-up and fire extinguisher use.
	Smoking will only be allowed in designated smoking areas. Cigarette bins will be provided at designated smoking areas.
	Plant and equipment will be maintained to minimise the risk of presenting an ignition source. Hot works will be undertaken in accordance with the relevant Safe Work Method Statement (SWMS).
Operation	
Pest and Weed Management	Refer to measures listed under Pre-Construction and Construction above.
Emissions and Dust Management	Lighting disturbances will be reduced / minimised wherever practicable.
	To reduce noise and vibration, equipment will be maintained to be in good working order.
	Refer to measures listed under Pre-Construction and Construction above.
Fire Management	Refer to measures listed under Pre-Construction and Construction above.
Hazardous Substances Management	Refer to Pre-Construction and Construction measures above.
Access	Fencing of well sites and other operational areas will be implemented where required to prevent access by fauna and stock. Refer to Pre-Construction and Construction measures above.
Progressive Rehabilitation / Stabilisation	Areas disturbed by Project Activities, including those which represent potential significant species habitat, will be progressively rehabilitated in accordance with the requirements of the RMP (Santos, 2025c).
Rehabilitation	
Decommissioning and Abandonment	Decommissioning and abandonment of infrastructure will be undertaken in accordance with the requirements of the RMP (Santos, 2025c).
Rehabilitation / Stabilisation	Areas disturbed by Project Activities, including those which represent potential significant species habitat, will be progressively rehabilitated in accordance with the final rehabilitation acceptance criteria (FRC) detailed in the RMP (Santos, 2025c).

4.5. Disturbance tracking, reporting and review

4.5.1. Disturbance tracking

Santos will record disturbance using spatial systems and data (in the Santos GIS). Disturbance areas will be tracked against the maximum disturbance limits detailed in Table 2.

4.5.2. Regulatory reporting

Santos will comply with environmental reporting requirements imposed by the Queensland Government under the requirements of the EA, and any conditions imposed by a decision on the Project under the EPBC Act.

4.5.3. Review

This SSMP has been written to consider likely conditions of the new EA, however it will be revised or updated once the new EA is granted to ensure it complies with any additional conditions.

This SSMP will be revised or updated from time-to-time to align with regulatory requirements. Revised versions of the SSMP will be made available upon request to DCCEEW or as otherwise required under conditions of a regulatory approval, whether under the EPBC Act or any other applicable legislation.

5. Significant Species Profiles

5.1. Sharp-tailed sandpiper

Status

- Vulnerable / Migratory – listed under the EPBC Act

Biology and ecology

Characteristics

The sharp-tailed sandpiper (*Calidris acuminata*) is a small to medium wader. The bird has a length of 17 to 22 cm, a wingspan of 36 to 43 cm and a weight of 65 g. It is a portly sandpiper with a flat back, pot belly and somewhat drawn-out rear end. It has a small flat head on a short neck with a short and slightly decurved bill. The species has medium length legs. At rest, the primaries are level with or slightly short of the tip of the tail. The primary projection is short in adults and moderately long in juveniles. The sexes are similar and there is marked seasonal variation (Higgins & Davies, 1996).

Plate 1: Sharp-tailed sandpiper (Source: ALA, 2024a)

Known distribution

The sharp-tailed sandpiper spends the non-breeding season in Australia with small numbers occurring regularly in New Zealand. Most of the population migrates to Australia, mostly to the south-east and are widespread in both inland and coastal locations and in both freshwater and saline habitats. Many inland records are of birds on passage (Cramp, 1985; Higgins & Davies, 1996). In Queensland, they are recorded in most regions, being widespread along much of the coast and very sparsely scattered inland, particularly in central and south-western regions (Higgins & Davies, 1996).

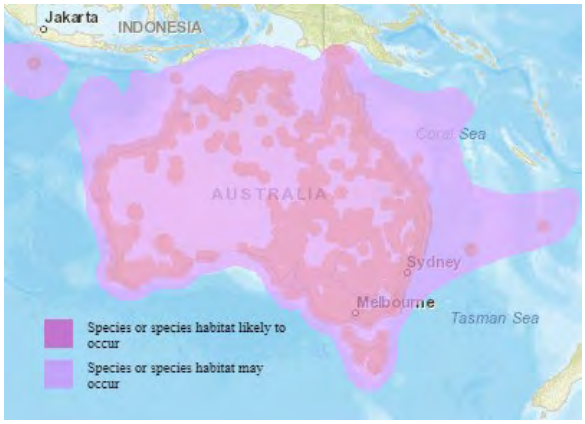

Figure 5: Mapped distribution of sharp-tailed sandpiper (Source: DCCEEW, 2024a)

Habitat description

In Australasia, the sharp-tailed sandpiper prefers muddy edges of shallow fresh or brackish wetlands, with inundated or emergent sedges, grass, saltmarsh or other low vegetation. This includes lagoons, swamps, lakes and pools near the coast, and dams, waterholes, soaks, bore drains and bore swamps, saltpans and hypersaline salt-lakes inland. They also occur in saltworks and sewage farms. They use flooded paddocks, sedgelands and other ephemeral wetlands, but leave when they dry. They use intertidal mudflats in sheltered bays, inlets, estuaries or seashores, and also swamps and creeks lined with mangroves. They tend to occupy coastal mudflats mainly after ephemeral terrestrial wetlands have dried out, moving back during the wet season. They may be attracted to mats of algae and water weed either floating or washed up around terrestrial wetlands, and coastal areas with much beach-cast seaweed. Sometimes they occur on rocky shores and rarely on exposed reefs (Higgins & Davies, 1996).

Biology and reproduction

The sharp-tailed sandpiper forages on seeds, worms, molluscs, crustaceans and insects (Higgins & Davies, 1996). It has also been recorded to eat *Paspalum* spp.; Clover (*Trifolium* spp.); *Medicago* sp., Lucerne (*Medicago sativa*); *Ruppia* spp.; Goosefoot (*Chenopodium* spp.) and Knotweed (*Polygonum* spp.) plant seeds (Higgins & Davies, 1996) and arachnids and dead fish (Barker & Vestjens, 1989; Higgins & Davies, 1996). They also ingest grit, sand and charcoal.

This species does not breed in Australia (DCCEEW, 2024a).

Likelihood of occurrence within the Project Area

This species has *potential* to occur within the Project Area.

5.2. Glossy black cockatoo (eastern)

Status

- Vulnerable – listed under the EPBC Act

Biology and ecology

Characteristics

Glossy black cockatoos (*Calyptorhynchus lathami lathami*) have a body length of around 48 cm and weight of 420 g. Plumage is mostly dull black, with a blackish-brown head, an inconspicuous crest and a broad bulbous bill. Adult males have bright red panels in the tail. Adult females have yellowish-red panels in the tail, and variable yellow patches on their heads. Juveniles are similar to adult females but with spotted pale-yellow patches on their heads, lower breast, belly and flanks, and barred undertail (DCCEEW, 2022b).

Plate 2: Glossy black cockatoo (Source: ALA, 2024h)

Known distribution

Glossy black cockatoos are uncommon but widespread. They can be found from Mitchell, Queensland, through eastern New South Wales to East Gippsland, Victoria. Their distribution is continuous through the forested parts of the Great Dividing Range but, becomes more scattered inland, to as far west as the Riverina in New South Wales (DCCEEW, 2022b).

Figure 6: Mapped distribution of glossy black cockatoo (Source: ALA, 2024b)

Habitat description

Glossy black cockatoos rely on nine species of sheoaks (*Allocasuarina* spp. and *Casuarina* spp.) for feeding, with species used varying depending on the region.

Biology and reproduction

Glossy black cockatoos are hollow nesters, utilising large hollows in both living and dead eucalypt trees (DCCEEW, 2022b). Peak breeding is between march and August. They have a clutch size of one, and females are entirely responsible for incubation and brooding. Males are present throughout the incubation and nestling period to feed the females. Fledging occurs after around three months (DCCEEW, 2022b) but these birds are still dependent on and fed by both parents for another three to four months after leaving the nest. The adolescent birds will start feeding themselves from around 6 months but may stay with the parents until the next breeding period.

Likelihood of occurrence within the Project Area

This species has *potential* to occur within the Project Area.

5.3. Latham's snipe

Status

- Vulnerable / Migratory – listed under the EPBC Act

Biology and ecology

Characteristics

Latham's snipe (*Gallinago hardwickii*) is a medium sized wader, and the largest snipe in Australia, with a length of 29 to 33 cm, a wingspan of 50 to 54 cm and a mass of 150 to 230 g. It has a long straight bill, rather short broad pointed wings, a long tail and short legs (Higgins & Davies, 1996). The cryptic plumage is intricately marked with barring and chevrons of buff, black and various shades of brown, with blackish-brown stripes across the crown and cream streaks down the back. The belly and parts of the head are white, and the tail is rufous with a white tip. The eyes are large and blackish-brown in colour (Higgins & Davies, 1996; Pizzey & Knight, 1997). The colour of

the bill varies from pale-brown to olive, becoming blackish at the distal third and olive-yellow at the base. The legs and feet are olive-grey to olive in colour. The sexes are similar in appearance, and there is no seasonal variation in the plumage. Juveniles in fresh plumage differ only slightly from adults, but can be distinguished by slight differences in the patterning on the upper wing. Adults and juveniles are indistinguishable after early November (Higgins & Davies, 1996).

Plate 3: Latham's snipe (Source: Birds in Backyards 2010)

Known distribution

Latham's snipe is a non-breeding visitor to south-eastern Australia, and is a passage migrant through northern Australia (i.e. it travels through northern Australia to reach non-breeding areas located further south) (Higgins & Davies, 1996). The species has been recorded along the east coast of Australia from Cape York Peninsula through to south-eastern South Australia (including the Adelaide plains and Mount Lofty Ranges, and the Eyre Peninsula). The range extends inland over the eastern tablelands in south-eastern Queensland (and occasionally from Rockhampton in the north), and to west of the Great Dividing Range in New South Wales (Barrett *et al*, 2003; Blakers *et al*, 1984).

The extent of occurrence is estimated to be 3,000,000 km^2 and the area of occupancy 3,000 km^2 (Garnett & Crowley, 2000).

The distribution of Latham's snipe is naturally fragmented (although, because of the mobility of the species, this is unlikely to have any effect on survival) (DCCEEW, 2024b). The size of the Latham's snipe population that visits Australia is estimated at 25,000 to 100,000 birds (DCCEEW, 2024b).

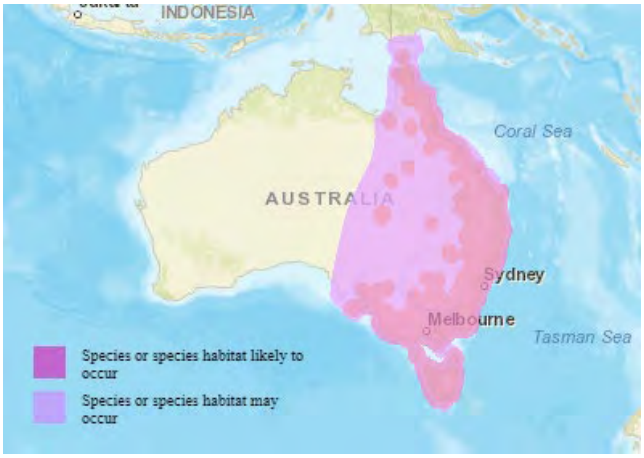

Figure 7: Mapped distribution of Latham's snipe (Source: ALA, 2024c)

Habitat description

Latham's snipe occurs in temperate and tropical regions of Australia (Driscoll, 1993). Its altitudinal range extends from sea-level (i.e. the coast) to approximately 2,000 m above sea-level (Driscoll, 1993). In Australia, Latham's snipe occurs in a wide variety of permanent and ephemeral wetlands (Naarding, 1982). It usually occurs in open, freshwater wetlands that have some form of shelter (usually low and dense vegetation) nearby (Frith *et al*, 1977; Naarding, 1982; ALA, 2024c). It generally occupies flooded meadows, seasonal or semi-permanent swamps, or open waters (Frith *et al,* 1977; Naarding, 1983), but various other freshwater habitats can be used including bogs, waterholes, billabongs, lagoons, lakes, creeks or river margins, river pools and floodplains (Frith *et al,* 1977; Naarding, 1981; 1983). The structure and composition of the vegetation that occurs around these wetlands is not important in determining the suitability of habitat (Naarding 1983). As such, snipe may be found in a variety of vegetation types or communities including tussock grasslands with rushes, reeds and sedges, coastal and alpine heathlands, lignum or tea-tree scrub, button-grass plains, alpine herbfields and open forest (Chapman, 1969; Frith 1970; Frith *et al,* 1977; Naarding, 1983).

