Santos

NARRABRI GAS PROJECT

Fire Management Plan

PHASE 1

0041-150-PLA-0004

Date	Revision	Reason for Issue	Author	Checked	Approved
15 November 2022	0E	For approval	Eco Logical Australia / Onward Consulting	[redacted]	[redacted]

Document review history

In accordance with consent condition D4, this document has been reviewed as follows:

Review Date	Reason for review	Reviewed by	Revision required (Y/N)

Acronyms and abbreviations

Acronym	Description
AFAC	Australasian Fire and Emergency Service Authorities Council
APZ	asset protection zone
AS	Australian Standard
BAL	bushfire attach level
BFMC	(Narrabri) Bush Fire Management Committee
Cth	Commonwealth
CoC	Conditions of consent for the NGP SSD 6456
CSG	coal seam gas
DAWE	Cth Department of Agriculture, Water and the Environment
DPE	NSW Department of Planning and Environment
EIS	environmental impact statement
EPA	NSW Environment Protection Authority
EP&A Act	*Environmental Planning and Assessment Act 1979* (NSW)
EP&A Regulation	Environmental Planning and Assessment Regulation 2021
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Cth)
EPL	environment protection licence under the POEO Act
ERC	Emergency Response Coordinator
ERT	Emergency Response Team
FBI	Fire Behaviour Index
FCNSW	Forestry Corporation of New South Wales
FDR	Fire Danger Rating
FDI	Fire Danger Index (now the Fire Behaviour Index)
FFDI	Forest Fire Danger Index (now the Fire Behaviour Index)
FRNSW	Fire and Rescue NSW
FRT	Field Response Team
HRC	Hazard Reduction Certificate
IPA	Inner Protection Area
km	kilometre
km/hr	kilometre per hour
kW/m^2	kilowatt per square metre
L	litre
LGA	Local Government Area
m	metre
m/hr	metre per hour
mm	millimetre
NPWS	NSW National Parks and Wildlife Service

Acronym	Description
NSW	New South Wales
OPA	Outer Protection Area
PAL	petroleum assessment lease under the PO Act
PEL	petroleum exploration licence under the PO Act
PH	Permit Holder
PHS	Permit Holder Supervisor
PO Act	*Petroleum (Onshore) Act 1991* (NSW)
POEO Act	*Protection of the Environment Operations Act 1997* (NSW)
POEO Regulation	Protection of the Environment Operations (General) Regulation 2009
PPL	petroleum production lease under the PO Act
PSA	Permit Safety Authority
PPRR	prevention, preparedness, response and recovery
RFS	NSW Rural Fire Service
RTS	Response to Submissions
SRTS	Supplementary Response to Submissions
SMS	Santos Management System
SSD	State Significant Development
SWPP	Santos Work Permit Procedure
t	tonne
t/ha	tonne per hectare
TOBAN	total fire ban
WPM	Work Part Member

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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 Tintsfield 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) and the Project footprint will only directly impact 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:

- Tintsfield 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 NGP. 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 and 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.

Full definitions of the approved activities for Phases 2, 3 and 4 of the Project are provided in the consent.

1.2 Purpose and scope of this Plan - Phase 1

This Fire Management Plan (the **Plan**) applies to activities undertaken during Phase 1 of the Project only. It provides a framework for bushfire prevention, preparedness, response and recovery (**PPRR**) associated with the Project areas and assets. It is based on a study area (**Study area**) which includes the Project area plus a 5 km buffer, to assist in assessing the fire risk to and from the Project area.

The Plan forms part of Santos' response to bushfire risk and been developed in accordance with the requirements of approval conditions of PEL 238; PAL 2; PPL 3; compliance conditions of Environment Protection Licence (**EPL**) 20350; SSD 6456 conditions of consent (**CoC**) B78 to B80 and the applicable regulatory framework regarding fire and emergency management in NSW. It is aligned with the Santos Management Standard (**SMS**) for Emergency Preparedness and Fire Risk Management.

The Plan applies to the construction and operation of Phase 1 activities only. It will be revised, updated and approved prior to subsequent phases to reflect additional gas production infrastructure and associated activities, if any; updated operational procedures and any revised lease or licence conditions.

As required by consent condition B80, Santos will implement this Fire Management Plan in consultation with RFS and FCNSW once approved by the Planning Secretary.

1.3 Objectives

The objective of this Plan is to provide direction for Project personnel and stakeholders on bushfire prevention, preparedness, response and recovery (**PPRR**) within the Project area of operation. Santos has the following primary objectives with respect to bushfires. They are to:

- protect human life;
- minimise the impact on neighbouring property and key Santos assets;
- minimise the impact on the environment; and
- reduce the likelihood of ignition.

The Plan has been developed to complement other management plans and forms part of the Project Environmental Management Strategy (**EMS**) and the emergency response documentation framework.

It further details the relevant statutory requirements (including any relevant approval, licence or lease conditions) and any relevant commitments or recommendations identified in the Environmental Impact Statement (**EIS**) for the Project, and a description of the measures to be implemented to comply with the relevant statutory requirements, limits, or performance measures and criteria.

1.4 Performance measures

In order to fulfil its responsibilities as a landowner and occupier, and in recognition of its role in the community to manage vegetation within its area of operation, Santos will:

- implement best practice bushfire risk management on all land under its control;
- encourage all owners or occupiers of neighbouring properties to implement best practice bushfire risk management;
- meet all statutory obligations for bush fire management;
- educate staff and contractors regarding the risks from bushfires in consultation with the NSW Rural Fire Service (**RFS**), Fire and Rescue NSW (**FRNSW**) and Forestry Corporation of NSW (**FCNSW**); and
- consult with community and other stakeholders when planning bushfire management activities on Project land.

1.5 Consultation

This Plan has been prepared in consultation with the RFS, FCNSW and landowners upon which gas field infrastructure is proposed to be located, with the primary objective to inform and involve all relevant stakeholders during each stage of Plan development. Since Santos is not a fire authority and therefore relies on the RFS and FCNSW for fire-fighting and hazard reduction burning within the Project area, this Plan emphasises a strong bushfire risk management relationship with these organisations.

The response received from the RFS during the consultation process identified no issues and stated that the draft plan reflects the many discussions between Santos, FCNSW and the RFS. The comments provided by FCNSW on the draft management plan centred around notification requirements, the details of fire-fighting equipment, and the training of Santos personnel. A number of comments were related to inconsistencies with the FCNSW Forest Permit[1] issued to Santos, and FCNSW also identified a number of inconsistencies in the draft plan which have been corrected.

No comments were received from any of the relevant landholders in the NGP where Santos currently has wells, or where Phase 1 drilling activities are proposed to be undertaken.

The consultation correspondence and responses to the comments are provided in Appendix A.

1.6 Structure of this Plan

This Plan provides strategies and actions designed to prevent and, if prevention is not reasonable and feasible, minimise risks associated with bushfire including, but not limited to:

- loss of life or major injuries;
- loss of or damage to production infrastructure or property;
- damage to other infrastructure;
- material harm to the environment;
- disruption to activities/ impact of business continuity, and
- loss of stock from surrounding pastoral leases.

The bushfire risk is summarised within the Plan and followed by risk reduction measures under the PPRR model which offers a comprehensive approach to risk management. This model has been used in Australian bushfire risk management for many decades and is a foundational component of risk management planning in natural hazard risk management planning in Australia. The PPRR risk management responses for the Study area are covered in sections 5 to 8.

Sections

Section 1	Provides an introduction to the Project and the context, scope, purpose and objectives of this Plan.
Section 2	Defines the roles and responsibilities of personnel involved with the Project, including project personnel, consultants, contractors and service providers
Section 3	Outlines the regulatory requirements for fire management, the compliance conditions and the relevant codes, standards, policies and guidelines
Section 4	Provides a risk analysis of the Project area
Section 5	Describes the bushfire awareness program
Section 6	Outlines the methods to prevent bushfires and an annual timetable for prevention works
Section 7	Details the preventative measures that can be taken
Section 8	Provides details of the bushfire warnings and alerts, the communication protocols and the appropriate response to a bushfire risk

[1] The Forest Permit issued to Santos by FCNSW for land use access and project activities is at times in this Plan referred to as the Access Agreement.

Section 9	Describes the recovery and debrief process, and how to prepare for a future bushfire event
Section 10	Provides details on the process that is implemented to manage data and records in a consistent, efficient and effective manner
Section 11	Details the process for incident and non-compliance reporting, and how to deal with complaints
Section 12	Describes the reporting, evaluation and review process of this Plan
Section 13	References
Section 14	Glossary

Appendices

Appendix A	Consultation records
Appendix B	Consent conditions relevant to this Plan
Appendix C	APZ dimensions
Appendix D	Evacuation decision making
Appendix E	What to do if caught in a bushfire
Appendix F	Project Field Emergency Response Map
Appendix G	Project incident assessment matrix
Appendix H	Emergency Activation and Escalation Flowchart

1.7 Distribution

A copy of the approved Plan is available to all Santos personnel via the Santos intranet. In accordance with consent condition D13, the latest copy of the Plan, 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.

In accordance with specific licence, approval or code of practice conditions, a copy of this Plan is available 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 Plan are uncontrolled.

2. Roles and responsibilities

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

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

3. Regulatory requirements

The Project is permissible with development consent under the former *State Environmental Planning Policy (Mining, Petroleum and Extractive Industries) 2007*, and is identified as a 'State significant development' under Section 4.38 of the EP&A Act and the former *State Environmental Planning Policy (State and Regional Development) 2011*.

The Project was subject to the State significant development assessment and approval provisions of Division 4.1 of Part 4 of the EP&A Act and has been granted approval as a State significant development under the EP&A Act and the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (**EPBC Act**) (EPBC 2014/7376).

The Project will be carried out in accordance with the:

- relevant existing development consents and activity approvals;
- the conditions of relevant tenements including PEL 238, PAL 2, PPL 3;
- the provisions of the *Petroleum (Onshore) Act 1991* (NSW) (**PO Act**) and relevant codes of practice and guidelines;
- the requirements of the following NSW Acts and supporting regulations:
  - *Rural Fires Act 1997;*
  - *Fire and Rescue Act 1989;*
  - *State Emergency Service Act 1989;*
  - *Work Health and Safety (Mines and Petroleum Sites) Act 2013;*
  - *Forestry Act 2012;*
- EPL 20350 issued by the NSW Environment Protection Authority (**EPA**) and the provisions of the *Protection of the Environment Operations Act 1997* (NSW) (**POEO Act**); and
- the conditions of consent for the NGP SSD 6456.

This Plan has been developed to comply with and fulfil the specific requirements of the legislation described below.

Rural Fires Act 1997

Under Section 63 of the *Rural Fires Act 1997* (**Rural Fires Act**) public authorities and owners and occupiers of land have a number of duties to prevent bush fires.

(1) It is the duty of a public authority to take the notified steps (if any) and any other practicable steps to prevent the occurrence of bush fires on, and to minimise the danger of the spread of a bush fire on or from:

  (a) any land vested in or under its control or management; or

  (b) any highway, road, street, land or thoroughfare, the maintenance of which is charged on the authority.

(2) It is the duty of the owner or occupier of land to take the notified steps (if any) and any other practicable steps to prevent the occurrence of bush fires on, and to minimise the danger of the spread of bush fires on or from, that land.

(3) A public authority or owner or occupier is liable for the costs incurred by it in performing the duty imposed by this section.

Under Section 64 of the Rural Fires Act, occupiers have a duty to extinguish fires or notify fire-fighting authorities.

(1) If a fire (not being a fire or part of a fire lit under the authority of this Act or any other Act) is burning on any land at any time during a Bush Fire Danger Period applicable to the land the occupier of the land must:

(a) immediately on becoming aware of the fire and whether the occupier has lit or caused the fire to be lit or not, take all possible steps to extinguish the fire; and

(b) if the occupier is unable without assistance to extinguish the fire and any practicable means of communication are available, ensure that the fire is reported immediately to the (000) emergency telephone number.

Forestry Act 2012

In accordance with the requirements of the Forest Permit issued to Santos by FCNSW under the *Forestry Act 2012*, Santos must comply with all requirements of FCNSW and all other relevant authorities in relation to fire safety and must ensure that:

- it takes all reasonable precautions to minimise the risk of fire on the Forest Permit area and in particular in any facilities, building or structure in the Forest Permit area;
- during the Bush Fire Danger Period, the following fire suppression resources are maintained within, or within 50 km of, the Forest Permit area and are made available at any time:
  - a fire tanker with capacity of not less than 4000 litres and the capacity to deliver water up to 30 m from the vehicle;
  - a piece of heavy plant with operator which is capable of clearing a mineral earth fire break within the Forest Permit area; and
  - where reasonably practicable, at least four firefighters, three being qualified as RFS Bush Firefighter (or equivalent) and one being qualified as RFS Crew Leader Wildfire (or equivalent). The Santos Crew Leader will only direct and manage Santos staff and contractors.
- fire resources are applied within the Forest Permit area to suppress and control fire on the Forest Permit area where it can provide the first firefighting response to the fire;
- on request, FCNSW has access during the Bush Fire Danger Period to the Santos bulk water tankers and its water resources within the Forest Permit area;
- despite any direction given to any Authority, no burning of timber, grass, cleared vegetation or other combustible matter is undertaken without the written consent of FCNSW and subject to such conditions as FCNSW and any authority may determine;
- it complies with all requirements of the Forest Permit and any imposed by FCNSW as owner of the Forest Permit area under the *Rural Fires Act 1997*
- Santos employees and agents do not allow any act, matter or thing within the Forest Permit area whereby the risk of fire might be increased.

It is to be noted that Santos will not deploy personnel to any fire event where a significant risk to health and safety exists.

3.1 Compliance conditions

Compliance conditions associated with the following licence(s), lease(s) and consent(s) are or will be relevant to this Plan:

- PEL 238, granted on 1 September 1980 and most recently renewed on 12 April 2022;
- PAL 2, granted on 30 October 2007;
- PPL 3, granted on 15 December 2003;
- PPLs 13, 14, 15 and 16, once issued;
- EPL 20350, as varied; and
- SSD 6456.

3.1.1 PEL 238, PAL 2 and PPL 3

There are no specific conditions or obligations in PEL 238, PAL 2 and PPL 3 related to (bush)fire management.

3.1.2 EPL 20350

'Petroleum exploration, assessment and production' is a scheduled activity listed in Schedule 1 of the POEO Act. Under Section 48 of this Act, all scheduled activities are required to hold an environment protection licence. EPL 20350 is held for Santos' current CSG activities in PEL 238, PAL 2 and PPL 3.

Condition O4.1 relates to emergency response and states to Santos must have an Emergency Response Plan in place to deal with emergencies (including fire). This Fire Management Plan supports and supplements the Project Emergency Response Plan and associated documents.

3.1.3 Development Consent SSD 6456

There are several key SSD 6456 consent conditions that are directly relevant to bushfire prevention, preparedness, response and recovery, as provided in full below. Table B1 in Appendix B specifies where each of the requirements of the SSD 6456 consent conditions relevant to this Fire Management Plan are addressed in this Plan.

Consent condition B78 states that Santos must:

(a) ensure that the development:
  (i) provides for asset protection in accordance with the relevant requirements in the *Planning for Bushfire Protection* (RFS, 2019) guideline;
  (ii) ensure that there is suitable equipment to respond to any fires in the Project area; and
  (iii) provides for safety flare stack heights of 50 metres above ground level; and

(b) assist the RFS and emergency services to the extent practicable if there is a fire in the vicinity of the Project area.

Consent condition B79 states that prior to the commencement of Phase 1, Santos must prepare a Fire Management Plan for the development in consultation with RFS, FCNSW and landowners upon which gas field infrastructure is proposed to be located to the satisfaction of the Planning Secretary. This plan must include a:

(a) contact person and 24-hour contact phone number;
(b) schedule and description of proposed bushfire mitigation works, including:
    (i) location of managed and unmanaged vegetation within the Project area;
    (ii) asset protection zones for project related infrastructure, based on detailed risk assessment;
    (iii) design of applicable buildings in accordance with the requirements in the *Planning for Bushfire Protection* (RFS, 2019) guideline;
    (iv) location of water supply
    (v) internal access roads;
(c) protocol for certification of project related infrastructure in relation to radiant heat exposure;
(d) plan identifying the location and storage of bulk flammable liquids and materials;
(e) plan and procedures for minimising bushfire risks associated with safety flaring activities;
(f) plan and procedures for shutting-in wells in the event of bushfire risk;
(g) 'hot works' management plan, including:
    (i) restrictions on when 'hot works' are limited and prohibited; and
    (ii) safety measures to be implemented when 'hot works' are being conducted; and
(h) emergency/evacuation plan in accordance with the *Guidelines for the Preparation of Emergency/Evacuation Plans* (RFS) and Australian Standard AS3745 *Planning for emergencies in facilities*.

Consent condition B80 states that Santos must implement the Fire Management Plan in consultation with RFS and FCNSW once approved by the Planning Secretary.

3.2 Relevant codes, standards, policies and guidelines

Santos will implement and comply with the relevant codes, standards, policies and guidelines as detailed below.

3.2.1 Planning for Bush Fire Protection

The *Planning for Bush Fire Protection: A guide for councils, planners, fire authorities and developers* (RFS, 2019) (**PBP**) was implemented on 1 March 2020. It is referenced by the EP&A Act and provides development standards for designing and building on bush fire prone land in NSW. It replaces the Planning for Bushfire Protection 2006.

With the implementation of the PBP 2019, AS 3959:2018 *Construction of buildings in bushfire-prone areas* is now in force in NSW also.

PBP provides standards and guidance for:

- strategic land use planning to ensure that new development is not exposed to high bush fire risk;
- creating new residential and rural residential subdivision allotments;
- special fire protection purpose development taking account of occupant vulnerability;
- bush fire protection measures for new buildings; and
- upgrading and maintaining existing development.

PBP is applicable to all development on bush fire prone land in NSW. The general principles underlying this document are that:

- a suite of bush fire protection measures are required to reduce the impact of a bush fire;
- protection measures are governed by the degree of threat posed to a development and the vulnerability of occupants;
- minimising the interface of a development to the hazard reduces the bush fire risk to the development; and
- good practice in planning, building and management reduces the risk to developments and their occupants, and increases their resilience.

The PBP will be implemented by Santos for the Bibblewindi, Leewood and Wilga Park buildings, including certification.

3.2.2 Construction of buildings in bushfire-prone areas

Australian Standard (**AS**) 3959:2018 *Construction of buildings in bushfire-prone areas* specifies requirements for the construction of buildings in order to improve their resistance to bushfire attack from burning embers, radiant heat, flame contact and combinations of the three attack forms. It is referenced in the National Construction Code 2019

3.3 EIS commitments

In the EIS Chapter 31 and updated in Appendix B of the Response to Submissions, Santos committed to implement a number of measures pending Project approval and a final investment decision. The EIS commitments relevant to bushfire management have been reproduced in Table 3.1, in accordance with 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 3.1 - EIS commitment relevant to bushfire management

Number	EIS Commitment relevant to bushfire management
1.2	A project wide environmental management strategy, comprising a number of sub-plans to be used throughout the planning and design, construction, operation and decommissioning and rehabilitation stages of the project are described in Chapter 30. The sub-plans are[2]: • … • Bushfire Management Plan • …
16.1	A Fire Management Plan will be implemented.

As described in section 12 of this Plan and section 8 of the EMS, this Plan will be subject to regular evaluation and review. This will include the EIS commitments to ensure they remain current, applicable, and generally improve the environmental performance of the Project.

[2] Only the plans relevant to fire management have been listed. The full list of sub-plans is provided in the EMS.

4. Risk analysis

4.1 Risk analysis background

The Pilliga bushfire risk (e.g. remoteness, bushfire proneness and fire history) has been assessed in detail and responded to in the development design. The Project does not exacerbate bushfire proneness of the landscape and the likelihood of fire from increased human activity has been assessed within the EIS as remote and is mitigated by the improved fire detection and improved response potential associated with the development. Further, the bushfire ignition risk from all phases of operation is classified as remote within the EIS and the overall bushfire risk has been assessed as medium. The risk to firefighters/emergency responders has been evaluated and can be well managed through this multi-agency Plan.

