Attachment B1

NARRABRI GAS PROJECT (EPBC 2014/7376)

EPBC ACT ASSESSMENT UPDATED LEGAL CONSIDERATIONS REPORT

19 NOVEMBER 2020

CONTENTS

1 OVERVIEW

1.1 USING THIS REPORT

1.1. This updated legal considerations and assessment report (the Report) should be read in conjunction with the covering brief (MS20-001556) and other attachments. This Report adopts the terminology defined in the brief (for example, the proponent, proposed action, etc.). All attachments refer to attachments to the proposed decision brief at Attachment A unless otherwise specified.

1.2. The Department has prepared this updated Report to guide the Minister for the Environment in making a final decision on whether or not to approve the proposed action for the purposes of each controlling provision under sections 130 and 133 of the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act).

1.3. This Report includes additional information considered by the Department following the proposed approval decision (MS20-001405; Attachment A). This includes having regard to comments received from the proponent and Commonwealth Ministers on the proposed conditions of approval, the provision of relevant environmental history information, and further consideration of recovery plans and threat abatement plans for relevant impacted threatened species and communities. This also includes further consideration of economic and social matters, particularly in regard to Indigenous consultation and Aboriginal cultural heritage.

1.4. Except for these new or updated sections, this Report is otherwise as set out for the proposed decision.

1.5. The Report identifies:

i The matters that you must and may consider in making your final decision, including the impacts of the proposed action for the purposes of each controlling provision.

ii The Department's analysis and conclusions in respect of these matters and recommended final decision.

iii The Department's assessment of how, in approving the proposed action and attaching the recommended conditions to the approval, you would not be acting inconsistently with any applicable recovery plans and threat abatement plans and relevant international obligations.

1.6. The 'assessment report' for the purposes of section 130(2) of the EPBC Act refers to the NSW Government's assessment documentation. They summarise impacts on the environment, including matters protected by the controlling provisions listed in paragraph 1.9 below.

1.2 RECOMMENDATION

1.7. The Department concludes in this Report, and recommends that you agree, that the proposed action should be approved under sections 130 and 133 of the EPBC Act subject to the conditions specified in Attachment E to the final decision brief.

1.3 MANDATORY CONSIDERATIONS

1.8. Under subsection 136(1) of the EPBC Act, in deciding whether or not to approve an action and what conditions to attach to the approval, you must consider the following,

so far as they are not inconsistent with any other requirement of Subdivision B, Division 1 of Part 9 the EPBC Act:

i Matters relevant to any matter protected by the controlling provisions for the action; and

ii economic and social matters.

1.4 MATTERS RELEVANT TO ANY MATTER PROTECTED BY THE CONTROLLING PROVISIONS FOR THE ACTION (EPBC ACT, S136(1)(A))

1.9. The proposed action was referred to the Department by the proponent on 28 October 2014. The proposed action was determined to be a controlled action on 1 December 2014, on the basis that the action is likely to have a significant impact on certain matters protected under the EPBC Act. The controlling provisions for the proposed action are:

i sections 18 and 18A (listed threatened species and communities);

ii sections 24D and 24E (a water resource, in relation to coal seam gas development and large coal mining development); and

iii section 26 and 27A (Commonwealth land).

1.10. The proposed action was assessed by the NSW Government in accordance with the Bilateral Agreement.

1.11. The NSW Government's consideration of Commonwealth matters (MNES report at Attachment D4) concludes that the likely impacts of the proposed action on protected matters will not be unacceptable, provided the action is conducted consistently with avoidance, mitigation and offset measures proposed by the proponent and NSW Government and undertaken in accordance with the relevant conditions.

1.12. The Department considers there are additional conditions which should be imposed in relation to the protection of matters of national environmental significance, beyond those outlined in the NSW assessment report and conditions. The Department recommends the additional conditions to ensure the impacts are acceptable for EPBC Act approval purposes. The Department's considerations and recommendations are provided below.

1.13. In addition to the conclusions outlined in the NSW assessment report the information below is relevant to the Department's analysis on the acceptability of impacts to the relevant controlling provisions.

2 BACKGROUND

2.1 LOCATION

2.1. Santos NSW (Eastern) Pty Ltd (Santos; the proponent and person proposing to take the action), proposes to progressively develop, operate and decommission a new coal seam gas (CSG) field and associated infrastructure across a 95,000 hectare (ha) area south-west of Narrabri, in north-western NSW (see 'project area' in Figure 1 at Attachment A3).

2.2. The proposed action will be developed on around 1,000 hectares (ha) of the proposed action area, in Pilliga State Forest and adjoining privately-owned agricultural grazing land.

2.2 REGIONAL CONTEXT AND LAND USE

2.3. The proposed action is located within the 'Pilliga', an area of over 500,000 ha of semi-arid native vegetation around Coonabarabran and Narrabri. Nearly half of the Pilliga is protected under the NSW national park and reserve system and most of the remaining area is State forest (see Figure 3 of Attachment A3).

2.4. The proposed action is in Narrabri in north-western NSW, a region that has traditionally been a major producer of agricultural goods. Situated in the Namoi River Catchment (see Figure 5 at Attachment A3), which is part of the Murray Darling Basin, the region has seen significant land use change and degradation as a result of large-scale irrigated cropping and grazing on the alluvial floodplains of the Namoi River and associated tributaries.

2.5. The region has significant groundwater resources in shallow aquifers that form part of the Great Artesian Basin (GAB). A number of ephemeral creeks occur across the proposed action area (see Figure 8 of Attachment A3). Regional water resources are discussed in greater detail in Chapter 3.

2.6. Land use in Narrabri Shire has seen a recent shift toward extractive activities such as coal and coal seam gas, which is creating significant community concerns about competing land uses.

2.7. Two-thirds of the proposed action area is in an area of Pilliga State Forest that has been designated for forestry, recreation and mineral extraction. It provides for mining, petroleum production and extractive industry (see Figure 4 of Attachment A3).

2.8. Gas exploration has been undertaken in the proposed action area by various title holders since the 1960s. Existing gas-related infrastructure in the proposed action area includes drill pads, gas wells, and the Bibblewindi and Leewood processing facilities (see Figure 7 of Attachment A3).

2.3 DESCRIPTION OF THE PROPOSED ACTION

2.9. The life of the proposed action is 25 years, which includes exploration and appraisal activities and 20 years of natural gas production. Up to 200 terajoules (TJ) of unconventional natural gas (methane) will be produced per day for the domestic market, which is approximately half of NSW's gas demand.

2.10. The proposed action includes four distinct phases, noting some may occur concurrently rather than sequentially:

i Phase 1 – exploration and appraisal activities, including seismic surveys, drilling pilot wells and installing supporting ancillary infrastructure.

ii Phase 2 – development of the gas field and related infrastructure over approximately 1000 ha.

iii Phase 3 – operation of the gas field and production for the domestic market.

iv Phase 4 – progressive decommissioning of the gas field and infrastructure, and rehabilitation.

2.11. The proposed action involves:

i The construction of 850 gas wells on up to 425 well pads over the life of the proposed action and associated ancillary infrastructure such as access tracks.

- Each well pad will be up to one hectare in area during construction and reduce to a quarter of the area during operation.
- While the layout of the gas wells is subject to refinement and micro-siting, there will be an equivalent of one well pad per 225 ha within the proposed action area.
- The proposed action area will be progressively rehabilitated.

ii Upgrading associated gas and water processing facilities, including the existing Bibblewindi and Leewood facilities (see Figure 7 at Attachment A3).

- Gas safety flares at each facility.
- Produced water treatment (reverse osmosis) facility and storage ponds.
- Ancillary infrastructure such as offices, workshops, chemical storage and utilities.
- An infrastructure corridor for gas and water pipelines and utilities connecting the Bibblewindi and Leewood facilities to the existing Wilga Park power station.

iii Extraction of gas resources from the Maules Creek Formation (800-1200 m deep) and Black Jack Group (500 m deep) coal seams of the Gunnedah Basin (see Figure 2 at Attachment A3).

- Up to 200 terajoules (TJ) of gas will be produced a day for the domestic gas market.
- Due to the geology of the region, gas production will not require fracking (fracturing of the bedrock by injected pressurised liquid mixture to allow gas to flow into the well).

iv The production and management of produced water and waste:

- Extraction of up to 37.5 gigalitres (GL) of produced water (saline groundwater extracted from the coal seams) over the life of the proposed action and up to 10 megalitres (ML) per day.
- Water treatment for reuse on site, crop irrigation or discharge into Bohena Creek in favourable conditions if reuse is not available.
- Extraction and disposal of up to 840,000 tonnes of salt from the produced water.
- Production and waste or 1.1 million cubic metres of drill cuttings.
- Disposal of drilling fluids and chemicals, cement slurry and other waste to licenced waste facilities.

2.12. The proposed action has a capital investment value of $3.6 billion and will create 1,300 jobs during construction and 200 jobs during operations.

2.4 EPBC Act process

2.13. On 28 October 2014, the proposed action was referred by Santos under the EPBC Act. The referral was published on the Department's website on 4 November 2014 and comments from the public and Commonwealth Ministers were invited until 17 November 2014.

i 3,143 submissions were received (3,098 were campaign related). In excess of 2,800 campaign submissions were also received by the Minister's Office.

ii Comments from the then Department of Industry highlighted the importance of the proposed action in addressing domestic gas supply challenges. Geoscience Australia noted the proposed action is likely to cause significant impacts to groundwater resources and supported the need for greater assessment of impacts prior to any approval under the EPBC Act.

2.14. On 1 December 2014, the delegate determined that the proposed action is a controlled action under the EPBC Act as it is likely to have a significant impact on listed threatened species and communities (sections 18 and 18A), water resources (sections 24D and 24E), and Commonwealth land (sections 26 and 27A).

i In making a controlled action decision, the delegate determined that the issues raised in submissions, including any information gaps or areas of uncertainty, could be addressed during assessment.

2.15. On the same date, the delegate agreed that the proposed action would be assessed by the NSW Government under the *Bilateral agreement between the Commonwealth of Australia and the State of New South Wales relating to environmental assessment* (bilateral agreement). Under the bilateral agreement, upon completion of the NSW assessment process, the NSW Government provides a report on its assessment of Commonwealth matters to the Minister for the Environment's consideration prior to a final decision being made under the EPBC Act.

2.5 NSW assessment process

2.16. Following the controlled action decision, the NSW Government undertook the assessment of the proposed action on behalf of the Commonwealth and in accordance with the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act).

2.17. Key steps in the NSW assessment process included:

i Public exhibition of the environmental impact statement (EIS) for 90 days between 21 February 2017 and 22 May 2017 (Attachment F1).

- Nearly 23,000 submissions were received, comprised of 17 from NSW agencies and councils, 133 from special interest groups, and 22,721 from the general public.
- 98 percent of submissions opposed the proposed action. A breakdown of the EIS submissions from the local area showed nearly 37 percent of submissions supported the proposed action.
- Key issues raised included: opposition to gas development in NSW; action on climate change and transitioning away from reliance on fossil fuels; the risks of non-conventional gas development; impacts to land and water resources; uncertainty around final project design; strategic benefits of the proposed action; and health and safety risks to the local community.

ii Submission of a Response to Submissions report (RTS) by the proponent (and additional information in 2019) to address issues raised during public exhibition (Attachment F2).

iii DPIE's review of the proponent's assessment documents and preparation of the NSW assessment report for the proposed action (Attachment D3).

- The Department notes that DPIE obtained technical advice from government agencies and independent experts during its assessment and established an independent Water Expert Panel (WEP) due to significant community concerns about the potential impacts of the proposed action on the environment. The WEP was chaired by Professor Peter Cook (geologist) from the University of Melbourne and was comprised of Professor John Carter (geotechnical engineer), Professor Chris Fell (chemical engineer) and Michael Williams (hydrogeologist and former principal hydrogeologist for the NSW Officer of Water).

iv DPIE's referral of the proposed action, and its recommendation for approval, to the IPC for merit review and determination.

- The IPC's review included a public hearing over seven days from 20 to 25 July 2020 and 1 August 2020. The IPC received 11,273 written submissions (including 10,720 objections) and heard from 364 speakers (including 346 objections).
- Submissions in support of the proposed action raised the economic and employment benefits of the proposed action.
- Submissions opposed to the proposed action raised issues including impacts to groundwater, biodiversity, agriculture and heritage, greenhouse gas emissions, and social impacts.

2.18. On 30 September 2020, the proposed action was approved by the IPC under the EP&A Act subject to conditions (Attachments D1 & D7).

2.19. The Department was formally advised of the outcome on 6 October 2020 (Attachment D2) and provided with the NSW assessment of Commonwealth matters (Attachments D4-D6). This started the 30-business day decision timeframe under the EPBC Act, with a final decision due on 17 November 2020.

i DPIE concluded that the likely impacts of the proposed action on protected matters would not be unacceptable, provided the action was taken in a manner consistent with the avoidance, mitigation and offset measures proposed by Santos, and in accordance with the NSW conditions.

ii DPIE recommended that the Commonwealth endorse the NSW conditions relating to the management of biodiversity, water resources, and light impacts (for Commonwealth land).

3 RECOMMENDATIONS REGARDING A WATER RESOURCE, IN RELATION TO COAL SEAM GAS (S24D & S24E)

3.1. In addition to the conclusions outlined in the NSW assessment documentation (Attachment D), the information below is relevant to the Department's analysis of the acceptability of impacts to water resources.

3.1 IESC ADVICE

3.2. On 15 June 2017, the Minister's delegate sought advice from the Independent Expert Scientific Committee on Coal Seam Gas and Large Coal Mining Development (IESC) on the impacts of the proposed action on local water resources. On 8 August 2017, the IESC provided advice indicating that key potential risks from the proposed action included:

i salt and chemical management and disposal;

ii groundwater depressurisation and drawdown in aquifers within the proposed action area and surrounds; and

iii changes to surface water flow and quality from discharges to Bohena Creek.

3.3. The IESC advice identified several knowledge gaps, uncertainties and data limitations in the proponent's EIS. These are detailed at Attachment B2 of the final decision brief.

3.4. The Department is satisfied that the NSW conditions of consent (Attachment D7) address the IESC's concerns regarding discharges to Bohena Creek as they relate to the management of impacts to surface water flow and quality.

3.5. However, the Department's assessment considers that additional conditions are required to fully address the IESC's concerns relating to the management of;

i groundwater resources;

ii impacts to groundwater dependent ecosystems (GDEs); and

iii risks to water resources from chemicals used in CSG drilling.

3.6. The Department has therefore recommended that additional conditions that address the above outstanding issues are included in your proposed approval, so that adverse impacts to water resources are avoided and appropriately managed.

3.2 GROUNDWATER

3.2.1 NSW assessment report overview

Note: the following overview is taken from page 50 of the NSW assessment report (Attachment D3).

3.7. The coal seams and associated aquifers targeted by the proposed action differ from many contemporary coal seam gas projects in Australia (mainly Queensland) and overseas, in that they are deeper and more saline, and are consequently not used for beneficial purposes such as agriculture or town water supply.

3.8. These target aquifers are geologically separated from the shallower, more highly valued aquifers by thick layers of rock including aquitards, which limit the potential for impact.

3.9. Notwithstanding, the shallower aquifers do comprise important groundwater resources for the region. They include the Namoi alluvial aquifers and aquifers associated with the Great Artesian Basin (Pilliga Sandstone). These aquifers are generally productive and contain good quality water and are consequently widely used for agricultural and domestic supplies in the region.

3.10. The proposed action would not extract any water directly from these aquifers. However, it does have the potential to indirectly affect them through induced

drawdown from the underlying coal seam groundwater extraction, and/or through otherwise contaminating the aquifers.

3.11. A substantial body of work has now been undertaken to model and assess whether such impacts would occur. This work includes regional groundwater modelling undertaken by the NSW Government, peer reviewed modelling undertaken by Santos, independent assessment by the WEP, and additional groundwater modelling undertaken by CSIRO.

3.12. Based on this work, the relevant NSW Government agencies and the WEP believe that the groundwater modelling work is 'fit for purpose' and is adequate and appropriate to assess the broad land and water-related impacts of the proposed action.

3.13. The assessment indicates that, due to the depth of the target coal seams and the overlying aquitards, the impacts on the highly valued aquifers would be minimal and would not occur until many years after mining commences. Ultimately, the water extracted for the proposed action (37.5 GL) would be replenished by downward induced flows from overlying water sources. Aquifer recharge rates are naturally slow and this recovery is expected to occur over a period of approximately 1,500 years.

3.14. Peak drawdown (i.e. groundwater level lowering) in both the Namoi Alluvium and the Pilliga Sandstone (GAB) is predicted to be less than 0.5 m, which is within the range of natural fluctuation and the minimal harm considerations in the *NSW Aquifer Interference Policy*, and therefore meets the applicable nondiscretionary development standard for aquifer interference under the Mining State Environment Planning Policy. The changes are unlikely to be noticed by groundwater users in the area.

3.15. Peak groundwater take (i.e. volumetric groundwater loss through induced drawdown) from these groundwater sources is also predicted to be minor, at well below one percent of the Sustainable Diversion Limits (or long term annual average extraction limits) for each of the relevant water sources.

3.16. The WEP and the NSW Government have considered the proposed action's potential to contaminate or otherwise affect groundwater resources in a number of other ways, such as subsurface contamination from drilling fluids, below ground methane or carbon dioxide leakage, cross contamination of aquifers, and long-term legacy issues following well decommissioning.

3.17. The WEP and the NSW Government have considered these potential impacts in detail and found that the risks are able to be effectively managed and are unlikely to result in any significant impacts to regional land and water resources.

3.18. The WEP concluded that the current regulatory framework for coal seam gas well integrity provides reassurance that the likelihood for potential harm to humans and the environment is low.

3.2.2 Background

3.19. Gas production will target the Rutley, Namoi, Parkes and Bohena coal seams within the Maules Creek Formation and the Hoskissons Seam of the Black Jack Group (see Figure 2 of Attachment A3). The target coal seams are very deep, generally between 800 and 1,200 metres below ground although some target seams (5 per cent) are located around 500 metres below ground, and at least 350-650 metres deeper than most (97 per cent) of the productive groundwater bores in the shallower aquifers overlying the proposed action area (p. xi of Attachment D3).

3.20. The CSG wells will be drilled through the Namoi Alluvium and Pilliga Sandstone aquifers to reach the deeper target coal seams.

3.21. These aquifers are relatively shallow, productive, have good quality water and are heavily relied on by the agricultural industry. There are approximately 4,682 registered water bores within 30 km of the proposed action area. About 97 percent of these are located within the Namoi Alluvium and Pilliga Sandstone aquifers, less than 150 m deep (p. 55 of Attachment D3).

3.22. The proposed action will not directly extract any groundwater from these shallow aquifers (p. 63 of Attachment D3). However, there is the possibility that depressurisation of the target coal seams could cause groundwater drawdown in the shallow aquifers (p. 55 of Attachment D3).

3.23. Up to 37.5 GL of water will be extracted from the Gunnedah Oxley Basin, which lies under the GAB.

3.2.3 Potential impacts & NSW conclusions

Groundwater extraction

3.24. The EIS predicts that groundwater depressurisation will occur rapidly in the deeper target coal seams once groundwater extraction commences but that propagation (groundwater drawdown in overlying aquifers through a hydrological connection) to the shallow aquifers would be limited by the intervening aquitards (a geological formation that restricts the flow of groundwater from one aquifer to another) (p. 31 of Attachment D2).

3.25. Groundwater base case modelling predicts that drawdown for the shallow aquifers will be less than 0.5 m. This is below the minimal harm criteria of the NSW Aquifer Interference Policy (p. 61 of Attachment D3).

3.26. Proposed groundwater extraction is estimated to be 1.8 percent of the sustainable diversion limit[1] for the Gunnedah Oxley Basin. For the Namoi Alluvium and Pilliga Sandstone aquifers, which are high value aquifers, extraction is estimated to be less than 1 percent of their sustainable diversion limit. DPIE and the WEP consider that there is adequate depth in the market for this take to be accommodated.

3.27. The Department notes that these sustainable diversion limits are set by NSW water sharing plans and restrict how much water can be extracted by the proponent through licenses.

3.28. The NSW assessment report states that the groundwater extracted from the Gunnedah Oxley Basin is predicted to be replenished by downward induced flows from overlying aquifers over a period of approximately 1,500 years (p. 61 of Attachment D2).

3.29. DPIE and the WEP concluded that the predicted groundwater take is low relative to long term annual extraction limits for the high value aquifers. The IPC accepted this finding (p. 33 of Attachment D2).

3.30. The IPC notes that the NSW Environment Protection Authority (EPA), IESC and WEP all found the proponent's groundwater model fit for purpose. The Department

[1] Sustainable diversion limits are how much water, on average, can be used in the Murray-Darling Basin by users while leaving enough water to sustain natural ecosystems.

notes that while the risks and impacts associated with groundwater drawdown are generally well understood, there are still inherent uncertainties with modelling outcomes.

3.31. To reduce these uncertainties, the WEP and IESC made several recommendations to improve the groundwater model. These have been reflected in the NSW conditions of consent at Attachment D7 and include:

i Consideration of the impact of GAB pressure levels from Great Artesian Basin Sustainability Initiative (GABSI) programs (condition B39(f) iv of the NSW conditions);

ii developing a transient groundwater flow model and regularly updating the new model (conditions B39(c) and (f));

iii obtaining and using additional data to improve parameterisation and model verification (condition B39(f)); and

iv improving confidence in the model through regular updates based on monitoring data (conditions B39(d) and (e)).

3.32. The WEP accepted the groundwater modelling and concluded that appropriate conditions, together with adaptive management and regulation could be applied to the development to successfully manage risks associated with geological uncertainties (p. 32 of Attachment D2). The IPC also agreed (pp. 33-35 of Attachment D3).

3.33. The Department's consideration of the modelling, and recommendation for additional conditions, is provided at section 3.2.6.

Geology

3.34. The IPC report notes that information gaps exist relating to the local geology. These relate particularly to the deeper stratigraphic layers and create uncertainties in how water resources will react to CSG development, especially at a local scale where depressurisation may affect overlying shallow aquifers (p. 32 of Attachment D2).

3.35. The WEP considers that while smaller scale geological fault structures (fractures in the rock) could have a significant local impact on groundwater resources, faulting is unlikely to constitute a major risk. Therefore, the proposed action would be unlikely to have a major impact on groundwater flow. The IPC acknowledged that more knowledge can ultimately be obtained, and it accepted the views and advice of the WEP (p. 33 of Attachment D2).

Groundwater contamination

3.36. While the WEP considered that there is potential for cross contamination of aquifers due to geological faults or well integrity failure, the WEP noted that this risk would be reduced due to depressurisation of the coal seams. This would prevent upward movement of saline deep-groundwater to the high value aquifers. The IPC accepted this and concluded that the risk of methane migration into overlying aquifers was also low (p. 37 of Attachment D2).

3.37. The WEP considers that the risk of groundwater contamination from drilling procedures and drilling fluids can be adequately managed. Significant subsurface migration of gases is unlikely to occur or result in significant impacts if the gas wells are constructed according to the NSW Code of Practice for Coal Seam Gas Well Integrity (2012). The IPC accepted this finding (p. 37 of Attachment D2).

Groundwater dependent ecosystems (GDEs)

3.38. Several GDEs and potential GDEs occur in the region, including springs, and NSW-listed forest and woodland ecosystems associated with riparian areas (p. 3 of Attachment H). Groundwater depressurisation and drawdown of the shallow aquifers that provide water to these GDEs could result in decreased water availability and adverse impacts to the health and structure of these ecological communities.

3.39. The WEP noted that GDEs are protected under the NSW Aquifer Interference Policy and water sharing plans, with groundwater drawdown predicted to be below the minimal harm criteria of the policy. DPIE concluded that compliance with the minimal harm criteria of the NSW Aquifer Interference Policy would ensure any high-value GDEs within the proposed action area are protected from unacceptable cumulative impacts associated with CSG production (p. 66 of Attachment D3).

3.40. The Department notes that the minimal harm criteria of the NSW Aquifer Interference Policy are only applicable to high-value GDEs as defined in the relevant water sharing plan. Therefore, these criteria do not ensure protection of all GDEs potentially impacted by the proposed action, such as some riparian vegetation or stygofauna.

3.41. The WEP considered that further studies need to be undertaken to improve the groundwater model and therefore allow early detection of impacts to GDEs (p. 46 of Attachment D2). The Department's assessment, undertaken by the Office of Water Science and Water Resources Regulatory Support, supports the WEP's conclusion. The Department has therefore recommended additional conditions to address this gap, as discussed in section 3.2.6.

3.2.4 Avoidance and mitigation measures

3.42. The proponent proposed a number of measures to avoid and mitigate impacts to water resources (Attachment F1). These measures have been incorporated into the NSW conditions of consent (Attachment D7) listed in section 3.2.5 and are summarised below.

i The location of project infrastructure will be determined in the Field Development Protocol and as a result of further field surveys to micro-site infrastructure (p. 56 of Attachment D3). Development and implementation of the protocol is a NSW condition of consent and restricts the placement of:

- surface infrastructure within 200 m of Yarrie Lake;
- non-linear infrastructure near watercourses based on the stream order; and
- ponds and dams relative to the 100-year flood extent.

ii No hydraulic fracturing (fracking) will be undertaken (p. 2 of Attachment D3).

iii The extraction of groundwater from aquifers not currently utilised by other users in the region will be capped at 37.5 GL over the life of the proposed action (p. 56 of Attachment D3).

iv All well construction, maintenance and rehabilitation will be undertaken in accordance with the NSW Well Integrity Code, which contains provisions to prevent interconnection of aquifers and gas leakage, ensure isolation of aquifers, and to not introduce substances that may cause environmental harm (p. 56 of Attachment D3).

v Lined pits will be used during drilling. Drilling fluids and cuttings that cannot be beneficially reused on site will be removed (p. 56 of Attachment D3).

vi A groundwater monitoring network and Water Management Plan will be implemented (p. 56 of Attachment D3).

vii Produced water will be treated via reverse osmosis to meet or exceed either Australian drinking water, irrigation or stock watering guidelines (p. 56 of Attachment D3).

viii Discharges to Bohena Creek will be managed and occur only under appropriate flow conditions where beneficial reuse is not available (p. 57 of Attachment D3).

ix Water and gas gathering lines below ground will be installed with leak detection units (p. 57 of Attachment D3).

x Incident protocols will be established that include the option of well shutdown should an incident occur (p. 57 of Attachment D3).

xi If impacts exceed those predicted for the base case scenario, mitigation measures including water monitoring plans and the implementation of make good protocols in accordance with the NSW Aquifer Interference Policy are proposed (Attachment D7).

3.2.5 NSW conditions

3.43. The WEP did not identify any land or water issues that were considered likely to result in significant impacts to the environment or people which could not be managed (p. 33 of Attachment D2).

3.44. The IPC was satisfied that potential groundwater impacts can be effectively managed through conditions. The IPC accepted DPIE's recommended conditions and imposed additional conditions to increase the transparency of the development's operations, improve groundwater modelling and data acquisition, increase expert involvement in the management and mitigation of impacts and strengthen protective measures for affected stakeholders including the environment (pp. 33-35 of Attachment D2).

3.45. The NSW conditions relevant to protecting groundwater resources are within Schedule 2, Parts A and B of Attachment D7.

3.46. NSW conditions A15-A17 relate to limits on groundwater extraction, ensure gas well integrity in accordance with relevant industry codes of practice and Australian standards, and prohibit fracking.

3.47. NSW conditions B27-B35 and B37-B42 relate to:

i limits on groundwater take;

ii compensatory water supply measures for affected landholders;

iii compliance with water management performance measures to minimise impacts to water resources and associated users. Table 7 of the NSW conditions requires compliance with the water management performance measures identified for:

- general water management;
- Namoi alluvial aquifers and Great Artesian Basin aquifers;
- Gunnedah Oxley Basin aquifers;
- riparian and aquatic ecosystems;
- well integrity;
- produced water management;
- irrigation and beneficial reuse management;
- Bohena Creek water discharge;
- salt management; and
- chemical and hydrocarbon storage.

iv the establishment of a Water Technical Advisory Group;

v updating the groundwater model for the development;

vi preventing the Applicant commencing Phase 2 (development of the gas field) if the updated groundwater model predicts any exceedance of the water management performance measures in Table 7; and

vii implementation of a Water Management Plan to ensure compliance with the water management performance measures in Table 7. The Water Management Plan includes the following sub-plans that outline monitoring, management, reporting and mitigation:

- Erosion and Sediment Control Plan;
- Site Water Balance;
- Surface Water Management Plan;
- Groundwater Management Plan
- Produced Water Management Plan;
- Irrigation Management Plan;
- Dust Suppression Protocol;
- Management Release Protocol;
- Salt Management Plan;
- Pollution Incident Response Management Plan; and
- a protocol to report on measures, monitoring results and performance criteria as identified in these reports in the Annual Review.

3.2.6 Proposed EPBC Act conditions

3.48. The Department accepts the NSW assessment of groundwater impacts and that the above avoidance and mitigation measures will contribute to protecting water resources and users. The Department therefore recommends that you require the proponent to comply with conditions A15-A17, B27-B35 and B37-B42 of the NSW conditions to manage the impacts to groundwater (condition 5 of Attachment E of the final decision brief).

3.49. The Department recommends that additional conditions be attached to the approval to ensure the proposed action will have no significant adverse effects on water resources and to provide an early warning of potential impacts.

3.50. The additional conditions (conditions 5-17 of Attachment E of the final decision brief) provide further assurance to the Commonwealth that impacts to groundwater resources (aquifers) and GDEs will be appropriately managed and mitigated by the approval holder by setting evidence-based cease-work limits (if required) and establishing clear protocols and consequences should those limits be exceeded.

i The approval holder is required to establish an early-warning monitoring system in the Napperby Sandstone and the Digby Formation. This network will be used to detect potential impacts to the productive shallow aquifers and GDEs prior to impacts being realised.

ii The approval holder must undertake groundwater monitoring and modelling in accordance with NSW conditions. The Department has required particular hydrogeological strata to be monitored. Both the monitoring and modelling are early-warning systems of potential impacts, before any impacts in productive aquifers are realised.

iii The Department (and/or Minister) only becomes involved if there is an actual incident of non-compliance of groundwater performance measures specified in the NSW conditions, or the groundwater model predicts an exceedance of performance measures.

iv In such instances, the approval holder must report the incident, implement mitigation measures as per NSW conditions, and undertake mitigation and/or corrective actions. This gives the approval holder an opportunity to, over a period of six months, investigate the incident, run further models, and determine whether the incident will actually have an adverse impact on protected matters.

v If those mitigation and/or corrective actions still do not achieve the desired environmental outcomes (i.e. there is non-compliance or a predicted exceedance), or the Minister determines that the desired outcomes cannot or will not be achieved, the approval holder must undertake site-specific assessments to derive a scientifically-robust cease-work limit within a three month period. This limit will be based on the approval holder's own updated modelling and monitoring data. The Minister may set an interim cease-work limit if not satisfied that the approval holder's limit will achieve the desired environmental outcomes.

vi The approval holder must automatically cease groundwater extraction at any gas wells identified as contributing to the exceedance of the cease-work limit and implement corrective actions. Gas extraction from those gas wells cannot recommence without Ministerial approval.