Latham's snipe sometimes occurs in habitats that have saline or brackish water, such as saltmarsh, mangrove creeks, around bays and beaches, and at tidal rivers (Frith *et al,* 1977; Naarding, 1983; Patterson 1991). These habitats are most commonly used when the birds are on migration (Frith *et al,* 1977). They are regularly recorded in or around urban habitats including pasture, ploughed paddocks, irrigation channels and drainage ditches, rice fields, orchards, saltworks, and sewage and dairy farms (ALA, 2024c; Frith *et al,* 1977). They can also occur in various sites close to humans or human activity (e.g. near roads, railways, airfields, commercial or industrial complexes) (Frith *et al,* 1977; Naarding, 1983). The foraging habitats of Latham's snipe are characterised by areas of mud (either exposed or beneath a very shallow covering of water) and some form of cover (e.g. low, dense vegetation) (Frith *et al,* 1977; Todd, 2000). The snipe roosts on the ground near (or sometimes in) foraging areas, usually in sites that provide some degree of shelter, e.g. beside or under clumps of vegetation, among dense tea-tree, in forests, in drainage ditches or plough marks, among boulders, or in shallow water if cover is unavailable (Frith *et al,* 1977; Naarding, 1982; 1983). Latham's snipe could potentially occur in Bluegrass (*Dichanthium*) dominant grasslands of the Brigalow Belt Bioregions (North and South) if this community is subject to flooding (ALA, 2024c).

Biology and reproduction

Latham's snipe is an omnivorous species that feeds on seeds and other plant material (mainly from species in families such as Cyperaceae, Poaceae, Juncaceae, Polygonaceae, Ranunculaceae and Fabaceae), and on invertebrates including insects (mainly flies and beetles), earthworms and spiders and occasionally molluscs, isopods and centipedes (Frith *et al,* 1977; Todd, 2000). Latham’s snipe are non-breeding migrants in Australia. Breeding takes place in Japan and Eastern Russia (ALA, 2024c).

Likelihood of occurrence within the Project Area

This species has *potential* to occur within the Project Area.

5.4. White-throated needletail

Status

- Vulnerable / Migratory– listed under the EPBC Act

Biology and ecology

Characteristics

The white-throated needletail (*Hirundapus caudacutus*) has long curved wings and white markings. Plumage is predominantly grey-brown, glossed with green and the wings are long and pointed. The tail is short and square, with the protruding feather shafts giving a spiky appearance. The throat and undertail are white (Birds in Backyards, 2006).

Plate 4: White-throated needletail (Source: Bridger 2010)

Known distribution

The white-throated needletail is usually a summer migrant to Australia and is widespread in eastern Queensland. Migration usually occurs from the breeding grounds of the Northern Hemisphere (Pizzey & Knight, 1997).

Figure 8: Mapped distribution of white-throated needletail (Source: DCCEEW, 2019a)

Habitat description

This species is regularly observed flying over forests, woodlands, pastoral areas, floodplains, lakes and coastlines (Pizzey & Knight, 2007). Indicative habitat also includes near margins of wetlands and human settlements.

This species occurs over most types of habitat, as described above and may also fly between trees or in clearings, below the canopy, but are less commonly recorded flying above woodland (DCCEEW, 2019a). Essential microhabitat is defined as forests, woodlands, lakes, coastlines and active nesting sites.

Biology and reproduction

During the non-breeding season in Australia, the White-throated needletail has been recorded eating a wide variety of insects, including beetles, cicadas, flying ants, bees, wasps, flies, termites, moths, locusts and grasshoppers (DCCEEW, 2019a).

White-throated needletails are non-breeding migrants in Australia. Breeding takes place in northern Asia.

Likelihood of occurrence within the Project Area

This species is *likely* to occur within the Project Area.

5.5. Australian painted snipe

Status

- Endangered – listed under the EPBC Act

Biology and ecology

Characteristics

The Australian painted snipe (*Rostratula australis*) is a stocky wading bird around 220 to 250 mm in length with a long pinkish bill. The adult female is slightly larger and more brightly coloured than the male. Females have a chestnut-coloured head, with white around the eye and a white crown stripe, and metallic green back and wings, barred with black and chestnut. There is a pale stripe extending from the shoulder into a 'V' down its upper back (DCCEEW, 2022a).

This species is generally seen singly or in pairs, or less often in small flocks (Marchant & Higgins, 1993). Flocking occurs during the breeding season, when adults sometimes form loose gatherings around a group of nests. Flocks can also form after the breeding season, and at some locations small groups regularly occur (DCCEEW, 2022a).

Plate 5: Australian painted snipe (Source: BirdLife Australia, 2024)

Known distribution

The Australian painted snipe has been recorded at wetlands in all states of Australia (Barrett *et al,* 2003; Blakers *et al,* 1984; Hall,1910b). It is most common in eastern Australia, where it has been recorded at scattered locations throughout much of Queensland, New South Wales, Victoria and south-eastern South Australia (DCCEEW, 2022a).

The extent of occurrence of the Australian painted snipe is estimated, with low reliability, to be 4,500,000 km² (Garnett & Crowley, 2000).

The total population size of the Australian painted snipe is effectively unknown, but tentative estimates range from a few hundred individuals to 5,000 breeding adults (Garnett & Crowley, 2000; Lane & Rogers, 2000; Oring *et al,* 2004).

The Australian painted snipe is considered to occur in a single, contiguous breeding population (Garnett & Crowley, 2000).

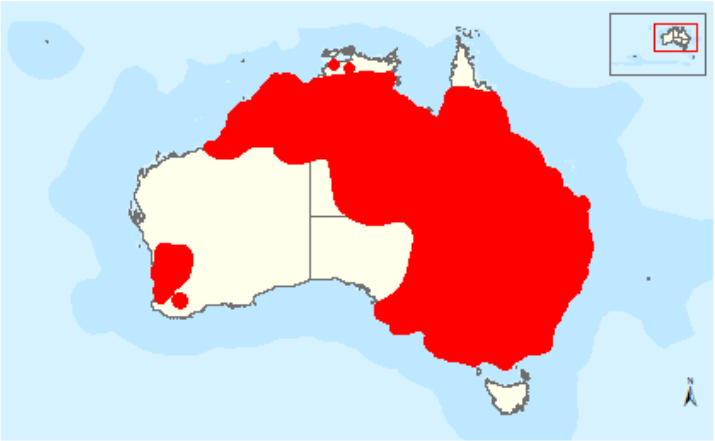

Figure 9: Mapped distribution of Australian painted snipe (Source: DCCEEW, 2022a)

Habitat description

The Australian painted snipe generally inhabits shallow terrestrial freshwater (occasionally brackish) wetlands, including temporary and permanent lakes, swamps and claypans. They also use inundated or waterlogged grassland or saltmarsh, dams, rice crops, sewage farms and bore drains. Typical sites include those with rank emergent tussocks of grass, sedges, rushes or reeds, or samphire; often with scattered clumps of lignum *Muehlenbeckia* or canegrass or sometimes tea-tree (*Melaleuca*) (DCCEEW, 2022a). The Australian painted snipe sometimes utilises wetland areas that are lined with trees, or that have some scattered fallen or washed-up timber (Marchant & Higgins, 1993).

This species requires suitable wetland areas even in drought conditions. The species can move to suitable habitat if necessary (Marchant & Higgins, 1993).

Biology and reproduction

The Australian painted snipe may breed in response to wetland conditions rather than during a particular season. It has been recorded breeding in all months in Australia. In southern Australia most records have been from August to February. Eggs have been recorded from mid-August to March, with breeding in northern Queensland also recorded between May and October (Marchant & Higgins, 1993).

Australian painted snipe breeding habitat requires shallow wetlands with areas of bare wet mud and both upper and canopy cover nearby, nests usually occur on or near small islands in freshwater habitats (DCCEEW, 2022a).

The Australian painted snipe loafs on the ground under clumps of lignum, tea-tree and similar dense bushes (Marchant & Higgins, 1993).

In some situations, this species is loosely colonial, although nests are widely separated (Lowe, 1963). The Australian painted snipe often breeds near nesting red-necked avocets (*Recurvirostra novaehollandiae*), banded

stilts (*Cladorhynchus leucocephalus*), red-kneed dotterels (*Erythrogonys cinctus*) and black-tailed native-hens (*Gallinula ventralis*) (Lowe, 1963).

The Australian painted snipe has been recorded nesting in and near swamps, canegrass swamps, flooded areas including samphire, grazing land, among cumbungi, sedges, grasses, salt water couch (*Paspalum*), saltbush (*Halosarcia*) and grass, also in ground cover of waterbuttons and grasses, at the base of tussocks and under low saltbush (Marchant & Higgins, 1993).

The nest is usually placed in a scrape in the ground (Pringle 1987), and either has scant lining or is a shallow bowl-shaped nest of dry grass or other plant material (Marchant & Higgins, 1993). The Australian painted snipe can also use modified habitats, such as low-lying woodlands converted to grazing pasture, sewage farms, dams, bores and irrigation schemes (Marchant & Higgins, 1993).

The Australian painted snipe are known to lay two to six (usually three or four) eggs and females may lay up to four clutches in a year. Incubation takes 15 to 21 days (DCCEEW, 2022a).

The female Australian painted snipe mostly breed every two years (del Hoyo *et al,* 1996; Marchant & Higgins, 1993).

Likelihood of occurrence within the Project Area

This species has *potential* to occur within the Project Area.

5.6. Fork-tailed swift

Status

- Migratory – listed under the EPBC Act

Biology and ecology

Characteristics

The fork-tailed swift (*Apus pacificus*) is a medium-sized Swift with a length of 18 to 21 cm, a wingspan of 40 to 42 cm and weight of around 30 to 40 g. The body is slim, with long scythe-shaped wings that taper to finely pointed tips. It is characterised by a long and deeply forked tail. The species is mainly blackish with a white band across the rump and a white patch on the chin and throat. Both adult and juvenile sexes are indistinguishable in the field (DCCEEW, 2024c).

Plate 6: Fork-tailed swift (Source: eBird, 2024)

Known distribution

This species occurs throughout the majority of Australian except for south-eastern Western Australian and western South Australia. Within Queensland this species is normally found in higher abundance west of the Great

Dividing Range, while east of the range records are more scattered. There is limited information on the population size (DCCEEW, 2019b).

Figure 10: Mapped distribution of the Fork-tailed swift (Source: DCCEEW, 2024c)

Habitat description

This species is usually observed flying over open country (from semi-arid to coastal zones and islands), however occasionally observed flying over forests and cities (Pizzey & Knight, 2007). In Australia, they are observed over many habitat types including cliffs, beaches, islands and urban areas. They mostly occur over dry or open habitats, including riparian woodland and tea-tree swamps, low scrub, heathland or saltmarsh. They are also found at treeless grassland and sandplains covered with spinifex, open farmland and inland and coastal sand-dunes. The species sometimes occurs above rainforests, wet sclerophyll forest or open forest or plantations of pines (Higgins 1999).

Biology and reproduction

This species is highly mobile, flying anywhere between 1 and 300 m above the ground. The species forages for insects along the leading edge of low-pressure gradients, generally in flocks (10 to 1,000). The fork-tailed swift is a non-breeding migrant to Australia usually in the summer (October to April) (DCCEEW, 2019b; Pizzey & Knight, 2007).

Likelihood of occurrence within the Project Area

This species is *likely* to occur within the Project Area.

5.7. Common sandpiper

Status

- Migratory – listed under the EPBC Act

Biology and ecology

Characteristics

The common sandpiper (*Actitis hypoleucos*) is a small shorebird. Individual birds are 19-21 cm in length with a wingspan of 32-35 cm. It is grey-brown above and white below. It has an indistinct white supercilium (eyebrow) and white eye-ring. The bill is dark grey with yellow at the base and the legs vary from greyish-olive to a yellowish-brown (Geering, Agnew, & Harding, 2007; BirdLife Australia, 2024).

Plate 7: Common sandpiper (Source: National Geographic, n.d.)

Known distribution

In Australia, the common sandpiper is found along all coastlines and in many areas inland. The species is widespread in low numbers. The Australian population is concentrated in northern and western Australia (Cork, 2024).

Figure 11: Mapped distribution of common sandpiper (Source: Birdlife International)

Habitat description

The common sandpiper is known to occur in a range of wetland environments, both coastal and inland. The species is most abundant in mangrove inlets but is found on narrow muddy margins or rocky shores. It has also been recorded in estuaries and deltas of streams, on banks farther upstream; around lakes, pools, billabongs, reservoirs, dams and claypans, and occasionally piers and jetties (Cork, 2024; Geering, Agnew, & Harding, 2007).

Biology and reproduction

Common sandpiper is typically carnivorous, feeding on molluscs such as bivalves, crustaceans such as amphipods and crabs and a variety of insects including crickets, antlions, rove beetles and kelp flies (DAWE, 2020). The species is usually solitary or occurs in very small flocks. It is often observed flying from one site to another in search of food. It is busy when feeding, sometimes dashing after prey or continuously pecking small items from the surface, climbing nimbly over mangrove roots and other obstacles (Geering, Agnew, & Harding, 2007).

Common sandpiper breeds in the vicinity of water in a variety of habitats in parts of Europe and Asia, and occasionally Africa. Incubation takes approximately 21–22 days, and chicks fledge in 26–28 days. The population that migrates to Australia breeds in the Russian far east. The Australian population during the non-breeding period is estimated to be approximately 3000 (Geering, Agnew, & Harding, 2007).

