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Mr Stephen O'Donoghue
Team Leader – Resource Assessments
NSW Department of Planning and Environment
GPO Box 39
Sydney NSW 2001

26 May 2017

Dear Stephen,

RE: NARRABRI GAS PROJECT ENVIRONMENTAL IMPACT STATEMENT (SSD 6456) –
SUBMISSION FROM FORESTRY CORPORATION OF NSW

Forestry Corporation of NSW (FCNSW) has reviewed the Environmental Impact Statement for the Narrabri Gas Project as exhibited 21 February 2017.

Feel free to call me if you would like further explanation on any of the matters raised.

Yours Faithfully,

A handwritten signature in dark ink, appearing to read "Jarod Dashwood". The signature is written in a cursive, flowing style.

Jarod Dashwood
Forest Occupancy Supervisor
FCNSW WESTERN REGION

Chapter 02 Location and setting

Past forest management

The EIS describes how grazing and commercial forestry have degenerated the ecology of the Pilliga (2-4). This is an over-simplification of the issues and appears to single out commercial timber harvesting criticism without providing supporting evidence.

On page 13-13 the EIS again singles out logging and grazing. However the claims are unsupported by any empirical data or peer reviewed research.

Appendix N1 p28 claims that box trees and kurrajongs were heavily targeted by timber getters and pastoralists, suggesting that this is the reason for the lack of scarred trees. No evidence is provided or cited to support this claim.

Brigalow tenure decision

The EIS asserts that the areas subject to the 2005 tenure changes were explicitly determined so the Project could proceed (2-4). No evidence was presented that supports Santos' claim of *the location and area of the new national park reserves were explicitly determined on the basis that this gas project would be developed* (2-4).

The Brigalow tenure decision was not made on the basis that the Project or any other mining activity would be permitted to proceed in the area to the detriment of other forest users.

Any suggestion that the areas reserved as part of the Brigalow decision should be seen as an offset for the impacts of this project or any other on State forests is without basis.

Chapter 04 State legislation and approvals

EIS's consideration of Secretary's Environmental Assessment Requirements

The EIS describes the use of the SEARs process to guide the commitments contained within the EIS.

The following are matters raised by FCNSW in the SEARs process that were not adequately addressed by the EIS.

- The EIS shall consider what impacts any infrastructure left *in situ* may have on the management of State forests, and its potential ongoing environmental impacts, for example erosion causing the exposure of buried infrastructure several years after decommissioning.
- The EIS should describe how Santos will ensure Access Agreements with Landholder's maintain relevancy considering the likely staged nature of planning and construction of such a project.
- The EIS should:
 - (a) present a risk assessment process that addresses all of the likely construction and operating activities that could cause unintentional ignition;
 - (b) list all of the activities that have been identified as presenting a risk of fire ignition;
 - (c) describe how Santos will reduce the risk of ignition from each of these activities;

- (d) outline Santos' response actions when confronted with uncontrolled fire; and
 - (e) list the resources that Santos will maintain or make available in preparedness for detection or suppression of uncontrolled wildfire within their licence area.
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- The EIS should detail Santos' assessment process and subsequent implementation methodologies for designated *Asset Protection Zones* and *Strategic Fire Advantage Zones* as required by the Rural Fire Service.
 - Any co-location of linear infrastructure within existing forestry road corridors should consider the possibility of reducing a road's service capacity for existing forest activities. The EIS should describe possible impacts to existing forest activities as a result of surface activity limitations.
 - The EIS should quantify and map pre-project disturbance within the Project Area (i.e. existing roads which precede the project).
 - The EIS should nominate proposed notification periods to stakeholders and describe why such periods are suitable.
 - The EIS should contain details of the forestry roads that are to be used by Santos and for what purpose.

Chapter 06 Project description

Bibblewindi Facility

Santos proposes to increase the footprint of the Bibblewindi site (6-20).

Santos claims that making cleared timber and forest products available to FCNSW will reduce the Project's impact. Santos makes this claim without providing evidence that their clearing schedule will meet FCNSW's commercial interests or forest management obligations.

To minimise the impacts of clearing the Bibblewindi site, Santos must meet its existing obligations under the current occupation permit and negotiate with FCNSW to establish a mechanism by which losses in the growth of commercial timber products can be offset.

The EIS describes the 2011 produced water spill at Bibblewindi that impacted the adjacent production forest (Appendix 13 p23). This land continues to remain out of the State forest production cycle. Loss of forest productivity at this site continues to be borne by FCNSW.

Leewood to Bibblewindi Infrastructure Corridor

The EIS describes the installation of linear infrastructure within an existing easement that links Bibblewindi to Leewood (2-10). No easement exists for this cleared corridor. The land is wholly Pilliga East State Forest.

Santos proposes to widen the existing corridor to allow the construction of:

- an access track;
- installation of additional gas and water pipelines; and
- laying of high voltage power cables and communications lines (6-23).

The expanded works are beyond the scope of the occupation permit. Land access was predicated on applications limited to pilot well development.

Should the Leewood to Bibblewindi infrastructure corridor be approved, FCNSW seeks confirmation from Santos that:

- Santos will provide FCNSW unfettered access to the corridor for forestry operations;
- the build specifications and capacity of the trench and overburden which house the pipelines and cables will allow heavy plant and trucks involved in forestry operations to cross the trench and pipes and cables at any point along its length;
- Santos agrees to pay FCNSW any costs that FCNSW incurs as a result of not having unfettered access as described above; and
- Santos' occupation permit will be revised to describe the *Leewood to Bibblewindi Infrastructure Corridor*.

Seismic activity on State forest

The EIS describes how 500 kilometres of seismic survey will be undertaken on existing cleared areas and/or pre-disturbed areas (6-32). In the absence of any further details, FCNSW assumes that seismic activity will be undertaken on State forest.

The EIS does not describe any restrictions to other road users where seismic activity is to take place. If there will be restrictions to non-Project traffic, Santos must seek approval from FCNSW to enforce these. FCNSW will consider other road users in their assessment of the suitability of proposed restrictions. Santos may have to compensate other forest users where seismic (or other) traffic restrictions cause commercial loss.

Santos states that seismic line preparation may involve the removal of vegetation and subsequent rehabilitation as required. It is unclear in the EIS as to these rehabilitation requirements.

The impacts from seismic works are beyond the scope of the occupation permit. Land access was predicated on applications limited to pilot well development.

Roads and Access track construction standards

The occupation permit requires Santos to design and construct all tracks and roads to a known forestry standard. This includes the associated drainage. The forestry standard was agreed so that forestry operations may take advantage of tracks and roads built as part of gas field development. The EIS does not make reference to this agreed standard. Instead, Santos states that erosion and sediment controls associated with the Project will be implemented based on *Managing Urban Stormwater – Soils and Construction Vol. 1* (Table 14-2).

This inconsistency between the occupation permit and statements in the EIS would be required to be addressed before applicable works could commence.

Co-locating infrastructure with roads

Santos proposes to minimise vegetation clearing by co-locating gathering system networks within existing road corridors (6-40). FCNSW relies on unfettered mobile plant access from forestry roads into forest compartments for:

- new road construction;
- road maintenance;
- harvesting operations; and
- fire fighting.

These forestry activities may damage road side buried infrastructure. The EIS does not address this conflict.

Road closures

Santos should consider the risk posed by FCNSW closing or rehabilitating forestry roads where gathering systems are co-located. The decommissioning and rehabilitation of forestry roads could prevent Santos accessing gathering lines. The reopening of decommissioned or rehabilitated forestry roads will in effect increase the footprint of the Project.

Stockpiles

The EIS describes the stockpiling of soils, mulch and coarse woody debris in areas of State forest (6-53). There are no details as to how long these materials will be stored for or any mention of pile size limitations. The EIS makes reference to soil stockpile management measures but these are not listed in the document (Appendix V p19).

Stockpiles of all material should be within fenced areas so as to minimise:

- theft;
- colonisation of pest animals (large woody debris); and
- the total area excluded from commercial timber production

Stockpiles of mulch and woody debris outside of fenced areas will be impacted by hazard reduction burns and wildfire. Such incidents attract additional fire suppression resources and increase the risk of ignition points within the forest during bushfire danger periods. Burning or theft of this material also reduces what is available for *fauna habitat reconstruction* in the future.