Not all Project facilities and infrastructure are at risk from bushfire. Facilities with a low to negligible bushfire risk in Phase 1 include Leewood, Bibblewindi and the Bibblewindi to Leewood infrastructure corridor.

Located on farmland to the north of the forest, the Leewood property comprises a central water management facility, including ponds and water treatment infrastructure. It has been cleared historically for cropping and improved pastures. As a major facility the key infrastructure is behind fenced areas, on hard stand or on concrete. The grassy vegetation on the property is managed as an asset protection zone.

The existing infrastructure at Bibblewindi comprises an in-field compression station, a safety flare, a communications tower; water tanks, decommissioned water ponds and staff amenities. These facilities are fully fenced, located on hard stand or concrete surfaces, appropriately offset from the forest and with appropriately managed asset protection zones. The existing Bibblewindi flare will continue to be used for safety purposes to support the ongoing operation of the Wilga Park Power Station[3] for beneficial re-use purposes, though flaring will be minimised. The flare is designed with a sterile zone as outlined in the EIS and the area surrounding the flare is kept with minimal vegetation through regular maintenance.

For infrastructure required for future phases, final engineering design will determine whether wiring and sensitive components of the communications tower will be protected by shielding.

All power lines, water and gas pipelines and communications lines in the Bibblewindi to Leewood corridor are buried and therefore not exposed to damage by bushfire. The remaining assets and infrastructure, including fences, high point vents and low point drains are either non-combustible or low value structures, or structures requiring no specific bushfire protection. In the event of a bushfire, wells can be remotely isolated as required. This will be undertaken in consultation with FCNSW.

4.1.1 Risk of under-ground coal seam fires

It is not possible for underground coal ignition to occur through development of natural gas from coal seams. Gas is extracted from coal seams that are up to 1,200 m below ground level. The reduction of pressure resulting from the extraction of water from within coal seams allows natural gas to flow to the surface via the gas wells. The gas in the coal seams is almost entirely comprised of methane, carbon dioxide and nitrogen. For a fire to occur in the well casing up to 1,200 m underground near the coal

[3] The Wilga Park Power Station project (Project Approval 07_0023, as modified) was first approved in 2008.

seam, in addition to the presence of methane (a combustible gas), oxygen must also be present. Given the absence of oxygen at the coal seam, combustion would not be possible.

The maximum concentration of methane that will burn in open air is 15%. It is expected that around 90% of the gas extracted from the coal seam (and therefore the gas present in the well casing) will be methane. Therefore, the ignition of methane at the concentration within the coal seam is also not possible.

While the Project proposes to extract naturally occurring methane from the coal seam by reducing the groundwater pressure, underground coal gasification is not proposed. The production of natural gas from coal seams should not be confused with underground coal gasification, a process which converts the coal *in situ* to 'syngas' through partial combustion. The air or oxygen required for this combustion is injected into the coal seam. Unlike underground coal gasification, there is no risk of a fire in the coal seam associated with coal seam gas development.

4.2 Elevation and slope

Figure 4.1 shows the elevation for the Study area which is largely flat with a gentle north-west to south-east rise of about 250 m across about 48 km. The slight rise in elevation will have an insignificant influence on fire spread with the majority of potential fire spread on near-flat land (refer to Figure 4.2). The assessments for the minimum area required for asset protection (refer to Appendix C for details) assume a downslope of 3 degrees.

The steepest slopes are in the south-eastern portion of the Study area with all slopes smaller than 6 degrees[4]. These slightly steeper slopes mitigate a fire's rate of spread and intensity if fires enter the Study area from the south-east and will slightly increase a rate of spread and intensity if exiting the Study area to the south-east.

[4] APZ are determined by the slopes within 100 m of each site. The landscape-wide slope patterns are different and not relevant to APZ calculations under AS3959 or PBP.

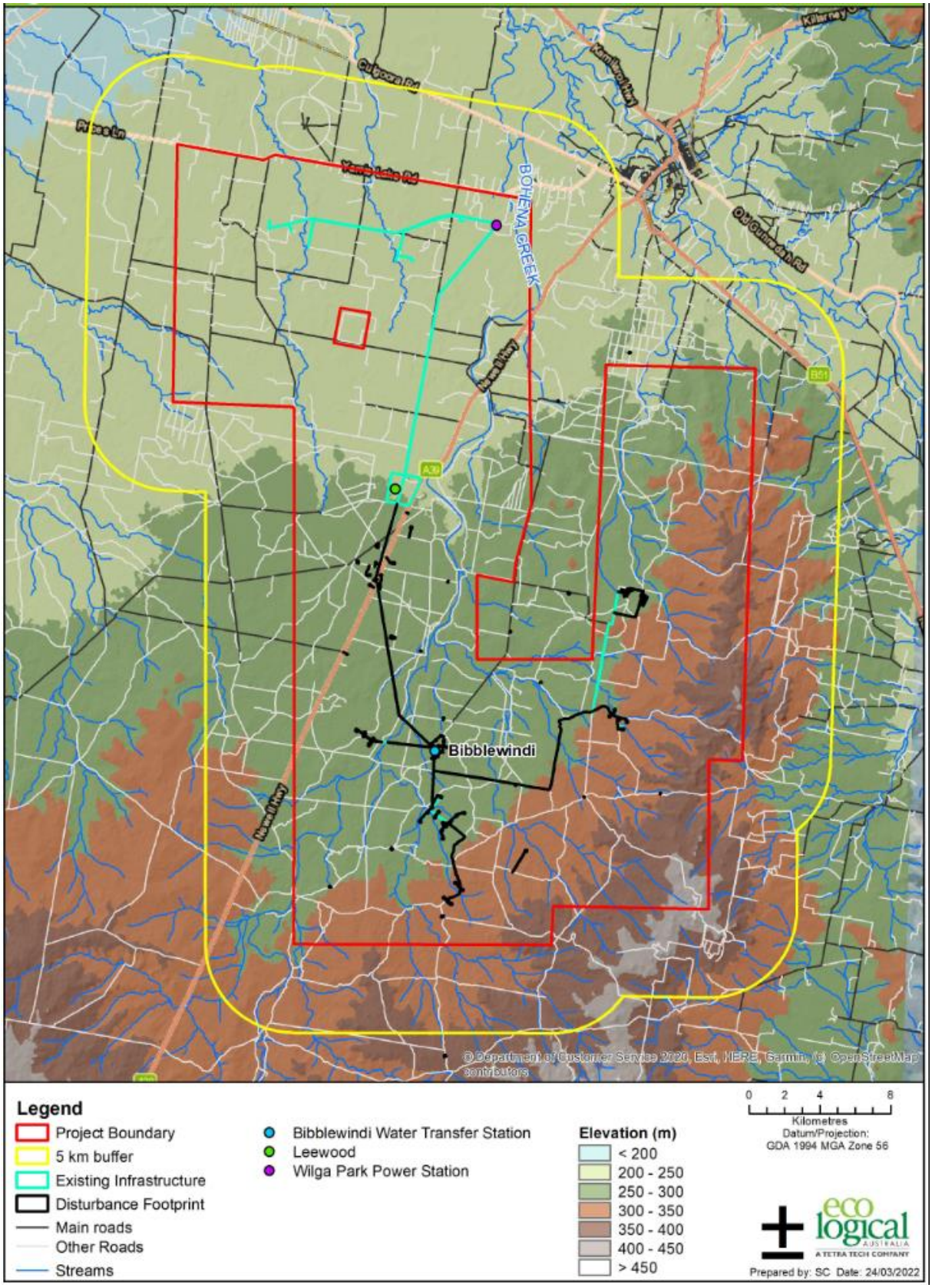


Figure 4.1 - Elevation within the Study area

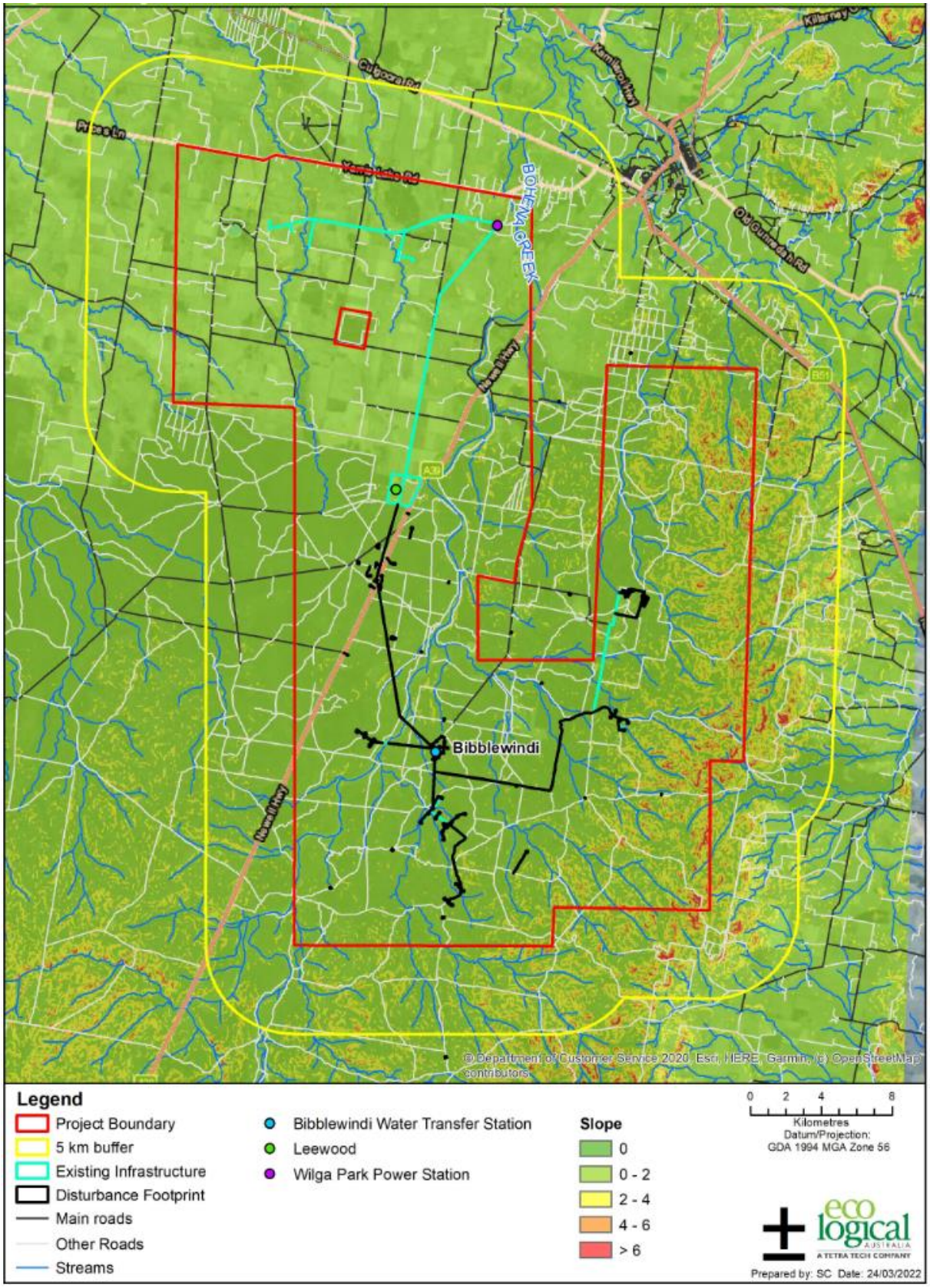


Figure 4.2 - Slope within the Study area

4.3 Vegetation and fuel

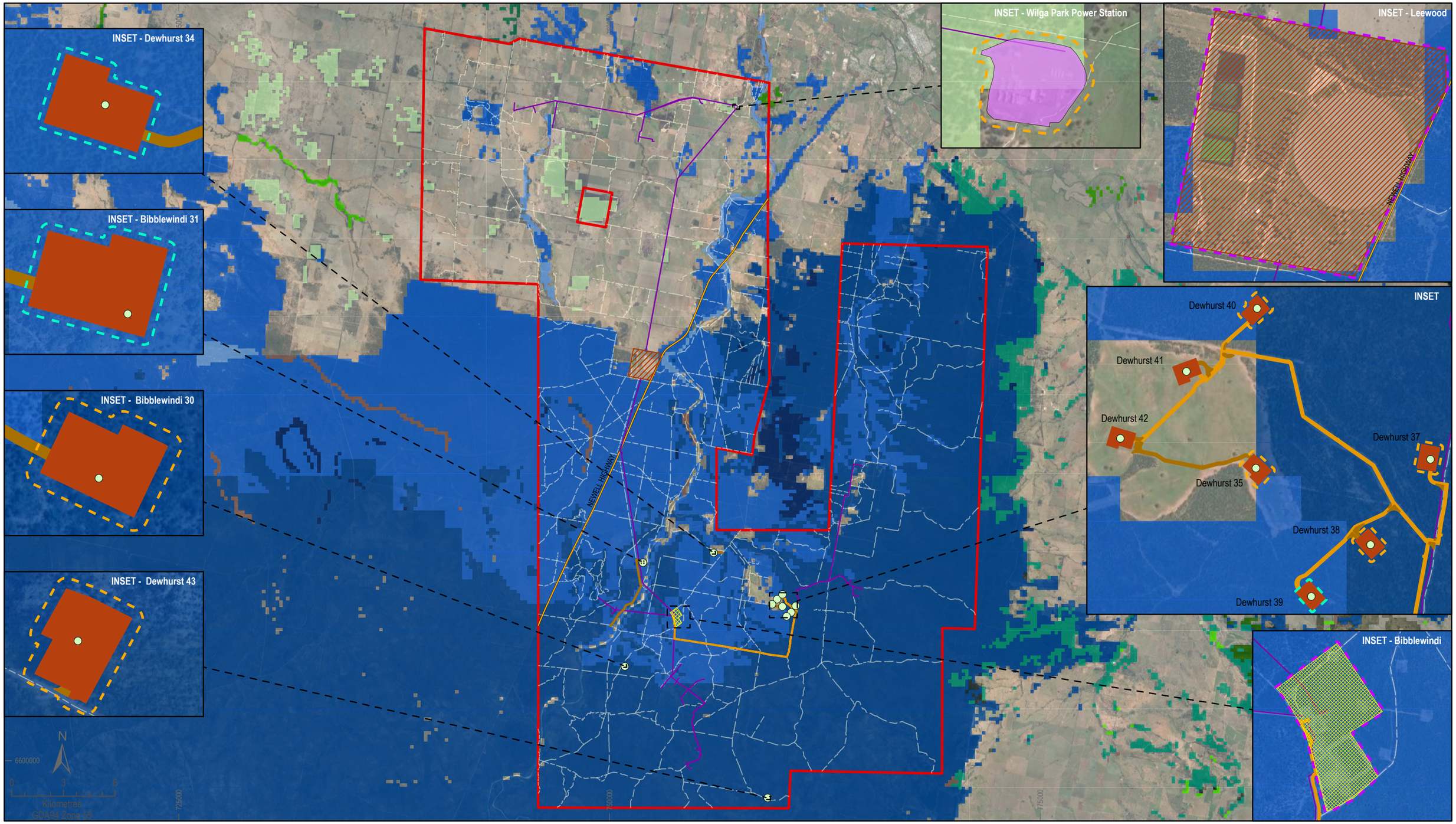
Figure 4.3 presents the distribution of vegetation types across the Study area. It has been prepared from combining vegetation data from two sources; the 2020 North West Local Land Services *Travelling Stock Reserves Vegetation Guide* and the NSW Bionet Vegetation Information System (Bionet VIS) vegetation. All cleared and cropping areas have been labelled as grassland for the purposes of estimating the potential fire behaviour and fire spread (refer to the figures in Appendix D) and therefore likely overstates the risk in some of the 'grassland' labelled areas.

Figure 4.3 also shows vegetation in structure groupings of forests, woodlands, heathlands/swamps and grasslands and asset protection zone (**APZ**) buffers (refer also to section 6.5). Fire behaviour in each of these groups can be quite different as can fire behaviour in specific vegetation types. In very general terms the fire behaviour for each of these four groups is summarised in Table 4.1

Table 4.1 - Fire behaviour characteristics of broad vegetation groups

Vegetation group	General fire behaviour characteristics
Forests	Typically have heavier fuel loads (but not always), create higher flame heights and therefore higher fire intensity effects on buildings and people. Fuel burns for longer periods and more intense mop up (blacking out) is required. Rough or fibrous barked species may cause short distance spotting (10's of meters) and ribbon gum species can result in long distance spotting (hundreds of metres and even kilometres). Direct attack on fires within forests can be restricted by tree trunks and fire risk. Wind effects at ground level of forests can be mitigated and dramatic changes in wind and fire behaviour can occur where forests abut open areas and roads.
Woodlands	Similar to forests however the tree height and spacing is less and therefore the flame heights may be less (especially in crown fire) fuels loads may be less. Both forest and woodland fire risk is often strongly influenced by the understorey fuel height and density. Shrubby understoreys can provide 'ladder' fuels that help spread fire from ground layers into treetops (crown fires). Crown fire spread is typically more likely in forests than woodlands due to tree spacing (but not always).
Heathlands/swamps	Heathlands fire behaviour is primarily driven by wind. Heathlands and swamps typically carry a lot of fine fuel (<6 mm in diameter) which is the fuel type that contributes to the flaming edge of a fire. Despite their lower vegetation height, they can therefore carry high intensity fires that are difficult to control.
Grasslands	Grassfires are potentially the easiest fuel type to ignite (very high risk when fully cured) and are the most rapidly spreading fires in the absence of spotting. Grassfires are typically wind driven and change direction rapidly with wind changes. Fences and access are significant challenges to 'rounding up' grassfires, particularly given their rapid rates of spread. Mopping up and fire attack on buildings is less problematic than that with woody fuel types.

Figure 4.4 shows the indicative distribution of fuel load across the Study area (i.e. the fine fuel components of vegetation). General fuel load data has been used to compile Figure 4.4 and should not be relied upon for fire spread predictions, but it provides a useful perspective of the landscape wide fuel load related risk. In general terms, fuel loads increase from north to south through the Study area. However, localised risk considerations are best undertaken on a site-specific investigation and consideration of the broad characteristics of the vegetation groups in Table 4.1.