Likelihood of occurrence within the Project Area

This species has *potential* to occur within the Project Area.

5.8. Pectoral sandpiper

Status

- Migratory – listed under the EPBC Act

Biology and ecology

Characteristics

The pectoral sandpiper (*Calidris melanotos*) is a small to medium-sized shorebird with a longish neck, short legs and medium-length bill that is slightly decurved at the tip. At rest the flight feathers are level with, just short of, or slightly longer than the tip of the tail. The species has a length of 19-24 cm with a wingspan of 37-45 cm and a weight of 85 g for males and 60 g for females (Geering, Agnew, & Harding, 2007; DAWE, 2020). The species is usually solitary but can be found in small flocks of 2-5 birds (Geering, Agnew, & Harding, 2007).

Plate 8: Pectoral sandpiper (Source: Paul Jones, 2020)

Known distribution

Pectoral sandpiper is a regular, uncommon summer migrant to Australia. In Queensland, most records for the pectoral sandpiper occur around Cairns. Scattered records also occur east of the Great Divide between Townsville and Yeppoon, in the south-east of the state as well as a few inland records at Mount Isa, Longreach and Oakley (DCCEEW, 2015).

Figure 12: Mapped distribution of pectoral sandpiper (source: ALA, 2024)

Habitat description

This species is usually found in coastal or near coastal habitat but very occasionally found further inland. It prefers shallow fresh waters, often with low grass or other herbage such as samphire. It also occurs in swamp margins, flooded pastures, sewage ponds, and occasionally tidal areas and saltmarshes (Pizzey & Knight, 1997).

Biology and reproduction

The pectoral sandpiper is omnivorous, consuming algae, seeds, crustaceans, arachnids and insects. While feeding, they move slowly, probing with rapid strokes. Food is found by sight or by probing. They walk slowly on grass fringing water (Higgins & Davies, 1996).

Pectoral sandpiper breeds on dry fringes of well-vegetated wetlands in the high arctic tundra of North America and eastern Siberia. Most birds migrate to South America, but some travel to Japan, Pacific Islands, Papua New Guinea, Australia and New Zealand (Geering, Agnew, & Harding, 2007; Pizzey & Knight, 1997).

Likelihood of occurrence within the Project Area

This species has *potential* to occur in the Project Area.

5.9. Koala

Status

- Endangered – listed under the EPBC Act

Biology and ecology

Characteristics

The koala (*Phascolarctos cinereus*) is an arboreal, herbivorous marsupial and is mostly nocturnal. However, unlike other arboreal mammals the koala does not have a tail. They have a large round head, large round furry ears, a stout body, short legs and large feet. Both front and hind paws have long sharp claws. The koala ranges between 67 to 74 cm in males and 64 to 73 cm in females. A male koala on average weighs 6.5 kg, while a female koala on average weighs 5.1 kg (Australian Koala Foundation, 2020; Menkhorst & Knight, 2004).

Plate 9: Koala (Source: Monkhouse 2005)

Known distribution

In Queensland, the koala's distribution extends inland from the east coast: from the Wet Tropics interim biogeographic regionalisation of Australia (IBRA) bioregion, into the Einasleigh Uplands bioregion in the north of the state; from the Central Mackay Coast bioregion, through the Brigalow Belt North bioregion to the Desert

Uplands and Mitchell Grass Downs bioregions, and from the Southeast Queensland bioregion, through the Brigalow Belt to the Mulga Lands and Channel Country bioregions in the south-west of the state. The highest density of the koala population occurs in south-east Queensland. Lower densities occur through central and eastern areas (Patterson, 1996).

Figure 13: Mapped distribution of koala (Source: DCCEEW 2024c)

Habitat description

Koalas naturally inhabit a range of temperate, sub-tropical and tropical forest, woodland and semi-arid communities dominated by *Eucalyptus* species (Martin & Handasyde, 1999).

Koala habitat can be broadly defined as any forest or woodland containing species that are known koala food trees, or shrubland with emergent food trees. The distribution of this habitat is largely influenced by land elevation, annual temperature and rainfall patterns, soil types and the resultant soil moisture availability and fertility. Preferred food and shelter trees are naturally abundant on fertile clay soils.

Along the Great Dividing Range and the coastal belt throughout the species' range, koalas inhabit moist forests and woodlands mostly dominated by *Eucalyptus* species. In coastal lowlands in Queensland and New South Wales, koalas are also found in vegetation communities dominated by *Melaleuca* or *Casuarina* species that also contain sub-dominant eucalypts. On the western slopes, tablelands and plains in Queensland and New South Wales, koalas are found in sub-humid *Eucalyptus*-dominated forests and woodlands in riparian and non-riparian environments, and some Acacia-dominated forests and woodlands in non-riparian environments (Melzer *et al,* 2000). In the dry, subtropical to semi-arid environments in the western parts of the species' range, koalas inhabit *Eucalyptus*-dominated forests and woodlands, particularly in the vicinity of riparian environments, and *Acacia*-dominated forests, woodlands and shrublands (Melzer *et al,* 2000).

Koalas are also known to occur in modified or regenerating native vegetation communities, as well as urban and rural landscapes where food trees or shelter trees may be highly scattered. There is a growing body of evidence that identifies the importance of shelter (non-food) trees to koalas. Crowther and colleagues (2013) expand on this and suggest that shelter trees are equally important as food trees and should be weighted as such when assessing habitat suitability. Shelter trees play an essential role in thermoregulation and are likely to be selected based on height, canopy cover and elevation (i.e. trees occurring in shaded gullies are preferable) (Crowther *et al,* 2013). The difficulty with shelter trees is that, unlike food trees, there is no identified sub-set of forest and woodland trees known to be shelter trees. The use of a particular tree species, or individual trees within a species is highly contextual and variable (Crowther *et al,* 2013) probably relating to microclimate rather than species composition.

Biology and reproduction

Female koalas can potentially produce one offspring each year with births occurring between October and May. The newly born koala lives in its mother's pouch for six to eight months and, after leaving the pouch, remains

dependent on the mother, riding on her back. Young koalas are independent from about 12 months of age (DCCEEW, 2024).

The koala is a leaf-eating specialist that feeds primarily during dawn, dusk or night (Crowther *et al,* 2013). Its diet is restricted mainly to foliage of *Eucalyptus* spp.; however, it may also consume foliage of related genera, including *Corymbia* spp., *Angophora* spp. and *Lophostemon* spp. The koala may, at times, supplement its diet with other species, including *Leptospermum* spp. and *Melaleuca* spp. (Martin & Handasyde, 1999; Moore & Foley, 2000).

Likelihood of occurrence within the Project Area

This species has *potential* to occur within the Project Area, but only as an occasional transient.

5.10. Yakka skink

Status

- Vulnerable – listed under the EPBC Act

Biology and ecology

Characteristics

The yakka skink (*Egernia rugosa*) is a large, robustly built skink with a notably thick tail and grows to a total length of about 40 cm with short legs and claws. A broad, dark brown to black stripe extends along the back from the nape to the tail. Individual scales within this stripe can be variegated with dark and medium brown. This dark stripe is bordered on either side by a narrow, pale fawn stripe. The upper lips are whitish to reddish brown, contrasting with darker adjacent scales. The belly and ventral surfaces are cream to yellowish orange and the throat often with blackish flecks. Scales are in 26 to 30 rows at mid-body (Cogger, 2000; DEHP, 2012; Richardson, 2006).

Plate 10: Yakka skink (Source: ALA, 2024n)

Known distribution

Important yakka skink populations occur wherever colonies are identified, or are within 5 km of known records of the species. Any contiguous patch of vegetation which is suitable for the long-term persistence of a population, or for maintaining genetic diversity across the landscape, is considered important habitat for the species (Brigalow Belt Reptiles Workshop, 2010).

The distribution of the yakka skink is highly fragmented and spans from the coast to the hinterland of sub-humid to semi-arid eastern Queensland. Included in this range are sections of the Brigalow Belt (North and South), Mulga Lands, South-east Queensland, Einasleigh Uplands, Wet tropics and Cape York Peninsula Biogeographical Regions (DCCEEW, 2024d).

This species is known from Fairview and Arcadia gas fields and has been recorded from Arcadia Valley, Lonesome Holding and Mt. Hutton (DEHP, 2012c). The yakka skink is also known from remnant vegetation communities which are contiguous with the communities within the gas fields, including Expedition National Park (URS, 2009), unprotected lands near the Dawson Highway and Leichardt Highway junction, a number of unprotected areas in Arcadia Valley and also from the Burnett Highway to the north of Biloela (Richardson, 2006).

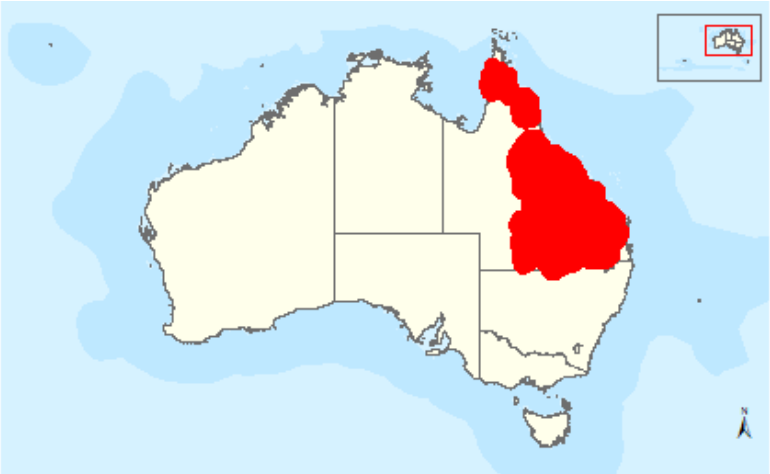

Figure 14: Mapped distribution of yakka skink (Source: DCCEEW, 2024d)

Habitat description

Yakka skink habitat is amongst dense ground vegetation, fallen timber or rock outcrops in open dry sclerophyll forest (ironbark) or woodland, forest, open shrub land, and lancewood forest on coarse gritty soils in the vicinity of low ranges, foothills and undulating terrain with good drainage (Cogger 2000; DEHP 2012; Richardson, 2006).

Important microhabitats for this species include rocky outcrops, hollow logs, animal burrows and ground cover (including perennial grass clumps, leaf litter, rocks, fallen timber etc) (Richardson, 2006).

Colonies have been found in large hollow logs, cavities or burrows under large fallen trees, tree stumps, logs, stick-raked piles, large rocks and rock piles, dense ground-covering vegetation, and deeply eroded gullies, tunnels and sinkholes. However, the species is not generally found in trees or exposed rocky habitats (DCCEEW, 2024d).

This species can occur in forests dominated by *Eucalyptus, Acacia and Callitris spp.* (DCCEEW, 2024d).

Biology and reproduction

The yakka skink is a gregarious terrestrial species which is active during the morning, and from dusk through the early evening. The colony / group consists of both adults and juveniles and a wide variety of body sizes (Curtis *et al,* 2012; DCCEEW, 2024d).

The species is omnivorous feeding on plant material (including fruits) and a wide variety of invertebrates (e.g. beetles, grasshoppers and spiders). The species also uses a common defecation site and is known to retreat quickly to shelter (Curtis *et al,* 2012; DCCEEW, 2024d).

The species shows high site-fidelity and limited capacity to disperse from a colony site (DCCEEW, 2024d), although dispersal was recorded for older subadult lizards (Peck et al. 2017).

The yakka skink produces live young and rarely bears more than six per litter. The breeding season for this poorly known species has been recorded as January / February (Peck *et al*. 2017).

Likelihood of occurrence within the Project Area

This species has *potential* to occur within the Project Area.

5.11. Grey snake

Status

- Endangered – listed under the EPBC Act

Biology and ecology

Characteristics

The grey snake (*Hemiaspis damelii*) is a relatively small, venomous, front-fanged (proteroglyphous) snake that can be confused with several other similar-looking elapid species (e.g., juvenile eastern brown snake (*Pseudonaja textilis*), curl snake (*Suta suta*), Dwyer's snake (*Suta dwyeri*) and Carpentaria snake (*Cryptophis boshmai*)). The body colour is a uniform pale or dark grey to olive grey with the top of the head and a few scale rows on the nape being black in juveniles, and more of a crescent or absent in adults. Belly colour is white, cream or pale yellow, often with darker flecks, and the skin between the scales is black. The eyes are large relative to other small snakes that share a similar habitat (DCCEEW, 2022c).

Plate 11: Grey snake (Source: DCCEEW, 2022c)

Known distribution

In Queensland, most records for the species are located along the Macintyre and Condamine Rivers and associated floodplains of the southern Brigalow Belt from Goondiwindi and Dalby west to Glenmorgan; the Darling Downs and western Lockyer Valley near Rockhampton on the central Queensland coast; and on the Darling Riverine Plains near Currawinya in south-western Queensland.