3.3 SURFACE WATER / PRODUCED WATER

3.3.1 NSW assessment report overview

Note: the following overview is taken from page 73 of the NSW assessment report (Attachment D3)

3.51. The WEP has reviewed Santos' proposed produced water treatment system in detail. It concludes that the system represents best current international practice, and that risks are able to be effectively managed subject to stringent design, management and monitoring. The WEP is also satisfied that the treated water can be beneficially reused and/or released to Bohena Creek without causing any significant adverse impacts on water users or the environment.

3.52. The produced water treatment system would generate up to 840,000 tonnes of salt over the proposed action life, or an average of around 35,000 tonnes per year. As a comparison, the Murray Darling Basin Authority's salt interception scheme generates about 500,000 tonnes of salt per year.

3.53. The WEP accepts that the salt product would likely classify as general solid waste under the EPA's waste classification guidelines and could be disposed of at appropriately licensed solid waste facilities. It notes that the salt product does have the potential for beneficial reuse given its composition, and Santos has committed to investigating beneficial reuse options.

3.54. The proposed action also has the potential to contaminate or otherwise affect surface water and land resources in a number of other ways, such as surface spills and leaks, and via irrigation and/or discharge of treated water.

3.55. The WEP and the NSW Government have considered these potential impacts in detail, and found that the risks can be effectively managed, and are unlikely to result in any significant impacts to regional land and water resources.

3.56. The WEP concluded that the current regulatory framework for produced water management provides reassurance that the likelihood for potential harm to humans and the environment is low.

3.3.2 Background

3.57. The proposed action is located within the Namoi River catchment, which is part of the Murray Darling Basin. Creeks draining the area include Bohena, Jacks, Bundock and Mollee creeks, which are ephemeral (p. 73 of Attachment D3).

3.58. Bohena Creek is the main watercourse in the proposed action area. Bohena Creek flows in a northerly direction joining the Namoi River approximately 10 km north of the proposed action area. It flows only following heavy rainfall events but can contribute significant flood inflows during prolonged wet conditions. Water quality is generally fresh with neutral pH (p. 73 of Attachment D3).

3.59. Surface water extracted from the Namoi River is an important water supply for farmers in the Narrabri region.

3.3.3 Potential impacts & NSW conclusions

3.60. Impacts to surface water from the proposed action could include changes to the flow regime and water quality in Bohena Creek due to controlled or uncontrolled discharges of treated or untreated produced water. Spills and leaks of stored produced water could also impact water quality within Bohena Creek.

3.61. The WEP considers that the measures for spill management are appropriate and that any spill is unlikely to significantly impact regional water resources. The IPC accepted this finding (p. 37 of Attachment D2).

3.62. The WEP notes that water storages for produced water are consistent with best practice standards (p. 37 of Attachment D3).

3.63. The WEP concludes that constituents of potential concern and other possible contaminants can be effectively treated with the proposed reverse osmosis treatment facility. The system represents best current international practice and can be readily adapted to address risks if required. Additionally, gas wells can be shut in if needed to reduce the volume of produced water (p. 78 of Attachment D3).

3.64. The WEP concluded that treated water discharges are unlikely to have adverse impacts as only boron and zinc concentrations may be slightly raised by the discharge (p. 79 of Attachment D3).

3.3.4 Avoidance and mitigation measures

3.65. The proponent within the EIS proposed a range of monitoring systems in wells and storage ponds to enable rapid detection and rectification of spills and leaks. These included continuous pressure monitoring of produced water gathering lines and leak detection and monitoring bores for produced water ponds. The EIS concluded that with these systems in place, any spills would remain localised and unlikely to be significant spill events (p. 37 of Attachment D2).

3.66. Treated produced water is proposed to be beneficially reused for irrigation (up to 10 ML/day) and stock watering, dust suppression, construction and drilling (approximately 1 to 2 ML/day). Discharge to Bohena Creek will be managed and only occur when beneficial reuse options are unavailable (p. 78 of Attachment D3).

3.67. Produced water infrastructure at the Leewood and Bibblewindi facilities will be constructed according to applicable Australian standards and codes, with freeboard (available storage in the dam to receive rainfall without spillover) to contain a 72-hour 100-year storm event, double lined with seepage collection between the layers and beneath the secondary layer, and with leak detection and groundwater monitoring systems (p. 78 of Attachment D3).

3.68. A Produced Water Management Plan will be implemented including a trigger action response plan and pollution incident response management plan (p. 78 of Attachment D3).

3.69. Saline water from the treatment process will be crystallised to a solid product for disposal at a licenced off-site landfill (p. 80 of Attachment D3).

3.3.5 NSW conditions

3.70. The IPC was satisfied that potential surface water impacts can be effectively managed through conditions. The IPC accepted DPIE's recommended conditions.

3.71. The NSW conditions relevant to protecting surface water resources are within Schedule 2, Parts A and B of Attachment D7.

i Condition B26 relates to the installation and maintenance of suitable erosion and sediment control measures in accordance with state guidance.

ii Condition B36 requires surface water discharges to comply with relevant environmental protection licence limits and the *Protection of the Environment Operations Act 1997* (NSW);

iii Conditions B37, B38, B41 and B42 require:

i compliance with water management performance measures to minimise impacts to water resources and associated users, including for produced water and salt management and Bohena Creek water discharge.

ii the establishment of a Water Technical Advisory Group;

iii implementation of a Water Management Plan to ensure compliance with the water management performance measures in Table 7. The Water Management Plan includes sub-plans that outline monitoring, management, reporting and mitigation, and a protocol to report on measures, monitoring results and performance criteria as identified in these reports in annual reporting.

iv Conditions B67-B71 relate to the effective management of waste, including produced water.

3.72. The Department notes that several of the performance measures outlined in the NSW conditions (Table 7) specify 'negligible impacts' or 'negligible changes'. These are not easily quantifiable and will rely on the development of triggers and limits for suitable variables that can be measured in the field. The Department notes that more detailed measures will be established through the Water Management Plan required by NSW condition B41.

3.73. The WEP concluded that the current regulatory framework for produced water management provides reassurance that the likelihood for potential harm to humans and the environment is low (p. 81 of Attachment D3). The Department agreed with this conclusion.

3.3.6 Proposed EPBC Act conditions

3.74. The Department accepts the NSW assessment of surface water impacts and that the avoidance and mitigation measures contribute to protecting water resources and users.

3.75. The Department is satisfied that most impacts to surface water can be effectively managed through the NSW conditions and recommends that you require the proponent to comply with conditions B26, B36, B37, B41, B42 and B67-71 of the NSW conditions, as specified at condition 5 of Attachment E of the final decision brief.

3.76. However, additional conditions are recommended to protect surface water resources from contamination by CSG drilling fluid chemicals. These are discussed in more detail in section 3.4.5 below. The Department considers that these conditions are necessary and convenient to manage potential impacts of chemicals to surface water.

3.4 WASTE MANAGEMENT / CHEMICALS / SALT MANAGEMENT

3.4.1 Background

3.77. The EIS states that approximately 400,000 m^3 of rock-based drill cuttings and 720,000 m^3 of coal-based drill cuttings will be generated by the proposed action. The coal-based drill cutting will require off-site disposal (p. 48 of Attachment D2).

3.78. The EIS predicts that approximately 430,500 tonnes of salt will be produced over the life of the proposed action. However, the WEP considers up to 850,000 tonnes could be produced and the IPC indicates that 840,000 tonnes of crystalised salt and 178,000 m^3 of drilling fluid will be generated.

3.4.2 Potential impacts & NSW conclusions

3.79. Waste and salt generated by the proposed action and chemicals used for drilling the gas wells have the potential to contaminate groundwater and surface water resources if these are not adequately stored and disposed of, or if storage facilities leak.

3.80. The WEP concluded that salt waste would be low in heavy metals and other pollutants meaning it is likely to be able to be classified as general solid waste and could be disposed of at licensed waste facilities (p. 49 of Attachment D2).

3.81. The WEP considers that hazards and risks to land and water resources are similar to those posed from other large industrial facilities. The measures in place for spill management were found to be appropriate. While spills could have a significant localised impact, the WEP considers significant impacts to regional water resources are unlikely given the potential low spill volume and composition (p. 81 of Attachment D3).

3.4.3 Avoidance and mitigation measures

3.82. To avoid and/or minimise spills, leaks or uncontrolled discharges from surface facilities, key infrastructure will be designed to comply with best practice and codes of practice. In addition, a Trigger Action Response Plan, Produced Water Management Plan, Pollution Incident Response Management Plan, Irrigation Management Plan and Dam Safety Emergency Plan will be prepared and implemented to manage any risks (p. 80 of Attachment D3).

3.83. Proposed drilling fluids would be water-based with non-hazardous constituents and would meet drinking water guidelines for benzene, toluene, ethylbenzene and xylene (BTEX) compounds (p. 36 of Attachment D2).

3.84. The proponent proposes to temporarily store salt onsite in a weather-proof structure before off-site disposal at an appropriately licenced waste facility (p. 80 of Attachment D3).

3.85. The WEP noted that the higher sodium bicarbonate concentration of the waste salt compared with other CSG projects may make the waste salt more suitable for beneficial reuse through a sodium bicarbonate industry (p. 49 of Attachment D2).

3.4.4 NSW conditions

3.86. The NSW conditions relevant to protecting water resources from chemicals and waste are within Schedule 2, Parts A and B of Attachment D7.

i Condition A17 prohibits hydraulic fracturing of the coal seams in the proposed action area at any time.

ii Conditions B37, B38, B41 and B42 require:

i compliance with water management performance measures to minimise impacts to water resources and associated users, including for produced water and salt management and chemical and hydrocarbon storage;

ii the establishment of a Water Technical Advisory Group;

iii implementation of a Water Management Plan to ensure compliance with the water management performance measures in Table 7. The Water Management Plan includes sub-plans that outline monitoring, management, reporting and mitigation, and a protocol to report on measures, monitoring results and performance criteria as identified in these reports in the Annual Review.

iii Conditions B67-B71 relate to the effective management, reuse and disposal of waste, including produced water, drilling-related waste, salt and chemicals. The conditions require agreements with appropriately licensed waste facilities to be in place prior to Phase 1 (exploration and appraisal activities) commencing (p. 50 of Attachment D2).

3.87. The IPC notes that the lead environmental pollution regulator in NSW, the EPA, is satisfied that the conditions are reasonable and enforceable and will address and mitigate any potential impacts (p. 50 of Attachment D2).

3.4.5 Proposed EPBC Act conditions

3.88. The Department recommends that you require the proponent to comply with conditions A17, B37, B38, B41, B42 and B67-B71 of the NSW conditions to manage the impacts to water resources from chemicals and waste (see condition 18 of Attachment E of the final decision brief).

3.89. While the Department is satisfied that the disposal of produced water and salt waste will be satisfactorily managed through the relevant NSW conditions, the Department notes that the IESC's concerns relating to the need for a rigorous and transparent assessment of the hazards and risks posed by the drilling chemicals have not been addressed.

i Conditions B67-B71 of the NSW conditions of consent (Attachment D7) provide for the management of chemicals used at the proposed action site once they become a waste stream, but not prior to this.

ii Hazards and risks of chemicals used during CSG operations are not clearly assessed and managed considering site-specific factors such as the volumes and concentrations of chemicals used.

3.90. The Department has therefore recommended additional conditions to address the IESC's concerns. These conditions focus on a risk-based assessment framework for all chemicals used for the proposed action (specifically drilling chemicals) to prevent significant adverse impacts to water resources.

i The approval of the chemical risk assessment framework by the Department will ensure the proponent must undertake an assessment of all drilling chemicals before use, appropriate to the nature of the chemical, and outlines a process to undertake purpose-specific assessments to identify high risk chemicals and provide further information on mitigation and management required to prevent impacts to water resources.

ii The framework will outline how the purpose-specific assessments for chemicals will be provided to the Department before use. Assessment of low risk chemicals do not require approval by the Minister but must be peer reviewed and endorsed by an independent chemical expert. Assessment of high risk chemicals, including specific mitigation and management, will require Ministerial approval before the chemical can be used.

iii The framework will also outline procedures for registering assessed chemical before use; monitoring and reporting of ongoing chemical use; and incident response actions for accidental spills to provide assurance to the Department that impacts to water resources are being managed in a manner that ensures the risk to water resources is low.

iv The approval holder must maintain a register of all assessed chemicals used for drilling and undertake a 5-year review of assessed chemical to ensure adaptive management.

3.5 CONCLUSION ABOUT THE IMPACTS ON WATER RESOURCES (S24D & S24E)

3.91. Following consideration of the information discussed above, the Department is satisfied that the proposed action will not have unacceptable impacts on water resources, provided it is taken in accordance with conditions 5-24 of Attachment E of the final decision brief.

3.92. On this basis the Department recommends approving the proposed action for the purposes of sections 24D and 24E of the EPBC Act.

4 LISTED THREATENED SPECIES AND ECOLOGICAL COMMUNITIES (S18 & S18A)

4.1. The Department's Environmental Reporting Tool (ERT) identifies 28 threatened species and 7 ecological communities that may occur within 10 km of the proposed action area.

4.2. Based on the location of the action, the likely habitat present in the proposed action area, and the findings of the NSW assessment process, the proposed action is likely to have a significant impact on the 12 listed threatened species and one ecological community listed below:

i Fauna

- Koala (combined populations of Qld, NSW and the ACT) (*Phascolarctos cinereus*) – vulnerable
- Pilliga Mouse (*Pseudomys pilligaensis*) – vulnerable
- South-eastern Long-eared Bat (*Nyctophilus corbeni*) – vulnerable
- Superb Parrot (*Polytelis swainsonii*) – vulnerable
- Regent Honeyeater (*Anthochaera phrygia*) –endangered
- Spotted-tail Quoll (*Dasyurus maculatus maculatus*) – endangered
- Swift Parrot (*Lathamus discolor*) – endangered

ii Flora

- *Androcalva procumbens* – vulnerable
- *Bertya opponens* – vulnerable
- Spiny Pepper-cress (*Lepidium aschersonii*) – vulnerable
- *Tylophora linearis* – endangered
- Winged Pepper-cress (*Lepidium monoplocoides*) – endangered

iii Ecological communities

- Brigalow (*Acacia harpophylla* dominant and co-dominant) – endangered

4.3. The Department notes that some of these species have undergone a change in listing status since the 2014 controlled action decision. In particular, the Regent Honeyeater was up-listed to critically endangered, effective 8 July 2015, and the Swift Parrot was up-listed to critically endangered, effective 5 May 2016. In accordance with section 158A of the EPBC Act, as these listing events occurred after the controlled action decision was made under section 75, these listing events have been disregarded for present purposes.

4.4. Field surveys for the proposed action were undertaken by a team of ecologists, including a senior ecologist, between 2010 and 2014, over a number of seasons and varying weather conditions (see Figures 10-12 at Attachment A3). Supplementary floristic surveys were undertaken in response to the RTS in 2017, including targeted surveys for both the Spiny Pepper-cress and Winged Pepper-cress.

4.5. Flora surveys were undertaken in accordance with the NSW BioBanking Assessment Methodology and the NSW *Threatened Biodiversity Survey and Assessment Guidelines* (working draft). Fauna surveys were undertaken in accordance with the aforementioned guidelines, and relevant Commonwealth species specific survey guidelines as they became available.

4.6. The proponent is also required to undertake additional on-ground pre-construction surveys, discussed further in the avoidance and mitigation sections below.

4.7. Due to the extent of the 2019/20 bushfires, the Department appointed a wildlife and threatened species bushfire recovery expert panel to assist in prioritising recovery actions for impacted native species and ecological communities. This included a provisional list of species and communities requiring urgent management intervention to support their protection and recovery.

i Commonwealth-listed species and communities that occur on the provisional list that will also be impacted by the proposed action include Koala, Regent Honeyeater, and Spotted-tail Quoll.

ii The proportion of each species' or ecological community's habitat with relation to the bushfire impacts can be seen at Attachment A4. The Department notes that only a small amount of the Narrabri LGA was burnt, almost entirely within the Mount Kaputar National Park, around 30 km from the proposed action area.

iii While the Narrabri region was not impacted by the 2019/20 fires, the Department has had consideration of bushfire impacts at a local, regional and national scale for the relevant species as discussed below.

4.8. The NSW assessment report notes that the upper clearing limits identified for listed threatened species and ecological communities are conservative estimates and are

likely to be reduced through pre-clearance measures. As such, the NSW conditions of consent require the proponent to retire 70 percent of the biodiversity offset liability prior to commencement of Phase 2 (the development of project infrastructure) and to retire the residual offset liability only if further clearing is required. This is to provide the proponent with an incentive to reduce vegetation clearing and habitat removal during the detailed design of the proposed action. The Department agrees with this approach and has recommended that you adopt this approach in applying conditions to this approval.

4.9. The Department's analysis of relevant threatened species and communities is discussed in more detail below and relies predominantly on the NSW assessment (Attachment D) and proponent's assessment documentation (Attachment F).

4.1 SPECIES AND ECOLOGICAL COMMUNITIES

4.1.1 Koala (combined populations of Qld, NSW and the ACT) (*Phascolarctos cinereus*) – vulnerable

Species information

4.10. The Koala is a medium-sized, arboreal marsupial endemic to Australia. Koalas inhabit a range of temperate, sub-tropical and tropical forest and woodland dominated by eucalypt species, and their habitat can be broadly defined as any forest or woodland containing Koala food trees[2].

4.11. The Koala was listed as vulnerable under the EPBC Act in 2012 due to the substantial decline of the combined populations of Queensland, NSW and the ACT.

4.12. SPRAT states that the Koala population experienced a 33 percent decline between 1990 and 2010 and is continuing to decline[3]. The approved conservation advice for the Koala identifies loss and fragmentation of habitat as key threats to the species. Drought and incidences of extreme heat are also known to cause significant mortality[2].

4.13. Substantial areas of Koala habitat across the east coast were burnt during the 2019/20 summer bushfires (Attachment A4) and the species is on the Department's provisional list of species requiring urgent management intervention[4].

4.14. The Department has had consideration of the aims and management actions outlined in the Department's technical report on the bushfires[5], and notes that the proposed action area is not considered a priority area as it is not adjacent to largely burnt areas of habitat. The Department considers that management actions

---

[2] Department of Agriculture, Water and the Environment, 2012, *Approved Conservation Advice for* Phascolarctos cinereus, Canberra

[3] Department of Agriculture, Water and the Environment, 2020, Koala (combined populations of Qld, NSW and the ACT) (*Phascolarctos cinereus*) *SPRAT Profile* [website], *http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=85104*

[4] Department of Agriculture, Water and the Environment, 2020, *Provisional list of animals requiring urgent management intervention*, https://www.environment.gov.au/system/files/pages/ef3f5ebd-faec-4c0c-9ea9-b7dfd9446cb1/files/provisional-list-animals-requiring-urgent-management-intervention-20032020.pdf

[5] Department of Agriculture, Water and the Environment, 2020, *Rapid analysis of impacts of the 2019-20 fires on animal species, and prioritization of species for management response, http://www.environment.gov.au/system/files/pages/ef3f5ebd-faec-4c0c-9ea9-b7dfd9446cb1/files/assessments-species-vulnerability-fire-impacts-14032020.pdf*

discussed below such as the management of feral predators, will contribute to identified priority actions in the report.

4.15. The Department considers that at a local level, aside from a small patch of low to moderately burnt vegetation within the proposed action area, the closest impacts of the main fires are approximately 30 km away from the proposed action. The Department considers that regionally and nationally the fires were more severe in other areas of eastern Australia, and as a result, has reduced overall habitat for the Koala as a whole. Given the proposed offset measures, the Department considers that the extent of the impact of the bushfires is not sufficient to justify additional avoidance, mitigation or offset measures, even in light of the decline in koala habitat following the bushfires.

Impacts

4.16. The MNES report (Attachment D4) states that no individuals were recorded within the proposed action area during surveys undertaken for the proposed action (see Figure 14 at Attachment A3).

4.17. However, the species is considered likely to occur in the proposed action area due to the availability of suitable habitat and the species' known occurrence in the Pilliga and surrounding areas.

4.18. The NSW Assessment report states that up to 989 ha of habitat for the species would be directly impacted (cleared) by the proposed action, while a further 181.1 ha would be indirectly impacted by habitat fragmentation, weed and feral animal incursion, noise, light and previously approved gas activities.

4.19. The proponent considers that the habitat within the proposed action area constitutes habitat critical to the survival of the species in accordance with the Department's EPBC Act referral guidelines for the vulnerable Koala. However, it states that the impact is unlikely to be significant as the Koala was not recorded in the proposed action area and 98 percent of potential habitat within the proposed action area will not to be impacted.

4.20. However, DPIE disagrees with this conclusion and considers that impacts to the species are likely to be significant in accordance with the Department's *Matters of National Environmental Significance, Significant Impact Guidelines 1.1* (Significant Impact Guidelines) [6].

4.21. The Department agrees with the NSW assessment that direct impacts of up to 989 ha of Koala habitat, and indirect impacts to a further 181.11 ha, as a result of the proposed action are likely to be significant as the proposed action is likely to adversely affect habitat critical to the survival of the species.

[6] Department of Agriculture, Water and the Environment, 2013, *Matters of National Environmental Significance, Significant Impact Guidelines 1.1,* http://www.environment.gov.au/system/files/resources/42f84df4-720b-4dcf-b262-48679a3aba58/files/nes-guidelines_1.pdf

Avoidance and mitigation

4.22. The areas of direct and indirect impact to Koala are conservative estimates that will be refined through further on-ground surveys pre-construction, as required by the plans and protocol discussed below.

4.23. The NSW conditions require the proponent to prepare and implement:

i a Field Development Protocol (FDP) to avoid, mitigate or manage environmental impacts during the planning, design and construction phases of the proposed action, including through surveys to inform micro-siting of wells and other infrastructure.

ii A Biodiversity Management Plan (BMP), including best-practice pre-clearance controls, weed and pest management, and measures to enhance the quality of habitat and vegetation connectivity within the proposed action area.

iii A Rehabilitation Management Plan (RMP) that addresses all aspects of rehabilitation including progressive rehabilitation and final closure, that would be approved by the NSW Resources Regulator.

4.24. The NSW conditions also require that a Biodiversity Advisory Group of biodiversity experts must be established to advise on the implementation of the FDP and BMP.

4.25. The Department considers that these measures are suitable and necessary to reduce impacts to the Koala and remaining habitat, and recommends you adopt the relevant NSW conditions relating to these measures in your EPBC Act approval.

4.26. The Department will be consulted during the development of the BMP and is satisfied that the expertise and oversight that will be provided by the Biodiversity Advisory Group, including the NSW Biodiversity and Conservation Division (BCD), provides suitable assurance that mitigation and management measures will be implemented thoroughly and in accordance with the recommended conditions, to minimise impacts to MNES.

Offsets and compensatory measures

4.27. The Department considers that despite the proposed avoidance and mitigation measures, the direct clearance of 989 ha of habitat for the Koala will likely result in a residual significant impact for the species and offsets are required to ensure that the proposed action does not have an unacceptable impact on the species.

4.28. The NSW Government has confirmed that the proponent has calculated the offset liability for the Koala in accordance with the NSW Biodiversity Offsets Policy for Major Projects (Major Projects Offset Policy) and underlying Framework for Biodiversity Assessment (FBA), which have been endorsed by the Commonwealth.

4.29. The offset liability for the Koala is 30,454 species credits. The NSW conditions require the proponent to retire:

i 70 percent of species credits (22,006) to compensate for the clearance of 692 ha of Koala habitat, prior to the commencement of Phase 2 and the development of the CSG field and related infrastructure.

ii Residual species credits (8,449) based on any exceedance of the 692 ha of clearance.

iii The species credits through land-based offsets where possible.

4.30. The NSW assessment report (Attachment D3) states that the proponent has demonstrated that suitable sites with like-for-like offsets are likely to be available,

and DPIE is satisfied that the biodiversity impacts can be offset in accordance with the EPBC Act Environmental Offsets Policy[7].

4.31. The proponent has also proposed a Koala research proposal which includes targeted surveys for Koala across 500,000 ha of the Pilliga Forest and modelling of density estimates. The NSW conditions of consent require that this research program is designed to determine the location and size of remnant Koala populations in the Pilliga Forest, and to guide adaptive management of the species' population in the proposed action area and land-based offset areas.

Conclusion

4.32. The Department recommends the relevant NSW conditions relating to mitigation and offsets for the Koala are applied for the purposes of the EPBC Act.

4.33. The NSW conditions include an upper clearance limit of 989 ha of Koala habitat based on the conservative estimate of impacts provided in the EIS and NSW assessment report. The NSW conditions also require that credits are retired in accordance with the NSW Biodiversity Offsets Scheme, which has also been endorsed by the Commonwealth.

4.34. The Department considers that, if approved subject to the recommended conditions, the proposed action will not have an unacceptable impact on the Koala.

4.1.2 Pilliga Mouse (*Pseudomys pilligaensis*) – vulnerable

Species information

4.35. The Pilliga Mouse is a small rodent known only to occur in the Pilliga region. It inhabits mixed *Eucalyptus*, *Acacia*, and *Callitris* open forests on sandy soil and sandstone ridges, with a preference for sparse understorey vegetation. It is a terrestrial species and lives in burrows[8].

4.36. The approved conservation advice for the Pilliga Mouse identifies key threats to the species as loss or degradation of habitat through inappropriate fire regimes or forestry operations, predation by feral cats and foxes, and competition with other species[9].

4.37. The conservation advice also notes regional priority actions for the species include the prevention of clearing habitat[9].

Impacts

4.38. The MNES report (Attachment D4) indicates that there are existing records of the species within the proposed action area. The EIS confirms that the species is known to occur.

4.39. The MNES report states that 889.3 ha of habitat for the species will be directly impacted (cleared) by the proposed action and a further 162.9 ha would be subject to

[7] Department of Agriculture, Water and the Environment, 2012, *Environment Protection and Biodiversity Conservation Act 1999 Environmental Offsets Policy*, Commonwealth of Australia, Canberra

[8] Department of Agriculture, Water and the Environment, 2020, Pseudomys pilligaensis – *Pilliga Mouse, Poolkoo SPRAT Profile* [website], http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=99

[9] Department of Agriculture, Water and the Environment, 2008, *Approved Conservation Advice for* Pseudomys pilligaensis *(Pilliga Mouse)*, Canberra

indirect impacts from habitat fragmentation, weed and feral animal incursion, noise, light and previously approved gas activities.

4.40. The EIS states that the proposed action will impact habitat critical to the survival of the species necessary for foraging, breeding and dispersal. However, it states that the species is unlikely to be significantly impacted by the proposed action as 98 percent of the habitat within the proposed action area would not be impacted, the removal of habitat would not isolate remaining patches of suitable habitat, and it is unlikely that the proposed action would introduce invasive species or disease likely to threaten the species.

4.41. DPIE disagrees with this conclusion and considers that impacts to the species are likely to be significant in accordance with the Significant Impact Guidelines, as the proposed action is likely to adversely affect habitat critical to the survival of the species[6].

4.42. The Department agrees with the NSW assessment that direct impacts to up to 889.3 ha of Pilliga Mouse habitat and indirect impacts to a further 162.9 ha are likely to be significant.

Avoidance and mitigation

4.43. The areas of direct and indirect impact to Pilliga Mouse are conservative estimates that will be refined through further on-ground surveys pre-construction, as required by the plans and protocol discussed below.

4.44. The NSW conditions require the proponent to prepare and implement:

i An FDP to avoid, mitigate or manage environmental impacts during the planning, design and construction phases of the proposed action, including through surveys to inform micro-siting of wells and other infrastructure.

ii A BMP, including best-practice pre-clearance controls, weed and pest management, and measures to enhance the quality of habitat and vegetation connectivity within the proposed action area.

iii An RMP that addresses all aspects of rehabilitation including progressive rehabilitation and final closure, that would be approved by the NSW Resources Regulator.

4.45. The NSW conditions also require that a Biodiversity Advisory Group of biodiversity experts must be established to advise on the implementation of the FDP and BMP.

4.46. The Department considers that these measures are suitable and necessary to reduce impacts to the Pilliga Mouse and remaining habitat, and recommends you adopt the relevant NSW conditions relating to these measures in your EPBC Act approval.

4.47. The Department will be consulted during the development of the BMP and is satisfied that the expertise and oversight that will be provided by the Biodiversity Advisory Group, including BCD, provides suitable assurance that mitigation and management measures will be implemented thoroughly and in accordance with the recommended conditions, to minimise impacts to MNES.

Offsets and compensatory measures

4.48. The Department considers that despite the proposed avoidance and mitigation measures, the direct clearance of up to 889.3 ha of habitat for the Pilliga Mouse will likely result in a residual significant impact for the species and offsets are required to

ensure that the proposed action does not have an unacceptable impact on the species.

4.49. The NSW Government has confirmed that the proponent has calculated the offset liability for the Pilliga Mouse in accordance with the Major Projects Offset Policy and FBA, which have been endorsed by the Commonwealth.

4.50. The offset liability for the Pilliga Mouse is 62,533 ecosystem credits. The NSW conditions require the proponent to retire:

i 70 percent of ecosystem credits (43,773) to compensate for the clearance of 622.5 ha of Pilliga Mouse habitat, prior to the commencement of Phase 2 and the development of the CSG field and related infrastructure.

ii Residual ecosystem credits (18,760) based on any exceedance of the 622.5 ha of clearance.

iii The ecosystem credits through land-based offsets where possible.

4.51. The NSW assessment report (Attachment D3) states that the proponent has demonstrated that suitable sites with like-for-like offsets are likely to be available, and DPIE is satisfied that the biodiversity impacts can be offset in accordance with the EPBC Act Environmental Offsets Policy[7].

Conclusion

4.52. The Department recommends the relevant NSW conditions relating to avoidance, mitigation and offsets for the Pilliga Mouse are applied for the purposes of the EPBC Act.

4.53. The NSW conditions include upper clearing limits for plant community types within the proposed action area which are commensurate with habitat for the species. These limits are equivalent to an upper clearing limit of 889.3 ha of habitat for the species. The NSW conditions also require that credits are retired in accordance with the NSW Biodiversity Offsets Scheme, which has been endorsed by the Commonwealth.

4.54. The Department considers that, if approved subject to the recommended conditions, the proposed action will not have an unacceptable impact on the Pilliga Mouse.

4.1.3 South-eastern Long-eared Bat (*Nyctophilus corbeni)* – vulnerable

Species information

4.55. The South-eastern Long-eared Bat is a relatively large, solid bat with a broad, robust skull, long ears and light to dark brown fur. It is found in central Queensland, central western NSW, north-western Victoria and eastern South Australia, with a patchy distribution. Most records are from inland of the Great Dividing Range[10].

