

NARRABRI GAS PROJECT

Field Development Protocol

PHASE 1

0041-150-PLA-0002

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Acronyms and abbreviations

Acronym	Description
ACHMP	Aboriginal Cultural Heritage Management Plan
AEP	annual exceedance probability
AS/NZS	Australian Standard/New Zealand Standard
BC Act	<i>Biodiversity Conservation Act 2016 (NSW)</i>
BCD	The former Biodiversity Conservation Division within DPE
BCS	The Biodiversity, Conservation & Science directorate within DPE (formerly BCD)
BMP	Biodiversity Management Plan
CCC	Community Consultative Committee
CoC	Conditions of consent for the NGP SSD 6456
CSG	coal seam gas
DPI	The former NSW department of Primary Industries
DPE	The NSW Department of Planning and Environment
DPIE	The former NSW Department of Planning, Industry and Environment
DPE Water	The Water group within DPE
EEC	endangered ecological communities
EIS	environmental impact statement
EMP	environmental management plan
EMS	Environmental Management Strategy
EPA	The NSW Environment Protection Authority
EP&A Act	<i>Environmental Planning and Assessment Act 1979 (NSW)</i>
EP&A Regulation	Environmental Planning and Assessment Regulation 2021
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999 (Cth)</i>
ESA	ecological sensitivity analysis
ESCP	erosion and sediment control plan
GIS	geographical information systems
ha	hectare
IEA	Independent Environmental Audit
ISO	International Organisation for Standardisation
m	metre
ML	megalitre
mm	millimetre
NP&W Act	<i>National Parks and Wildlife Act 1974 (NSW)</i>
PAL	petroleum assessment lease under the PO Act
PEL	petroleum exploration licence under the PO Act
PO Act	<i>Petroleum (Onshore) Act 1991 (NSW)</i>
POEO Act	<i>Protection of the Environment Operations Act 1997 (NSW)</i>

Acronym	Description
POEO Regulation	Protection of the Environment Operations (General) Regulation 2022
PPL	petroleum production lease under the PO Act
PPLA	petroleum production lease application under the PO Act
SMS	Santos Management System
SSD	State significant development
TARP	trigger action response plan

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1. Introduction

1.1 Narrabri Gas Project

1.1.1 Background

Resource exploration has been occurring in the north-western area of NSW since the 1960s; initially for oil, but more recently for coal and gas. Santos NSW Pty Ltd began exploring for natural gas from coal seams in north-western NSW in 2008 and is currently conducting coal seam gas (**CSG**) exploration and appraisal activities within Petroleum Exploration Licence (**PEL**) 238, Petroleum Assessment Lease (**PAL**) 2 and Petroleum Production Lease (**PPL**) 3, located in the Gunnedah Basin about 20 kilometres (**km**) south-west of the town of Narrabri. Activities in PAL 2 have focussed on the Bibblewindi and Bohena CSG pilots, whilst recent activities in PEL 238 have focussed on the Dewhurst and Tintfield CSG pilots.

The Narrabri Coal Seam Gas Utilisation Project (Wilga Park Power Station and associated infrastructure) operates under an existing Part 3A approval under the *Environmental Planning and Assessment Act 1979* (NSW) (**EP&A Act**). It was originally approved in 2008, with various modifications approved between 2011 and 2019. It encompasses a gas gathering system, a compressor and associated flare, a gas flow line from Bibblewindi to Wilga Park within a 10 metre (**m**) corridor with a riser at Leewood and an expansion of the existing Wilga Park Power Station from 12 to 40 megawatts.

1.1.2 Current Project

On 30 September 2020, Santos NSW (Eastern) Pty Ltd (**Santos**) obtained consent for State significant development (**SSD**) 6456 to develop the Narrabri Gas Project (**NGP**) (**the Project**). Approval EPBC 2014/7376 under the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (**EPBC Act**) was granted on 24 November 2020.

The Project includes the progressive installation of up to 850 new gas wells on up to 425 new well pads over approximately 20 years and the construction and operation of gas processing and water treatment facilities. The Project area covers about 950 square kilometres (95,000 hectares) in size and the Project footprint will directly impact only about 1 % of that area.

Four phases of development are defined under the consent, including:

- Phase 1 - exploration and appraisal;
- Phase 2 - construction activities for production wells and related infrastructure;
- Phase 3 - gas production operations; and
- Phase 4 - gas well and infrastructure decommissioning, rehabilitation and closure.

Phase 1 of the Project is defined in the consent as the phase of the development comprising ongoing exploration and appraisal activities in the Project area, including:

- seismic surveys;
- core and chip holes;
- construction and operation of pilot wells (up to 25 wells on up to 25 well pads across the Project area); and
- pilot well ancillary infrastructure, including access tracks, gas and water gathering lines, water balance tanks, safety flaring infrastructure, utilities and services, and environmental monitoring equipment including groundwater monitoring bores.

Santos plans to continue exploration and appraisal of the resource in the near term until a final investment decision can be made. The exploration and appraisal activities will include continued operation of Santos' existing wells, infrastructure and facilities in PEL 238 and PAL 2, and construction and operation of new core holes, pilot wells and supporting infrastructure permitted under Phase 1.

Santos' existing exploration and appraisal activities in PEL 238 and PAL 2 include:

- Tintsville Pilot;
- Bibblewindi East Pilot;
- Bibblewindi West Pilot;
- Dewhurst North Pilot;
- Dewhurst South Pilot;
- Dewhurst northern and southern flow lines;
- Leewood Water Management Facility including ponds, water treatment plant and irrigation area;
- Bibblewindi Facility, including gathering system, water balance tank, compressor and flare; and
- Bibblewindi to Leewood buried gas pipeline.

These exploration and appraisal activities will continue as part of the Narrabri Gas Project. The initial, new-appraisal Phase 1 scope is a relatively minor extension to these existing exploration and appraisal activities.

The Phase 1 scope is planned to include the construction and operation of:

- 4 coreholes;
- 6 pilot wells;
- 2 deep reservoir monitoring bore (converted coreholes);
- new shallow water monitoring bores;
- associated linear infrastructure;
- seismic surveys (length and location to be determined); and
- continued operation of Santos' existing exploration and appraisal activities.

The full definitions of the approved activities for Phases 2, 3 and 4 of the Project are provided in the conditions of consent (**CoC**) for SSD 6456.

The Project will use existing gas flow lines, risers and gas gathering systems and some additional infrastructure to support the Project will be located in the same corridor that was part of the Wilga Park approval. The Protocol does not apply to some of the previously constructed (or approved but not yet constructed) infrastructure that will continue to be used, including produced water and brine ponds and water treatment facilities located at Bibblewindi and Leewood. These are further described in the NGP Water Management Plan and sub-plans, together with an overview of the current approvals, leases and licences.

1.2 Purpose and scope - Phase 1

Santos has developed this Field Development Protocol (hereafter also referred to as **the Protocol**) in accordance with CoC B1, B2 and B3. It has been prepared to specify the locational criteria for the Project infrastructure during Phase 1 and details the procedures that Santos will implement to ensure that the infrastructure is sited in accordance with these criteria. The Protocol describes how all reasonable and feasible measures, as appropriate, will be implemented to prevent, mitigate or minimise material harm to the environment that may result from the proposed Phase 1 activities. This fulfils the requirement of Project commitment 1.1 in the Environmental Impact Statement (**EIS**) and in turn consent condition D3(c), which states that Santos must ensure that (where relevant) the management plans include any relevant commitments or recommendations identified in the EIS. Table A1 in Appendix A specifies where each of the requirements of the applicable SSD 6456 consent conditions are addressed in this Protocol.

The planning and development of Project infrastructure will be an iterative or phased process, where the final locations of infrastructure including gas wells are determined by the resource, proximity to existing infrastructure, landholder agreements and environmental constraints. The Protocol details this iterative process by providing a framework to systematically avoid certain attributes and maximise avoidance of the most sensitive ecological features to minimise the impacts of the Project. The four stages of constraints planning (refer to Figure 1.1) will ensure that the development of the Project takes place in accordance with:

- the Project commitments;
- relevant State and Commonwealth legislation;
- the environmental constraints and limits identified in the impact assessment reports;
- the environmental management plans, protocols and procedures; and
- conditions of consent.



Figure 1.1 - Stages of the constraints planning process

PEL 238 was most recently renewed on 12 April 2022. It is to be noted that a renewal application has been made for PAL 2 which is currently under consideration. Under the provisions of Section 20 of the PO Act, if an application for renewal of a title has not been withdrawn or determined before the date on which the title would, but for this section, expire, the title continues in force until the date on which the application is withdrawn or determined. Therefore, PAL 2 continues in force until such time as a determination is made on the renewal application.

Note that the definition for Phase 1 as provided in the CoC states that when or if operations move to a PPL, activities allowed under the beneficial use of gas provisions are no longer permissible. Santos lodged four petroleum production lease application (**PPLAs**) in May 2014 covering the Project area, being PPLAs 13, 14, 15 and 16. The Project area and the petroleum titles are presented in Figure 3.1 of the Environmental Management Strategy (**EMS**).

This Protocol relates to the activities required for the development of natural gas from the Gunnedah Basin under the existing tenures, being PEL 238, PAL 2 and PPL 3, or undertaken under the petroleum production leases, when granted, in respect of petroleum production lease application PPLA 13, PPLA 14, PPLA 15 and PPLA 16. The Protocol does not apply to the infrastructure existing at the time the Project commenced. It applies for the life of the Project and to each phase of the development, including infrastructure planning and design, construction, operation, decommissioning and rehabilitation as presented in Figure 1.2.

Details of the locational criteria are addressed in detail in the various sections of this Protocol and are summarised in Table B1 in Appendix B.

1.3 Preparation of this Protocol

This Protocol has been prepared by [REDACTED] who are certified and accomplished environmental practitioners with more than 20 years' experience each. Considering their individual and combined industry experience and professional expertise, [REDACTED] suitably qualified and experienced for the preparation of this Field Development Protocol, as required by CoC B2(a).

1.4 Consultation

As required by consent condition B2(b), this Protocol has been prepared in consultation with the NSW Environment Protection Authority (**EPA**), the Water group within the Department of Planning and Environment (**DPE**) (generally referred to as **DPE Water**), the DPE Biodiversity, Conservation & Science directorate (**BCS**) (formerly the Biodiversity Conservation Division [**BCD**]), the NSW Resources Regulator, Heritage NSW and Narrabri Shire Council (**Council**). The primary objective of consultation was to inform and involve all listed stakeholders during each stage of development and completion of the Protocol.

The comments provided by the EPA on the draft Protocol (Revision C) related to micro-siting and additional consultation with Heritage NSW and BCS. Heritage NSW in turn confirmed its in principle support for the Protocol. The comments received from BCS predominantly centred around the incorporation of additional references and management strategies in the Protocol, as well as the inclusion of an unexpected finds procedure. The comments also identified a discrepancy in relevant legislation and several typographical errors.

Council suggested in their comments that the draft Protocol should be provided to Fire and Rescue NSW for consultation, and that a Traffic Management Plan and Weed Management Plan should form part of the suite of management plans for the Project. Council also identified a number of errors in the draft document.

No comments were received from DPE Water or the Resources Regulator on the draft Protocol (Revision C).

All consultation correspondence and the responses to comments are provided in Appendix C.

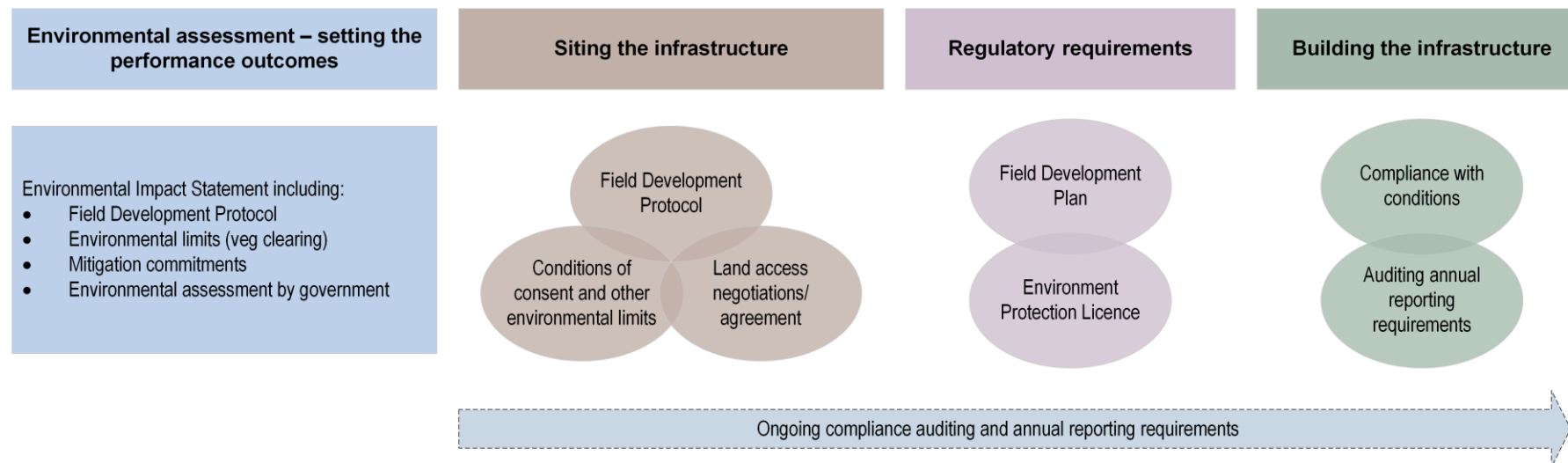


Figure 1.2 - The Protocol within the overall Project document and compliance framework

Note: The Field Development Plan is referred to as the Plan of Operations in the EIS.

1.5 Structure of this Protocol

This Protocol has been structured as follows:

Sections

Section 1	Introduces the Project and the context, scope, purpose and objectives of this Protocol
Section 2	Summarises the roles and responsibilities of personnel involved with the implementation of the Protocol
Section 3	Outlines the compliance requirements related to this Protocol and a summary of the relationship with the Field Development Plan
Section 4	Provides an outline of the landholder engagement and land access agreements
Section 5	Provides summary details for field development, exclusion areas and the various steps in the constraints planning process
Section 6	Provides summary details of implementation of management controls, with reference to the relevant management plans and protocols
Section 7	Provides details on ecological constraints and the ecological sensitivity analysis
Section 8	Describes the evaluation and review process of this protocol
Section 9	Provides the details regarding the Aboriginal cultural heritage and historical heritage constraints
Section 10	Provides details of additional constraints, including nature reserves, national parks, conservation areas, watercourses, flooding, noise and air quality
Section 11	Outlines the process for reporting incidents and non-compliances to the relevant agencies, and the management procedure for complaints
Section 12	Describes the reporting, evaluation and review process of this Protocol, including the annual review, independent audits and environmental improvement measures
Section 13	References
Section 14	Glossary

Appendices

Appendix A	Consent conditions relevant to this Protocol
Appendix B	Locational criteria
Appendix C	Consultation records
Appendix D	Ecological constraints disturbance limits

1.6 Distribution

A copy of the approved Protocol is available to all Santos personnel via the Santos intranet. In accordance with consent condition D13, the latest copy of the Protocol including all associated appendices, audits and reports, and summaries of all monitoring data (where relevant), can also be found on the Project website, once these have been approved by the Planning Secretary. This information will be kept up to date.

Since specific approval or code of practice conditions require management plans and protocols to be made available at the location of the activities to all persons involved in those activities, a copy of this Protocol will be kept at the Santos' Operations Centre located at 300 Yarrie Lake Road in Narrabri. This is where operational and field staff commence and finish each workday.

Note that any printed copies of this Protocol are uncontrolled.

2. Roles and responsibilities

All Santos employees and contractors involved in the Narrabri Gas Project are responsible for the environmental performance of their activities and for complying with all legal requirements and obligations. All Project personnel will be made aware of and will be required to comply with approval requirements of the activities they undertake, and any potential environmental impacts from the activities are managed in accordance with the Project's relevant management plans and protocols.

In accordance with consent condition D1, the EMS sets out the roles, responsibility, authority and accountability of all key personnel involved in the environmental management of the Project, including the requirements and obligations in this Protocol. All roles, responsibilities and accountabilities have been assigned in accordance with Santos Management System *SMS-MS_14 People Management Standard*.

The roles and responsibilities in Table 2.1 relevant to the implementation and management of the Field Development Protocol reflect those that are defined in the EMS.

Table 2.1 - Roles and responsibilities

Position	Responsibility
Area Manager, Arcadia, Scotia and Narrabri Operations	<ul style="list-style-type: none"> Responsible for the operation of all gas transmission and electricity generation infrastructure. Ensure the environmental performance of the project is consistent with the conditions of approval Santos SMS. Responsible for legislative compliance, observation of contractual obligations and the maintenance of resources to achieve the main objectives of the Field Development Protocol.
HSER Manager - Onshore	<ul style="list-style-type: none"> Reports to the Executive Vice President Onshore Oil and Gas. Accountable to ensure awareness of the compliance requirements of the Field Development Protocol. Ensures adequate resources are available to advise on the implementation of the Field Development Protocol and to undertake assurance of compliance in its implementation.
D&C Project Lead or D&C Manager	<ul style="list-style-type: none"> Responsible for the drilling and development of the well to operational handover. Ensures the environmental performance of the project is consistent with the conditions of approval Santos SMS during drilling & completions activities. Responsible for legislative compliance, observation of contractual obligations and monitoring contractor risk controls and assurance activities to achieve the main objectives of the Field Development Protocol.
Team Leader Narrabri Operations	<ul style="list-style-type: none"> Reports to the Area Manager, Arcadia, Scotia and Narrabri Operations. Maintains accountability, either directly or by delegation, for the overall management of the Project site and the operation of Project components. Retains responsibility for the conveyance of the Field Development Protocol and its objectives to all employees and contractors entering site.
Team Leader Environment -	<ul style="list-style-type: none"> Reports to the HSER Manager - Onshore.