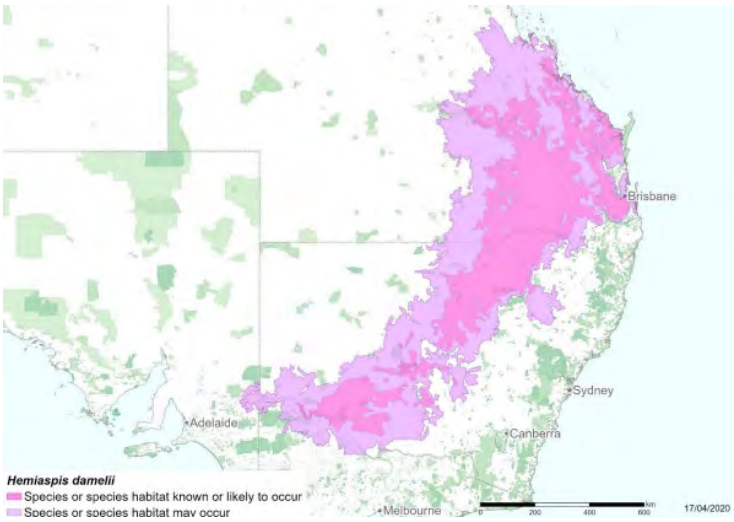

Figure 15: Mapped distribution of grey snake (Source: DCCEEW, 2022c)

Habitat description

In Queensland, grey snake habitat is Brigalow (*Acacia harpophylla*) and Belah (*Casuarina cristata*) woodlands on heavy, dark brown to black cracking clay soils, particularly in association with water bodies, areas with small

gullies and ditches, and floodplain environments where the species shelters beneath logs, rocks and soil cracks. Habitat in Queensland also includes Queensland bluegrass (*Dichanthium sericeum*) and / or Mitchell grass (*Astrebla spp.*) grassland on alluvial plains with cracking clay soils.

Grey snake occurrence on the western downs of Queensland has a strong positive association with red sodosol soils which have a strong texture contrast between the A horizon and sodic B horizon, and which are often quite dense and coarsely structured (blocky, prismatic or columnar peds) favouring the crack-inhabiting and foraging ecology of this species (DCCEEW, 2022c).

Biology and reproduction

The grey snake is live bearing (viviparous) and gives birth to 4-16 young between January and March. Juvenile snakes are approximately 140 mm in length, males mature at around seven months of age and females mature at 12 months (DCCEEW, 2022c).

Likelihood of occurrence within the Project Area

This species has *potential* to occur within the Project Area.

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Appendix 4:

Santos Roma Phase 7-7B-SD20 Development - Response to Information Request – Air Quality

Virid Ardent AU

Roma Phase 7-7B-SD20 Development (ATP 2053)

Response to Information Request – Air Quality

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1 Introduction

Santos Ventures Pty. Ltd. (Santos), on behalf of its joint venture partners, proposes to develop petroleum production operations on proposed Petroleum Lease (PL) 1123 as a part of the Roma Phase 7-7B-SD20 development project ('the project'). The visual extent of the project area, as provided by Santos, is presented in **Figure 1.** The project area is located approximately 5 km east of the township of Wallumbilla in central-eastern Queensland.

The project will involve the progressive construction, operation, decommissioning and rehabilitation of up to 24 Coal Seam gas (CSG) wells and associated infrastructure located in PL 1123.

PL 1123 will replace all existing blocks of Authority to Prospect (ATP) 2053, which is an existing exploration tenure operated by Santos.

Petroleum exploration undertaken by Santos within the project area to date has included the drilling and completion of five (5) CSG appraisal wells and associated infrastructure under the existing EA0002052 during 2022-2024. These five (5) appraisal wells also form part of the proposed 24-well development.

Project development is planned to commence following regulatory approval and will be phased to optimise gas production. The project will involve continuous operation of the wells, with an expected operational life of 30–50 years. Progressive decommissioning and rehabilitation of activities and infrastructure will occur throughout the life of the project, reducing disturbance during operations, until final decommissioning and rehabilitation at the end of the project life.

An Environmental Authority (EA) application was lodged with the Queensland Department of Environment, Tourism, Science and Innovation (DETSI) to support the proposed development of PL 1123.

Following its review of the application, the Department issued an Information Request (IR) on 02 April 2026 seeking additional information to further assess the potential environmental impacts from the project.

Amongst other environmental matters, the IR requested additional information relating to potential air quality impacts associated with construction and operational activities undertaken on the project site.

Virid ArdentAU (VAAU) have been engaged by Santos to address the air quality matters raised in the Department's IR. This report has been prepared to respond to those comments and address air quality impacts associated with the project.

The air quality information requested by DETSI, together with the corresponding sections of this report that addresses each requirement, are summarised in **Table 1.**

As noted above, the proposed development relates to the conversion of ATP 2053 to PL 1123. Accordingly, the terms ATP 2053 and PL 1123 are used interchangeably throughout the report, unless

otherwise stated. Similarly, the words 'project' and 'proposed development' are used interchangeably throughout the report.

Table 1: Information request from DETSI corresponding to air quality

DETSI Information Request	Sections of the Report Addressing the Requirements
Air The application material identifies that the proposal will likely result in air emissions relating to fuel combustion, flaring, venting, fugitive emissions and dust emissions during construction. The impact of these air emissions on nearby sensitive receptors has not been quantified or modelled. It needs to be demonstrated that the proposed activity can be carried out in a manner that protects the environmental values of air.	This report addresses the potential air quality impacts associated with the construction and operational phases of the proposed development qualitatively. This report includes a discussion of the nature, extent and magnitude of the identified air emission sources, together with the rationale for adopting a qualitative approach having regard to the nature of the proposed activities, expected air emission sources and the characteristics of the receiving environment.
Information requested Utilising *the Application requirements for petroleum activities*[1] and *Application requirements for activities with impacts to air*[2] and/or other prescribed guidelines or standards, develop an air impact assessment and management report that at minimum provides:	
• All sensitive places that may be adversely affected by the release of contaminants must be identified,	
• The report should also provide details of contaminant concentrations and mass loads likely to be released to the atmosphere from venting and flaring, and discuss any impacts from these processes on sensitive receptors,	
• Quantifies worst-case ground level concentrations for expected contaminants; and	
• Demonstrates how EPP Air and NEPM Air objectives are achieved.	

[1] *Guideline – Application requirements for petroleum activities, Department of Environment, Tourism, Science and Innovation, Version 4.01, June 2024*

[2] *Guideline – Application requirements for activities with impacts to air, Department of Environment, Tourism, Science and Innovation, Version 5.05, November 2025*

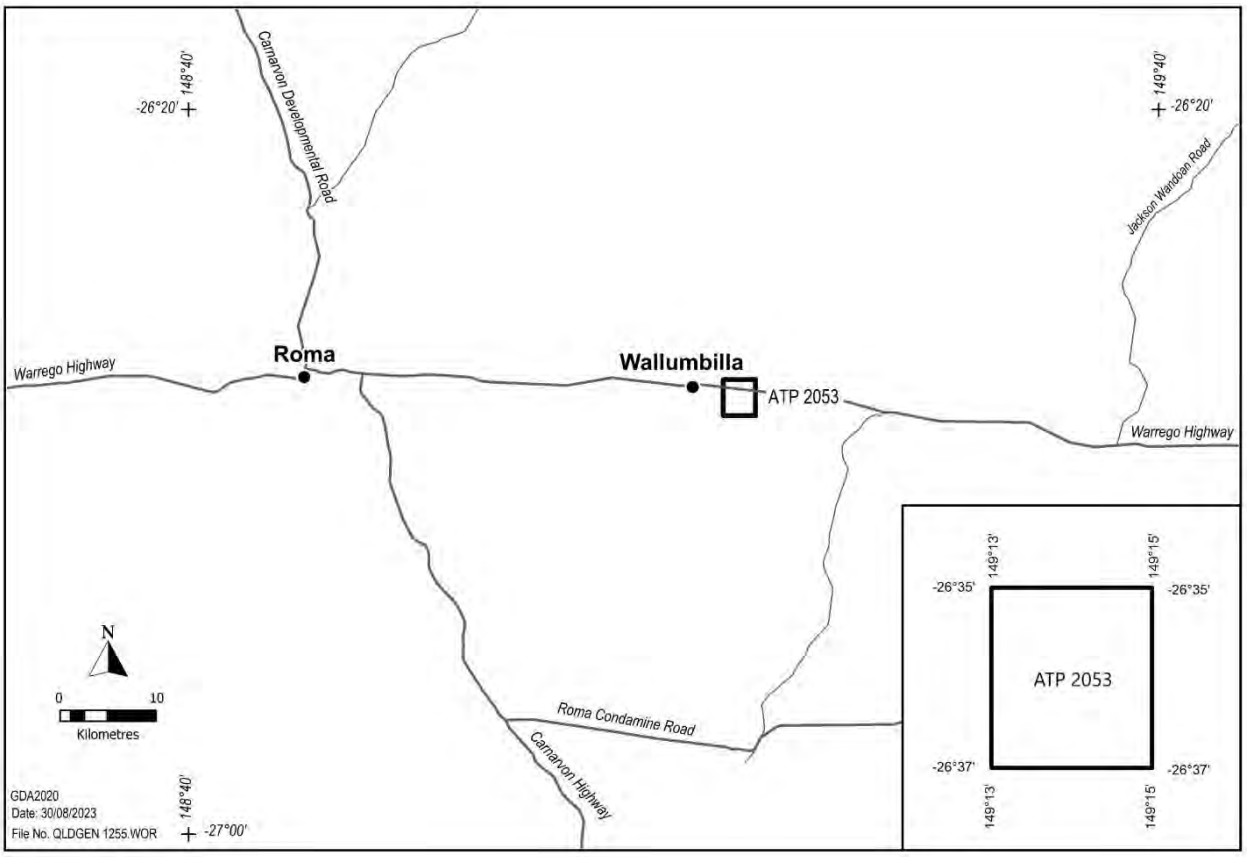


Figure 1: Visual extent and location of the project area (ATP 2053)

Source: Santos Limited

2 Project Description

This section provides an overview of the proposed PL 1123 development, including the key construction and operational activities relevant to assessment of air quality impacts.

Information pertaining to the proposed development has been referenced from *Santos' Supporting Information Report – Site-Specific Environmental Authority Application Petroleum Lease 1123 – Attachment 2* ('the supporting information report').

The project area is located approximately 5 km east of the township of Wallumbilla in central-eastern Queensland within the Maranoa Regional Council Local Government Area (LGA) (**Figure 2**).

The proposed development comprises the construction and operation of up to 24 CSG wells, including the existing five(5) appraisal wells constructed between 2022-2024 under the existing EA 0002052.

Development of the wells will be undertaken in a phased manner to optimise gas production and to meet Santos' gas supply obligations and market opportunities. Construction of the proposed wellfield is expected to be completed in Year 1 with operations commencing from Year 2.

Details of the construction and operational activities associated with the project is provided in the following sections.

2.1 Construction Phase Activities

Construction activities associated with the proposed development have been referenced from the supporting information report, including the detailed description of proposed activities presented in Appendix B of the supporting information report.

The proposed construction activities will be undertaken progressively and are expected to complete during the first year of the project, prior to commencement of routine production activities.

Principal construction activities associated with the proposed development are discussed below.

1. Vegetation clearing: Approximately 62 hectares (ha), representing around 5% of the total project area (1,229 ha), is proposed to be disturbed for the establishment of well pads. The majority of this disturbance area is located within previously disturbed land associated with historical agricultural activities, thereby minimising the extent of vegetation clearing required. Furthermore, to minimise the disturbance area, some well leases will host multiple wells, and infrastructure will be placed along existing access tracks and fence lines where practicable. These measures will minimise the requirement for additional land clearing and associated potential emissions generated from vegetation removal and ground disturbance.
2. Well leases / well pads: Establishment of well pads will involve preparation of the well lease area to accommodate drilling, operation, maintenance and associated support infrastructure. Where vegetation clearing cannot be avoided, vegetation will be removed,

followed by topsoil stripping, excavation, cut and fill activities, levelling, capping and compaction of the well pad surface. Additional construction activities will include installation of fencing, establishment of hardstand areas, and mobilisation and setup of drilling rigs and associated equipment.

All CSG wells will be constructed within prepared well lease areas, which are designed to accommodate the required drilling and operational infrastructure while minimising the overall disturbance footprint. Individual well pads are expected to range between approximately 1.25 ha and 1.5 ha in size, depending on site-specific requirements such as additional infrastructure, water balance tanks and cut-and-fill requirements. Where practicable, multiple wells will be located within a single well lease area to optimise land use, maximise gas recovery and reduce the number of disturbance areas required. Multi-well lease areas may be up to approximately 2.5–3 ha in size but will reduce the overall disturbance footprint compared with establishing separate leases for each well.

Where practicable, minimum disturbance well lease construction methods will be adopted to further reduce the extent of ground disturbance. These methods involve placement of temporary matting directly over slashed vegetation to create a temporary hardstand surface, thereby avoiding full vegetation clearing and reducing the potential for emissions associated with vegetation removal and earthworks.

3. Well construction: The project will involve construction of 24 wells. Well construction activities are expected to involve the use of drilling rigs, gas generators, chemical and fuel storage, drilling fluids, flare and flare sump for disposal of gas during drilling and appraisal and water storage.