Incorporation of drill cuttings into soil profile

The EIS describes advice from the NSW Environmental Protection Authority (EPA) regarding the reuse of *Naturally Excavated Material* (6-59). The EPA advice states that *the activity would not trigger any waste licensing requirements* (Appendix E).

No evidence is presented in the EIS that the incorporation of drilling spoil into the surface soil profile will provide benefits to FCNSW or the receiving environment.

In the absence of evidence that drilling spoil would be of benefit to FCNSW, FCNSW would consider that drill cuttings are a waste as described by the *Protection of the Environment Operations Act 1997* (i.e. any discarded, rejected, unwanted, surplus or abandoned substance).

Should Santos wish to use the drill cuttings for construction purposes, Santos should manage the material in a manner such that it may be accounted for and then removed from State forest at the cessation of the Project.

Sewage Treatment Plant

FCNSW raises the following concerns regarding the proposal to operate a 200 person capacity sewage treatment plant at the Bibblewindi facility (6-65):

1. No details are provided as to the location of the onsite disposal area;
2. No details are provided as to the size of the onsite disposal area;
3. No details are provided of the quality of water to be discharged to the onsite disposal area;
4. No details are provided of the volumes of treated water to be discharged to the onsite disposal area;
5. Whether the disposal of treated sewage water will be via infiltration/irrigation to land or via evaporation ponds; and
6. No evidence has been provided to demonstrate the capacity of the target land and/or vegetation types that will be subject to exposure of treated sewage.

The development of a sewage treatment plant is beyond the scope of the occupation permit. Land access was predicated on applications limited to pilot well development.

Surveillance systems in State forests

The use of surveillance technology to capture images of State forest must be assessed and authorised by FCNSW (6-73). In consideration that State forests in the Project area are classed as multiple use forests, FCNSW's consent to use surveillance will be in consideration of the rights and conveniences of other users.

Risk of buried infrastructure to forestry operations

The EIS states that the Project will not impede continued forestry operations (4-15). Hence, presumably there will be no restriction to the locations where plant and vehicles undertaking forestry operations may crossover buried infrastructure.

FCNSW is concerned that the nominated depths will place this infrastructure at risk from surface activities (6-24).

The risk of damage is heightened if the installation does not meet or exceed this depth, or the depth decreases after installation through erosion or compaction, or the structural integrity of the ground fails (i.e. the formation of bulldust or waterlogging).

Figures 1 and 2 show examples of slumping can reduce the amount of cover over the buried infrastructure.



Figure 1. Slumping of cover material. Leewood to Bibblewindi flowline.



Figure 2. Slumping of road surface at flowline crossing. Pilliga East State Forest.

Santos must demonstrate through field testing (using forestry machinery or similar) that the proposed specifications are a suitable burial depth.

Table 6-11 lists a buried depth of two metres for gas and gathering systems passing beneath roads. This suggests two metres of overburden is necessary for safe passage by vehicles and plant operating in a gas field.

If Santos has no evidence to show their specifications will protect forestry operations from buried lines through the life of the project, then Santos must either:

- nominate specifications that have been suitably field tested; or
- negotiate alternative operational arrangements with FCNSW which do not impact other forest users.

Communications Towers

The development of a communications tower network is beyond the scope of the occupation permit. Land access was predicated on applications limited to pilot well development.

The communications towers are not mentioned in the Decommissioning Report. Rather the EIS states that the telecommunication towers would be dismantled and removed at the end of their *effective life* (6-82). FCNSW would expect that unless agreed with the land manager, that

telecommunications towers are removed from State forest at the cessation of the project similar to all other infrastructure.

Where the liability of a tower is transferred to another operator, authorisations may be required by the *Forestry Act 2012*.

Chapter 07 Produced water management

Irrigation of forested areas

The EIS states that treated water would be suitable for the irrigation of local soils in forested areas on non-agricultural land (7-15). If Santos wishes to expand irrigation onto areas of State forest (beyond the existing rehabilitation activities) each irrigation event is to be preapproved by FCNSW.

Chapter 09 Community and stakeholder consultation

Property and land use - Limitations of access

As described, an occupation permit was issued by FCNSW to allow access to Pilliga East State Forest and Bibblewindi State Forest (9-20). However the occupation permit does not extend authority to Jacks Creek State Forest as shown in the EIS in Figure 2-1.

Demarcation of co-existence responsibilities

The EIS does not discuss the scope of responsibility overlap as a consequence of desired coexistence. To avoid misunderstanding, confusion or conflict, the relevant responsibilities, pathways, thresholds and timeframes should be clearly documented in a Forest Management Plan, renewed occupation permit or the like.

Examples of such matters include:

1. The roles and requirements of the different management levels within FCNSW and the Proponent, including identifying liaison staff and relevant contacts;
2. Procedures for inspections for compliance with the occupation permit and dispute resolution procedures;
3. Procedures for assessing road and track conditions, drainage effectiveness and implementing road maintenance;
4. Procedures and time frames for application for and approval of construction and maintenance works;
5. Procedures for:
 - a. closure and re-opening of roads/tracks in relation to construction, damage, adverse weather (so as to avoid damage to the road/track surface);
 - b. gas field operation where forest closures prevent access to facilities;
 - c. Harvesting timber:

- i. adjacent to or within Project sites, including access tracks and above buried infrastructure; or
 - ii. and use of roads/tracks also used by the Project.
6. Hazard reduction planning and conduct;
7. Providing records to FCNSW for threatened entities and cultural heritage sites;
8. Reporting and response to environmental and safety incidents, bushfires and other emergencies;
9. Reporting of construction, decommissioning and rehabilitation works including monitoring results thereto;
10. General safety training for relevant staff of both parties (i.e. training FCNSW staff in relation to safety on typical Project sites, and training for Project staff in relation to typical forestry operations);
11. Response to potential protest activity; and
12. FCNSW input into Proponent Management Plans and Monitoring Plans.

Chapter 10 Approach to the impact assessment

Field Development Protocol

FCNSW acknowledges Santos' comments regarding the specific nature of landholder access agreements (Appendix C p8). However as the occupation permit with FCNSW precedes the field development protocol, and given the extent and intensity of the Project on State forest and well as FCNSW's ongoing legislated land management obligations, such conditions cannot be excluded from the protocol.

For all proposed works on State Forests, consultation and agreement with FCNSW must be included as Environmental and Regulatory constraints in the Field Development Protocol.

Landholder consent

The EIS describes a landholder consultation process for the siting of wells and infrastructure (10-12). On State forests, Santos are required to have written consent from FCNSW to install or alter facilities. This process is a constraint that is not described in the Field Development Protocol (10-1).

Road buffers

Santos have agreed that on State forests, a 20 metre visual buffer will be maintained between gas well pads and existing roads. This prescription has not been listed as a constraint in the Field Development Protocol (10-1).

Access track construction constraint

The EIS states that new access tracks will be built in accordance with the Field Development Protocol (6-35). The EIS does not describe that when on State forests, Santos must build access tracks as per the occupation permit issued by FCNSW.

Other forestry uses

As part of Santos' gas field planning and works scheduling, Santos should consider the impacts that existing and upcoming timber harvesting operations may have on gas field activities. Santos does not describe the constraint presented by commercial conflict or work health and safety risks.

Forest Management Zones

State forest in the Project area hosts a number of Forest Management Zones including formal and informal reserve types that are managed by FCNSW for various conservation outcomes. FCNSW permits the undertaking of forestry activities on some areas of State forest predicated on minimising disturbance in others.

Any activities on State forest that are not consistent with management prescriptions in the various Forest Management Zones, may result in outcomes that compromise FCNSW's conservation efforts in the Project area.

The Field Development Protocol should include reference to these Forest Management Zones as a constraint.

Plan of Operations

FCNSW must be afforded comment on the *Plan of Operations* before submission to the NSW Department of Planning and Environment (10-12). This process is consistent with the occupation permit that requires Santos to seek consent from FCNSW prior to making any disturbance on State forest.

Chapter 11 Groundwater and geology

Groundwater Dependent Ecosystems

Appendix B of Appendix F describes *Groundwater Dependent Ecosystems* in State forest. It states that these systems have moderate to high groundwater interaction. However, there is no description as to the extent of dependency from any one of these species/communities.

The EIS claims that the Project's impact on groundwater is within the range of natural variation (11-69). It suggests that there will likely to be no measurable or meaningful impacts on *Groundwater Dependent Ecosystems* (11-2). No data is provided to support this claim.