Position	Responsibility
Onshore	<ul style="list-style-type: none"> • Maintains responsibility for the implementation, maintenance and monitoring of compliance with the Field Development Protocol. • Advises operations, development and drilling & completions management on environmental issues. • Reviews contractor HSE and EMP documentation (where applicable).
Environmental Advisor	<ul style="list-style-type: none"> • Reports to the Team Leader Environment - Onshore. • Maintains accountability for the monitoring of compliance with the Field Development Protocol. • Advises operations field staff on environmental issues. • Responsible for assessing, developing and validating the implementation of erosion and sediment plans. • Undertakes site inspections.
Construction Field Supervisor	<ul style="list-style-type: none"> • Reports to the Construction Manager, Development. • Responsible for ensuring implementation of the Field Development Protocol during construction phase. • Communicates the Field Development Protocol compliance during construction phase.
Santos personnel and contractors	<ul style="list-style-type: none"> • Undertake all activities in accordance with the Field Development Protocol. • Undertake site inspections. • Undertake all activities in accordance with the full suite of approved EMPs.

3. Compliance

3.1 Relevant legislation

The siting of new infrastructure associated with the Project will comply with relevant Commonwealth and New South Wales legislation and approvals, including but not limited to relevant sections of the:

- EP&A Act;
- *Petroleum (Onshore) Act 1991* (NSW) (**PO Act**);
- *National Parks and Wildlife Act 1974* (NSW) (**NP&W Act**);
- *Biodiversity Conservation Act 2016* (NSW) (**BC Act**);
- *Protection of the Environment Operations Act 1997* (NSW) (**POEO Act**); and the
- *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (**EPBC Act**);

3.2 Santos Management System

Santos will use its company-wide Santos Management System (**SMS**), which provides a structured framework for effective environmental and safety practice across all Santos activities and operations. The implementation of the SMS will assist in compliance with the Protocol, the Field Development Plan and all other management plans and protocols to minimise environmental impacts.

The SMS is maintained in electronic form on the Santos intranet that is accessible to all employees. Management standards have been developed as part of the SMS and define the requirements necessary to systematically manage environmental, cultural heritage, health and safety risks. Santos has a Contractor Management Standard that outlines requirements for contractors to include their own health, safety and environment management systems that meet or exceed the SMS standards.

3.3 Management plans and procedures

Management plans have been developed to incorporate Commonwealth and State regulatory requirements. These plans also incorporate the Santos corporate values, policies and the SMS into Project-level documents that set out measures and commitments to manage the risk of adverse impacts to environmental values. Table 6.1 in section 6 details the key management plans that have been developed for the Project. Note that some of the plans are not relevant to or required for Phase 1, and these will be developed for the relevant subsequent phase(s).

3.4 Field Development Plan

As required by consent conditions B4 and B5, a Field Development Plan will be prepared prior to the construction of any gas field infrastructure. This will be in consultation with relevant landholders and stakeholders, including the EPA, the BCS¹, DPE Water, the Resources Regulator, Council, the Community Consultation Committee (**CCC**), the Water Technical Advisory Group, the Greenhouse Gas Emissions Advisory Group, the Aboriginal Cultural Heritage Advisory Group and the Biodiversity Advisory Group.

¹ The Biodiversity, Conservation & Science directorate within DPE (formerly the Biodiversity Conservation Division.)

The Field Development Plan will include detailed plans of existing gas field infrastructure in the Project area, and proposed gas field infrastructure to be developed under the Field Development Plan, and provide detailed consideration of the proposed gas field infrastructure against the provisions of the Field Development Protocol. Further details on the Field Development Plan are provided in section 5.4.

Note that the Field Development Plan is referred to as the Plan of Operations in the EIS.

4. Landholder engagement

Landholder engagement and consultation is an important component of all stages of the Project. Gas wells will only be drilled on a landholder's property where there is a land access agreement in place negotiated in accordance with the *Agreed Principles of Land Access* (available at <https://narrabrigasproject.com.au/uploads/2014/08/Agreed-principles-of-land-access.pdf>).

The *Agreed Principles of Land Access* is an agreement on access to private agricultural landholder's property (the Landholders) for coal seam gas drilling operations for exploration and production purposes (the Operations). It has been signed by Santos, AGL and landholder representatives from the NSW Farmers Association, Cotton Australia Ltd, the NSW Irrigators Council, the Country Women's Association and Dairy Connect.

A Land Access Agreement will be required with each landowner before infrastructure may be located on the landholder's property. Due to the specific nature of the activities that may be proposed on each landholder's property and the localised issues that may be identified during the landholder consultation process, landholder consultation and land access agreements do not form part of this Protocol.

Property Management Plans (referred to as Farm Management Plans in the EIS commitments), included as part of the Field Development Plan, will be prepared in consultation with landowners upon which gas field infrastructure is proposed to be located, to manage impacts and access arrangements on the properties. The Property Management Plans will document planned activities and indicative timing of these for both the landholder and Santos to enable coexistence of activities to be managed effectively.

5. Field development

This Protocol applies for the life of the Project, for each stage of development throughout infrastructure planning and design, construction, operation, decommissioning and rehabilitation, and takes into account the following constraints:

- maximum ecological disturbance limits by vegetation community and for individual threatened flora and fauna (refer to CoC B43 tables 8, 9 and 10);
- cultural heritage including Aboriginal cultural heritage and non-indigenous heritage;
- unless a written agreement is in place with the relevant landholder, no Project infrastructure will be located within 200 m of an occupied residence on that property;
- watercourses and buffer width, as determined by Strahler stream order;
- flooding and geomorphology;
- noise; and
- identified sites (e.g. Yarrie Lake Reserve, Brigalow State Conservation Area, Brigalow Nature Reserve).

Field development is summarised in Figure 5.1 below and commences with a desktop review, then micro-siting in the field, finalising design and provision of the Field Development Plan to DPE for approval for each Phase. The final steps are implementation including management controls, and ongoing monitoring and auditing. The gas field development locational criteria, as defined in Table 1 of the CoC, are summarised in Table B1 of Appendix B, together with a number of relevant EIS commitments. The Field Development Plan will be reviewed and updated for each Phase of the Project and provided to DPE for approval prior to implementation. The Field Development Plan will further detail site-specific information for planned infrastructure, compliance with various constraints including direct impacts on vegetation communities, and include management and monitoring methods that will be implemented.

5.1 Exclusion areas and maximising avoidance

During the design and location of infrastructure for the Project, Santos will exclude certain sensitive areas, minimise overall disturbance, and maximises the use of areas within or adjacent to existing disturbance where practicable. This strategy includes but is not limited to:

- exclusion of Brigalow Park Nature Reserve from the Project area (and a 50 m buffer from the Brigalow Nature Reserve);
- exclusion of surface infrastructure from the Brigalow State Conservation Area (and a 50 m buffer from the Brigalow State Conservation Area);
- exclusion of surface infrastructure from Yarrie Lake Reserve (plus a buffer of at least 200 m from Yarrie Lake Reserve);
- avoidance of all currently known Aboriginal sites;
- placement of large ponds (for brine and produced water) and large dams in areas of low ecological sensitivity;
- the exclusion of non-linear infrastructure from riparian corridors (plus buffers);
- disturbance to the high ecological sensitivity class is limited to 0.5 % of total class area; and
- where reasonable and feasible, development planning will maximise the use of existing roads, tracks and previously disturbed corridors for construction, operational access and the placement of linear infrastructure (for example gas and water gathering systems).

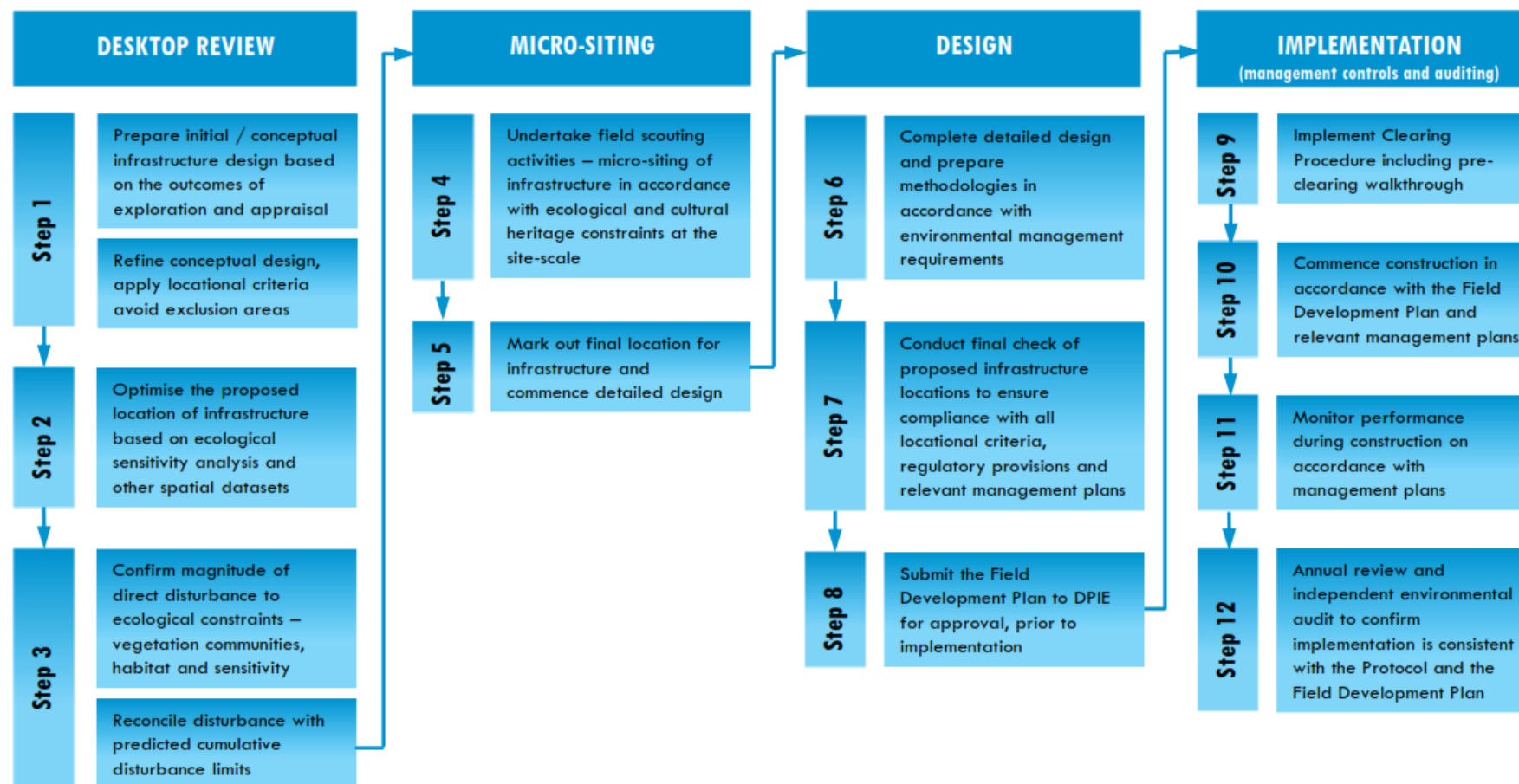


Figure 5.1 - Constraints planning process

5.2 Desktop review

The desktop review process, incorporating steps 1 to 3 below, optimises the location of infrastructure and environmental outcomes and identifies likely suitable development areas. The geographic information system (**GIS**) database that is utilised during desktop review includes:

- geologic features and knowledge of gas resources;
- ecological sensitivity mapping as described in section 7.1, as well as other ecological data;
- the location of known Aboriginal cultural heritage and historic heritage sites, described in section 9;
- existing access tracks and roads that can be used for the Project development, minimising development scope and disturbance through co-location;
- existing infrastructure including gas and water gathering and transmission pipelines, ponds, dams, electrical infrastructure and compression infrastructure;
- the location of surface water resources, riparian corridors and 1 % Annual Exceedance Probability (**AEP**) flood event levels; and
- sensitive receptors, which could potentially be impacted by noise or air emissions.

Step 1 – Define the next stage of development relative to exclusion areas (conceptual design)

This process involves the development of the initial conceptual infrastructure design and takes into account the gas resource, locational criteria, exclusion areas, existing infrastructure and other relevant information. The conceptual design of infrastructure also informs the land access negotiations.

Step 2 – Review of the proposed infrastructure against ecological and other spatial constraints

This step utilises the conceptual design from in Step 1 and seeks to optimise the placement of infrastructure using the ecological sensitivity class hierarchy (described in section 7.1) and the potential for impacts on other constraint classes. Initially, this process involves reviewing the proposed infrastructure locations relative to the ecological sensitivity maps. Through this process, infrastructure locations will be directed (where practicable) to less sensitive ecological classes in accordance with the general rules and specifications.

As detailed in the constraint matrix (Table 7.1), this will result in the majority of the well pads being located outside of high and moderately high ecological sensitivity classes (disturbance to the high ecological sensitivity class is limited to 0.5% of total class area), as detailed in Appendix J of the EIS. Linear infrastructure will be less constrained – development will be directed firstly to areas adjacent to existing linear infrastructure where practicable and/or the shortest feasible routes to minimise the total clearing required.

Where the total extent of clearing is similar between two potential options, linear infrastructure will be directed to the areas with the lowest aggregate disturbance of higher-order ecological sensitivity classes. Following optimisation for ecological sensitivity, consideration is given to the remaining constraints. Where necessary, the placement of infrastructure will be modified.

It is to be noted that Steps 1 and 2 are not mutually exclusive and are undertaken in parallel as an iterative process to ensure the infrastructure locations are optimised.

Step 3 – Review of cumulative disturbance against predicted estimates of disturbance

Step 3 involves reconciliation of the potential disturbance of each development stage against the predicted cumulative disturbance calculations for development. The reconciliation of potential disturbance provides a critical component of the framework for tracking of performance, as well as ensuring the conceptual design and optimisation described in Steps 1 and 2 above are maintained within the approved ecological disturbance limits over the life of the Project.

5.3 Micro-siting

Step 4 – In-field micro-siting

Micro-siting involves, amongst other things, ensuring compliance with all the relevant avoidance measures and constraints at the site-scale. Micro-siting seeks to further direct the development away from sensitive ecological and cultural features and involves field scouting of ecological features (such as threatened flora and hollow-bearing trees) and pre-clearance surveys for Aboriginal cultural heritage within the proposed area of the development. The micro-siting process will be conducted as follows:

Step 4a – Mark-out of the proposed layout of infrastructure within the development area.

Step 4b – Ecological site scouting of the marked-out area and buffer areas to survey for the presence of the high value ecological features, including threatened flora, significant fauna habitat features and hollow-bearing trees (see Table 5.1). For the purposes of the site scouting, the survey buffers will comprise an area approximately 50 m beyond the boundary on the one-hectare well pad sites and 6 m on either side of the 12 m linear infrastructure easements. Note, step 4b may be conducted prior to 4a marking up of the proposed layout of infrastructure for efficiency. The site scouting procedure is further described in section 6.2.1 of the Biodiversity Management Plan (**BMP**).

The hierarchical structure as presented in Table 5.1 will be applied to the relocation of infrastructure to avoid or minimise impacts on key features and attributes identified during micro-siting. Priority will also be given to avoiding exacerbation of edge effects, fragmentation and habitat connectivity, wherever possible, by minimising width of clearing, co-location with existing roads or infrastructure and using short direct routes. If an endangered ecological community is identified that was not mapped at that particular location (as part of the EIS), an attempt will be made to avoid the community. If avoidance is not possible, then the impact will count toward the upper disturbance limit for that endangered ecological community. For all other impacts, the upper clearing limits will be assessed as per the mapped plant community type.

Step 4c – The data collected during site scouting will be used to recommend refined infrastructure locations and alignments to maximise avoidance, whilst remaining within engineering limits for construction and operation. The data collected during site scouting will also be used to inform future desktop reviews (Steps 1 to 3).

Step 4d – Following completion of the ecological micro-siting component, a constructability scout will be performed to confirm the preferred refined infrastructure locations and alignments.

Step 4e – Following completion of the ecological micro-siting component and constructability scout, a cultural heritage pre-clearance survey will be conducted within the preferred refined infrastructure locations and alignments:

- this survey will be undertaken in accordance with the process described in section 5.8.5 of the Aboriginal Cultural Heritage Management Plan (**ACHMP**) and confirm the presence or absence of Aboriginal cultural heritage sites;

- all currently known sites will be avoided; and
- if Aboriginal cultural heritage sites are encountered in the recommended area then the survey area will extend to the original marked out area plus buffer in the vicinity of the find. The procedures outlined in the ACHMP will be implemented, including the avoidance commitments by Aboriginal site type. Where a repositioning of infrastructure to avoid Aboriginal cultural heritage features can be conducted without causing additional impact to ecological features and attributes, the alignment will be modified immediately. Otherwise, an iterative approach (a repeat of some or all of steps 4a to 4e) will be followed to position and reposition the infrastructure until a location can be determined that ensures overall ecological impact is minimised whilst fully complying with avoidance commitments by Aboriginal site type.

The cumulative ecological disturbance limits will then be verified. The Field Development Plan will include a trigger action response plan (TARP) to avoid exceedances of the various performance criteria. This is further addressed in section 5.4 below.

Table 5.1 - Ecological avoidance hierarchy in order of priority

Priority	Ecological feature of attribute	
1	Endangered Ecological Communities by listing status	
	Ranking (highest to lowest)	Status
	1	EPBC Act Endangered
	2	BC Act Endangered
2	Threatened flora species prioritised by listing status	
	Ranking (highest to lowest)	Status
	1	EPBC Act Critically Endangered
	2	BC Act Critically Endangered
	3	EPBC Act Endangered
	4	BC Act Endangered
	5	EPBC Act Vulnerable
	6	BC Act Vulnerable
3	Hollow-bearing trees prioritised by size class	
	Ranking (highest to lowest)	Size class (hollow)
	1	> 300 millimetres (mm)
	2	> 200 mm < 300 mm
	3	< 200 mm
4	Significant fauna habitat (e.g. Pilliga Mouse habitat, nests including stick nests for raptors, mistletoe, termite mounds, hollow logs and rock piles)	

Step 5 – Complete final survey and mark-out of the development area.