   Drilling activities are expected to occur continuously on a 24-hour basis for approximately 1 to 3 weeks per well, depending on factors such as well depth, geological conditions and the type of drilling rig utilised. Drilling fluids are continuously circulated down the drill pipe to lubricate and cool the drill bit and remove drill cuttings from the bore.

   Through multiple cycles of drilling, installing casing and cementing casing, the well is isolated from surrounding formations. The well casing within the coal seam is perforated to allow material from the coal seam to enter the well and go to surface. The wellhead is installed and completed with a pump and surface facilities. Hydraulic fracture stimulation will be undertaken to complete the wells.

4. Water and gas gathering lines, trunklines and pipelines: Construction of the gathering network, trunklines and pipelines will be required to connect wells and transport water and gas. These linear infrastructure components typically require a right-of-way approximately 20–35 m wide. Gathering lines may also include associated infrastructure such as low point drains (LPDs) and high point vents (HPVs).

   Gathering lines would be constructed using a combination of conventional earthmoving equipment and specialist pipeline trenching and lifting equipment. Gathering lines are constructed using a standard construction methodology including:

   - Clearing and grading,

- Trenching and padding,
- Pipe stringing, laying, and welding,
- Backfilling and reinstating natural ground level; and
- Installing marker signs as required.

Once installed, the construction Right of Way (RoW) corridor would be rehabilitated back to the minimum width required for operations. Groundcover would be re-established along the operational RoW.

5. Roads / access tracks: Roads and access tracks will be constructed as required to facilitate heavy and light vehicle access during construction, operations and maintenance. Where practicable, existing disturbance areas or access tracks will be utilised, upgraded and/or co-located with the gathering network to minimise additional disturbance. Disturbance widths for roads and access tracks are generally expected to be in the order of 10–15 m and linear infrastructure would be co-located to reduce the disturbance wherever feasible. Construction activities associated with the roads and access tracks include:
    - Upgrading and/or widening of existing roads,
    - Excavation and filling,
    - Preparation of sub grade; and
    - Installation of drainage.
6. Temporary water storage tanks: Approximately 158 megalitres (ML) of water is estimated to be required for development of the Project. Water will be needed to support development, maintenance, dust suppression, drilling and construction activities. Produced water generated by the Project will be stored in onsite temporary water storage tanks, with additional water potentially sourced from existing approved dams and tanks.
7. Other Ancillary Infrastructure: Ancillary infrastructure and incidental petroleum activities would be required to support construction and operation activities. These include, but are not limited to:
    - Laydown, stockpile, storage, and vehicle cleaning areas,
    - A temporary workers camp including an STP and associated irrigation (<21 EP),
    - Low hazard dams and storage tanks,
    - Power and communication lines,
    - Borrow pits,
    - Fencing,
    - Environmental monitoring equipment and management controls,
    - Geophysical, geotechnical, geological, topographic, cadastral, and ecological surveys; and
    - Supporting infrastructure, such as energy supply, water supply and communications.

Based on the above information, it is understood that construction activities will be undertaken progressively across the project area and are temporary in nature, with the majority of activities completed during the first year of the project. Activities with the greatest potential to generate air

emissions are generally limited to vegetation clearing, earthworks associated with establishment of well pads and access tracks, and vehicle movements on unsealed surfaces. These activities will occur intermittently and over relatively small areas as construction progresses between well locations.

Standard construction environmental management measures, including dust suppression where required and good housekeeping practices, will be implemented throughout construction. Consequently, the potential for adverse off-site air quality impacts during construction is expected to be low.

2.2 Operational Phase Activities

During the operational phase, gas wells will operate continuously with an expected operational life of 30 to 50 years. Each operational well will include gas and water metering, separation and filtering equipment, electrical and control system , pipeline connections and associated infrastructure. Gas wells will be remotely monitored and controlled and each well has an automated shutdown system in the event of non-routine operating conditions.

The proposed development is limited to gas production and gathering within PL 1123. Produced gas will be transferred via approximately 11 km of new gathering pipeline to the existing Roma Hub Compressor Station 2 (R-HCS-02) located on PL 314, where downstream gas compression occurs. Similarly, produced water will be conveyed via the water gathering network to existing approved storage and treatment facilities located on PLs 314 and 315, with treatment undertaken at the existing facilities on PL 314. Accordingly, no gas compression, gas processing or permanent produced water treatment facilities are proposed within PL 1123, with these activities occurring at existing downstream infrastructure located outside the project area. As-such, the potential for air emissions to be generated from operational activities within PL 1123 is inherently limited when compared to downstream gas compression, processing and water treatment activities.

Activities associated with operational phase of the project includes:

1. Well Commissioning and Initial Production: Following drilling and completion, wells will undergo commissioning and initial production activities to verify well integrity and establish stable production prior to routine operations. During this period, production-related flaring may occur intermittently where gas cannot be immediately transferred through the gas gathering network. These activities are temporary and associated with bringing individual wells into production.
2. Gas Production: Gas production will occur continuously throughout the operational life of the project. Each well will comprise gas and water metering, separation and filtering equipment, electrical and control systems, pipeline connections and associated infrastructure. Wellheads will be electrically powered and remotely monitored, with automated shutdown systems provided to respond to non-routine operating conditions. Intermittent production-related flaring may occur during routine maintenance, start-up and shutdown activities, or where gas cannot be immediately transferred through the gathering network.

3. Gas Gathering: Produced gas from the project area will be transported via approximately 11 km of new gathering pipeline to the existing gas gathering network before being transferred to the existing gas compression infrastructure located on PL 314. Gathering lines, low point drains (LPDs) and high point vents (HPVs) will be routinely inspected and maintained throughout the operational life of the project. LPDs and HPVs would be installed along the gathering lines to allow drainage of any condensate from gas, and the release of any minor entrained gases from produced water as required.
4. Produced Water (PW): Produced water generated during gas production will be transferred via the water gathering network to existing approved water storage and treatment facilities located on PLs 314 and 315. Temporary prefabricated water storage tanks may be utilised within the project area prior to transfer of produced water to the existing downstream facilities.
5. Well Workovers: Routine inspections and maintenance of wellhead infrastructure will be undertaken throughout the operational life of the project. Well workovers may be undertaken periodically to complete repairs, servicing or optimise well performance. Based on information provided by Santos, well workovers are anticipated to occur approximately once every three (3) years per well.
6. Logistics Activities: Operational activities will include light and heavy vehicle movements associated with personnel transport, routine inspections, delivery of materials and consumables, and maintenance activities. Vehicle movements will be intermittent and will vary depending on operational requirements.
7. Plug and Abandonment: Wells will be decommissioned at the end of their productive life by installing engineered barriers to isolate hydrocarbon-bearing and water-bearing formations. Where required, intermittent production-related flaring may occur where residual gas cannot be safely transferred or otherwise managed. Disturbed areas no longer required for operational purposes will be progressively rehabilitated, with infrastructure decommissioned unless otherwise agreed with the landholder and permitted under the relevant environmental approvals.

Based on the above information, the proposed development is limited to upstream gas production and gathering activities, with produced gas transferred to existing downstream infrastructure for compression and processing. Accordingly, operational air emission sources within PL 1123 are primarily limited to intermittent production-related flaring, minor fugitive emissions associated with wellheads and gathering infrastructure, periodic vehicle movements and routine maintenance activities. The nature and significance of these emission sources, and their potential contribution to local air quality, are discussed in the following sections of this report.

Figure 2: Location of ATP 2053 relative to the township of Wallumbilla

Source: Queensland Globe

3 Existing Environment

This section describes the existing environment with reference to air quality, including land use and topographical features, nearby sensitive receptors, long-term climatic conditions and the characterisation of the existing airshed.

The proposed PL 1123 development is located approximately 5 km east of the township of Wallumbilla, and as shown in **Figure 3**, the project forms part of the established Santos Roma gas field and is surrounded by existing petroleum exploration and production tenures.

The following sections describe the land-use, topographical features, proximity to sensitive receptors, long-term climatic conditions and existing air quality, providing an understanding of the existing airshed and assimilative capacity.

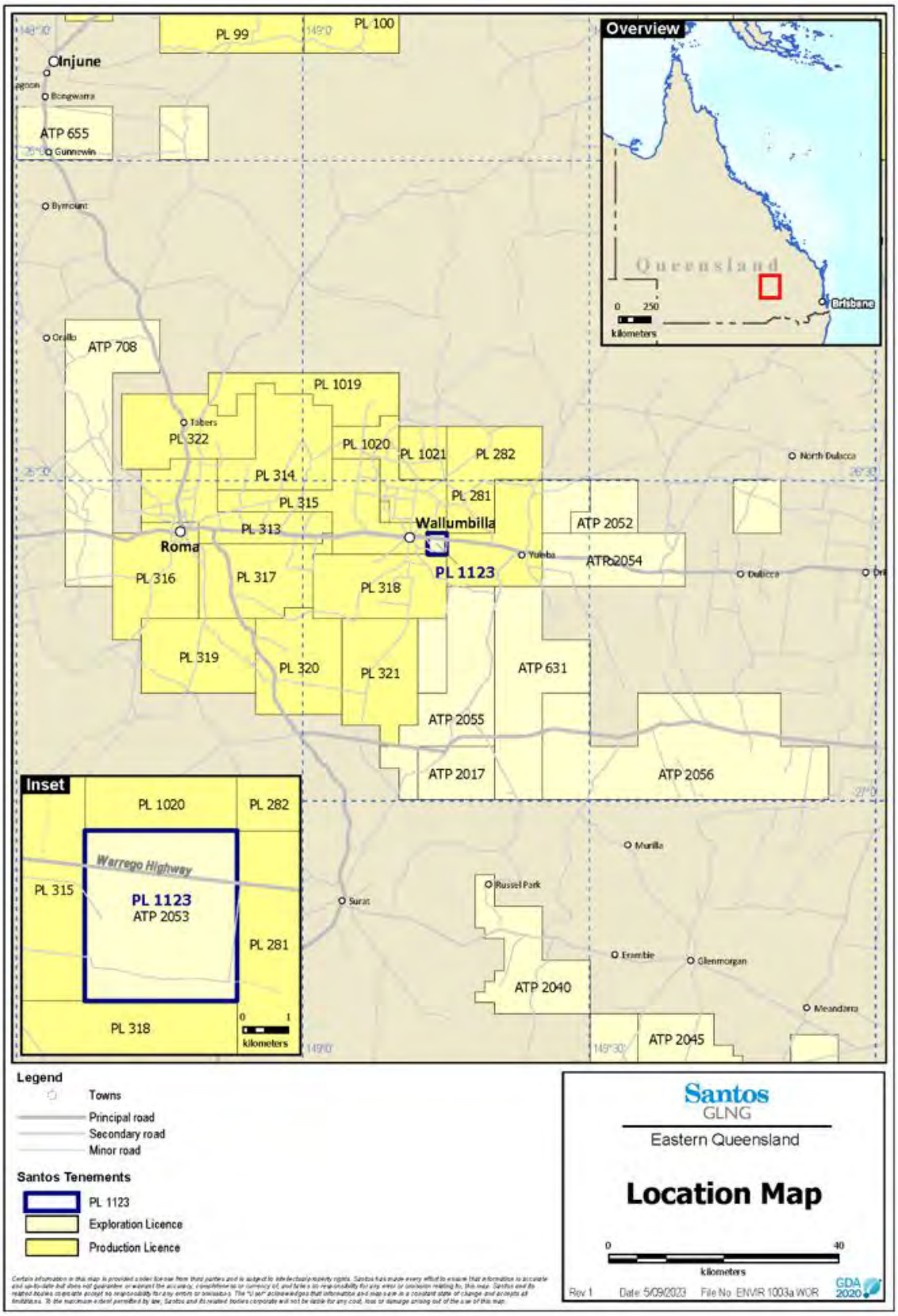


Figure 3: Location of PL 1123 relative to existing Exploration and Production Tenures

3.1 Land Use and Topography

As seen in **Figure 4**, land-use surrounding the project area is predominantly characterised by *agricultural land* and *rangeland* based on recent land-use data (circa. 2021) as per the Queensland Land Use Mapping Program (QLUMP) published by the Queensland Government.

As seen in **Figure 3**, the broader locality also contains existing petroleum and exploration activities within the Santos Roma gas field.

1-arc second (30 m) resolution terrain data surrounding the site has been sourced from the Geoscience Australia website. As presented in **Figure 5**, terrain in the immediate vicinity of the facility is generally level with minimal variation in elevation. Higher ground occurs to the north-east and south-east of the project area, where elevations gradually increase to 380 m.