Chapter 14 Soils and land contamination

Existing Contamination

The EIS describes a series of indicators of potential land contamination within State forests (14-14 and Appendix I3).

Santos notes the following observations as potential sites of contamination:

- tree stumps and merchandised log ends;
- incidences of “possible” minor fuel spills associated with former logging activities;
- soil stockpiles adjacent to well pads; and
- corroded car bodies and 44 gallon drums.

No evidence of contamination as defined by the *Contaminated Land Management Act 1997* has been presented.

The summary of the State forests field assessment also describes the dumping of fibre cement sheeting. This is shown in Plate 6 which is not located on State forest.

Chapter 16 Aquatic ecology

Stream buffers

Fifth order streams on State forest are protected by a 50 metre buffer. Santos proposes a buffer width with a minimum of 40 metres for linear infrastructure (16-16). This is not appropriate as it is not consistent with prescriptions for State forest.

Chapter 17 Property and land use

Valuation of State forest resources

The EIS repeats the misconception that only Pilliga East State Forest is currently harvested for timber (17-8 and Appendix I3). This statement is misleading as all State forests within the Project area are available for and will likely be subject to timber harvesting during the term of the Project.

Santos has made the following assumptions of forestry activities in the Project area (17-8):

1. *Forestry operations occur at a relatively small scale due to:*
 - a. *the low value of the sawlog; and*

b. *the reduction in marketable timber due to recent fire.*

2. *The quality of sawlog is not likely to significantly improve over the life of the Project due to slow regeneration rates.*

Santos' determinations are presented without any supporting evidence.

The EIS also assumes that the harvesting of timber and taking of other forest products and materials will remain static for the life of the project.

However, the EIS makes note of the strategic aims outlined in the Community Conservation Area Agreement for Community Conservation Area Zone 4 (4-3). The Community Conservation Area Agreement seeks to improve the productivity of State forests and the utilisation of forest resources therein. This suggests Santos are aware of the aims to promote utilisation of State forest resources and questions why the EIS underplays the delivery of these strategies.

Project impacts to timber, forest products and materials and other forest uses

The EIS repeats a theme of coexistence between gas field developments and forestry. However, the industry compatibility statements made by Santos appear inconsistent. Examples of inconsistent compatibility statements include:

- *would not impede continued forestry operations (4-15);*
- *generally compatible with [continuation of forestry] (17-6); and*
- *obstruction of access to forestry operations (17-12).*

Santos describes the Project's impacts to FCNSW's forestry operations as *limited (17-12)* and *negligible (17-19)*. Santos' determination is based upon such statements as:

- *Forestry operations in the Project area occur at a relatively small scale (17-12); and*
- *FCNSW would retain the right to timber removed for the Project (17-12).*

Santos have provided no justification to support their description of the scale of forest operations in the area or why it necessarily follows that the impact of the Project is therefore less.

FCNSW's right to retain timber is only of benefit to FCNSW where:

- acceptable markets for cleared timber are available at the time of clearing; and
- trees cleared for the Project are not being felled before they have reached maximum commercial value. In reality, clear felling of areas in the Pilliga as proposed will result in the felling of significant quantities of sub-merchantable trees.

The EIS acknowledges other land uses on State forest included beekeeping, commercial firewood harvesting, community firewood harvesting, harvesting of broombush and harvesting of fencing timber (Appendix I3). However, impacts to these activities by the Project is not developed or discussed in the EIS.

EIS assessment processes - impacts to forestry operations and forestry activities

Table 17-4 describes the mitigation and management measures to address impacts to forestry operations and other forest activities. The measures are limited to *consultation in accordance with the agreed occupation permit*.

The conditions listed in the occupation permit were predicated on applications to construct and operate a series of pilot wells. Given the significant increase in the size of the Project proposed in the EIS, the conditions in the existing occupation permit require a commensurate adjustment for the occupation permit to be considered an adequate mitigation measure.

Additionally, the occupation permit affords FCNSW the right to negotiate towards an agreed outcome. The right to an agreement extends beyond the consultation process described by Santos. FCNSW's opportunity to negotiate should be listed as part of the environmental significance assessment process (17-18).

Cleared timber and other materials

The EIS describes FCNSW's right to utilise cleared timber (17-12 & Appendix V p25).

Santos have agreed to:

- stack it separately from other debris; and
- load and deliver the timber as specified by FCNSW.

Additionally, Santos and FCNSW have agreed that Santos will remove from State forest, all forest material not wanted by FCNSW.

This agreement is not consistent with the EIS which states that the material subject to clearing that is not wanted by FCNSW will be utilised in rehabilitation strategies. Santos' described uses include:

- fauna habitat reconstruction (large trees); and
- soil amelioration or erosion mitigation (any material subject to mulching).

In situations where FCNSW sells the majority of this product to other customers, Santos must consider:

- where Santos will source alternate material for rehabilitation, amelioration or erosion mitigation; and
- how Santos will ensure imported material is not affected by weeds or pests.

Hunting on State forest

The EIS claims that the Project will result in temporary access restrictions to the rights of licenced hunters. The EIS does not present details of these restrictions nor does it describe why hunting restrictions should apply.

Other Recreation

The EIS states that the Project will result in temporary restrictions to the rights of recreational forest users. The EIS does not present details of these restrictions nor does it describe why recreational restrictions should apply.

Santos will need to consult with FCNSW to ensure the exclusion of people using State forests for recreational purposes is justified.

Apiary

Significant apiary activities occur within the Project area. There are 228 registered apiary sites within the Project area and a further 16 sites where there is no practical alternative to site access than through the Project area.

The apiary industry relies heavily on FCNSW maintaining forestry roads to allow State forest access. Road maintenance services are funded in part through apiary permit fees. The possibility of restrictions to the use of forestry roads presents risk to the incomes of apiarists and FCNSW.

The suggested disruption of the State forest road network is beyond the scope of the occupation permit. Land access was predicated on applications limited to pilot well development.

The EIS touches upon but does not develop the cyclic nature of apiary activity in the Pilliga. Known as “the flow”, these mass eucalypt flowering events generate significant revenue for the industry. Restrictions to forestry road access during a flow event is likely to have significant ramifications to apiarist’s livelihoods.

Such is the opportunity for good earnings during a flow event, road restrictions may force apiarist onto alternate access routes not designed to support apiary vehicles. This may cause FCNSW additional road maintenance costs and possible safety issues.

Chapter 21 Historic heritage

Government Land Use Decisions

Some of the information presented in Appendix O is misleading and erroneous.

The EIS states that following the establishment of the National Parks & Wildlife Service in 1967 *thousands of hectares of Crown land in less accessible areas of the state were acquired by the Forestry Commission to forestall the NPWS’s program of land acquisition.*

This comment is unreferenced and appears out of context when considering the dedication dates of Pilliga East (1916), Jacks Creek (1916) and Bibblewindi (1919) State forests.

Chapter 22 Traffic and transport

Forestry Roads - Current traffic movements

The EIS details the estimated traffic movements on X-line Road and Old Mill Road in Pilliga East and Bibblewindi State forests. Table 22-4 of the EIS describes *existing* movements for each road at 300 per day, with 30 per hour at peak times. Santos provides no description of the methodology used to determine these rates.

FCNSW's own assessments of traffic movements suggest that the estimate included in the EIS substantially overestimates pre-project road usage for the area.

FCNSW data for 28 March 2017 to 22 May 2017 found 1266 traffic movements along Pilliga Forest Way. This road is considered one of the busiest thoroughfares in Pilliga East State Forest. This is an average of 21 vehicles per day. The traffic meter was located beyond the Project boundary so is representative of non-gas project traffic movements. The data provides some context as to the more likely level of general forest road use.

Similarly, the additional traffic from the expanded Project is estimated at 228 per day (100 per hour peak) for X-Line Road and 279 per day (88 per hour peak) for Old Mill Road (22-9). It is unclear if these figures include 3rd party vehicle movements such as protestors, agencies and media which would not be there other than for the project. If these users are not considered in the EIS figures, then the *traffic from Project* component understates the real outcome.

The volume of traffic proposed by Santos is inconsistent with multiple-purpose forest use. Road use conflict further develops as heavy plant, drill rigs and other non-conventional vehicles put further pressure on the forest road network.