The final infrastructure locations and alignments will then be surveyed and delineated in the field. Delineation will be achieved through the installation and application of a combination of survey stakes and pegs, flagging tape and marking paint to identify the boundaries of the development area, the limits of clearing and any ecological features to be avoided or relocated.

5.4 Design

Step 6 – Detailed design and management control planning

Detailed designs and management practices for the proposed development are finalised after considering:

- constructability; and
- environmental and construction hazards and risks; and management controls (to mitigate potential impacts) and management practices (for example erosion and sediment controls).

Step 7 – Final check to verify compliance with all Project conditions and management plans

A final check for the proposed infrastructure locations to ensure compliance with locational criteria, regulatory conditions and management plans.

Step 8 – Prepare and submit a Field Development Plan

In accordance with CoC B4 and B5, prior to the construction of any gas field infrastructure, Santos will prepare a Field Development Plan for the applicable gas field infrastructure for each phase to the satisfaction of the Planning Secretary. This plan will:

- be prepared by a suitably qualified and experienced person/s;
- include detailed plans of existing gas field infrastructure in the Project area, and proposed gas field infrastructure to be developed under the Field Development Plan;
- include incremental and cumulative analysis of compliance with the locational criteria;
- provide detailed consideration of the proposed gas field infrastructure for each phase against the provisions of the Field Development Protocol. There may be multiple plans for each phase, with the Field Development Plan being revised and updated to reflect the scope of the proposed infrastructure, including wells, core holes, groundwater monitoring wells, gathering lines, roads, tracks, seismic surveys, flaring infrastructure, utilities and services;
- provide the results of all surveys undertaken as part of in-field micro-siting;
- describe the performance criteria to be implemented to ensure compliance with the water performance measures in Table 7 of the CoC, and to meet the rehabilitation objectives in Table 11 of the CoC, including a:
 - TARP to identify risks and actions to avoid exceedances of the performance criteria, including tiered triggers to provide for early detection of impacts; and
 - contingency plan that expressly provides for adaptive management where monitoring indicates that there has been an exceedance of the performance criteria, or where an exceedance appears likely;
- include site-scale ecological constraints maps, to quantify impacts/avoidance of impacts and reflect compliance with ecological disturbance limits set out in Tables 8, 9 and 10 of the CoC;
- include a:
 - Public Safety Management Plan, prepared in consultation with Rural Fire Service, the Forestry Commission of NSW and NSW Health, to ensure public safety and manage access in the Project area, including verification of minimum safe separation distances between all potentially hazardous facilities; and
 - Property Management Plans, prepared in consultation with landowners upon which gas field infrastructure is proposed to be located, to manage impacts and access arrangements on the properties.

Each Field Development Plan will be prepared in consultation with the:

- EPA, DPE Water, BCS, Resources Regulator, Heritage NSW and Council;
- owners of land not owned by Santos, upon which gas field infrastructure is proposed to be located;
- CCC;
- Water Technical Advisory Group;
- Greenhouse Gas Emissions Advisory Group;
- Aboriginal Cultural Heritage Advisory Group; and the
- Biodiversity Advisory Group.

The Field Development Plan will be submitted to DPE for approval prior to implementation. Digital spatial datasets of existing and proposed infrastructure will also be provided. Once approved, the Field Development Plan will be made publicly available on the Project website.

6. Implementation of management controls

The key strategies for management and mitigation of impacts, which will be documented within the Field Development Plan, include:

- implementation of **pre-clearance protocols for fauna management** to minimise and mitigate disturbance to fauna within the proposed development area (section 6.1);
- **construction management** techniques that minimise the extent and nature of disturbance. A broad range of management controls have been established to manage and mitigate the impacts of construction and operational activities (section 6.2);
- ongoing **rehabilitation, including partial rehabilitation**, to facilitate revegetation of disturbed areas and the return of ecological functions, or resume agricultural activities in developed areas (section 6.3);
- **monitoring of the performance** of the management methods and key environmental indicators, for example indirect impacts on biodiversity, water, noise, air quality (section 11.1); and
- **review and auditing** to assess the performance of this Protocol and facilitate modification if and when required (section 11. 2).

6.1 Implement pre-clearance protocols for fauna management

Pre-clearing and clearing procedures, including a pre-clearing walkthrough, have been developed to minimise potential impacts or risk to fauna during vegetation removal and are included in the BMP. The purpose of the procedures is to identify fauna occurrence in the proposed development area and encourage fauna to relocate outside of the development area prior to habitat clearing and to move fauna during clearing.

6.2 Implementation of management and construction controls

The general management and mitigation measures that will be utilised for the Project are summarised in section 6.2.1. In conjunction with the Field Development Plan, all activities will be undertaken in accordance with the EMS and the relevant management plans.

6.2.1 General management and mitigation measures

Relevant provisions of management plans will be implemented as appropriate throughout the constraints planning process as presented in Figure 5.1 and during construction, operation, rehabilitation and decommissioning. Relevant management plans include, but are not limited to, those summarised in Table 6.1. Each of the management plans listed in Table 6.1 provides in detail the relevant measures to be implemented as part of the infrastructure siting process described in this Protocol. For example, the ACHMP provides details regarding the cultural heritage pre-clearance survey and the site scouting procedures is fully described in the BMP.

Each of the management plans prepared for the Project also includes a program to monitor the effectiveness of each of the management measures, as required under CoC D3(f).

Table 6.1 - Management plan summary

Management Plan		Management strategies and approaches
Water Management Plan		Describes the measures to be implemented to ensure that Santos complies with the water management performance measures, and includes the following 10 sub-plans and protocols as the appendices:
Attachment 1	Erosion and Sediment Control Plan (ESCP)	Prepared in accordance with the Blue Book. Identifies details including but not limited to activities that could cause soil erosion, generate sediment or affect flooding; the location, function, and capacity of erosion and sediment control structures and flood management structures; and measures to manage any effects of soil erosion, sediment transport and flooding.
Attachment 2	A Site Water Balance	Includes details of the inflows and outflows in the Project area; sources and security of water supply for the life of the Project; water storage and treatment capacity; water use and management, including sharing and transfers; licenced discharge points; and reporting procedures, including the annual preparation of an updated site water balance.
Attachment 3	Surface Water Management Plan	Provides specific details on baseline data on surface water flows and quality of watercourses; the surface water management system; detailed plans, design objectives and performance criteria for water infrastructure; performance criteria; a program and procedures for monitoring, evaluation and reporting; and plan to respond to any exceedances of the performance measures or performance criteria, and repair, mitigate and/or offset any adverse surface water impacts of the development.
Attachment 4	Groundwater Management Plan	Provides details of baseline data of hydrogeology and groundwater levels, formation parameters and quality for groundwater resources; a description of the groundwater management and monitoring system; performance criteria, trigger and response levels; a program and procedures for monitoring, evaluation and reporting; and a plan to respond to any exceedances of the groundwater performance criteria, and repair, mitigate and/or offset any adverse groundwater impacts of the Project.
Attachment 5	Produced Water Management Plan (PWMP)	Provides detailed baseline data on produced water yield and quality, and includes but is not limited to details regarding the produced water management system; performance criteria, including trigger levels; and a program and procedures for monitoring, evaluation and reporting.
Attachment 6	Irrigation Management Plan (IMP)	Provides details on managing beneficial reuse of treated water for crop irrigation and stock watering, including details regarding site selection and assessment; agreements with third parties; baseline soil and groundwater conditions and quality; a protocol for operation of the irrigation management system; and measures to manage any effects on soils structure, erosion, groundwater quality and maintain a water balance.
Attachment 7	Dust Suppression Protocol	Provides details on managing beneficial reuse of treated water for dust suppression and construction activities including but not limited to details of site selection and assessment; baseline soil and groundwater conditions and quality; a protocol for operation of the dust suppression system; and measures to manage any effects on soils structure, erosion, surface water runoff, groundwater quality and groundwater levels.
	Managed Release Protocol	Not relevant for Phase 1, however brief description included as section 6 of the Produced Water Management Plan. Provides details on managing disposal of treated water to Bohena Creek, that includes but is not limited to details of water flows,

Management Plan		Management strategies and approaches
		quality and health; predicted plume dispersal; a protocol and detailed procedures for managed release; and measures to manage any effects of water quality, stream and riparian health, erosion and sedimentation and downstream flooding.
	Salt Management Plan	Not relevant for Phase 1, however brief description included as section 7 of the Produced Water Management Plan. Provides details on salt and other waste volumes and composition generated by the produced water management system; a program for investigating and implementing beneficial reuse options for the salt product; and a protocol and procedures for the full-cycle management of salt and salt-related waste products.
Attachment 8	Pollution Incident Response Management Plan	Prepared in accordance with the Protection of the Environment Operations (General) Regulation 2009 (POEO Regulation) and includes detailed procedures for responding to incidents, spills and leaks associated with the produced water management system; and a Dam Safety Emergency Plan for managing potential incidents and emergencies associated with produced water storages.
Aboriginal Cultural Heritage Management Plan (ACHMP)		Provides the framework for avoiding or minimising impacts from the Project on Aboriginal cultural heritage and promotes the responsible management of Aboriginal cultural heritage values in connection with the undertaking of the Project.
Biodiversity Management Plan		Provides the framework for the management of biodiversity values associated with the project. More specifically, the Biodiversity Management Plan describes the specific management actions required to avoid, minimise, mitigate, rehabilitate and offset impacts on these values. The Biodiversity Management Plan includes a Pest Plant and Animal Control Protocol.
Noise Management Plan		Outlines the strategies and procedures to manage noise requirements associated with the development, operation, decommissioning and rehabilitation of the Project.
Air Quality and Greenhouse Gas Management Plan		Note that this management plan is only required to be approved prior to the commencement of Phase 2. Provides details on the management and mitigation of air emissions during construction and operation to minimise any negative effect on air quality, and details the monitoring and reporting requirements associated with the potential air quality and greenhouse gas impacts of the Project.
Historic Heritage Management Plan		Provides details on the management and mitigation of historic heritage during construction and operation of the Project development to minimise any negative effect on historic heritage.
Fire Management Plan		Provides an ongoing management framework for preparedness and review of the Project's operational areas and its assets, and provides information on site responsibilities, actions, reporting requirements and resources required to ensure effective and timely preparedness is undertaken to prevent any potential bushfire incident or emergency.
Waste Management Plan		Provides a framework and suitable management measures to control and manage waste generated from the construction, operation and decommissioning of the Project.
Rehabilitation Management Plan		Provides a clear set of on-ground work methods, objectives and completion criteria for rehabilitation of each management domain (production wells, gathering systems and associated infrastructure and auxiliary sites). It contains detailed information on rehabilitation methods, schedules and monitoring methods based on the Project's rehabilitation strategy.

6.2.2 Management strategies for mitigation of impacts on terrestrial ecology

Management strategies (in no specific order) include the following:

- site inductions;
- clear demarcation of work areas and restricting access to designated access roads and corridors;
- installation of fauna friendly fencing and inspection of trenches;
- prohibition of domestic pets and observations of illegal hunting or collection;
- speed limitations and dust suppression;
- minimising driving during high fauna activity periods (i.e. from dusk through to dawn);
- minimising light spill;
- progressive rehabilitation;
- adequate storage and bunding of liquids and spill management procedures; and
- rubbish collection.

Additional management strategies, including wildfire control, noise control, air quality control, weed and pest control and the control of surface water runoff and erosion are described extensively in the respective management plans listed in Table 6.1.

6.3 Rehabilitation strategy

A Rehabilitation Management Plan has been prepared for the Project. Partial and progressive rehabilitation of the disturbed areas will occur as soon as practicable after the completion of both the relevant construction activities, and the assessment of the operational performance of the well or supporting infrastructure. Rehabilitation will be completed once all infrastructure has been fully decommissioned.

Unless Santos and the applicable authority agree otherwise, Santos will repair, or pay the full costs associated with repairing, any public infrastructure that is damaged by carrying out the Project. Santos will also relocate, or pay the full costs associated with relocating, any public infrastructure that needs to be relocated as a result of the Project, to the satisfaction of the applicable authority.

7. Ecological constraints categories

The potential constraints of the Project area from an ecological perspective are complex, including threatened flora, threatened fauna habitat, endangered ecological communities (**EECs**), high quality vegetation, regionally significant vegetation and large patch size. To present these constraints in a meaningful manner, an ecological sensitivity analysis (**ESA**) was developed as part of the EIS to identify the degree of ecological sensitivity, and hence constraint, to development.

The primary purpose of the ESA is to inform the selection of locations for well pads and associated infrastructure (such as access tracks, gas and water gathering systems, water balance tanks and telecommunications equipment) to maximise avoidance of areas of higher ecological sensitivity.

The ESA used available spatial data as well as new spatial data collected through field investigations and developed specifically for the Project to identify areas of sensitivity. Ecological criteria were identified and assigned rankings and weightings. The ESA then combined scores for the data, applied weightings, and modelled sensitivity indices. The following five relative sensitivity classes based on identified trends (clustering) in the sensitivity index were modelled:

- **Low** - areas that include a high degree of previous disturbance which impact on long term viability. Disturbance should be directed to these areas wherever possible;
- **Low to Moderate** - areas that exhibit effects of previous disturbance, or habitat values, which are of lower sensitivity in the regional context. Disturbance of these areas should be minimised at the site scale;
- **Moderate** - areas that exhibit some effects of previous disturbance, or habitat values which are or moderate sensitivity in the regional context. Disturbance of these areas should be minimised at the site scale;
- **Moderate to High** - areas that include a range of ecological values, including those listed under State or Federal legislation. Maximise avoidance on these areas whenever practical;
- **High** - areas which contain a combination of significant ecological values, including those listed under State or Federal legislation. Maximise avoidance on these areas whenever practical, with disturbance to this ecological sensitivity class limited to 0.5% of the total class area.

7.1 Ecological sensitivity and constraint categories

The key ecological sensitivity constraints for the Project are summarised in Table 7.1, with the definitions for the relevant activities as follows:

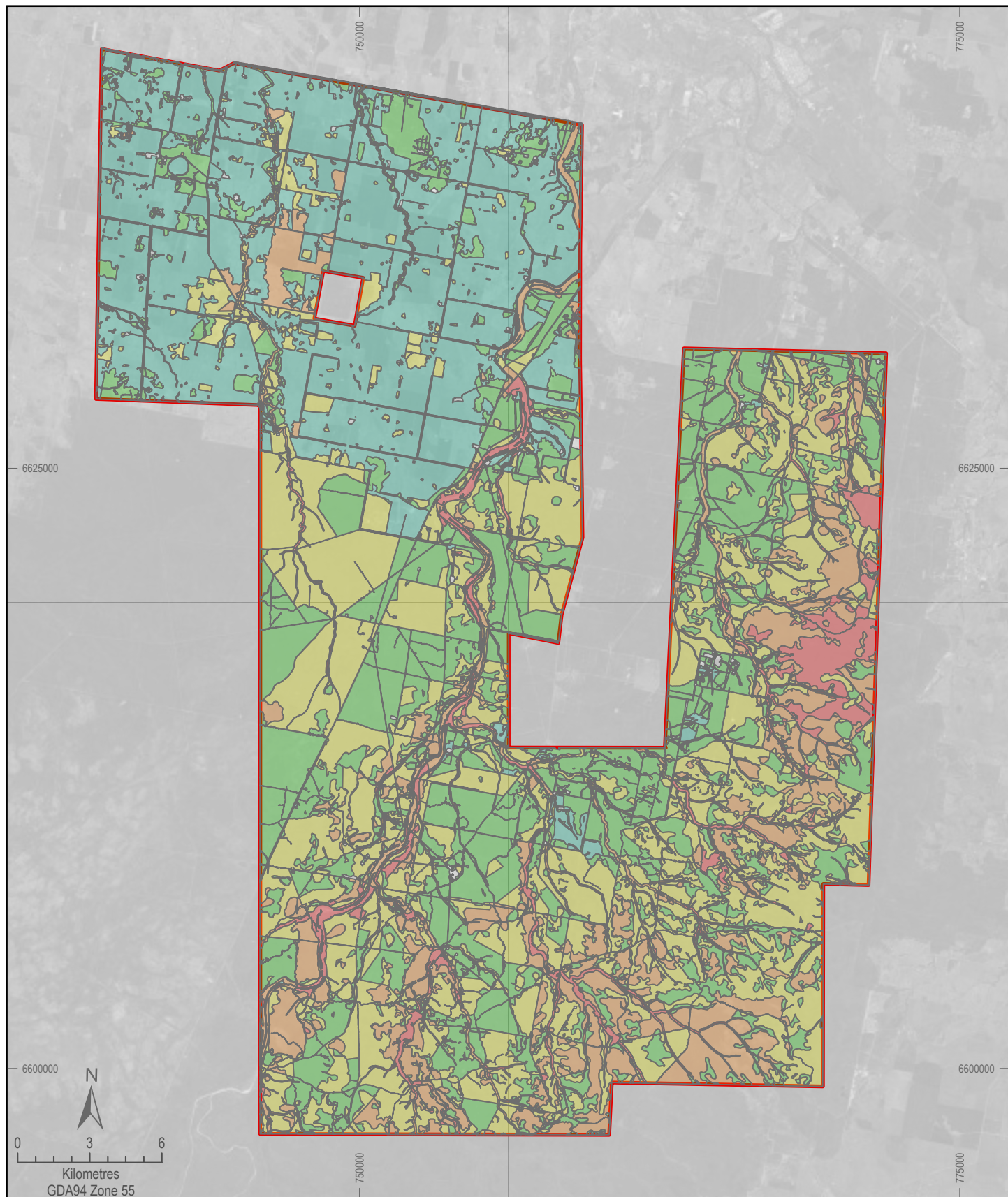
- **Support for planning** - monitoring including air quality, noise, ecological surveys, pests and weeds and cultural heritage surveys.
- **Non-linear infrastructure** - infrastructure including, but not limited to, exploration and production wells, field compressor stations, dams, ponds, communications towers, water tanks/balance tanks, flares, irrigation areas (and associated infrastructure) and maintenance facilities.
- **Linear infrastructure** - infrastructure including, but not limited to, gas and water gathering lines, low and medium pressure gas and water pipelines/water trunk lines, access tracks, power lines, communication lines and other service lines.
- **Large ponds and dams** - ponds and dams greater than 1 megalitres (ML) capacity.