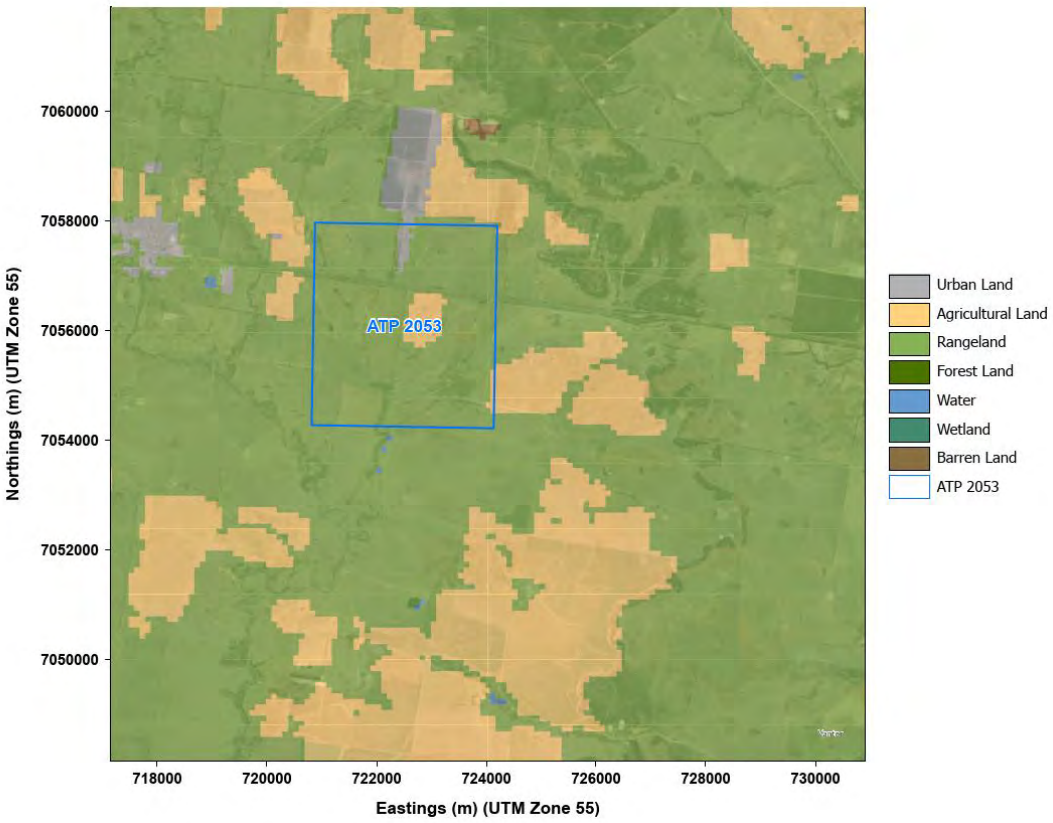


Figure 4: Land use surrounding the project area

Source: https://www.data.qld.gov.au/dataset/land-use-mapping-current-web-service-json

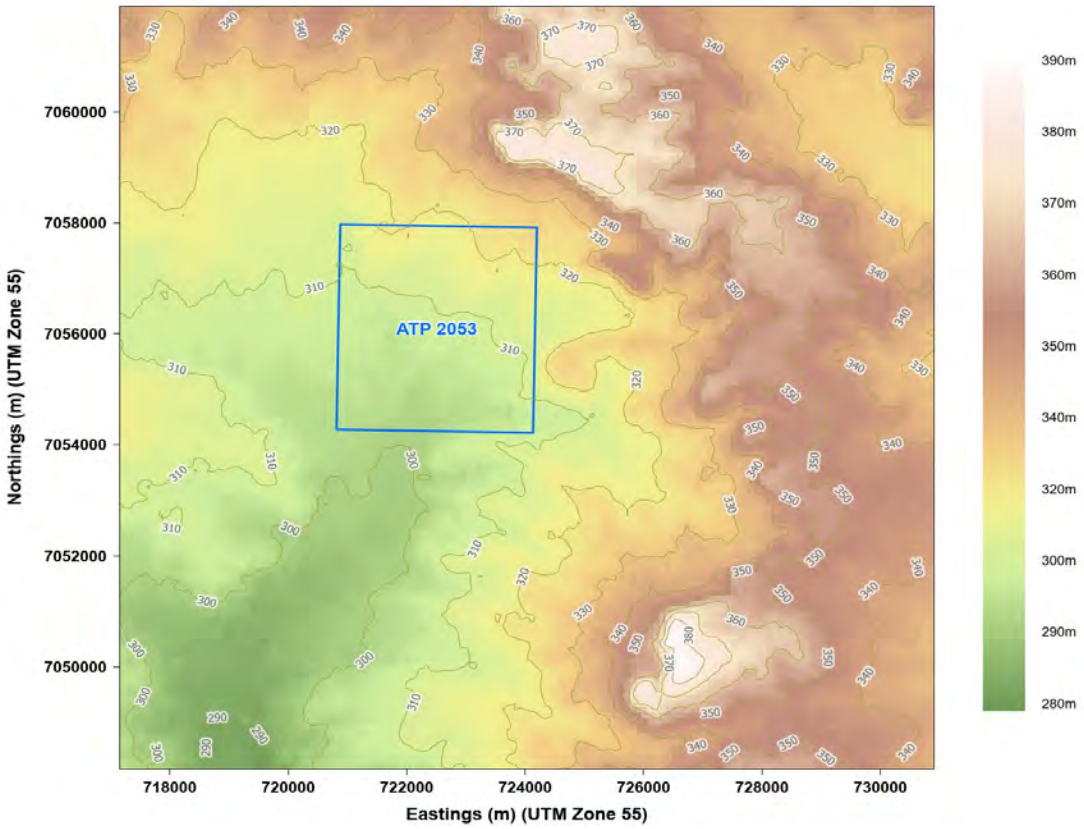


Figure 5: Topographical features surrounding the project area (highlighted in blue polygon)

Source: https://ecat.ga.gov.au/geonetwork/srv/api/records/a05f7892-eebe-7506-e044-00144fdd4fa6

3.2 Sensitive Receptors

The project area is zoned as *rural* within Maranoa Regional Council Planning Scheme as shown in **Figure 6**. Land uses surrounding the project area is predominantly zoned as *Rural* and comprises mainly agricultural and rural land uses, including scattered rural dwellings in the vicinity of the project area.

General Residential and *Rural Residential* zones are located approximately 2.5 km to the west of the project area, while land zoned *Industry* and *Community Facilities* occur approximately 1.3 km and 1.6 km from the project area, respectively.

Figure 7 present the spatial distribution of sensitive receptors located in the vicinity of the project area. There are five (5) residential receptors within the project area and six (6) residential receptors within approximately 1 km of the boundary of PL 1123.

Given the predominantly rural nature of the surrounding environment and the relatively low density of nearby sensitive receptors, the potential for widespread exposure to air emissions generated during the construction and operational phases of the project is inherently limited. However, as there are receptors located within the extents of the development site, their proximity has been considered in the assessment of air quality impacts. Sensitive receptors considered for this assessment are visually presented in **Figure 7** and summarised in **Table 2**.

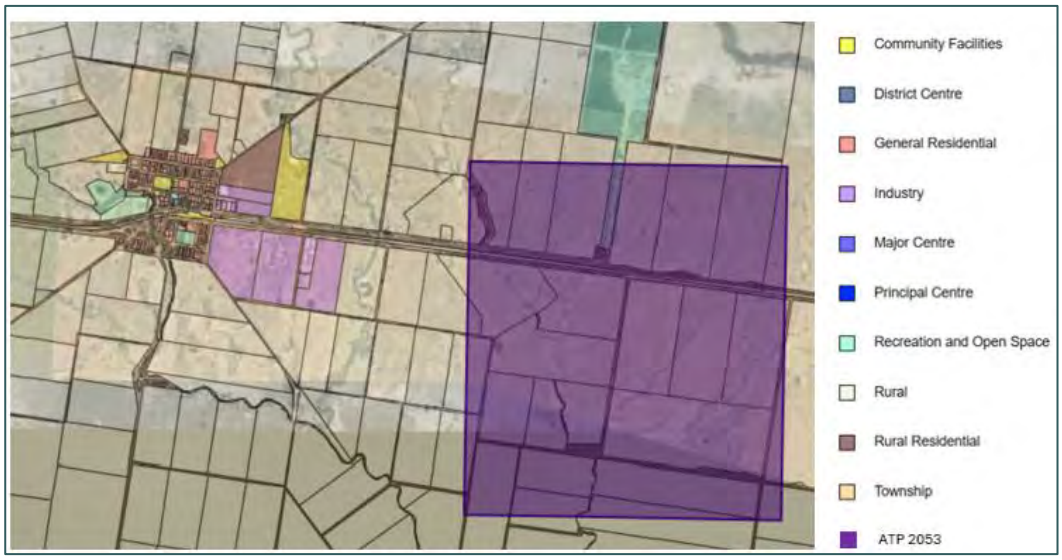


Figure 6: Land use zoning map identifying the project area (purple box) and its surrounds

Source: Maranoa Regional Council Planning Scheme

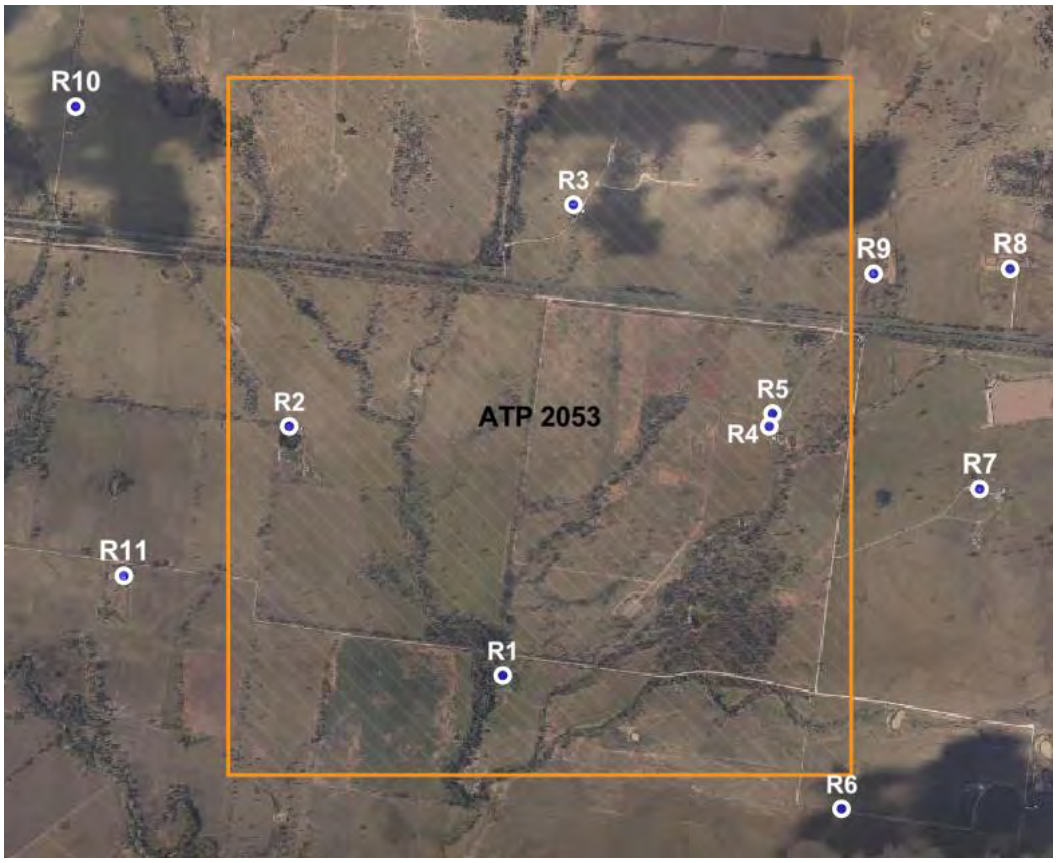


Figure 7: Location of sensitive receptors within and outside the extents of ATP 2053

Table 2: Sensitive receptors within and outside the extents of ATP 2053

Receptor ID	Easting (m) (UTM Zone 55J)	Northing (m) (UTM Zone 55J)
R1	722281	7054781
R2	721188	7056123
R3	722734	7057247
R4	723754	7056013
R5	723747	7056134
R6	724076	7054044
R7	724845	7055723
R8	725026	7056883
R9	724300	7056874
R10	720066	7057838
R11	720277	7055333

3.3 Long Term Climatic Conditions

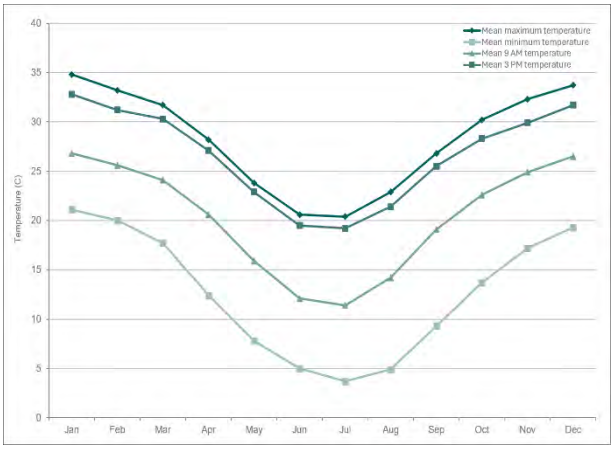
Climatic records for more than 30 years from 1992-2026 for the Bureau of Meteorology (BoM) Automatic Weather Station (AWS) at the Roma Airport AWS (043091) were analysed to assess the long-term climatic conditions likely to be experienced at the facility. The Roma Airport AWS is located approximately 48 km west of the proposed development area.