4.56. The conservation advice for the species states that the South-eastern Long-eared Bat occurs throughout much of inland NSW, with at least 50 percent of the species' distribution occurring in that state.

[10] Threatened Species Scientific Committee, 2015, Nyctophilius corbeni – *Corben's Long-eared Bat, South-eastern Long-eared Bat SPRAT Profile* [website], http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=83395

4.57. Habitat for the species includes inland woodland vegetation types, such as box, ironbark and cypress pine woodlands and various types of tree mallee[10]. The conservation advice also states that the Pilliga scrub region is a distinct stronghold for the species.

4.58. A key threat to the species is habitat loss and fragmentation, as identified in both the Department's Action Plan for Australian Bats and the CSIRO Action Plan for Australian Mammals. The conservation advice states that 75 percent of the eastern part of the species range has been cleared in NSW.

4.59. Agriculture has been a significant cause for the above land clearing, however extractive industries are increasingly targeting the remaining areas [10].

4.60. Fire, predation by feral animals and reduction in hollow availability are other key threats identified to the species[10].

Impacts

4.61. The MNES report (Attachment D4) states that the South-eastern Long-eared Bat is known to occur in the proposed action area. Eight individuals were recorded within the proposed action area during surveys for the proposed action, with an additional 20 records identified through a literature review.

4.62. The MNES report states that 885 ha of foraging and breeding habitat for the species would be directly impacted (cleared) by the proposed action, and an additional 175.4 ha would be subject to indirect impacts from habitat fragmentation, weed and feral animal incursion, noise, light and previously approved gas activities.

4.63. The proponent considers that the proposed action is likely to reduce the area of occupancy of an important population of the species as the proposed action is likely to result in the removal of occupied habitat, and is likely to adversely affect habitat critical to the survival of the species. However, it states that the proposed action is unlikely to have a significant impact on the South-eastern Long-eared Bat as 98 percent of the habitat within the proposed action area would not be impacted, the removal of habitat would not isolate remaining patches of suitable habitat, and it is unlikely that the proposed action would introduce invasive species or disease likely to threaten the species.

4.64. However, DPIE disagrees with this conclusion and considers that impacts to the species are likely to be significant in accordance with the Significant Impact Guidelines[6].

4.65. The Department agrees with the NSW assessment that direct impacts to 885 ha of South-eastern Long-eared Bat habitat, and further indirect impacts to 175.4 ha of habitat, are likely to be significant, as the proposed action is likely to adversely affect habitat critical to the survival of the species, and to reduce the area of occupancy of an important population of the species.

Avoidance and mitigation

4.66. The areas of direct and indirect impact to South-eastern Long-eared Bat habitat are conservative estimates that will be refined through further on-ground surveys pre-construction, as required by the plans and protocol discussed below.

4.67. The NSW conditions require the proponent to prepare and implement:

i an FDP to avoid, mitigate or manage environmental impacts during the planning, design and construction phases of the proposed action, including through surveys to inform micro-siting of wells and other infrastructure.

ii A BMP, including best-practice pre-clearance controls, weed and pest management, and measures to enhance the quality of habitat and vegetation connectivity within the proposed action area.

iii An RMP that addresses all aspects of rehabilitation including progressive rehabilitation and final closure, that would be approved by the NSW Resources Regulator.

4.68. The NSW conditions also require that a Biodiversity Advisory Group of biodiversity experts must be established to advise on the implementation of the FDP and BMP.

4.69. The Department considers that these measures are suitable and necessary to reduce impacts to the South-eastern Long-eared Bat and remaining habitat, and recommends you adopt the relevant NSW conditions relating to these measures in your EPBC Act approval.

4.70. The Department will be consulted during the development of the BMP and is satisfied that the expertise and oversight that will be provided by the Biodiversity Advisory Group, including BCD, provides suitable assurance that mitigation and management measures will be implemented thoroughly and in accordance with the recommended conditions, to minimise impacts to MNES.

Offsets and compensatory measures

4.71. The Department considers that despite the proposed avoidance and mitigation measures, the direct clearance of up to 885 ha of habitat for the South-eastern Long-eared Bat will likely result in a residual significant impact for the species and offsets are required to ensure that the proposed action does not have an unacceptable impact on the species.

4.72. The NSW Government has confirmed that the proponent has calculated the offset liability for the South-eastern Long-eared Bat in accordance with the Major Projects Offset Policy and underlying FBA, which have been endorsed by the Commonwealth.

4.73. The offset liability for the South-eastern Long-eared Bat is 65,847 ecosystem credits. The NSW conditions require the proponent to retire:

i 70 percent of ecosystem credits (46,093) to compensate for the clearance of 620 ha of South-eastern Long-eared Bat habitat, prior to the commencement of Phase 2 and the development of the CSG field and related infrastructure.

ii Residual ecosystem credits (19,754) based on any exceedance of the 620 ha of clearance.

4.74. The NSW assessment report (Attachment D3) states that the proponent has demonstrated that suitable sites with like-for-like offsets are likely to be available, and DPIE is satisfied that the biodiversity impacts can be offset in accordance with the EPBC Act Environmental Offsets Policy[7].

Conclusion

4.75. The Department recommends the relevant NSW conditions relating to mitigation and offsets for the South-eastern Long-eared Bat are applied for the purposes of the EPBC Act.

4.76. The NSW conditions include upper clearing limits for plant community types within the proposed action area which are commensurate with habitat for the species. These limits are equivalent to an upper clearing limit of 885 ha of habitat for the

South-eastern Long-eared Bat. The NSW conditions also require that credits are retired in accordance with the NSW Biodiversity Offsets Scheme, which has been endorsed by the Commonwealth.

4.77. The Department considers that, if approved subject to the recommended conditions, the proposed action will not have an unacceptable impact on the South-eastern Long-eared Bat.

4.1.4 Superb Parrot (*Polytelis swainsonii*) – vulnerable

Species information

4.78. The Superb Parrot is a medium-sized parrot, with bright green plumage and a long tail, occurring only in south-eastern Australia[11].

4.79. In NSW, it mostly occurs west of the Great Dividing Range, where it mainly inhabits the Riverina, the South-west Slope and Southern Tableland regions. Its range extends north to around Narrabri and Wee Waa in the North-west Plain Region, from a line joining Coonabarabran and Narrabri[11].

4.80. The species mainly inhabits forests and woodlands dominated by eucalypts, especially River Red Gums (*Eucalyptus camaldulensis*), and box eucalypts such as Yellow Box (*E. melliodora*) or Grey Box (*E. microcarpa*) [11].

4.81. The conservation advice for the Superb Parrot identifies key threats to the species as loss and degradation of habitat, competition for nesting hollows, road kills, climate change, disease, and illegal removal of wild birds[12].

4.82. It is estimated that over 90 percent of habitat for the species has been cleared, with remaining patches occurring mostly along roadsides or in small, scattered remnant patches[12]. The conservation advice also states that the loss of large-hollow bearing trees suitable for nesting will continue to decline into the future unless urgent action is taken.

Impacts

4.83. The MNES report (Attachment D4) states that no individuals were recorded in the proposed action area during surveys undertaken for the proposed action (see Figures 10 and 12 at Attachment A3).

4.84. However, the species is considered to potentially occur due to the availability of suitable habitat.

4.85. The MNES report states that up to 416.8 ha of Superb Parrot habitat will be directly impacted (cleared) by the proposed action, and an additional 82.02 ha would be subject to indirect impacts from habitat fragmentation, weed and feral animal incursion, noise, light and previously approved gas activities.

4.86. The EIS states that potential foraging habitat for the species within the proposed action area aligns with the definition for habitat critical to the survival of the species described in the recovery plan. However, it states that the proposed action is unlikely

[11] Department of Agriculture, Water and the Environment, 2020, Polytelis swainsonii – *Superb Parrot SPRAT Profile* [website], http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=738

[12] Threatened Species Scientific Committee, 2016, *Conservation Advice* Polytelis swainsonii *Superb Parrot,* Canberra

to have a significant impact on Superb Parrot as over 98 percent of foraging habitat in the proposed action area would not be impacted, the removal of habitat within the area would not isolate patches such that movement could not occur between patches, and it is unlikely that invasive species or disease would be introduced as a threat to the species as a result of the proposed action.

4.87. DPIE accepted this assessment in the MNES report (Attachment D4).

4.88. Line area advice was sought from the Department's Threatened and Migratory Birds section (Attachment E2) who advised that the most significant threat to the Superb Parrot is widespread clearing, degradation and fragmentation of breeding and foraging habitat throughout the species' range, including corridors of vegetation used for regular movements. The advice further states that the direct clearance of up to 416.8 ha of habitat is likely to have adverse impacts to the Superb Parrot.

4.89. On that basis, the Department disagrees with the conclusions of the proponent and DPIE and considers that impacts to the species as a result of the proposed action are likely to be significant in accordance with the Significant Impact Guidelines, as the proposed action is likely to adversely affect habitat critical to the survival of the species.

Avoidance and Mitigation

4.90. The areas of direct and indirect impact to Superb Parrot habitat are conservative estimates that will be refined through further on-ground surveys pre-construction, as required by the plans and protocol discussed below.

4.91. The NSW conditions require the proponent to prepare and implement:

i An FDP to avoid, mitigate or manage environmental impacts during the planning, design and construction phases of the proposed action, including through surveys to inform micro-siting of wells and other infrastructure.

ii A BMP, including best-practice pre-clearance controls, weed and pest management, and measures to enhance the quality of habitat and vegetation connectivity within the proposed action area.

iii An RMP that addresses all aspects of rehabilitation including progressive rehabilitation and final closure, that would be approved by the NSW Resources Regulator.

4.92. The NSW conditions also require that a Biodiversity Advisory Group of biodiversity experts must be established to advise on the implementation of the FDP and BMP.

4.93. The Department notes that while the NSW Government did not determine impacts to Superb Parrot as a result of the proposed action to be significant, the above avoidance and mitigation measures apply to the plant community types within the proposed action area that are commensurate with habitat for the species.

4.94. The Department considers that these measures are suitable and necessary to reduce impacts to the Superb Parrot and remaining habitat, and recommends you adopt the relevant NSW conditions relating to these measures in your EPBC Act approval.

4.95. The Department will be consulted during the development of the BMP and is satisfied that the expertise and oversight that will be provided by the Biodiversity Advisory Group, including BCD, provides suitable assurance that mitigation and management measures will be implemented thoroughly and in accordance with the recommended conditions, to minimise impacts to MNES.

Offsets and compensatory measures

4.96. The Department considers that despite the proposed avoidance and mitigation measures, the direct clearance of up to 416.8 ha of habitat for the Superb Parrot will likely result in a residual significant impact to the species and offsets are required to ensure that the proposed action does not have an unacceptable impact on the species.

4.97. The Department notes that the NSW conditions do not require the proponent to provide offsets for the Superb Parrot. However, the Superb Parrot is an ecosystem credit species under the FBA and the offset liability will be met through the retirement of ecosystem credits required by the NSW conditions.

4.98. As the MNES report does not identify species specific ecosystem credit requirements for the Superb Parrot, the number of required credits was provided to the Department by BCD.

4.99. The offset liability for the Superb Parrot is 31,233.6 ecosystem credits. The Department recommends you attach conditions to the approval of the proposed action to require the proponent to retire:

i 70 percent of ecosystem credits (22,984.1) to compensate for the clearance of 291.8 ha of Superb Parrot habitat, prior to the commencement of Phase 2 and the development of the CSG field and related infrastructure.

ii Residual ecosystem credits (8,249.5) based on any exceedance of the 291.8 ha of clearance.

iii The ecosystem credits through land-based offsets where possible.

4.100. The NSW assessment report (Attachment D3) states that the proponent has demonstrated that suitable sites with like-for-like offsets are likely to be available, based on PCTs associated with Superb Parrot, and DPIE is satisfied that the biodiversity impacts can be offset in accordance with the EPBC Act Environmental Offsets Policy[7].

Conclusion

4.101. The Department recommends that conditions are applied to the approval of the action requiring that residual significant impacts to Superb Parrot are offset.

4.102. The NSW conditions include upper clearing limits for plant community types within the proposed action area which are commensurate with habitat for the species. These limits are equivalent to an upper clearing limit of 416.8 ha of habitat for the Superb Parrot. The NSW conditions also require that credits are retired in accordance with the NSW Biodiversity Offsets Scheme, which has been endorsed by the Commonwealth.

4.103. The Department considers that, if approved subject to the recommended conditions, the proposed action will not have an unacceptable impact on the Superb Parrot.

4.1.5 Regent Honeyeater (*Anthochaera phrygia*) – endangered

Species information

4.104. The Regent Honeyeater is a striking black and yellow bird with a patchy distribution between south-east Queensland and central Victoria. It primarily occurs in box-ironbark woodland, but also occurs in other forest type. The species primarily feeds

on nectar, and to a lesser extent, insects. It mainly feeds on nectar from eucalypt species and mistletoes, and it prefers taller and larger diameter trees for foraging[13].

4.105. The conservation advice states that the species is thought to have undergone a population decline of greater than 80 percent in 24 years. The main cause of the decline is thought to be clearance of the species habitat[14].

4.106. Key identified threats to the species include the clearing, fragmentation and degradation of suitable habitat, and competition for that habitat with other nectarivorous and non-nectarivorous bird. The rapid decline of the once large population also means that a severe loss of genetic variability is also a threat[15].

4.107. Substantial areas of Regent Honeyeater habitat across the east coast were burnt during the 2019/20 summer bushfires (Attachment A4) and the species is on the Department's provisional list of species requiring urgent management intervention[4].

4.108. The Department has had consideration of the aims and management actions outlined in the Department's technical report on the bushfires[5], and notes that the proposed action area is not considered a priority area as it is not adjacent to largely burnt areas of habitat. The Department considers that management actions discussed below such as the management of feral predators, will contribute to identified priority actions in the report.

4.109. The Department considers that at a local level, aside from a small patch of low to moderately burnt vegetation within the proposed action area, the closest impacts of the main fires are approximately 30 km away from the proposed action. The Department notes that regionally and nationally the fires were more severe in other areas of eastern Australia, and, as a result, has reduced overall habitat for the Regent Honeyeater as a whole. Given the proposed offset measures, the Department considers that the extent of the impact of the bushfires is not sufficient to justify additional avoidance, mitigation or offset measures, even in light of the decline in Regent Honeyeater habitat following the bushfires.

Impacts

4.110. The MNES report (Attachment D4) states that no individuals were recorded in the proposed action area during surveys undertaken for the proposed action (see Figures 10 and 12 at Attachment A3).

4.111. However, the species is considered to potentially occur due to the availability of potential habitat, and scattered records of the species in the Pilliga.

4.112. The EIS states that up to 796.8 ha of foraging habitat for the species would be removed as a result of the proposed action, and an additional 157.48 ha would be subject to indirect impacts. However, this was revised in the RTS in consultation with BCD, as only Mugga Ironbark (*E. sideroxylon*) and Yellow Box are key foraging

[13] Department of Agriculture, Water and the Environment, 2020, Anthochaera phyrgia – *Regent Honeyeater SPRAT profile* [website], http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=82338
[14] Department of Agriculture, Water and the Environment, 2015, *Conservation Advice* Anthochaera phyrgia *Regent Honeyeater*, Canberra
[15] Department of Agriculture, Water and the Environment, 2016, *National Recovery Plan for the Regent Honeyeater (*Anthochaera phyrgia*),* Canberra

species for the Regent Honeyeater and consequently other areas of potential habitat identified within the proposed action area are not associated with the species.

4.113. As such, up to 48 ha of foraging habitat for the Regent Honeyeater will be directly impacted (cleared) as a result of the proposed action and a further 9.5 ha of foraging habitat will be subject to indirect impacts from habitat fragmentation, weed and feral animal incursion, noise, light and previously approved gas activities.

4.114. The Department considers that BCD has the required expertise to undertake an adequate assessment of habitat for the species and therefore agrees with the assessment of habitat and associated conditions.

4.115. The proponent considers that the proposed action is unlikely to have a significant impact on the Regent Honeyeater as the species is not considered to use habitat in the proposed action area as a reliable foraging resource, 98 percent of potential foraging habitat in the area would not be impacted, and the nature and scale of habitat removal would not isolate patches such that movement could not occur between patches.

4.116. However, DPIE disagrees with that conclusion and consider that impacts to the species are likely to be significant in accordance with the Significant Impact Guidelines[6].

4.117. The Department agrees with the NSW assessment that direct impacts to 48 ha of habitat for the Regent Honeyeater, and indirect impacts to a further 9.5 ha, are likely to be significant as the proposed action is likely to adversely affect habitat critical to the survival of the species.

Avoidance and Mitigation

4.118. The areas of direct and indirect impact to Regent Honeyeater are conservative estimates that will be refined through further on-ground surveys pre-construction, as required by the plans and protocol discussed below.

4.119. The NSW conditions require the proponent to prepare and implement:

i a Field Development Protocol (FDP) to avoid, mitigate or manage environmental impacts during the planning, design and construction phases of the proposed action, including through surveys to inform micro-siting of wells and other infrastructure.

ii A Biodiversity Management Plan (BMP), including best-practice pre-clearance controls, weed and pest management, and measures to enhance the quality of habitat and vegetation connectivity within the proposed action area.

iii A Rehabilitation Management Plan (RMP) that addresses all aspects of rehabilitation including progressive rehabilitation and final closure, that would be approved by the NSW Resources Regulator.

4.120. The NSW conditions also require that a Biodiversity Advisory Group of biodiversity experts must be established to advise on the implementation of the FDP and BMP.

4.121. The Department considers that these measures are suitable and necessary to reduce impacts to the Regent Honeyeater and remaining habitat, and recommends you adopt the relevant NSW conditions relating to these measures in your EPBC Act approval.

4.122. The Department will be consulted during the development of the BMP and is satisfied that the expertise and oversight that will be provided by the Biodiversity

Advisory Group, including BCD, provides suitable assurance that mitigation and management measures will be implemented thoroughly and in accordance with the recommended conditions, to minimise impacts to MNES.

Offsets and compensatory measures

4.123. The Department considers that despite the proposed avoidance and mitigation measures, the direct clearance of up to 48 ha of habitat for the Regent Honeyeater will likely result in a residual significant impact for the species and offsets are required to ensure that the proposed action does not have an unacceptable impact on the species.

4.124. The NSW Government has confirmed that the proponent has calculated the offset liability for the Regent Honeyeater in accordance with the Major Projects Offset Policy and FBA, which have been endorsed by the Commonwealth.

4.125. The offset liability for the Regent Honeyeater is 4,255 species credits. The NSW conditions require the proponent to retire:

i 70 percent of species credits (3,035) to compensate for the clearance of 34 ha of Regent Honeyeater habitat, prior to the commencement of Phase 2 and the development of the CSG field and related infrastructure.

ii Residual species credits (1,220) based on any exceedance of the 34 ha of clearance.

iii The species credits through land-based offsets where possible.

4.126. The NSW assessment report (Attachment D3) states that the proponent has demonstrated that suitable sites with like-for-like offsets are likely to be available, and DPIE is satisfied that the biodiversity impacts can be offset in accordance with the EPBC Act Environmental Offsets Policy[7].

Conclusion

4.127. The Department recommends the relevant NSW conditions relating to mitigation and offsets for the Regent Honeyeater are applied for the purposes of the EPBC Act.

4.128. The NSW conditions include an upper clearance limit of 48 ha based on the conservative estimate of impacts provided in the EIS and NSW assessment report. The NSW conditions also require that credits are retired in accordance with the NSW Biodiversity Offsets Scheme, which has been endorsed by the Commonwealth.

4.129. The Department considers that the proposed action, if approved subject to the recommended conditions, will not have an unacceptable impact on the Regent Honeyeater.

4.1.6 Spotted-tail Quoll (*Dasyurus maculatus maculatus*) – endangered

Species information

4.130. The Spotted-tail Quoll is a nocturnal, cat-sized, carnivorous marsupial with reddish-brown fur, and distinctive white spots over its back and tail[16].

[16] Department of Agriculture, Water and the Environment, 2020, Dasyurus maculatus maculatus (SE mainland population) – *Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (southeastern mainland*

4.131. The species was previously widely distributed throughout south-east Queensland, eastern NSW, Victoria, south-east Australia and Tasmania. The subspecies' mainland range has reduced by 50-90 percent since European settlement, with only 44 known sites within NSW[16].

4.132. The Spotted-tail Quoll is a mainly forest dependent species, although occurs in a variety of habitats including closed forests, temperate and sub-tropical rainforest, tall eucalypt forests, open woodlands, drier rain shadow woodlands and coastal heathlands[17].

4.133. Key threats to the species identified in the conservation advice include habitat loss and fragmentation, invasive species, fire and purposeful killing[18].

4.134. Substantial areas of Spotted-tail Quoll habitat across the east coast were burnt during the 2019/20 summer bushfires (Attachment A4) and the species is on the Department's provisional list of species requiring urgent management intervention[4].

4.135. The Department has had consideration of the aims and management actions outlined in the Department's technical report on the bushfires[5], and notes that the proposed action area is not considered a priority area as it is not adjacent to largely burnt areas of habitat. The Department considers that management actions discussed below such as the management of feral predators, will contribute to identified priority actions in the report.

4.136. The Department considers that at a local level, aside from a small patch of low to moderately burnt vegetation within the proposed action area, the closest impacts of the main fires are approximately 30 km away from the proposed action. The Department notes that, regionally and nationally the fires were more severe in other areas of eastern Australia, and, as a result, has reduced overall habitat for the Spotted tail Quoll as a whole. Given the proposed offset measures, the Department considers that the extent of the impact of the bushfires is not sufficient to justify additional avoidance, mitigation or offset measures, even in light of the decline in Spotted tail Quoll habitat following the bushfires.

Impacts

4.137. The MNES report (Attachment D4) states that no individuals were recorded in the proposed action area during surveys undertaken for the proposed action (see Figures 10 and 12 at Attachment A3).

4.138. However, the species is considered to potentially occur due to the presence of suitable habitat.

4.139. The MNES report states that up to 989 ha of foraging and 885 ha of breeding habitat would be directly impacted (cleared) as a result of the proposed action, and further 181 ha of foraging habitat and 175 ha of breeding habitat would be subject to indirect impacts from habitat fragmentation, weed and feral animal incursion, noise, light and previously approved gas activities.

---

[17] Threatened Species Scientific Committee, 2020, *Conservation Advice* Dasyurus maculatus maculatus *(southeastern mainland population) Spotted-tail Quoll, southeastern mainland*, Canberra
[18] Department of Agriculture, Water and the Environment, 2016, *National Recovery Plan for the Spotted-tailed Quoll* Dasyurus maculatus maculatus, Canberra

4.140. The proponent considers that the proposed action is unlikely to have a significant impact on the Spotted-tail Quoll as the species is not considered to use habitat in the proposed action area as a reliable foraging resource, 98 percent of potential foraging habitat in the area would not be impacted, and the nature and scale of habitat removal would not isolate patches such that movement could not occur between patches.

4.141. However, DPIE disagrees with that conclusion and considers that impacts to the species are likely to be significant in accordance with the Significant Impact Guidelines[6].

4.142. The Department agrees with the NSW assessment that direct impacts to 989 ha of habitat for the species, and indirect impacts to a further 181 ha, are likely to be significant, as the proposed action is likely to adversely affect habitat critical to the survival of the species.

Avoidance and Mitigation

4.143. The areas of direct and indirect impact to the Spotted-tail Quoll are conservative estimates that will be refined through further on-ground surveys pre-construction, as required by the plans and protocol discussed below.

4.144. The NSW conditions require the proponent to prepare and implement:

i An FDP to avoid, mitigate or manage environmental impacts during the planning, design and construction phases of the proposed action, including through surveys to inform micro-siting of wells and other infrastructure.

ii A BMP, including best-practice pre-clearance controls, weed and pest management, and measures to enhance the quality of habitat and vegetation connectivity within the proposed action area.

iii An RMP that addresses all aspects of rehabilitation including progressive rehabilitation and final closure, that would be approved by the NSW Resources Regulator.

4.145. The NSW conditions also require that a Biodiversity Advisory Group of biodiversity experts must be established to advise on the implementation of the FDP and BMP.

4.146. The Department considers that these measures are suitable and necessary to reduce impacts to the Spotted-tail Quoll and remaining habitat, and recommends you adopt the relevant NSW conditions relating to these measures in your EPBC Act approval.

4.147. The Department will be consulted during the development of the BMP and is satisfied that the expertise and oversight that will be provided by the Biodiversity Advisory Group, including BCD, provides suitable assurance that mitigation and management measures will be implemented thoroughly and in accordance with the recommended conditions, to minimise impacts to MNES.

Offsets and other compensatory measures

4.148. The Department considers that despite the proposed avoidance and mitigation measures, the direct clearance of up to 989 ha of habitat for the Spotted-tail Quoll will likely result in a residual significant impact for the species and offsets are required to ensure that the proposed action does not have an unacceptable impact on the species.

4.149. The NSW Government has confirmed that the proponent has calculated the offset liability for the Spotted-tail Quoll in accordance with the Major Projects Offset Policy and FBA, which have been endorsed by the Commonwealth.

4.150. The offset liability for the Spotted-tail Quoll is 59,068 ecosystem credits. The NSW conditions require the proponent to retire:

i 70 percent of ecosystem credits (41,348) to compensate for the clearance of 692 ha of Spotted-tail Quoll habitat, prior to the commencement of Phase 2 and the development of the CSG field and related infrastructure.

ii Residual species credits (17,720) based on any exceedance of the 692 ha of clearance.

iii The species credits through land-based offsets where possible.

4.151. The NSW assessment report (Attachment D3) states that the proponent has demonstrated that suitable sites with like-for-like offsets are likely to be available, and DPIE is satisfied that the biodiversity impacts can be offset in accordance with the EPBC Act Environmental Offsets Policy[7].

Conclusion

4.152. The Department recommends the relevant NSW conditions relating to mitigation and offsets for the Spotted-tail Quoll are applied for the purposes of the EPBC Act.

4.153. The NSW conditions include upper clearing limits for plant community types within the proposed action area which are commensurate with habitat for the species. These limits are equivalent to an upper clearing limit of 989 ha of habitat for the Spotted-tail Quoll. The NSW conditions also require that credits are retired in accordance with the NSW Biodiversity Offsets Scheme, which has been endorsed by the Commonwealth.

4.154. The Department considers that, if approved subject to the recommended conditions, the proposed action will not have an unacceptable impact on the Spotted-tail Quoll.

4.1.7 Swift Parrot (*Lathamus discolor*) – endangered

Species information

4.155. The Swift Parrot is a slim, medium-sized parrot that is mostly bright green in colour, with dark-blue patches on the crown, a prominent red face, and the chin and throat are narrowly bordered with yellow[19].

4.156. The species breeds in Tasmania during the summer and the entire population migrates to mainland Australian for the winter. Whilst on the mainland the Swift Parrot disperses widely to forage on eucalypt species, with the majority being found in Victoria and NSW. The area of occupancy has declined significantly since European settlement, as can be inferred from the extend of habitat loss. 70 percent of the principal wintering habitat for the species has been cleared in NSW[19].

[19] Threatened Species Scientific Committee, 2016, *Conservation Advice* Lathamus discolor *Swift Parrot,* Canberra

4.157. Key threats to the species include habitat loss and alteration, predation by sugar gliders, competition, disease and illegal wildlife capture[20].

4.158. The species recovery plan states that the majority of Swift Parrot foraging in NSW occurs outside of conservation reserves, and therefore those areas continue to be vulnerable to loss, fragmentation or disturbance[20].

4.159. The species was listed due to a significant reduction in population size[19].

Impacts

4.160. The MNES report (Attachment D4) states that no individuals were recorded within the proposed action area (see Figures 10 and 12 at Attachment A3).

4.161. However, the species is considered to have potential to occur in the area due to the availability of suitable habitat.

4.162. The MNES report states that up to 796.8 ha of foraging habitat for the species would be directly impacted (cleared) as a result of the proposed action, and an additional 157.48 ha would be subject to indirect impacts from habitat fragmentation, weed and feral animal incursion, noise, light and previously approved gas activities.

4.163. The EIS states that the proposed action is unlikely to have a significant impact on the Swift Parrot as 98 percent of potential foraging habitat within the proposed action area would not be impacted, the removal of habitat is not likely to isolate patches such that movement could not occur between patches, and it is unlikely that the proposed action would result in the introduction of invasive species or disease that would pose a threat to the species.

4.164. DPIE accepted this assessment in the MNES report (Attachment D4).

4.165. Line area advice was sought from the Department's Threatened and Migratory Birds section (Attachment E2) who advised that it is considered critically important to protect and manage a broad range of habitat and foraging resources for the species due to the variability of Swift Parrots across the landscape. Further, where habitat loss continues to occur within foraging habitat on the mainland, it is also important to retain mature trees to ensure continuity of food resources over time.

4.166. On that basis, the Department disagrees with the conclusions of the proponent and DPIE and considers that the proposed action is likely to have a significant impact to the species as it is likely to reduce the area of occupancy of the species, in accordance with the Significant Impact Guidelines.

Avoidance and Mitigation

4.167. The areas of direct and indirect impact to Swift Parrot habitat are conservative estimates that will be refined through further on-ground surveys pre-construction, as required by the plans and protocol discussed below.

4.168. The NSW conditions require the proponent to prepare and implement:

[20] Saunders, D.L & C.L. Tzaros, 2011, *National Recovery Plan for the Swift Parrot* (Lathamus discolor), Melbourne

i an FDP to avoid, mitigate or manage environmental impacts during the planning, design and construction phases of the proposed action, including through surveys to inform micro-siting of wells and other infrastructure.

ii A BMP, including best-practice pre-clearance controls, weed and pest management, and measures to enhance the quality of habitat and vegetation connectivity within the proposed action area.

iii A RMP that addresses all aspects of rehabilitation including progressive rehabilitation and final closure, that would be approved by the NSW Resources Regulator.

4.169. The NSW conditions also require that a Biodiversity Advisory Group of biodiversity experts must be established to advise on the implementation of the FDP and BMP.

4.170. The Department notes that while the NSW Government did not determine impacts to Swift Parrot as a result of the proposed action to be significant, the above avoidance and mitigation measures apply to the plant community types within the proposed action area that are commensurate with habitat for the species.

4.171. The Department considers that these measures are suitable and necessary to reduce impacts to the Swift Parrot and remaining habitat, and recommends you adopt the relevant NSW conditions relating to these measures in your EPBC Act approval.

4.172. The Department will be consulted during the development of the BMP and is satisfied that the expertise and oversight that will be provided by the Biodiversity Advisory Group, including BCD, provides suitable assurance that mitigation and management measures will be implemented thoroughly and in accordance with the recommended conditions, to minimise impacts to MNES.

Offsets and compensatory measures

4.173. The Department considers that despite the proposed avoidance and mitigation measures, the direct clearance of up to 796.8 ha of habitat for the Swift Parrot will likely result in a residual significant impact to the species and offsets are required to ensure that the proposed action does not have an unacceptable impact on the species.