Ecological sensitivity classes for the Project area are presented in Figure 7.1.

Table 7.1 - Ecological constraints matrix

Constraint category	Prohibited activities	Permitted activities	Ecological Sensitivity / Constraints Class
No-go area	Petroleum activities are prohibited in this area.	NIL	Nature reserves, national parks, Aboriginal areas ²
Surface development exclusion area	Linear infrastructure Non-linear infrastructure Large ponds and dams	Support for planning	State conservation areas Yarrie Lake Reserve
High constraint area	Large ponds and dams	Support for planning Linear infrastructure Non-linear Infrastructure	High Moderate-High Note: Ecological disturbance limits and siting of infrastructure process apply. Disturbance to high ecological sensitivity class limited to 0.5% of total class area
Moderate constraint area	Large ponds and dams	Support for planning Linear infrastructure Non-linear infrastructure	Low-moderate Moderate Note: Ecological disturbance limits and 'siting of infrastructure' process apply
Low constraint area	No prohibited activities	Support for planning Linear infrastructure Non-linear infrastructure Large ponds and dams	Low ecological sensitivity Note: Ecological disturbance limits apply where relevant

² Cultural heritage sites as listed in Schedule 3 of the ACHMP will be avoided. For certain site types as identified in Schedule 4 of the ACHMP, if it is not practicable to re-site the infrastructure, then Santos will adopt a range of management measures, including maximising avoidance and artefact relocation.



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NGP boundary

Sensitivity Classes

- Low
- Low-Moderate
- Moderate
- Moderate-High
- High

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Figure 7.1
Ecological Sensitivity Analysis

8. Ecological constraints disturbance limits

The Project consent provides a total maximum disturbance on vegetation communities, and as estimated by modelling threatened flora and habitat. The development planning and execution maintains the Project under these defined limits, in accordance with the Protocol.

8.1 Disturbance limits

The disturbance limits, direct impacts, are the maximum amount of each native vegetation community or threatened flora that was proposed to be cleared for the Project. Direct impacts considered for the assessment were vegetation removal, habitat removal and removal of threatened flora individuals.

Approval has been obtained for a maximum of 988.8 hectares of new disturbance of native vegetation, including derived native grassland. The approved maximum disturbance of each vegetation community is presented in Table D1 in Appendix D, which is a direct reproduction of CoC B43 Table 8. The maximum disturbance is displayed as both hectares removed, and also as a percentage of the plant community type to be removed within the Project area.

The disturbance limits for the threatened flora species and threatened fauna species (as modelled by vegetation community) is presented respectively in Tables D2 and D3 in Appendix D. These tables are a direct reproduction of Tables 9 and 10 in CoC B43.

Given the extensive ecological survey effort conducted to support the assessment of the Project (prior to submission of the EIS), it is considered highly unlikely that a previously undetected threatened ecological community or species, listed at the time of the development consent, will be identified in micro-siting areas. In the unlikely event that this does occur, these entities will be avoided. Micro-siting activities allow for flexibility in project design, through exploration of alternative routes or placement options to provide opportunities for avoidance of impact to threatened species. If it is not possible to avoid previously undetected threatened ecological communities or species, the development consent will need to be modified prior to impacting these entities. This does not apply to species listed after the date of consent.

The reporting framework to manage and document upper disturbance limits includes the Annual Review and the regular independent environmental audits, as detailed in sections 12.1 and 12.3 respectively. The process of monitoring direct impact on flora and fauna is described in the BMP, and the Field Development Plan.

8.2 Ecological impact assessment

A comprehensive impact assessment, which considered the terrestrial ecological values of the Project area, was undertaken as part of the EIS. The impact assessment used multiple data sources including existing mapping layers and light detection and ranging datasets, which were supported by extensive targeted field surveys and mapping to develop a robust baseline dataset.

A series of technical reports were produced as part of the terrestrial ecological assessment, which provide a detailed description of the assessment methodologies and findings. All reports are listed in Appendix C of the EIS.

9. Cultural heritage constraints

9.1 Aboriginal cultural heritage

Santos will avoid all currently known Aboriginal sites and objects, presented in Figure 9.1. This figure is a direct reproduction of Figure 11 in Appendix 7 of the consent. Santos will also implement avoidance strategies by site type, as detailed in Schedule 3 and Schedule 4 of the ACHMP.

For all currently known sites, and for the most sensitive site types identified during the pre-clearance survey, complete avoidance will be applied, and no infrastructure will be located in that area. For other sites, avoidance will be maximised and where the site cannot be avoided, artefacts may be relocated.

In advance of petroleum activities as part of the field micro-siting process, cultural heritage pre-clearance surveys will be undertaken with representatives of the Aboriginal community accordance with the ACHMP. Unless otherwise approved in a Field Development Plan, Santos will not disturb any other Aboriginal cultural heritage items identified during the development if assessed in a Field Development Plan to be of high significance.

9.2 Historic heritage

There have been 53 potential historic heritage sites identified within the Project area, primarily associated with past logging activities. The majority of sites were found to be of local significance as part of a collection, referred to as the Pilliga East Logging Cultural Landscape, that can demonstrate the pattern and course of the development of logging in the forests. In addition, a number of other sites of heritage significance were identified. These sites have been classified as surface development exclusion areas in order to preserve their heritage significance and are listed in Table 9.1. Note that there are multiple heritage sites in the majority of the identified areas. The locations are shown in Figure 9.2.

Support for planning activities (e.g. monitoring air, noise, water, ecology etc.) that do not result in disturbance to the surface of the site may be undertaken without impacting the heritage significance. Potential historic heritage sites that are identified during site surveying or micro-siting will be managed in accordance with an unexpected finds procedure provided in the Historic Heritage Management Plan. This will include adding the location of the site to the GIS layers, creation of an inventory sheet recording the features and components of the site and protocols and criteria for determining mitigation measures required. Santos will not disturb any other historical heritage items identified during the development, unless otherwise approved in a Field Development Plan.

Further information on each of the previously identified sites is provided in the Historic Heritage Management Plan.

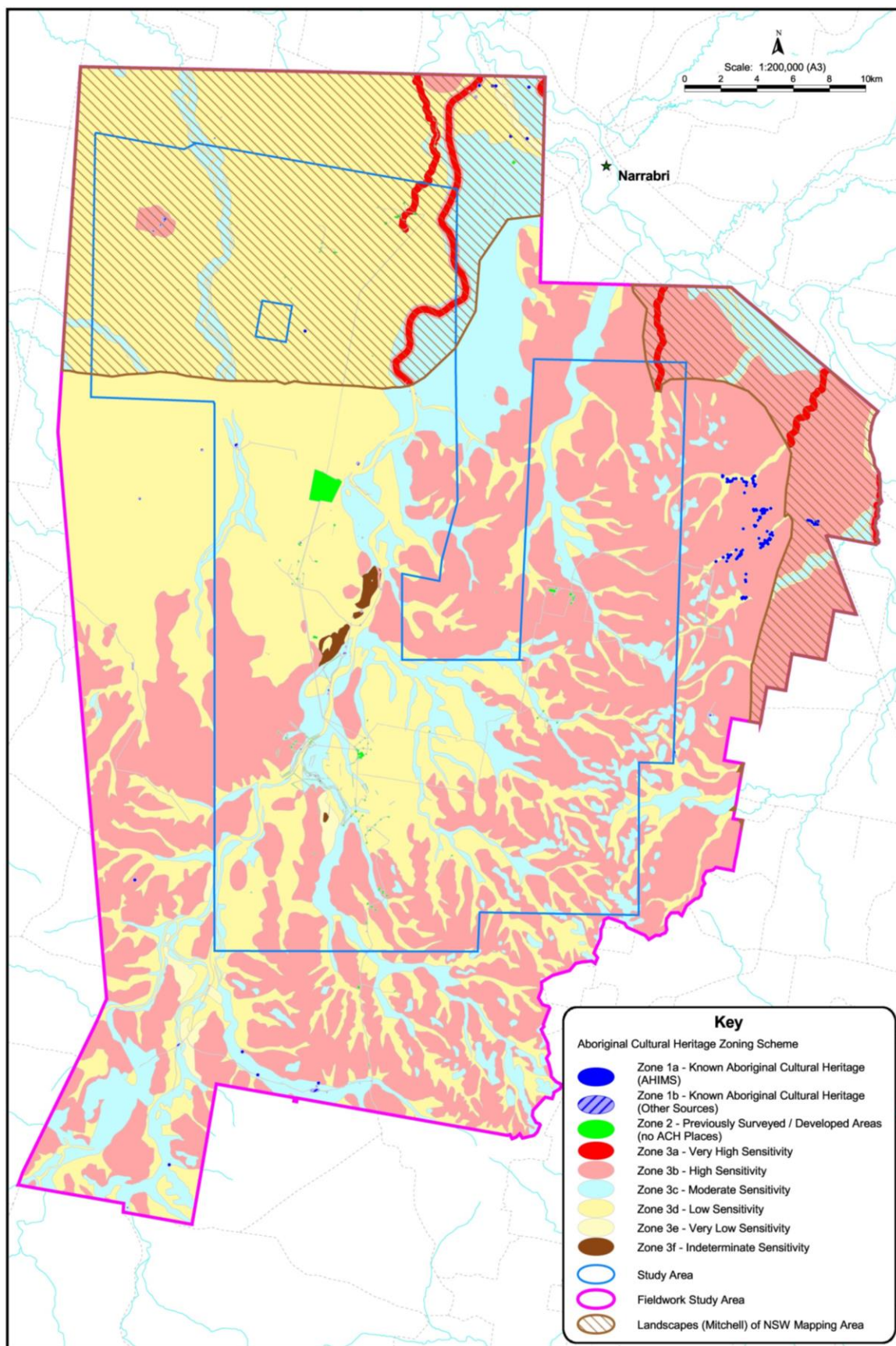


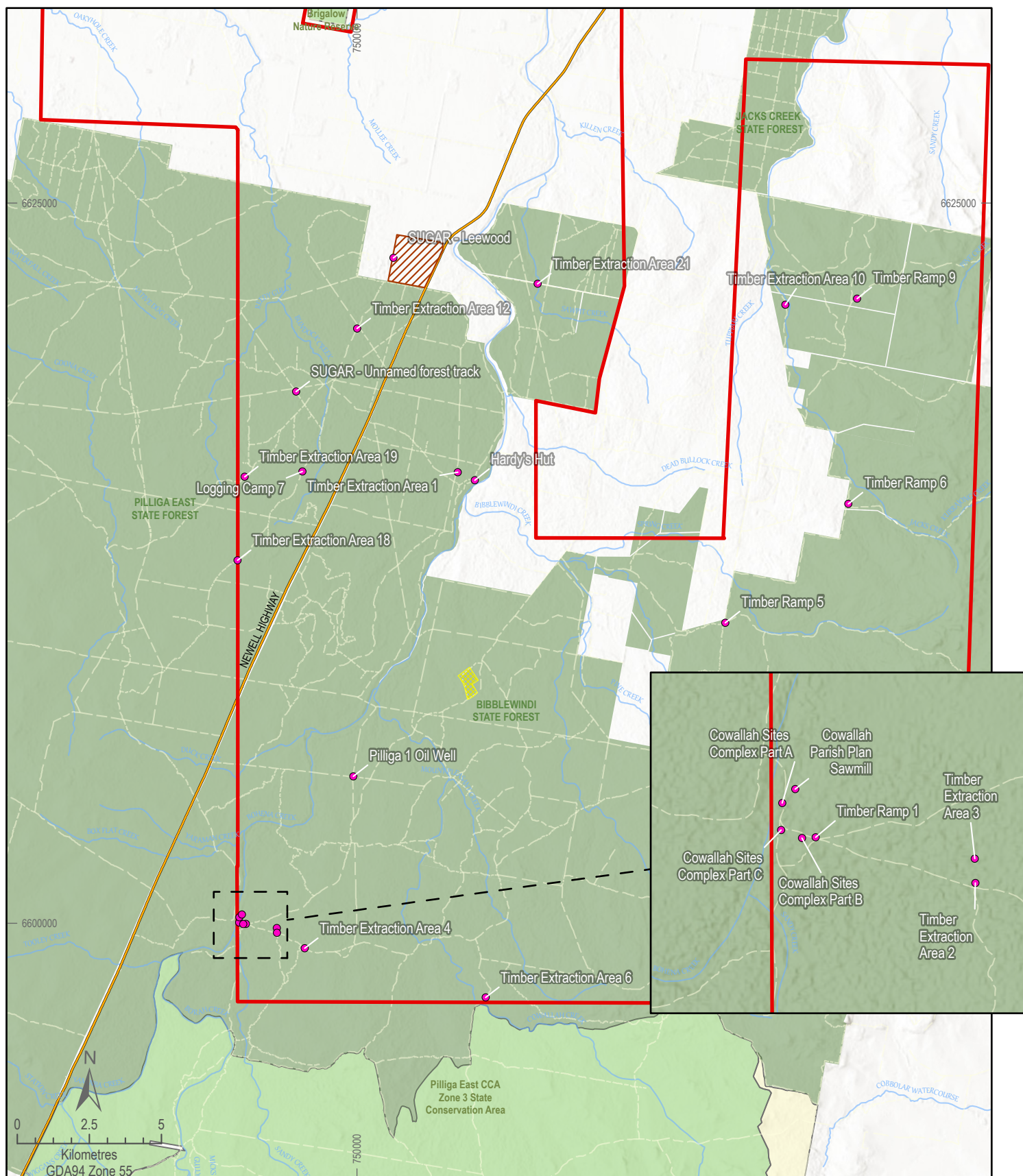
Figure 9.1 - Aboriginal heritage sites

Table 9.1 - Historic heritage surface development exclusion areas

Area No.	Heritage sites	Non-linear infrastructure	Linear infrastructure	Large ponds and dams	Support for planning
1	Cowallah Parish Plan Sawmill	Surface: prohibited Sub-surface: permitted	Prohibited	Prohibited	Permitted
2	Logging Camp 7	Surface: prohibited Sub-surface: permitted	Prohibited	Prohibited	Permitted
3	Cowallah Sites Complex	Surface: prohibited Sub-surface: permitted	Prohibited	Prohibited	Permitted
4	Hardy's Hut	Surface: prohibited Sub-surface: permitted	Prohibited	Prohibited	Permitted
5	Pilliga 1 Oil Well	Surface: prohibited Sub-surface: permitted	Prohibited	Prohibited	Permitted
6	SUGAR pits (2) – (Leewood and Plumb Rd/No Name Road intersection	Surface: prohibited Sub-surface: permitted	Prohibited	Prohibited	Permitted
7	Timber extraction areas 1, 2, 3, 4, 6, 10, 12, 18, 19 and 21	Surface: prohibited. Same site type may be substituted if unavoidable ^a Subsurface: permitted	Prohibited. Same site type may be substituted if unavoidable ^a	Prohibited. Same site type may be substituted if unavoidable ^a	Permitted
8	Timber loading ramp 1, 5, 6, 9 and ramp associated with timber extraction area 19	Surface: prohibited. Same site type may be substituted if unavoidable ^a Subsurface: permitted	Prohibited. Same site type may be substituted if unavoidable ^a	Prohibited. Same site type may be substituted if unavoidable ^a	Permitted

Notes:

a - The timber extraction areas and timber loading ramps are nominally listed as suggested sites to avoid surface disturbance. However, due to the similarity of the sites across the Project area, if impacts are unavoidable at a listed timber extraction area or listed timber loading ramp, another site of the same type may be substituted without impacting the heritage significance of the collection of sites.



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- NGP boundary
- Leewood
- Bibblewindi
- Historic heritage sites (surface development exclusion zones)
- Highway
- Roads and tracks
- Watercourse
- State Forest
- Aboriginal areas
- Parks and reserves

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Figure 9.2

Historic Heritage Surface Exclusion Zones

10. Additional constraints

10.1 Constraints for nature reserves, national parks and Aboriginal areas

Petroleum activities are not permissible within the NP&W Act reserve categories of national parks, historic sites, nature reserves and Aboriginal areas. As per Section 62 of the Act, lands within an Aboriginal area shall be deemed to be reserved for the purpose of preserving, protecting and preventing damage to Aboriginal objects or Aboriginal places therein. There are no Aboriginal areas within the Project footprint.

The Brigalow Park Nature Reserve has been excluded from the Project area and no petroleum activities will occur in this area. No surface infrastructure will be located within 50 m from the Brigalow Park Nature Reserve boundary.

10.2 State conservation areas

The Brigalow State Conservation Area is located within the Project area. The Brigalow State Conservation Area is gazetted to a depth of 100 m. It is a designated surface development exclusion zone for the Project, including a buffer of at least 50 m. No surface infrastructure will be located within the State Conservation Area and the buffer. Any wells drilled under the Brigalow State Conservation Area from outside of the buffer area must be at least 110 m deep under the State Conservation Area.

10.3 Residences

Unless a written agreement is in place with the relevant landholder, and a copy of the agreement has been forwarded to the Planning Secretary, no Project-related infrastructure will be located within 200 m of any residence (occupied or otherwise). Note that for telecommunication towers, as addressed in section 10.8, this distance is 500 m, although no telecommunication towers are approved to be constructed as part of Phase 1.

If previously unidentified land contamination or sources of potential land contamination are encountered, the landholder will be notified and the contamination will be avoided as far as practicable.