Santos

LEGEND

- NGP boundary
- Leewood
- Bibblewindi
- Wilga Park Power Station
- Proposed phase 1 wells
- Existing linear infrastructure
- Phase 1 flowlines
- Phase 1 access roads
- Phase 1 well pads
- 7 m APZ buffer
- 10 m APZ buffer
- 14 m APZ buffer
- Highway
- Roads and tracks

Woodlands and Forests

- Brigalow Clay Plain Woodlands
- Cleared
- Eastern Riverine Forests
- Floodplain Transition Woodlands
- Inland Riverine Forests
- North-west Alluvial Sand Woodlands
- North-west Floodplain Woodlands
- North-west Slopes Dry Sclerophyll Woodlands
- Pilliga Outwash Dry Sclerophyll Forests
- Western Peneplain Woodlands
- Western Slopes Dry Sclerophyll Forests
- Western Slopes Grassy Woodlands
- Yetman Dry Sclerophyll Forests

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Figure 4.3

Vegetation and APZ Buffers

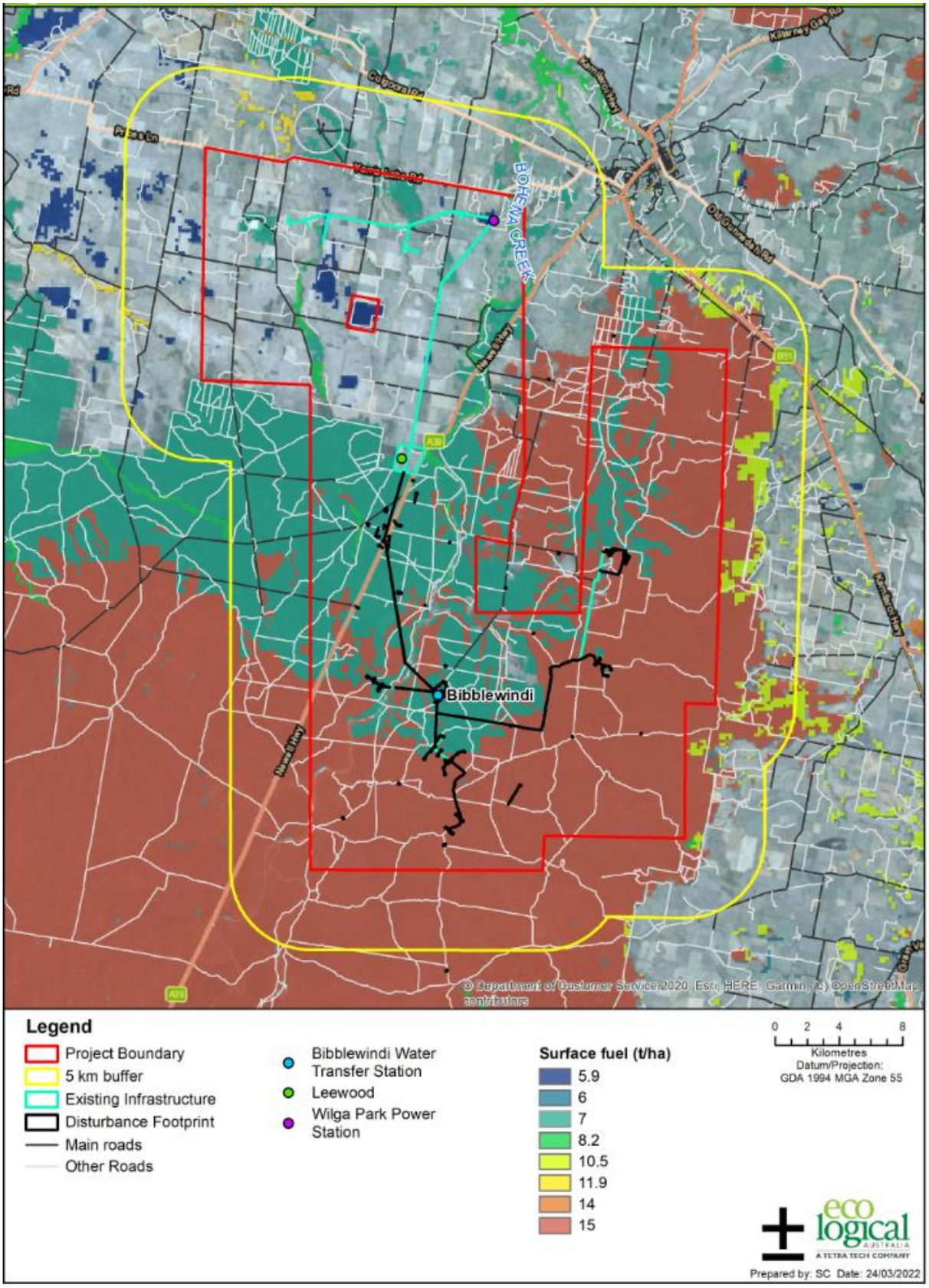


Figure 4.4 - Fuel loads within the Study area

4.4 Bushfire weather and behaviour

Fire behaviour is determined by a combination of weather factors including temperature, relative humidity, wind speed and the time since rain. Other factors such as topography and aspect can also affect fire behaviour and intensity, along with fuel (vegetation) load, fuel structure (vertical arrangement), fuel continuity (horizontal arrangement) and fuel dryness. Fuels facilitate the spread of fire by various means including flame contact, radiant heat and spotting (or embers). Forest fuels can provide both long-distance spotting (e.g. ribbon bark) and short-distance spotting (e.g. fibrous bark) whereas pure grasslands fires typically only spot short distances e.g. 10 m or so, and their fuel contribution to fire spread is mainly affected by grass height and curing. Grass fires are typically easier to ignite and often spread fire from grassy disturbed areas into more remote forested and scrubby areas.

Typical adverse fire weather days may include temperatures of >30°C, relative humidity <20%, and wind speed >15 km per hour (km/hr). Winds from the west and north-west usually drive this type of weather in the Study area. Due to the small range of elevation and slope in the Study area, fire spread direction is typically downwind but temperature inversions can rapidly change fire behaviour and direction when they erode away during the day, allowing upper level winds to come down to the surface. Such changes in wind direction and speed can suddenly change the flank of a fire to the head of a fire and rapidly change the risk to nearby life and property.

In other situations, masses of hot air or fire generated clouds (pyro-cumulus clouds) can create extremely volatile localised fire storms with the potential to dump super-heated air and turbulent winds onto nearby areas with dangerous changes in fire behaviour and new ignitions. Whilst steep slopes are not prevalent in the Study area, pyro-cumulous clouds are possible under higher intensity fire behaviour associated with strong hot and dry winds and areas with heavy and structured fuels.

Rapid uncontrollable fire spread though the crowns of forests and shrublands is referred to as crown fire. Fires rarely spread over large distances as crown fire but when they do, they are of an intensity that is uncontrollable by ground-based firefighting resources and small aircraft. Crown fire is most common on steeper slopes but strong winds on an adverse fire weather day can result in crown fire spread within the Study area.

The Study area is typically dry with daily humidity between 30% and 45%. From September to March, fuel curing (drying) typically occurs in association with an increasing number of days between rain and relative humidity below 40%. Every year the weather and fuel conditions within the Study area have the potential to carry higher intensity (uncontrollable fires). Even lower fuels of the Pilliga Outwash Dry Sclerophyll Forest (i.e. 5 tonne per hectare (t/ha) surface/elevated fuel and 11.05 t/ha overall fuel) may carry uncontrollable fire intensities whenever the fire danger rating (**FDR**) is extreme or above. Heavier fuel vegetation types within the Study area may experience uncontrollable fire intensities when the fire danger rating is high or above.

The rate of spread of fire in the Pilliga Outwash Dry Sclerophyll Forest on days of extreme fire danger may be 660 m per hour (**m/hr**) and on catastrophic fire danger days well over 1,320 m/hr (or 22 metres per minute). Much higher rates of spread (e.g. >3 km/hr) are suggested for the Pilliga Forests by some regional fire experts (P. Brookhouse[5] pers. comm. 2021) and grasslands may have rates of spread over 15 km/hr. As higher intensity forest fires can spread as fast, or faster, than grassfires when spotting occurs (i.e. burning debris carried downwind in the smoke column to ignite fires beyond the main fire footprint), the observation of spot fires within forests may pose a high evacuation risk with egress routes cut unexpectedly.

[5] Former NPWS Northern Plains Region Fire Management Officer.

4.5 Fire history and ignition risk

Fire history records reveal numerous wildfires and many very large fires suggesting that wildfires will occur at regular intervals in Study area in the future. The 2016-2021 NPWS *Pilliga East Fire Management Strategy* (OEH, 2015) describes the fire history and fire behaviour in the Study area (or nearby) as follows:

The Pilliga Scrub is characterised by large fire events which rapidly escalate to a landscape scale. Fires have exceeded 100,000 ha on a number of occasions. The potential fire behaviour in the eastern Pilliga is indicated by the following incidents:

- day-time runs of 20+ kilometres;
- increases of the fire area greater than 50,000 ha in one day;
- significant fire runs if different directions over successive days; and
- significant night-time runs with easterly winds after very dry south-westerly conditions.

Seasonal dry lightning storms pose the greatest natural ignition risk. Use of machinery in grass and forested areas, and activities such as field welding and grinding are also common ignition sources. The ignition risk from these human-causes increases significantly when fuel and soil dryness is low and especially when extended droughts are exacerbated by shorter term very low rainfall and high drying periods.

Potential ignition sources include:

- lightning;
- plant and equipment working over rock and timber debris;
- accumulation of grass and timber debris in belly plates and engine cavities of machines;
- faulty exhausts;
- welding and grinding in the field;
- slashing and mulching;
- escaped hazard reduction burns;
- spot-overs from burning heaps or windrows;
- gas well flaring; and
- arson.

4.6 Remoteness and access

Whilst the Study area has a reasonable array of access roads, all occur in remote bushland areas with little or no adjacent habitation. Travelling into remote bushland where visibility is constrained by the flatness of terrain and the height and cover of vegetation poses additional risk to people working in the Study area.

Also given the rapid-fire spread potential (refer to section 4.4) and the safe travel speed limitations of gravel roads, the risks associated with fire suppression and evacuation are exacerbated.

4.7 Life, property and environment

Bushfire risks may be posed to life, property and the environment, with the risk to life the priority concern followed by infrastructure/built and environmental assets. Santos manages a variety of key infrastructure and activities within the Study area, as shown in Table 4.2.

Table 4.2 - Key Phase 1 project infrastructure and activities

Major facilities	Infrastructure or activity
Existing facilities	
Leewood	• A central water management facility including storage and treatment of produced water and brine • Treated water management infrastructure to facilitate the transfer of treated water for irrigation, dust suppression, construction and drilling activities • Other supporting infrastructure including storage and utility buildings, staff amenities, equipment shelters, car parking, and diesel and chemical storage, as follows: ▪ Leewood Ponds – 2,000 L ▪ Leewood Water Treatment Plant – 20,000 L • Continued use of existing facilities such as the brine and produced water ponds • Operation of the facility
Bibblewindi	• In-field compression facility and pre-existing flare • Supporting infrastructure including storage and utility areas, treated water holding tank, a 5,000L diesel storage tank and a communications tower • Produced water, and construction water storage • Continued use of existing facilities such as the 5 ML water balance tank • Operation of the expanded facility
Bibblewindi to Leewood infrastructure corridor	• Existing corridor for operation of buried medium pressure gas pipeline, and a water pipeline
Phase 1 scope	
Gas exploration, appraisal and production infrastructure	• Seismic geophysical survey • 4 coreholes and 6 pilot wells • 1 deep reservoir monitoring bore (converted corehole) and new shallow water monitoring bores • Installation of water and gas gathering lines and supporting infrastructure • Construction of new access tracks where required • Lease pads will have storage for up to 5,000 L diesel for the backup diesel generators at Dewhurst South, Dewhurst North (only on two lease pads at each site). • Diesel storage will also be used intermittently to support drilling operations, typically in a 5000 L tank.

Complete and up to date inventory details regarding the location and storage of bulk flammable liquids and materials are provided in the Pollution Incident Response Management Plan (PIRMP) and the supporting chemical management system, ChemAlert.

In general terms, the bushfire risk to life associated with the infrastructure and activities listed in Table 4.2 is associated with staff, contractors and visitors being exposed to a bushfire while at a work site or travelling the intervening roads. Risk exposure is always higher when on foot, followed by in a vehicle and the lowest within bushfire resilient buildings, however, any of these exposures can be life threatening in a wide variety of circumstances.

Also, in general terms, the risk to infrastructure is determined by the components which are most prone to failure or burning in a bushfire. Typically, the most vulnerable components are plastics and rubber which melt or burn at relatively low exposure to radiant heat (e.g.13 kilowatts per square metre (kW/m^2) and their failure may result in the functioning of the item of infrastructure e.g. electrical components. In general terms the vegetation around infrastructure with plastic or rubber essential componentry within the Study area forests would need to be managed for a distance of at least 40 m for the radiant heat exposure to be < 13 kW/m^2. The risk to vulnerable componentry can be lowered in some cases by it being shielded with non-combustible, opaque materials.

4.8 Risk to firefighters

There is no obligation or expectation that RFS or other firefighters will specifically protect project related infrastructure, with the potential exception of back burning operations, where if feasible and considered feasible by responding firefighters, fire retardant or other measures may be used to protect facilities prior to the impact of a back burning operation.

5. Bushfire risk awareness

The Bushfire Awareness Program helps ensure people who use, manage and work on the Project:

- are aware of the bushfire risks in the Project area;
- know what to do in the case of a bushfire in the Project area;
- are advised of any prescribed burning in the Project area; and
- have contact details for questions about bushfires or for reporting a bushfire.

Bushfire awareness will be raised through:

- Santos' participation on the Narrabri Bush Fire Management Committee (**BFMC**);
- responding to enquiries about bushfire management related issues;
- co-ordinating distribution of information to Santos staff, contractors, visitors and external agencies regarding awareness and management issues;
- providing fire safety advice and actions to be undertaken by Santos staff, contractors and visitors to operational sites;
- notification of neighbours of future activities that may affect them; and
- implementation of the Bushfire Awareness Program.

A program of raising bushfire awareness with Project personnel, contractors and visitors is vital for achievement of the objectives of this Plan. A proactive approach to managing public perception about the Project's bushfire risk is important, as is the need to manage risks to neighbours and other stakeholders.

Bushfire risks associated with Project have been described in section 4 and awareness of these are incorporated in the Bushfire Awareness Program. In general terms the risk of fire ignition and escape from Project-related operations is very low. The Bushfire Awareness Program is presented in Table 5.1.

5.1 Prepare, Act, Survive

Santos has incorporated the RFS "Prepare, Act, Survive" framework into the Project operational philosophy, which is outlined in section 8.7 for evacuation. Immediately prior to the Bush Fire Danger Period each year all staff and contractors are to be made aware of bushfire procedures and reporting obligations, including:

- identifying and reporting of bushfire hazards;
- acting on bushfire sightings or incidents;
- reporting of bushfires;
- locations of refuge areas and escape routes;
- fire season rules and fire danger ratings; and
- evacuation protocols.

5.2 Bushfire refuge points

The Project does not have ‘Neighbourhood Safer Place’ (as defined by the RFS) or ‘bushfire refuge of last resort’, however major ‘Refuge Points’ have been identified (refer to section 8.7) and are to be used where off-site evacuation is not feasible.

5.3 Santos points of contact

The Narrabri Gas Project provides a 24-hour emergency response number as the point of contact for Project related emergency calls in relation to bushfire issues. All 24-hour emergency contact numbers are provided in section 8.2, with table 5.1 below, identifying specific duties assigned within the Bushfire Awareness Program.

Table 5.1 - Bushfire awareness program

Awareness activity or product	Target audience	Resource(s)	Detail	Timing	Responsibility
Prepare, Act, Survive Plans	Santos personnel, contractors and visitors		Prepare, Act, Survive plan be integrated into site SOP (emergency, evacuation, induction); Include actions for triggers on alerts Advice, Watch and Act, Emergency Warning; Link to preparedness and response strategy;	Annual update prior to September	Area Manager
New starter, visitor and contractor inductions	Santos personnel, contractors and visitors	Induction package	Induction process to include evacuation, reporting of fires, hot works permits, out of bounds areas during higher FDRs, fire ignition prevention etc.	Bush Fire Danger Period	Project Manager, Construction Field Supervisor or their delegate
Annual briefings and bushfire preparedness	Santos personnel, contractors and visitors		Annual pre bushfire season briefing to include: Bushfire seasonal outlook from the Bushfire and Natural Hazards CRC Commencement of fire danger period Reminder of fire danger ratings, associated activity restrictions, preparedness and response strategies Follow up on previous post-fire season briefing and actions implemented Ensure all measures in place for upcoming season	Prior to September 30 (annually)	HSER Onshore Field Risk Adviser
			Annual post bushfire season briefing to include: Lessons learnt, fire debriefs Recommendations for updates to Mitigation works program, BMP, Preparedness and response strategy	April	HSER Onshore Field Risk Adviser
			Review annual mitigation works program.	Annually	HSER Onshore Field Risk Adviser
			Review annual preparedness and response program.	Annually	HSER Onshore Field Risk Adviser
Fire danger rating, Total Fire Ban notifications, restrictions and enforcement	All users of site		Communicated through morning toolbox and pre-start talks		HSER Onshore Field Risk Adviser
Programs for adjacent areas	Local RFS Narrabri Bushfire Committee NPWS, FCNSW	Fire Management Plan	Discuss bushfire matters as required with Narrabri RFS and FCNSW at BFMC meetings.	Ongoing	HSER Onshore Field Risk Adviser

6. Prevention

Prevention, in a bushfire context, includes managing the risk of ignition and establishing a management framework or plan to reduce a bushfire's spread and impact.

6.1 Management of ignition risks

Minimising the risk of ignitions is fundamental to bushfire prevention. The design of all built components and operational systems of the facilities includes measures that minimise and potentially eliminate bushfire ignition risk.

Santos has no influence over natural ignition causes and little influence over human-caused ignitions on neighbouring lands or not associated with their operations and infrastructure. However, Table 6.1 identifies prevention works appropriate for reducing ignition risks associated with Santos' operations and infrastructure.

Table 6.1 - Ignition risk management

Ignition risk	Prevention action required	Comments
Machinery operation	Restriction of machinery use during periods of higher risk	As required under the job hazard analysis with suitable controls of risks. See Table 7.3 for restrictions associated with fire danger rating.
Hot works	Santos Work Permit Procedure (**SWPP**) for Hot Work	As above. Fire units required at sites during the Bush Fire Danger Period. Detailed controls to be added as per Hot Work Permit under the SWPP, including the permit application, review and approval process (refer also to section 7.3).
Escapes from approved burning	Compliance with RFS Standards for pile burning and Permits to Burn. Wherever possible, schedule burns outside Bush Fire Danger Period.	Refer to: • the RFS *Standards for pile burning* (RFS, 2017); and • information on fire permits, when these are required and how to apply. Current information is available at https://www.rfs.nsw.gov.au/plan-and-prepare/know-your-risk/Bush-fire-hazards-and-your-property/fire-permits. Note that Santos will not conduct its own burning but may assist FCNSW or RFS as required.
Arson	Regular patrols by Santos and others, use of security cameras	Assist in lowering the risk of arson by identifying persons of interest. A number of cameras units exist within the NGP area with additional cameras to be added where required over time (as needed).
Fire detection	Fire detection cameras and regular patrols by Santos personnel	As above and includes a long range fire detection camera used to triangulate fire locations within the Pilliga forest. Satellite fire detection is likely to improve detection in the future with Santos working with external stakeholders on this matter.

6.2 Hazard reduction

All hand or mechanical bushfire hazard reduction works carried out in NSW, requires a Hazard Reduction Certificate (**HRC**), although some exemptions apply e.g. if the site has a development consent requiring an asset protection zone.

An HRC is an environmental approval to carry out hazard reduction work. The RFS can issue an HRC for works carried out on privately-owned land, providing it meets certain requirements. The HRC will specify conditions that are to be complied with to carry out the works.

Santos will not undertake hazard reduction burning on land it does not own, but may assist FCNSW or RFS as required.

The primary hazard reduction works proposed by the Plan are associated with asset protection zones which are discussed in section 6.5 below.

6.3 Roads and fire trails

FCNSW are the managers of the roads and trails built in State forests by FCNSW (refer to the Project Field Emergency Response Map in Appendix F). FCNSW has granted authority to Santos to use its road network for Project purposes and Santos has committed to maintaining these roads to FCNSWs standards (*Forest Road Practices Code 2013*).

Where Santos proposes to construct roads or access tracks within the Forest Permit Area, Santos will ensure these are properly constructed, drained and maintained to a standard which complies with both FCNSW requirements while ensuring full compliance with the requirements of PBP[6]. These are to be inspected and maintained in accordance with the prevention works discussed in section 6.7 and in consultation with FCNSW.

6.4 Fire breaks and tracks

Fire breaks and tracks are cleared/managed areas to help limit the spread of fire and provide vehicular access for fire suppression. As repeated bare earth grading of fire breaks can cause erosion, fire break maintenance using mulching and slashing strategies are preferred. Fire breaks and tracks are required around all key infrastructure within Santos fenced areas and are to be inspected and maintained annually.

6.5 Asset protection zones

An asset protection zone (**APZ**) is a fuel-reduced area surrounding a built asset or structure which provides a buffer zone between a bush fire hazard and an asset. The APZ includes a defendable space within which firefighting operations can be carried out. The size of the required APZ for buildings varies with slope, vegetation and fire behaviour index.

APZ are also a zoning classification used in landscape bushfire management planning, such as in the Namoi-Gwydir Bushfire Risk Management Plan, where its purpose is for minimising the bushfire attack on assets. APZ in landscape bushfire planning tend to vary in width depending upon biophysical and strategic protection requirements.

[6] In the event of an inconsistency between the FCNSW *Forest Road Practices Code 2013* and the PBP, both FCNSW and RFS will be engaged to reach an agreed solution.

Table 6.2 identifies where APZs are required for the key assets within the Project area, and their dimensions. Table 6.3 shows APZ maintenance standards for the various assets. An APZ for 'Refuges of Last Resort' and other key assets may be comprised of an Inner Protection Area (**IPA**) and an Outer Protection Area (**OPA**), but in most cases all APZ within the facility fenced boundaries of Project area will be maintained to the IPA standards in Table 6.3. The RFS publication *Standards for Asset Protection Zones* (RFS, 2006) provides additional information.