4.174. The Department notes that the NSW conditions do not require the proponent to provide offsets for the Swift Parrot. However, the Swift Parrot is an ecosystem credit species under the FBA and the offset liability will be met through the retirement of ecosystem credits required by the NSW conditions.

4.175. As the MNES report does not identify species specific ecosystem credit requirements for the Swift Parrot, the number of required credits was provided to the Department by BCD.

4.176. The offset liability for the Swift Parrot is 61,433.5 ecosystem credits. The Department recommends you attach conditions to the approval of the proposed action to require the proponent to retire:

i 70 percent of ecosystem credits (44,434) to compensate for the clearance of 557.8 ha of Swift Parrot habitat, prior to the commencement of Phase 2 and the development of the CSG field and related infrastructure.

ii Residual ecosystem credits (16,999.5) based on any exceedance of the 557.8 ha of clearance.

iii The ecosystem credits through land-based offsets where possible.

4.177. The NSW assessment report (Attachment D3) states that the proponent has demonstrated that suitable sites with like-for-like offsets are likely to be available, based on PCTs associated with Swift Parrot, and DPIE is satisfied that the biodiversity impacts can be offset in accordance with the EPBC Act Environmental Offsets Policy[7].

Conclusion

4.178. The Department recommends that conditions are applied to the approval of the action requiring that residual significant impacts to Swift Parrot are offset.

4.179. The NSW conditions include upper clearing limits for plant community types within the proposed action area which are commensurate with habitat for the species. These limits are equivalent to an upper clearing limit of 796.8 ha of habitat for the Swift Parrot. The NSW conditions also require that credits are retired in accordance with the NSW Biodiversity Offsets Scheme, which has been endorsed by the Commonwealth.

4.180. The Department considers that, if approved subject to the recommended conditions, the proposed action will not have an unacceptable impact on the Swift Parrot.

4.1.8 *Androcalva procumbens* – vulnerable

Species information

4.181. *Androcalva procumbens* is a prostrate shrub with slender trailing stems, recorded in an area bounded by Nymagee, Dubbo, Narrabri and the Pilliga in NSW. The species occurs on sandy sites, often along roadsides, with Mugga Ironbark, Red Gum (*E. dealbata*), and Broombush (*Melaleuca uncinate*)[21].

4.182. The conservation advice for the species identifies its key threats as the clearing of native vegetation, competition from woody shrubs, and inappropriate fire regimes[22].

Impacts

4.183. The MNES report (Attachment D4) states that approximately 240,274 individuals of the species are known to occur within the proposed action area (see Figure 15 at Attachment A3). Based on occupied habitat and average densities of occurrence, up to 3,716 individuals would be removed or indirectly impacted from habitat

[21] Department of Agriculture, Water and the Environment, 2020, Andorcalva procumbens *SPRAT Profile* [website], http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=87153
[22] Department of Agriculture, Water and the Environment, 2008, *Approved Conservation Advice for* Rulingia procumbens, Canberra

fragmentation, weed and feral animal incursion, noise, light and previously approved gas activities.

4.184. The EIS states that the breeding cycle of the species can be impacted by habitat removal undertaken during important stages of the species' lifecycle, or which reduce habitat quality, and that in this case, the germination of seedlings and the regeneration of the population would be prevented. It continues to say that the breeding cycle would still be able to be successfully completed in the study area during all stages of the proposed action.

4.185. Linear fragmentation of the species' habitat would occur, with an average width of 10 m and a maximum width of 30 m along the Bibblewindi to Leewood infrastructure corridor. Further fragmentation would occur through the construction of well pads, as up to 1 ha will be cleared at each pad. The Department notes that well pads will be located at least 250 m away from each other.

4.186. The EIS states that there is no evidence of disease (dieback) caused by the soil-borne water mould *Phytophthora cinnamomi,* a root-rot plant pathogen, in the study area. It states that the risk of *Phytophthora cinnamomi* occurring in the study area is low as it is not within a known vulnerable climatic zone but that the potential extent of the pathogen in Australia is not completely known.

4.187. The EIS states that there is the potential for the pathogen to be introduced or spread as a result of the movement of contaminated soil or vehicles.

4.188. The proponent considers that the proposed action is unlikely to have a significant impact on *Androcalva procumbens* as over 98 percent of individuals within the proposed action area would not be impacted, it is unlikely that the breeding cycle would be disrupted, the removal of habitat is unlikely to isolate patches, and it is unlikely that the proposed action would introduce invasive species or disease that would likely pose a threat to the species.

4.189. However, DPIE disagrees with that conclusion and considers that impacts to the species are likely to be significant in accordance with the Significant Impact Guidelines[6].

4.190. The Department agrees with the NSW assessment that direct impacts to up to 3,716 individuals of *Androcalva procumbens* is likely to be significant, as the proposed action is likely to adversely affect habitat critical to the survival of the species.

<u>Avoidance and Mitigation</u>

4.191. The areas of direct and indirect impact to *Androcalva procumbens* are conservative estimates that will be refined through further on-ground surveys pre-construction, as required by the plans and protocol discussed below.

4.192. The NSW conditions require the proponent to prepare and implement:

i An FDP to avoid, mitigate or manage environmental impacts during the planning, design and construction phases of the proposed action, including through surveys to inform micro-siting of wells and other infrastructure.

ii A BMP, including best-practice pre-clearance controls, weed and pest management, and measures to enhance the quality of habitat and vegetation connectivity within the proposed action area.

iii An RMP that addresses all aspects of rehabilitation including progressive rehabilitation and final closure, that would be approved by the NSW Resources Regulator.

4.193. The NSW conditions also require that a Biodiversity Advisory Group of biodiversity experts must be established to advise on the implementation of the FDP and BMP.

4.194. As stated in the EIS the proponent has committed to staged clearing and rehabilitation across the proposed action area. This would allow for the recovery of individuals and the completion of the full life cycle of the species throughout all stages of the proposed action.

4.195. Rehabilitation is proposed following the clearance of vegetation for the construction of well pads and linear infrastructure. Linear fragmentation would be rehabilitated by 50 percent of its average width, and areas cleared for the installation of well pads would be rehabilitated by approximately 75 per cent. Rehabilitation would be informed by the RMP required in the NSW conditions.

4.196. The EIS states that the potential risk of introduction or spread of *Phytophthora cinnamomi*, and potential impacts to *Androcalva procumbens*, will be minimised through controlling soil transportation into the study area. Vehicle wash down stations and inspections of transported soil will be applied throughout the construction and operation phases of the project. The Department understands that these measures will be incorporated into the FDP and/or BMP.

4.197. The Department considers that the NSW conditions are suitable and necessary to reduce impacts to *Androcalva procumbens* and remaining habitat, and recommends you adopt the relevant NSW conditions in your EPBC Act approval.

4.198. The Department will be consulted during the development of the BMP and is satisfied that the expertise and oversight that will be provided by the Biodiversity Advisory Group, including BCD, provides suitable assurance that mitigation and management measures will be implemented thoroughly and in accordance with the recommended conditions, to minimise impacts to MNES.

Offsets and compensatory measures

4.199. The Department considers that despite the proposed avoidance and mitigation measures, the direct clearance of up to 3,176 individuals of *Androcalva procumbens* will likely result in a residual significant impact for the species and offsets are required to ensure that the proposed action does not have an unacceptable impact on the species.

4.200. The NSW Government has confirmed that the proponent has calculated the offset liability for *Androcalva procumbens* in accordance with the Major Projects Offset Policy and FBA, which have been endorsed by the Commonwealth.

4.201. The offset liability for *Androcalva procumbens* is 55,740 species credits. The NSW conditions require the proponent to retire:

i 70 percent of species credits (39,018) to compensate for the clearance of 2,601 individuals of *Androcalva procumbens* habitat, prior to the commencement of Phase 2 and the development of the CSG field and related infrastructure.

ii Residual species credits (16,722) based on any exceedance of the clearance of 2,601 individuals.

iii The species credits through land-based offsets where possible.

4.202. The NSW assessment report (Attachment D3) states that the proponent has demonstrated that suitable sites with like-for-like offsets are likely to be available, and DPIE is satisfied that the biodiversity impacts can be offset in accordance with the EPBC Act Environmental Offsets Policy[7].

Conclusion

4.203. The Department recommends that the relevant NSW conditions relating to avoidance, mitigation and offsets for *Androcalva procumbens* are applied for the purposes of the EPBC Act.

4.204. The NSW conditions include an upper clearance limit of 3,716 individuals based on the conservative estimate of impacts provided in the EIS and NSW assessment report. The NSW conditions also require that credits are retired in accordance with the NSW Biodiversity Offsets Scheme, which has also been endorsed by the Commonwealth.

4.205. The Department considers that, if approved subject to the recommended conditions, the proposed action will not have an unacceptable impact on *Androcalva procumbens*.

4.1.9 *Bertya opponens* – vulnerable

Species information

4.206. *Bertya opponens* is a slender shrub that grows to 4 m tall, and can be multi-stemmed or have a single trunk. Branches and stems are densely covered with intertwined hairs, and flowers are yellow-brown[23].

4.207. *Bertya opponens* occurs in Queensland and NSW with a wide distribution. In NSW it occurs in the Pilliga Scrub and north-east of Cobar[24].

4.208. Habitat for the species includes mixed shrubland, lancewood woodland, mallee woodland, eucalypt and acacia open forest with shrubby understorey, and eucalypt and callitris open woodland and semi-evergreen vine-thicket[23].

4.209. The conservation advice for the species identifies its key threats as inappropriate disturbance regimes, including fire and land clearing[25].

4.210. The EIS states that the population within Jack's Creek State Forest and adjoining private land, adjacent to the proposed action area, is the most significant population of the species in NSW, with an estimated 5,000,000 individuals.

Impacts

4.211. The MNES report (Attachment D4) states that the species is known to occur within the proposed action area (see Figures 11 and 15 at Attachment A3) and the EIS confirms that 20 percent of the abovementioned population occurs within the proposed action area.

4.212. The MNES report states that based on occupied habitat and average densities of occurrence, up to 10,309 individuals would be impacted by the proposed action. This would equate to approximately 6.37 ha of occupied habitat.

4.213. The EIS states that the breeding cycle of the species can be impacted by habitat removal undertaken during important stages of the species' lifecycle and that in this case, the germination of seedlings and the regeneration of the population would be

[23] Department of Agriculture, Water and the Environment, 2020, Bertya opponens *SPRAT Profile* [website], http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=13792
[24] NPWS, 2002, Bertya *sp.* Cobar-Coolabah *Recovery Plan,* Hurstville
[25] Threatened Species Scientific Committee, 2016, *Conservation Advice* Bertya opponens, Canberra

prevented. It continues to say that the breeding cycle would still be able to be successfully completed in the proposed action area during all stages of the proposed action.

4.214. Linear fragmentation of the species' habitat would occur, with an average width of 10 m. This species' would not be intersected by the Bibblewindi to Leewood infrastructure corridor. Further fragmentation would occur through the construction of well pads, as up to 1 ha will be cleared at each pad. The Department notes that well pads will be located at least 250 m away from each other.

4.215. The EIS states that there is no evidence of disease (dieback) caused by the soil-borne water mould *Phytophthora cinnamomi,* a root-rot plant pathogen, in the study area. It states that the risk of *Phytophthora cinnamomi* occurring in the study area is low as it is not within a known vulnerable climatic zone but that the potential extent of the pathogen in Australia is not completely known.

4.216. The EIS states that there is the potential for the pathogen to be introduced or spread as a result of the movement of contaminated soil or vehicles.

4.217. The proponent considers that the proposed action is unlikely to have a significant impact on *Bertya opponens* on the basis that over 98 percent of individuals within the proposed action area would not be impacted, it is unlikely that the breeding cycle would be disrupted, the removal of habitat is unlikely to isolate patches, and it is unlikely that the proposed action would introduce invasive species or disease that would likely pose a threat to the species.

4.218. However, DPIE disagrees with that conclusion and considers that impacts to the species are likely to be significant in accordance with the Significant Impact Guidelines[6].

4.219. The Department agrees with the NSW assessment and considers that direct impacts to up to 10,309 individuals of *Bertya opponens* are likely to be significant, based on the importance and extent of the impacted population, and the large scale of the impacts. As such, the Department considers that the proposed action is likely to significantly impact *Bertya opponens* as the proposed action is likely to adversely affect habitat critical to the survival of the species.

Avoidance and Mitigation

4.220. The areas of direct and indirect impact to *Bertya opponens* are conservative estimates that will be refined through further on-ground surveys pre-construction, as required by the plans and protocol discussed below.

4.221. The NSW conditions require the proponent to prepare and implement:

i An FDP to avoid, mitigate or manage environmental impacts during the planning, design and construction phases of the proposed action, including through surveys to inform micro-siting of wells and other infrastructure.

ii A BMP, including best-practice pre-clearance controls, weed and pest management, and measures to enhance the quality of habitat and vegetation connectivity within the proposed action area.

iii An RMP that addresses all aspects of rehabilitation including progressive rehabilitation and final closure, that would be approved by the NSW Resources Regulator.

4.222. The NSW conditions also require that a Biodiversity Advisory Group of biodiversity experts must be established to advise on the implementation of the FDP and BMP.

4.223. As stated in the EIS the proponent has committed to staged clearing and rehabilitation across the proposed action area. This would allow for the recovery of individuals and the completion of the full life cycle of the species throughout all stages of the proposed action.

4.224. Rehabilitation is proposed following the clearance of vegetation for the construction of well pads and linear infrastructure. Linear fragmentation would be rehabilitated by 50 percent of its average width, and areas cleared for the installation of well pads would be rehabilitated by approximately 75 per cent. Rehabilitation would be informed by the RMP required in the NSW conditions.

4.225. The EIS states that the potential risk of introduction or spread of *Phytophthora cinnamomi*, and potential impacts to *Bertya opponens*, will be minimised through controlling soil transportation into the study area. Vehicle wash down stations and inspections of transported soil will be applied throughout the construction and operation phases of the project. The Department understands that these measures will be incorporated into the FDP and/or BMP.

4.226. The Department considers that the NSW conditions are suitable and necessary to reduce impacts to *Bertya opponens* and remaining habitat, and recommends you adopt the relevant NSW conditions in your EPBC Act approval.

4.227. The Department will be consulted during the development of the BMP and is satisfied that the expertise and oversight that will be provided by the Biodiversity Advisory Group, including BCD, provides suitable assurance that mitigation and management measures will be implemented thoroughly and in accordance with the recommended conditions, to minimise impacts to MNES.

Offsets and compensatory measures

4.228. The Department considers that despite the proposed avoidance and mitigation measures, the direct clearance of 10,309 individuals of *Bertya opponens* will likely result in a residual significant impact for the species and offsets are required to ensure that the proposed action does not have an unacceptable impact on the species.

4.229. The NSW Government has confirmed that the proponent has calculated the offset liability for *Bertya opponens* in accordance with the Major Projects Offset Policy and FBA, which have been endorsed by the Commonwealth.

4.230. The offset liability for the *Bertya opponens* is 144,326 species credits. The NSW conditions require the proponent to retire:

i 70 percent of species credits (101,028) to compensate for the clearance of 7,216 individuals of *Bertya opponens*, prior to the commencement of Phase 2 and the development of the CSG field and related infrastructure.

ii Residual species credits (43,298) based on any exceedance of the clearance of 7,216 individuals.

iii The species credits through land-based offsets where possible.

4.231. The NSW assessment report (Attachment D3) states that the proponent has demonstrated that suitable sites with like-for-like offsets are likely to be available, and DPIE is satisfied that the biodiversity impacts can be offset in accordance with the EPBC Act Environmental Offsets Policy[7].

Conclusion

4.232. The Department recommends the relevant NSW conditions relating to avoidance, mitigation and offsets for *Bertya opponens* are applied for the purposes of the EPBC Act.

4.233. The NSW conditions include an upper clearance limit of 10,309 individuals based on the conservative estimate of impacts provided in the EIS and NSW assessment report. The NSW conditions also require that credits are retired in accordance with the NSW Biodiversity Offsets Scheme, which has also been endorsed by the Commonwealth.

4.234. The Department considers that, if approved subject to the recommended conditions, the proposed action will not have an unacceptable impact on *Bertya opponens*.

4.1.10 Spiny Pepper-cress (*Lepidium aschersonii*) – vulnerable

Species information

4.235. Spiny Pepper-cress is a branched perennial herb which grows to 30 cm, occurring in NSW, Victoria and Western Australia. Habitat for the species includes wet sites such as gilgai depressions and the margins of freshwater and saline marshes and shallow lakes, usually on heavy clay soil[26].

4.236. Key threats to the species include weed invasion, grazing, altered hydrology, habitat destruction and roadworks. Destruction and degradation of habitat through agricultural development has been the major cause of the species' decline in distribution[27].

4.237. According to the recovery plan, and prior to targeted surveys for this project, the species was thought to be close to extinction in NSW, with an estimated of 25,000-100,000 plants remaining across 30 wild populations[26]. The recovery plan states that the Spiny Pepper-cress has been recorded at 14 locations in NSW over the last 20 years, and that the population in Brigalow Park Nature Reserve near Narrabri may be the largest remaining population of the species[27].

4.238. However, targeted surveys undertaken by EcoLogical to inform the RTS found a total of 4,643 individuals at 113 discrete locations, both inside and outside of the proposed action area, indicating an estimated population of 8,264,623 occurs within the proposed action area[28].

4.239. The results of this study indicate that there are considerable populations of the species in the Pilliga region, potentially an 8,000 percent increase of the known population of the species from literature.

---

[26] Department of Agriculture, Water and the Environment, 2020 Lepidium aschersonii – *Spiny Pepper-cress SPRAT Profile* [website], http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=10976

[27] Carter, O. 2010, *National Recovery Plan for the Spiny Peppercress* Lepidium aschersonii, Melbourne

[28] Eco Logical Australia Pty Ltd, n.a., Narrabri Gas Project s*upplementary targeted surveys for Spiny Pepper-cress and Winged Pepper-cress and revision of upper disturbance limits*, https://majorprojects.planningportal.nsw.gov.au/prweb/PRRestService/mp/01/getContent?AttachRef=SSD-6456%2120190228T050949.597%20GMT

Impacts

4.240. The MNES report (Attachment D4) states that the species is known to occur within the proposed action area, and based on occupied habitat and average densities of occurrence, up to 77,691 individuals would be removed or indirectly impacted as a result of the proposed action. This assessment is based on the abovementioned targeted surveys, indicating a higher population than was previously known.

4.241. The EIS states that the breeding cycle of the species can be impacted by habitat removal undertaken during important stages of the species' lifecycle and that in this case, the germination of seedlings and the regeneration of the population would be prevented. It continues to say that the breeding cycle would still be able to be successfully completed in the proposed action area during all stages of the proposed action.

4.242. Linear fragmentation of the species' habitat would occur, with an average width of 10 m and a maximum width of 30 m along the Bibblewindi to Leewood infrastructure corridor. Further fragmentation would occur through the construction of well pads, as up to 1 ha will be cleared at each pad. The Department notes that well pads will be located at least 250 m away from each other.

4.243. The EIS states that there is no evidence of disease (dieback) caused by the soil-borne water mould *Phytophthora cinnamomi,* a root-rot plant pathogen, in the study area. It states that the risk of *Phytophthora cinnamomi* occurring in the study area is low as it is not within a known vulnerable climatic zone but that the potential extent of the pathogen in Australia is not completely known.

4.244. The EIS states that there is the potential for the pathogen to be introduced or spread as a result of the movement of contaminated soil or vehicles.

4.245. Given that the impacted population was previously thought to be, and may still be, the largest remaining population of the species, it is considered that the removal of 77,691 individuals would reduce the area of occupancy of an important population.

4.246. The proponent considers that the proposed action is unlikely to result in a significant impact to Spiny Pepper-cress as the upper disturbance limit represents 0.94 percent of the population estimated within the proposed action area, it is unlikely that the breeding cycle would be disrupted, the removal of habitat is unlikely to isolate patches, and it is unlikely that the proposed action would introduce invasive species or disease that would likely pose a threat to the species.

4.247. DPIE disagrees with this conclusion and considers that the impacts to the species are likely to be significant in accordance with the Significant Impact Guidelines[6].

4.248. The Department agrees with the NSW assessment that direct impacts to 77,691 individuals are likely to be significant, on the basis that the proposed action is likely to adversely affect habitat critical to the survival of the species, and reduce the area of occupancy of an important population.

Avoidance and Mitigation

4.249. The areas of direct and indirect impact to Spiny Pepper-cress are conservative estimates that will be refined through further on-ground surveys pre-construction, as required by the plans and protocol discussed below.

4.250. The NSW conditions require the proponent to prepare and implement:

i An FDP to avoid, mitigate or manage environmental impacts during the planning, design and construction phases of the proposed action, including through surveys to inform micro-siting of wells and other infrastructure.

ii A BMP, including best-practice pre-clearance controls, weed and pest management, and measures to enhance the quality of habitat and vegetation connectivity within the proposed action area.

iii An RMP that addresses all aspects of rehabilitation including progressive rehabilitation and final closure, that would be approved by the NSW Resources Regulator.

4.251. The NSW conditions also require that a Biodiversity Advisory Group of biodiversity experts must be established to advise on the implementation of the FDP and BMP.

4.252. As stated in the EIS the proponent has committed to staged clearing and rehabilitation across the proposed action area. This would allow for the recovery of individuals and the completion of the full life cycle of the species throughout all stages of the proposed action.

4.253. Rehabilitation is proposed following the clearance of vegetation for the construction of well pads and linear infrastructure. Linear fragmentation would be rehabilitated by 50 percent of its average width, and areas cleared for the installation of well pads would be rehabilitated by approximately 75 per cent. Rehabilitation would be informed by the RMP required in the NSW conditions.

4.254. The EIS states that the potential risk of introduction or spread of *Phytophthora cinnamomi*, and potential impacts to Spiny Pepper-cress, will be minimised through controlling soil transportation into the study area. Vehicle wash down stations and inspections of transported soil will be applied throughout the construction and operation phases of the project. The Department understands that these measures will be incorporated into the FDP and/or BMP.

4.255. The Department considers that the NSW conditions are suitable and necessary to reduce impacts to Spiny Pepper-cress and remaining habitat, and recommends you adopt the relevant NSW conditions in your EPBC Act approval.

4.256. The Department will be consulted during the development of the BMP and is satisfied that the expertise and oversight that will be provided by the Biodiversity Advisory Group, including BCD, provides suitable assurance that mitigation and management measures will be implemented thoroughly and in accordance with the recommended conditions, to minimise impacts to MNES.

Offsets and compensatory measures

4.257. The Department considers that despite the proposed avoidance and mitigation measures, the direct clearance of 77,691 individuals of Spiny Pepper-cress will likely result in a residual significant impact for the species and offsets are required to ensure that the proposed action does not have an unacceptable impact on the species.

4.258. The NSW Government has confirmed that the proponent has calculated the offset liability for Spiny Pepper-cress in accordance with the Major Projects Offset Policy and FBA, which have been endorsed by the Commonwealth.

4.259. The offset liability for Spiny Pepper-cress is 1,087,674 species credits. The NSW conditions require the proponent to retire:

i 70 percent of species credits (761,372) to compensate for the clearance of 54,384 individuals of Spiny Pepper-cress, prior to the commencement of Phase 2 and the development of the CSG field and related infrastructure.

ii Residual species credits (362,302) based on any exceedance of the clearance of 54,384 individuals.

iii The species credits through land-based offsets where possible.

4.260. The NSW assessment report (Attachment D3) states that the proponent has demonstrated that suitable sites with like-for-like offsets are likely to be available, and DPIE is satisfied that the biodiversity impacts can be offset in accordance with the EPBC Act Environmental Offsets Policy[7].

Conclusion

4.261. The Department recommends the relevant NSW conditions relating to avoidance, mitigation and offsets for Spiny Pepper-cress are applied for the purposes of the EPBC Act.

4.262. The NSW conditions include an upper clearance limit of 77,691 individuals based on the conservative estimate of impacts provided in the EIS and NSW assessment report. The NSW conditions also require that credits are retired in accordance with the NSW Biodiversity Offsets Scheme, which has also been endorsed by the Commonwealth.

4.263. The Department considers that, if approved subject to the recommended conditions, the proposed action will not have an unacceptable impact on Spiny Pepper-cress.

4.1.11 *Tylophora linearis* – endangered

Species information

4.264. *Tylophora linearis* is an herbaceous climber, with clear latex that grows to around 2 m long, with dark green, linear leaves and clustered, olive-green and dark purple flowers[29].

4.265. The species grows in dry scrub, open forest and woodlands associated with melaleuca, eucalypt and callitris species[29].

4.266. Key threats to the species include forestry activities, disturbances such as grazing and fire, and invasion of habitat by introduced weeds. Regional and local priority actions identified in the conservation advice include protecting all known sites from disturbance until recovery actions are better developed[30].

4.267. The proposed action area supports approximately 33,154 individuals of *Tylophora linearis,* which the proponent has determined to be the largest population of the species in NSW based on population data presented by the NSW Scientific Committee.

[29] Department of Agriculture, Water and the Environment, 2020, Tylophora linearis *SPRAT Profile* [website], http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=55231
[30] Department of Agriculture, Water and the Environment, 2008, *Approved Conservation Advice for* Tylophora linearis, Canberra

Impacts

4.268. The MNES report (Attachment D4) states that the species is known to occur within the proposed action area (see Figure 15 at Attachment A3), and based on occupied habitat and average densities of occurrence, up to 513 individuals would be removed or indirectly impacted by habitat fragmentation, weed and feral animal incursion, noise, light and previously approved gas activities.

4.269. The EIS states that the breeding cycle of the species can be impacted by habitat removal undertaken during important stages of the species' lifecycle and that in this case, the germination of seedlings and the regeneration of the population would be prevented. It continues to say that the breeding cycle would still be able to be successfully completed in the proposed action area during all stages of the proposed action.

4.270. Linear fragmentation of the species' habitat would occur, with an average width of 10 m and a maximum width of 30 m along the Bibblewindi to Leewood infrastructure corridor. Further fragmentation would occur through the construction of well pads, as up to 1 ha will be cleared at each pad. The Department notes that well pads will be located at least 250 m away from each other.

4.271. The EIS also states that the proposed action is likely to adversely affect habitat critical to the survival of the species, as this includes all occupied habitat within the proposed action area.

4.272. The EIS states that there is no evidence of disease (dieback) caused by the soil-borne water mould *Phytophthora cinnamomi,* a root-rot plant pathogen, in the study area. It states that the risk of *Phytophthora cinnamomi* occurring in the study area is low as it is not within a known vulnerable climatic zone but that the potential extent of the pathogen in Australia is not completely known.

4.273. The EIS states that there is the potential for the pathogen to be introduced or spread as a result of the movement of contaminated soil or vehicles.

4.274. The proponent considers that the proposed action is unlikely to have a significant impact on *Tylophora linearis* as over 98 percent of individuals within the proposed action area would not be impacted, it is unlikely that the breeding cycle would be disrupted, the removal of habitat is unlikely to isolate patches, and it is unlikely that the proposed action would introduce invasive species or disease that would likely pose a threat to the species.

4.275. However, DPIE disagrees with this conclusion and considers that impacts to the species are likely to be significant in accordance with the Significant Impact Guidelines[6].

4.276. The Department agrees with the NSW assessment and considers that direct impacts to up to 513 individuals of *Tylophora linearis* are likely to be significant, on the basis that the impacted population of the species is the largest in NSW, and as the proposed action is likely to adversely affect habitat critical to the survival of the species.

Avoidance and Mitigation

4.277. The areas of direct and indirect impact to *Tylophora linearis* are conservative estimates that will be refined through further on-ground surveys pre-construction, as required by the plans and protocol discussed below.

4.278. The NSW conditions require the proponent to prepare and implement:

i An FDP to avoid, mitigate or manage environmental impacts during the planning, design and construction phases of the proposed action, including through surveys to inform micro-siting of wells and other infrastructure.

ii A BMP, including best-practice pre-clearance controls, weed and pest management, and measures to enhance the quality of habitat and vegetation connectivity within the proposed action area.

iii An RMP that addresses all aspects of rehabilitation including progressive rehabilitation and final closure, that would be approved by the NSW Resources Regulator.

4.279. The NSW conditions also require that a Biodiversity Advisory Group of biodiversity experts must be established to advise on the implementation of the FDP and BMP.

4.280. As stated in the EIS the proponent has committed to staged clearing and rehabilitation across the proposed action area. This would allow for the recovery of individuals and the completion of the full life cycle of the species throughout all stages of the proposed action.

4.281. Rehabilitation is proposed following the clearance of vegetation for the construction of well pads and linear infrastructure. Linear fragmentation would be rehabilitated by 50 percent of its average width, and areas cleared for the installation of well pads would be rehabilitated by approximately 75 per cent. Rehabilitation would be informed by the RMP required in the NSW conditions.

4.282. The EIS states that the potential risk of introduction or spread of *Phytophthora cinnamomi*, and potential impacts to *Tylophora linearis*, will be minimised through controlling soil transportation into the study area. Vehicle wash down stations and inspections of transported soil will be applied throughout the construction and operation phases of the project. The Department understands that these measures will be incorporated into the FDP and/or BMP.

4.283. The Department considers that the NSW conditions are suitable and necessary to reduce impacts to *Tylophora linearis* and remaining habitat, and recommends you adopt the relevant NSW conditions in your EPBC Act approval.

4.284. The Department will be consulted during the development of the BMP and is satisfied that the expertise and oversight that will be provided by the Biodiversity Advisory Group, including BCD, provides suitable assurance that mitigation and management measures will be implemented thoroughly and in accordance with the recommended conditions, to minimise impacts to MNES.

Offsets and compensatory measures

4.285. The Department considers that despite the proposed avoidance and mitigation measures, the direct clearance of up to 513 individuals of *Tylophora linearis* will likely result in a residual significant impact for the species and offsets are required to ensure that the proposed action does not have an unacceptable impact on the species.

4.286. The NSW Government has confirmed that the proponent has calculated the offset liability for *Tylophora linearis* in accordance with the Major Projects Offset Policy and FBA, which have been endorsed by the Commonwealth.

4.287. The offset liability for the *Tylophora linearis* is 7,722 species credits. The NSW conditions require the proponent to retire:

i 70 percent of species credits (5,721) to compensate for the clearance of 359 individuals of *Tylophora linearis*, prior to the commencement of Phase 2 and the development of the CSG field and related infrastructure.

ii Residual species credits (2,001) based on any exceedance of the clearance of 359 individuals.

iii The species credits through land-based offsets where possible.

4.288. The NSW assessment report (Attachment D3) states that the proponent has demonstrated that suitable sites with like-for-like offsets are likely to be available, and DPIE is satisfied that the biodiversity impacts can be offset in accordance with the EPBC Act Environmental Offsets Policy[7].

Conclusion

4.289. The Department recommends the relevant NSW conditions relating to avoidance, mitigation and offsets for *Tylophora linearis* are applied for the purposes of the EPBC Act.