10.4 Biophysical strategic agricultural land

No biophysical strategic agricultural land is located within the Project area. A site verification certificate acknowledging the absence of biophysical strategic agricultural land in the Project area was issued by the (then) NSW Department of Planning and the Environment on 1 December 2015, a copy of which is included in Appendix I2 of the EIS. On this basis, no constraints are proposed.

10.5 Watercourses

Watercourses in the Project area have been mapped at a scale of 1:15,000. Stream order was assigned to each watercourse in accordance with the Strahler (1952) system. To account for the need to include channel widths as part of the total riparian corridor width, top of bank was digitised for watercourses with larger channels that could be identified at a scale of 1:15,000, including all 5th and 6th order watercourses. For all other watercourses, an average channel width was applied based on their stream order. Average channel widths for 1st to 4th order streams were determined by identifying the average channel width for 10 % of the watercourses within each of these classes. The average channel width was identified by measuring the width of the top of bank at a number of locations along each reach. The average widths for 10 % of each stream order class were then combined and a mean determined for each class. Riparian corridors were determined in accordance with the riparian corridors shown in Figure 10.1, with corresponding buffer zones detailed in Table 10.1, consistent with the *NSW Guidelines for riparian corridors on waterfront land* (NSW Office of Water, 2012). Non-linear infrastructure and large ponds and dams will be excluded from these buffers.

Table 10.1 - Riparian corridor widths

Strahler Order	Riparian buffer zones
1 st order	20 m plus channel width
2 nd order	40 m plus channel width
3 rd order	60 m plus channel width
4 th order and greater	80 m plus channel width

In accordance with commitment 4.3 in the EIS Chapter 31 (as updated in Appendix B of the Response to Submissions), Santos will, where practical, select watercourse crossing points after consideration of the following:

- use existing vehicular crossings;
- locate the crossing points on straight sections of channel; and
- maximise avoidance of steep, unstable banks, permanent pools and waterholes for crossing points.

10.6 Flooding and geomorphology

Flood analysis over the Project area has been carried out for a 1 % AEP. Large ponds and dams, and any ponds or dams that are used for the storage of produced water or brine, will be located outside of the 1 % AEP flood extent to ensure long term protection of these assets and to minimise impact from the Project on surface flow during large flood events. All other infrastructure and activities located in accordance with the Protocol will be designed and installed to ensure that where they occur within the 1 % AEP, there will be negligible modification of flows and necessary sediment and erosion controls will be implemented, with no ongoing impacts to geomorphology. Activities within the 1 % AEP will be planned and constructed in accordance with the Project commitments and mitigations, and the ESCP.

Figure 10.2 shows the maximum flood levels for a 1 % AEP flood event in the Project area.

10.7 Infrastructure siting and well pad spacing

No telecommunications towers will be constructed within 500 m of any residence (occupied or otherwise) unless agreed with the landowner, and a copy of this agreement has been forwarded to the Planning Secretary. Note that no telecommunication towers are approved to be constructed as part of Phase 1.

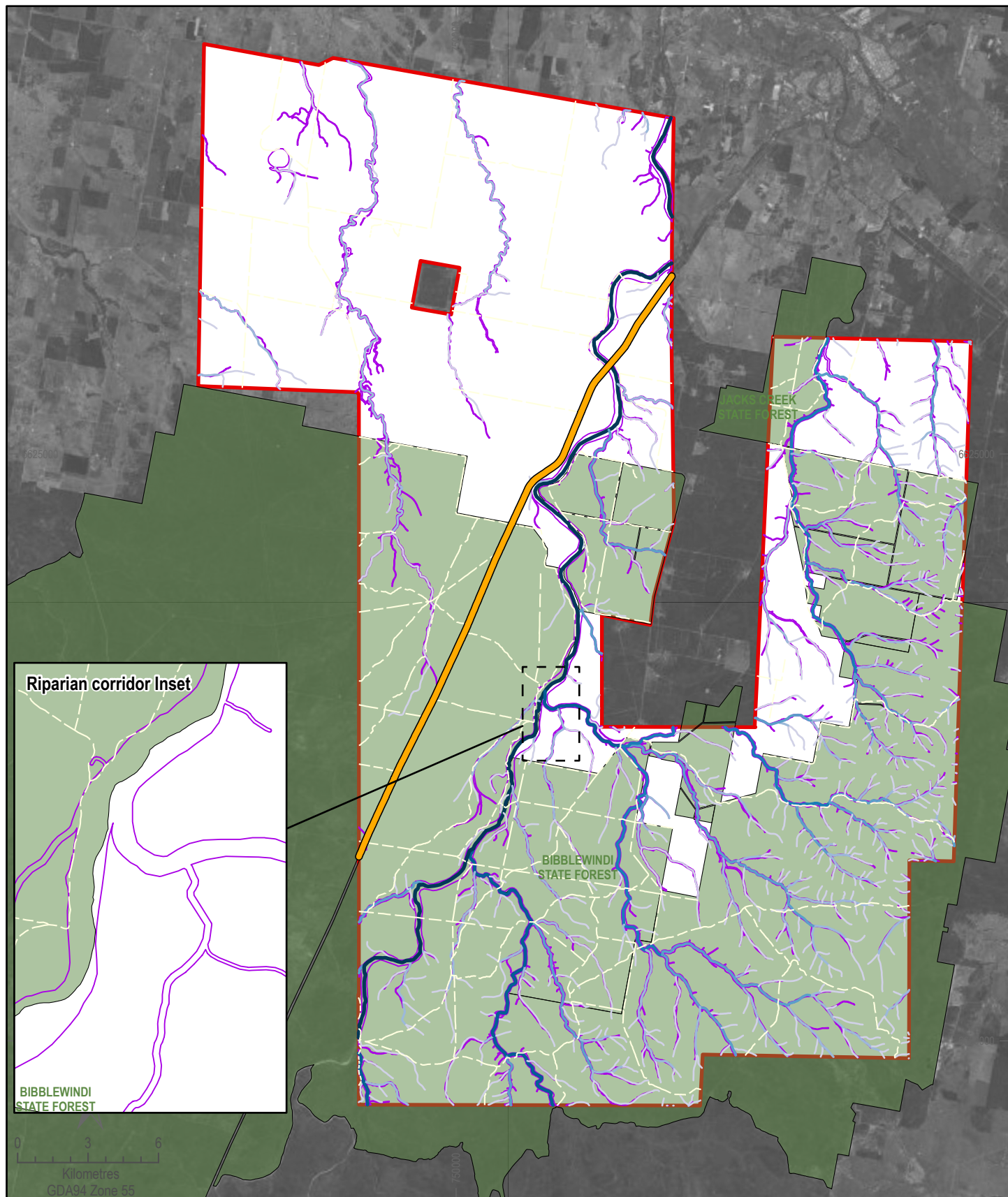
Minimal Project infrastructure will be located in travelling stock routes, and the NSW Local Land Services will be consulted regarding the location of any Project infrastructure in this respect.

The spacing between production well pads will be at least 750 m. They will be sited based on surface geography, coal physical and chemical properties, environmental constraints, land access arrangements and subsurface characteristics. The spacing between pilot / appraisal well pads will be at least 250 m. All pilot wells can later be converted to production wells³.

10.8 Production well pads and neighbouring properties

No pilot or production well pads will be located within 200 m of any privately-owned land or other land not owned by Santos, unless otherwise agreed with the landowner, and a copy of this agreement has been forwarded to the Planning Secretary.

³ A modification to the development consent will be required to convert pilot/appraisal wells to production wells, if spacing of the pads is less than 750 m.



Santos

LEGEND

- ▬ NGP boundary
- ▬ State Forest
- ▬ Highway
- ▬ Roads

Strahler Stream Order

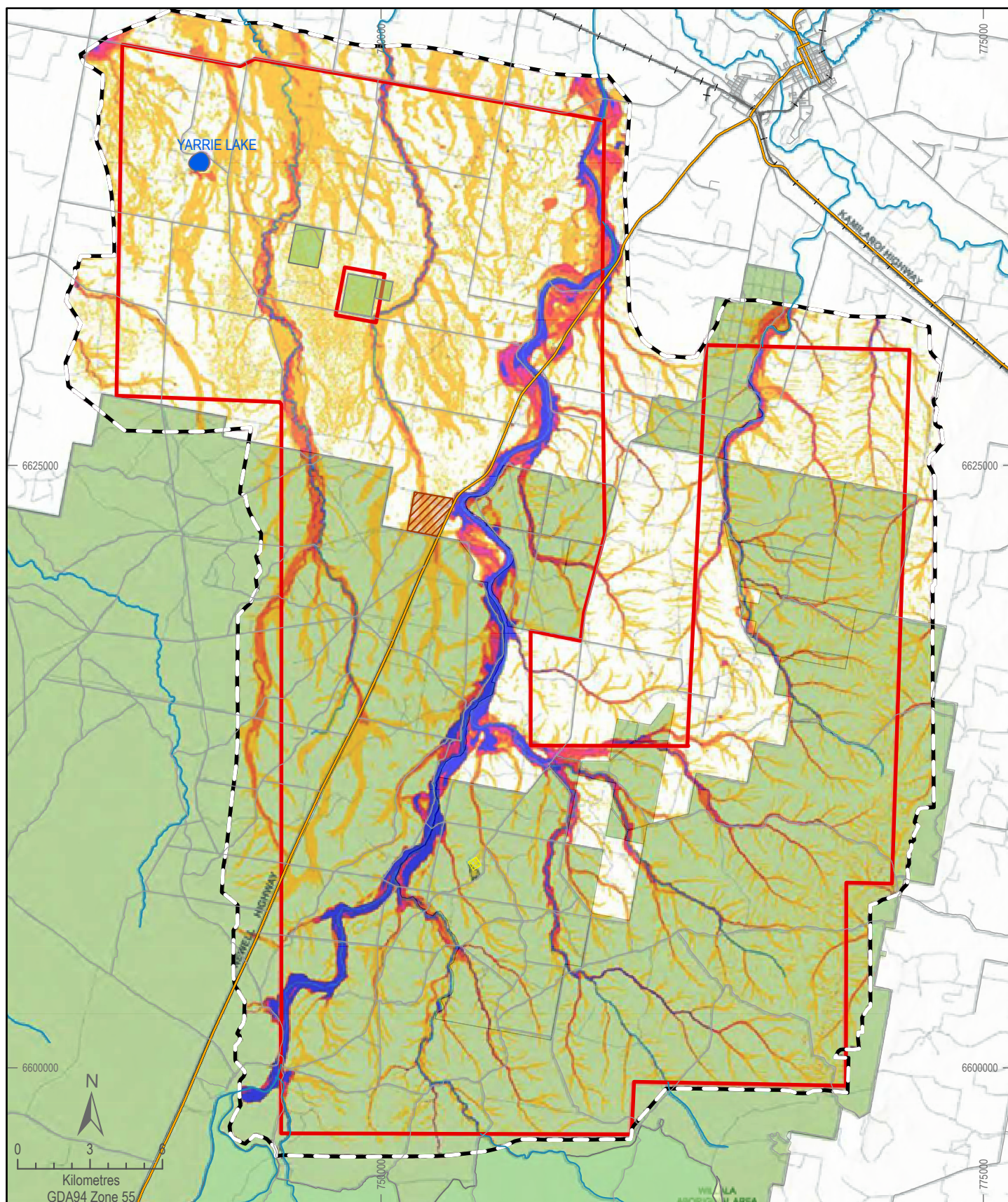
- ▬ 0 - 1
- ▬ 2
- ▬ 3
- ▬ 4
- ▬ 5
- ▬ 6
- ▬ Riparian corridors (to scale)

ONWARD
CONSULTING

NARRABRI GAS PROJECT

Figure 10.1

Mapped Riparian Corridors



Santos

ONWARD
CONSULTING

LEGEND

- NGP boundary
- Leewood
- Bibblewindi
- TUFLOW model extent
- Highway
- Roads

- Railway
- Watercourses
- Aboriginal areas
- Parks and reserves
- Lakes and dams
- State Forest

Maximum flood depth (m)

- 0.00 - 0.50
- 0.5 - 1.00
- 1.00 - 1.50
- 1.50 - 2.00
- >2

NARRABRI GAS PROJECT

Figure 10.2
Existing Maximum Flood Depth for
One Per Cent AEP Event

10.9 Constraints for noise

Noise impacts during construction and operation are considered a constraint for the Project and are summarised in Tables 10.2, 10.3 and 10.4. These levels will be measured in accordance with the *NSW Industrial Noise Policy* (EPA, 2000), with the exception of applying appropriate modifying factors for low frequency noise during compliance testing which will be undertaken in accordance with Fact Sheet C of the *NSW Noise Policy for Industry* (EPA, 2017).

Standard construction hours are between 7 am and 6 pm Monday to Friday, and from 8 am to 1 pm on Saturday. Note that in accordance with consent condition B11, the constraints in Tables 10.2, 10.3 and 10.4 will not apply at privately owned residences if an agreement is in place with the landholder to exceed the noise criteria, and Santos has advised the Planning Secretary in writing of the terms of the agreement.

Further details regarding the management of noise through a range of avoidance, mitigation and management methods are outlined in the Noise Management Plan.

As outlined in section 3.3 of the Noise Management Plan and in accordance with commitment 10.3 in the EIS Chapter 31 (as updated in Appendix B of the Response to Submissions), if vibration-generating activities are to be undertaken in the vicinity of occupied residences or buildings, Santos will develop and implement a Vibration Management Plan.

10.9.1 Construction during standard hours

Santos will implement all reasonable and feasible measures to ensure that the noise generated by Phase 1 construction activities during standard construction hours - including the cumulative noise generated by the Project and noise from the Wilga Park Power Station and ancillary activities in the Project area - does not exceed the criteria in Table 10.2.

Table 10.2 - Construction noise criteria during standard hours

Noise Assessment Location	During standard construction hours
All privately owned residences	40 L_{Aeq} (15 min)
Yarrie Lake, Brigalow State Conservation Area, Brigalow Nature Reserve	50 L_{Aeq} (period)

10.9.2 Construction outside standard hours

Santos will ensure that the noise generated by the Project, including the cumulative noise generated by the Wilga Park Power Station and ancillary activities in the Project area, but excluding Phase 1 construction activities during standard construction hours, and non-routine safety flaring operations - will not exceed the criteria in Table 10.3.

Table 10.3 - Construction noise criteria outside standard hours

Noise Assessment Location	Day	Evening	Night	Night
	L _{Aeq} (15 min)	L _{Aeq} (15 min)	L _{Aeq} (15 min)	L _{A1} (1 min)
All privately owned residences	35	35	35	45
Yarrie Lake, Brigalow State Conservation Area, Brigalow Nature Reserve	50 L _{Aeq} (period)			-

10.9.3 Operational phase

The noise generated by the Project, including the cumulative noise generated by the Wilga Park Power Station and ancillary activities in the Project area, but excluding Phase 1 construction activities during standard construction hours, and non-routine safety flaring operations - must not exceed the criteria in Table 10.4.

Table 10.4 - Operational noise criteria

Noise Assessment Location	Day	Evening	Night	Night
	L _{Aeq} (15 min)	L _{Aeq} (15 min)	L _{Aeq} (15 min)	L _{A1} (1 min)
All privately owned residences	35	35	35	45
Yarrie Lake, Brigalow State Conservation Area, Brigalow Nature Reserve	50 L _{Aeq} (period)			-

10.10 Constraints for air emissions

Air quality impacts during construction and operation are considered a constraint for the Project. Santos will ensure that all reasonable and feasible avoidance and mitigation measures are employed so that air emissions generated by the Project do not cause exceedances of the criteria listed in Table 10.5 at any residence on privately-owned land. These levels will be measured with the relevant requirements and exemptions of the *Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales* (EPA, 2007).

Table 10.5 - Air quality criteria

Pollutant	Averaging period	Criterion
Particulate matter < 10 µm (PM ₁₀)	Annual	^{a, c} 25 µg/m ³
	24 hour	^b 50 µg/m ³
Particulate matter < 2.5 µm (PM _{2.5})	Annual	^{a, c} 8 µg/m ³
	24 hour	^b 25 µg/m ³

Pollutant	Averaging period	Criterion
Total suspended particulate (TSP) matter	Annual	^{a, c} 90 µg/m ³
Nitrogen dioxide (NO ₂)	1 hour	^a 246 µg/m ³
	Annual	^a 62 µg/m ³
Ozone (O ₃)	1 hour	^a 214 µg/m ³
	4 hour	^a 171 µg/m ³

Notes:

^a Total impact (i.e. incremental increase in concentrations due to the development plus background concentrations due to all other sources).

^b Incremental impact (i.e. incremental increase in concentrations due to the development on its own).

^c Excludes extraordinary events such as bushfires, prescribed burning, dust storms, fire incidents or any other activity agreed by the Planning Secretary.

Note that in accordance with consent condition B18, the constraints in Table 10.5 will not apply at privately owned residences if an agreement is in place with the landholder to exceed the air quality criteria, and Santos has advised the Planning Secretary in writing of the terms of the agreement.

Santos will implement all reasonable and feasible measures to:

- minimise odour, fume and particulate matter (including PM₁₀ and crustal and combustion PM_{2.5}) emissions of the Project;
- minimise point source and fugitive emissions of methane, carbon dioxide and other pollutants from all Project-related infrastructure;
- minimise any visible off-site air pollution generated by the Project; and
- minimise the extent of potential dust generating surfaces exposed in the Project area at any given point in time;

Further details regarding the management and monitoring of air quality through a range of avoidance, mitigation and management methods are outlined in the Air Quality and Greenhouse Gas Management Plan.

11. Incidents, non-compliances and complaints

11.1 Incidents and non-compliances

Incident reporting and non-compliance notification will be in accordance with CoC D6 and D7 respectively, as described in section 6 of the EMS. In the event of an environmental incident or non-compliance with the Project Approval, Santos will initiate an investigation. The incident will be reported immediately after Santos becomes aware of an incident causing or threatening to cause material environmental harm⁴. Any notification will be provided to the Department and any other relevant agencies immediately via the Major Projects Portal and will describe the location and nature of the incident that occurred.