Table 6.2 - NGP APZ requirements

Location and asset	APZ requirement	Comment
Leewood	Pilliga Outwash Dry Sclerophyll Forests: Inner APZ – 7 m All other Dry Sclerophyll Forests: Inner APZ – 11 m Outer APZ – 3 m (Refer to Appendix C)	Grazing, slashing and mulching in buffer areas APZ buffers are also presented in Figure 4.3, with all areas within the buffer zone classified as managed vegetation
Bibblewindi	Pilliga Outwash Dry Sclerophyll Forests: Inner APZ – 7 m All other Dry Sclerophyll Forests: Inner APZ – 11 m Outer APZ – 3 m (Refer to Appendix C)	Grazing, slashing and mulching in buffer areas APZ buffers are also presented in Figure 4.3, with all areas within the buffer zone classified as managed vegetation
Well heads and communications towers	No above ground infrastructure is to be within the bushfire attack level (**BAL**) flame zone. The BAL flame zone is 7 m wide in the Pilliga Outwash Dry Sclerophyll Forests and 14 m wide in all other Dry Sclerophyll Forest. APZ is measured from nearest part of above ground infrastructure to the unmanaged vegetation i.e. beyond the APZ.	Refer to Appendix C for model reports validating the APZ distances required. APZ buffers are also presented in Figure 4.3, with all areas within the buffer zone classified as managed vegetation
Use-suspended well heads	No above-ground infrastructure is to be located within the bushfire attack level (**BAL**) flame zone. The BAL flame zone is 7 m wide in the Pilliga Outwash Dry Sclerophyll Forests and 14 m wide in all other Dry Sclerophyll Forest. APZ is measured from nearest part of above-ground infrastructure to the unmanaged vegetation i.e. beyond the APZ.	Refer to Appendix C for model reports validating the APZ distances required. APZ compliance required to avoid damage to infrastructure in situations where it has the potential to be re-activated sometime in the future. Specific APZ design that achieves both rehabilitation and APZ objectives is required.

Table 6.3 - APZ maintenance standards for key assets

Treatment	Inner protection area (IPA)	Outer protection area (OPA)
Trees	Less than 15% tree cover at maturity	Less than 30% tree cover at maturity
	Not touch or overhang a building	N/A
	Lower limbs removed up to a height of 2 m above the ground	Lower limbs removed up to a height of 2 m above the ground
	Tree canopies separated by 2 m	Tree canopies separated by 2 m
	When removing trees prioritise removal of rough-barked trees	When removing trees prioritise removal of rough-barked trees
Mid-storey vegetation	Large discontinuities or gaps should be provided to slow down or break the progress of fire towards buildings	Large discontinuities or gaps should be provided to slow down or break the progress of fire towards buildings
	Shrubs should not be located under trees	
	Shrubs should not form more than 10% ground cover	Shrubs should not form more than 20% ground cover
	Clumps of shrubs should be separated from exposed windows and doors by a distance of at least twice the height of the vegetation	N/A
Ground covers	Grass should be kept mown (as a guide grass should be kept to no more than 100 mm in height); and	Grass should be kept mown (as a guide grass should be kept to no more than 100 mm in height); and
	Leaves and vegetation debris should be removed	Leaves and vegetation debris should be removed

6.6 Water points

Water points such as bores, tanks, dams and ponds are located throughout the Project area. Bibblewindi Facilities Area, Bibblewindi 5, Leewood Facilities and Wilga Park have water facilities (refer to the Project Field Emergency Response Map in Appendix F).

Prior to the Bush Fire Danger Period all water points are to be checked and the Narrabri BFMC advised of any that are not functioning (see Table 6.4). All water points are to be assigned a “Static Water Point” sign and GPS site references of the water points provided to the RFS.

6.7 Prevention works summary and timetable

A summary of the prevention works required by this Plan and the associated related timetable are shown in Table 6.4.

Table 6.4 - Prevention works summary and timetable

Activity	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb
Maintain asset protection zones (as required)	■	■	■	■	■	■	■	■	■	■	■	■
Assess seasonal fuel hazard risks	■						■	■	■	■	■	■
Hazard reduction grazing, grading, mulching program within fenced areas etc.			■	■	■	■						
Fire break maintenance					■	■	■					
Water supplies checked and Narrabri BFMC advised						■	■					
Review field signage (water points and relevant roads) and replace as necessary				■	■							
Detail a budget for implementation	■											
Monitor and communicate	■						■	■	■	■	■	■

7. Preparedness

Bushfire prevention works minimise the risk of ignition, spread and impact of fire. Preparedness works may achieve similar outcomes but focus on people, plant and equipment being ready for a response to a bushfire. A preparedness strategy is typically used in the lead up to the Bush Fire Danger Period, however as potentially damaging bushfires can occur at any time of year, a basic level of bushfire awareness is a year-round requirement.

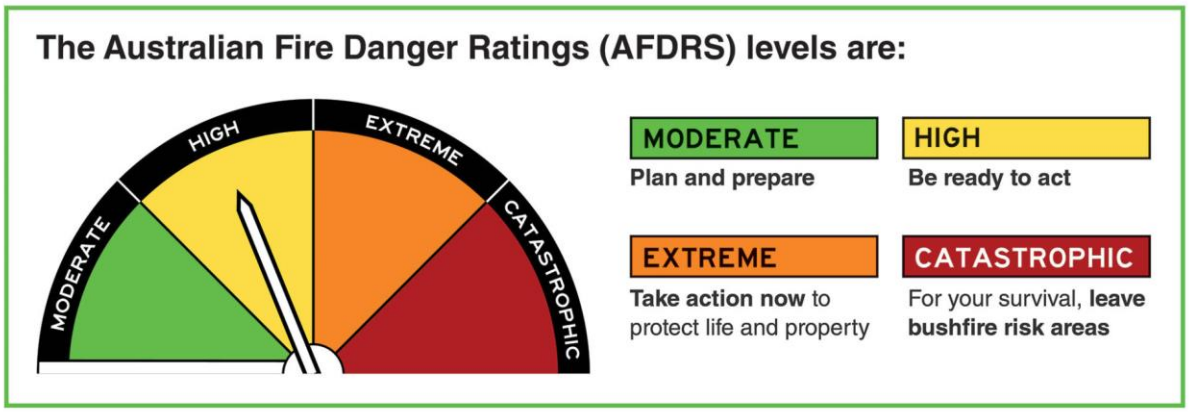
The level of preparedness typically increases as the fire danger rating increases or if fire(s) occur in the region/locality. The matrix in Figure 7.1 provided bushfire preparedness guidelines based on fire danger ratings and the proximity of a bushfire.

Table 7.1 - Bushfire preparedness matrix

Bushfire preparedness matrix	
Prior to the Bush Fire Danger Period (April to September)	• Complete bushfire protection maintenance (prevention) • Review site specific bushfire protection needs and evacuation protocols • Complete Awareness works, including review of alerts • Ensure all vehicles are equipped with fire extinguishers and fire blankets • Test all firefighting equipment including mobile tanks and associated pumps • Asset protection zones are to be kept at the required standard • Prepare any potential refuge buildings • Download 'Fires near Me' mobile device application to be notified of nearby fires, and set up a 'watch zone'
During the Bush Fire Danger Period (October to March)	• Refine any bushfire protection works required • Monitor daily fire danger rating, bushfire alerts and Santos instructions • As required, monitor multi sources of fire information e.g. RFS website, ABC radio and Santos UHF radio channels (see section 8.2) • If buildings/infrastructure are to be left unused for extended time periods, make them bushfire safe • Routinely review worksite bushfire risks and evacuation options and travel times to refuge points
Bushfire exists nearby (within 20 km)	• Respond to bushfire warnings and alerts • Frequently check 'Fires Near Me' mobile device application • Enact your evacuation plan (see section 8.7) • If the bushfire ETA allows, quickly prepare yourself and place of refuge for the bushfire attack

7.1 Fire danger rating

The FDR system is used to communicate bushfire risk and is a trigger for various levels of preparedness. It provides an indication of potential fire behaviour and difficulty of suppression, with the range of fire danger ratings shown in Figure 7.1. The FDR is derived by the fire behaviour index (**FBI**) which is a numerical scale of 0 to 100+. The **FBI** is determined by temperature, wind speed, relative humidity, fuel load and drought factor. An indication of the fire behaviour expected at each FDR and typical response required is shown in Table 7.2.



Source: Australian Fire and Emergency Services Authorities Council (2022)

Figure 7.1 – Australian Fire Danger Ratings

Table 7.2 - Fire danger rating, indicative fire behaviour and response requirements

Rating	Indicative fire behaviour
Catastrophic FBI 100+	**For your survival, leave bush fire risk areas** If a fire starts and takes hold, lives are likely to be lost These are the most dangerous conditions for a fire. Your life may depend on the decisions you make, even before there is a fire. Stay safe by going to a safer location early in the morning or the night before. Homes cannot withstand fires in these conditions. You may not be able to leave, and help may not be available.
Extreme FBI 50 - 99	**Take action now to protect life and property** Fires will spread quickly and be extremely dangerous. These are dangerous fire conditions. Check your bushfire plan and ensure that your property is fire ready. If a fire starts, take immediate action. If you and your property are not prepared to the highest level, go to a safer location well before the fire impacts. Reconsider travel through bushfire risk areas.
High FBI 24 - 49	**Be ready to act** Fires can be dangerous There's a heightened risk. Be alert for fires in your area. Decide what you will do if a fire starts. If a fire starts, your life and property may be at risk. The safest option is to avoid bushfire risk areas.
Moderate FBI 12 - 23	**Plan and prepare** Most fires can be controlled. Stay up to date and be ready to act if there is a fire.
No rating FBI 0-11	**No rating issued** No proactive action is required by the community. Fires can still happen, but that any fires that start are not likely to move or act in a way that threatens the safety of the community.

7.2 Monitoring fire weather and fire incidents

Monitoring of fire weather and fire occurrences is a critical part of preparedness. During Bush Fire Danger Periods, Santos personnel routinely monitor the Bureau of Meteorology website for forecasts of temperature, humidity, wind speed and direction. Information can also be obtained through the remote telemetry data loggers.

Santos also has access to 'Special Fire Weather Reports' through the local RFS or when the Emergency Control Centre is activated. The RFS website provides regularly updated information on the location and spread of active fires, as well as the forecast Total Fire Ban and Current Fire Danger Map.

This same information is available on the 'Fires Near Me NSW' application for mobile devices.

7.3 Work practices on days of elevated fire danger rating

It is essential that during Bush Fire Danger Periods or whenever the FDR is 'High' or above, the whereabouts of everyone in the operational field is known and communicated at the daily toolbox and pre-start talks. This will include communicating details of fire risk, expected weather, controls in place to manage risks and identification of alternate evacuation routes. This will assist the Field Response Team (**FRT**), Emergency Response Team (**ERT**) and emergency services in the event of an evacuation.

Any fire danger rating of 'Extreme' or above poses a high bushfire risk and is usually declared a Total Fire Ban. Any days with a fire danger rating of 'High' also pose high bushfire risks in the Project area due to remoteness and risk of rapid fire spread with or without fire spotting blocking preferred evacuation routes. Table 7.3 shows the Project operations and activities permitted under each fire danger rating. It should be noted that the fire danger rating will most likely vary throughout the day based on changing weather conditions and as such, work permissions may vary throughout the day based on real time monitoring conducted from the weather station located at the Leewood facility. If weather conditions change significantly or under other circumstances, all Santos permits can be revoked at which point the site will be made safe and directions provided to work parties on actions required.

As outlined in the SWPP, a Hot Work Permit is required for any work activity that has the potential to generate static electricity, naked flame, heat, spark, or any other ignition source sufficient to ignite combustible and/or flammable materials in normally anticipated conditions.

All persons involved in the permit application and preparation processes must challenge the need to perform Hot Work in designated hazardous areas and leases unless work requirements dictate otherwise. In the case of a loss of containment, elimination of ignition sources (heat) is a major barrier to the escalation of incidents.

Hot Work activities must be executed under the nominated work conditions of a Hot Work Permit unless otherwise stated in the SWPP.

Hot Work activities include but are not limited to:

- welding, soldering, heat gun;
- burning, flame cutting, flame heating, grinding, abrasive blasting;
- concrete chipping;
- use of electrical hand tools (240v or battery), power driven cutters;
- use of internal combustion engines;
- activities involving the use of or exposure to a naked flame;

- use of x-ray generating equipment or radioactive devices; and
- tasks that involve the exposing of electrical circuits that are normally protected by an Ex – certified enclosure such as explosion proof junction box, light fittings, or pressurised cabinets in the hazardous area.

The roles, responsibilities and accountabilities regarding the Hot Work Permit preparation, submission, review and approval are summarised below, with full details provided in the SWPP.

- The SWPP Technical Authority has suitable skills and experience across all of Santos operated assets in the application of operation processes, sound knowledge of the application of process safety principles to Santos operated assets and overall governance of the SWPP across Santos and provides technical direction where decisions are escalated;
- The Permit Safety Authority (**PSA**) role is the site-based SWPP subject matter expert and therefore must understand all aspects of SWPP and the associated documents. The PSA has ownership of SWPP for their designated facility/field area of responsibility and is accountable for ensuring that all work tasks are carried out safely;
- The Permit Authority (**PA**) is responsible for the overall management of day-to-day SWPP activities within their designated facility/field area, and is accountable for:
  - challenging the categorisation and type of permits submitted with the aim of minimising higher risk work and hot work where practical to do so;
  - verifying that the permit applicant has accurately identified, documented and communicated the information required on the permit so that hazards can be identified, and adequate risk and process controls can be implemented prior to the issuing of the permit; and
  - reviewing and amending as required the hazard identification and hazard control section of the permit
- The Permit Holder Supervisor (**PHS**) is accountable for the allocation for work on Santos operated assets and must understand their accountabilities and responsibilities under the SWPP. The PHS must have the knowledge and competence to be able to manage the scope of work, provide input into the identification of hazards, assessment of risks and implementation of controls associated with the task. The PHS' responsibility is to ensure that that Permit Holders and Work Party Members have the necessary knowledge, experience, and applicable skills to fulfil their roles;
- The Permit Holder (**PH**) must be assessed by their PHS to be competent to safely execute the work and manage associated work tasks of Work Party Members. The PH is responsible for planning of the actual work tasks and contributing to the detailed development of the relevant permit. The PH will collaborate with and assist the PA to determine appropriate risk management method(s) for the work scope. Once a permit has been issued the PH is accountable for:
  - executing the work scope according to nominated and established risk controls
  - ensuring the risk controls remain in place during the execution of the work scope
  - briefing and confirming Work Party Members understanding of the work scope, equipment isolation, all known work hazards, risks and controls as defined on the permit and associated documents
  - ensuring that Work Party Members work in compliance with the Safe Work Method Statement, permit conditions and requirements at all times
  - complying with mandatory Santos SMS Procedures
  - stopping work where required to do so by a hold point; when any significant change in site conditions occurs, or where a hazard (not previously identified or adequately controlled) is identified.

- A Work Party Member (**WPM**) is a competent person allocated by the PHS to safely execute the work scope and is accountable for ensuring that they attain a proper understanding of the hazards and risks associated with the work site and work activities under the scope of work, and the controls required to be implemented and maintained that manage identified hazards and risks. WPMs must review hazards and risk controls identified on work permits and raise any concerns or additional hazards/ risks that they observe, and stop work activities when they see any significant change in site conditions, or where a hazard or risk has not previously been identified or adequately controlled under the relevant work permit.
- A Fire Watcher is a person who has been assigned to monitor hot work activities and respond to any potential ignition sources. They must be deemed by the PHS as competent to perform the Fire Watchers duties and utilise the required equipment.

Table 7.3 - Operations permitted under each fire danger rating

Operations / activities*	Fire Danger Rating					
	No rating FBI 0-11	Moderate FBI 12-23	High FBI 24-49	Extreme FBI 50-74	Extreme FBI 75-99	Catastrophic FBI 100+
Hot work (e.g. welding, grinding etc.)	• Standard practices - works to be conducted under Santos standards and management system		• Re-assess hot work conditions • Job hazard analysis / safety check • Notification and FBI reporting provided to FCNSW	• Essential work only. L4 Manager permit reqd. • Clear and wet down around the work area • Notification and FBI reporting provided to FCNSW • No activity within 25 m of forest fuels	• No activity	• No activity
Lease clearing / mulching / road works / other work in contact with fuels	• Standard practices - works to be conducted under Santos standards and management system		• Toolbox talk includes FDR and fire risk	• Apply work restrictions • Notification and FBI reporting provided to FCNSW.	• No activity	• No activity
All other work activities	• Standard practices - works to be conducted under Santos standards and management system		• Toolbox talk includes FDR and fire risk	• Apply work restrictions. • Notification and FBI reporting provided to FCNSW • Apply additional fire controls to all works in hazardous areas (refer to section 7.4)	• Essential work only with On-site Permit Safety Authority • Strict controls and monitoring required	• No activity
ERT and issue of warnings	• Standard practices - works to be conducted under Santos standards and management system		• Update warnings as required.	• 4-hourly update of warnings • ERT notified and on standby	• Project ER protocols activated. • ERT setup and on standby. • IMT Duty Manager notified	

* **Note**: FCNSW may exercise their stop work authority at any FDR level.

7.4 Total fire bans

During a Total Fire Ban (**TOBAN**) only essential[7] field operations works are permitted (refer to Table 7.3). Any work involving contact with fuels (vegetation) during this time will be assessed via the weather station at Leewood facility. Emails will be sent to nominated personnel (including FCNSW) on current weather conditions from which the forest fire danger rating can be monitored.

As agreed with RFS, in addition to the framework set out in Table 7.3, any urgent hot works required during a TOBAN are to be approved by the RFS, with a written notification provided to FCNSW. RFS approval notifications will be provided to the nominated FCNSW staff member on weekdays or the relevant Duty Officer on weekends and public holidays. If approved by the RFS, the work area will be surrounded by at least 2 m of cleared mineral earth, wetted down before the hot work commences, not be undertaken within 25 m of forest fuels and with a fire unit or tanker, with a dedicated operator, available on site for the duration of the activity.

Other permitted work during a TOBAN is to be guided by the details provided in Table 7.3 and will include a task risk assessment / job hazard analysis, approved prior to works commencing, to identify any additional controls required.

7.5 Preparedness messaging

Effective communication of bushfire risk among staff and contractors entering bushfire prone lands (i.e. any area within 100 m of bushland or grassland) is critical and should include communication and awareness of:

- protection of life as the absolute priority;
- elimination of ignition risks;
- assessment and reporting of potential bushfire hazards;
- fire risks and protection measures required for specific field locations, including PPE and equipment;
- firefighting support equipment and Warning and Alert Systems;
- work practices required under varying FDRs (refer to Table 7.3);
- verify communication channels, both internally and externally;
- appropriate bushfire risk training and awareness;
- evacuation and incident decision-making e.g. leaving the area in adequate time; and
- procedures for escalation of responses to bushfires and the relationship between this Plan and the Emergency Response Plan.

7.6 Bushfire training and competence

Training requirements for staff are determined by their level of responsibility or risk in a bushfire. The bushfire competency framework and section 7.6.1 identify the minimum training requirements for staff. Completion of these competencies is required prior to the Bush Fire Danger Period for each risk/responsibility level and role. The Project Risk Advisor or delegate is required to certify compliance of the required training levels prior to staff entering bushfire prone lands in the Bush Fire Danger Period.

[7] Essential works for this Plan are defined as essential to the continuation of field operations (business critical).

7.6.1 Minimum training skills for various roles

All Santos staff and contractors who are required to conduct works in bushfire prone land (i.e. any area within 100 m of bushland or grassland) are required to complete the RFS *Bushfire Awareness* training package designed for support personnel not directly involved in firefighting. It focuses on the principles of prepare, act and survive.

Field staff potentially involved in fire suppression (i.e. manning emergency response vehicles and equipment) are required to complete the 'Fire Management Level 1 Program' which is designed to provide an understanding of bush/grass fire behaviour and the skills and knowledge of safety procedures for responding to a wildfire. The program includes:

- inspecting, maintaining and testing a range of equipment associated with fighting wildfires;
- the identification of workplace risks and hazards and maintenance of personal safety whilst fighting wildfires;
- following workplace procedures for hazard identification and risk control;
- operating communications equipment; and working in a team.