As the road network manager, FCNSW will continue to control traffic flow to minimise instances of conflict between gas development traffic and other forest use traffic.

Forestry Roads - Trafficability

Santos' assessment of the traffic capacity of forestry roads (22-9) is not consistent with the road design and construction. Exposing forestry roads to the nominated vehicle movements will cause surface damage to such effect that forestry operations and public use will be impeded.

As per the occupation permit, FCNSW will close forestry roads within the Project area where:

- roads and tracks are not maintained or constructed to the requirements of the Brigalow Nandewar IFOA; and/or
- at times when water is running in the table drains or when damage to road surfaces is likely to result.

The proposed use of the forestry road network is beyond the scope of the occupation permit. Land access was predicated on applications limited to pilot well development.

In order to mitigate impacts to FCNSW and other forest users, Santos should consider:

- applying to FCNSW to construct (on State forests) a purpose built road network for the Project; and/or
- application to FCNSW to update the occupation permit as necessary.

Forestry roads – length of network

FCNSW manages less than 600 kilometres of forestry roads in the Project area. This is contrary to Santos' description of 5000 kilometres (17-8).

Project use of decommissioned roads

Santos describes a somewhat unfettered authority to utilise existing forestry tracks and roads. Santos' use of forestry roads is authorised (and controlled) by the occupation permit.

The EIS does not consider the standard road decommissioning process that follows timber harvest and fire suppression activities.

FCNSW will consider applications by Santos to reopen decommissioned roads. Where FCNSW considers that reopening is inappropriate, mechanisms exist for Santos to construct new, purpose built roads.

Project upgrades of forestry roads

The EIS makes numerous references to the use and upgrading of Old Mill Road and X Line Road (Appendix P p27). However, the EIS appears silent on the other forestry roads which will be subject to Project traffic.

Prior to commissioning of the Project, Santos should provide FCNSW with a pre-Project itinerary of the forestry road network that will be subject to Project traffic. These details will be necessary for FCNSW to track Project decommissioning activities.

Forestry road maintenance

The EIS states that the ongoing management of forestry roads will be the responsibility of FCNSW (9-27 & 22-13). FCNSW is unlikely to be able to deliver the road maintenance services as described by the EIS. FCNSW foresees significant delays to the Project's works scheduling under the current road use arrangement, as well as disruptions to other forest users.

Operating in State forest during periods of wet weather

Santos have agreed with FCNSW that activity is to cease on forestry roads when:

- water is running in table drains; and
- when damage to road surfaces is likely to result.

Such restrictions include the driving of vehicles.

FCNSW understands that routine and adhoc works are necessary for the operation of gas field facilities. The EIS should describe contingencies for continued access to gas field facilities in circumstances where forestry roads are unavailable for use.

Road and intersection upgrades

The EIS describes the proposal to upgrade X Line Road (Appendix P p27). Should bitumen or other paved surfaces be introduced, FCNSW expects that these surfaces are removed from State forest as part of the decommissioning process. Additionally (and as currently agreed with FCNSW), following the removal of the paved surface, the roads will be repaired and drained to meet forestry standards.

Chapter 25 Hazard and risk

Spill and contamination liability

FCNSW acknowledges Santos' intent to transport and store chemicals and fuels on State forest.

FCNSW is conscious that spills and any subsequent contamination of State forest may:

- kill existing vegetation;
- inhibit the growth of future vegetation; and
- sterilise into the future the value of forest products and services (i.e. apiary, recreation etc).

In such instances the commercial and environmental value of State forest is diminished.

The EIS lacks details of the spatial extent of Santos' liability for chemical and fuel spills on State forest. FCNSW wants reassurance that Santos shall take responsibility for the liabilities caused by a spill of any chemical or fuel that is on State forest for the purpose of the Project.

Historic spill impacts on State forest

There are areas of State forest receiving treatment for historic unauthorised discharges (Appendix I3 p23). The impacted areas are beyond the boundaries of occupation authorised by Santos' exploration and appraisal approvals.

There remains no significant regeneration of timber species at these sites. FCNSW considers that the loss of forest productivity and direction by compliance agencies to undertake reclamation works, is evidence of occupation of State forest.

Appendix V p13-14 describes the control measures to address land disturbance outside of nominated areas. However, these control measures are limited to satisfying rehabilitation bond requirements and do not make any commitments to address the immediate and ongoing losses suffered by land managers.

Likelihood of the Project causing a bushfire

FCNSW disagrees with Santos' determination that the Project's activities have a *remote* likelihood of causing a bushfire (25-1). Santos describes *remote* likelihood as *once in one thousand years*.

FCNSW is of the opinion that these findings are under-calculated, and ask that Santo provide evidence to support their assessment.

FCNSW acknowledges the bushfire mitigation measures designed to reduce the likelihood of ignition from the Project's construction activities.

However, the EIS does not describe restrictions to particular operations that could start a bushfire. Such activities include:

- flaring;
- land clearing;
- vegetation mulching;
- trenching;
- road maintenance; and
- operation of drilling rigs and workover rigs.

To address the risk of ignition causing uncontrolled wildfire, FCNSW will enforce the conditions of the occupation permit. Such conditions include:

- the clearing of vegetation and other activities are to cease on days on which a total fire ban has been declared;
- on days of very high to extreme fire danger, FCNSW reserves the right to stop operations; and
- for any operations conducted during the fire season (1 October to 31 March) FCNSW can insist that a fire tanker and grader be on standby at the worksite during all operations. The reasonable costs of each will be borne by Santos.

The EIS does not acknowledge that dangerous fire weather may prevent access to the gas field for prolonged periods. Santos should list the operational contingencies to deal with such a scenario (i.e. State forest closures authorised by Clause 6 Forestry Regulation 2012).

Further, the EIS does not acknowledge the general increased risk of ignition that comes as a result of the increased number of people in the forest associated with the Project.

[Bushfire suppression resourcing](#)

FCNSW is concerned that the EIS makes no reference to fire suppression resources to support the introduction of 1300 workers into a fire prone landscape. The EIS simply states that external authorities will be responsible for initial and sustained attack (Appendix S p57).

FCNSW does not have local fire suppression resources to address the increase in bushfire risk presented by the Project, or the resources to manage the additional numbers of people in the forest in the event of a bushfire. The issue of managing additional people in the forest in the event of a bushfire is applicable to all bushfires regardless of whether the ignition was caused by Santos' activities or not.

The EIS makes significant reference to the development of a Bushfire Management Plan (Chapter 25). As the EIS does not describe the suppression resources and/or any operational limitations

triggered by the fire danger index, these must be stated in the Bushfire Management Plan. Operational limitations and suppression resources must be agreed with FCNSW.

In lieu of Santos' personnel or contractors providing initial and sustained fire suppression efforts, Santos should deliver necessary resources to the agencies whose staff and resources are expended in fighting fire in the Project area.

Treated water for fire fighting

The making available of treated water at Bibblewindi for fire fighting purposes is advantageous to FCNSW. For the water source to serve maximum effect, access by FCNSW should be unfettered. FCNSW recommends a lockable overhead standpipe, capable of filling Category 1 fire fighting appliances. The standpipe should be established on the outside of the Bibblewindi compound. Keys are to be distributed to FCNSW and local RFS brigades.

Hazard reduction burning

FCNSW intends to continue to execute hazard reduction burning (HRB) in the Project area. The EIS suggests that Santos is supportive of FCNSW's intent (25-8).

Santos' Bushfire Management Plan is said to include measures to create *fuel reduced areas*. Santos must describe to FCNSW the quantitative details that categorise an area as a *fuel reduced area*.

The EIS does not describe possible restrictions to HRB operations imposed by the presence of a gas infrastructure. For example, the delay or cancellation of hazard reduction burning due to the detection of leaking gas, or the incompatibility of construction works within areas of forest on fire.

Depending on these restrictions, *fuel reduced areas* may not be possible through burning and may require other fuel manipulation strategies such as grazing or mechanical slashing.

Assistance with or the restriction of FCNSW undertaking fuel reduction operations are beyond the scope of the occupation permit. Land access was predicated on applications limited to pilot well development.

Asset Protections Zones and Strategic Fire Advantage Zones

The EIS does not describe how existing forestry activities will not be impacted by Santos' proposal to create and maintain Asset Protections Zones and Strategic Fire Advantage Zones.