4.290. The NSW conditions include an upper clearance limit of 513 individuals based on the conservative estimate of impacts provided in the EIS and NSW assessment report. The NSW conditions also require that credits are retired in accordance with the NSW Biodiversity Offsets Scheme, which has also been endorsed by the Commonwealth.

4.291. The Department considers that, if approved subject to the recommended conditions, the proposed action will not have an unacceptable impact on *Tylophora linearis*.

4.1.12 Winged Pepper-cress (*Lepidium monoplocoides*) – endangered

Species information

4.292. Winged Pepper-cress is a small annual herb, growing to about 20 cm tall, with narrow, linear leaves, tiny green-brown flowers, and circular fruit. The species is widely distributed on the inland plains of south-eastern Australia, occurring from northern NSW to western Victoria[31].

4.293. Habitat for the species includes sparsely vegetated sites on heavy clay, or clay-loam soils, usually on sites that are seasonally flooded or prone to waterlogging. Vegetation types in which the species occurs include grasslands, wetlands and floodplain wetlands dominated by eucalypt species[31].

4.294. The recovery plan states that the Winged Pepper-cress has suffered a widespread decline in both range and abundance since European settlement. Key identified threats to the species include altered hydrology, increasing salinity, weed invasion, grazing, physical damage, drought and climate change[311].

4.295. The recovery plan states that the Winged Pepper-cress is currently known from 13 locations in Victoria, and total population size is estimated at less than 3,000 individuals[31].

[31] Mavromihalis, J. 2010, *National Recovery Plan for the Winged Peppercress* Lepidium monoplocoides, Melbourne

4.296. However, targeted surveys for the species undertaken by EcoLogical for the proposed action identified 2,268 individuals across 65 discrete locations, both within and outside of the proposed action area. An estimated 218,265 individuals were determined to occur within the proposed action area[28].

4.297. The results of this study indicate that there are considerable populations of the species in the Pilliga region, potentially an 8,000 percent increase of the known population of the species from literature.

Impacts

4.298. The MNES report (Attachment D4) states that the species is known to occur within the proposed action area, and based on the abovementioned surveys, up to 1,116 individuals would be removed or indirectly impacted as a result of the proposed action.

4.299. The EIS states that the breeding cycle of the species can be impacted by habitat removal undertaken during important stages of the species' lifecycle, or which reduce habitat quality, and that in this case, the germination of seedlings and the regeneration of the population would be prevented. It continues to say that the breeding cycle would still be able to be successfully completed in the proposed action area during all stages of the proposed action.

4.300. Linear fragmentation of the species' habitat would occur, with an average width of 10 m and a maximum width of 30 m along the Bibblewindi to Leewood infrastructure corridor. Further fragmentation would occur through the construction of well pads, as up to 1 ha will be cleared at each pad. The Department notes that well pads will be located at least 250 m away from each other.

4.301. Given that the population determined to be within the proposed action area is larger than the previous known total population, it is considered that the removal of 1,116 individuals would reduce the area of occupancy of an important population.

4.302. The EIS states that there is no evidence of disease (dieback) caused by the soil-borne water mould *Phytophthora cinnamomi,* a root-rot plant pathogen, in the study area. It states that the risk of *Phytophthora cinnamomi* occurring in the study area is low as it is not within a known vulnerable climatic zone but that the potential extent of the pathogen in Australia is not completely known.

4.303. The EIS states that there is the potential for the pathogen to be introduced or spread as a result of the movement of contaminated soil or vehicles.

4.304. The proponent considers that the proposed action is unlikely to result in a significant impact to Winged Pepper-cress as over 98 percent of the population estimated within the proposed action area would not be impacted, it is unlikely that the breeding cycle would be disrupted, the removal of habitat is unlikely to isolate patches, and it is unlikely that the proposed action would introduce invasive species or disease that would likely pose a threat to the species.

4.305. However, DPIE disagrees with this conclusion and considers that impacts to the species are likely to be significant in accordance with the Significant Impact Guidelines[6].

4.306. The Department agrees with the NSW assessment that direct impacts to 1,116 individuals of Winged Pepper-cress are likely to be significant as the proposed action is likely to adversely affect habitat critical to the survival of the species, and reduce the area of occupancy of an important population.

Avoidance and Mitigation

4.307. The areas of direct and indirect impact to Winged Pepper-cress are conservative estimates that will be refined through further on-ground surveys pre-construction, as required by the plans and protocol discussed below.

4.308. The NSW conditions require the proponent to prepare and implement:

i An FDP to avoid, mitigate or manage environmental impacts during the planning, design and construction phases of the proposed action, including through surveys to inform micro-siting of wells and other infrastructure.

ii A BMP, including best-practice pre-clearance controls, weed and pest management, and measures to enhance the quality of habitat and vegetation connectivity within the proposed action area.

iii An RMP that addresses all aspects of rehabilitation including progressive rehabilitation and final closure, that would be approved by the NSW Resources Regulator.

4.309. The NSW conditions also require that a Biodiversity Advisory Group of biodiversity experts must be established to advise on the implementation of the FDP and BMP.

4.310. As stated in the EIS the proponent has committed to staged clearing and rehabilitation across the proposed action area. This would allow for the recovery of individuals and the completion of the full life cycle of the species throughout all stages of the proposed action.

4.311. Rehabilitation is proposed following the clearance of vegetation for the construction of well pads and linear infrastructure. Linear fragmentation would be rehabilitated by 50 percent of its average width, and areas cleared for the installation of well pads would be rehabilitated by approximately 75 per cent. Rehabilitation would be informed by the RMP required in the NSW conditions.

4.312. The EIS states that the potential risk of introduction or spread of *Phytophthora cinnamomi*, and potential impacts to Winged Pepper-cress, will be minimised through controlling soil transportation into the study area. Vehicle wash down stations and inspections of transported soil will be applied throughout the construction and operation phases of the project. The Department understands that these measures will be incorporated into the FDP and/or BMP.

4.313. The Department considers that the NSW conditions are suitable and necessary to reduce impacts to Winged Pepper-cress and remaining habitat, and recommends you adopt the relevant NSW conditions in your EPBC Act approval.

4.314. The Department will be consulted during the development of the BMP and is satisfied that the expertise and oversight that will be provided by the Biodiversity Advisory Group, including BCD, provides suitable assurance that mitigation and management measures will be implemented thoroughly and in accordance with the recommended conditions, to minimise impacts to MNES.

Offsets and compensatory measures

4.315. The Department considers that despite the proposed avoidance and mitigation measures, the direct clearance up to 1,116 individuals of Winged Pepper-cress will likely result in a residual significant impact for the species and offsets are required to ensure that the proposed action does not have an unacceptable impact on the species.

4.316. The NSW Government has confirmed that the proponent has calculated the offset liability for Winged Pepper-cress in accordance with the Major Projects Offset Policy and FBA, which have been endorsed by the Commonwealth.

4.317. The offset liability for Winged Pepper-cress is 16,740 species credits. The NSW conditions require the proponent to retire:

i 70 percent of species credits (11,781) to compensate for the clearance of 781 individuals of Winged Pepper-cress, prior to the commencement of Phase 2 and the development of the CSG field and related infrastructure.

ii Residual species credits (5,022) based on any exceedance of the clearance of 781 individuals.

iii The species credits through land-based offsets where possible.

4.318. The NSW assessment report (Attachment D3) states that the proponent has demonstrated that suitable sites with like-for-like offsets are likely to be available, and DPIE is satisfied that the biodiversity impacts can be offset in accordance with the EPBC Act Environmental Offsets Policy[7].

Conclusion

4.319. The Department recommends the relevant NSW conditions relating to mitigation and offsets for Winged Pepper-cress are applied for the purposes of the EPBC Act.

4.320. The NSW conditions include an upper clearance limit of 1,116 individuals based on the conservative estimate of impacts provided in the EIS and NSW assessment report. The NSW conditions also require that credits are retired in accordance with the NSW Biodiversity Offsets Scheme, which has also been endorsed by the Commonwealth.

4.321. The Department considers that, if approved subject to the recommended conditions, the proposed action will not have an unacceptable impact on Winged Pepper-cress.

4.1.13 Brigalow (*Acacia harpophylla* dominant and co-dominant) ecological community – endangered

Ecological community information

4.322. The Brigalow (*Acacia harpophylla* dominant and co-dominant) ecological community (Brigalow), occurs in both Queensland and NSW, and is commonly dominated by *Acacia harpophylla*, a distinctive silver-foliaged wattle shrub or tree[32].

4.323. Brigalow is found mostly west of the Great Dividing Range in semi-arid areas, stretching in a broad swathe east of Blackall, Charleville and Cunnamulla, north to Townsville in Queensland and south to Narrabri. In NSW, remnants of the community mostly occur north of Bourke and west of Narrabri[32].

4.324. Key threats to the ecological community include clearing, fire, invasive species, inappropriate grazing regimes and climate change. Brigalow was listed as endangered on the basis of extensive clearing which has altered the ecological

[32] Department of Agriculture, Water and the Environment, 2013, *Approved Conservation Advice for the Brigalow (*Acacia harpophylla *dominant and co-dominant*) *ecological community,* Canberra

community's typical landscape context, with most remnants now occurring as fragments with substantially modified landscapes[32].

4.325. The conservation advice states that the ecological community has undergone severe decline in extent, to approximately 10% of its former area, as a result of clearing for agricultural use in Queensland and NSW.

Impacts

4.326. The MNES report (Attachment D4) states that 2,468 ha the ecological community is known to occur within the proposed action area, confined to the north (see Figure 3 at Attachment A3). It further states that 19.3 ha of Brigalow would be directly impacted as a result of the proposed action, and a further 3.9 ha would be subject to indirect impacts from habitat fragmentation, weed and feral animal incursion, noise, light and previously approved gas activities.

4.327. The EIS states that all patches of Brigalow occurring within the proposed action area are considered habitat critical to the survival of the community, as they meet the key diagnostic characteristics defined in the conservation advice.

4.328. It also states that the proposed action is likely to increase fragmentation of the ecological community to a degree that it is likely that new patches would be formed. Fragmentation to the ecological community would be as a result of clearing vegetation for both linear infrastructure and well pads. While up to 1 ha of contiguous vegetation would be cleared for each well pad, any linear fragmentation of the community would not be greater than an average width of 10 m, which would be rehabilitated to 5 m of linear fragmentation immediately after impact.

4.329. The proponent considers that the proposed action is unlikely to significantly impact Brigalow due to the small area of impact, despite the potential for the proposed action to adversely affect habitat critical to the survival of the community.

4.330. However, DPIE disagrees with this conclusion and considers that the impacts to Brigalow as a result of the proposed action are likely to be significant in accordance with the Significant Impact Guidelines[6].

4.331. The Department agrees with the NSW assessment that direct impacts to 19.3 ha of the ecological community is likely to be significant as the proposed action will adversely affect habitat critical to the survival of the ecological community and increase fragmentation.

Avoidance and Mitigation

4.332. The areas of direct and indirect impact to Brigalow are conservative estimates that will be refined through further on-ground surveys pre-construction, as required by the plans and protocol discussed below.

4.333. The NSW conditions require the proponent to prepare and implement:

i An FDP to avoid, mitigate or manage environmental impacts during the planning, design and construction phases of the proposed action, including through surveys to inform micro-siting of wells and other infrastructure.

ii A BMP, including best-practice pre-clearance controls, weed and pest management, and measures to enhance the quality of habitat and vegetation connectivity within the proposed action area.

iii An RMP that addresses all aspects of rehabilitation including progressive rehabilitation and final closure, that would be approved by the NSW Resources Regulator.

4.334. The NSW conditions also require that a Biodiversity Advisory Group of biodiversity experts must be established to advise on the implementation of the FDP and BMP.

4.335. Rehabilitation is proposed following the clearance of vegetation for the construction of well pads and linear infrastructure. Linear fragmentation would be rehabilitated by 50 percent of its average width, and areas cleared for the installation of well pads would be rehabilitated by approximately 75 per cent. Rehabilitation would be informed by the RMP required in the NSW conditions.

4.336. The Department considers that these measures are suitable and necessary to reduce impacts to the Brigalow ecological community and remaining habitat, and recommends you adopt the relevant NSW conditions relating to these measures in your EPBC Act approval.

4.337. The Department will be consulted during the development of the BMP and is satisfied that the expertise and oversight that will be provided by the Biodiversity Advisory Group, including BCD, provides suitable assurance that mitigation and management measures will be implemented thoroughly and in accordance with the recommended conditions, to minimise impacts to MNES.

Offsets and compensatory measures

4.338. The Department considers that despite the proposed avoidance and mitigation measures, the direct clearance of up to 19.3 ha of Brigalow will likely result in a residual significant impact for the ecological community and offsets are required to ensure that the proposed action does not have an unacceptable impact on the ecological community.

4.339. The offset liability for Brigalow is 1,303.5 ecosystem credits. The NSW conditions require the proponent to retire:

i 100 percent of ecosystem credits (1303.5) to compensate for the clearance of 19.3 ha of Brigalow, prior to the commencement of Phase 2 and the development of the CSG field and related infrastructure.

ii The ecosystem credits through land-based offsets where possible.

4.340. The proponent is required to retire 100 percent of ecosystem credits for the loss of Brigalow prior to the commencement of Phase 2 as there are no further opportunities for avoidance of the ecological community and therefore the 70 percent credit retirement approach applied for species is not suitable in this instance.

4.341. The NSW assessment report (Attachment D3) states that the proponent has demonstrated that suitable sites with like-for-like offsets are likely to be available, and DPIE is satisfied that the biodiversity impacts can be offset in accordance with the EPBC Act Environmental Offsets Policy[7].

Conclusion

4.342. The Department recommends the relevant NSW conditions relating to avoidance, mitigation and offsets for Brigalow are applied for the purposes of the EPBC Act.

4.343. The NSW conditions include an upper clearance limit of 19.3 ha of the equivalent plant community type based on the conservative estimate of impacts provided in the EIS and NSW assessment report. The NSW conditions also require that credits are

retired in accordance with the NSW Biodiversity Offsets Scheme, which has also been endorsed by the Commonwealth.

4.344. The Department considers that, if approved subject to the recommended conditions, the proposed action will not have an unacceptable impact on Brigalow.

4.2 NSW CONDITIONS RELEVANT TO LISTED THREATENED SPECIES AND ECOLOGICAL COMMUNITIES

4.345. The Department considers conditions B43-B52 of the NSW conditions of approval relate to avoidance, mitigation and offsetting measures for listed threatened species and communities.

4.346. NSW conditions B43-B49 relate to the retirement of biodiversity credits to compensate for impacts to biodiversity as a result of the proposed action, in accordance with the Department endorsed BOS. This includes the option for the proponent to retire ecosystem or species credits using rehabilitated land, if specific criteria outline in a Rehabilitation Management Plan is met to the satisfaction of BCD.

4.347. NSW conditions B50-B52 relate to the formation of a Biodiversity Advisory Group, and the subsequent preparation and implementation of a Biodiversity Management Plan. NSW condition B51 (a-l) specifies the necessary inclusions in that plan, such as a Biodiversity Offset Strategy, Koala Research Program, measures to manage invasive species, grazing and agriculture and measures to minimise impacts to biodiversity.

4.348. The NSW Assessment Report states that the conditions relating to offsetting are consistent with the NSW Major Projects Offsetting Policy, and with the NSW Biodiversity Offsetting Scheme. As such, the conditions are consistent with the EPBC Act Offsets Policy.

4.3 EPBC ACT CONDITIONS RELEVANT TO LISTED THREATENED SPECIES AND ECOLOGICAL COMMUNITIES

4.349. The Department considers the relevant NSW conditions of approval are suitable and necessary measures for the protection of listed threatened species and communities, and considers that those conditions are in line with the EPBC Act Condition Setting Policy.

4.350. Conditions 25-27 of the notice (at Attachment E of the final decision brief) reflect the NSW conditions of approval relating to listed threatened species and ecological communities.

4.351. The upper clearing limits identified in Tables 8-10 at condition B43 of the NSW conditions are considered appropriate in limiting the clearance of habitat or individuals of Commonwealth-listed impacted species and ecological communities.

4.352. The offset liability for each listed threatened species or ecological community discussed above would be met through the retirement of the ecosystem credits identified at Tables 8-10 of NSW condition B43.

4.353. The NSW biodiversity assessment and offset framework, which has been endorsed by the Commonwealth, calculates offset credits based on plant community types which act as surrogates for species habitat. The NSW conditions set clearance limits based on the maximum clearance for each plant community type, instead of for each species. Despite this difference in the methodology, the Department considers that the NSW conditions would achieve the same result as conditions that are based on

species habitat. The Department is satisfied that as long as the proponent complies with the NSW conditions, and retires all necessary ecosystem credits, impacts to listed threatened species and communities will be offset. Therefore, the Department considers that additional EPBC Act conditions for clearance limits and offset credit requirements for each protected matter are not necessary.

4.354. The Department considers that based on the NSW assessment, NSW conditions and the proposed EPBC Act conditions, that impacts of the proposed action on listed threatened species and communities would be acceptable.

4.4 OTHER LISTED THREATENED SPECIES AND ECOLOGICAL COMMUNITIES RELEVANT TO THE PROPOSED ACTION

4.355. The Department considered at referral stage that there was a real chance or possibility that the proposed action would result in significant impacts to the listed threatened species discussed below. Based on the information provided in the assessment documentation and NSW Assessment Report, the Department considers that the proposed action is unlikely to have a significant impact to these species and ecological communities.

4.4.1 Large-eared Pied Bat (*Chalinolobus dwyeri*) – vulnerable

4.356. The MNES report states that the proposed action would result in the clearance of up to 885 ha of foraging habitat for the species, with indirect impacts to an additional 175.4 ha. The MNES report (Attachment D4) states that no individuals were recorded within the proposed action area during surveys undertaken for the proposed action, and that the NSW BioBanking credit calculator determined that the species is unlikely to occur in the area. Avoidance and mitigation measures discussed above are also applicable to this species.

4.357. The proponent considers that the proposed action would not have a significant impact on the Large-eared Pied Bat as the area does not contain habitat critical to the survival of the species, or an important population, the scale of habitat removal would not isolate patches of habitat such that movement could not occur between patches, and it is unlikely that the proposed action would result in the introduction of disease or invasive species that would lead to a decline in the species population.

4.358. The NSW Assessment Report states that DPIE agrees with this conclusion.

4.359. The Department agrees with the NSW Assessment Report and considers that given the significant impact criteria for a vulnerable species, the proposed action area does not contain habitat critical to the survival of the species, or an important population. The Department considers that given the nature and scale of the proposed impacts, that the proposed action is unlikely to have a significant impact on the Large-eared Pied Bat, with consideration of the Significant Impact Guidelines.

4.4.2 Weeping Myall Woodlands ecological community – endangered

4.360. The MNES report states that the proposed action would result in the clearance of up to 0.1 ha of the Weeping Myall Woodlands ecological community (Weeping Myall), which has been identified as occurring within the proposed action area.

4.361. The EIS states that the 0.1 ha of the Weeping Myall that would be cleared constitutes habitat critical to the survival of the ecological community.

4.362. Avoidance and mitigation measures discussed above in paragraphs 4.22-4.26 are also applicable to Weeping Myall, and are required under proposed condition 25 (at

Attachment E of the final decision brief) which requires the proponent to comply with NSW condition B43.

4.363. The NSW assessment report states that the proposed action is unlikely to have a significant impact on Weeping Myall due to the small area that would be disturbed. However, the proponent has calculated that 5 ecosystem credits would be required to offset impacts to Weeping Myall as a result of the proposed action, which has been included in the NSW conditions of approval, along with an upper clearing limit of 0.1 ha.

4.364. The Department considers that given the small area of Weeping Myall that would be impacted as a result of the proposed action, along with the proposed avoidance and mitigation measures, and the NSW conditions of approval, that the proposed action is unlikely to adversely affect habitat critical to the survival of the ecological community, or increase fragmentation or reduce the extent of the ecological community. As such, the Department considers that the proposed action is unlikely to have a significant impact on Weeping Myall, in accordance with the Significant Impact Guidelines, and therefore offsets are not required under the EPBC Act.

4.4.3 White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland ecological community – critically endangered

4.365. At the time of the referral decision the Department considered that the White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and derived Native Grassland ecological community (Box Gum Woodland) had the potential to occur within the proposed action area and be impacted by the proposed action. As such, further assessment was undertaken by the proponent to determine whether or not Box Gum Woodland does occur within the proposed action area.

4.366. At the RTS stage, Eco Logical completed a further assessment of field data vegetation plots and landscape and vegetation mapping, and concluded that the assemblage of species and soil type within the proposed action area is not consistent with the listing advice for Box Gum Woodland.

4.367. The NSW Assessment Report states that DPIE accepts this assessment and notes that the FDP includes on-ground surveys pre-construction which would provide further opportunity to assess the presence of Box Gum Woodland within the proposed action area. The NSW Assessment Report states that if surveys were to subsequently determine the presence of Box Gum Woodland within the proposed action area, the proponent would be required to avoid any impact to the ecological community or seek separate approval for that clearing under the EPBC Act.

4.368. The Department agrees with the conclusions drawn by DPIE and considers that based on the assessment of the proposed action area in consideration of the listing advice for the ecological community it is unlikely that Box Gum Woodland is present in the proposed action area and therefore would not be significantly impacted by the proposed action.

4.4.4 Other listed threatened species and ecological communities

4.369. The Department compared the ERT report for the proposed action area to determine if any listed species or ecological communities required further consideration in the assessment. The Department considered at the referral stage that there was a real chance or possibility that the proposed action would result in significant impacts to the following listed threatened species and ecological communities:

i Australasian bittern (*Botaurus poiciloptilus*) – endangered

ii Australian Painted Snipe (*Rostratula australis*) – endangered

iii Malleefowl (*Leipoa ocellata*) – vulnerable

iv Silver Perch (*Bidyanus bidyanus*) – critically endangered

v Murray Cod (*Maccullochella peelii*) – vulnerable

vi Booroolong Frog (*Litoria booroolongensis*) – endangered

vii Brush-tailed Rock Wallaby (*Petrogale penicillate*) – vulnerable

viii Five-clawed Worm-skink (*Anomalopus mackayi*) – vulnerable

ix Pink-tailed Worm-lizard (*Aprasia parapulchella*) – vulnerable

x Border Thick-tailed Gecko (*Uvidicolus sphryrurus*) – vulnerable

xi *Cadellia pentastylis* – vulnerable

xii *Philotheca ericifolia* – vulnerable

xiii *Prasophyllum* sp. Wybong – critically endangered

xiv Austral Toadflax (*Thesium australe*) – endangered

xv Coolibah-black box woodlands of the Darling Riverine Plains and the Brigalow Belt South Bioregions ecological community – endangered

xvi Grey box (*E. macrocarpa*) grassy woodlands and derived native grasslands of south-eastern Australia ecological community – endangered

xvii Natural grasslands on basalt and fine-textured alluvial plains of northern NSW and southern Queensland ecological community – critically endangered.

4.370. These matters are discussed in the BCD advice on MNES, attached to the NSW recommendation letter, which concludes that significant impacts to these matters as a result of the proposed action are unlikely.

4.371. The Department has also considered the information in the EIS and the NSW Assessment report with regard to potential impacts as a result of the proposed action on other listed threatened species and communities. The Department concludes that any anticipated impacts on these protected matters are unlikely to be significant based on the Significant Impact Guidelines.

4.372. For the reasons set out above, the Department concluded that the proposed action was unlikely to result in a significant impact upon these species.

4.373. Given this conclusion, the Department's view is that impacts on these listed species and communities will not be unacceptable and, for that reason, it is not considered necessary for you to impose specific EPBC conditions to avoid, mitigate or offset the potential impacts of the proposed action on these threatened species and ecological community.

4.5 CONCLUSION ON THREATENED SPECIES AND COMMUNITIES (S18 & S18A)

4.374. The Department has considered the information in the EIS and the NSW Assessment Report, as well as the other documents and material attached to this brief, regarding the likely impacts of the proposed action on listed threatened species and communities.

4.375. For the reasons set out above, the Department is satisfied that any potential impacts on listed threatened species and ecological communities from the proposed action can be adequately addressed through the recommended approval conditions, and

therefore the proposed action is not expected to result in an unacceptable impact on threatened species and ecological communities, provided it is taken in accordance with those conditions.

4.376. The Department therefore recommends that the proposed action be approved for the purpose of the controlling provisions in sections 18 and 18A, subject to the above-mentioned conditions.

5 COMMONWEALTH LAND (S26 & S27A)

5.1 SIDING SPRING OBSERVATORY

5.1. Siding Spring Observatory (the Observatory) is Australia's largest and premier optical and infrared observatory. It was built in the 1960s as a field station of the Mt Stromlo Observatory, away from the increasing light pollution of Canberra. It has over 20 telescopes and is an operating research facility for local and international astronomical science.

5.2. The Observatory is located on the traditional lands of the Kamilaroi people. It is situated on Mount Woorut and adjacent to the eastern boundary of Warrumbungle National Park, which is a listed National Heritage Place for its geomorphology. It also sits within the Warrumbungle International Dark Sky Park, which is free from light pollution.

5.3. It is 20 km west of Coonabarabran and approximately 80 km south-west of the proposed action's southern boundary (see Figures 6 at Attachment A3). The Observatory is on approximately 151 ha of Commonwealth land owned and primarily managed by the Australian National University (ANU).

5.4. The Dark Sky Planning Guideline – protecting the observing conditions at Siding Spring (Dark Sky Guidelines) was published by the then NSW Department of Planning and Environment in 2015. It provides guidance and technical information to reduce and manage artificial light from development in the Dark Sky Region, a 200 km radius area around the Observatory.

5.1.1 Heritage Values

5.5. The Observatory is not listed on the World, National, Commonwealth or State heritage lists. However, the heritage values and local significance of the Observatory contribute to the general values of the 'environment' on Commonwealth land.

5.6. ANU, as a Commonwealth entity and managers of the Observatory, has committed to identifying, protecting, conserving and managing the Observatory's heritage values through its Heritage Strategy and the Siding Spring Observatory Heritage Management Plan (Attachment J).

5.7. The HMP recognises that the historical, social, Indigenous and natural heritage values of the Observatory are embodied in the landscape and campus and its various elements. The HMP also indicates that the Observatory is significant for its rarity, research potential, community aesthetic, representation of creative and technical achievement.

5.1.2 Impacts

5.8. As the Observatory is located on Commonwealth land, impacts to these values were taken into consideration as part of a 'whole of environment' assessment during the referral.

5.9. Given the distance of the proposed action from the Observatory, the Department did not consider that the social, economic, aesthetic and cultural values of the Observatory were likely to be impacted.

5.10. However, the Department considered that the operation of the Observatory could be significantly impacted through artificial light spill and increased dust emissions from construction and/or operation of the proposed action, which could affect astronomical observing conditions.

5.11. The main sources of light would be from gas well flaring (controlled release and burning of gas to dispose of unwanted gas) at proposed pilot wells and safety flares at the Bibblewindi and Leewood processing facilities.

5.1.3 Avoidance and mitigation

5.12. During the NSW assessment process, the impacts of gas well was raised by the Observatory, Gilgandra Shire Council, the former Australian Astronomical Observatory (AAO; previously a division of the Commonwealth Department of Industry), and members of the public.

5.13. In response to the submissions, the proponent consulted with the Observatory and AAO and undertook a Gas Flare Light Assessment as part of the RTS (Attachment F2). The assessment noted that:

i flaring would result in some vertical and horizontal light impacts but these were below the Dark Sky Guideline thresholds and would have a negligible impact on the Observatory's operations.

ii Safety flares may be visible on occasion from the Observatory but were unlikely to impact its long-term operation as they were used infrequently above 1.5 m.

iii Air quality could be impacted by dust and nitrogen dioxide but the proposed emissions are within regulatory thresholds.

5.14. The NSW assessment report (Attachment D3) states that the AAO acknowledged that the proposed action was unlikely to adversely affect operations but that visual and lighting impacts could be minimised by undertaking scheduled flaring activities during a gibbous (more than 50 percent full) moon.

5.15. The Observatory also subsequently confirmed that its concerns had been addressed. Due to the small number of flares, the dispersed nature of lit locations and the limited magnitude of the flare height and minimal lighting requirements of operational sites, the potential for impacts was considered to be negligible. The Observatory also indicated that the use of safety flares to its full capacity at night (up to 30 flame height) is likely to be rare and of short duration.

5.16. The IPC report (Attachment D2) states that the Director of the Observatory and Chair of the Observatory's Dark Sky Guidelines Committee noted "if the project follows [the Dark Sky Guidelines], then it would be a satisfactory outcome from the perspective of the Observatory".

5.17. The IPC's conditions of consent do not allow flares associated with the pilot wells. As such, the potential light impacts are further reduced to the two safety flares at the

Bibblewindi and Leewood processing facilities. In making its decision, the IPC indicated that the NSW conditions ensure the proposed action will not have detrimental impacts on the Observatory's operation.

5.18. NSW has concluded that impacts to the Observatory would not be unacceptable if the proposed action is undertaken in accordance with conditions B65 of the NSW conditions (Attachment D7).

5.19. The Department agrees that conditions B65a-d are appropriate, which require the proponent to:

i Minimise lighting and skyglow impacts on the Observatory;

ii Consult with relevant parties on monitoring light levels;

iii Undertake scheduled flaring activities during a gibbous moon; and

iv Ensure compliance with the Dark Sky Guidelines and give due consideration to good lighting design principles.

5.20. The Department's Historic Heritage Section (HHS) advised that the proposed action is unlikely to have detrimental impacts on the heritage values of the Observatory identified in the HMP (Attachment J), provided it complies with the Dark Sky Guidelines.

5.21. HHS considers the proposed action is unlikely to have direct, indirect and cumulative impacts upon the observing environment of the Commonwealth land on which the Observatory is situated, due to the nature and significant distance of the proposed action to the Observatory.

5.1.4 Conclusion on Commonwealth land (s26 & s27A)

5.22. The Department recommends that you adopt the relevant NSW conditions relating to the above mitigation measures as the Department considers these measures are suitable and necessary to mitigate any impacts on the values of the Observatory. The Department does not consider the proposed action would otherwise have a significant impact on the environment on the Commonwealth land on which the Observatory stands. If undertaken in accordance with these measures, the proposed action is unlikely to result in a residual significant impact on the environment on Commonwealth land.

5.23. Given the above information, the Department considers that the proposed action will not have an unacceptable impact on Commonwealth land.

6 GREENHOUSE GAS EMISSIONS

6.1 NSW CONSIDERATION

6.1. The NSW assessment notes that the proposed action's direct 'Scope 1' greenhouse gas (GHG) emissions (including fugitive emissions from the gas field) would be small, representing less than 0.2 percent of total Australian emissions. Total project-related Scope 1 to 3 emissions (including emissions from the downstream burning of the gas resource) would also be low relative to Australian emissions, at approximately 0.9 percent of the nation's total emissions. This is despite the proposed action potentially supplying up to 50 percent of NSW gas demand. On a

global scale, the proposed action related emissions (Scopes 1 to 3) represent some 0.009 percent of current global GHG emissions (i.e. 53.5 GT CO2-e).