Both the *Bushfire Awareness* and *Fire Management Level 1* programs provide accredited training and a nationally recognised statement of attainment.

In accordance with the requirements under the Forest Permit, during the Bush Fire Danger Period, where reasonably practicable, at least four firefighters, three being qualified as RFS Bush Firefighter (or equivalent) and one being qualified as RFS Crew Leader Wildfire (or equivalent) will be made available within, or within 50 km of, the Forest Permit area and are to be available at any time. The Santos Crew Leader will only direct and manage Santos staff and contractors.

7.7 Vehicle and equipment preparation

All vehicles, fire appliances and equipment, and PPE are to be in a bushfire-prepared condition by the end of September each year. A list of bushfire-related requirements is to be compiled and used as a checklist for all vehicles and equipment to ensure it is available when required:

- vehicles and motorised equipment:
  - refilling fuel, oil and water reservoirs;
  - all safety equipment exists and is in useable condition;
  - communication and navigational equipment/materials complete and operable; and
  - assess the operational standard of vehicles and equipment, and correct any deficiencies;
- hand tools:
  - sharpened, oiled, repaired;
- PPE:
  - verification of all fire-related PPE required by their position/role.

The fire-fighting equipment in all Santos inhabited buildings will be installed and maintained as per the relevant building and construction codes, and the applicable Australian standard including *AS 1670:2018 Fire detection, warning, control and intercom systems* and *AS 2444:2001 Portable fire extinguishers and fire blankets*.

In accordance with the requirements under the Forest Permit, during the Bush Fire Danger Period, the following fire suppression resources will be maintained within, or within 50 km of, the Forest Permit Area and will be made available at any time:

- a fire tanker with capacity of not less than 4000 litres and the capacity to deliver water up to 30 m from the vehicle; and
- a piece of heavy plant with operator which is capable of clearing a mineral earth fire break within the Forest Permit Area.

7.8 Preparedness works summary and timetable

A summary of the preparedness works required by this Plan and its related timetable is shown in Table 7.4.

Table 7.4 - Preparedness works summary and timetable

Activity	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb
APZ and refuge buildings checked and remedied												
Check water supplies and access are adequate												
Check field signage (water points and relevant roads)												
Check and service vehicles, equipment, PPE												
Update contact lists												
Pre-fire season meeting: Santos rep, FCNSW and RFS												
Daily monitoring FDR and ‘fires near me’												
Toolbox talks include bushfire risk												
Check internal roads to FCNSW standards												

8. Response

8.1 Priorities

The response strategy describes the approach required in the event of a fire regardless of its cause, this includes:

- the protection of life is paramount in fire response operations;
- early evacuation of the Operations Area is the safest strategy for protection of Santos staff and contractors;
- rapid detection and initial attack are typically the best way to control a bushfire;
- all unplanned fires from Project activities are suppressed immediately, if safe and feasible to do so; and
- cooperation with fire authorities is essential for successful bushfire control.

Although not an authorised bushfire response agency, Santos may provide a support or ancillary role in bushfire control in conjunction with RFS and FCNSW. Santos will direct its heavy plant operators to commence tracking the fire's edge (if safe to do so) and FCNSW will assume practical control when equipment and operator arrives on site. Any subsequent use of heavy plant or equipment to track the fire or built fire breaks will be at the direction of FCNSW or RFS.

Staff and contractors may also be required to initiate some basic initial attack e.g., if a fire escapes from a work activity. In the event of a bushfire the applicable emergency response protocols shall be implemented as per the Project Emergency Response Plan.

Santos' response to any incident or emergency is prioritised according to the PEARL principles (refer to Figure 8.1). Although the PEARL principles prioritise the environment over property (counter the usual priority in NSW), priority action should be given to Project buildings (assets) where people may be required to shelter in, e.g. if off-site evacuation is not feasible.

Firefighting agencies are to be routinely reminded, via the Namoi-Gwydir Bush Fire Management Committee, that infrastructure is not a priority over the environment. While protection of Santos assets and critical infrastructure is not expected by firefighting agencies due to the design and capabilities of these facilities to respond to emergencies, it would be appreciated if this were to occur but should not compromise protection of life or the control of the fire spread.

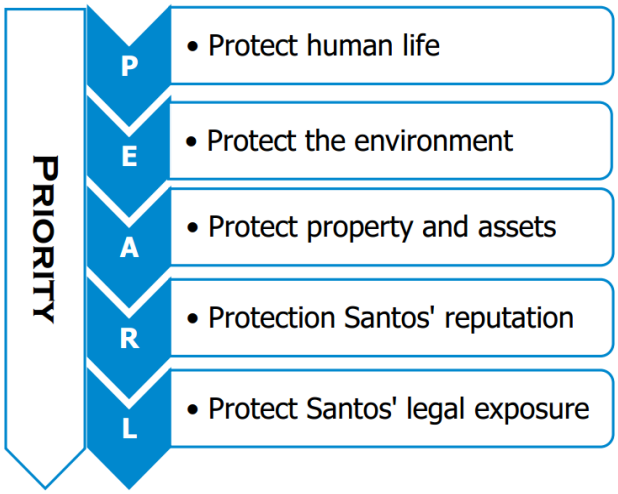


Figure 8.1 - PEARL Principles

8.2 Contacts and communication

Santos personnel and contractors will operate on VHF Channel 1 (or alternatively UHF 25) during a bushfire or other emergency response. Emergency response protocols are to be placed on standby for Santos and contractors. The Project Emergency Response Plan should be referred to for all relevant Santos / external contact details. During a bushfire the RFS utilise UHF Channel 13.

Narrabri Gas Project Hotline Numbers

Telephone (business hours) - 02 6792 9000
Operations On-Call / Emergency – 0427 923 401
Freecall number – 1800 071 278
Email – energy.nsw@santos.com

Emergency Services Numbers

Emergency Services, Fire - 000
Narrabri RFS Control Centre – 02 6792 3667
Bushfire Information line – 1800 679 737
RFS UHF – Ch 13
Narrabri Police – 02 6792 7199

Internal Santos contacts in case of bushfire

Santos UHF – Ch 25
Santos VHF – Ch 1
Emergency / On Duty: 0427 923 401

8.3 Bushfire warnings and alerts

Official warnings issued by the emergency services (e.g. via media or text messages) will be followed. Table 8.1 lists the official alert levels and their meaning, and the evacuation action required for each of the alert levels.

Table 8.1 - Bushfire alert levels and evacuation responses

ALERT LEVEL	Meaning	Evacuation response
Advice	A fire has started There is no immediate danger. Stay up to date in case the situation changes.	• Leaving early is the safest option • Confirm with Team Leader/Project Manager action required, options may include: ▪ Proceed to Muster Point ▪ Proceed to Narrabri ▪ Move to a safer location ▪ Regular monitoring of action required • Have a Plan B in case circumstances do not allow your Plan A to proceed.
Watch and Act	There is a heightened level of threat. Conditions are changing and you need to start taking action now to protect you and your family.	• As above
Emergency Warning	An Emergency Warning is the highest level of Bush Fire Alert. You may be in danger and need to take action immediately. Any delay now puts your life at risk.	• Follow the issued evacuation advice • If safe, evacuate to Narrabri • If NOT safe to go to Narrabri, go to the nearest Refuge Point (Bibblewindi, Leewood or Wilga Park if safe to do so) • If unable to safely reach a Refuge Point, find the best possible on-site refuge (refer to Appendix D) • If no evacuation advice is received, take action as described in Appendix E
GENERAL ACTIONS (for all Alert Levels) • report bushfire to 000; • review your 'Evacuation and Bushfire Survival Strategy'; • prepare yourself; • prepare where you may be required to shelter (if not evacuating early off-site); and • monitor 'Fires near Me' mobile application and media messages.		

8.4 Fire detection and reporting

Fire detection systems are rapidly improving in Australia and it is possible that over the next 5 years that satellite detection will pick up any fire within minutes of it starting. This will rapidly assist the emergency services response and therefore improve the safety of personnel working in remote areas. While these systems are currently operating, the sensitivity and accuracy may sometimes be lacking meaning that support is still required from other technology such as the Santos long range camera, observers on the ground, fire towers and spotter planes or other aircraft.

Santos personnel play an important role in the detection and reporting of fires in the Project area as it is a low visitation area but one within which Project personnel operate daily. All Santos personnel have a responsibility to report all fires and specifically assign fire spotting/reporting duties to those who undertake patrols for other purposes. This has been very effective in previous years where Santos personnel have been able to identify, report and respond to lightning strike, well before they are able to develop into a bushfire.

Table 8.2 details the action required for reporting a fire; note a different approach is required when the FDR is 'High' or above.

Table 8.2 - Reporting a fire

Issue	Action required
FDR is 'High' or above	• Report fire IMMEDIATELY even if it is not clear where it is located; • Report the information below; • If safe to do so, and approved by Supervisor, obtain addition fire location information. Determine likely spread direction with supervisor and avoid locations in front (or near to the front) of fire.
FDR is below 'High'	• Report fire IMMEDIATELY unless it is safe to obtain a clearer position within a few minutes; • Report the information below.
Fire reporting details	• Provide as much information on the fire as possible, including: ▪ name of person reporting the fire; ▪ location of person reporting the fire; ▪ time of report; ▪ contact details of person reporting the fire; ▪ approximate location of fire; ▪ approximate direction and distance of smoke plume from reporter if location is unclear; ▪ apparent size of fire, size and density of smoke column; ▪ approximate flame height (if observable); ▪ apparent spread direction of fire (smoke plume travel); ▪ current approximate wind speed and direction in the area; ▪ nature of vegetation in which fire is burning (if obvious); ▪ nature of terrain in which fire is burning (if obvious); ▪ any assets immediately ahead of the fire (if known); ▪ approximate rate of spread (if obvious); ▪ any potential hazards or constraints; and ▪ best access roads to fire if known.

8.5 Bushfire safety

The overriding principle in a bushfire response is the protection of life. Any firefighting by Santos personnel should only occur when it is safe to do so, and in accordance with this Plan or instruction from a Team Leader or Area Manager. Appendix E provides a checklist of actions required for personal protection under different bushfire exposures.

8.6 Fire identification

Table 8.3 lists the actions required of Santos personnel or contractors if they identify a fire regardless of whether the fire is naturally occurring or as a result of accidentally ignition. Note that appropriate PPE is to be worn whenever fire suppression is attempted.

Table 8.3 - If you identify a fire

Issue	Action required
Identification of a small fire	• Put it out with appropriate equipment including fire extinguisher or similar (if safe to do so); • Report the location and coordinates of the fire on State Forest land to FCNSW immediately after it is extinguished, not matter the size; • Black out fire completely.
Identification of a fire that cannot be extinguished	• Report the location and coordinates of all fires on State Forest land to FCNSW immediately, no matter the size; • If safe to do so, and you have appropriate PPE and equipment, contain the fire spread to firefighter-accessible areas.
Initial reporting requirements	• Notify the Santos NGP team leader or Project Manager either by: ▪ UHF 25 / VHF 1; ▪ Operations Emergency on-call - 0427 923 401; ▪ Narrabri Office (02) 6792 9000; • If you cannot immediately raise Supervisor/ Response Coordinator, call 000; • Report fire details (see Table 8.2)
Actions until firefighters arrive	• Assess your safety. Decide whether to: ▪ stay and defend/suppress fire; ▪ evacuate off site; or ▪ shelter on-site; • Report position of fire and local access options to firefighters when they arrive. Identify any known hazards or precautions required.

8.7 Evacuation

Every bushfire poses a different mix of evacuation risks and requires a specific evacuation risk assessment. An evacuation decision is a personal safety decision and is based primarily on the proximity, behaviour and direction of a bushfire and a person's evacuation options. Other important factors to consider include the:

- fire danger rating;
- alert levels;
- weather conditions including wind strength and direction;
- ability to safely complete early evacuation (i.e. before bushfire impacts the evacuation route);
- proximity of suitability of refuge points; and
- current preparedness/ability of individuals to evacuate or refuge on-site.

A pre-planned "leave early" strategy is critically important. It requires assessment on the safety and suitability of 'leave early' evacuation under different circumstances and the circumstances a refuge point, or place of last resort, is likely to be used. Adaptation of the issues contained in the preparation of an RFS-style 'Bushfire Survival Plan' by Santos staff may help.

The risk associated with an evacuation route can change rapidly with tree fall, strong winds, flames, smoke, dust and vehicular conflict with incoming fire vehicles or other evacuees. Consideration of the evacuation risk of different egress routes and the alternative of sheltering at a refuge point can be life threatening decisions. Wherever possible, these decisions should be approved or at least discussed with a Team Leader, Area Manager or emergency services person.

All evacuation options have risks. Research has shown understanding these beforehand improves your decision-making and lowers your risk. Toolbox talks should therefore include identification of alternate evacuation routes whenever the FDR is 'High' or above. In circumstances where small groups are required to work in isolated areas with only one egress route (e.g. rig camps), a 'Refuge of Last Resort' along with a 'Shelter in Position' is to be identified and sufficient equipment carried by individuals to support these responses.

Full details regarding emergency evacuation processes and procedures are provided in the Santos NGP Emergency Response Plan, a copy of which is provided to the commander of the Narrabri RFS Headquarters. As detailed in section 1.5, the RFS did not have any specific issues or comments on the draft Fire Management Plan during consultation.

8.7.1 What to do if caught in a bushfire

If you are at personal risk from any bushfire, regardless of how it started, an important decision is required on whether to evacuate to Narrabri, seek a Refuge of Last Resort or Shelter in Place as described in section 8.7 above. Table 8.4 summarises actions required in making these decisions. Appendix D provides a more comprehensive checklist under different circumstances in a bushfire; it should form part of an aide memoir within any vehicle entering the Project area.

Table 8.4 - General actions required in a bushfire

Action	Details
Evacuate or not?	A decision to evacuate and its timing may be life critical. Details provided in section 8.7.
Follow instructions	Associated with Alert Level or from radio/telephone from Santos or emergency services
Stay informed	Obtain information on proximity of fire front to you e.g. via 2-way radio, mobile or local radio
Stay in touch	If your phone/radio is working, ensure others know your location. Do not assume assistance can be provided unless you have been personally notified of this by Santos or emergency services.
Avoid heat exposure	Cover exposed skin, preferably in heavy cotton materials and includes utilising PPE equipment provided. Drink water as often as required
Drive cautiously	If you are confronted by a fire, do not attempt to drive through or near it. Return to a designated refuge point, or if that is not possible seek the nearest and safest refuge available e.g. a suitable building, a large area more than 100 m from vegetation, etc.
Ready a building for refuge	Before fire approaches ensure gutters and walls are free of potential bushfire fuels such as leaf litter, twigs and rubbish. Close all doors, windows and curtains. Block gaps under doors with wet towels. Secure a water supply by filling sinks, bathtubs and buckets. Shelter in small room on side of building away from fire.
When the fire arrives stay inside the building.	Most fire fronts pass within 5 minutes or so. Inside is the safest place to be. Check fire periodically through a small window. Have water, wet towels or fire extinguishers available to extinguish the building should it catch alight.
Extinguish small fires	As a fire front approaches and after it passes there are likely to be small spot fires on or near the refuge building. When safe to do so put these out.

8.7.2 Early evacuation

Early evacuation to the Santos Operations Centre, many hours before a fire is expected to impact an area, is the safest and preferred evacuation strategy. In the event this is not a safe option, Santos personnel and contractors may need to evacuate to a non-fire affected area. If an evacuation order is required, it will be broadcast via radio and phone with instructions to evacuate broadcast at regular intervals using the following general format:

"Attention all field staff in the area of (affected area), a grassfire/forest fire is located at XXX and moving in a (direction of travel) direction. If you have a safe evacuation route to Narrabri proceed there immediately, if evacuation to Narrabri is not safe, move immediately to a non-affected Refuge of Last Resort. If none of these options are safe, enact your personal Bushfire Survival Plan on a nearby low-risk site. Please report your current location and chosen fire refuge destination".

8.7.3 Refuges of last resort

If safe evacuation to Narrabri is not possible, an approved 'Refuge of Last Resort' will often provide the best field-base refuge option. 'Refuges of Last Resort' are currently labelled "Major Refuge Points" on the Project Field Emergency Response Map (refer to Appendix F), a copy of which is carried in all field vehicles.

The Emergency Response Coordinator (ERC) also maintains a current list of 'Refuges of Last Resort' (Major Refuge Points) on the Emergency Response Page of the NGP SharePoint site and these are identified on the Project Field Emergency Response Map. 'Refuges of Last Resort' (Major Refuge

Points) are located at Bibblewindi, Leewood; and at the Wilga Park Power Station. If possible, when sheltering in your vehicle at any of these sites, park behind non-combustible objects as far from the fire as possible e.g. behind or between dam walls, or buildings. Shielding from radiant heat behind non-combustible objects can be as important as being located in the centre of a cleared area. Chose very low fuel areas as any nearby grass is likely to burn and follow the guidelines in Appendix E.

8.7.4 Shelter in place

A 'Shelter in Place' option is only to be used if early evacuation or a 'Refuge of Last Resort' (Major Refuge Point) is unavailable/unsuitable. The 'What to do if caught in a bushfire' guidelines in Appendix E provide information related to sheltering from a bushfire in a building, car or in the open.

8.7.5 Summary of evacuation options

Table 8.4 provides a summary of the evacuation options as discussed in sections 8.7.2 to 8.7.4.

Table 8.5 - If you need to evacuate or shelter from a fire

Issue	Action required
Early evacuation	Early evacuation is the safest option. This means hours before the predicted arrival time of a fire at your site or anywhere along your chosen evacuation route. Early evacuation means evacuation out of the forest/grassland to the Santos Operations Centre in Narrabri. The muster points are shown on the Project Field Emergency Response Map in Appendix F and are located at the following intersections: • corner of Xline and Newel Hwy (for personnel at Bibblewindi and in State forest) • corner of Old Mill Rd ad Newell Hwy (for personnel at Leewood) • corner of Kaindool Lane and Yarrie Lake Road. Once accounted for all personnel, everyone is then to proceed to the Narrabri Operations Centre for further instructions.
Refuge of last resort	Santos Bibblewindi Facilities Area Leewood Water Treatment facility – Leewood Ponds Wilga Park Power Station
Shelter in place	Being burned over/around by fire is life threatening and it is used only when other options have failed or are not safe. It typically means you have been trapped by the fire. Appendix E provides checklists of different 'Sheltering in Place' options.

8.8 Santos emergency response to bushfire

A response to fire requires the authorisation of the Area Manager or the nominated ERC. The size, type and intensity of a fire (classification) determines the resources required and strategies employed to safely manage the situation.

Only the smallest of fires are attacked directly. The role of the first attack is to contain the fire swiftly and minimise the risk to life and property. This is particularly important on days when the fire danger rating is 'High' or above, when initial attack might be the only opportunity for containing a fire.

As fire size increases in size and intensity, indirect means of control are used. In the case of large high intensity fire, defensive strategies are adopted with protection of life the point of focus.

Full details regarding emergency response processes and procedures are provided in the Santos NGP Emergency Response Plan.

8.8.1 Emergency response communication and awareness

Personnel will be informed of their requirements prior to any emergency response to a bushfire within the Project area. The position and predicted spread of the fire and weather conditions will be clarified, as will roles and responsibilities, hazards and risks, communications, crew change expectations etc. This process is defined within the Project Emergency Response Plan.

8.8.2 Information to be provided to Emergency Services during an emergency event

A briefing of emergency services related to Santos response to a bushfire and support available should include:

- location of all Santos employees and contractors;
- names and contact details of personnel who cannot be contacted or whose exact location is not known;
- Santos 'Places of Last Resort' that may be used and buildings/assets within these that may require protection;
- potential hazardous plant, services or equipment;
- location of diesel fuel storage for generators at each lease area are identified on the Narrabri Emergency Response map (NB: storages are double bunded, appropriately labelled and cattle fenced);
- available resources, such as Santos water storage locations and water tankers;
- field amenities that may be utilised;
- plant or equipment that may be utilised; and
- nominated Santos liaison name and phone number/radio channel

8.9 Mop-up and patrol

It is possible that during a heightened bushfire season and successive bushfire events that RFS personnel are unable to assist with mop-up and patrol. Santos qualified fire crews may therefore be required to assist this work. The mop up and patrol of a fire should occur until a safe and blacked out fire is achieved.