Within 7 days of becoming aware of a non-compliance, Santos will notify the Department of non-compliance via the Major Projects Portal. This report will include the set out of the non-compliance, the reason for the non-compliance (if known) and the actions that have been or will be taken to address the non-compliance.

Where incidents or non-compliances related to this Protocol are identified, Santos will:

- take all reasonable and feasible steps to ensure that the incident or non-compliance ceases and does not reoccur;
- consider all reasonable and feasible options for remediation (where relevant) and submit a report to the relevant department(s) describing options and any preferred remediation measures or other courses of action; and
- implement remediation measures as directed by the relevant department(s).

11.2 Unpredicted impact protocol

It is considered unlikely that the activities during Phase 1 will result in any unpredicted or unforeseen impacts in relation to the infrastructure siting procedures as set out in this Protocol. However, in accordance with CoC D3(f), the following strategy outlined in Table 11.1 below will be adopted in the event where the infrastructure is not sited in in accordance with this Protocol, and the locational criteria.

Table 11.1 - Unpredicted impact protocol

Step	Strategy
1	Stop any ground disturbance works and implement immediate corrective actions to minimise the unpredicted impact
2	Review the unpredicted impact and consider the following: <ul style="list-style-type: none"> • activities that may have triggered this event; and • relevant locational criteria.
3	Notify the relevant agencies and departments
4	If appropriate, commission an investigation by an appropriate specialist
5	Based on the results of the investigation, develop the appropriate amendment and amelioration methods

⁴ Refer to the Glossary in section 12 for the full definition of 'incident', as per the Development Consent for SSD 6456.

Step	Strategy
6	<p>Implement the information from the investigation to review, and if necessary, update this Field Development Protocol which will include any or all of the following:</p> <ul style="list-style-type: none"> • a review and where required, revision of the field development steps in section 5; • a review and where required, revision of the management controls in section 6 and the constraints mapping in sections 7, 8, 9 and 10;; • a review the actions that may have been taken prior to event; and • implement any relevant training based on the findings of the investigation to avoid any recurrence of the unpredicted impact.

11.3 Complaint management

Santos has a documented *Complaint Management Procedure* that is communicated to all relevant staff members. Complaints can be directed to Santos via phone or email 24 hours a day, 7 days a week. Contact details are publicly available on the Project website and are presented in Appendix D of the EMS.

All complaints are logged on a complaint form which includes the following details:

- date and time of the complaint;
- complainant details;
- details of the issue or complaint;
- actions taken to remediate the issue, if any;
- follow up actions required, if any;
- details of further liaison with complainant, if any; and
- closure date and time of the issue.

As per CoC D13, Santos maintains a complaint register which is updated as required and available on the Project website.

12. Reporting, evaluation and review

12.1 Annual review

In accordance with CoC D8 and as further described in section 8 of the EMS, Santos will review the performance of its field development process for the previous calendar year and report the relevant results within the Annual Review, to the satisfaction of the Planning Secretary. The Annual Review will be submitted to the Department via the Major Projects Portal by the end of March each year, and will at a minimum provide the following information regarding:

- the effectiveness of the framework for siting gas field infrastructure measures to prevent, and if prevention is not reasonable and feasible, to minimise and manage any impact associated with the Project;
- any incidents, non-compliances and complaints;
- monitoring relevant results, including any trends;
- compliance with performance measures, performance criteria and operating conditions;
- discrepancies between predicted and actual impacts; and
- measures to be implemented to improve environmental performance.

The Annual Review may also make recommendations for any additions, changes or improvements to the strategies and processes outlined in the Protocol. Specific performance indicators regarding compliance with the full range of applicable constraints are provided in the Field Development Plan.

In accordance with the ACHMP, an Annual Report will be compiled, and the third-party auditor will periodically compile a ACHMP Auditor's Report in consultation with the Aboriginal community and State Government. Therefore, the ACHMP will be subject to a stand-alone audit.

12.2 Independent environmental audits

In accordance with CoC D9, within one year of commencement of Phase 1 and every three years thereafter unless the Planning Secretary directs otherwise, Santos will commission an Independent Environmental Audit (IEA) to ensure compliance with the following:

- implementation consistent with the Protocol and Field Development Plan;
- conditions of relevant approvals, permits, licences and plans;
- relevant State and Commonwealth legislation;
- management plans; and
- annual compliance review obligations for the period.

The IEA will be led and conducted by a suitably qualified, experienced and independent team of experts whose appointment has been endorsed by the Planning Secretary, and be carried out in consultation with the relevant agencies, the CCC and the various advisory groups required by the CoC.

Within 3 months of commencing an IEA, unless the Planning Secretary agrees otherwise, Santos will submit a copy of the IEA report to DPE (and any other NSW agency that requests it) together with its response to any recommendations contained in the IEA report, and a timetable for the implementation of the recommendations.

12.3 Protocol review and evaluation

As required by CoC D4, Santos will review the suitability of the Protocol within two months of:

- (a) the submission of an incident report;
- (b) the submission of an Annual Review;
- (c) the submission of an Independent Environmental Audit;
- (d) the submission of a Field Development Plan;
- (e) the submission of a Groundwater Model Update; or
- (f) the approval of any modification of the conditions of this consent.

This is to ensure the Protocol is updated on a regular basis and to incorporate any recommended measures to improve the environmental performance of the Project. In any case, it will be updated prior to the commencement of Phase 2. The Phase 2 update will include a TARP for when aggregate areas of clearing reach 80% of the maximum clearing areas, as defined by Table 8, Table 9 and Table 10 of the CoC.

In view of the various conditions requiring annual reviews, suitability assessments and performance evaluations, this Protocol will be reviewed and, if necessary, updated in at least the following circumstances:

- in accordance with any direction from the NSW EPA or the Minister administering the PO Act;
- before making any significant change to the field development process. If there is ambiguity in relation to whether there is a significant change, Santos will consult with the Planning Secretary to determine whether the Protocol must be reviewed; and
- otherwise at intervals of no longer than one year.

The review history table in the front of this Protocol provides the details of each review, conducted in accordance with condition D4.

As required by CoC D5, if the review under condition D4 determines that the Protocol requires revision - to either improve the environmental performance of the development, cater for a modification or comply with a direction - then Santos will submit the revised document to the Planning Secretary for approval within 6 weeks of the review.

As required by CoC B3, Santos will implement each revision of this Protocol once approved by the Planning Secretary.

12.4 Improvement measures

Santos will conduct a program to investigate and implement ways to improve the environmental performance regarding the siting of gas field infrastructure, and implement a protocol for the periodic review of the Protocol, in accordance with CoC D3(g) and (i) respectively.

Measures to improve the environmental performance of the Project that will be implemented following review and evaluation include the following:

- audit of the design and micro siting processes;
- reviewing the implementation of the management controls;

- assess ongoing consistency with the underlying and supporting management plans (including Aboriginal cultural heritage and historical heritage; biodiversity management; water; rehabilitation, fire; noise and vibration; and air quality); and
- review of monitoring and inspections data, and any assessment of trends.

The results of the review of the individual management plans will be used to report back to the Protocol for periodic fine-tuning to ensure that leading practice environmental management is maintained for the Project.

The protocol for review is set out by consent conditions D8, D4 and D5, which have been addressed in sections 12.1 and 12.3 above.

In accordance with CoC D13 and as described in section 6 of the EMS, all relevant monitoring data and associated reports will be made available on the Project website, for the duration of the Project. This information will be kept up to date.

13. References

GHD (2017). *Narrabri Gas Project Environmental Impact Statement*. Prepared for Santos Ltd.

NSW Office of Water (2012) *NSW Guidelines for riparian corridors on waterfront land*. Published by the Department of Trade and Investment, Regional Infrastructure and Services.

EPA (2017). *Noise Policy for Industry*. Published by the NSW Environmental Protection Authority

EPA (2017). *Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales*. Published by the Department of Environment and Conservation NSW.

EPA (2000). *NSW Industrial Noise Policy*. Published by the NSW Environmental Protection Authority

14. Glossary

Term	Definition ⁵
Access track	Cleared and graded track constructed where existing tracks are not available
Alignment	The line or lines that describe a linear-infrastructure route; it defines how linear infrastructure (such as a road, access track or pipeline) will be located in relation to the features encountered along the route
Approved disturbance area	The disturbance areas shown in the EIS as modified by any approved Field Development Plan
Council	Narrabri Shire Council
Department	NSW Department of Planning and Environment (DPE)
EIS	The Environmental Impact Statement titled Narrabri Gas Project Environmental Impact Statement, dated 31 January 2017, submitted with the development application, including the response to submissions and supplementary response to submissions, and the additional information provided to the Department in support of the application
Feasible	Means what is possible and practical in the circumstances
Gas compression facility	A facility that houses multiple compressor units, either nodal or hub compressors or a mixture of both used to increase the pressure of gas for the purpose of transmission; may be collocated with a gas treatment facility and/or water management facility
Gas field infrastructure	All Project-related infrastructure, excluding the Leewood facility, Bibblewindi facility and the road upgrades required under SSD 6456
Gas well	Pilot wells and production wells
Gathering lines	Pipelines used to transfer gas and produced water from wells
Linear infrastructure	Project related infrastructure of a linear nature including gas and water gathering lines, gas and water pipelines, access tracks, power lines, communication lines and other service lines
Major facilities	Leewood facility and Bibblewindi facility
Managed release scheme	The managed release of treated water into Bohena Creek as one of the beneficial uses of produced water ⁶
Material harm	Material harm to the environment is defined in Section 147 of the POEO Act
Minimise	Implement all reasonable and feasible mitigation measures to reduce the impacts of the Project
Mitigation	Activities associated with reducing the impacts of the development
Petroleum Assessment Lease 2 (PAL 2)	A PAL is required to hold the exclusive right to prospect for petroleum and to assess any petroleum deposit over a specified area of land in NSW. A lease allows the holder to maintain a title over a potential area, without having to commit to further exploration. The holder can, however, continue prospecting operations and to recover petroleum in the course of assessing the viability of commercial mining. PAL 2 is held by Santos NSW Pty Ltd; .
Petroleum Exploration Licence 238 (PEL 238)	Before exploring for minerals or petroleum in NSW, an explorer must first obtain a Petroleum Exploration Licence (PEL) under the <i>Petroleum (Onshore) Act 1991</i> . An exploration licence gives the licence holder exclusive rights to explore for petroleum or specific minerals within a designated area but it does

⁵ The majority of the definitions are as provided in the Development Consent for SSD 6456.

⁶ Note that there will be no discharge to Bohena Creek for Phase 1.

Term	Definition ⁵
	not permit mining, nor does it guarantee a mining or production lease will be granted. PEL 238 is held by Santos NSW Pty Ltd.
Petroleum Production Lease 3 (PPL 3)	A petroleum production lease gives the holder the exclusive right to extract petroleum within the production lease area during the term of the lease. PPL 3 is held by the following titleholders: <ul style="list-style-type: none"> • Santos QNT Pty Ltd; • Santos NSW (Hillgrove) Pty Ltd; and • Santos NSW (Eastern) Pty Ltd.
Petroleum production lease application (PPLA)	A petroleum production lease gives the holder the exclusive right to extract petroleum within the production lease area during the term of the lease. Development consent under the <i>Environmental Planning and Assessment Act 1979</i> must be in place before a petroleum production lease can be granted. Santos, on behalf of its then joint venture partner lodged four petroleum production lease applications under the PO Act in May 2014 for the Project area, being PPLAs 13, 14, 15 and 16. The ownership of the application is now held by Santos NSW Pty Ltd.
Pilot well	A well for gas and water extraction, for the purpose of exploration, appraisal and assessment of the gas field potential
Planning Secretary	Planning Secretary under the EP&A Act, or nominee
Production well	A well for gas and water extraction, for the purpose of commercial gas production and/or use
Project area	The area of approximately 95,000 hectares that encompasses the Project, as shown in Appendix 2 of the CoC.
Project footprint	The area of surface expression being about 1,000 hectares occupied by the infrastructure components of the Narrabri Gas Project
Project-related infrastructure	All infrastructure and other structures associated with the development. This includes linear infrastructure and non-linear infrastructure, surface infrastructure and subsurface infrastructure, major facilities, wells and well pads and other gas field infrastructure
Reasonable	Means applying judgement in arriving at a decision, considering mitigation benefits, cost of mitigation versus benefits provided, community views and the nature and extent of potential improvements
Registered bore	A water bore whose presence has been notified to Water NSW and included in its registered groundwater bore database. The database typically includes details on bore location, construction and where possible, the source aquifer.
Rehabilitation	The restoration of land disturbed by the development to ensure it is safe, stable and non-polluting over the short, medium and long term
Strahler stream order	The stream order classification system based on Strahler, A.N. (1952) Dynamic basis of geomorphology. <i>Geological Society of America Bulletin</i> , 63, 923-938
Unacceptable risk	The level of risk at which mitigation actions are deemed to be warranted.
Watercourse	A river, creek or other stream, including a stream in the form of an anabranch or tributary, in which water flows permanently or intermittently, regardless of the frequency of flow events: In a natural channel, whether artificially modified or not, or in an artificial channel that has changed the course of the stream. It also includes weirs, lakes and dams
Well	Pilot wells and production wells

Term	Definition ⁵
Well pad	An area of up to 1 hectare in size upon which the gas wells are to be located, with the area decreasing to no more than 0.25 hectares following rehabilitation ⁷ , or other area as may be approved in the Field Development Plan

⁷ Workover activities will be contained within the operational area of the well pad area of around 0.2 ha, with an additional laydown area that could be approximately 0.2 ha in size.

Appendix A - Consent conditions relevant to this Protocol

Table A1 - SSD 6456 consent conditions directly relevant to this Protocol

SSD 6456 consent conditions directly relevant to this Protocol	Section reference
Consent condition A1 In meeting the conditions of this consent, the Applicant must implement all reasonable and feasible measures to prevent and, if prevention is not reasonable and feasible, minimise any material harm to the environment that may result from the construction, operation or rehabilitation of the development.	Section 1.2
Consent condition A5 The Applicant may only undertake the development in the following stages:	Section 1.1.2 Section 1.2
a) Phase 1, comprising ongoing exploration and appraisal activities;	
b) Phase 2, comprising construction activities for production wells and related infrastructure;	
c) Phase 3, comprising gas production operations; and	
d) Phase 4, comprising gas well and infrastructure decommissioning, rehabilitation and mine closure.	
Consent condition A23 With the approval of the Planning Secretary, the Applicant may:	
a) prepare and submit any strategy, plan or program required by this consent on a staged basis (if a clear description is provided as to the specific stage and scope of the development to which the strategy, plan or program applies, the relationship of the stage to any future stages and the trigger for updating the strategy, plan or program	Section 1.2
b) combine any strategy, plan or program required by this consent (if a clear relationship is demonstrated between the strategies, plans or programs that are proposed to be combined);	No combination proposed as part of this Plan
c) update any strategy, plan or program required by this consent (to ensure the strategies, plans and programs required under this consent are updated on a regular basis and incorporate additional measures or amendments to improve the environmental performance of the development); and	Section 1.2 Section 12.3
d) combine any strategy, plan or program required by this consent with any similar strategy, plan or program required by a consent	No combination proposed as part of this Plan
Consent condition A25 Unless the Applicant and the applicable authority agree otherwise, the Applicant must:	
a) repair, or pay the full costs associated with repairing, any public infrastructure that is damaged by carrying out the development; and	
b) relocate, or pay the full costs associated with relocating, any public infrastructure that needs to be relocated as a result of the development, to the satisfaction of the applicable authority.	
Consent condition B1 The Applicant must ensure that petroleum mining operations in the Project area comply with the locational criteria in Table 1 [of the CoC].	Section 5 Appendix B
Consent condition B2 Prior to the commencement of Phase 1, the Applicant must prepare a Field Development Protocol for the NGP to the satisfaction of the Planning Secretary, and that this Protocol must:	This Protocol

SSD 6456 consent conditions directly relevant to this Protocol	Section reference
a) be prepared by a suitably qualified and experienced person/s;	Section 1.3
b) be prepared in consultation with the EPA, BCD, DPE Water, Heritage NSW, the NSW Resources Regulator and Council;	Section 1.4
c) provide a framework for siting gas field infrastructure in the Project area to ensure:	Section 1.2
(i) compliance with the locational criteria in Table 1 of the CoC;	Section 5 Appendix B
(ii) compliance with the noise and noise quality criteria;	Section 10.10
(iii) compliance with applicable legislative requirements;	Section 3.1
(iv) consistency with the CoC, including the plans, strategies and programs; and	Section 3.3
(v) reasonable and feasible measures are being employed to avoid, minimise and manage the environmental impacts of the development;	Section 1.2
d) describe the process for siting gas field infrastructure, based on:	Section 5
(i) detailed constraints and avoidance analysis (including avoidance of faulting);	
(ii) incremental and cumulative disturbance review;	
(iii) in-field micro-siting, including:	
▪ ground-truthing survey against all locational criteria;	
▪ ecological survey, in accordance with the Biodiversity Management Plan;	Section 5.3
▪ cultural heritage survey, in accordance with the Aboriginal Cultural Heritage Management Plan;	Section 5.3
(iv) detailed infrastructure design; and	Section 5.4
e) describe the process for implementing the Protocol, in accordance with the Field Development Plan.	Section 6
Consent condition B3 The Applicant must implement the approved Field Development Protocol.	Section 12.3
Consent condition D3 The Applicant must ensure that (where relevant) the management plans required under this consent include:	
a) a summary of relevant background or baseline data;	Not relevant
b) details of:	
(i) the relevant statutory requirements (including any relevant approval, licence or lease conditions);	Section 3.1 Appendix A
(ii) any relevant limits or performance measures and criteria; and	Sections 4, 5, 6, 7, 8, 9 and 10 Appendix B
(iii) the specific performance indicators that are proposed to be used to judge the performance of, or guide the implementation of, the development or any management measures;	Section 12.1
c) any relevant commitments or recommendations identified in the documents listed in condition A2(c);	Section 3.2