Table 1: Direct and indirect GHG emissions (source NSW assessment report)

Scope	GHG Source	Total Project GHG Emissions (Mt CO_2-e)		Typical Year Project GHG Emissions (Mt CO_2-e)	
		Option 1 – On-site Power	Option 2 – Grid Power	Option 1 – On-site Power	Option 2 – Grid Power
Scope 1	Fuel Use	12.0	2.2	0.47	0.08
	Gas Flaring	2.0	2.0	0.005	0.004
	Gas Venting	0.1	0.1	0.005	0.004
	CO_2 Venting	12.0	10.9	0.48	0.44
	Fugitive Emissions	0.1	0.05	0.002	0.002
	Vegetation Clearance	0.2	0.2	0	0
	Total Scope 1	**26.3**	**15.5**	**0.96**	**0.53**
Scope 2	Electricity	0	18	0	0.72
Scope 3	Downstream Gas Use	94.3	94.3	3.77	3.77
Total		**120.6**	**127.8**	**4.73**	**5.02**

6.2. The bulk of emissions associated with the proposed action are indirect emissions associated with the downstream burning of the gas resource (Scope 3 emissions), which account for some 75 percent to 80 percent of the total direct and indirect GHG emissions generated by the proposed action.

6.3. Public submissions on the EIS raised concerns that the GHG assessment omitted or underestimated some emissions, particularly fugitive emissions of methane and CO^2 from gas extraction and processing operations. Submitters cited studies from the US and elsewhere (including Australia) that indicate that fugitive methane constitutes a significant GHG emission source from coal seam gas mining, potentially negating the relatively lower CO^2 emissions associated with the downstream burning of gas for energy compared to coal or oil.

6.4. Public submissions during the IPC process raised the contribution of greenhouse gases from the proposed action to climate change and the view that fugitive emissions and carbon dioxide content of the gas produced from the target coal seams had been underestimated in the EIS and not appropriately addressed in the NSW assessment report.

6.5. The IPC considered the public submissions and agreed that substantial exceedance of predicted emissions would jeopardise the expected greenhouse gas advantages of the CSG over coal, which was a strategic justification presented in the NSW assessment. The Commission determined that the proposed action should not be permitted to exceed its predicted Scope 1 and 2 emissions.

6.6. The NSW approval conditions require that reasonable measures are employed, so that greenhouse gas emissions generated by the development do not exceed

defined limits identified in the NSW conditions. Where greenhouse gas limits are exceeded the proponent will be required to offset in compliance with the offset integrity principles set out in the Commonwealth Government's Carbon Neutral Organisation: Climate Active Carbon Neutral Standards for Organisations (July 2020).

6.7. The NSW approval conditions also require the establishment of a Greenhouse Gas Emissions Advisory Group to inform the proper management and reporting of the proposed action's greenhouse gas emissions.

6.2 CONCLUSION

6.8. The Department notes the NSW approval conditions in regard to GHG emissions. The Department does not consider that further conditions are necessary to protect listed threatened species and ecological communities, the Siding Spring Observatory, the environment on Commonwealth land, and water resources.

7 ECONOMIC AND SOCIAL MATTERS (S136(1)(B))

7.1. In deciding whether or not to approve the proposed action and what conditions to attach to the approval, you must consider economic and social matters, so far as they are not inconsistent with any other requirement of Subdivision B, Division 1 of Part 9 of the EPBC Act.

7.2. Information on economic and social matters was primarily obtained from the NSW assessment report (Attachment D3), IPC report (Attachment D2), EIS (Attachment F1) and RTS (Attachment F2). The key issues are discussed below.

7.1 ECONOMIC MATTERS

7.3. The NSW assessment report (Attachment D3) states that the Narrabri Gas Project would provide major economic benefits for Narrabri, the North West region and to NSW, including:

i a direct capital investment of $3.6 billion, and a further $5.5 billion in operating costs over the life of the proposed action

ii generating 1,300 jobs during peak construction, 200 jobs at the proposed action during operations

iii over 500 direct and indirect jobs in the surrounding region and NSW

iv increasing NSW real economic output by approximately $12 billion

v generating more than $3 billion in direct revenue for the NSW Government through royalties and taxes

vi providing significant funding for local infrastructure and community service projects over the life of the proposed action, including via a Community Benefit Fund with a value of around $120 million, and also a Voluntary Planning Agreement and Road Maintenance Agreement with Narrabri Council, with a value of approximately $14.5 million.

7.4. NSW DPIE engaged an independent economist, Dr Brian Fisher of BAEconomics, to undertake a review of the economic assessments and economic impact associated with the proposed action. Following the provision of some additional information

provided by Santos in its RTS, Dr Fisher confirmed that the assessments had been undertaken in accordance with applicable economic guidelines and gives reasonable estimates of the likely impacts of the proposed action.

7.5. Public submissions provided varied views on the economic impacts of the proposed action, including questioning the long-term viability of the farming economy and agricultural land, jobs gained in the proposed action being offset by the loss of jobs in other sectors, the validity of the expert consultants, independence and expense of the Narrabri gas supply, and potential flaws in the revised economic modelling of the proponent.

7.6. The IPC is satisfied that the proposed action, subject to the conditions of consent imposed by the IPC, is consistent with the intent of the NSW Energy Package Memorandum of Understanding (MoU) entered into on 31 January 2020 as part of the goals of the NSW Gas Plan. Under the MoU, the NSW Government will set a target to inject an additional 70 PJ of gas per year into the NSW market.

7.7. The IPC considered that the proposed action will provide a net economic benefit for the local community, region and state through increased economic activity (Attachment D2). The IPC reiterated and agreed with the benefits raised by NSW.

7.8. The EIS cost benefit analysis, which is also provided on page 110 of the NSW assessment report, noted the costs of the proposed action as listed below. The EIS stated that even considering the below costs, the proposed action's economic benefits would significantly outweigh its costs, with a net economic benefit of between $1.5 and $1.6 billion.

i Capital project construction;

ii Operating costs;

iii Decommissioning and rehabilitation;

iv Loss of agricultural production;

v Loss of forestry production;

vi Public infrastructure maintenance and renewal;

vii Biodiversity offsetting;

viii Noise and vibration impacts; and

ix Greenhouse gas impacts.

7.9. The IPC accepted NSW DPIE's summary of the project's economic benefits and found that, on balance, the project will have a significant net economic benefit for the local community, region and State through increased investment and economic activity. It will also secure existing and future industries through the provision of a local gas supply, and job creation.

7.2 SOCIAL MATTERS

7.10. The EIS includes a detailed social assessment that considers the social impacts of the proposed action on infrastructure and community health and wellbeing (Attachment F1). A summary of the social assessment and the Department's consideration of the social impacts is provided below.

7.11. The NSW assessment report (Attachment D3) states that the proposed action would generate a range of major positive social impacts in the local community through job creation and economic opportunities and facilitate flow-on local economic

development. It would also have major positive social impacts for the wider region and State, through bolstering domestic and industrial gas supplies, and generating significant tax and royalty revenues.

7.12. The IPC considered the potential social impacts of the proposed action, and the likely social benefits, and concluded that the benefits include:

i 1,300 construction jobs;

ii 200 operational jobs (includes approximately 50 existing project-related jobs);

iii Opportunities for skills training for Aboriginal employees;

iv Diversification of local industry and jobs – multiplier flow on in employment generation;

v Increase in local procurement;

vi Small increase in the population of Narrabri;

vii Compensation to landholders for the duration of the proposed action;

viii Community Benefit Fund grants (no more than $500,000 per project);

ix Voluntary Planning Agreement with Council worth $14.5 million; and

x Catalyst for Inland Port Employment Precinct.

7.13. However, the NSW assessment report and IPC report (Attachment D2) also acknowledge that the proposed action has the potential to have negative social impacts in the local community and the wider area, by putting pressure on local services and facilities and affecting social dynamics and other land users. Other costs and risks identified are:

i Increased traffic generation around Narrabri;

ii Increase in potential traffic incidents;

iii Decrease in Narrabri's housing availability and affordability;

iv Masculinisation of Narrabri during construction;

v Potential loss of jobs from agriculture to the proposed action;

vi Continuing social conflict and division;

vii Increase demand on social infrastructure and services;

viii Potential distributional inequity of benefits;

ix Potential increased cost of living; and

x Potential decline in mental health indicators from perceived CSG impacts.

7.14. The NSW assessment report describes the consultation with Professor Deanna Kemp, Director of the University of Queensland's Centre for Social Responsibility in Mining Sustainable Minerals Institute, to provide advice on the social assessment and impacts of the proposed action. Professor Kemp identified issues with aspects of Santos' social assessment, including assumptions made in the assessment of distribution of benefits and potential social conflict and division, and the response to community concerns. Nevertheless, Professor Kemp considers that, overall, the negative social impacts of the proposed action can be appropriately managed, and that many of the residual issues can be dealt with through a Social Impact Management Plan (SIMP) and appropriate conditions of consent.

7.15. Public submissions also raised several issues, including concerns about vulnerable groups, community fears and health, impacts associated with a fly-in-fly-out (FIFO) workforce, and impacts following closure of the proposed action.

7.16. The IPC concluded that the proposed action would result in a range of positive and negative social risks and/or impacts, but also finds that the negative social risks associated with the proposed action can be appropriately monitored, managed and mitigated through the conditions imposed.

7.2.1 Indigenous and cultural matters

7.17. The proposed action area is located within Kamilaroi Country. The proposed action area is located predominantly within the administrative area of the Narrabri Local Aboriginal Land Council (LALC).

7.18. An Aboriginal Cultural Heritage Assessment (ACHA) was undertaken as part of the EIS, and the NSW Government arranged an independent review of both that assessment, and the associated Aboriginal Cultural Heritage Management Plan (ACHMP). That review did not raise any significant concerns about the ACHA, subject to a number of recommendations which have been reflected in the NSW conditions.

7.19. 90 known Aboriginal cultural heritage sites were identified within the proposed action area during the ACHA, and associated landscape mapping identifies potential cultural heritage sensitivity zones within the proposed action area.

7.20. The proponent has committed to implementing buffers to culturally sensitive areas, such as watercourses, and to avoid all known Aboriginal sites within the proposed action area, which have been reflected in the NSW conditions.

7.21. The NSW Assessment Report states that both the ACHA and development of the ACHMP were undertaken in consultation with applicable Aboriginal stakeholders including the Narrabri LACL, Wee Waa LALC, Red Chief LALC, the Gomeroi native title claimants, and other Registered Aboriginal Parties (RAPs).

7.22. All RAPs were invited to participate in the consultation process which included letters and advertisements, meetings, field trips, requests for comment and the review of assessment documentation. The NSW Assessment Report states that over 550 RAPs have been involved in the consultation process for the proposed action.

7.23. Some stakeholders raised concerns regarding the adequacy of the above consultation during the NSW assessment process, however, BCD, an independent reviewer and the NSW Government have reviewed the consultation process and are satisfied that it has been undertaken in accordance with the applicable guidelines.

7.24. The Minister for Indigenous Australians responded to an invitation to comment on the proposed decision, and noted that based on information provided by NSW officials, the proponent has met its Aboriginal consultation obligations under the NSW legislative requirements.

7.25. He provided general support for the proposed action, however, highlighted tensions between Indigenous stakeholders in relation to development proposals and encouraged the Department to work closely with the NSW Government to ensure the preservation of Aboriginal cultural heritage.

7.26. The Department has encouraged working relationships between the proponent, NSW Government and the National Indigenous Australians Agency as part of this

assessment, in regard to Aboriginal consultation and the management of Aboriginal cultural heritage.

7.27. The Department notes that NSW conditions B55-B59 relate to Aboriginal heritage reflect the proponent's commitments, and the recommendations in the independent review of the ACHA and ACHMP. The conditions require the proponent to avoid all direct and indirect impacts to known Aboriginal sites, and higher significance sites identified through micro-siting surveys.

7.28. The conditions also require the proponent to finalise and implement the ACHMP, and to establish and maintain and Aboriginal Cultural Heritage Advisory Group for the proposed action, including representatives from DPIE, suitably qualified archaeologists, the Narrabri LALC, Wee Waa LALC and the Gomeroi native title claimants.

7.29. The IPC concluded that the NSW conditions are an appropriate mechanism to guide the development of the proposed action in regard to Aboriginal cultural heritage, and considers that the preparation of the ACHMP will ensure that the proponent has proper regard to items and areas of Aboriginal cultural significance.

7.30. The Department notes the conclusions in the NSW Assessment Report, and the IPC Statement of Reasons as they relate to Aboriginal heritage.

7.3 CONCLUSION

7.31. The Department accepts the conclusion made in the NSW assessment report, that indicates that the proposed action would generally meet all relevant health and amenity criteria, and result in major socio-economic benefits for the locality, region, and the State. Nevertheless, as with other contemporary mining projects, the proposed action does have the potential to result in some negative social impacts, particularly at the local level. The NSW assessment was satisfied that these residual impacts can be appropriately minimised and managed.

7.32. The Department agrees with the conclusions of the IPC, and considers that despite the presence of several Aboriginal cultural sites within the proposed action area, the implementation of both an ACHMP and an associated advisory group, will ensure that potential disturbance to Aboriginal cultural heritage will be suitable managed.

7.33. The NSW assessment, IPC conclusions, and the Department's consideration of the positive and negative economic and social matters conclude that with appropriate management and mitigation, the negative impacts can be managed to achieve the benefits of the proposed action.

8 FACTORS TO BE TAKEN INTO ACCOUNT

8.1. In considering the above matters, you must take into account:

i the principles of ecologically sustainable development (set out in section 3A of the EPBC Act), including the precautionary principle (set out in sections 3A(b) and 391(2) of the EPBC Act) (section 136(2)(a));

ii the NSW assessment report, being the assessment report relating to the proposed action (section 136(2)(b));

iii any other information you have on the relevant impacts of the proposed action (section 136(2)(e));

iv any relevant comments given to you by another Minister in accordance with an invitation under section 131, 131AA or 131A ((section 136(2)(f) and section 131AA(6)); and

v any information given to you in accordance with a notice under section 132A (section 136(2)(g)).

8.1 THE PRINCIPLES OF ECOLOGICALLY SUSTAINABLE DEVELOPMENT (SET OUT IN S3A OF THE EPBC ACT), INCLUDING THE PRECAUTIONARY PRINCIPLE (SET OUT IN S3A(B) AND S391(2) OF THE EPBC ACT) (EPBC ACT, S136(2)(A))

8.2. In recommending that you approve the proposed action subject to conditions, the Department has taken into account the principles of ecologically sustainable development, including the precautionary principle, in the following ways:

a) Decision-making processes should effectively integrate both long-term and short-term economic, environmental, social and equitable considerations.

8.3. In recommending the approval of this proposed action, the Department has considered the long and short-term economic, environmental, social and equitable impacts in accordance with section 3A(a) of the EPBC Act. The Department notes that the proposed action has gone through an environmental impact assessment process with economic, environmental, social and equitable considerations, and included a public consultation process.

8.4. This Report and the NSW assessment documentation provide sufficient information to allow you to conclude that the decision-making processes have effectively integrated both short and long term social, economic and environmental considerations.

8.5. The NSW assessment report (Attachment D3) states that the Narrabri Gas Project is critical for energy security and reliability in NSW and will deliver significant economic benefits to the State and Narrabri region, including attracting $3.5 billion of capital investment to the region and $5.5 billion of spending during operations, creating 1,300 construction jobs and helping to reduce gas prices.

8.6. As noted previously, the proposed action is expected to produce up to 200 TJ of gas per day for the domestic market, which is approximately half of NSW's gas demand, and will help address any forecast shortfalls in gas supply on the east coast.

8.7. Targeted ecological surveys of the existing environment within the proposed action area were undertaken to increase the understanding of the potential impacts of the proposed action on the environment. The Department notes the ecological surveys were undertaken in accordance with the Commonwealth-endorsed NSW biodiversity offsets policy for major projects and Framework for Biodiversity Assessment.

8.8. Data on groundwater and surface water quality and quality, and core sampling, was also collected to better understand the geology, hydrology and hydrogeology of the proposed action area and surrounds. The data was used to inform predictive modelling to also understand the nature and extent of potential impacts on the environment.

8.9. As discussed above, the EIS includes a Social Impact Assessment (Appendix T1 of Attachment F1), which concluded that some negative impacts will occur on the 'way

of life' of nearby communities, including infrastructure and community health and wellbeing, but numerous beneficial social impacts are expected to occur.

8.10. The Department notes that DPIE engaged an independent expert to provide advice on the social assessment and impacts of the proposed action.

8.11. The NSW assessment concluded the proposed action is likely to result in both positive and negative social impacts in the region but overall, any adverse social impacts can be mitigated through community engagement and transparent public reporting on the proposed action; promoting local economic development through jobs and training opportunities; and providing significant funding for local public infrastructure and essential services.

8.12. The Department considers that the likely impacts on the environment as a result of the proposed action are satisfactory in terms of the long-term and short-term economic, environmental, social and equitable impacts.

8.13. The Department considers that all short-term and long-term impacts on protected matters will be managed through the recommended conditions for approval under the EPBC Act, and the conditions imposed by the NSW Government.

8.14. The Department further considers that the proposed action, if undertaken in accordance with the recommended approval conditions, would be consistent with this principle of ecologically sustainable development.

b) <u>If there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation (also the precautionary principle - section 391(2))</u>

8.15. In recommending approval of the proposed action, the Department concluded that there is sufficient scientific information to know of, and understand, the likely impacts of the proposed action on matters protected by the controlling provisions of the proposed action.

8.16. The Department notes that the proponent has taken a precautionary approach in determining its biodiversity impacts and based its offset liability on a worst-case scenario of up to 989 ha of vegetation clearance. The proponent expects to impact less than 70 percent of this amount.

8.17. The IPC report considered the precautionary principle in its determination, particularly regarding groundwater contamination, water security, bushfire risk, greenhouse gas emissions, biodiversity and Aboriginal cultural heritage impacts. The IPC concluded that the risk of the proposed action causing serious or irreversible environmental harm is low. The Department agrees with this conclusion, having regard to the proposed avoidance, mitigation and offset measures.

8.18. There is a lack of certainty regarding the risk or severity of impacts around groundwater drawdown on GDEs as the impacts are based on modelling and the location of wells has not been finalised. To account for this uncertainty, the Department has recommended additional conditions to ensure the proposed action complies with relevant performance measures and thresholds, ongoing monitoring and updated modelling is undertaken, and response mechanisms are in place to manage those impacts in a timely manner. The Department has included a cease-work condition and the requirement for corrective actions to be undertaken to prevent any adverse impacts to GDEs resulting from exceedances in groundwater drawdown.

c) The principle of intergenerational equity – that the present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations.

8.19. The Department has taken the intergenerational principle into consideration when recommending that the proposed action be approved.

8.20. The IPC report considers that intergenerational equity had been appropriately addressed by the proponent and noted that impacts to the region's natural resources, including water and agricultural land would be relatively low, and potential risks can be identified, avoided and managed through the conditions of approval.

8.21. The Department agrees with this conclusion and considers that the recommended conditions of approval (at Attachment E of the final decision brief) would ensure the protection and management of listed threatened species and ecological communities, water resources, and the heritage values of the Observatory on Commonwealth land. Those conditions ensure that the proposed action must be implemented in a sustainable way and to protect the environment for future generations.

8.22. On this basis, the Department considers that approving the proposed action subject to the recommended approval conditions would not be inconsistent with the principle of intergenerational equity.

d) The conservation of biological diversity and ecological integrity should be a fundamental consideration in decision-making.

8.23. The Department has considered the conservation of biodiversity and ecological integrity in relation to relevant threatened species and communities and in recommending that the proposed action be approved.

8.24. The Department considers the proponent's commitments to avoid, mitigate and manage the impacts of the proposed action, including through the implementation of management plan objectives, and the recommended proposed conditions of approval, allow for the proposed action to not have serious or irreversible impacts on biological diversity and ecological integrity.

8.25. In addition, the Department considers that the NSW assessment report (Attachment D3) and the EIS (Attachment F) also took the conservation of biological diversity and ecological integrity into account as a fundamental consideration in assessing the proposed action. This documentation included a review of the land use in the Pilliga to balance values, land-uses and formal conservation reserves and ultimately aim to protect the biological diversity values of the Pilliga.

e) Improved valuation, pricing and incentive mechanisms should be promoted.

8.26. The Department considers the costs of avoidance, mitigation and management measures for any relevant impacts provide appropriate pricing and incentive mechanisms for the protection of matters of environmental significance and the environment.

8.27. In addition, the NSW conditions provide a financial incentive to further reduce impacts to biodiversity by including the opportunity for the proponent to reduce the biodiversity offset liability amount if the final disturbance footprint is reduced.

8.2 THE NSW ASSESSMENT REPORT, BEING THE ASSESSMENT REPORT RELATING TO THE PROPOSED ACTION (EPBC ACT, S136(2)(B))

8.28. In considering the matters set out in section 136(1) of the EPBC Act – matters relevant to protected matters and economic and social matters – you must take into account the assessment report relating to the proposed action. The NSW assessment report relating to the proposed action is at Attachments D3 – D6.

8.3 ANY OTHER INFORMATION THE MINISTER HAS ON THE RELEVANT IMPACTS OF THE PROPOSED ACTION (EPBC ACT, S136(2)(E))

8.29. In considering the matters set out in section 136(1) of the EPBC Act – matters relevant to protected matters and economic and social matters – you must take into account any other information you have on the relevant impacts of the proposed action (including information in a report on the impacts of actions taken under a policy, plan or program under which the action is to be taken that was given to you under an agreement under Part 10 (about strategic assessments)).

8.30. The Department has considered the proponent's assessment documents (EIS, RTS, which included public comments, and additional information; Attachment F), and material from NSW agencies in considering relevant impacts of the proposed action (Attachment D).

8.31. The Department has considered information from relevant line areas on the potential impacts of the proposed action on protected matters (Attachment E).

8.32. There are no strategic assessment reports that are relevant to the proposed action, and all other information relevant to the proposed action is attached to the brief.

8.33. There are no bioregional plans relevant to this proposed action, as these relate to marine regions (see section 8.9).

8.34. The Australian Government's Bioregional Assessment Program (completed in 2018) assessed the potential impacts of coal seam gas and large coal mining developments on surface water and groundwater, and ecosystems or assets that depend on them. Six bioregions across Queensland, New South Wales, Victoria and South Australia were assessed.

8.35. The Narrabri Gas Project is located in the Namoi subregion of the Northern Inland Catchments bioregion.

i The Namoi subregion bioregional assessment (Attachment I) was considered as part of the NSW assessment process and by the Department in preparing this Report.

ii The Namoi subregion bioregional assessment included regional-scale hydrological modelling of how new or expanding coal resource developments in the region could affect groundwater and surface water resources.

iii The model predicted that none of the main aquifers of the GAB would be impacted by coal resource development in the region.

8.36. The Department considers the extensive site specific water impact assessments undertaken during the NSW assessment of the proposed action and the IESC advice (Attachment H), provides a finer scale assessment of the proposed action's impacts on water resources and therefore can provide greater certainty with regard to decision making in respect to impacts on water resources.

8.37. As outlined in the Department's conclusions in this Report, the Department is satisfied that the proposed action will not have an unacceptable impact on water resources, provided it is undertaken in accordance with the recommended conditions of approval.

8.4 Any relevant comments given to the Minister by another Minister in accordance with an invitation under s131, s131AA or s131A (EPBC Act, s136(2)(f) and s131AA(6))

8.38. In considering the matters set out in section 136(1) of the EPBC Act – matters relevant to protected matters and economic and social matters – you must take into account any relevant comments given to you under sections 131 (from other Commonwealth Ministers) and 131A (from members of the public).

8.39. In deciding whether or not to approve the proposed action you must also take into account relevant comments provided by the proponent and person proposing to take the action under section 131AA.

8.40. Under section 131 of the EPBC Act, you must inform any other Minister whom you believe has administrative responsibilities relating to the action of the decision you propose to make, and invite the other Ministers to give comments to you within 10 business days.

8.41. On 28 October 2020, you wrote to:

i The Prime Minister, the Hon Scott Morrison MP;

ii The Deputy Prime Minister and Minister for Infrastructure, Transport and Regional Development, the Hon Michael McCormack MP;

iii The Minister for Employment, Skills, Small and Family Business, Senator the Hon. Michaelia Cash;

iv The Minister for Energy and Emissions Reduction, the Hon Angus Taylor MP;

v The Minister for Indigenous Australians, the Hon Ken Wyatt AM MP;

vi The Minister for Industry, the Hon Karen Andrews MP;

vii The Minister for Regional Health, Regional Communications and Local Government, the Hon Mark Coulton MP;

viii The Minister for Resources, Water and Northern Australia, the Hon Keith Pitt MP;

ix The Minister for Agriculture, Drought and Emergency Management, the Hon David Littleproud MP; and

x The proponent, Santos.

8.42. The responses to your invitation to comment are discussed in the final approval decision brief and are found Attachment C of the final approval decision brief.

8.43. You also notified the NSW Minister for Planning and Public Spaces, the Hon Rob Stokes MP, of your proposed decision.

8.44. Seeking comments from the public under section 131A of the EPBC Act at the proposed decision stage is discretionary and is not recommended in this case. The Department considers that the views of the public in relation to the proposed action are well understood, noting the extensive consultation undertaken through the

NSW assessment process (both exhibition of the EIS and the IPC's public hearing) and that public consultation on a proposed decision is unlikely to raise new issues.

8.5 Any relevant advice obtained by the Minister from the Independent Expert Scientific Committee on Coal Seam Gas and Large Coal Mining Development in accordance with s131AB (s136(2)(fa))

8.45. In considering the matters set out in section 136(1) of the EPBC Act – matters relevant to protected matters and economic and social matters – you must take into account any relevant advice obtained from the IESC.

8.46. On 8 August 2017, the then Commonwealth Department of the Environment and Energy and the then NSW Department of Planning and Environment received advice on the proposed action from the IESC. A summary of the IESC advice is provided in the discussion on water resources section of this document and a copy of the IESC advice is at Attachment H.

8.47. A table analysing how the NSW assessment and conditions of approval have addressed the IESC's advice is at Attachment B2 of the final decision brief.

8.6 Any information given to the Minister in accordance with a notice under s132A (EPBC Act, s136(2)(g))

8.48. Section 132A of the EPBC Act provides that, for certain actions, before you decide whether or not to approve the taking of the action for the purposes of a controlling provision, and what conditions (if any) to attach to an approval, you may request the appropriate Minister of the State or Territory to give you a notice stating the method that has been used to assess the certain and likely impacts of the action on things other than matters protected by the controlling provisions for the action.

8.49. Section 132A of the EPBC Act does not apply to the proposed action as there has been no request for a notice from the relevant State Minister.

8.7 Person's environmental history – s136(4)

8.50. In deciding whether to approve the taking of an action, and what conditions to attach to the approval, you may, under section 136(4) of the EPBC Act, consider whether the person proposing to take the action is a suitable person to be granted an approval, having regard to:

i the person's history in relation to environmental matters;

ii if the person is a body corporate – the history of its executive officers in relation to environmental matters; and

iii if the person is a body corporate that is a subsidiary of another body or company (the parent body) – the history in relation to environmental matters of the parent body and its executive officers.

8.51. Santos NSW (Eastern) Pty Ltd (the proponent and person proposing to take the action; ACN 009 321 662) is a wholly-owned subsidiary of Santos NSW (Narrabri Energy) Pty Ltd. Santos NSW (Narrabri Energy) Pty Ltd is a wholly owned subsidiary of Santos Limited (ABN 80 007 550 923), which is the ultimate holding company.

8.52. The proponent's 2014 referral included information about its environmental record, including that Santos NSW (Eastern) Pty Ltd had been subject to the following proceedings:

i June 2013 – reporting failures under the *Petroleum (Onshore) Act 1991* (NSW) in relation to natural gas operations in the Pilliga. The proponent pleaded guilty and was fined $52,500 by the NSW Land and Environment Court.

ii February 2014 – water pollution at Bibblewindi Pond 3, which was used to manage existing produced water at the Bibblewindi Water Treatment Facility. A penalty infringement notice and $1500 fine from the NSW EPA were issued.

8.53. On 6 October 2020, the Compliance Section of the Department's Office of Compliance advised that a search of the Department's compliance and enforcement databases and records held by the Department indicated that there was no adverse compliance history under the EPBC Act for the person proposing to take the action.

8.54. Given the outdated information on the proponent's environmental history (from the referral), on 3 November 2020, the Department requested additional information (Attachment D of the final decision brief) from the proponent in relation to section 136(4). Environmental history from the last 10 years was requested and is considered a reasonable timeframe for the purposes of your consideration of whether the person proposing to take the action is a suitable person for approval.

8.55. On 10 November 2020, Santos advised (Attachment D of the final decision brief) that:

i Santos NSW (Eastern) Pty Ltd had three incidents in the past 10 years, including the two already outlined in the 2014 referral. The most recent incident was in October 2018 and related to using produced water for irrigation. A penalty infringement notice and $1500 fine from the NSW EPA were issued and the NSW EPA acknowledged that the incident did not result in actual or potential environmental harm;

ii The only record of any conviction or fine against a parent company of Santos NSW (Eastern) Pty Ltd (Santos NSW (Narrabri Energy) Pty Ltd or Santos Limited), under any Commonwealth, State or Territory legislation in the past 10 years was in February 2014 and related to a water bore Work Approval and the applicable Water Access License. A penalty infringement notice and $1500 fine from the NSW Office of Water Science were issued; and

iii Enquiries were made about the environmental history of each of the directors and company secretaries of Santos NSW (Eastern) Pty Ltd, Santos NSW (Narrabri Energy) Pty Ltd, and Santos Limited, and the members of the executive committee of Santos Limited. Each of those people confirmed that they have never been convicted of any offence or had civil penalties awarded against them under Commonwealth, State or Territory law in the past 10 years, either in their capacity as a Santos executive officer, or the executive officer of another organisation.

iv Santos's management system integrates technical and engineering requirements with personal health and safety requirements to comprehensively manage health, safety and environmental risks within Santos's operations. Santos attached its Environmental Health and Safety Policy, Incident and Crisis Management Standard, Compliance Management Standard, and Compliance Procedure.

8.56. Having regard to the nature and scale of the incidents outlined above, the Department notes that these incidents did not result in significant environmental harm. Most of the penalties imposed were at the low end (ie $1,500). The $52,500 fine was a relatively larger penalty. The Department notes that Santos, or its parent body, accepted and acknowledged these infringements and penalties. The Department considers that this represents Santos's commitment to taking responsibility for incidents that result in environmental harm.

8.57. Having regard to the company policies provided in the referral documentation and in its response of 10 November 2020, the Department considers that Santos has environmental management systems in place to manage any environmental incidents that could arise.