9. Recovery

Bushfire recovery requirements need to be considered for both planned and unplanned fires.

9.1 Objectives

The objectives for the recovery after for both planned and unplanned fires are as follows:

- to help restore Santos operations and infrastructure to working condition ASAP;
- stabilise or rehabilitate where necessary so that post-fire environmental impacts do not increase;
- support people involved with or affected by bushfire; and
- a post-fire debrief so that effectiveness of this Plan (and its various sections) can be reviewed and modified where necessary.

9.2 Counselling services for Santos staff and families

Counselling and social workers are available to Santos personnel and family. Contact Santos Employee Assistance Provider (EAP) - BSS directly on 1800 30 30 90 for details.

The *NSW State Emergency and Rescue Act 1989* and the NSW *Recovery Plan* (Resilience NSW, 2021) provide for community recovery support services through the Narrabri Local Emergency Management Committee.

The NSW Rural Fire Service's counselling service can be contacted on 1800 049 933.

The potential for critical incident stress impact on those involved in fire response should be investigated and counselling made available.

9.3 Debrief

Debriefing shall be conducted after each fire response event, for both planned and unplanned fire operations. Debriefs should be conducted as soon as possible at the conclusion of fire operations.

All fire debriefs shall consider recovery. Debriefs may involve one or more of the following groups firefighters; control, operations, planning, logistics and other support personnel; Santos management; and inter-agency personnel. The matters to be considered in a debrief are:

- history of the fire;
- impacts on infrastructure and operations;
- strategies, resources committed, authorities involved, and neighbour responses;
- review of operations; detection, call-out, initial response, equipment, access, food and accommodation, command structure, asset protection arrangements welfare, adequacy of strategies, health and safety, reliability of ground reports, aircraft, adequacy of fire information, preparedness, co-ordination arrangements, public and media awareness, out-of-area support, administrative support, communications, adequacy of training, transport;
- critical incident stress management;
- recovery requirements.

A written record of the debrief is to be kept and forwarded to the Project Area Manager for a decision on further action.

Debriefings provide an important forum to discuss and review the management effectiveness of fire operations and management and the need for changes.

Debriefings should be conducted as soon as possible at the conclusion of a fire, regardless of the scale of the event. In most cases, post-fire debriefing will be undertaken with the Santos Incident Controller.

Post-fire debriefs are to determine the effectiveness of the Fire Management Plan and include investigation of the matters outlined in Table 9.1.

Table 9.1 - Fire debrief checklist

Aspect	Debriefing questions	Potential directions for amendments to this Plan
Prevention	• What was the ignition source? • Was the ignition from Santos personnel? • Was initial response fire equipment available at the site? and • Where standing orders and training procedures followed?	• Additional first response equipment; and • Increased Bushfire Awareness for Santos personnel and contractors.
Preparedness	• Were Santos assets damaged? • Were the protection provisions outlined in the Fire Management Plan in place? • Were there any problems with fire vehicles accessing the site?	• Adjustments to the size of Asset Protection Zones; • Installation of other protection measures (construction standards, external sprinklers, radiant heat barriers, etc.); and • Improvements to the condition of access trails.
Response	• What was the Santos response time? • What was the extent of damage to the environment through suppression actions? • Where evacuations undertaken safely and effectively?	• Increasing site response capabilities; • Increased awareness raised of environmental values and restrictions; and • Improvements to evacuation protocols.

9.4 Infrastructure and utilities

Assets and services impacted by bushfire may be directly or indirectly damaged or destroyed. This may include critical services such as water supply, sewerage infrastructure, communication systems and power supplies. A post-fire audit of critical assets and services is required as soon as practical to identify remediation works and ensure capability.

Santos is to work with respective authorities (including power and phone providers) so that post-fire repairs are conducted in a timely manner, minimising disruptions to Santos operations.

9.5 Site rectification planning

As soon as possible after every fire within the Project area, and no later than two months after a fire, a rectification plan or action list is required. This plan is to identify impacted environmental and operational level controls and may include items such as erosion control, weed and pest animal control.

Before mopping up of a fire is complete, the Santos Emergency Commander is to brief the Santos Environmental Department on potential rectification works e.g. location of control lines, potential sites of erosion or other environmental sensitivities.

The rectification plan/action list is to address the following:

- responsibilities for rectification planning and implementation;
- steps to restore environmental assets and systems;
- drainage and rectification works;
- prioritising of short term and immediate work priorities such as emergency stabilisation and rehabilitation work to protect life and property, protect catchment values, and prevent further degradation of critical cultural and natural resources;
- post-fire weed and pest control and rehabilitation; and
- communication with conservation authorities in relation to impacts on threatened species.

9.6 Injured animals

Contacts for Santos Operations Centre to report injured animals to local carers or authorities. On occasions firefighters may need to cut fences with a risk that stock may stray. Narrabri Police are to be notified immediately of any potential for stock straying onto roads.

9.7 Vehicle and equipment checks

Following any fire all firefighting appliances and equipment are to be returned to their original fire preparedness condition. This is to be completed within 7 days of the cessation of firefighting. The following routine vehicle and equipment checks are required after each fire:

- refilling fuel, oil and water reservoirs;
- cleaning of all equipment and vehicles;
- re-sharpening tools;
- assessment of the operational standard of vehicles and equipment, and repair or maintenance of any deficiencies;
- replacement of any materials used such as re-charging fire extinguishers;
- identification of any damage and completion of accident report forms; and
- any other matters requiring attention.

If a period of extensive firefighting occurs, then a thorough mechanical service of all vehicles and equipment will be required.

10. Record keeping

Santos has a data management plan for the NGP that outlines the policies and procedures that will be implemented to ensure that data is managed in a consistent, efficient and effective manner in order to provide accurate records of activity operations and enhance the value of the data collected.

Santos uses a number of systems and platforms to manage the documentation and data associated with the activities under this Plan. These include Sharepoint for management plans, procedures and laboratory reports; Santos' EHS Toolbox for capturing inspections and field assessments; and EQuIS, an advanced environmental data management and decision support system, for capturing all data and any laboratory results.

Details of data collection, inspection and maintenance key records associated with this Fire Management Plan that are stored and managed include (where applicable):

- details of fires starting on, or impacting, Santos managed lands;
- inspection and monitoring records;
- records of any review of the Plan;
- operational monitoring and performance data;
- calibration records for field instruments and continuous monitoring systems; and
- annual inspection reports and/or certifications.

Monitoring data is subject to quality assurance and quality control protocols and procedures that ensure that data is accurate and usable. Data is subjected to consistent validation and verification procedures. Any data that fails QA and QC procedures is rejected for future use.

Note that records will be kept in a legible form for production to any inspector for a period of four years following the expiry or termination of a prospecting title (refer to Sections 97D and 97E of the PO Act).

11. Incidents, non-compliance 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 to the DPE and any other relevant agencies via the Major Projects Portal immediately after Santos becomes aware of the incident causing or threatening to cause material environmental harm[8]. The notification will describe the location and nature of the incident.

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 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 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.

Telephone (business hours): 02 6792 9000
Operations On-Call/Emergency: 0427 923 401
Freecall number: 1800 071 278
Email: energy.nsw@santos.com

These contact details are publicly available on the Project website (https://narrabrigasproject.com.au/) and are also presented in Appendix D of the EMS along with postal and street addresses.

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.

[8] [8] Refer to the Glossary in section 14 for the full definition of 'incident', as per the Development Consent for SSD 6456.

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 8.1 of the EMS, Santos will review the performance of this Plan for the previous calendar year and report 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 fire management 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 this Plan and the appendices.

12.2 Independent environmental audits

Within one year of commencement of Phase 1 and every three years thereafter, Santos will commission an Independent Environmental Audit (**IEA**) of the development, to be conducted in accordance with CoC D9. The audit team will be led by a suitably qualified auditor and include experts in groundwater, well integrity, hazards, and any other fields specified by the Planning Secretary.

The IEA process is further described in section 8.3 of the EMS.

12.3 Fire Management Plan review and evaluation

As required by CoC D4, Santos will review the suitability of this Fire Management Plan, 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.

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

- in accordance with any written direction from the Planning Secretary;
- due to any significant change to the management processes as described herein. If there is ambiguity in relation to whether there is a significant change, Santos will consult with the Planning Secretary to determine whether the Plan must be reviewed; and

- otherwise at intervals of no longer than one year.

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

Consent condition D5 in turn states that if the review under condition D4 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 Santos will submit the revised Plan to the Planning Secretary for approval within 6 weeks of the review.

Further details on the evaluation and review of this Plan are provided in the EMS.

12.4 Improvement measures

Consent condition D3(g) requires that this Plan includes a program to investigate and implement ways to improve the environmental performance of the Project over time; and CoC D3(i) states that the Plan is to include a protocol for the periodic review. 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.

Measures that may be implemented following review and evaluation may include the following:

- audit of the bushfire management system, reviewing the management measures;
- identification of potential system improvements such as upgrade of equipment or increased levels of training; and
- implementation of any modifications to the bushfire management and notification system.

In accordance with CoC D13 and as described in section 8 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

Australian Fire and Emergency Service Authorities Council (2012). *Bushfire Glossary*. Prepared by Rural and Land Management Group for AFAC Agencies.

Australian Fire and Emergency Service Authorities Council (2022, 12 September). *Australian Fire Danger Rating System*. https://afdrs.com.au/.

Forestry Corporation (2013). *Forest Practices Code*.

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

North West Ecological Services (2020). *Travelling Stock Reserves Vegetation Guide*. Prepared for NSW Local Land Services.

RFS (2006). *Standards for Asset Protection Zones*. Prepared by the NSW Rural Fire Service.

RFS (2014). *Development Planning – A guide to developing a Bush Fire Emergency Management and Evacuation Plan*. Prepared by the NSW Rural Fire Service.

RFS (2017). Standards for pile burning. Prepared by the NSW Rural Fire Service.

RFS (2019). *Planning for Bush Fire Protection: A guide for councils, planners, fire authorities and developers*. Prepared by the NSW Rural Fire Service.

OEH (2015). *Pilliga East Fire Management Strategy 2016 - 2021*. Prepared by the Office of Environment & Heritage

Resilience NSW (2021). *NSW Recovery Plan*.

Standards Australia (2001). Australian Standard/New Zealand Standard International Standards Organisation 2444:2001 *Portable fire extinguishers and fire blankets*.

Standards Australia (2010). Australian Standard/New Zealand Standard International Standards Organisation 3745:2010 *Planning for emergencies in facilities.*

Standards Australia (2018). Australian Standard/New Zealand Standard International Standards Organisation 3959:2018 *Construction of buildings in bushfire-prone areas.*

Standards Australia (2018). Australian Standard/New Zealand Standard International Standards Organisation 1670:2018 *Fire detection, warning, control and intercom systems*

14. Glossary

Term	Definition[9]
Asset protection zone (APZ)	A fuel-reduced area surrounding a built asset or structure which provides a buffer zone between a bush fire hazard and an asset. The APZ includes a defendable space within which firefighting operations can be carried out. The size of the required APZ varies with slope, vegetation and FBI
Approved disturbance area	The disturbance areas shown in the EIS as modified by any approved Field Development Plan
Back burn	A fire started intentionally along the inner edge of a fire line during indirect attack operations to consume fuel in the path of a bushfire.
Bushfire	An unplanned fire burning in vegetation; also referred to as wildfire.
Bush Fire Danger Period	A period of the year (October to March) either established by legislation or declared by the relevant agency, when restrictions are placed on the use of fire due to dry vegetation and the existence of conditions conducive to the spread of fire.
Council	Narrabri Shire Council
Department	NSW Department of Planning and Environment (DPE)
Ecosystem	An interconnected biological community of organisms that interact with each other and their physical environment.
EIS	The Environmental Impact Statement titled Narrabri Gas Project Environmental Impact Statement, dated 31 January 2017, submitted with the development application, including the Applicant's response to submissions and supplementary response to submissions, and the additional information provided by the Applicant to the Department in support of the application
Emergency manual	NSW Operations Emergency dashboard document which is provided at level 3 induction - which contains key contacts for Santos personnel
Emergency	A site/field/area based unplanned event, accidentally or deliberately caused, which requires a response, and which may result in: • fire; • injury to people; • damage to the environment; • loss of control of any aspect; • loss of business; • loss or damage to product or assets; • loss of production; • disruption to customers; or • the potential for any of the above.
Escape routes	A planned route away from danger areas at a fire.
Evacuation	The temporary relocation of persons from dangerous or potentially dangerous areas to safe areas
Exploration well	A petroleum well that is drilled to: a) explore for the presence of petroleum or natural underground reservoirs suitable for storing petroleum, or b) obtain stratigraphic information for the purpose of exploring for petroleum. For clarity, an exploration well is not a production well

[9] The majority of the definitions are as provided in the Development Consent for SSD 6456, with others consistent with *A Guide to Planning for Bushfire Protection* (RFS, 2019) or the *Bushfire Glossary* (AFAC, 2012)

Term	Definition[9]
Feasible	Means what is possible and practical in the circumstances
Fire behaviour index	A relative class denoting the potential rates of spread, or suppression difficulty for specific combinations of temperature, relative humidity, drought effects and wind speed, indicating the relative evaluation of fire danger.
Fire line	A natural or constructed barrier or treated fire edge used in prescribed burning or fire suppression to limit the spread of fire.
Forest Permit area	The area agreed with FCNSW and described in the Forest Permit
Gas well	Pilot wells and production wells
Hazard	A situation or condition with potential for loss or harm to the community or the environment. A bushfire hazard is any vegetation that has the potential to threaten lives, property or the environment.
Incident	An occurrence or set of circumstances that causes or threatens to cause material harm and which may or may not be or cause a non-compliance
Incident response	The physical response to an incident. For example, the actions directly associated with firefighting.
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
Material harm	Is harm that: • involves actual or potential harm to the health or safety of human beings or to the environment that is not negligible, or • results in actual or potential loss or property damage of an amount, or amounts in aggregate, exceeding $10,000 (such loss includes the reasonable costs and expenses that would be incurred in taking all reasonable and practicable measures to prevent, mitigate or make good harm to the environment) This definition excludes “harm” that is authorised under either SSD 6456 or any other statutory approval
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
Mopping up	Making a fire safe after control has been achieved, by extinguishing burning material near the fire line, felling snags, trenching logs to prevent rolling etc. Also called ‘blacking out’.
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 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 *Petroleum (Onshore) Act 1991*. An exploration licence gives the licence holder exclusive rights to explore for petroleum or specific minerals within a designated area but it does 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.

Term	Definition[9]
	PPL 3 is held by the following titleholders: • 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 *Environmental Planning and Assessment Act 1979* 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
Portable assets	Portable assets are those which are generally relocatable such as drilling rigs and camps and construction site offices.
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
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
Refuge area	A refuge is a local open space or building or similar where people may gather, as a last resort, to seek shelter from a bushfire.
Study area	The Study area includes the Project area plus a 5 km buffer, to assist in assessing the fire risk to and from the Project area
Unacceptable risk	The level of risk at which mitigation actions are deemed to be warranted.
Well	Pilot wells and production wells
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[10], or other area as may be approved in the Field Development Plan

[10] 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 - Consultation records

Santos

Management Plan Consultation Feedback Form

DOCUMENT TITLE:	**Bushfire Management Plan**
STAKEHOLDER:	**Forestry Corporation of NSW**
CONSULTATION RELEASE DATE:	**1 December 2021**
COMMENTS DUE DATE:	**14 January 2022**

General Feedback	
Key Issues	
Suggestions for improvement	

Section	**Type**	**Specific Feedback** *Detail specific issues with certain sections in the document*
3 (Forestry Act 2012)		Suggest replacing listed dot points with those terms listed at section 3.7 of current FCNSW/Santos access agreement.
6.3		Reword the first paragraph similar to below. *FCNSW are the managers of the roads and trails built in State forests by FCNSW. FCNSW has granted authority to Santos to use its road network for Project purposes and Santos has committed to maintaining these roads to FCNSWs standards (Forest Road Practices Code 2013).*
Table 7.3		Does not describe who Santos offers notice and FFDI reporting to.

Santos

Management Plan Consultation Feedback Form

Section	Type	Specific Feedback *Detail specific issues with certain sections in the document*
7.4 (second paragraph)		- Access agreement allows hot works up to an FFDI 74 and > 25 metres from forest fuels. Elements of Table 7.3 are inconsistent with the access agreement. The inconsistencies are to be resolved before this management plan is released for public exhibition. - FCNSW supports rewording the first sentence such that approval need only be gained by RFS and notification given to FCNSW. Gaining authority from the RFS may be reasonable basis for an amendment to the access agreement limitations. - Will the fire unit / tanker have a dedicated operator (ie spark watch)? This should be clear.
7.6 and/or 7.7		There is a lack of detail of the *suitable equipment* Santos will use to respond to fires in the Project area. Possibly list the access agreement requirements (e.g. 4000L tanker, heavy plant, fire fighters, add what resources these four firefighters will have i.e. Cat 9 units or similar).
8.1		Does the basic initial attack referred to include using heavy plant to track the fire, built mineral earth breaks? Santos and FCNSW should consult regulators to ensure any vegetation disturbance caused by Santos as part of the initial attack is acceptable. The mgt plan should include comments that Santos shall direct its heavy plant operators to commence tracking the fires edge if safe to do so. FCNSW to assume all practical control when it arrives on site.
Table 8.3		Include an action "report location/coordinates of all fires on State forest, no matter the size to FCNSW"
8.7		The plan may wish to include a reference to a southern evacuation option - towards Baan Baa via Smithers Gate (-30.637147; 149.833633). Santos may wish to discuss with Narrabri Shire opportunities to maintain this short length of road for emergency purposes.

Santos

Management Plan Consultation Feedback Form

DOCUMENT TITLE:	**Bushfire Management Plan**
STAKEHOLDER:	**NSW Rural Fire Service**
CONSULTATION RELEASE DATE:	**1 December 2021**
COMMENTS DUE DATE:	**14 January 2022**

General Feedback	
Key Issues	
Suggestions for improvement	

Section	**Type**	**Specific Feedback** *Detail specific issues with certain sections in the document*
		There are no issues from the RFS point of view in relation to the Bushfire Management Plan. The plan reflects the many discussions between Santos, Forestry and the RFS.