SSD 6456 consent conditions directly relevant to this Protocol	Section reference
d) a description of the measures to be implemented to comply with the relevant statutory requirements, limits, or performance measures and criteria	Section 6.2.1
e) a program to monitor and report on the:	Section 11
(i) impacts and environmental performance of the development; and	
(ii) effectiveness of the management measures set out pursuant to paragraph (d);	
f) a contingency plan to manage any unpredicted impacts and their consequences and to ensure that ongoing impacts reduce to levels below relevant impact assessment criteria as quickly as possible;	Section 11.2
g) a program to investigate and implement ways to improve the environmental performance of the development over time	Section 12.4
h) a protocol for managing and reporting any:	
(i) incident, non-compliance or exceedance of any impact assessment criterion and performance criterion	Section 11.1
(ii) complaint; or	Section 11.3
(iii) failure to comply with other statutory requirements; and	Section 11.1
i) a protocol for periodic review of the plan.	Section 12.3
Consent condition D4 Within 2 months of: (a) the submission of an incident report; (b) the submission of an Annual Review; (c) the submission of an Independent Environmental Audit; (d) the submission of a Field Development Plan; (e) the submission of a Groundwater Model Update; or (f) the approval of any modification of the conditions of this consent, the Applicant must review the suitability of existing strategies, plans and programs required under this consent.	Section 12.3
Consent condition D5 If the review determines that the strategies, plans and programs required under this consent require revision – to either improve the environmental performance of the development, cater for a modification or comply with a direction - then the Applicant must submit the revised document to the Secretary for approval within 6 weeks of the review.	Section 12.3
Note: <i>This is to ensure strategies, plans and programs are updated on a regular basis and to incorporate any recommended measures to improve the environmental performance of the development.</i>	
Consent condition D6 The Applicant must notify the Department and any other relevant agencies via the Major Projects Portal immediately after it becomes aware of the incident. This notice must describe the location and nature of the incident.	Section 11.1
Consent condition D7 Within 7 days of becoming aware of a non-compliance with the conditions of this consent, the Applicant must notify the Department of the non-compliance via the Major Projects Portal. This notice must set out the non-compliance, the reasons for the non-compliance (if known) and what actions have been taken, or will be taken, to address the non-compliance.	Section 11.1

SSD 6456 consent conditions directly relevant to this Protocol	Section reference
Note: <i>A non-compliance which has been notified as an incident does not need to also be notified as a non-compliance</i>	
Consent condition D8 By the end of March each year, unless the Planning Secretary agrees otherwise, the Applicant must submit an Annual Review of the environmental performance of the development to the Department via the Major Projects Portal.	Section 12.1
Consent condition D9 Within one year of commencement of Phase 1 and every 3 years thereafter, unless the Planning Secretary directs otherwise, the Applicant must commission and pay the full cost of an Independent Environmental Audit of the development.	Section 12.2
Consent condition D13 From the commencement of Phase 1, until the completion of all rehabilitation required under this consent, the Applicant must:	
a) make copies of the following information publicly available on its website: <ul style="list-style-type: none"> ▪ the document/s listed in condition A2(c); ▪ current statutory approvals for the development; ▪ approved strategies, plans and programs; ▪ detailed plans for the Phases of the development; ▪ minutes of CCC and Advisory Group meetings; ▪ regular reporting on the environmental performance of the development in accordance with the reporting requirements in any plans or programs approved under the conditions of this consent; ▪ a comprehensive summary of the monitoring results of the development, reported in accordance with the specifications in any conditions of this consent, or any approved plans and programs; ▪ a summary of the current phase/s and progress of the development; ▪ contact details to enquire about the development or to make a complaint; ▪ a complaint register, updated monthly; ▪ a record of all incidents and non-compliances; ▪ the Annual Reviews of the development; ▪ audit reports prepared as part of any Independent Environmental Audit of the development and the Applicant's response to the recommendations in any audit report; and ▪ any other matter required by the Planning Secretary; and 	Section 1.6 Section 12.4
b) keep such information up to date.	Section 1.6 Section 12.4

Appendix B - Locational criteria

Table B1 - Summary of Project infrastructure locational criteria

No.	Constraint	Non-Linear Infrastructure	Linear Infrastructure	Large Ponds and Dams	Support for Planning	Section in this Protocol
1.	Brigalow Nature Reserve (plus 50 m buffer)	Prohibited	Prohibited	Prohibited	Prohibited	Section 10.1
2.	National Park	Prohibited	Prohibited	Prohibited	Prohibited	Section 10.1
3.	Aboriginal areas	Prohibited	Prohibited	Prohibited	Prohibited	Section 10.1
4.	Yarrie Lake Reserve (plus 200 m buffer)	Surface - prohibited Sub-surface - permitted	Prohibited	Prohibited	Prohibited	Section 10.4
5.	Brigalow State Conservation Area (plus 50 m buffer)	Surface - prohibited Sub-surface - at least 110 metres depth	Prohibited	Prohibited	Surface - prohibited Sub-surface - at least 110 metres depth	Section 10.2
6.	High ecological constraint area	Permitted subject to: <ul style="list-style-type: none"> • Total area of disturbance for all infrastructure not to exceed the ecological disturbance limits • Total area of disturbance to high ecological sensitivity class limited to 0.5% of total class area, otherwise prohibited 	Permitted subject to: <ul style="list-style-type: none"> • Total area of disturbance for all infrastructure not to exceed the ecological disturbance limits • Total area of disturbance to high ecological sensitivity class limited to 0.5% of total class area, otherwise prohibited 	Prohibited.	Permitted	Sections 7 and 8. Ecological disturbance limits set out in section 8.
7.	Moderate ecological constraint area	Permitted subject to: <ul style="list-style-type: none"> • Total area of disturbance for all infrastructure not to exceed the ecological disturbance limits 	Permitted subject to: <ul style="list-style-type: none"> • Total area of disturbance for all infrastructure not to exceed the ecological disturbance limits 	Prohibited	Permitted	Sections 7 and 8. Ecological disturbance limits set out in section 8.
8.	Low ecological constraint area	Permitted subject to: <ul style="list-style-type: none"> • Total area of disturbance not to exceed the ecological disturbance limits 	Permitted subject to: <ul style="list-style-type: none"> • Total area of disturbance not to exceed the ecological disturbance limits 	Permitted subject to: <ul style="list-style-type: none"> • Total area of disturbance not to exceed the ecological disturbance limits 	Permitted	Sections 7 and 8. Ecological disturbance limits set out in section 8.
9.	Area of currently known Aboriginal sites and objects	Surface - prohibited. Sub-surface - permitted	Prohibited	Prohibited	Permitted	Section 9.1
10.	Area of further identified Aboriginal sites and objects.	Surface - prohibited except for site types specified in ACHMP and as approved in a Field Development Plan Sub-surface - Permitted	Prohibited except for site types specified in ACHMP	Prohibited except for site types specified in ACHMP		Section 9.1
11.	Area of historic heritage site	Prohibited for surface development exclusion areas otherwise permitted.	Prohibited for surface development exclusion areas otherwise permitted.	Prohibited for surface development exclusion areas otherwise permitted	Permitted	Section 9.2
12.	Area within 200 metres of an occupied residence (occupied or otherwise) on that property.	Prohibited unless with written agreement of relevant landholder	Prohibited unless with written agreement of relevant landholder	Prohibited unless with written agreement of relevant landholder	Permitted	Section 10.3
13.	Area within 500 metres of an occupied residence (occupied or otherwise) on that property.	Prohibited for telecommunications towers unless with written agreement of relevant landholder	Not applicable	Not applicable	Not applicable	Section 10.8 Note that telecom towers are not approved as part of Phase 1
14.	Area within riparian corridor	Surface - prohibited Sub-surface - permitted	Permitted	Prohibited.	Permitted	Section 10.6
15.	Area of 1% Annual Exceedance Probability (AEP) (Flooding)	Permitted	Permitted	Prohibited	Permitted	Section 10.7
16.	Proximity to other well pads	Spacing between pads: Pilot well pads - 250 m Production well pads at least 750 m apart	Not applicable	Not applicable	Not applicable	Section 10.8
17.	Well pads within 100 metres of privately owned land	Prohibited unless with written agreement of neighbouring landholder	Permitted	Permitted	Permitted	Section 10.9
18.	Private property	Permitted only in accordance with land access agreement.	Permitted only in accordance with land access agreement.	Permitted only in accordance with land access agreement.	Permitted only in accordance with land access agreement.	Section 4

Appendix C - Consultation records

Santos

Management Plan Consultation Feedback Form

DOCUMENT TITLE:	Field Development Protocol
STAKEHOLDER:	NSW Environment Protection Authority
CONSULTATION RELEASE DATE:	16 June 2021
COMMENTS DUE DATE:	15 July 2021

General Feedback	
Key Issues	No significant issues identified.
	Santos should consult with Heritage NSW before finalising the protocol.
Suggestions for improvement	Include a process to review or update the protocol as the project progresses.
	Recommend consulting with DPIE Biodiversity Conservation and Heritage NSW, particularly on the sequencing of cultural heritage surveys relative to other considerations.

Section	Type	Specific Feedback <i>Detail specific issues with certain sections in the document</i>
eg Section 2	Legislative + Regulatory reqs./ Readability / Usability /	Further detail is required about when a report is required and how the report is to be submitted.
Section 5.3	Regulatory requirements	Cultural heritage surveys are proposed to be undertaken in the micro siting stage following ecological and constructability scouting. Recommend consulting with DPIE Biodiversity Conservation and Heritage NSW, particularly on the sequencing of cultural heritage surveys relative to other considerations.

Santos

Management Plan Consultation Feedback Form

DOCUMENT TITLE: Field Development Protocol

STAKEHOLDER: North West Planning - Biodiversity Conservation and Science Directorate (BCS)

**CONSULTATION
RELEASE DATE:** 16 June 2021

COMMENTS DUE DATE: 15 July 2021

General Feedback	
Key Issues	<p>Given the high-level nature of the field development protocol, BCS has no general feedback to provide outside of minor suggestions related primarily to the readability and usability of the document. These points of feedback have been captured in the specific feedback table below.</p>
Suggestions for Improvement	<p>Many aspects of the field development protocol provide comments regarding the avoid, minimize and offset hierarchy that will be employed in the micro-sighting of surface infrastructure in addition to the maximum cumulative ecological disturbance limits the project will adhere to. Primarily these sections of the field development protocol reference threatened flora and vegetation.</p> <p>BCS understands that limits to impacts to specific threatened fauna species and their habitats are also set out in the project's development consent (Condition B43 – Table 10). This should also be referenced clearly within the field development protocol to provide assurances that threatened fauna and their habitats are also being considered.</p>

Section	Type	Specific Feedback
		<i>Detail specific issues with certain sections in the document</i>
Section 3.1	Legislative + Regulatory reqs	Relevant legislation incorrectly refers to the <i>Biodiversity Conservation Act 2017</i> , this should be revised to the <i>Biodiversity Conservation Act 2016</i>
Section 5	Readability	As per the comments above in the "Suggestions for Improvement" field, Section 5 could be improved by referencing threatened fauna and their habitats.
Figure 5.1	Readability	Step 2 of the flow chart references ecological sensitivity analysis and other "special data sets". Should this be other <i>spatial datasets</i> ?

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Management Plan Consultation Feedback Form

Section	Type	Specific Feedback <i>Detail specific issues with certain sections in the document</i>
Section 5.3 and Table 5.1	Usability	<p>Step 4b and Table 5.1 should reference stick nest building birds, including raptors.</p> <p>Step 4b could also reference avoiding canopy-dwelling arboreal mammals i.e. Koalas.</p> <p>Step 4b could also reference avoiding hollow logs, rock piles, termite mounds and other significant habitat features present in the groundstorey and/or reference a protocol for relocating these features outside of disturbance areas if unavoidable</p> <p>Step 4b could also reference avoiding exacerbating edge effects, fragmentation and barriers to habitat connectivity (where applicable)</p>
Section 5.3	Usability	This Section could benefit from describing the protocol which would be undertaken for unexpected finds i.e. a TEC or threatened species unaccounted for in the EIS
Section 5.3	Usability	Step 8 could include reference to preparing a site scale ecological constraints map. This map could assist in demonstrating what avoidance of sensitive biodiversity values has taken place within the final micro-sighting design.
6.2.2	Usability	<p>This Section could also include reference to the following, if applicable:</p> <ul style="list-style-type: none"> • Wildfire control • Lower speed limits • Lowering noise pollution • Weed management • Pest control • Management of surface water runoff • Management of erosion
Section 8.1	Readability	<p>Section 8.1. states the following:</p> <p><i>The maximum disturbance is displayed as both hectares removed, and also as a percentage of the plant community type to be removed.</i></p> <p>For readability and clarity to stakeholders the BCS suggest this is amended to the following;</p> <p><i>The maximum disturbance is displayed as both hectares removed, and also as a percentage of the plant community type to be removed within the project site.</i></p>

Santos

Management Plan Consultation Feedback Form

DOCUMENT TITLE: Field Development Protocol

STAKEHOLDER: Heritage NSW

**CONSULTATION
RELEASE DATE:** 13 July 2021

COMMENTS DUE DATE: 4 August 2021

General Feedback	
Key Issues	Heritage NSW have reviewed the protocols for Aboriginal cultural heritage of the Narrabri Gas Field Development Protocol (Onward Consulting 20121:32), relative to condition B2. The description of the protocols is broad with no specific details. HNSW understand that the details for avoidance strategies for Aboriginal objects and method for mitigating harm are listed in the draft Aboriginal cultural heritage management plan (ACHMP) which is currently subject to review by HNSW and Department of Planning Infrastructure and Environment. In the interim, HNSW offer in principle support for the Field Development Protocol.
Suggestions for Improvement	

Section	Type	Specific Feedback
		<i>Detail specific issues with certain sections in the document</i>
eg Section 2	Legislative + Regulatory reqs./ Readability / Usability /	Further detail is required about when a report is required and how the report is to be submitted.

Santos

Management Plan Consultation Feedback Form

DOCUMENT TITLE: Field Development Protocol

STAKEHOLDER: NARRABRI SHIRE COUNCIL

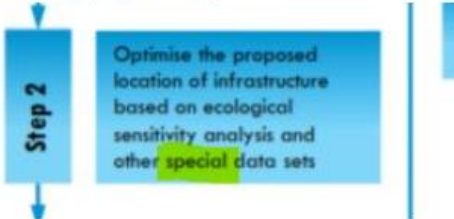
**CONSULTATION
RELEASE DATE:** 16 June 2021

COMMENTS DUE DATE: 15 July 2021

General Feedback	
Key Issues	Refer consolidated feedback below.
Suggestions for Improvement	Refer consolidated feedback below.

Section	Type	Specific Feedback
		<i>Detail specific issues with certain sections in the document</i>
<i>eg Section 2</i>	<i>Legislative + Regulatory reqs./ Readability / Usability /</i>	<i>Further detail is required about when a report is required and how the report is to be submitted.</i>
5.1	Legislative + regulatory requirements	<p>Section 5.1 states: <i>where practicable, development planning will maximise the use of existing roads, tracks and previously disturbed corridors for construction, operational access and the placement of linear infrastructure (for example gas and water gathering systems).</i></p> <ul style="list-style-type: none"> Maximising the use of existing roads should be taken with caution, a Traffic Management Plan should be submitted prior to construction/operation, as previously noted in Council's original project response.

Management Plan Consultation Feedback Form

Section	Type	Specific Feedback <i>Detail specific issues with certain sections in the document</i>
5.1	Readability	<p>Figure 5.1 In "Desktop Review" Step 2</p>  <p>Confirmation is sought that the highlighted term is <i>special</i> and not meant to read <i>spatial</i>?</p>
5.4	Legislative + regulatory requirements	<p>Section 5.4 Design Step 8 states:</p> <p><i>Each Field Development Plan will be prepared in consultation with the EPA, DPIE Water, BCS, Resources Regulator and Council.</i></p> <ul style="list-style-type: none"> ○ Council is of the opinion that Fire and Rescue NSW should also be consulted as part of this process
6.2.1	Legislative + regulatory requirements	<p>Table 6.1 Management Plan Summary</p> <p>Table 6.1 lists a number of Management Plans; however, a Traffic Management Plan is not included.</p> <ul style="list-style-type: none"> ○ Clarification sought that a Traffic Management Plan will be submitted prior to construction/operation.
6.2.1	Legislative + regulatory requirements	<p>Table 6.1 Management Plan Summary</p> <p>Table 6.1 lists a number of Management Plans; however, a Weed Management Plan is not included.</p> <ul style="list-style-type: none"> ○ Clarification sought that a Weed Management Plan will be submitted prior to construction/operation.
6.2.2	Legislative + regulatory requirements	<p>Section 6.2.2 identifies "<i>management strategies</i>", suggesting that this should form part of the Management Plans including items such as.</p> <ul style="list-style-type: none"> ○ <i>clear demarcation of work areas and restricting access to designated access roads and corridors.</i> ○ <i>speed limitations and dust suppression.</i> ○ <i>minimising driving during high fauna activity periods (i.e., from dusk through to dawn).</i> ○ <i>rubbish collection.</i> <ul style="list-style-type: none"> ▪ All of the abovementioned items would typically form part of a Traffic Management Plan, consequently it is recommended that this document be added to Table 6.1.

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Management Plan Consultation Feedback Form

DOCUMENT TITLE: Field Development Protocol

STAKEHOLDER: Resources Regulator

**CONSULTATION
RELEASE DATE:** 16 June 2021

COMMENTS DUE DATE: 26 August 2021

General Feedback	
Key Issues	No comments from the Resources Regulator
Suggestions for improvement	

Section	Type	Specific Feedback
		<i>Detail specific issues with certain sections in the document</i>
eg Section 2	Legislative + Regulatory reqs./ Readability / Usability /	Further detail is required about when a report is required and how the report is to be submitted.