8.58. On that basis of the above factors, the Department considers that it would be open to you to conclude that the proponent is a suitable person to be granted an approval.

8.8 MINISTER NOT TO CONSIDER OTHER MATTERS (EPBC ACT, S136(5))

8.59. Under Subsection 136(5) of the EPBC Act, in deciding whether or not to approve the taking of an proposed action, and what conditions to attach to an approval, you must not consider any matters that you are not required or permitted, by Division 1, Part 9 of the EPBC Act, to consider.

8.60. The Department has based its recommendation to approve the proposed action with conditions on matters that you are required or permitted by Division 2, Part 9 of the EPBC Act to consider.

8.9 BIOREGIONAL PLANS – S176(5)

8.61. Under section 176(5), you are required to have regard to a bioregional plan in making any decision under the Act to which the plan is relevant.

8.62. Bioregional plans have been developed under the EPBC Act for specific marine regions to protect biodiversity and the sustainable use of marine resources.

8.63. The proposed action is not located within or near an area designated by a bioregional plan. The Department considers that there are no bioregional plans relevant to your decision.

8.10 REQUIREMENTS FOR DECISION ABOUT THREATENED SPECIES AND ENDANGERED COMMUNITIES (EPBC ACT, S139)

8.64. Under section 139(1) of the EPBC Act, in deciding whether or not to approve for the purposes of a subsection of section 18 or section 18A the taking of an action, and what conditions to attach to such an approval, you must not act inconsistently with:

i Australia's obligations under:

  i the Convention on Biological Diversity (Biodiversity Convention); or

  ii the Convention on the Conservation of Nature in the South Pacific (Apia Convention); or

  iii the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES); or

ii a recovery plan or threat abatement plan.

8.65. Section 139(2) states, if:

i the Minister is considering whether to approve, for the purposes of a section of section 18 or section 18A, the taking of an action; and

ii the action has or will have, or is likely to have, a significant impact on a particular listed threatened species or a particular listed threatened ecological community;

the Minister must, in deciding whether to approve the taking of the action, have regard to any approved conservation advice for the species or community.

8.10.1 The Biodiversity Convention

8.66. The Biodiversity Convention is available at: http://www.austlii.edu.au/au/other/dfat/treaties/ATS/1993/32.html

8.67. The objectives of the Biodiversity Convention, to be pursued in accordance with its relevant provisions, are the conservation of biological diversity, the sustainable use of its components and the fair and equitable sharing of the benefits arising out of the utilisation of genetic resources, including by appropriate access to genetic resources and by appropriate transfer of relevant technologies, taking into account all rights over those resources and to technologies, and by appropriate funding.

8.68. The Biodiversity Convention requires Contracting Parties, as far as possible and as appropriate, to introduce procedures requiring environmental impact assessments of projects that are likely to have significant adverse effects on biological diversity to avoid and minimise such impacts, and requires Parties to introduce appropriate arrangements to ensure that the environmental consequences of their programmes and policies that are likely to have significant adverse impacts on biological diversity are duly taken into account. The proposed action was subject to an environmental impact assessment process under the NSW EP&A Act.

8.69. The NSW assessment report identifies the likely impacts of the proposed action on listed threatened species and communities, and recommends measures to avoid, mitigate and offset those impacts. These measures are reflected in the NSW conditions at Attachment D7.

8.70. The Department considers that approval of the proposed action will have been carried out in accordance with an EIS, and there are arrangements in place to ensure that the significant adverse impacts of the proposed action on biological diversity are taken into account. The Department also considers that the proposed action will not have unacceptable impacts on biodiversity, including Commonwealth-listed threatened species and communities, if it is taken in accordance with the recommended conditions.

8.71. The Department therefore considers that you should be satisfied that approving the proposed action, subject to conditions that avoid, mitigation and offset impacts to biodiversity, is not inconsistent with Australia's obligations under the Biodiversity Convention.

8.10.2 Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)

8.72. CITES is available at: http://www.austlii.edu.au/au/other/dfat/treaties/ATS/1976/29.html

8.73. The aim of CITES is to ensure that international trade in specimens of wild animals and plants does not threaten their survival.

8.74. The Department considers that you should be satisfied that approving the proposed action, subject to conditions, is not inconsistent with Australia's obligations under

CITES as the proposed action does not involve international trade in specimens of wild animals and plants.

8.10.3 Convention on the Conservation of Nature in the South Pacific (APIA Convention)

8.75. The APIA Convention is available at: http://www.austlii.edu.au/au/other/dfat/treaties/ATS/1990/41.html

8.76. The APIA Convention encourages the creation of protected areas which together with existing protected areas will safeguard representative samples of the natural ecosystems occurring therein (particular attention being given to endangered species), as well as superlative scenery, striking geological formations, and regions and objects of aesthetic interest or historic, cultural or scientific value.

8.77. The APIA Convention was suspended with effect from 13 September 2006 and Australia therefore has no current international obligations under the Convention. Nevertheless, the obligations under the Convention have been taken into consideration.

8.78. The proposed action has undergone an environmental assessment which concluded that the proposed action will not have an unacceptable impact on biodiversity, geological formations and objects of aesthetic interest or historic, cultural or scientific value, subject to the proposed conditions.

8.79. The proposed conditions of approval place restrictions on the extent of impacts the action can have on biodiversity and water assets, and how they are managed in the long-term. The proposed conditions also require ongoing monitoring of potential impacts and obligations for the person taking the action to implement mitigation and corrective actions, and to offset significant residual impacts. As such, the Department considers that you could be satisfied that approving the proposed action, subject to conditions, is not inconsistent with the obligations under the Convention.

8.10.4 Recovery Plans and Threat Abatement Plans

8.80. The recovery plans relevant to the proposed action are:

i Baker-Gabb, D. (2011). *National Recovery Plan for the Superb Parrot* Polytelis swainsonii. Department of Sustainability and Environment, Melbourne. Available from: http://www.environment.gov.au/biodiversity/threatened/recovery-plans/national-recovery-plan-superb-parrot-polytelis-swainsonii.

ii Department of the Environment (2016). *National Recovery Plan for the Regent Honeyeater* (Anthochaera phrygia). Canberra, ACT: Commonwealth of Australia. Available from: http://www.environment.gov.au/biodiversity/threatened/recovery-plans/national-recovery-plan-regent-honeyeater-anthochaera-phrygia-2016.

iii Department of Environment, Land, Water and Planning (2016). *National Recovery Plan for the Spotted-tailed Quoll* Dasyurus maculatus. Australian Government, Canberra. Available from: http://www.environment.gov.au/biodiversity/threatened/recovery-plans/spotted-tailed-quoll.

iv Saunders, D.L. & C.L. Tzaros (2011). *National Recovery Plan for the Swift Parrot* (Lathamus discolor). Birds Australia, Melbourne. Available from: http://www.environment.gov.au/biodiversity/threatened/recovery-plans/national-recovery-plan-swift-parrot-lathamus-discolor.

v NPWS (2002). *Bertya* sp. Cobar-Coolabah (Cunningham & Milthorpe s.n., 2/8/73) Recovery Plan. NSW National Parks and Wildlife Service, Hurstville NSW. Available from: http://www.environment.gov.au/biodiversity/threatened/recovery-plans/national-recovery-plan-bertya-sp-cobar-coolabah-cunningham-milthorpe-sn-2873.

vi Carter, O. (2010). *National Recovery Plan for the Spiny Peppercress* Lepidium aschersonii. Department of Sustainability and Environment, Melbourne. Available from: http://www.environment.gov.au/biodiversity/threatened/recovery-plans/national-recovery-plan-spiny-peppercress-lepidium-aschersonii.

vii Mavromihalis, J. (2010). *National Recovery Plan for the Winged Peppercress* Lepidium monoplocoides. Department of Sustainability and Environment, Melbourne. Available from: http://www.environment.gov.au/resource/national-recovery-plan-winged-peppercress-lepidium-monoplocoides.

8.81. The State has considered these recovery plans in its assessment as summarised in Attachments D4 & D6, excluding those recovery plans relevant to Superb Parrot and Swift Parrot, and is of the view that approval of the proposed action would not be inconsistent with those recovery plans.

8.82. The Department has had separate consideration of the recovery plans for Superb Parrot and Swift Parrot, and is of the view that the approval of the proposed action would not be inconsistent with those plans as discussed below.

8.83. The Department will also be consulted during the development of the BMP, along with the Biodiversity Advisory Group, to ensure that adequate mitigation and management measures will be undertaken by the approval holder with regard to these recovery plans. As such, the Department has confidence that the proposed action will not be inconsistent with relevant recovery plants.

8.84. The recovery plans are provided at Attachment G and discussed below.

National Recovery Plan for the Superb Parrot

8.85. The recovery plan for the Superb Parrot (Attachment G1) came into force in 2011 and identifies major threats to the species as:

i Loss and degradation of habitat;

ii Irrigation and regulated flows;

iii Firewood collection and timber production;

iv Disturbance, poisoning and road-kills; and

v Illegal removal of wild birds and competition for nest hollows.

8.86. The overall strategy for the recovery of the species, as detailed in the recovery plan, is to:

i Locate and protect nesting colonies and treed corridors to foraging areas;

ii Improve foraging habitat quality through reductions in grazing pressure, timber harvesting, firewood gathering, irrigation and other degrading impacts;

iii Control recreational impacts near nesting colonies and prevent illegal trapping;

iv Reduce road kill and involve the community in the recovery program.

8.87. The Department considers that disturbance and the loss and degradation of habitat are relevant threats to the proposed action. The Department considers that the

improvement of foraging habitat quality, and the involvement of the community in the recovery program are relevant recovery actions to the proposed action.

8.88. Proposed condition 25 (at Attachment E of the final decision brief) requires the proponent to comply with NSW condition B43. Table 8 of that condition includes upper clearing limits, which would limit the clearance of habitat for the species to 416.8 ha. The Department has also recommended conditions requiring the proponent to comply with NSW conditions B49-B52, which includes the establishment and facilitation of a Biodiversity Advisory Group, Field Development Protocol, Rehabilitation Management Plan and Biodiversity Management Plan, discussed in paragraphs 4.23 and 4.24 of this document.

8.89. Proposed conditions 26 and 27 require the proponent to provide like-for-like offsets to compensate for impacts to the species, in accordance with either the NSW Biodiversity Offsets Policy for Major Projects (Major Projects Policy), or the Biodiversity Offsets Scheme (BOS) under the NSW *Biodiversity Conservation Act 20126* (BC Act).

8.90. The Department notes that while the proposed action would result in the loss and degradation of habitat for the Superb Parrot, the proposed avoidance and mitigation measures and recommended conditions, including offsetting measures discussed above, will contribute to the improvement of foraging habitat quality, and provide opportunities for community involvement in the recovery of the species.

8.91. For these reasons, the Department considers that in approving the proposed action, subject to the recommended conditions, you would not be acting inconsistently with this recovery plan.

National Recovery Plan for the Regent Honeyeater

8.92. The recovery plan for the Regent Honeyeater (Attachment G2) came into force in 2016 and identifies major threats to the species as:

i Small population size;

ii Habitat loss, fragmentation and degradation; and

iii Competition.

8.93. The overall strategy for the recovery of the species, as detailed in the recovery plan, is to:

i Improve the extent and quality of regent honeyeater habitat.

ii Bolster the wild population with captive-bred birds until the wild population becomes self-sustaining.

iii Increase understanding of the size, structure, trajectory and viability of the wild population.

iv Maintain and increase community awareness, understanding and involvement in the recovery program.

8.94. The Department considers that habitat loss, fragmentation and degradation are relevant threats to the proposed action. The Department considers that improving the extent and quality of Regent Honeyeater habitat, and increasing understanding of the wild population are relevant recovery actions to the proposed action.

8.95. Proposed condition 25 (at Attachment E of the final decision brief) requires the proponent to comply with NSW condition B43. Table 8 of that condition includes upper clearing limits, which would limit the clearance of habitat for the species to

48 ha. The Department has also recommended conditions requiring the proponent to comply with NSW conditions B49-B52, which includes the establishment and facilitation of a Biodiversity Advisory Group, Field Development Protocol, Rehabilitation Management Plan and Biodiversity Management Plan, discussed in paragraphs 4.23 and 4.24 of this document.

8.96. These conditions also include the requirement for micro-siting and pre-construction ecological scouting which will further inform the understanding of Regent Honeyeater presence and habitat in the region.

8.97. Proposed conditions 26 and 27 (at Attachment E of the final decision brief) require the proponent to provide like-for-like offsets to compensate for impacts to the species, in accordance with either the Major Projects Policy, or the BOS under the BC Act.

8.98. The Department notes that while the proposed action would result in habitat loss, fragmentation and degradation for the Regent Honeyeater, the proposed avoidance and mitigation measures and recommended conditions, including offsetting measures discussed above, will contribute to the improvement of extent and quality of Regent Honeyeater habitat. The required survey efforts will also contribute to an increased understanding of the wild population of the species.

8.99. For these reasons, the Department considers that in approving the proposed action, subject to the recommended conditions, you would not be acting inconsistently with this recovery plan.

Spotted-tail Quoll

8.100. The recovery plan for Spotted-tail Quoll (Attachment G3) came into effect in 2016 and identifies major threats to the species as:

i Habitat loss, fragmentation and modification;

ii Timber harvesting;

iii Poison baiting and poisoning by cane toads;

iv Competition and predation from introduced predators;

v Road mortality and deliberate killing;

vi Bushfire and prescription burning; and

vii Climate change.

8.101. The overall strategy for the recovery of the species, as detailed in the recovery plan, is to:

i Determine the distribution and status of Spotted-tail Quoll populations throughout the range, and identify key threats and implement threat abatement management practices.

ii Investigate key aspects of the biology and ecology of the Spotted-tailed Quoll to acquire targeted information to aid recovery.

iii Reduce the rate of habitat loss and fragmentation on private land.

iv Evaluate and manage the risk posed by silvicultural practices.

v Determine and manage the threat posed by introduced predators (foxes, cats, wild dogs) and of predator control practices on Spotted-tailed Quoll populations.

vi Determine and manage the impact of fire regimes on Spotted-tailed Quoll populations.

vii Reduce deliberate killings of Spotted-tailed Quolls.

viii Reduce the frequency of Spotted-tailed Quoll road mortality.

ix Assess the threat Cane Toads pose to Spotted-tailed Quolls and develop threat abatement actions if necessary.

x Determine the likely impact of climate change on Spotted-tailed Quoll populations.

xi Increase community awareness of the Spotted-tailed Quoll and involvement in the Recovery Program.

8.102. The Department considers that habitat loss, fragmentation and modification, and competition and predation from introduced predators are relevant threats to the proposed action. The Department considers that further understanding of the distribution and status of Spotted-tail Quoll, the reduction of habitat loss and fragmentation, and the management of threats posed by introduced species are relevant recovery actions to the proposed action.

8.103. Proposed condition 25 at (at Attachment E of the final decision brief) requires the proponent to comply with NSW condition B43. Table 8 of that condition includes upper clearing limits, which would limit the clearance of habitat for the species to 989 ha. The Department has also recommended conditions requiring the proponent to comply with NSW conditions B49-B52, which includes the establishment and facilitation of a Biodiversity Advisory Group, Field Development Protocol, Rehabilitation Management Plan and Biodiversity Management Plan, discussed in paragraphs 4.23 and 4.24 of this document.

8.104. These conditions also include the requirement for micro-siting and pre-construction ecological scouting which will further inform the understanding of the distribution of Spotted-tail Quoll in the Pilliga region.

8.105. Proposed conditions 26 and 27 (at Attachment E of the final decision brief) require the proponent to provide like-for-like offsets to compensate for impacts to the species, in accordance with either the Major Projects Policy, or the BOS under the BC Act.

8.106. Furthermore, the NSW Assessment Report states that pest animal control would be required for both the proposed action area, and land-based offsets, under the BMP.

8.107. The Department notes that while the proposed action would result in habitat loss, fragmentation and modification, the proposed avoidance and mitigation measures and recommended conditions, including offsetting measures discussed above, will contribute to the reduction of habitat loss. The required pest management measures will contribute to the management of threats posed to Spotted-tail Quoll by introduced species, and the required survey efforts will contribute to a further understanding of the distribution and status of the species.

8.108. For these reasons, the Department considers that in approving the proposed action, subject to the recommended conditions, you would not be acting inconsistently with this recovery plan.

National Recovery Plan for the Swift Parrot

8.109. The recovery plan for Swift Parrot (Attachment G4) came into force in 2011 and identifies major threats to the species as:

i Habitat loss and alteration;

ii Climate change;

iii Collision mortality;

iv Competition;

v Disease;

vi Illegal wildlife capture and trade; and

vii Cumulative impacts.

8.110. The overall strategy for the recovery of the species, as detailed in the recovery plan, is to:

i Identify the extent and quality of habitat;

ii Manage and protect Swift Parrot habitat at the landscape scale;

iii Monitor and manage the impact of collisions, competition and disease; and

iv Monitor population and habitat.

8.111. The Department considers that habitat loss and alteration, and cumulative impacts are relevant threats to the proposed action. The Department considers that the identification of the extent and quality of Swift Parrot habitat, the management and protection of Swift Parrot habitat at the landscape scale, and the monitoring of population and habitat are relevant recovery actions to the proposed action.

8.112. Proposed condition 25 (at Attachment E of the final decision brief) requires the proponent to comply with NSW condition B43. Table 8 of that condition includes upper clearing limits, which would limit the clearance of habitat for the species to 796.8 ha. The Department has also recommended conditions requiring the proponent to comply with NSW conditions B49-B52, which includes the establishment and facilitation of a Biodiversity Advisory Group, Field Development Protocol, Rehabilitation Management Plan and Biodiversity Management Plan, discussed in paragraphs 4.23 and 4.24 of this document.

8.113. These conditions also include the requirement for micro-siting and pre-construction ecological scouting which will further inform the understanding of Swift Parrot habitat at a landscape scale.

8.114. Proposed conditions 26 and 27 (at Attachment E of the final decision brief) require the proponent to provide like-for-like offsets to compensate for impacts to the species, in accordance with either the Major Projects Policy, or the BOS under the BC Act.

8.115. The Department notes that while the proposed action would result in habitat loss and alteration, and potentially result in cumulative impacts to the species, the proposed avoidance and mitigation measures, and recommended conditions, including offsetting measures discussed above, will contribute to the management and protection of Swift Parrot habitat at a landscape scale. The required survey efforts will also contribute to the monitoring of Swift Parrot populations and habitat.

8.116. For these reasons, the Department considers that in approving the proposed action, subject to the recommended conditions, you would not be acting inconsistently with this recovery plan.

National Recovery Plan for *Bertya opponens*

8.117. The recovery plan for *Bertya opponens* (Attachment G5) came into force in 2002 and identifies major threats to the species as:

i Grazing;

ii Inappropriate fire and disturbance regimes; and

iii Clearing.

8.118. The overall strategy for the recovery of the species, as detailed in the recovery plan, is to:

i Examine the impacts of grazing pressures to *Bertya opponens*;

ii Increase certainty of the species distribution in the Cobar-Coolabah area;

iii Further understand the biology of germination and seedling survival of the species;

iv Improve survival prospects for senescent populations; and

v Increase community awareness and support for the conservation of the species.

8.119. The Department considers that inappropriate disturbance regimes and clearing are relevant threats to the proposed action. The Department considers that there are no recovery actions listed in the recovery plan that are specifically relevant to the proposed action.

8.120. Proposed condition 25 (at Attachment E of the final decision brief) requires the proponent to comply with NSW condition B43. Table 9 of that condition includes upper clearing limits, which would limit the clearance of habitat for the species to 10,309 individuals. The Department has also recommended conditions requiring the proponent to comply with NSW conditions B49-B52, which includes the establishment and facilitation of a Biodiversity Advisory Group, Field Development Protocol, Rehabilitation Management Plan and Biodiversity Management Plan, discussed in paragraphs 4.23 and 4.24 of this document.

8.121. Pre-clearance micro-siting is also required, which will provide further opportunities for the proponent to avoid inappropriate or unnecessary disturbance or clearing.

8.122. Proposed conditions 26 and 27 (at Attachment E of the final decision brief) require the proponent to provide like-for-like offsets to compensate for impacts to the species, in accordance with either the Major Projects Policy, or the BOS under the BC Act.

8.123. Staged clearing and rehabilitation across the proposed action area would allow for the recovery of impacted individuals, and areas of clearing for both linear infrastructure and the installation of well pads would be partially rehabilitated immediately after impact.

8.124. The Department notes that while the proposed action would results in disturbance and clearing of *Bertya opponens*, the proposed avoidance and mitigation measures, and recommended conditions, including offsetting measures discussed above, will not limit the recovery of the species, or the recovery actions identified in the recovery plan.

8.125. For these reasons, the Department considers that in approving the proposed action, subject to the recommended conditions, you would not be acting inconsistently with this recovery plan.

National Recovery Plan for Spiny Peppercress

8.126. The recovery plan for Spiny Pepper-cress (Attachment G6) came into force in 2010 and identifies major threats to the species as:

i Weed invasion;

ii Grazing;

iii Altered hydrology;

iv Habitat destruction; and

v Roadworks.

8.127. The overall strategy for the recovery of the species, as detailed in the recovery plan, is to:

i Determine distribution, abundance and population structure;

ii Determine habitat requirements;

iii Identify and manage threats to populations;

iv Identify key biological functions;

v Determine growth rates and viability of populations;

vi Establish a seedbank in storage; and

vii Build community support for conservation.

8.128. The Department considers that weed invasion, and habitat destruction are relevant threats to the proposed action. The Department considers that further understand distribution, abundance and population structure, managing threats to populations, and determining growth rates and viability of populations are relevant recovery actions to the proposed action.

8.129. Proposed condition 25 (at Attachment E of the final decision brief) requires the proponent to comply with NSW condition B43. Table 9 of that condition includes upper clearing limits, which would limit the clearance of habitat for the species to 77,691 individuals. The Department has also recommended conditions requiring the proponent to comply with NSW conditions B49-B52, which includes the establishment and facilitation of a Biodiversity Advisory Group, Field Development Protocol, Rehabilitation Management Plan and Biodiversity Management Plan, discussed in paragraphs 4.23 and 4.24 of this document.

8.130. As discussed above in paragraphs 4.235-4.237, surveys undertaken to inform the proposed action identified a population of the species that is significantly larger than any known populations of the species. The recommended conditions include the requirement for pre-clearance micro-siting which would further inform that understanding of the species' population.

8.131. Proposed conditions 26 and 27 (at Attachment E of the final decision brief) require the proponent to provide like-for-like offsets to compensate for impacts to the species, in accordance with either the Major Projects Policy, or the BOS under the BC Act.

8.132. Furthermore, the NSW Assessment Report states that the BMP would include best-practice pre-clearance controls, including weed and pest management, as discussed in paragraph 4.251 of this document.

8.133. The Department notes that while the proposed action would result in the clearance of habitat and individuals of the Spiny Pepper-cress, the proposed avoidance and mitigation measures and recommended conditions, including offsetting measures discussed above, will contribute to further understanding the species distribution and population viability, as surveys for the project have already shown. Compliance with relevant threat abatement plans and weed and pest management measures would also contribute to the management of threats to Spiny Pepper-cress populations.

8.134. For these reasons, the Department considers that in approving the proposed action, subject to the recommended conditions, you would not be acting inconsistently with this recovery plan.

National Recovery Plan for Winged Pepper-cress

8.135. The recovery plan for Winged Pepper-cress (Attachment G7) came into force in 2010 and identifies major threats to the species as:

i Altered hydrology;

ii Increasing salinity;

iii Weed invasion;

iv Grazing;

v Physical damage; and

vi Drought and climate change.

8.136. The overall strategy for the recovery of the species, as outlined in the recovery plan, is to:

i Determine distribution, abundance and population structure;

ii Determine habitat requirements;

iii Manage threats to populations;

iv Identify key biological functions;

v Determine growth rates and viability of populations;

vi Establish a seed bank; and

vii Build community support for conservation.

8.137. The Department considers that weed invasion and physical damage are relevant threats to the proposed action. The Department considers that determining distribution, abundance and population structure, managing threats to populations, and determining viability of populations are relevant recovery actions to the proposed action.

8.138. Proposed condition 25 (at Attachment E of the final decision brief) requires the proponent to comply with NSW condition B43. Table 9 at that condition includes upper clearing limits, which would limit the clearance of habitat for the species to 1,116 individuals. The Department has also recommended conditions requiring the proponent to comply with NSW conditions B49-B52, which includes the establishment and facilitation of a Biodiversity Advisory Group, Field Development

Protocol, Rehabilitation Management Plan and Biodiversity Management Plan, discussed in paragraphs 4.23 and 4.24 of this document.

8.139. As discussed above in paragraphs 4.291-4.293, surveys undertaken to inform the proposed action identified a population of the species that is significantly larger than any known populations of the species. The recommended conditions include the requirement for pre-clearance micro-siting which would further inform that understanding of the species' population.

8.140. Proposed conditions 26 and 27 (at Attachment E of the final decision brief) require the proponent to provide like-for-like offsets to compensate for impacts to the species, in accordance with either the Major Projects Policy, or the BOS under the BC Act.

8.141. Furthermore, the NSW Assessment Report states that the BMP would include best-practice pre-clearance controls, including weed and pest management, as discussed in paragraph 4.307 of this document.

8.142. The Department notes that while the proposed action would result in physical damage to individual Winged Pepper-cress, the proposed avoidance and mitigation measures and recommended conditions, including offsetting measures discussed above, will contribute to further understanding the species distribution and population viability, as surveys for the project have already shown. Compliance with relevant threat abatement plans and weed and pest management measures would also contribute to the management of threats to Winged Pepper-cress populations.

8.143. For these reasons, the Department considers that in approving the proposed action, subject to the recommended conditions, you would not be acting inconsistently with this recovery plan.

8.144. The Department has also considered the below recovery plans in its assessment, for species and ecological communities that were considered unlikely to be significantly impacted by the proposed action.

i Queensland Department of Environment and Resource Management (2011), *National recovery plan for the large-eared pied bat* Chalinolobus dwyeri. Queensland Government, Brisbane. Available from: http://www.environment.gov.au/system/files/resources/9e59696a-f72f-4332-8eda-25eeb4460349/files/large-eared-pied-bat.pdf

ii Department of Environment, Climate Change and Water NSW (2010), National Recovery Plan for White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland. Department of Environment, Climate Change and Water NSW, Sydney. Available from: https://www.environment.gov.au/system/files/resources/386f395f-b2c6-4e10-8fc3-e937ad277bfe/files/white-and-yellow-box.pdf

iii Benshemesh, J. (2007), *National Recovery Plan doe Malleefowl* Leipoa ocellate. Department of Environment and Heritage, South Australia. Available from: http://www.environment.gov.au/system/files/resources/dd346674-08ab-403d-8c11-5b88e8247e8f/files/malleefowl.pdf

iv Koehn et al. (2010), *National Recovery Plan for the Murray Cod* Maccullochella peelii peelii. Victorian Government Department of Sustainability and Environment, Melbourne. Available from: http://www.environment.gov.au/system/files/resources/bcc0fbf6-279b-4c52-88c5-42ce4d44b864/files/murray-cod.pdf

v Hunter, D. (2012), *National Recovery Plan for the Booroolong Frog* Litoria booroolongensis. NSW Office of Environment and Heritage, NSW. Available from: http://www.environment.gov.au/system/files/resources/bb38ec60-bdea-43db-8fbd-4b28a0af6fca/files/litoria-booroolongensis.pdf

vi Hynes, E. & Menkhorst, P. (2011), *National Recovery Plan for the Brush-tailed Rock-wallaby* Petrogale penicillate. Victorian Government Department of Sustainability and Environment, Melbourne. Available from: http://www.environment.gov.au/system/files/resources/55148790-484f-4413-9a06-90e6d985c267/files/brush-tailed-rock-wallaby.pdf

National Recovery Plan for Large-eared Pied Bat

8.145. The recovery plan for Large-eared Pied Bat (Attachment H1 of the final decision brief) came into force in 2012 and identifies major threats to the species as:

i Destruction and mining of roosts, and interference with roosts;

ii Mine induced subsidence of cliff lines;

iii Disturbance from human recreational activities;

iv Habitat disturbance by livestock and feral animals;

v Predation by introduced predators;

vi Vegetation clearance and fires in the proximity of roosts; and

vii Loss of genetic diversity.

8.146. The overall objectives for the recovery of the species, as detailed in the recovery plan, are to:

i Identify priority roost and maternity sites for protection;

ii Implement conservation and management strategies for priority sites;

iii Educate the community and industry to understand and participate in the conservation of the species;

iv Research the species to augment biological and ecological data to enable conservation management; and

v Determine the meta-population dynamics throughout the species' distribution.

8.147. The Department considers that predation by introduced predators is a relevant threat to the proposed action. The Department notes that as no individuals, roosts or habitat critical to the survival of the species were determined to be present within the proposed action area, that threats specific to roosts are not relevant to the proposed action.

8.148. The Department considers that identifying priority roost sites, and priority sites for protection, and further understanding the species' distribution are relevant recovery actions to the proposed action.

8.149. As discussed in section 4.4.1 of this report, no individuals were recorded within the proposed action area during surveys undertaken for the proposed action, and the resources available indicate that no roosts are present within the proposed action area. However, the required micro-siting and preconstruction ecological scouting will inform the understanding of habitat within the Pilliga region and assist in identifying any priority roosts.

8.150. Additionally, the NSW Assessment Report states that the BMP would include best-practice weed and pest management, which would mitigate the threat of predation by introduced predators as a result of the proposed action.

8.151. The Department also notes that while the NSW conditions, or the EPBC Act conditions do not specifically require a like-for-like offset for the species, the retirement of ecosystem credits consequently contribute to increased habitat for the species.

8.152. The Department notes that while the proposed action would result in vegetation clearance, this would not occur in the proximity of any known roosts, and the required pre-clearance procedures would contribute to the broader understanding of the species' distribution and dynamics at a regional level. Compliance with relevant weed and pest management measures would also contribute to the management of threats to the Large-eared Pied Bat.

8.153. For these reasons, the Department considers that in approving the proposed action, subject to the recommended conditions, you would not be acting inconsistently with this recovery plan.

National Recovery Plan for Box Gum Woodland

8.154. The recovery plan for Box Gum Woodland (Attachment H2 of the final decision brief) came into force in 2013 and identifies major threats to the ecological community as:

i Agricultural and horticultural development;

ii Rural residential and urban development;

iii Mining and public infrastructure;

iv Grazing regimes and pasture management;

v Firewood collection and changed fire regimes;

vi Increased soil nutrients, salinity and the use of chemicals;

vii Mowing or slashing regimes;

viii Revegetation management;

ix Weed invasion and declining tree health; and

x Animal pests, disease, and the removal of native flora.

8.155. Recovery actions for the ecological community, as detailed in the recovery plan, are to:

i Improve baseline information;

ii Increase protection of the ecological community;

iii Improve community engagement;

iv Continue ecosystem function and management research; and

v Improve compliance and regulatory activities.