Fire Management Plan (Revision A) - comments reconciliation

FCNSW comments

Item	Section #	Section heading	Existing text	Comment	Final response
1	3	Regulatory requirements	No specific text reference	Suggest replacing listed dot points with those terms listed at section 3.7 of current FCNSW / Santos access agreement.	The dot points in section 3 have been replaced by those in section 3.7 of the Forest Permit.
2	6.3	Roads and fire trails	All roads and trails within the Pilliga Forest are considered State Forestry Roads and are the responsibility of FCNSW under the environmental protection standards listed in FCNSW's *Forest Road Practices Code* (2013). Santos is an authorised user under the Forest Permit and is required to maintain the State Forest Roads it uses for its activities in accordance with this code.'	Suggest rewording existing text as: *FCNSW are the managers of the roads and trails built in State forests by FCNSW. FCNSW has granted authority to Santos to use its road network for Project purposes and Santos has committed to maintaining these roads to FCNSWs standards (Forest Road Practices Code 2013).*	The paragraph has been reworded as follows: *FCNSW are the managers of the roads and trails built in State forests by FCNSW. FCNSW has granted authority to Santos to use its road network for Project purposes and Santos has committed to maintaining these roads to FCNSWs standards (Forest Road Practices Code 2013).*
3	7.3	Table 7.3 - Operations permitted under each fire danger period rating	No specific text reference	Does not describe who Santos offers notice and FFDI reporting to.	The wording has been amended as follows: Notification and FFDI reporting *provided to FCNSW*
4	7.4	Total fire bans	In addition to the framework set out in Table 7.3, any urgent hot works required during a TOBAN are to be approved by the RFS and FCNSW. Approval requests are to be made to the nominated FCNSW staff member on weekdays or the relevant Duty Officer on weekends and public holidays. If approved, the work area should be surrounded by at least 2 m of cleared mineral earth, wet down before the hot work commences, and with a fire unit or tanker available on site for the duration of the activity.	• Access agreement allows hot works up to an FFDI 74 and > 25 metres from forest fuels. Elements of Table 7.3 are inconsistent with the access agreement. The inconsistencies are to be resolved before this management plan is released for public exhibition. • FCNSW supports rewording the first sentence such that approval need only be gained by RFS and notification given to FCNSW. Gaining authority from the RFS may be reasonable basis for an amendment to the access agreement limitations. Will the fire unit / tanker have a dedicated operator (ie spark watch)? This should be clear.	The text in section 7.4 has been amended as follows: In addition to the framework set out in Table 7.3, any urgent hot works required during a TOBAN are to be approved by the RFS, *with a written notification provided to FCNSW*. *RFS* approval *notifications* are to be made to the nominated FCNSW staff member on weekdays or the relevant Duty Officer on weekends and public holidays. If approved *by the RFS*, the work area *will* be surrounded by at least 2 m of cleared mineral earth, *wetted* down before the hot work commences, *not be undertaken within 25 m of forest fuels* and with a fire unit or tanker, *with a dedicated operator,* available on site for the duration of the activity. Table 7.3 has been amended to be consistent with Table 1 in Schedule 4 of the Forest Permit.
5	7.6 / 7.7	Bushfire training and competence Vehicle and equipment preparation	No specific text reference	There is a lack of detail of the suitable equipment Santos will use to respond to fires in the Project area. Possibly list the access agreement requirements (e.g. 4000L tanker, heavy plant, fire fighters, add what resources these four firefighters will have i.e. Cat 9 units or similar).	The section has been amended to reflect the equipment and personnel outlined in the Forest Permit. Refer also to Item #1 above. Note that the Forest Permit simply specifies 'a piece of heavy plant' rather than a specific type, brand or size.
6	8.1	Response - Priorities	Although not an authorised bushfire response agency, Santos may provide a support or ancillary role in bushfire control in conjunction with RFS and FCNSW. Staff and contractors may also be required to initiate some basic initial attack e.g., if a fire escapes from a work activity. In the event of a bushfire the applicable emergency response protocols shall be implemented as per the Project Emergency Response Plan.	Does the basic initial attack referred to include using heavy plant to track the fire, built mineral earth breaks? Santos and FCNSW should consult regulators to ensure any vegetation disturbance caused by Santos as part of the initial attack is acceptable. The mgt plan should include comments that Santos shall direct its heavy plant operators to commence tracking the fires edge if safe to do so. FCNSW to assume all practical control when it arrives on site.	As Santos is not an authorised bushfire response agency, Santos may provide a support or ancillary role in bushfire control in conjunction with RFS and FCNSW. As such, any use of heavy plant or equipment to track the fire or built fire breaks will be at the direction of RFS or FCNSW.
7	8.6	Table 8.3 – If you identify a fire	No specific text reference	Include an action "report location/coordinates of all fires on State forest, no matter the size to FCNSW"	The table has been amended to include the action: *Report location/coordinates of all fires on State forest land, no matter the size to FCNSW*
8	8.7	Evacuation	No specific text reference	The plan may wish to include a reference to a southern evacuation option - towards Baan Baa via Smithers Gate (-30.637147; 149.833633). Santos may wish to discuss with Narrabri Shire opportunities to maintain this short length of road for emergency purposes.	As discussed at the meeting of 22 March 2022, this road is considered unsuitable as an evacuation route as Santos staff and contractors are not familiar with this road and it is not well signposted.

Note: The Forest Fire Danger Index (FFDI) has been replaced by the Fire Behaviour Index (FBI) from 1 September 2022. For clarity and consistency, FFDI has been retained in the consultation comments and responses.

RFS comments

Item	Section #	Section heading	Existing text	Comment	Final response
No RFS comments on the Fire Management Plan					

Landholder comments

Landholder	Property	Comments
1	[redacted]	No comments
2	[redacted]	Comfortable with the Fire Management Plan and contents. No comments
3	[redacted]	No comments
4	[redacted]	All good with the Fire Management Plan. No comments
5	[redacted]	No comments
6	[redacted]	No comments
7	[redacted]	No comments

Appendix B - Consent conditions relevant to this Plan

Table B1 - SSD 6456 consent conditions relevant to this Fire Management Plan

SSD 6456 consent conditions directly relevant to this Plan	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 1.6
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 12.4
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 B78 The Applicant must:	
a) ensure that the development:	
(i) provides for asset protection in accordance with the relevant requirements in the *Planning for Bushfire Protection* (RFS, 2019) guideline;	Section 3.2 Section 6.2, 6.3, 6.5 and 6.7
(ii) ensure that there is suitable equipment to respond to any fires in the Project area; and	Section 7.6 and 7.7
(iii) provides for safety flare stack heights of 50 metres above ground level; and	Not applicable for Phase 1
b) assist the RFS and emergency services to the extent practicable if there is a fire in the vicinity of the Project area.	Section 7.6.1 Section 8.1

SSD 6456 consent conditions directly relevant to this Plan	Section reference
Consent condition B79 Prior to the commencement of Phase 1, the Applicant must prepare a Fire Management Plan for the development in consultation with RFS, FCNSW and landowners upon which gas field infrastructure is proposed to be located to the satisfaction of the Planning Secretary. This plan must include a:	
a) contact person and 24-hour contact phone number;	Section 8.2
b) schedule and description of proposed bushfire mitigation works, including:	Section 7.8
(i) location of managed and unmanaged vegetation within the Project area;	Section 4.3
(ii) asset protection zones for Project-related infrastructure, based on detailed risk assessment;	Section 6.5
(iii) design of applicable buildings in accordance with the requirements in the *Planning for Bushfire Protection* (RFS, 2019) guideline;	Section 3.2 Section 6.1
(iv) location of water supply	Section 6.6 Appendix F
(v) internal access roads;	Section 6.3 Appendix F
c) protocol for certification of Project-related infrastructure in relation to radiant heat exposure;	Section 3.2
d) plan identifying the location and storage of bulk flammable liquids and materials;	Table 4.2 Section 4.7
e) plan and procedures for minimising bushfire risks associated with safety flaring activities;	Section 1.1.2 Section 4.1
f) plan and procedures for shutting-in wells in the event of bushfire risk;	Section 4.1
g) 'hot works' management plan, including:	Table 6.1
(i) restrictions on when 'hot works' are limited and prohibited; and	Table 6.1 Section 7.3
(ii) safety measures to be implemented when 'hot works' are being conducted; and	Table 6.1 Section 7.3
h) emergency/evacuation plan in accordance with the *Guidelines for the Preparation of Emergency/Evacuation Plans* (RFS) and Australian Standard *AS3745 Planning for emergencies in facilities*.	Section 8.8
Consent condition B80 The Applicant must implement the Fire Management Plan in consultation with RFS and FCNSW once approved by the Planning Secretary.	Section 1.2
Consent condition D3 The Applicant must ensure that (where relevant) the management plans required under this consent include:	
a) summary of relevant background or baseline data;	Section 4
b) details of:	
(i) the relevant statutory requirements (including any relevant approval, licence or lease conditions);	Section 3
(ii) any relevant limits or performance measures and criteria; and	Section 3

SSD 6456 consent conditions directly relevant to this Plan	Section reference
(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 9.3
c) any relevant commitments or recommendations identified in the documents that together comprise the NGP EIS;	Section 3.3
d) a description of the measures to be implemented to comply with the relevant statutory requirements, limits, or performance measures and criteria;	Section 1.4
e) a program to monitor and report on the:	Section 12
(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 9.3
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 11.2
(iii) failure to comply with other statutory requirements; and	Section 11.1
i) a protocol for periodic review of the plan.	Section 11
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. **Note**: *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.*	Section 12.3
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

SSD 6456 consent conditions directly relevant to this Plan	Section reference
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. **Note**: *A non-compliance which has been notified as an incident does not need to also be notified as a non-compliance*	Section 11.1
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:	
j) make copies of the following information publicly available on its website: (i) the document/s listed in condition A2(c); (ii) current statutory approvals for the development; (iii) approved strategies, plans and programs; (iv) detailed plans for the Phases of the development; (v) minutes of CCC and Advisory Group meetings; (vi) 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; (vii) 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; (viii) a summary of the current phase/s and progress of the development; (ix) contact details to enquire about the development or to make a complaint; (x) a complaint register, updated monthly; (xi) a record of all incidents and non-compliances; (xii) the Annual Reviews of the development; (xiii) 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 (xiv) any other matter required by the Planning Secretary; and	Section 1.7
k) keep such information up to date.	Section 1.7

Appendix C - APZ dimensions

Model outputs calculating the minimum sized APZ required to ensure all above ground infrastructure at well heads and communication towers are located outside the BAL Flame Zone are shown for the Pilliga Outwash Dry Sclerophyll Forests (Table C1) and for wells/towers located in any other Dry Sclerophyll Forest or Woodland (Table C2).

Both assessments assume a downslope of 3 degrees and an FBI[11] of 80. The fuel loads for the model inputs are those listed within the RFS publication *Comprehensive Vegetation Fuel Loads* (RFS, 2019). The Bushfire Attack Assessor models used are generated by Newcastle Bushfire Consulting in 2021 and are accepted by the RFS as suitable for determining BALs in the Pilliga area.

[11] The Fire Danger Index (FDI) has been replaced by the Fire Behaviour Index (FBI) from 1 September 2022

Table C1 - Bushfire Attack Assessor Report to determine the minimum APZ required to avoid BAL flame zone in the Pilliga Outwash Dry Sclerophyll Forests

NBC Bushfire Attack Assessment Report V4.1

AS3959 (2018) Appendix B - Detailed Method 2

Print Date: 13-Apr-21 **Assessment Date:** 07-Apr-21

Site Street Address: NGP, Narrabri Ops Area

Assessor: [redacted]

Local Government Area: Narrabri **Alpine Area:** No

Equations Used

Transmissivity: Fuss and Hammins, 2002
Flame Length: RFS PBP, 2001/Vesta/Catchpole
Rate of Fire Spread: Noble et al., 1980
Radiant Heat: Drysdale, 1985; Sullivan et al., 2003; Tan et al., 2005
Peak Elevation of Receiver: Tan et al., 2005
Peak Flame Angle: Tan et al., 2005

Run Description: Well APZ in Pilliga Outwash DSF

Vegetation Information

Vegetation Type:	Forest (including Coastal Swamp Forest)		
Vegetation Group:	Forest and Woodland		
Vegetation Slope:	3 Degrees	**Vegetation Slope Type:**	Downslope
Surface Fuel Load(t/ha):	7	**Overall Fuel Load(t/ha):**	11.5
Vegetation Height(m):	2	Only Applicable to Shrub/Scrub and Vesta	

Site Information

Site Slope:	0 Degrees	**Site Slope Type:**	Downslope
Elevation of Receiver(m):	Default	**APZ/Separation(m):**	7

Fire Inputs

Veg./Flame Width(m):	100	**Flame Temp(K):**	1090

Calculation Parameters

Flame Emissivity:	95	**Relative Humidity(%):**	25
Heat of Combustion(kJ/kg)	18600	**Ambient Temp(K):**	308
Moisture Factor:	5	**FDI:**	80

Program Outputs

Level of Construction:	BAL 40	**Peak Elevation of Receiver(m):**	2.95
Radiant Heat(kW/m2):	32.32	**Flame Angle (degrees):**	61
Flame Length(m):	6.75	**Maximum View Factor:**	0.482
Rate Of Spread (km/h):	0.83	**Inner Protection Area(m):**	7
Transmissivity:	0.882	**Outer Protection Area(m):**	0
Fire Intensity(kW/m):	4911		

Note: The Fire Danger Index (FDI) has been replaced by the Fire Behaviour Index (FBI) from 1 September 2022.

Table C2 - Bushfire Attack Assessor Report to determine the minimum APZ required to avoid BAL flame zone in all other Dry Sclerophyll Forests other than Pilliga Outwash Dry Sclerophyll Forests

NBC Bushfire Attack Assessment Report V4.1

AS3959 (2018) Appendix B - Detailed Method 2

Print Date: 13-Apr-21 **Assessment Date:** 07-Apr-21

Site Street Address:	NGP, Narrabri Ops Area		
Assessor:	[redacted]		
Local Government Area:	Narrabri	**Alpine Area:**	No

Equations Used

Transmissivity: Fuss and Hammins, 2002
Flame Length: RFS PBP, 2001/Vesta/Catchpole
Rate of Fire Spread: Noble et al., 1980
Radiant Heat: Drysdale, 1985; Sullivan et al., 2003; Tan et al., 2005
Peak Elevation of Receiver: Tan et al., 2005
Peak Flame Angle: Tan et al., 2005

Run Description:	Well APZ in DSF		
Vegetation Information			
Vegetation Type:	Forest (including Coastal Swamp Forest)		
Vegetation Group:	Forest and Woodland		
Vegetation Slope:	3 Degrees	**Vegetation Slope Type:**	Downslope
Surface Fuel Load(t/ha):	14	**Overall Fuel Load(t/ha):**	24.7
Vegetation Height(m):	2	Only Applicable to Shrub/Scrub and Vesta	
Site Information			
Site Slope:	0 Degrees	**Site Slope Type:**	Downslope
Elevation of Receiver(m):	Default	**APZ/Separation(m):**	14
Fire Inputs			
Veg./Flame Width(m):	100	**Flame Temp(K):**	1090
Calculation Parameters			
Flame Emissivity:	95	**Relative Humidity(%):**	25
Heat of Combustion(kJ/kg)	18600	**Ambient Temp(K):**	308
Moisture Factor:	5	**FDI:**	80
Program Outputs			
Level of Construction:	BAL 40	**Peak Elevation of Receiver(m):**	5.94
Radiant Heat(kW/m2):	31.94	**Flame Angle (degrees):**	60
Flame Length(m):	13.71	**Maximum View Factor:**	0.487
Rate Of Spread (km/h):	1.65	**Inner Protection Area(m):**	11
Transmissivity:	0.862	**Outer Protection Area(m):**	3
Fire Intensity(kW/m):	21096		

Note: The Fire Danger Index (FDI) has been replaced by the Fire Behaviour Index (FBI) from 1 September 2022.

Appendix D - Evacuation decision making

On occasions in major bushfires communications systems fail or become overloaded. As these represent life threatening situations in a bushfire this Appendix provides rough guidelines for Santos staff and personnel to help them make evacuation decisions in the absence of advice from fire authorities or the Narrabri Operations Centre.

Figure D1 shows the Estimated Time of Arrival of a bushfire at Bibblewindi under a Fire Danger Rating of Extreme (FBI 80) and Figure D2 under an FDR of Extreme (FBI 50). Both figures are compiled from bushfire spread models and show a series of coloured areas out from Bibblewindi that represent the time it would take a bushfire to reach Bibblewindi from various distances out from Bibblewindi.

In Figure D1 (FBI 80) the coloured areas are in 2-hourly intervals and in Figure D2 (FBI 50) the intervals are 4-hourly. Black lines on both figures show major time increments and both Figures have an inset in the top right corner which is an enlargement of the Bibblewindi area with 30 minute or 1 hour incremental 'ETA lines'.

Both figures have been compiled from modelling of the fire spread from 16 ignition points located 5 km beyond the Study area and located on each of the 16 compass cardinal points (i.e. N, NNE, NE, ENE, E, etc). The model also assumes each of the 16 fires are burning independent of the other and burning toward Bibblewindi, driven by winds directly from the ignition point to Bibblewindi.

A different FBI has been applied to the eight fire spread models approaching Bibblewindi from the east compared to the eight fire runs from the west. This approach has been taken as FBI analysis under different wind directions found that on average the FBI from the N/E/S sector (i.e. under winds with an easterly influence) is 25% of the FBI from the N/W/S sector (i.e. under winds with a westerly influence).

Forests and woodlands have been grouped together and assigned the heaviest fuel load found among each of these vegetation groups. The Pilliga Outwash Dry Sclerophyll Forest, however, has been treated separately to other forests because of its dominance in the landscape and its very low maximum fuel load. Fire spread models for the grassland areas assumes unmanaged native grassland.

The models show a significant difference in fire spread rates under the 'Extreme' FDR and for fires spreading generally west to east, associated with the hotter, drier winds and FBI from these directions. As Bibblewindi is a primary' Refuge of Last Resort' for the Project area, these figures give important insight into the time required to evacuate to or from Bibblewindi under these fire danger ratings. Although these figures only cover two FDRs, they can be used to understand how various egress routes can be cut under other FDR and therefore the time required to evacuate safely under a range of conditions.

Figures D1 and D2 should ONLY be used in preparedness planning and if No Alert or Official Advice has been received and a fire is evident.

How to use Figure D1 and Figure D2

Preparedness

Both figures provide data that can help evacuation preparedness and discussion about which egress routes offer the best options under different fire spread scenarios. Estimates of the time required to travel the evacuation route options compared to the fire travel times can be used to consider the time required to evacuate safely. A minimum 2 hours of leeway should be built into planning of early evacuation i.e. two hours on top of the estimated time to detect and be advised of a fire, prepare for departure and the travel time under smoky conditions).

Evacuation response

The two figures can potentially be carried in vehicles and posted at Places of Last Resort' with some guidelines and used to consider evacuation routes in a real-life event. For example, if located at Bibblewindi and a decision to 'stay or go' is required and no contact with Narrabri Operations Centre or Emergency Services, and the approximate position of the fire and its spread direction is known, then an understanding of the risk associated with different egress options could be improved.

Similarly, if located in the field and a decision is required to evacuate to a 'Place of Last Resort' or 'Shelter in Place' the spread time of a fire and travel time to the Place of Last Resort can be compared. It is essential that conservative decision making is made in all such situations and it only occur in the absence of communication with external advisors on the exact position of fire and its predicted spread.