The EIS does not consider the impacts to timber productivity to satisfy engineered fuel levels.

Forest productivity is impacted by:

- interference with the natural rotation cycle (i.e. death of seedlings and juveniles);
- fire scarring;
- stress of mature stems promoting insect attack; and
- repeated colonisation of pioneer species which compete with timber producing species.

Such operations are beyond the scope of the occupation permit. Land access was predicated on applications limited to pilot well development.

An amendment to the occupation permit is necessary to authorise Santos to undertake works on State forest in order to meet Asset Protections Zone and Strategic Fire Advantage Zone requirements (i.e. burning of State forest, clearing of buffers, fire trail construction and fire trail maintenance).

Chapter 30 Environmental management and monitoring

Project Management Plans

As land manager, FCNSW has a vested interest in management and monitoring plans which guide the development and ongoing operation of the Project.

As both the land manager and agency responsible for forest management, FCNSW should be listed as a consultative organization for the following management plans:

- *Soil Management Plan*
- *Biodiversity Management Plan*
- *Pest, Plant and Animal Control Plan*
- *Traffic Management Plan*
- *Bushfire Management Plan*
- *Decommissioning Plan*
- *Rehabilitation Strategy*
- *Biodiversity Monitoring Plan*
- *Rehabilitation Monitoring Plan*

Chapter 34 Terms and abbreviations

Definition of State Forest

On page 34-16 the EIS defines State forest as meaning *Land reserved by the Department of Natural Parks, Recreation, Sport and Racing for state forest purposes*. This is not correct.

Appendix J1 Ecological impact assessment

Fauna exclusions

FCNSW notes that Santos proposes a 50 metre disturbance buffer for barking owl nests. Current prescriptions require a 200 metre disturbance exclusion buffer.

In lieu of satisfactory evidence otherwise, FCNSW would expect the above 200 metre prescription to apply to Santos' operations.

Koala Research

Santos has committed to a major koala research project capped at \$4.35 M (App L p23-24). FCNSW would encourage Santos to collaborate with FCNSW and its environmental research partners in the development of the project. FCNSW could provide efficiencies in the design of survey location and monitoring sites, and the nature of information gathered there.

Access to State forest to undertake the koala project must be consistent with the occupation permit. Where such works are outside of the occupation permit area of authority, Forest Permits are necessary as per the *Forestry Act 2012*.

Appendix J2 Biodiversity assessment report

Restriction on domestic pets

The EIS states that no domestic pets (including dogs and cats) will be permitted on the development site (Appendix J2 p114). Santos should make it clear that on State forest this restriction applies only to those associated with the Project.

Monitoring

The EIS acknowledges the existing biodiversity monitoring being undertaken by FCNSW (Appendix J2 p117). FCNSW would encourage Santos to align monitoring efforts on State forest with existing programs to maximise environmental outcomes.

Pest animal control program

The EIS's approach to pest animal control appears pragmatic (Appendix J2 (Appendix G p23)). FCNSW are agreeable with the proposal's consultation and execution processes. FCNSW understands that the new plan would replace the existing program that Santos supports across Pilliga East and Bibblewindi State forests.

Appendix V Rehabilitation strategy

Introduction (Section 1)

FCNSW acknowledges the Project's focus on fast-tracking the recovery of disturbance in order to minimise ecological and aesthetic interference.

FCNSW's interest in optimal rehabilitation outcomes is twofold:

1. As an affected land manager, FCNSW will inherit the rehabilitation successes and liabilities delivered by the Project; and
2. FCNSW is tasked to make available on behalf the State, timber and other forest products and materials (4-3).

FCNSW details below a number of matters of concern within the Rehabilitation strategy (the Strategy).

Negotiated outcomes for State forests (Section 3)

FCNSW were asked to provide *Secretary's Environmental Assessment Requirements* (SEARs) for the Project. FCNSW's comments that related to rehabilitation are listed in section 3 (Appendix V p8). The Strategy states that FCNSW's comments are addressed in sections 5 and 8. However FCNSW can see no response to these comments in either section.

Santos is aware of FCNSW's motivation to reinstate features of production forest where such forests have been replaced by gas field developments. While the EIS supports production forest outcomes (Appendix V p21), the Strategy does not commit to designing or managing rehabilitation areas for this explicit purpose.

Risk assessment (Section 4)

The risk assessment presented in Table 6 is limited to liability risks affecting Santos (Appendix V p12-14). As described above, risk to FCNSW includes both environmental and commercial liabilities.

The control measures described in Table 6 are not specific to the reinstating of timber productivity (Appendix V p12-14). As a result, the significance reported by the resultant *New Risk Rating* is understated for disturbance on State forest.

Land relinquishment disputes are likely if Santos does not look beyond its own liabilities and consider those liabilities faced by land managers post-production.

Weeds (Table 6)

Weed inspection scheduling must consider the vegetative cycles of all weed species growing on land used by Santos. A six monthly weed patrol as described in Table 6 will not deliver satisfactory outcomes (Appendix V p12).

FCNSW would expect the EIS described *Pest, plant and animal control plan* (30-5) to identify the times of the year each likely weed species is most easily identified, and the times when each species is most susceptible to treatment.

Appendix V p19 states that machinery and vehicles working in areas of significant infestations of noxious or environmental weeds will be washed down after leaving the site.

FCNSW wants vehicles to be washed down before they leave the infested site, not after.

Inappropriate seed material (Table 6)

Santos proposes to preferentially source seed resources from the Project area (Table 6 Appendix V p12). FCNSW requires that all seed for use in State forest is to be sourced from State forest (unless approved by FCNSW). Similarly, all seedlings to be planted on State forest must have been grown from seed collected in State forest (again, unless approved by FCNSW). Maintaining strict provenance standards reduces the likelihood of rehabilitation outcome failure. This is particularly important for timber species, when considering the time invested in growing the stand.

The use of inappropriate genetics may also deliver timber defects or other weaknesses not found in provenance genetics.

Table 6 repeats the notion that *seed from the respective vegetation community* will be utilised. FCNSW acknowledges this consideration of provenance. However, FCNSW wants assurances that if commercial timber species constitute part of that vegetation community, then seed to be sown must:

1. include those commercial species present in the vegetation community; and
2. not be of species that will inhibit the establishment of commercial species.

Appendix V p1 describes a similar non-specific revegetation commitment where by *forested land will be rehabilitated to its former vegetation community*. It is not appropriate for FCNSW to carry the liability that is presented by relying on vegetation community succession to deliver production forest outcomes. FCNSW requires that where Santos removes from a site commercial species, then Santos must demonstrate the establishment of the same commercial species.

Inappropriate topsoil management (Table 6)

The risk assessment presented in Appendix V p12-13 suggests that topsoil could be lost. Santos should stockpile topsoil within the disturbance footprint of each site to prevent such a possibility.

Revegetation establishment failure (Table 6)

Table 6 describes a period of up to three years for topsoil seedbanks or planted seed to demonstrate evidence of germination. Liabilities suffered by FCNSW as a result of postponement include:

1. further delay in an area from contributing towards the estates current annual increment; and
2. greater opportunity for the establishment of weeds.

Additionally, FCNSW does not believe that simply finding *evidence of germination* is appropriate for not taking further steps to improve the revegetation condition of the site (Appendix V p13). There needs to be a reference to completion criteria or other quantifiable standard.

Poor seasonal conditions (Table 6)

The Strategy proposes to delay revegetation assistance if poor seasonal conditions are experienced (Appendix V p13). It is not appropriate to use subjective measures to determine whether resources should be spent on rehabilitation. Santos should describe the climatic parameters and their values that constitute poor seasonal conditions.

In situations where rehabilitation is delayed, Santos should clearly articulate how they plan to catch-up on rehabilitation targets.

Erosion (Table 6)

Santos proposes to re-create topsoil to replace material that is lost through erosion or other processes. FCNSW is concerned that:

- mulch that is to be *turned through the soil* will not be available;
- pests and diseases could be introduced by imported mulch;
- establishment of production forest will be delayed;
- site fertility will be reduced; and

- exposed subsoils will generate sediment pollution.

If it is necessary to import mulch to the site, it must be sourced from State forest, as close to the site as possible.

Disturbance outside of nominated areas (Table 6)

The EIS concedes that there is a possibility of disturbance outside of nominated areas (Appendix V p14). Santos states that additional rehabilitation bond will be included in the security assessment.