Table 3 and **Figure 8** summarise the data from the BoM AWS at Roma Airport. The BoM AWS data shows:

- Hottest month of the year is January with a mean maximum temperature of 34.8°C,
- Coldest month is July with mean minimum temperature of 3.7°C,
- Rainfall peaks during summer and declines during winter,
    - The wettest month of the year is February with mean rainfall of 84.8 mm,
    - The dryest month of the year is August with 22.1 mm mean rainfall; and
- The 9 AM and 3 PM wind roses measured from 1992 to 2010 are shown in **Figure 9**. Long-term wind records indicate that morning winds (9 AM) are generally well-distributed across several directions, whereas afternoon winds (3 PM) are predominantly from the north and north-east.

Table 3: Long-term (1992-2026) monthly climatic statistics summary – BoM AWS Roma Airport

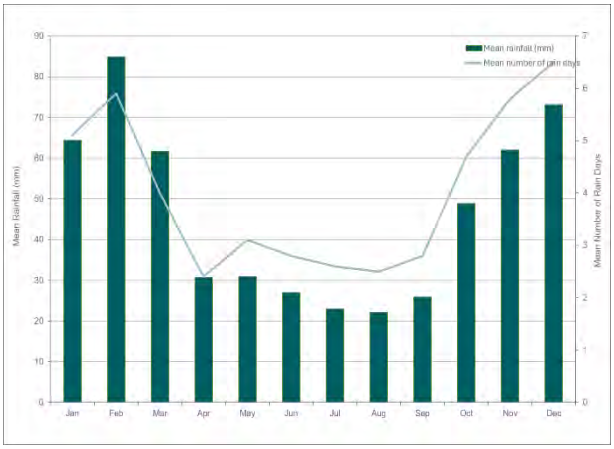
Parameter	Jan	Feb	Mar	May	Apr	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Temperature												
Mean Max Temperature (°C)	34.8	33.2	31.7	28.2	23.8	20.6	20.4	22.9	26.8	30.2	32.3	33.7
Mean Min Temperature (°C)	21.1	20	17.7	12.4	7.8	5	3.7	4.9	9.3	13.7	17.2	19.3
Rainfall												
Rainfall (mm)	64.4	84.8	61.6	30.6	30.8	26.9	22.9	22.1	25.9	48.8	62	73.1
Mean no. of rain days	5.1	5.9	4	2.4	3.1	2.8	2.6	2.5	2.8	4.7	5.8	6.5
9 AM Conditions												
Mean temperature (°C)	26.8	25.6	24.1	20.6	15.9	12.1	11.4	14.2	19.1	22.6	24.9	26.5
Mean relative humidity (%)	54	61	57	56	64	73	69	57	48	46	48	51
Mean wind speed (km/h) (1992-2010)	17	15.8	15.5	12.9	9.7	9.4	9.8	13.4	16.7	18.6	18	17.5
3 PM Conditions												
Mean temperature (°C)	32.8	31.2	30.3	27.1	22.9	19.5	19.2	21.4	25.5	28.3	29.9	31.7
Mean relative humidity (%)	34	41	34	33	37	41	38	31	27	28	32	33
Mean wind speed (km/h) (1992-2010)	15.1	14.8	14.5	14.3	14.3	14.8	15.3	16	16.4	16.8	16.7	16.3



Temperature Profile

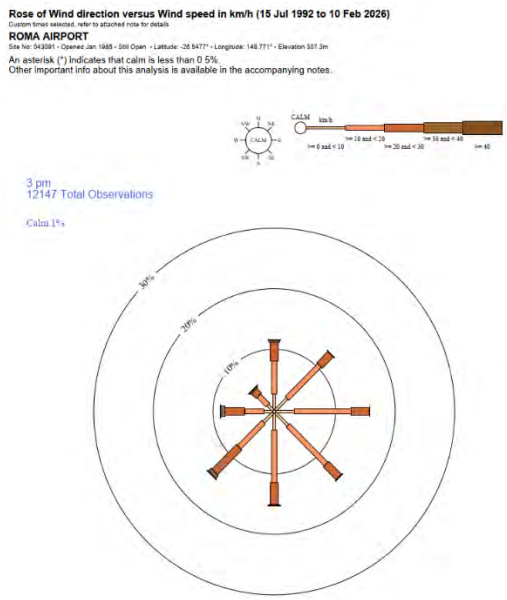
9 AM and 3 PM Wind Speed Profile

9 AM and 3 PM Relative Humidity (RH) Profile

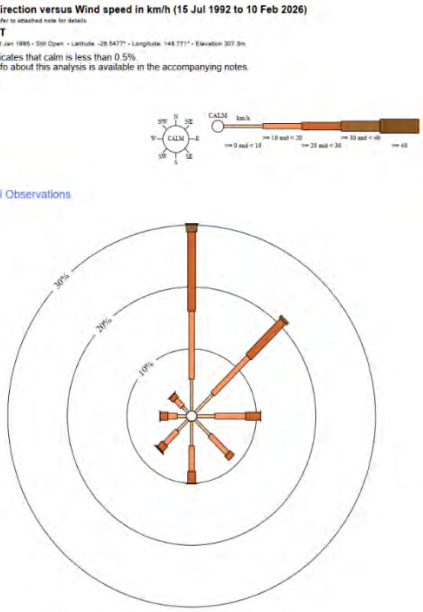


Rainfall Data and Number of Rain Days

Figure 8: Graphical representations of the monthly climate statistics summary from 1992-2026 – BoM AWS Roma Airport



Long-Term 9 AM Wind Rose



Long-Term 3 PM Wind Rose

Figure 9: Long-term (1992 – 2010) 9 AM (left) and 3 PM (right) Wind Roses - BoM AWS Roma Airport

3.4 Existing Air Quality

The existing air quality within the project area has been characterised by using a combination of publicly available information and regional ambient air quality databases. This included a review of the National Pollutant Inventory (NPI), ambient air quality levels in the Surat Basin undertaken by the Commonwealth Scientific and Industrial Research Organisation (CSIRO) through the Gas Industry Social and Environmental Research Alliance (GISERA), an air quality impact assessment prepared by SLR Consulting for the GLNG Gas Field Development Project[3] (SLR, 2014), and ambient air quality monitoring data recorded at the nearest NEPM ambient air quality monitoring stations.

A review of the NPI data indicates that no NPI-reporting facilities are located within the immediate vicinity of the project area (approximately a 6 km radius from the centre of the project area). Existing NPI-reporting facilities associated with petroleum production, mining, electricity generation and miscellaneous industries are present elsewhere within the broader Surat Basin region and were considered in the SLR, 2014 assessment as part of the regional background assessment undertaken for the Santos GLNG Gas Field Development project.

The Queensland Government operates a network of National Environment Protection (Ambient Air Quality) Measure (NEPM) monitoring stations across following regions in Queensland:

- South-East Queensland,
- South-West Queensland,
- Gladstone,
- Central Queensland,
- Bowen,
- Townsville; and,
- Mount Isa.

The nearest NEPM monitoring station is located at Toowoomba, approximately 250 km from the project area. Owing to the significant separation distance and differences in land use, topography and surrounding environment, data from the Toowoomba station may not be considered representative of background air quality conditions within the project area.

In the absence of suitably representative NEPM monitoring data, publicly available studies of ambient air quality within the Surat Basin were reviewed. These studies included a comprehensive monitoring program undertaken between 2014 and 2018, incorporating multiple stations located within and surrounding coal seam gas (CSG) development areas in the Surat Basin region. The study was conducted under the Gas Industry Social and Environmental Research Alliance (GISERA), a collaboration between CSIRO, government and industry partners[4]. Reference was also made to the air quality impact assessment conducted for the Santos GLNG Gas Field Development project (SLR, 2014).

[3] *Santos GLNG Gas Field Development Project, Air Quality Impact Assessment, SLR, August 2014*

[4] Source: https://gisera.csiro.au/research/greenhouse-gas-and-air-quality/ambient-air-quality-in-the-surat-basin/

Collectively, these studies provide a comprehensive assessment of ambient air quality within the Surat Basin and establish an appropriate basis for characterising background air quality conditions in the vicinity of PL 1123.

The GISERA study incorporated an extensive ambient monitoring network comprising air quality monitoring stations at Hopeland, Miles Airport, Condamine, Tara and Burncluith. Of these locations, the Miles Airport station (located approximately 95 km south-west of the project area) is the closest and is considered the most representative dataset for characterising existing background air quality conditions.

Baseline concentrations were derived from ambient monitoring data collected between 2014 and 2018. Tabulated datasets are publicly available for the period July 2015 to December 2016 and were used as the primary basis for quantitative analysis.[5] Data for the period 2017 to 2018 are presented primarily in graphical form and were reviewed qualitatively to confirm that observed concentration ranges remained consistent with the earlier tabulated dataset.[6]

The GISERA study concluded that ambient air quality throughout the Surat Basin is generally characteristic of a rural environment, with low background concentrations of criteria air pollutants. Similarly, SLR, 2014 determined that regional background concentrations of nitrogen dioxide (NO_2) and carbon monoxide (CO) associated with existing industrial emission sources were low relative to the applicable ambient air quality objectives. For the Roma Gas Field Domain, SLR, 2014, estimated a 1-hour average background NO_2 concentration of 17 $\mu g/m^3$ and an annual average concentration of 5 $\mu g/m^3$. These concentrations represent approximately 10% and 16% of the applicable ambient air quality objectives, respectively. Similarly, the assessment estimated very low background ambient carbon monoxide (CO) concentrations across the Roma Gas Field domain.

Both studies identified that short-term increases in particulate matter (PM) / dust emissions were primarily associated with naturally occurring and rural emission sources, including windblown dust, agricultural activities, vehicle movements on unsealed roads and bushfire smoke.

Ambient air quality monitoring data from the Miles Airport site collected and analysed as a part of the GISERA study from July 2015 to December 2016 are summarised in **Table 4.**

The observed concentrations indicate that ambient levels of CO, NO_2, PM_{10}, $PM_{2.5}$ and TSP remained below the relevant Queensland and National Environment Protection (Ambient Air Quality) Measure objectives throughout the monitoring period.

Overall, the available information indicates that the existing airshed surrounding PL 1123 is characteristic of a rural agricultural environment with generally good ambient air quality and low background concentrations of criteria air pollutants. Existing petroleum exploration and production activities form part of the broader regional emissions inventory; however, available monitoring and

[5] *CSIRO (2018), An assessment of ambient air quality in the Surat Basin, Queensland – Interim data summary, September 2014 to December 2016.*

[6] *Lawson, S.J., Powell, J.C., Noonan, J., Selleck, P.W. and Etheridge, D., 2018. Ambient air quality in the Surat Basin, Queensland: Final data summary (January 2017 – February 2018). Report to GISERA, Project G3, August 2018.*

assessment data indicate that ambient concentrations remain well below the applicable air quality objectives. These findings indicate that the existing airshed is not saturated and retains a relatively high assimilative capacity for the dispersion and dilution of air emissions generated by the proposed development.

Table 4: Monthly ambient air quality monitoring results for key pollutants at the Miles Airport site (2015–2016), including exceedances, observed maximum and average concentrations.

Averaging Period	2015						2016											
	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
CO (0 exceedances)																		
Max 8-hour (ppm)	0.3	0.7	0.6	0.9	-	-	-	-	-	0.8	0.8	0.8	0.8	0.7	0.9	1.1	1.2	0.7
Average 8-hour (ppm)	0.1	0.3	0.3	0.3	-	-	-	-	-	0.5	0.3	0.3	0.3	0.2	0.1	0.4	0.3	0.2
NO_2 (0 exceedances)																		
Max 1-hour (ppm)	-	0.018	0.015	0.014	0.012	-	-	-	-	0.022	0.023	0.02	0.011	-	0.015	0.02	0.013	0.018
Average 1- hour (ppm)	-	0.004	0.004	0.003	0.003	-	-	-	-	0.002	0.003	0.002	0.002	-	0.002	0.002	0.002	0.002
Annual Average (ppm)	0.002 (Jan 2016 to Dec 2016)																	
PM_{10} (1 exceedance)																		
Max 24-hour (*µg/m³*)	N/A	N/A	22.1	67.1	34.8	-	-	23.2	-	17.6	32.6	11.7	10.5	15.2	14.6	33.1	48.8	37
Annual Average (*µg/m³*)	10.3 (Jan 2016 to Dec 2016)																	
$PM_{2.5}$ (2 exceedances)																		
Max 24-hour	N/A	N/A	14.7	22.9	29.6	-	-	8.3	-	6.4	7.9	3.5	5.1	7.5	9.7	13.3	13.6	25.7
Annual Average (*µg/m³*)	4.1 (Jan 2016 to Dec 2016)																	
TSP (0 exceedances)																		
Max 24-hour	N/A	N/A	35.4	120.9	43.0	-	-	44.3	-	30.4	50.9	22.7	17	23.1	24.8	62.1	93.7	60.1
Annual Average (*µg/m³*)	16.5 (Jan 2016 to Dec 2016)																	
A dash (–) indicates that data were unavailable for the corresponding period due to low data capture (<75%) or invalid data, in accordance with study data quality criteria. "N/A" indicates that monitoring had not yet commenced.																		