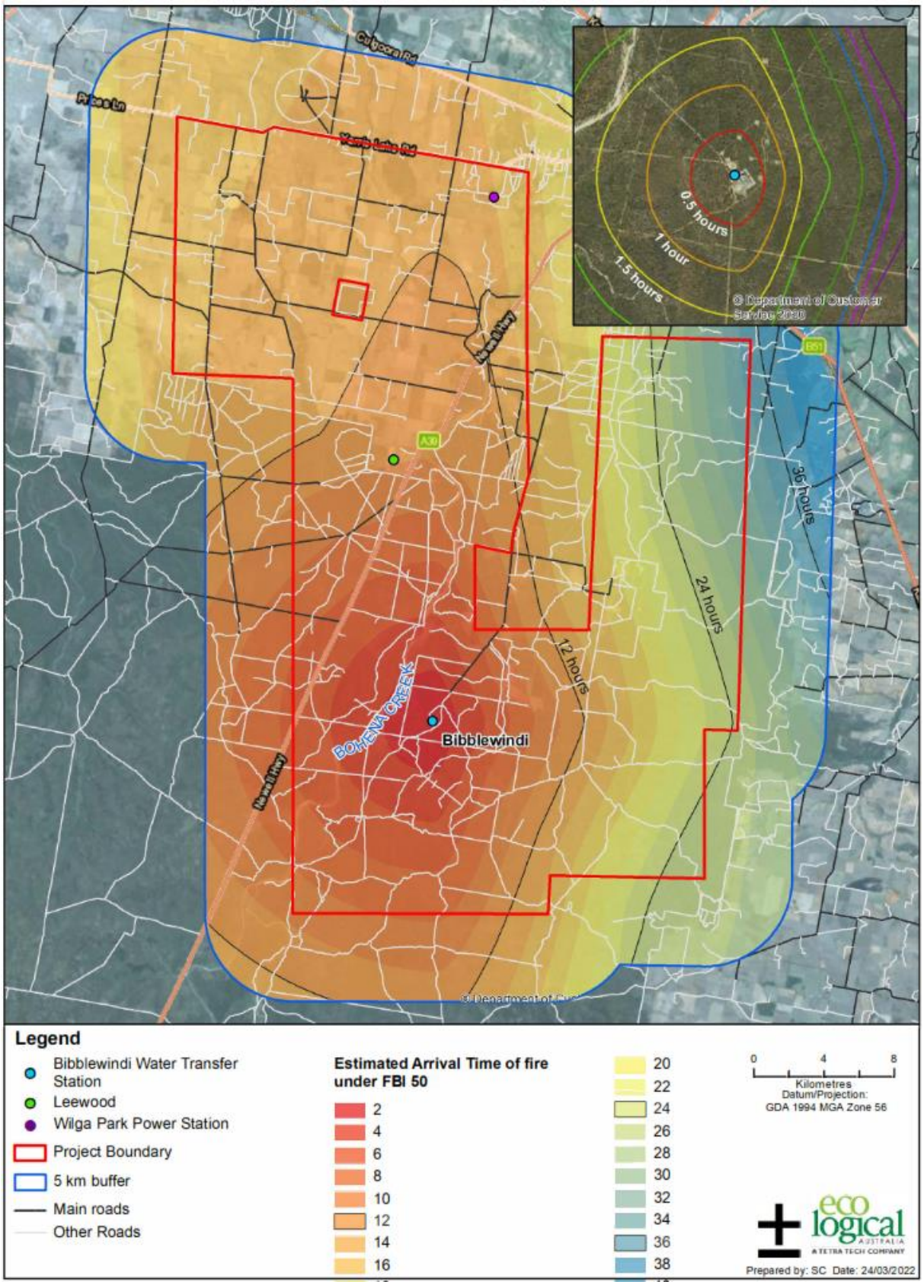


Figure D1 - ETA of fire attack on Bibblewindi under an Extreme FDR (FBI 80)

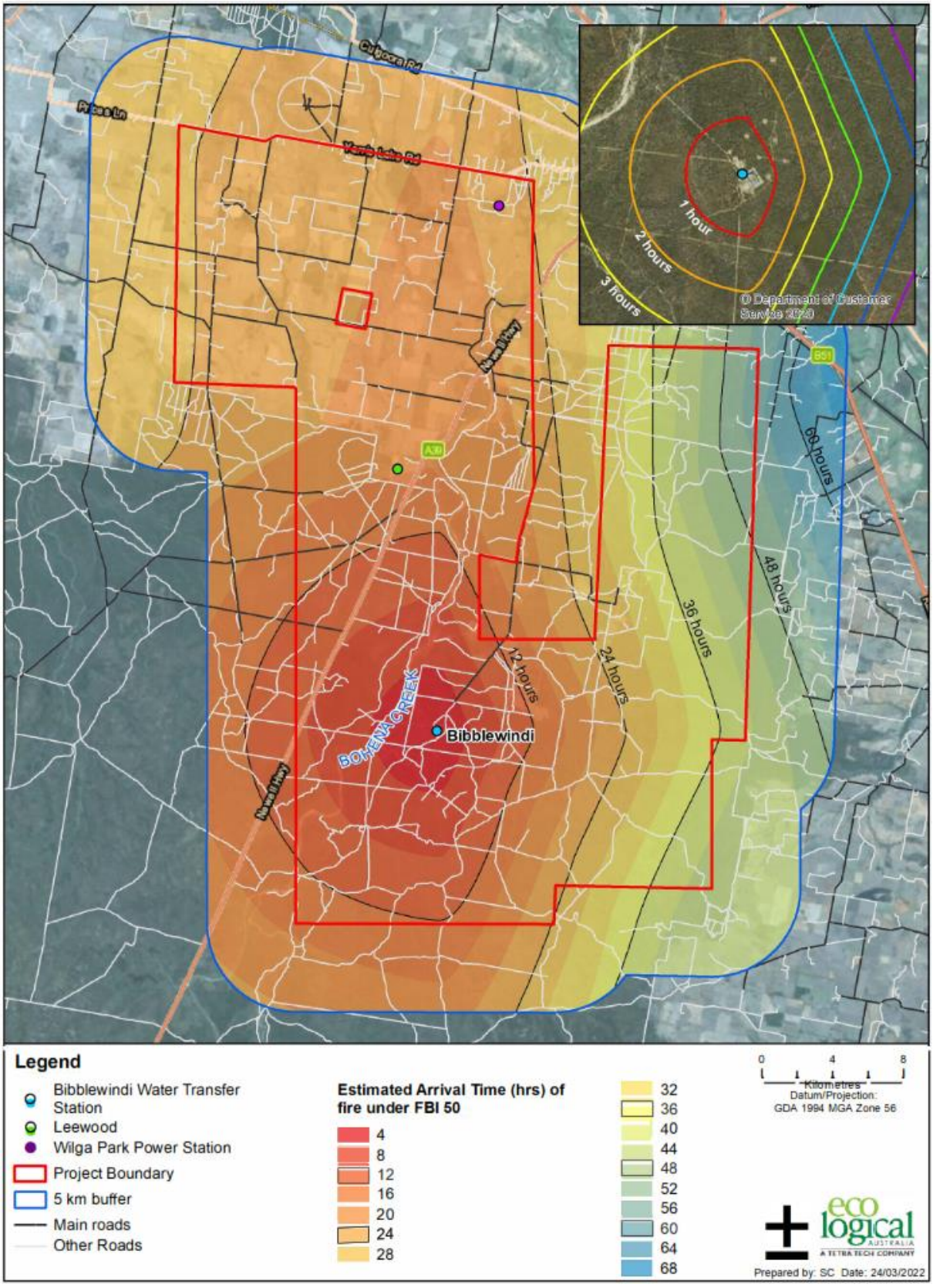


Figure D2 - ETA of fire attack on Bibblewindi under an Extreme FDR (FBI 50)

Appendix E - What to do if caught in a bushfire

The following provide guidelines from the RFS and other recognised experts on what to do if caught in a bushfire on foot, in a vehicle or in a building. Each requires a different response involving critical decisions for your survival.

What to do if caught in a bushfire IN A BUILDING[12]

Leaving Early

- The safest option during a bush fire is always to leave early.
- You need to decide what your trigger will be to signal to you that it is time to leave. You need to decide your own triggers based upon Santos guidelines and the workplace buildings you may be occupying;
- Triggers could be a range of things such as a Fire Danger Rating of 'Catastrophic' or 'Extreme', a fire in the vicinity of your workplace or smoke in the area.
- Regardless of what your trigger is, it needs to be something that happens long before your safety is threatened by a fire.
- When you leave, you need to make sure you're going somewhere that is safer. Central Narrabri or the Narrabri Operations Centre or the Santos approved Places of Last Resort may be options.
- Know the best way to get to the safer place and have a back-up plan if a road is blocked.
- Make a list of what you'll take from your workplace in the event of a fire. This may include identification, key documents or important personal items. If you assume the building may be destroyed by fire it will help prioritise your list.
- Call Narrabri Operations Centre to let them know are leaving and when you have arrived at your planned safe place.
- Always have a backup plan.

Personal preparation

- Wear PPE suitable for a bushfire, this may include cotton protective clothing, helmet or wide-brimmed hat, eye protection goggles, moistened facemask or cloth, loose long-sleeved cotton shirt, gloves, long cotton pants or jeans, sturdy leather shoes or boots.
- Stay hydrated and stock plenty of drinking water on hand.

What to do outside the building you are sheltering in

- Block drainpipes with plastic bags or similar full of sand and fill gutters with water. Don't get on the roof to hose it down since during bush fires, often more people are injured by falling from roofs than suffering burns.
- Move flammable items such as outdoor furniture, doormats, hanging baskets away from the building or inside the building.
- Move animals to a well-grazed or ploughed area away from the building and wind.
- Turn off the gas main and/or bottle.
- Patrol the outside of your building well before the fire arrives, putting out any embers and spot fires that may start.
- As the fire approaches, wet the side of the building and nearby vegetation, especially on the side that faces the fire.
- Move any firefighting equipment to a place where it will not get burnt and is readily accessible.

[12] Adapted from the RFS website Get ready for a Bushfire.pdf (nsw.gov.au) on 26 March 2021

What to do inside the building before the fire arrives

- Stay hydrated with drinking water close by.
- Confine any animals to one room.
- Close doors, windows, vents, blinds and curtains to prevent flames, smoke and embers from entering.
- Put tape across the inside of the windows so they stay in place if they break.
- Shut off gas at the meter or bottle.
- Move easily ignited material away from the windows to prevent any embers that enter the building from igniting these materials.
- Fill baths, sinks and buckets with water for putting out any fires that may start inside.
- Soak towels and rugs, lay them across external doorways.
- Place a ladder next to roof access hole so you can check for spot fires.

What to do inside the building during the fire

- If flames are on top of you or the heat becomes unbearable move inside until the fire front has passed (usually 5-10 minutes).
- Ensure you have torches ready as it is likely to become completely dark and you will not be able to see.
- Shelter in a room on the opposite side of the building from the approaching fire – and one that has a clear exit out of the building.
- Patrol the inside of the building, including the roof space for sparks and embers.
- Remember – if your life is at risk, call Narrabri Operations (or 000) immediately.

What to do after the fire passes

- Once the fire has passed, you should patrol your property for hours, looking for small fires and burning embers.
- Check the building both inside and out for fires including roof cavity, under the building, deck, stairs, windowsills etc.
- If possible and safe to do so, check all others in the locality are okay.
- Contact Narrabri Operations to tell them you are safe.

What to do if caught in a bushfire IN A VEHICLE[13]

Background

- If you see smoke ahead don't risk getting caught and play it safe! Find an alternate route.
- Do not leave the vehicle. Many people have lost their lives by exiting the vehicle only to be trapped on foot in the open. Your vehicle will help to protect you from radiant heat, which is the main danger.
- Listen to the local radio station for news of any fires in the area, or call Narrabri Operations Centre.
- If you have a smartphone and have downloaded the Fires Near You mobile application, check the location of fires and review the risks with Narrabri Operations Centre.

[13] Adapted from RFS bushfire training modules and website and from the RFS website Information-for-Travellers.pdf (nsw.gov.au) 26 March 2021

Before you leave your field workplace

- Ensure buildings and property are well prepared.
- Tell Narrabri Operations Centre where you plan to go and who is with you.
- Think about the area you are going to and what you would do if you encountered a fire; identify nearby “Places of Last Resort”.
- Check the Fires Near Me NSW smartphone application or website for any current incidents and/or check with Narrabri Operations Centre.
- Pack an emergency survival kit, just in case.

While travelling

- Monitor weather conditions with Narrabri Operations Centre.
- Stay up to date with any fire activity nearby via the Fires Near Me NSW smartphone application and website.
- Avoid travelling in directions potentially ahead of a fire.

Actions if you are caught in a fire

- Your vehicle can provide protection when caught in a bush fire.
- If caught by a bush fire, STOP immediately and look for a clear area, preferably off the road:
  - *Look for large areas clear of grass or bush as these may not sustain fires of high intensity e.g. places where you can be over 100 m from the trees or thicker bushes;*
  - *Look for heavily grazed paddocks, large gravel surfaces or large water bodies;*
  - *avoid sites with dense bush or trees and where the fire can approach uphill or from directly upwind toward you.*
- Face the front of your vehicle towards the direction an escape may be required but ideally in the direction where you can see what is unfolding with the fire.
- Park off the road (to avoid others running into you in thick smoke) in a clear area away from trees, scrub and tall grass.
  - *determine the direction the fire will approach from, and if you can position your vehicle in the centre of the chosen cleared area and then move slightly further from the centre in the direction away from the approaching fire;*
  - *face in the direction of escape;*
  - *apply the hand brake;*
  - *leave your hazard lights on, turn ignition off;*
  - *do not lock the doors or remove ignition keys;*
  - *close all windows and shelter below window level;*
  - *close all vents or turn the vents to recycle;*
  - *cover all parts of the body with woollen or cotton blankets to protect all passengers from radiant heat (do not use synthetic blankets);*
  - *drink water frequently;*
  - *stay in vehicle until fire front has passed;*
  - *when fire front has passed exit vehicle (it will be hot) and inspect for damage.*

What to do if caught in a bushfire ON FOOT[14]

Background

- It is extremely dangerous to be caught on foot in a bushfire.
- Surviving a bushfire on foot is not easy.
- Do not shelter in elevated water tanks. Water at ground level does not heat up quickly, but in elevated tanks it becomes warm very rapidly. A body immersed in lukewarm water cannot sweat and at a temperature of 44 ºC, collapse occur within about 3 minutes.

Actions

- Do not panic or try to outrun the fire - if you see smoke ahead turn back.
- Find cleared area with rocks, hollows, embankments, streams or roads to protect you and avoid hilltops of heavy fuel areas. Try to move on to bare or burnt ground at least 100 m from where fire is likely to burn, if this is not feasible find the largest bare or burnt ground possible (note: an un-grazed grassy paddock may not be safe when on foot).
- Drink water and cover your mouth with a damp cloth.
- Keep low and cover any exposed skin.
- Do not run uphill or downwind away from the fire unless you know a safe refuge is able to be reached before the fire arrives.
- Move across the slope or wind direction out of the path of the fire front and work your way downslope or across wind towards the back of the fire or onto burnt ground.
- Do not attempt to run through flames unless you can see clearly behind them. This generally means that the flames are less than 1 m high and less than 1 to 2 m deep at the back or on the flanks of the fire (and is typically a grazed grassland fire, or similar low fuel fire only).
- Lulls in a fire under less severe conditions may result in the flames being low enough to step or run through to the burnt ground beyond.
- When conditions become severe use every possible means to protect yourself from radiation. On bare ground cover yourself, use wheel ruts, depressions, large rocks or logs to give protection.
- Take refuge in ponds, running streams or culverts, but always behind solid objects such a rock.
- Remain calm and do not run blindly from the fire. If you become exhausted you are much more prone to heat stroke and you may easily overlook a safe refuge. Consider an alternative course of action.

[14] Adapted from RFS bushfire training modules and from RFS website Information-for-Travellers.pdf (nsw.gov.au) 26 March 2021

Appendix F - Project Field Emergency Response Map

Road Distances from Narrabri

Narrabri Operations Centre...........7km
Wilga Park Power Station............19km
Leewood Facility..........................26km
Bibblewindi Facility......................49km

NGP Helicopter Landing Zones

NAME	Longitude_DD	Latitude_DD
BBW HLZ	149.649719	-30.634547
Wilga Park Power Station HLZ	149.651428	-30.360164
Leewood HLZ	149.623086	-30.506219
Narrabri Ops Centre MP	149.731096	-30.336986

Emergency Contact Numbers

Australia's Primary Emergency Number 000

Narrabri Operations Emergency On-call Contact................0427 923 401

Santos

PAL 2, PPL 3 and PEL 238
Energy New South Wales

Narrabri Field Emergency Response

1 0 1 2 3 4 km

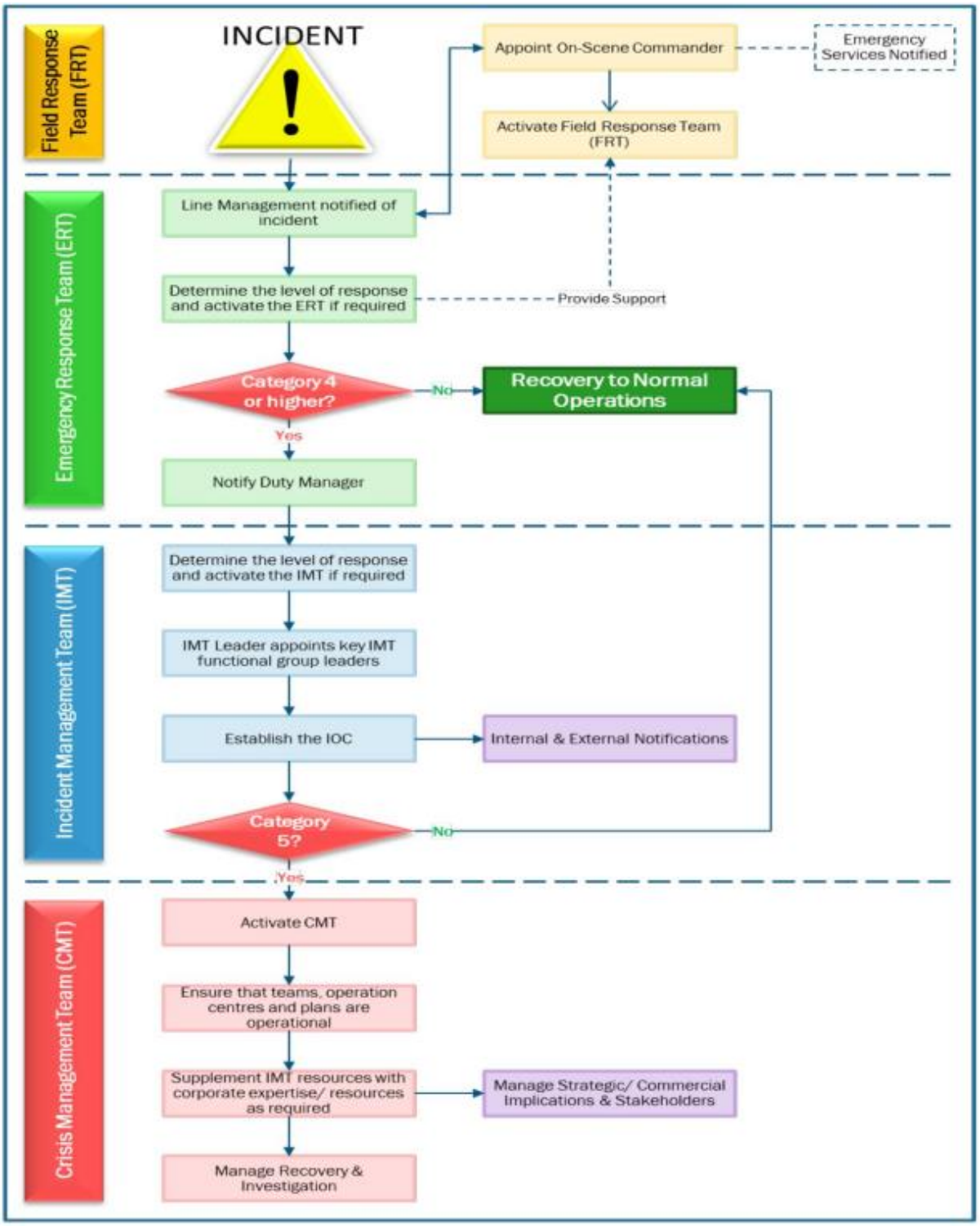
Date: September 2017, File No. GUNNEDAH 390

GDA

Appendix G - Project incident assessment matrix

Santos Response	Category	Health and Safety	Natural Environment	Reputation (Govt, media, community)
CMT / INCIDENT MANAGEMENT TEAM (IMT) / EMERGENCY RESPONSE TEAM / FIELD RESPONSE TEAM	Category 5	Fatality	Destruction of sensitive environmental features Regulatory & high-level Government intervention/action	Critical impact on business reputation National level media exposure
	Category 4	Permanent disabling injury and/or long term off work with high potential to become life threatening	Long-term impact of regional significance on sensitive environmental features Regulatory intervention/ action	Significant impact on business reputation State level media exposure
	Category 3	Multiple Injuries requiring medical treatment, time off work rehabilitation with the potential to escalate	Short-term impact on sensitive environmental features Triggers regulatory investigation	Moderate to small impact on business reputation State level media exposure
	Category 2	Injury requiring medical treatment, time off work and rehabilitation	Impact on fauna, flora and/or habitat but no negative effects on ecosystem Requires immediate regulator notification	Some impact on business reputation Adverse news in local media
	Category 1	Minor injury – first aid treatment	Negligible impact on flora/fauna, habitat, aquatic ecosystem or water resources Crisis reporting according to routine protocols	Minor impact to reputation

Appendix H - Emergency activation and escalation flowchart


Field Response Team (FRT)
INCIDENT
Appoint On-Scene Commander
Emergency Services Notified
Activate Field Response Team (FRT)
Emergency Response Team (ERT)
Line Management notified of incident
Determine the level of response and activate the ERT if required
Provide Support
Category 4 or higher?
No
Recovery to Normal Operations
Yes
Notify Duty Manager
Incident Management Team (IMT)
Determine the level of response and activate the IMT if required
IMT Leader appoints key IMT functional group leaders
Establish the IOC
Internal & External Notifications
Category 5?
No
Yes
Crisis Management Team (CMT)
Activate CMT
Ensure that teams, operation centres and plans are operational
Supplement IMT resources with corporate expertise/ resources as required
Manage Strategic/ Commercial Implications & Stakeholders
Manage Recovery & Investigation