However, disturbance outside of nominated areas is beyond the scope of the occupation permit. Land access was predicated on applications limited to disturbance of nominated areas.

Santos will need to seek an amendment to their occupation permit to address this shortcoming for any existing and potential future unplanned disturbance.

Fire impacting rehabilitation (Table 6)

The EIS acknowledges that there is a possibility that bushfire may interfere with rehabilitation efforts (Appendix V p14). Santos states that if an area undergoing rehabilitation is burnt, that that area will be afforded two years to regenerate *native species* before supplementary revegetation measures will be introduced.

No details are provided as to which *native species* Santos is referring to. Unless agreed with FCNSW, FCNSW expects that the original rehabilitation design would be reconstructed.

Domains (Section 5)

Santos' differentiation of domains is beyond the scope of the occupation permit. Rehabilitation and relinquishment was predicated on applications limited to pilot well development.

Therefore, domain unit has no bearing on FCNSW's liabilities or requirements for rehabilitation (Appendix V p15).

Rehabilitation management (Section 6)

Rehabilitation methods - Forestry purposes (6.1)

The EIS states that Santos is committed to rehabilitation *for forestry and agricultural purposes* (Appendix V p16). However, to this point, the Strategy fails to demonstrate specific actions that would encourage forestry outcomes.

Rehabilitation methods – Fencing and impacts from browsing (6.1)

The EIS is not clear how herbivores will be excluded from rehabilitation areas. Whilst the EIS refers to retaining fencing for rehabilitation of non-linear infrastructure (Appendix V p31), there is no

fencing specification in the EIS. Without a listed specification FCNSW cannot be confident of its effectiveness.

There is no mention of fencing for linear infrastructure, so rehabilitation thereon may be less effective due to likely browsing pressure.

Revegetation establishment appears to improve where fence height is extended to exclude kangaroos. Such examples include Bohena 1C and Bohena 3.

By excluding browsing fauna, Santos will:

- improve the survival rate of germinates and plantings; and
- increase the rate of revegetation establishment.

As discussed, survival and time are liabilities to both FCNSW and Santos.

Additionally, trees browsed at a young age are more likely to experience:

- suppressed growth rates;
- insect attack;
- multiple leaders; and/or
- stems with significant branching or sweep.

Rehabilitation methods - Reference Sites (6.1)

The EIS discusses the use of reference sites as a means of determining rehabilitation progress (Appendix V p16). This practice is not a suitable measure for re-establishing production forest because:

- the stocking density of timber species required for the establishment of production forest is many times greater than the stocking rate of mature and semi mature stands; and
- recent disturbance history may misrepresent species presence and prevalence (i.e. recent bushfire promoting the dominance of pioneer species to the exclusion of commercial overstorey species).

Contrary to FCNSW's concern, Santos proposes to select reference sites of matching disturbance regimes (Appendix V p28).

Reference sites for vegetation communities whose species mix includes commercial species, must demonstrate traits of commercial value (rather than being sites selected at random). Where Santos proposes to include reference site comparison as a measure of rehabilitation effectiveness, FCNSW must assess and approve the suitability of each of these reference sites.

Rehabilitation methods - Quantitative production criteria (6.1)

Section 6.1 describes consultation with FCNSW with regards to *preparation techniques and the management of resultant regeneration* (Appendix V p16). Such consultation is partly consistent with FCNSW's agency comment from the SEARs process. The Strategy is silent on the remaining SEARs advice from FCNSW which describes the assessment of rehabilitation against quantifiable measures as agreed with FCNSW.

For relinquishment purposes, Santos will need to demonstrate to FCNSW that a rehabilitated site is likely to achieve commercial value.

For sites in production forest, more appropriate measures of rehabilitations success are:

- presence of commercial timber species;
- stocking of commercial timber species; and
- size of commercial timber species.

The parameters for each measure may vary depending on the applicable vegetation community's canopy species and site productivity (as measured by FCNSW). Parameters are to be agreed and documented prior to the disturbance of a site.

Rapid establishment of trees and subsequent attainment of fire resilient stem diameter will reduce the risk of fire impacting relinquishment progress.

Inappropriate species utilisation (6.1)

The EIS lists a series of characteristics that a species will possess in order to qualify for use in *assisted revegetation* (Appendix V p16). As described above, FCNSW wants species chosen for, and their stocking rate(s) suitable to achieve production forest outcomes.

Partial rehabilitation of well pads

The EIS does not describe any restrictions to tree height inside the perimeter fence of the one hectare well pad disturbance areas during gas production. If restrictions apply to the establishment or growth of commercial species, it is likely that that the partially rehabilitated areas will not satisfy production forest characteristics. Partial rehabilitation efforts would therefore contribute little value to relinquishment efforts.

The EIS describes the use of partial rehabilitation in determination of the Project's total offset liability (Appendix J2 p125). This is inappropriate as partial rehabilitation will be subject to manipulation for either production forestry or gas field purposes. These actions may not deliver outcomes consistent with offset objectives.

Although not suggested in the Strategy, consent from FCNSW will be necessary if rehabilitated areas within production forest estate are to be considered for offset purposes.

Advocating natural regeneration (6.2)

FCNSW acknowledges that it's western hardwood silvicultural prescriptions utilise natural regeneration processes. However, the degree of land disturbance caused by native timber harvesting is not comparable to the disturbances caused by gas field infrastructure installation and occupation.

The context in which Santos describes FCNSW approval for natural regeneration may mislead readers (Appendix V p17).

Forest harvesting in the Pilliga involves the selective retention of over storey trees for a range of purposes including the provision of an ongoing seed source for the establishment of new trees.

At least six trees are retained per hectare for this purpose and in practice many more usually are.

This ensures that there are replacements if there is any mortality within the retained seed trees. It also ensures that there is a viable seed source for several decades in the event establishment of a new viable crop of trees is slow due to variable seasonal conditions or is damaged by fire.

The clearing proposed by Santos does not involve the retention of over storey trees dispersed across areas of disturbance. As such there is no insurance in the event trees are slow to establish or are destroyed by fire. Additionally, natural seed fall is unlikely to be adequately spread across disturbed sites.

Revegetation assistance (6.2)

Appendix V p17 describes how supplementary direct seeding will be determined by monitoring. There is no reference to the use of quantitative parameters. Santos should describe a commitment to a monitoring system based on measurable observations to ensure resource expenditure is not influenced by observation subjectivity.

Appendix V p18 describes how Santos will allow *the overstorey to regenerate over time to mimic the surrounding landscape and vegetation communities*. FCNSW is opposed to this strategy and its generality. Such statements present no surety that FCNSW's production forest liabilities will be alleviated.

Soil compaction (6.3)

Santos proposes to reduce the area of compacted soil (Appendix V p18). The term *reduce* implies some areas of compaction will remain. This proposal is inconsistent with the occupation permit which requires Santos to treat all areas of compaction.

Woody material (6.3)

No details are presented as to where woody material for access roads will be sourced (Appendix V p18). As shown in Figure 6-28 (EIS Chapter 6), woody material generated during the linear infrastructure clearing process is spread on the surface above the gathering system. Whether the gathering system is removed (as preferred by FCNSW) or remains buried in situ, it is unlikely that any of this material will be available for distribution to the adjacent access track. Similarly, there is no guarantee that any original material that may have been stockpiled would either exist or be suitable for such purposes at the end of life for that access track.

If additional woody material is required, it is to be sourced from State forest.

Bibblewindi (6.4)

As proposed in the EIS, the Bibblewindi facility will occupy approximately 40 hectares (Figure 6-11). In the absence of any other information, FCNSW has assumed that the entire footprint will require rehabilitation works. Such a contiguous area of disturbance will likely require a higher degree of planning and resource allocation because:

1. seed and shelter benefits offered by the surrounding forest reduce as the area to perimeter ratio increases;
2. the land hosting major facilities will be subject to greater levels of industrial impact than well pads and linear disturbances; and
3. the area will remain disturbed for a longer period than most other sites.

The EIS does not discuss how rehabilitation effectiveness may be influenced by these factors.

One activity proposed for all domains on State forest is the spreading of woody material. In the case of Bibblewindi, Santos have not described how or where such necessary woody material would be stored. If additional woody material is required, it is to be sourced from State forest.