Santos

Management Plan Consultation Feedback Form

DOCUMENT TITLE: Field Development Protocol

STAKEHOLDER: NRAR / DPIE Water

**CONSULTATION
RELEASE DATE:** 16 June 2021

COMMENTS DUE DATE: 18 August 2021

General Feedback	
Key Issues	
Suggestions for improvement	<p>Thank you for the opportunity to review the Field Development Protocol for the Narrabri Gas Project. It is understood this consultation is in accordance with Condition B2 of Schedule 2 of the consent for the Narrabri Gas Project SSD 6456.</p>
	Please be advised that NRAR and DPIE Water have reviewed the Field Development Protocol and have no comments.

Section	Type	Specific Feedback <i>Detail specific issues with certain sections in the document</i>
eg Section 2	Legislative + Regulatory reqs./ Readability / Usability /	Further detail is required about when a report is required and how the report is to be submitted.

Field Development Protocol - EPA comments received on Revision C (draft)

Item	Section #	Section heading	Existing text	Comment	Final response
1	5.3	Micro siting	No specific reference	Cultural heritage surveys are proposed to be undertaken in the micro siting stage following ecological and constructability scouting. Recommend consulting with DPIE Biodiversity Conservation and Heritage NSW, particularly on the sequencing of cultural heritage surveys relative to other considerations.	Heritage NSW was consulted through the Planning Portal on 13 July 2021. Heritage NSW confirmed its in principle support for the Field Development Protocol on 14 September 2021. The Protocol has been updated to include the details of this consultation.
2	N/A	General	No specific reference	Include a process to review or update the protocol as the project progresses	Section 11.3 <i>Revision of the Protocol</i> details the process for updating the Protocol and the relevant triggers, including project progress (update of the Protocol at intervals of no longer than one year).

Field Development Protocol - NSC comments received on Revision C (draft)

Item	Section #	Section heading	Existing text	Comment	Final response
1	5.1	Exclusion areas and maximising avoidance	Where practicable, development planning will maximise the use of existing roads, tracks and previously disturbed corridors for construction, operational access and the placement of linear infrastructure (for example gas and water gathering systems).	Maximising the use of existing roads should be taken with caution, a Traffic Management Plan should be submitted prior to construction/operation, as previously noted in Council's original project response.	A Traffic Management Plan is not mentioned in the Field Development Protocol as this is not a requirement of the development consent. Santos will prepare traffic management documents closer to the commencement of our activities and will provide these to the council for their information. This issue was discussed directly with Narrabri Shire Council at a meeting held 17 September 2021.
2	5.1	Exclusion areas and maximising avoidance	Figure 5.1 Desktop Review Step 2	Confirmation is sought that the highlighted term is special and not meant to read spatial?	The correct term is 'spatial'. This error has now been corrected.
3	5.4	Design	Each Field Development Plan will be prepared in consultation with the EPA, DPIE Water, BCS, Resources Regulator and Council.	Council is of the opinion that Fire and Rescue NSW should also be consulted as part of this process.	Santos is required to prepare a Fire Management Plan in consultation with the Rural Fire Service prior to the commencement of Phase 1. The Fire Management Plan will describe bushfire mitigation works, including but not limited to asset protection zones and vegetation management activities. This was discussed directly with Narrabri Shire Council at a meeting held 17 September 2021.
4	6.2.1	Implementation of management and construction controls	Table 6.1 Management plan summary	Table 6.1 lists a number of Management Plans; however, a Traffic Management Plan is not included. Clarification sought that a Traffic Management Plan will be submitted prior to construction/operation.	A Traffic Management Plan is not mentioned in the Field Development Protocol as this is not a requirement of the development consent. Santos will prepare traffic management documents closer to the commencement of our activities and will provide these to the council for their information. This issue was discussed directly with Narrabri Shire Council at a meeting held 17 September 2021.
5	6.2.1	Implementation of management and construction controls	Table 6.1 Management plan summary	Table 6.1 lists a number of Management Plans; however, a Weed Management Plan is not included. Clarification sought that a Weed Management Plan will be submitted prior to construction/operation.	Table 6.1 has been updated to reference the Pest Plant and Animal Control Protocol, which forms part of the Biodiversity Management Plan.
6	6.2.2	Management strategies for minimisation of impacts on terrestrial ecology	No specific reference	Section 6.2.2 identifies "management strategies", suggesting that this should form part of the Management Plans including items such as: clear demarcation of work areas and restricting access to designated access roads and corridors; speed limitations and dust suppression; minimising driving during high fauna activity periods (i.e., from dusk through to dawn); rubbish collection. All of the above mentioned items would typically form part of a Traffic Management Plan, consequently it is recommended that this document be added to Table 6.1.	A Traffic Management Plan is not mentioned in the Field Development Protocol as this is not a requirement of the development consent. Santos will prepare traffic management documents closer to the commencement of our activities and will provide these to the council for their information. This issue was discussed directly with Narrabri Shire Council at a meeting held 17 September 2021.

Field Development Protocol - BCS comments received on Revision C (draft)

Item	Section #	Section heading	Existing text	Comment	Final response
1	N/A	General	No specific reference	Many aspects of the field development protocol provide comments regarding the avoid, minimise and offset hierarchy that will be employed in the micro-sighting of surface infrastructure, in addition to the maximum cumulative ecological disturbance limits the project will adhere to. Primarily these sections of the field development protocol reference threatened flora and vegetation. BCS understands that limits to impacts to specific threatened fauna species and their habitats are also set out in the project's development consent (Condition B43 –Table 10). This should also be referenced clearly within the field development protocol to provide assurances that threatened fauna and their habitats are also being considered	Sections 5.1 and 5.4 of the Protocol have been updated to include references to tables 8, 9 and 10 under condition B43 of SSD-6456.
2	3.1		No specific reference	Relevant legislation incorrectly refers to the <i>Biodiversity Conservation Act 2017</i> , this should be revised to the <i>Biodiversity Conservation Act 2016</i>	This typographical error has been corrected.
3	5		No specific reference	Section 5 could be improved by referencing threatened fauna and their habitats.	The impacts to different species habitat are directly linked to the Plant Community Types (excluding the areas of Derived Native Grassland) they are associated with. Sections 5.1 and 5.4 of the Protocol have been updated to address this issue.
4			Figure 5.1	Step 2 of the flow chart references ecological sensitivity analysis and other “special data sets”. Should this be other spatial datasets?	The correct term is 'spatial'. This error has now been corrected.
5	5.3		Table 5.1	Step 4b and Table 5.1 should reference stick nest building birds, including raptors. Step 4b could also reference avoiding canopy-dwelling arboreal mammals i.e. Koalas. Step 4b could also reference avoiding hollow logs, rock piles, termite mounds and other significant habitat features present in the ground storey and/or reference a protocol for relocating these features outside of disturbance areas if unavoidable. Step 4b could also reference avoiding exacerbating edge effects, fragmentation and barriers to habitat connectivity (where applicable).	These concepts/features are implicitly included in the process but had not been explicitly stated. The Protocol has been updated to include explicit reference to these features. Note fauna individuals encountered during the micro-siting assessment are unlikely to be there when development occurs. Fauna present at this stage (just prior to clearing) are addressed in the pre-clearance/clearance procedure.
6	5.3		No specific reference	This Section could benefit from describing the protocol which would be undertaken for unexpected finds i.e. a TEC or threatened species unaccounted for in the EIS.	Section 8.1 of the Protocol has been updated to include an unexpected finds procedure, consistent with the Unexpected Finds Protocol as attached to the Biodiversity Management Plan.
7	5.3		No specific reference	Step 8 could include reference to preparing a site scale ecological constraints map. This map could assist in demonstrating what avoidance of sensitive biodiversity values has taken place within the final micro-sighting design.	Step 8 in section 5.4 of the Protocol has been updated to state: <ul style="list-style-type: none"> include site-scale ecological constraints maps, to quantify impacts/avoidance of impacts and reflect compliance with ecological disturbance limits set out in Tables 8, 9 and 10 of the CoC;
8	6.2.2		No specific reference	This Section could also include reference to the following, if applicable: <ul style="list-style-type: none"> Wildfire control; Lower speed limits; Lowering noise pollution; Weed management; Pest control; Management of surface water runoff; Management of erosion 	Section 6.2.2 has been updated to include a reference to these mitigation strategies.
9	8.1		The maximum disturbance is displayed as both hectares removed, and also as a percentage of the plant community type to be removed.	For readability and clarity to stakeholders the BCS suggest this is amended to the following: <i>The maximum disturbance is displayed as both hectares removed, and also as a percentage of the plant community type to be removed within the project site.</i>	Section 8.1 has been amended as suggested by BCS.

Note:

The numbering of the sections and appendices between the draft and final version of the document may have changed.

Appendix D - Ecological constraints disturbance limits

Table D1 - Disturbance limits for vegetation communities and habitat

Plant Community Type (PCT)	Fauna habitat type	Condition class	Total in Project area (ha)	Estimated disturbance (ha)	Percent impact
27 - Weeping Myall open woodland of the Darling Riverine Plains and Brigalow Belt South Bioregions	Grassy woodland	Native vegetation	36.0	0.1	0.28%
27 - Weeping Myall open woodland of the Darling Riverine Plains and Brigalow Belt South Bioregions	Grassland	Derived native grassland	173.3	0.5	0.29%
35 - Brigalow - Belah open forest / woodland on alluvial often gilgaied clay from Pilliga Scrub to Goondiwindi, Brigalow Belt South Bioregion	Grassland	Derived native grassland	4,228.5	37.2	0.88%
35 - Brigalow - Belah open forest / woodland on alluvial often gilgaied clay from Pilliga Scrub to Goondiwindi, Brigalow Belt South Bioregion	Closed forest	Native vegetation	2,468.0	19.3	0.78%
55 - Belah woodland on alluvial plains and low rises in the central NSW wheatbelt to Pilliga and Liverpool Plains regions	Grassland	Derived native grassland	322.9	1.7	0.53%
55 - Belah woodland on alluvial plains and low rises in the central NSW wheatbelt to Pilliga and Liverpool Plains regions	Closed forest	Native vegetation	362.5	3.9	1.08%
78 - River Red Gum riparian tall woodland / open forest wetland in the Nandewar and Brigalow Belt South Bioregions	Riparian woodland	Native Vegetation	10.5	0.0	0.00%
88 - Pilliga Box - White Cypress Pine - Buloke shrubby woodland in the Brigalow Belt South Bioregion	Grassland	Derived native grassland	1,526.9	8.8	0.58%
88 - Pilliga Box - White Cypress Pine - Buloke shrubby woodland in the Brigalow Belt South Bioregion	Shrub grass woodland	Native vegetation	4,456.4	40.8	0.92%
141 - Broombush - wattle very tall shrubland of the Pilliga to Goonoo regions, Brigalow Belt South Bioregion	Heath	Native vegetation	1,035.6	19.5	1.88%
202 - Fuzzy Box Woodland on alluvial brown loam soils mainly in the NSW South-western Slopes Bioregion	Grassland	Derived native grassland	1.4	0.0	0.00%
202 - Fuzzy Box Woodland on alluvial brown loam soils mainly in the NSW South-western Slopes Bioregion	Grassy woodland	Native vegetation	588.9	5.9	1.00%
256 - Green Mallee tall mallee woodland rises in the Pilliga - Goonoo regions, southern BBS Bioregion	Shrubby woodland	Native vegetation	20.3	0.3	1.48%

Plant Community Type (PCT)	Fauna habitat type	Condition class	Total in Project area (ha)	Estimated disturbance (ha)	Percent impact
379 - Inland Scribbly Gum - White Bloodwood - Red Stringybark - Black Cypress Pine shrubby sandstone woodland mainly of the Warrumbungle NP - Pilliga region in the BBS Bioregion	Heathy woodland	Native vegetation	103.6	2.7	2.61%
397 - Poplar Box - White Cypress Pine shrub grass tall woodland of the Pilliga - Warrumbungle region, BBS Bioregion	Grassland	Derived native grassland	446.3	1.3	0.29%
397 - Poplar Box - White Cypress Pine shrub grass tall woodland of the Pilliga - Warrumbungle region, BBS Bioregion	Shrub grass woodland	Native vegetation	326.7	1.0	0.31%
398 - Narrow-leaved Ironbark - White Cypress Pine - Buloke tall open forest on lower slopes and flats in the Pilliga Scrub and surrounding forests in the central north BBS Bioregion	Grassland	Derived native grassland	494.9	3.9	0.79%
398 - Narrow-leaved Ironbark - White Cypress Pine - Buloke tall open forest on lower slopes and flats in the Pilliga Scrub and surrounding forests in the central north BBS Bioregion	Shrub grass woodland	Native vegetation	23,492.0	323.4	1.38%
399 - Red gum - Rough-barked Apple +/- tea tree sandy creek woodland (wetland) in the Pilliga - Goonoo sandstone forests, BBS Bioregion	Grassland	Derived native grassland	47.1	0.2	0.42%
399 - Red gum - Rough-barked Apple +/- tea tree sandy creek woodland (wetland) in the Pilliga - Goonoo sandstone forests, BBS Bioregion	Riparian woodland	Native vegetation	1,048.0	3.4	0.32%
401 - Rough-barked Apple - red gum - cypress pine woodland on sandy flats, mainly in the Pilliga Scrub region	Grassland	Derived native grassland	1,641.2	18.1	1.10%
401 - Rough-barked Apple - red gum - cypress pine woodland on sandy flats, mainly in the Pilliga Scrub region	Riparian woodland	Native vegetation	5,954.9	46.4	0.78%
402 - Mugga Ironbark - White Cypress Pine - gum tall woodland on flats in the Pilliga forests and surrounding regions, BBS Bioregion	Grassy woodland	Native vegetation	177.7	1.6	0.90%
402 - Mugga Ironbark - White Cypress Pine - gum tall woodland on flats in the Pilliga forests and surrounding regions, BBS Bioregion	Grassland	Derived native grassland	189.7	1.6	0.84%
404 - Red Ironbark - White Bloodwood +/- Burrows Wattle heathy woodland on sandy soil in the Pilliga forests	Shrubby woodland	Native vegetation	9,993.9	86.6	0.87%

Plant Community Type (PCT)	Fauna habitat type	Condition class	Total in Project area (ha)	Estimated disturbance (ha)	Percent impact
405 - White Bloodwood - Red Ironbark - cypress pine shrubby sandstone woodland of the Pilliga Scrub and surrounding regions	Heathy woodland	Native vegetation	6,652.1	247.1	1.63%
406 - White Bloodwood - Motherumbah - Red Ironbark shrubby sandstone hill woodland/open forest mainly in east Pilliga forests	Heathy woodland	Native vegetation	3,239.2	69.0	2.13%
408 - Dirty Gum (Baradine Gum) - Black Cypress Pine - White Bloodwood shrubby woodland of the Pilliga forests and surrounding region	Grassland	Derived native grassland	103.5	0.4	0.39%
408 - Dirty Gum (Baradine Gum) - Black Cypress Pine - White Bloodwood shrubby woodland of the Pilliga forests and surrounding region	Heathy woodland	Native vegetation	3,084.8	33.3	1.08%
418 - White Cypress Pine - Silver-leaved Ironbark - Wilga shrub grass woodland of the Narrabri-Yetman region, BBS Bioregion	Shrub grass woodland	Native vegetation	66.2	0.2	0.30%
418 - White Cypress Pine - Silver-leaved Ironbark - Wilga shrub grass woodland of the Narrabri-Yetman region, BBS Bioregion	Grassland	Derived native grassland	69.6	0.3	0.43%
425 - Spur-wing Wattle heath on sandstone substrates in the Goonoo - Pilliga forests, Brigalow Belt South Bioregion	Heath	Native vegetation	366.7	8.4	2.29%
			80,518.6	988.8	1.23%

Table D2 - Disturbance limits for threatened flora

Flora Species	Phase 2 credits		Residual credits		Maximum number of individuals directly impacted	Ecological rehabilitation credits allowed
	Individuals	Credits required	Individuals	Credits required		
<i>Bertya opposens</i>	7,216	101,028	3,093	43,298	10,309	Yes
<i>Diuris tricolor</i>	36	473	16	203	52	No
<i>Lepidium aschersonii</i>	54,384	761,372	23,307	326,302	77,691	Potential
<i>Lepidium monoplacoides</i>	781	11,718	335	5,022	1,116	Potential
<i>Polygala linariifolia</i>	176	2,646	76	1,134	252	Potential
<i>Pomaderris queenslandica</i>	327	4,577	140	1,961	467	Yes
<i>Pterostylis cobarensis</i>	4,661	69,766	1,997	25,966	6,658	No
<i>Commersonia procumbens</i>	2,601	39,018	1,115	16,722	3,716	Yes
<i>Tylophora linearis</i>	359	5,721	154	2,001	513	No

Note: this table is a direct reproduction of Table 9 in CoC B43.

Table D3 - Disturbance limits for threatened fauna

Fauna species	Phase 2 credits		Residual credits		Maximum area of habitat directly impacted (ha)	Ecological rehabilitation credits allowed
	Area (ha)	Credits required	Area (ha)	Credits required		
Black-striped Wallaby (<i>Macropus dorsalis</i>)	692	22,006	297	8,450	989	Potential
Eastern Pygmy-possum (<i>Cercartetus nanus</i>)	542	13,026	232	4,924	775	No
Pale-headed Snake (<i>Hoplocephalus bitorquatus</i>)	620	24,457	266	9,283	885	No
Squirrel Glider (<i>Petaurus norfolcensis</i>)	603	15,927	259	6,026	862	No
Regent Honeyeater (<i>Anthochaera phrygia</i>)	34	3,035	14	1,220	48	No
Koala (<i>Phascolarctos cinereus</i>)	692	22,005	297	8,449	989	No

Note: this table is a direct reproduction of Table 10 in CoC B43.