Applicable ambient air quality objectives (NEPM / Queensland):	*CO (8-hour): 9.0 ppm*	*NO_2 (1-hour): 0.08 ppm* *NO_2 (Annual): 0.015 ppm*	*PM_{10} (24-hour): 50 µg/m³* *PM_{10} (Annual): 25 µg/m³*	*$PM_{2.5}$ (24-hour): 25 µg/m³* *$PM_{2.5}$ (Annual): 7 µg/m³*	*TSP (Annual):* 90 µg/m³

4 Air Quality Discussion

This section addresses the potential air quality matters associated with the proposed development during both the construction and operational phases.

The assessment has been undertaken qualitatively, having regard to the nature of the proposed activities, the expected air emission sources, the characteristics of the receiving environment and the location of nearby sensitive receptors. Information presented in the supporting information report, together with publicly available air quality studies undertaken within the Surat Basin, including SLR, 2014 has also been considered.

The proposed development is limited to upstream gas production and gathering activities within PL 1123. Construction activities are temporary and are expected to be substantially completed during the first year of the project. During operations, produced gas and produced water will be transferred to existing downstream infrastructure located outside the project area for compression, processing, storage and treatment.

Consequently, the principal air emission sources associated with the proposed development are limited to fugitive dust generated during construction activities, intermittent flaring associated with well completion, commissioning, initial production, periodic well workovers and well decommissioning, minor fugitive emissions from gas production and gathering infrastructure, and combustion emissions from diesel-powered equipment and vehicles.

As discussed in **Section 3**, the project area is located within a predominantly rural environment characterised by low background pollutant concentrations, relatively few sensitive receptors and an airshed with relatively high assimilative capacity. Considering the nature, scale and duration of the proposed activities, together with the characteristics of the receiving environment, a qualitative assessment is considered appropriate for addressing the potential air quality matters associated with the proposed development.

The following sections discuss the principal air emission sources associated with the construction and operational phases of the project and their potential contribution to local air quality.

4.1 Construction Phase

As mentioned in **Section 2.1**, activities will include construction of well pads, water and gas gathering lines, road and access tracks, temporary water storage, temporary workers camp, and other supporting infrastructure. Construction of the proposed wells will be completed within one (1) year.

Construction activities have the potential to generate dust emissions; however, these activities are temporary, progressive and confined to the construction period.

Construction activities are largely localised and occur over relatively short periods at individual well pads and along the proposed gathering lines. Construction activities which have potential to generate dust emissions include:

- Vegetation clearing,
- Earthworks associated with construction of well pads, gathering lines and access tracks,
- Material handling,
- Wind erosion from temporary exposed areas and stockpiles; and
- Vehicle movements on access tracks and unsealed roads.

The primary air pollutant released during construction would be dust and particulate matter (i.e., PM_{10}, $PM_{2.5}$, total suspended particles(TSP), generated from disturbed soils, material handling, earthmoving activities and vehicle movements. Combustion of diesel or petrol fuels (from vehicle movements and mobile machinery) could generate emissions of nitrogen oxides (NOx), sulfur dioxide (SO_2), carbon monoxide (CO), particulate matter (PM), and total volatile organic compounds (TVOCs).

Approximately 62 ha, representing around 5% of the total project area (1,229 ha), is proposed to be disturbed for the establishment of well pads. The majority of this disturbance area is located within previously disturbed land associated with historical agricultural activities, thereby minimising the extent of vegetation clearing required. Consequently, emissions associated with vegetation clearing are expected to be minimal.

Dust emissions from other construction activities such as drilling, excavation, material handling, wind erosion, vehicle movement on unpaved surfaces can be effectively managed through the implementation of standard construction environmental management practices and best-practice dust suppression measures as listed in **Table 5**. Implementation of these measures has been demonstrated to substantially reduce dust generation and minimise the potential for off-site impacts at nearby sensitive receptors.

Additionally, given that construction activities are progressive and transient in nature, the potential for the aforementioned activities to adversely impact the local air quality is low.

Table 5: Construction dust mitigation measures

Source of Dust	Mitigation Measures	Timing
General Construction	Identify dust-generating activities and inform site personnel about location	Throughout construction
	Identify adverse weather conditions (dry and high wind blowing from dust source to sensitive receptors) and halt dust emitting activities if visible dust impacts are identified at sensitive receptors.	Throughout construction
Material Handling	Minimise drop height for material handling equipment	As required
Wind generated dust from temporary stockpiles and exposed areas	Apply watering through water trucks or sprinklers.	Throughout construction
	Progressive staging of dust generating activities throughout the day to avoid concurrent dust emissions.	Throughout construction
	Minimise exposed area if possible.	Throughout construction
	Minimise amount of temporary material stockpiled if possible	Throughout construction
Wheel generated dust during handling	Restrict vehicle movement to haul routes that are watered regularly	Throughout construction
	Speed restrictions	Throughout construction

Diesel-powered construction equipment, drilling rigs, earthmoving machinery, generators and heavy vehicles will generate combustion emissions including oxides of nitrogen (NOx), carbon monoxide (CO), sulfur dioxide (SO_2), particulate matter (PM) and volatile organic compounds (VOCs). These emissions will be temporary, spatially dispersed and associated with mobile equipment operating across the project area. Given the temporary nature of construction and the absence of large stationary combustion sources, diesel exhaust emissions are not expected to adversely affect local air quality.

Overall, construction-related air emissions are expected to be temporary, localised and low in magnitude. The principal emissions of concern relate to dust generated during vegetation clearing, earthworks, material handling and vehicle movements, together with combustion emissions from diesel-powered equipment. These emissions will occur progressively as construction advances across the project area and will be managed through the implementation of standard construction environmental management measures, including dust suppression measures where required.

On this basis, construction-related air emissions are not expected to result in adverse air quality impacts at surrounding sensitive receptors.

4.2 Operational Phase

Following construction, the project will comprise upstream gas production and gathering activities within PL 1123. Produced gas will be transferred via the gas gathering network to the existing downstream compression and processing infrastructure located on PL 314, while produced water will be transferred to existing approved storage and treatment facilities located on PLs 314 and 315. Accordingly, no gas compression, gas processing or permanent produced water treatment facilities are proposed within the project area.

Operational air emission sources are therefore limited to intermittent flaring associated with well completion, commissioning, initial production, periodic well workovers and well decommissioning, minor fugitive emissions from gas production and gathering infrastructure, combustion emissions from diesel-powered equipment and vehicles, and minor fugitive dust associated with routine operational activities.

The potential air quality impacts associated with these emission sources are discussed below.

4.2.1 Production-related Flaring

Production-related flaring represents the principal air emission source associated with the proposed development. Flaring is undertaken as a controlled safety measure where gas cannot be immediately transferred through the gas gathering network, or where gas must be safely managed during specific operational activities. For the proposed development, intermittent flaring may occur during well completion, commissioning and initial production, periodic well workovers, plant start-up and shutdown activities, operational upsets, and well decommissioning at the end of the project life.

Combustion of natural gas during flaring converts methane (CH_4) primarily to carbon dioxide (CO_2), while also generating combustion products including NOx, CO and small quantities of PM. Trace quantities of VOCs may also be released as products of incomplete combustion. The quantity of pollutants released during flaring is governed primarily by the frequency and duration of individual flaring events. As flaring is limited to specific operational activities and non-routine events, pollutant emissions are expected to occur intermittently rather than as a continuous source.

Unlike continuous combustion sources, such as compressor stations or gas processing facilities, flaring is expected to occur infrequently and for relatively short durations throughout the operational life of the project. The frequency and duration of flaring events will depend on operational requirements and do not represent a continuous emission source. Flaring is undertaken as a controlled combustion process designed to safely combust natural gas during specific operational activities and non-routine events, thereby preventing the uncontrolled release of natural gas to atmosphere.

The proposed development does not include compressor stations, gas processing facilities or other continuous combustion sources within PL 1123. Based on the assumptions adopted for the greenhouse gas (GHG) assessment, flaring associated with well completion, commissioning and initial production is expected to occur once for each well, while flaring associated with well workover activities is anticipated to occur approximately once every three years per well. These events are

undertaken only where required for operational, maintenance or safety purposes and do not represent routine operating conditions. Consequently, production-related flaring represents an intermittent emission source rather than a continuous operational activity.

Given the intermittent nature of flaring and low anticipated frequency of flaring events, the absence of continuous combustion infrastructure within PL 1123, the separation distance to surrounding sensitive receptors and the relatively high assimilative capacity of the local airshed, emissions associated with production-related flaring are expected to be temporary and localised, with a low potential to adversely affect surrounding sensitive receptors.

4.2.2 Fugitive Emissions

Fugitive emissions associated with the proposed development may occur from wellheads, valves, flanges, connectors, pipeline fittings, LPDs, HPVs and PW gathering infrastructure. These emissions are characteristic of natural gas production systems and primarily comprise CH_4, with trace quantities of VOCs.

Produced gas from the project area is expected to comprise predominantly CH_4, with only minor concentrations of higher hydrocarbons. Consequently, fugitive VOC emissions are expected to be low. Fugitive emissions associated with gas production infrastructure will be minimised through routine inspection, maintenance and repair of wellheads, valves, pipelines and associated equipment throughout the operational life of the project.

Fugitive emissions may also occur during well completion, well workover activities and routine maintenance of gas gathering infrastructure. These emissions are expected to be intermittent, localised and of short duration. Given the relatively low frequency of these activities, together with the implementation of routine inspection and maintenance programs, fugitive emissions are not expected to result in adverse air quality impacts at surrounding sensitive receptors.

4.2.3 Combustion Emissions

Combustion emissions during the operational phase will be limited to diesel-powered vehicles and mobile equipment used for routine inspections, maintenance activities, well workovers and well decommissioning. Pollutants released from diesel combustion include NOx, CO, SO_2, PM and VOCs.

Unlike construction activities, operational use of diesel-powered equipment will be infrequent and generally limited to planned maintenance activities. Vehicle movements will primarily occur along existing access tracks and are expected to be intermittent throughout the operational life of the project. Consequently, combustion emissions are expected to be temporary, localised and make only a minor contribution to the overall operational emissions profile.

4.2.4 Fugitive Dust Emissions

Fugitive dust emissions during the operational phase will be limited to vehicle movements on unsealed access tracks and minor ground disturbance associated with routine maintenance, well workovers and well decommissioning activities. Unlike the construction phase, no continuous earthworks, vegetation clearing or other significant dust-generating activities are proposed during normal operations.

Where maintenance activities have the potential to generate dust, the same dust management principles adopted during construction will continue to be implemented, where applicable. These include minimising disturbed areas, maintaining appropriate vehicle speeds on unsealed roads, and implementing dust suppression where required under dry and windy conditions. Routine inspection and maintenance activities are expected to be of short duration and undertaken over relatively small areas.

Given the infrequent nature of operational maintenance activities, the absence of continuous dust-generating works, and the implementation of the dust management measures described in **Table 5**, fugitive dust emissions are expected to be temporary, localised and are not expected to result in adverse air quality impacts at surrounding sensitive receptors.

4.2.5 Operational Phase Summary

Overall, operational air emissions associated with the proposed development are expected to be low and are primarily associated with intermittent production-related flaring, minor fugitive emissions from gas production and gathering infrastructure, combustion emissions from diesel-powered equipment and vehicles, and limited fugitive dust generated during routine maintenance activities. The proposed development is limited to upstream gas production and gathering, with no gas compression, gas processing or permanent produced water treatment facilities located within PL 1123. Consequently, no continuous combustion or process emission sources are proposed within the project area.

The operational emission sources identified for the proposed development are either intermittent, localised or of short duration and will be managed through routine operational controls, inspection and maintenance programs. Considering the nature and frequency of these emission sources, the separation distance to surrounding sensitive receptors, the low background pollutant concentrations within the receiving environment and the relatively high assimilative capacity of the local airshed, operational air emissions are not expected to result in adverse air quality impacts at surrounding sensitive receptors.

5 Conclusion

The proposed PL 1123 development comprises upstream gas production and gathering activities, with gas compression, gas processing and produced water treatment undertaken at existing downstream facilities outside the project area. Construction activities are temporary and progressive in nature, while operational air emission sources are limited to intermittent production-related flaring, minor fugitive emissions, combustion emissions from diesel-powered equipment and vehicles, and limited fugitive dust associated with routine maintenance activities.

Based on the information reviewed, the characteristics of the proposed development and the receiving environment, air quality impacts associated with both the construction and operational phases of the project are expected to be low. Emission sources are either temporary, intermittent or localised in nature and, together with the implementation of standard environmental management measures, are not expected to result in adverse air quality impacts at surrounding sensitive receptors.

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