Santos makes reference to the use of *contingency species* in the event that provenance material is unavailable or fails to germinate (Appendix V p18). FCNSW will not approve the introduction of species not indigenous to the locality. FCNSW is afforded this right by the occupation permit.

Santos should either:

- manage seed resources to address the risk of rehabilitation failure; or
- commit to maintaining liability for the site until agreed revegetation outcomes are achieved.

FCNSW does not support the mechanical seeding of *Acacia* species on these new areas of disturbance (Appendix V p18). Such pioneer species hinder the establishment of over storey species.

Revegetation of this nature is beyond the scope of the occupation permit. Land access was predicated on applications limited to the existing pilot project areas.

Final land use (Section 7)

The EIS describes that the primary objective of the rehabilitation strategy is to:

1. *return land to its original vegetation community or former agricultural activity (grazing or cropping); and*
2. *be suitable for transfer back to Forestry Corporation of NSW or private ownership (Appendix V p21).*

FCNSW has two concerns with this general statement:

1. as a commercial activity is described for agriculture (grazing or cropping), but not for forestry, it could be misinterpreted as State forests do not have an equitable utility value; and
2. the context of *suitable* has not been defined.

To be suitable for transfer back to FCNSW, relinquishment criteria that include quantitative measures of commercial species establishment must be met.

FCNSW's land use strategy for vegetation communities in Zone 4 is described by the Community Conservation Area Agreement (CCA Agreement). The EIS references these strategies in the main body of the EIS (4-3).

FCNSW will discuss with applicable State agencies the importance of rehabilitation design and outcomes to ensure planning instrument conditions reflect the timber production outcomes as stated in the CCA Agreement.

The EIS states that *the Project is predominantly located in a production timber forest which contributes to the sustainable timber yield of Forestry Corporation NSW* (Appendix V p21). The statement continues that *[the] Strategy has been designed to maintain both the timber productivity and biodiversity of the forests in the long term* (Appendix V p21).

Santos does not provide details surrounding their intent to design rehabilitation for *biodiversity* outcomes (Appendix V p21). No measure of biodiversity is described. Biodiversity outcomes are acceptable to FCNSW where agreed timber production objectives are also delivered on the same area treated.

Nowhere in the Strategy has Santos listed details of how productivity will be delivered. Details are vague with the general intent to replace soil, hand seed if necessary and monitor the results. The EIS is absent of specific design and operational commitments necessary to deliver production forest.

Santos describes their intent to progressively rehabilitate production wells and other infrastructure to a *pre-production vegetation condition* following decommissioning. FCNSW assumes Santos means “the land” that these works have disturbed, not the infrastructure (Appendix V p21).

The statement says Santos will *progressively rehabilitate* the production wells and other infrastructure until such time as *pre-production vegetation condition* is met. This suggests that where mature trees were cleared for infrastructure installation, Santos will maintain liability of the site until pre-disturbance canopy structure returns. For western hardwoods and white cypress this could be in the order of over a hundred years.

Reinstatement of landforms (7.1)

FCNSW agrees with Santos that the use of LiDAR or other digital elevation models is an effective means to document pre-disturbance landforms (Appendix V p21). Pre-disturbance images should be provided to FCNSW for relinquishment purposes.

Benefits of post-production land to land owners (7.2)

The EIS states that Santos’ *proposed final use of disturbed land* is consistent with *relevant local and regional strategic land use objectives* (Appendix V p23). FCNSW has stated that all State forest land subject to gas development should be, and is, suitable for re-instatement of production forest.

Santos states that the Strategy will benefit FCNSW as post-production land on State forest will be returned to its former use as production forests (Appendix V p23).

However, what the Strategy describes is the transformation of areas of production forest into areas of a vegetation condition consistent with early successional species and structure. The process as described by the Strategy does not provide benefit to FCNSW.

As a State owned corporation, the NSW Government is connected to the liabilities associated with failure to efficiently reinstate production forest. For the Strategy to claim that economic benefits will flow to the State could be misleading in the absence of supporting evidence.

Rehabilitation schedule (Section 8)

Rehabilitation plan

The Strategy describes the preparation of a comprehensive rehabilitation plan (Appendix V p24). The only details provided are that this plan will contain details of rehabilitation schedules.

FCNSW would expect the rehabilitation plan to build upon this Strategy. For example, listing of details of quantitative measures and their appropriateness for planned outcomes. As the Rehabilitation plan is to be consistent with and referenced by approval conditions, commitments effecting liabilities should be documented in this plan.

Preparation for closure

The Strategy proposes a minimum of two years preparation for closure (Appendix V p24). FCNSW believes that two years is not enough time to guarantee the collection and preparation of provenance genetics.

Tables 7 – 9 describe land preparation methodologies which are unlikely to establish production forest as intended. FCNSW have provided comment on these methodologies in other sections of this submission.

Rehabilitation monitoring and completion criteria (Section 9)

FCNSW have previously described the apparent shortcomings of monitoring without targeted data collection. The Strategy states that *completion criteria provide a measurable goal for rehabilitation work to achieve* (Appendix V p28). For works on State forest, the goal is reinstatement of production forest. It must be clear that production is realised at harvest. Establishment and the process of forest succession does not attribute to production or benefit to FCNSW or the State.

FCNSW accepts that when land is relinquished by Santos, no timber or other forest products will be available for harvest. In most cases, commercial utility of the forest will be decades from realisation.

It is therefore inappropriate for the Strategy to use measures of the rehabilitating vegetation as evidence that Santos has established a production forest as committed to.

In the context of recreating production forest, completion criteria must include vegetation measures that lead to commercial outcomes. Presence of commercial species, stem densities and stem measures (i.e. diameter and height) are examples of attributes representative of production outcomes.

FCNSW detailed it's requirement for agreed quantifiable measures during the SEARs process.

Performance objectives of undisturbed land (9.1)

The Strategy describes *performance objectives* for the land in the Project area not subject to on-ground monitoring (Appendix V p28). FCNSW seeks further details as to the location of this land, or what the performance objectives are.

Monitoring operations using remote sensing (9.1)

Section 9.1 is titled *Rehabilitation monitoring* (Appendix V p28). However, the section appears to describe a process of landscape monitoring rather than the areas of surface disturbance caused by gas field development.

The anomalies which Santos propose to investigate via on-ground inspection are not described (Appendix V p28).

To justify whole of landscape monitoring suggests uncertainty of whether landscape scale impacts are possible. Santos proposes to cease landscape monitoring approximately five years after the practical completion of the Project. It is unclear what Santos' monitoring commitments would be if the remote sensing identified changes to State forest during the operation of the gas field.

FCNSW is unclear of the context of the final paragraph of section 9.1 as it appears to mix details of landscape monitoring with disturbance site monitoring. FCNSW seek clarification of this statement.

Monitoring methods (9.2)

The monitoring methodology described in section 9.2 of Appendix V addresses revegetation criteria suitable to demonstrate and track the recolonization of disturbed sites. The methodology does not describe the quantitative measures associated with production forest. Production forest quantitative measures are to be agreed between FCNSW and Santos and included in any methodology.

Data analysis and reporting (9.3)

As part of the relinquishment process, annual reports on the progress of rehabilitation should be provided to FCNSW (Appendix V p29).

Simply attaining similarity of the reference site may not qualify as rehabilitation effectiveness when one considers that the objective is to re-establish a production forest. A reference site will be used to determine suitable commercial species and the establishment ratio where more than one commercial species exists.

The Strategy may be averse to a benchmark condition, but that should not discourage targeted improvement of the forest productivity as warranted by the CCA Agreement for State forest estate (Appendix V p29). FCNSW does not advocate benchmarks either. Site establishment planning and outcomes will vary depending on the attributes of the particular site and species suitability.

Agreed completion criteria (9.4)

The refinement of rehabilitation completion criteria for works on State forest must be done in consultation with FCNSW (Appendix V p30). This process is to ensure relinquishment outcomes remain suitable to FCNSW and the intended final land use.

The EIS describes how the rehabilitation completion criteria for the existing works which constitute the Narrabri Gas Project helped to formulate the Strategy (Appendix V p30). However, these completion criteria were predicated on applications limited to exploration pilots and are not suitable in their entirety for what is proposed by the EIS.

Preliminary rehabilitation completion criteria (9.4)

Table 11 is unclear and vague in its explanation of timing and completion criteria (Appendix V p32).

For domains 1 and 2, the Strategy describes a timeframe of 10 years for midstorey species and 15 years for canopy species. These timeframes are not consistent with other periods of time described as being necessary for suitable rehabilitation outcomes. The necessary time periods described vary between:

- five years (Appendix V p34); and
- ten years (Appendix J2 p121).

Relinquishment of disturbed areas on State forest will only be predicated on the meeting of agreed criteria.

Further clarification is warranted for the completion criteria measure that describes a species richness value of 75%. It is unclear whether the measure is 75% of total species present, or 75% of species of each strata (canopy, midstorey and groundcover).

If the intent is of all species, a site may be seen to have achieved completion criteria without the presence of species of one or more strata. Without the presence of canopy species, it would then be impossible for Santos to demonstrate the establishment of production forest.

Parameters of completion criteria should follow the SMART principle (specific, measurable, agreed upon, realistic and time-bound). The Strategy's listed parameter *on a clear trajectory to meet that of reference site levels* does not satisfy the SMART principle, and is not supported by FCNSW.

Further clarification is warranted regarding the *assisted restoration* phase (Appendix V p32). No context is provided in the *Timing* column for the *groundcover* component. Additionally, the use of presence or absence for *canopy* species is an inappropriate measure of establishment success.

Post closure maintenance (9.5)

In the context of Santos' description of the extensive time period necessary for rehabilitation to produce timber products, Santos suggests that *[Santos] should be able to show the rehabilitation is on a clear trajectory that will eventually result in the rehabilitation approaching the condition of surrounding lands* (Appendix V p34).

FCNSW has described why it is not acceptable to use a trajectory as a measure of rehabilitation success and subsequent suitability for relinquishment. FCNSW has presented appropriate alternatives to address this concern of Santos’.

It would be inappropriate for Santos to be able to relinquish land where the guarantee of liability is so uncertain.

Rehabilitation trials, research and ability to achieve completion criteria (Section 10)

The Strategy suggests that results from existing rehabilitation efforts are evidence that the methods proposed by the Strategy are suitable (Appendix V p35).

However, the existing rehabilitation works were predicated on planning approval applications where the commitments to the reinstatement of production forest were less explicit than what is proposed in this EIS. Therefore, it is not appropriate to use these sites as evidence that the Strategy is appropriate.

Review of rehabilitation strategy and completion criteria (Section 11)

FCNSW are a professional forest management organisation whose business possess significant technical experience and resources. This warrants FCNSW’s involvement in the design and review of rehabilitation planning on State forest.

In response to the Strategy’s proposal for review of methodologies and outcomes, FCNSW has earlier stated that such reviews of strategy and completion criteria for works on State forest must be done with the involvement of FCNSW, and that any changes are to be approved by FCNSW before coming into effect.

Appendix W Decommissioning report

Decommissioning works on State forest

FCNSW does not want ongoing liabilities and therefore generally objects to plans to retain any gas development infrastructure on or beneath State forest. The occupation permit has provisions for FCNSW and Santos to agree to retain infrastructure and/or works at the request of FCNSW. The occupation permit states that any infrastructure or works unwanted by FCNSW will be removed, and that disturbed sites will be rehabilitated consistent with agreed standards.

Gas wells (production, exploration and appraisal)

The EIS decommissioning plan describes that plugged and decommissioned wells will be rehabilitated as per DTIRIS guidelines (Appendix W p10). Santos has not demonstrated that DTIRIS' guidelines are consistent with rehabilitation designs that would result in production forest outcomes.

The EIS states that subsurface components will remain in situ within the well pad footprint (Appendix W p11). FCNSW does not object to the plug and abandonment of the well and casings. However, FCNSW opposes the abandonment of subsurface components associated with the gathering systems. Such subsurface infrastructure has the potential to cause ongoing liabilities to FCNSW.

The abandonment of subsurface components (excluding the well casing) is not consistent with the agreed terms of the occupation permit. Santos presents no mechanisms to FCNSW that would offset the liabilities associated with the abandonment of subsurface components within former well pad areas.

Groundwater monitoring bores

The EIS does not describe the factors which determine whether a gas well is plugged and abandoned or converted to a water monitoring bore (6-81).

The expansion of a groundwater monitoring bore network is beyond the scope of the occupation permit. Land access was predicated on applications limited to pilot well development.

FCNSW seeks assurances from Santos that securities and rehabilitation standards agreed between Santos and FCNSW, will survive the exchange of groundwater monitoring bores to another party (whether government or private).

Biblewindi processing facility - Ponds

The EIS describes the recommissioning of Ponds 2 and 3 (Appendix W p13). The EIS does not explain why these works are proposed to be retained.

The retention of Ponds 2 and 3 reduces the timber production capacity of the area and presents ongoing liabilities to FCNSW. Without mechanisms to offset lost opportunity costs, or deal with liabilities, this proposal is not in the interest of FCNSW.

Biblewindi processing facility - Flare

The decommissioning report describes the retention of a safety flare (Appendix W p13). This suggests there will be residual gas in the network post closure of the Project. This is a concern to FCNSW who will remain responsible for environmental and safety matters on State forest after Santos have exited the forest.

Biblewindi processing facility - Construction material

The EIS is unclear as to whether imported bund material will be removed from State forest (6-82)

Biblewindi processing facility – Buried component and liners

The EIS states that above ground pipework would be removed from site. However, there is no mention of the decommissioning process for subsurface pipes, cables and other subsurface components (Appendix W p12).

Any plan to leave subsurface pipes, cables and other components buried at the Biblewindi site is opposed by FCNSW. Abandonment of this waste material has the potential to cause ongoing liabilities.

Leaving subsurface components buried in situ is not consistent with the occupation permit. Santos presents no mechanisms to FCNSW that would offset the liabilities associated with the abandonment of subsurface components.

Gas and water gathering lines

FCNSW does not support the proposal to leave subsurface components buried in State forest (6-82).

The EIS describes how FCNSW will inherit a network of unused:

- medium pressure gas pipelines and HDPE gas pipelines;
- HDPE water pipelines;
- high voltage power cables; and
- communication wires.

FCNSW considers these materials to be waste which should be treated in an identical manner to the decommissioned surface infrastructure.

The abandonment of buried pipes and cables is not consistent with the occupation permit. Santos presents no mechanisms to FCNSW that would offset the liabilities associated with the abandonment of subsurface components.

Access tracks and new gas service roads

The decommissioning report is not explicit that materials used to improve road surfaces will be removed from the site as part of the decommissioning and rehabilitation plan.

FCNSW is concerned that the incorporation into the soil profile of hardened material such as aggregate, gravel and other fills will reduce site productivity and therefore impact future timber yields.

Should this be Santos' intention, then Santos must demonstrate to FCNSW how forest productivity will not be impacted. Alternatively, mechanisms that would offset the liabilities associated with the abandonment of hardened material should be presented to FCNSW.

Design of access tracks and roads

The design and construction of tracks and roads must consider their possible use in fire suppression activities. To avoid firefighters becoming trapped by moving bushfire fronts, all roads and tracks built on State forest must be through roads (i.e. no dead-ends).

Although not suggested by the EIS, the sign posting of no through roads does not mitigate risks in circumstances of emergency evacuation as visibility and situational awareness is often compromised in such situations.

Infrastructure corridor

FCNSW does not support the proposal to leave subsurface components of the Leewood to Bibblewindi Infrastructure Corridor buried in State forest. As previously discussed, material left buried becomes an unwanted liability to FCNSW.

The abandonment of buried pipes and cables is not consistent with the occupation permit. Santos presents no mechanisms to FCNSW that would offset the liabilities associated with the abandonment of subsurface components.

Liability from abandoned underground infrastructure

The EIS fails to address the risks to FCNSW that the abandoned buried infrastructure poses. For example, exposure and entanglement of heavy plant and trucks engaged in logging operations, road construction and fire fighting.

As shown in figures 3 and 4, the abandoned pipes, wires and liners maybe exposed at the surface through:

- uprooting of trees;
- road construction and maintenance; and
- water erosion and shifting stream beds.

Exposure of wastes also damages the aesthetic appeal of State forests. This outcome conflicts with FCNSW's ongoing efforts to promote the recreational value of State forests.



Figure 3. Gas pipeline exposed at a drainage line crossing. Injune QLD 2015



Figure 4. Gas pipeline exposed at a drainage line crossing. Injune QLD 2015