8.156. As discussed in section 4.4.3 of this report, it is unlikely that Box Gum Woodland is present within the proposed action area, based on surveys undertaken for the proposed action. As such, the Department considers that there are no threats identified above that are specifically relevant to the proposed action.

8.157. The Department considers that improving baseline information, compliance and regulatory activities are relevant recovery actions to the proposed action.

8.158. During the NSW assessment process, further assessment of field data and vegetation plots was undertaken at the RTS stage to confirm that no Box Gum Woodland was present within the proposed action area. This information gathering has contributed to the baseline understanding of the distribution of the ecological community.

8.159. Additionally, the requirement for pre-construction ecological scouting would further inform baseline information.

8.160. If Box Gum Woodland was determined to be present within the proposed action area during that ecological scouting, Santos would be required to avoid any impacts to the ecological community, or seek separate approval for that clearing under the EPBC Act. This would contribute to compliance and regulatory activities that protect the ecological community.

8.161. The Department considers that as there is no Box Gum Woodland known to occur within the proposed action area, and the NSW conditions require management actions that will contribute to the objectives identified in the recovery plan for the ecological community, that in approving the proposed action subject to the recommended conditions, you would not be acting inconsistently with this recovery plan.

National Recovery Plan for Malleefowl

8.162. The recovery plan for Malleefowl (Attachment H3 of the final decision brief) came into force in 2010 and identifies major threats to the species as:

i Vegetation clearing;

ii Fragmentation and isolation;

iii Grazing;

iv Predation;

v Fire;

vi Disease, inbreeding and chemical exposure; and

vii Climate change.

8.163. The overall strategy for the recovery of the species, as detailed in the recovery plan, is to:

i Protect and revegetate habitat and habitat connectivity;

ii Control feral predators;

iii Monitor Malleefowl distribution and population trends;

iv Understand longevity and population turnover;

v Understand habitat requirements;

vi Captive breeding programs, re-implementation and supplementation;

vii Rapid survey techniques; and

viii Education.

8.164. The Ecological Impact Assessment (at Appendix J2 to the EIS) identified a low suitability of habitat for Malleefowl within the proposed action area, stating that the species is unlikely to occur. The NSW Assessment Report did not dispute this conclusion. As such, the Department considers that while vegetation clearing,

fragmentation and isolation, predation and disease are relevant threats to the controlled action, they are not specifically relevant in the context of Malleefowl.

8.165. The Department considers that controlling feral predators, and understanding habitat requirements are relevant recovery actions to the species.

8.166. The NSW Assessment Report states that the BMP would include best-practice pre-clearance controls, including weed and pest management which would assist in controlling feral predators to all biodiversity within the proposed action area, which may in turn contribute to the control of feral predators in the broader landscape, including Malleefowl habitat.

8.167. The requirement for pre-clearance ecological scouting would also contribute to understanding which habitat requirements for the species are absent from the proposed action area, which would in turn inform the understanding of species distribution.

8.168. Additionally, both the NSW conditions and EPBC Act conditions limit Santos from extending the proposed action beyond the proposed action area and inadvertently impacting habitat for the species.

8.169. The Department considers that given it is unlikely that the species, or its habitat is present within the proposed action area, and that management actions required by the NSW conditions would contribute broadly to the relevant recovery actions identified in the recovery plan, that in approving the proposed action subject to the recommended conditions, you would not be acting inconsistently with this recovery plan

National Recovery Plan for Booroolong Frog

8.170. The recovery plan for Booroolong Frog (Attachment H4 of the final decision brief) came into force in 2012 and identifies major threats to the species as:

i Disease;

ii Habitat degradation;

iii Stream drying;

iv Predation by exotic predatory fish; and

v Herbicide use.

8.171. The overall objectives for the recovery of the species, as identified in the recovery plan, are:

i Determine the species distribution in areas that have not been the focus of targeted surveys;

ii Determine the taxonomic status of northern and southern Booroolong Frog populations, and identify further genetic sub-division within these populations;

iii Reduce the impact of known or perceived threats contributing to the ongoing decline of the species;

iv Determine population trends across the species range, and in areas subject to different management regimes;

v Identify the potential impacts of climate change, and determine management responses to reduce these impacts;

vi Identify other potentially threatening processes;

vii Increase community awareness and involvement in the Booroolong Frog recovery; and

viii Achieve the effective implementation of the recovery plan.

8.172. The Ecological Impact Assessment (at Appendix J2 to the EIS) identified that there is no suitable habitat for the Booroolong Frog present within the proposed action area. The NSW Assessment Report did not dispute that conclusion. Given the habitat requirements for the species, and the lack thereof within the proposed action area, the Department considers that none of the above identified threats are specifically relevant to the proposed action.

8.173. For the reasons discussed above, the Department also considers that none of the recovery objectives identified above are specifically relevant to the proposed action, although the Department notes that the NSW conditions and required management measures will broadly benefit biodiversity in the region.

8.174. Additionally, both the NSW conditions and EPBC Act conditions limit Santos from extending the proposed action beyond the proposed action area and inadvertently impacting habitat for the species.

8.175. For these reasons, the Department considers that in approving the proposed action, subject to the recommended conditions, you would not be acting inconsistently with this recovery plan.

National Recovery Plan for Brush-tailed Rock-wallaby

8.176. The recovery plan for Brush-tailed Rock-wallaby (Attachment H5 of the final decision brief) came into force in 2011 and identifies major threats to the species as:

i Hunting and persecution;

ii Habitat degradation and loss;

iii Predation and competition; and

iv Genetic decline.

8.177. The overall strategy for the recovery of the species, as identified in the recovery plan, is to:

i Determine and manage threats to the Brush-tailed Rock-wallaby and its habitat;

ii Determine distribution, abundance, population trends and viability for the species;

iii Establish and maintain separate, viable captive populations;

iv Undertake translocations to improve the genetic and demographic robustness of populations and to establish new colonies of Brush-tailed Rock-wallabies;

v Investigate key aspects of the species biology and ecology for conservation management; and

vi Increase community awareness and support for Brush-tailed Rock-wallaby conservation.

8.178. The Ecological Impact Assessment (at Appendix J2 to the EIS) identified a low suitability of habitat for Brush-tailed Rock-wallaby within the proposed action area, stating that the species is unlikely to occur. The NSW Assessment Report did not dispute this conclusion. As such, the Department considers that while habitat degradation and loss, and predation and competition are relevant threats to the

controlled action, they are not specifically relevant in the context of Brush-tailed Rock-wallaby.

8.179. The Department considers that managing threats to the Brush-tailed Rock-wallaby and its habitat, and understanding the species distribution are relevant recovery actions to the proposed action.

8.180. The NSW conditions require clearance ecological scouting which would contribute to understanding which habitat requirements for the species are absent from the proposed action area, which would in turn inform the understanding of species distribution.

8.181. The mitigation and management measures required by the BMP would also contribute to the management and improvement of biodiversity in the broader landscape.

8.182. Additionally, both the NSW conditions and EPBC Act conditions limit Santos from extending the proposed action beyond the proposed action area and inadvertently impacting habitat for the species.

8.183. For these reasons, the Department considers that approving the proposed action, subject to the recommended conditions, would not be inconsistent with this recovery plan.

National Recovery Plan for Murray Cod

8.184. The recovery plan for Murray Cod (Attachment H6 of the final decision brief)) came into force in 2010 and identifies major threats to the species as:

i Flow regulation;

ii Habitat degradation;

iii Lowered water quality;

iv Barriers;

v Invasive species;

vi Commercial, recreational and illegal fishing;

vii Stocking and translocations;

viii Diseases; and

ix Climate change.

8.185. The overall strategy for the recovery of the species, as identified in the recovery plan, is to:

i Determine the distribution, structure and dynamics of Murray Cod populations across the Murray-Darling Basin and devise appropriate spatial management units and monitoring programs;

ii Identify and quantify the environmental parameters that drive recruitment and population growth;

iii Identify, protect and repair key aquatic and riparian habitats for Murray Cod in each spatial management unit;

iv Manage the recreational fishery for Murray Cod in a sustainable manner, while recognizing the social, economic and recreational value of the fishery; and

v Encourage community awareness and support for Murray Cod management.

8.186. The Ecological Impact Assessment (at Appendix J2 to the EIS) identified that there is no suitable habitat for the Murray Cod present within the proposed action area. The NSW Assessment Report did not dispute that conclusion. Given the habitat requirements for the species, and the lack thereof within the proposed action area, the Department considers that none of the above identified threats are specifically relevant to the proposed action.

8.187. For the reasons discussed above, the Department also considers that none of the recovery objectives identified above are specifically relevant to the proposed action, although the Department notes that the NSW conditions and required management measures will broadly benefit biodiversity in the region.

8.188. Additionally, both the NSW conditions and EPBC Act conditions limit the proponent from extending the proposed action beyond the proposed action area and inadvertently impacting habitat for the species.

8.189. For these reasons, the Department considers that approving the proposed action, subject to the recommended conditions, would not be inconsistent with this recovery plan.

8.190. The threat abatement plans relevant to the proposed action are:

i Department of Sustainability, Environment, Water, Population and Communities (2011). *Threat abatement plan for the biological effects, including lethal toxic ingestion, caused by cane toads*. Canberra, ACT: Commonwealth of Australia. Available from: http://www.environment.gov.au/resource/threat-abatement-plan-biological-effects-including-lethal-toxic-ingestion-caused-cane-toads.

ii Department of the Environment and Energy (2017). *Threat abatement plan for predation, habitat degradation, competition and disease transmission by feral pigs* (Sus scrofa) (2017). Canberra, ACT: Commonwealth of Australia. Available from: http://www.environment.gov.au/biodiversity/threatened/publications/tap/feral-pig-2017.

iii Department of the Environment, Water, Heritage and the Arts (DEWHA) (2008). *Threat abatement plan for competition and land degradation by unmanaged goats*. DEWHA, Canberra. Available from: http://www.environment.gov.au/biodiversity/threatened/publications/tap/competition-and-land-degradation-unmanaged-goats.

iv Department of the Environment and Energy (2016). *Threat abatement plan for competition and land degradation by rabbits*. Canberra, ACT: Commonwealth of Australia. Available from: http://www.environment.gov.au/biodiversity/threatened/publications/tap/competition-and-land-degradation-rabbits-2016.

v Department of the Environment (2015). *Threat abatement plan for predation by feral cats*. Canberra, ACT: Commonwealth of Australia. Available from: http://www.environment.gov.au/biodiversity/threatened/publications/tap/threat-abatement-plan-feral-cats.

vi Department of the Environment, Water, Heritage and the Arts (DEWHA) (2008). *Threat abatement plan for predation by the European red fox*. DEWHA, Canberra. Available from: http://www.environment.gov.au/biodiversity/threatened/publications/tap/predation-european-red-fox.

vii Department of the Environment and Energy (2016). *Threat abatement plan for infection of amphibians with chytrid fungus resulting in chytridiomycosis*. Available from: http://www.environment.gov.au/biodiversity/threatened/publications/tap/infection-amphibians-chytrid-fungus-resulting-chytridiomycosis-2016.

viii Department of the Environment and Energy (2018). *Threat abatement plan for disease in natural ecosystems caused by* Phytophthora cinnamomi. Available from: http://www.environment.gov.au/biodiversity/threatened/publications/threat-abatement-plan-disease-natural-ecosystems-caused-phytophthora-cinnamomi-2018.

8.191. NSW has considered the above threat abatement plans (excluding the *Phytophthora cinnamomi* and Chytrid fungus threat abatement plans) in its assessment (see Attachments D4 & D6). NSW is of the view that approval of the proposed action would not be inconsistent with those threat abatement plans.

8.192. Further consideration of the threat abatement plans for *Phytophthora cinnamomi* and Chytrid fungus was undertaken by the Department.

8.193. These threat abatement plans are provided at Attachment G and are discussed below.

Threat abatement plan for the biological effects, including lethal toxic ingestion, caused by cane toads

8.194. The Department notes that the threat abatement plan for the biological effects, including lethal toxic ingestion, caused by cane toads (Attachment G8) is relevant to the proposed action due to threats posed to the Brigalow ecological community, and other listed species and ecological communities.

8.195. The Department considers that cane toads are unlikely to have any impacts on the conservation and regeneration of Brigalow, or any other listed species and communities, and considers that the proposed mitigation measures and recommended conditions, including measures for weed and pest management within the required BMP, are such that the approval of the proposed action would not be inconsistent with this threat abatement plan.

Threat abatement plans for, predation, habitat degradation, competition, and disease transmission by feral species including pigs, goats, rabbits, cats and foxes

8.196. The Department notes that:

i the threat abatement plan for predation, habitat degradation, competition and disease transmission by feral pigs (Attachment G9) is relevant to the proposed action due to threats posed to Pilliga Mouse, Spiny Pepper-cress and Winged Pepper-cress, and other listed species and ecological communities;

ii the threat abatement plan for competition and land degradation by unmanaged goats (Attachment G10) is relevant to the proposed action due to threats posed to *Bertya opponens*, and other listed species;

iii the threat abatement plan for competition and land degradation by rabbits (Attachment G11) is relevant to the proposed action due to threats posed to Regent Honeyeater, Spiny Pepper-cress and Winged Pepper-cress, and other listed species;

iv the threat abatement plan for predation by feral cats (Attachment G12) is relevant to the proposed action due to threats posed to Swift Parrot, Spotted-tail Quoll, and Pilliga Mouse, and other listed species; and

v the threat abatement plan for predation by the European red fox (Attachment G13) is relevant to the proposed action due to threats posed to Spotted-tail Quoll and Pilliga Mouse, and other listed species.

8.197. Advice provided to DPIE by BCD as part of the NSW assessment process notes that the Pilliga is not identified as a priority area for any of the above threat abatement plans.

8.198. The NSW Assessment Report also states that further pest animal control would be required for both the proposed action area and land-based offsets required under the BMP.

8.199. The Department considers that the proposed action is unlikely to contribute to increasing feral animal activity within the proposed action area, and instead is likely to assist with the management of these species through the proposed mitigation measures and recommended conditions.

8.200. The Department considers that the recommended conditions require the proponent to undertake mitigation measures in accordance with these threat abatement plans to reduce threats from pests and predators. On this basis, the Department considers that the approval of the proposed action subject to the recommended conditions would not be inconsistent with any threat abatement plans relevant to the proposed action.

Threat abatement plan for the infection of amphibians with chytrid fungus resulting in chytridiomycosis

8.201. The Department notes that the threat abatement plan for the infection of amphibians with chytrid fungus resulting in chytridiomycosis (Attachment H7 of the final decision brief) is relevant to the proposed action due to threats posed to the Booroolong Frog.

8.202. The Ecological Impact Assessment (at Appendix J2 to the EIS) identified that there is no suitable habitat for the Booroolong Frog present within the proposed action area. The NSW Assessment Report did not dispute that conclusion. The Department considers that the proposed action is unlikely to increase the risk of infection of Booroolong Frog with chytrid fungus as the species is unlikely to occur within the proposed action area, and as there are suitable measures for weed and pest management within the required BMP.

8.203. As such, the Department considers that the approval of the proposed action would not be inconsistent with this threat abatement plan.

Threat abatement plan for disease in natural ecosystems caused by *Phytophthora cinnamomi*

8.204. The Department notes that the threat abatement plan for disease in natural ecosystems caused by *Phytophthora cinnamomi* (Attachment H8 of the final decision brief) is relevant to the proposed action due to threats posed to Box Gum Woodland, and other flora species, or their habitat, susceptible to dieback.

8.205. The EIS states that there is no evidence of dieback caused by *Phytophthora cinnamomi* in the study area. It states that the risk of the pathogen occurring in the study area is low as it is not within a known vulnerable climatic zone but that the potential extent of the pathogen in Australia is not completely known.

8.206. The EIS states that there is the potential for the pathogen to be introduced or spread as a result of the movement of contaminated soil or vehicles. To minimise risks, vehicle wash down stations and inspections of transported soil will be applied throughout the construction and operation phases of the project. The Department understands that these measures will be incorporated into the FDP and/or BMP.

8.207. The Department and the Biodiversity Advisory Panel will review the BMP to ensure environmental risks, including the risk of introduction or spread of *Phytophthora cinnamomi,* are appropriately managed. On this basis, the Department considers that the approval of the proposed action subject to the recommended conditions would not be inconsistent with this threat abatement plan.

8.10.5 Conservation Advices

8.208. The approved conservation advices relevant to the proposed action are:

i Department of Sustainability, Environment, Water, Population and Communities (2012). *Approved Conservation Advice for* Phascolarctos cinereus (*combined populations in Queensland, New South Wales and the Australian Capital Territory*). Canberra: Department of Sustainability, Environment, Water, Population and Communities. Available from: http://www.environment.gov.au/biodiversity/threatened/species/pubs/197-conservation-advice.pdf.

ii Department of the Environment, Water, Heritage and the Arts (2008). *Approved Conservation Advice for* Pseudomys pilligaensis (*Pilliga Mouse*). Canberra: Department of the Environment, Water, Heritage and the Arts. Available from: http://www.environment.gov.au/biodiversity/threatened/species/pubs/99-conservation-advice.pdf.

iii Threatened Species Scientific Committee (2015). *Conservation Advice* Nyctophilus corbeni *south-eastern long-eared bat*. Canberra: Department of the Environment. Available from: http://www.environment.gov.au/biodiversity/threatened/species/pubs/83395-conservation_advice-01102015.pdf.

iv Threatened Species Scientific Committee (2016). *Conservation Advice* Polytelis swainsonii *superb parrot*. Canberra: Department of the Environment. Available from: http://www.environment.gov.au/biodiversity/threatened/species/pubs/738-conservation-advice-05052016.pdf.

v Department of the Environment (2015). *Conservation Advice* Anthochaera phrygia *regent honeyeater*. Canberra: Department of the Environment. Available from: http://www.environment.gov.au/biodiversity/threatened/species/pubs/82338-conservation-advice.pdf.

vi Threatened Species Scientific Committee (2020). *Conservation Advice* Dasyurus maculatus maculatus (*southeastern mainland population) Spotted-tailed Quoll, south eastern mainland.* Canberra: Department of Agriculture, Water and the Environment. Available from: http://www.environment.gov.au/biodiversity/threatened/species/pubs/75184-conservation-advice-01092020.pdf.

vii Threatened Species Scientific Committee (2016). *Conservation Advice* Lathamus discolor *swift parrot*. Canberra: Department of the Environment. Available from:

http://www.environment.gov.au/biodiversity/threatened/species/pubs/744-conservation-advice-05052016.pdf.

viii Department of the Environment, Water, Heritage and the Arts (2008). *Approved Conservation Advice for* Rulingia procumbens. Canberra: Department of the Environment, Water, Heritage and the Arts. Available from: http://www.environment.gov.au/biodiversity/threatened/species/pubs/12903-conservation-advice.pdf.

ix Threatened Species Scientific Committee (2016). *Conservation Advice* Bertya opponens. Canberra: Department of the Environment and Energy. Available from: http://www.environment.gov.au/biodiversity/threatened/species/pubs/13792-conservation-advice-16122016.pdf.

x Department of the Environment, Water, Heritage and the Arts (2008). *Approved Conservation Advice for* Tylophora linearis. Canberra: Department of the Environment, Water, Heritage and the Arts. Available from: http://www.environment.gov.au/biodiversity/threatened/species/pubs/55231-conservation-advice.pdf.

xi Department of the Environment (2013). *Approved Conservation Advice for the Brigalow* (Acacia harpophylla *dominant and co-dominant) ecological community*. Canberra: Department of the Environment. Available from: http://www.environment.gov.au/biodiversity/threatened/communities/pubs/028-conservation-advice.pdf.

8.209. The MNES report (Attachment D4), and advice from BCD includes consideration of approved conservation advices, as summarised in Attachments D4 & D6.

8.210. The Department notes that the relevant conservation advices for Superb Parrot and Swift Parrot were not considered in the MNES report as the NSW assessment determined that the proposed action would not have a significant impact to these species. The MNES report did also not consider the conservation advice for Spotted-tail Quoll as it did not come into effect until after the NSW assessment was completed. As such, the Department has had particular consideration of these conservation advices as discussed below.

8.211. The Department's Protected Species and Communities Branch was consulted on any upcoming listings in preparing this recommendation. At the time of writing, the above list includes all conservation advices currently relevant to the proposed action.

8.212. The approved conservation advices are provided at Attachment G and are discussed below. The Department notes that there are no approved conservation advices for the Winged Pepper-cress (*Lepidium monoplocoides*) and Spiny Pepper-cress (*Lepidium aschersonii*).

Approved conservation advice for Koala

8.213. The conservation advice for Koala (Attachment G14) came into force in 2012 and identifies the major threats to the species as:

i Loss and fragmentation of habitat;

ii Vehicle strike;

iii Disease; and

iv Predation by dogs.

8.214. The conservation advice states that priority management, recovery and threat abatement actions that will support the recovery of the Koala are to:

i Develop and implement a development planning protocol to be used in areas of koala populations to prevent loss of important habitat, koala populations or connectivity options.

ii Development plans should explicitly address ways to mitigate risk of vehicle strike when development occurs adjacent to, or within, koala habitat.

iii Monitor the progress of recovery, including the effectiveness of management actions and the need to adapt them if necessary.

iv Identify populations of high conservation priority.

v Investigate formal conservation arrangements, management agreements and covenants on private land, and for Crown and private land investigate and/or secure inclusion in reserve tenure if possible.

vi Manage any other known, potential or emerging threats such a Bell Miner Associated Dieback or Eucalyptus rust.

vii Develop and implement options of vegetation recovery and re-connection in regions containing fragmented koala populations, including inland regions in which koala populations were diminished by drought and coastal regions where development pressures have isolated koala populations.

viii Develop and implement a management plan to control the adverse impacts of predation on Koalas by dogs in urban, peri-urban and rural environments.

ix Engage with private landholders and land managers responsible for the land on which populations occur and encourage these key stakeholders to contribute to the implementation of conservation management actions.

8.215. The Department has had regard to the conservation advice for the Koala in making this recommendation and considers that the NSW conditions require the proponent to undertake mitigation measures in accordance with the conservation advice. The recommended conditions also require that an offset be provided for residual significant impacts to Koala, which will provide for conservation actions in accordance with the conservation advice.

Approved Conservation Advice for Pilliga Mouse

8.216. The approved conservation advice for the Pilliga Mouse (Attachment G15) came into force in 2008 and identifies the major threats to the species as:

i Loss or degradation of habitat through inappropriate fire regimes, forestry operations and broombrush harvesting;

ii Predation by feral cats and foxes; and

iii Competition from the common house mouse.

8.217. The conservation advice states that priority management actions that will support the recovery of the Pilliga Mouse, are to:

i Monitor known populations to identify and manage threats, and monitor the progress of recovery;

ii Identify populations of high conservation priority;

iii Investigate records of the species' outside of the Pilliga forests and ensure forestry operations do not disturb identified habitat;

iv Prevent clearing of habitat, such as nesting sites, and investigate formal conservation arrangements;

v Develop and implement management strategies for the control and eradication of feral predators and competitors;

vi Develop and implement suitable fire management strategies for the Pilliga Mouse and Pilliga region, including maps of known occurrences of the species; and

vii Raise awareness of the species within the local community and establish a captive breeding program.

8.218. The Department has considered the conservation advice for the Pilliga Mouse in making this recommendation and considers that the NSW conditions require the proponent to undertake mitigation measures in accordance with the conservation advice The recommended conditions also require that an offset be provided for residual significant impacts to Pilliga Mouse, which will provide for conservation actions in accordance with the conservation advice.

Approved Conservation Advice for South-eastern Long-eared Bat

8.219. The conservation advice for the South-eastern Long-eared Bat (Attachment G16) came into force in 2015, and identifies major threats to the species as:

i Habitat loss and fragmentation;

ii Fire and grazing;

iii Reduction in hollow availability;

iv Exposure to agrichemicals; and

v Predation by feral animals.

8.220. The conservation advice states that priority management actions that will support the recovery of the South-eastern Long-eared Bat, are to:

i Implement conservation and management actions for the management and prevention of habitat loss, disturbance and modifications, invasive species, impacts of domestic species and fire;

ii Stakeholder engagement;

iii Survey and monitor to precisely assess population size, distribution, demographics and ecological requirements; and

iv Continue to identify and assess key identified research priorities for the species.

8.221. The BCD advice on this conservation advice states that there are no actions listed in the conservation advice that are relevant to the proposed action. However, the Department has considered the conservation advice for the South-eastern Long-eared Bat in making this recommendation and considers that NSW conditions such as avoidance measures for the prevention of habitat loss, and weed and pest management measures, are in accordance with the conservation advice. The NSW conditions also require that an offset be provided for residual significant impacts to South-eastern Long-eared Bat, which will provide for conservation actions in accordance with the conservation advice.

Approved Conservation Advice for Superb Parrot

8.222. The conservation advice for the Superb Parrot (Attachment G17) came into force in 2016, and identifies major threats to the species as:

i Loss and degradation of habitat;

ii Competition for nest hollows;

iii Road kills;

iv Illegal removal of wild birds;

v Disease; and

vi Climate change.

8.223. The conservation advice states that priority management actions that will support the recovery of the Superb Parrot, are to:

i Place all areas of public land that provide, or potentially provide, nesting or foraging habitat for the species under secure conservation management, particularly those in timber reserves, transport corridors and local government land.

ii Promote ecological management of woodland remnants on private land as well as the protection of old, hollow-bearing trees in paddocks.

iii Using appropriate incentives, encourage landholders to engage in appropriate regeneration of potential future nest trees and foraging trees.

iv Identify and revegetate critical breaks in flight corridors.

v Control and reduce firewood collection from areas occupied by the species, promoting wood-lot development close to markets, and reduce grazing densities under trees where necessary.

vi Ensure measures are in place to eliminate grain spills along roadways in order to reduce the incidence of accidental deaths that arise from birds feeding off spilled grain.

8.224. The Department has considered the conservation advice for the Superb Parrot in making this recommendation and considers that while there are no priority management actions identified in the advice that are relevant to the proposed action, the NSW conditions require the proponent to undertake mitigation measures to mitigate the major threats to the species, in accordance with the conservation advice.

Approved Conservation Advice for Regent Honeyeater

8.225. The conservation advice for Regent Honeyeater (Attachment G18) came into force in 2015 and identifies major threats to the species as:

i Clearing, degradation and fragmentation of habitat;

ii Removal of trees for timber and firewood, invasive weeds and inappropriate fire regimes;

iii Competition with other birds; and

iv Severe loss of genetic variability.

8.226. The conservation advice states the priority conservation and management actions to assist in the recovery of the species are to;

i Reverse the long-term population trend of decline and increase the numbers of regent honeyeaters to a level where there is a viable, wild breeding population, even in poor breeding years;

ii Maintain key regent honeyeater habitat in a condition that maximises survival and reproductive success, and provides refugia during periods of extreme environmental fluctuation;

iii Improve the extent and quality of regent honeyeater habitat;

iv Bolster the wild population with captive-bred birds until the wild population becomes self sustaining; and

v Maintain and increase community awareness, understanding and involvement in the recovery program.

8.227. The Department has considered the conservation advice for the Regent Honeyeater in making this recommendation and considers that the NSW conditions require the proponent to undertake mitigation measures that address major threats to the species identified in the conservation advice. The NSW conditions also require that an offset be provided for residual significant impacts to Regent Honeyeater, which will provide for conservation actions in accordance with the conservation advice. The NSW assessment identified that this requirement to offset will contribute to the objective to improve the extent and quality of Regent Honeyeater habitat. The Department agrees with this.

Approved Conservation Advice for Spotted-tail Quoll

8.228. The conservation advice for Spotted-tail Quoll (Attachment G19) came into force in 2020 and identified major threats to the species as:

i Habitat loss and fragmentation;

ii Invasive species;

iii Fire; and

iv Purposeful killing.

8.229. The conservation advice states the priority conservation and management actions to assist in the recovery of the species are to;

i Develop guidelines on minimum habitat requirements, implement monitoring programs to evaluate the effectiveness of habitat retention, and encourage landholders to protect and manage their land in a manner that is compatible with the maintenance of the species' habitat;

ii Control of introduced predators in fire affected areas, monitor introduced predators, conduct population viability analysis, review existing available information on the species and map current distributions; and

iii Incorporate the need to protect rocky outcrops and riparian zones into planning process for fire management and investigate the impacts of bushfires and fire management activities to the species.

8.230. The Department has considered the conservation advice for the Spotted-tail Quoll in making this recommendation and considers that the recommended conditions require the proponent to undertake mitigation measures that address major threats to the species identified in the conservation advice. Required measures for the management of weeds and pests will also support identified priority management

actions. The recommended conditions also require that an offset be provided for residual significant impacts to Spotted-tail Quoll, which will provide for conservation actions in accordance with the conservation advice.

Approved Conservation Advice for Swift Parrot

8.231. The conservation advice for Swift Parrot (Attachment G20) came into force in 2016 and identified major threats to the species as:

i Predation by sugar gliders;

ii Habitat loss and alteration;

iii Collision mortality;

iv Competition;

v Disease; and

vi Illegal wildlife capture and trading.

8.232. The conservation advice states the priority conservation and management actions are to:

i Review and update management prescriptions for swift parrots for use in the Forest Practices System and Local Government land use planning and approvals processes across the breeding and non-breeding range of swift parrots.

ii Revise and update forestry prescriptions to reflect the most recent habitat information available in Victoria and New South Wales.

iii Develop and implement strategies to reduce predation from sugar gliders when circumstances require.

iv Consider installing nesting boxes suitable for swift parrots in areas of low sugar glider predation to enhance swift parrot breeding success

v Continue to raise public awareness of the risks of collisions and how these can be minimised, targeting known high risk areas such as the greater Hobart, Melbourne and Western Sydney areas, and the central coast region of New South Wales (Wyong, Gosford, Lake Macquarie and Penrith Local Government areas).

vi Encourage and support the protection, conservation management and restoration of swift parrot nesting and foraging habitat through agreements with landowners, incentive programs and community projects.

vii Develop and implement a Disease Risk Assessment for swift parrots.

8.233. The Department has considered the conservation advice the Swift Parrot in making this recommendation and considers that the recommended conditions require the proponent to undertake mitigation measures that address major threats to the species identified in the conservation advice, such as disease and habitat loss. The recommended conditions also require that an offset be provided for residual significant impacts to Swift Parrot, which will provide for conservation actions in accordance with the conservation advice.

Approved Conservation Advice for *Androcalva procumbens*

8.234. The conservation advice for *Androcalva procumbens* (Attachment G21) came into force in 2008 and identifies major threats to the species as:

i Clearing of native vegetation on roadsides;

ii Competition from woody shrubs, particularly *Acacia triptera*; and

iii Inappropriate fire regimes.

8.235. The conservation advice states the priority conservation and management actions to assist in the recovery of the species are to:

i Monitor known populations to identify key threats and determine the progress of recovery, including identifying priority populations;

ii Identify and manage roadside populations and ensure forestry operations do not adversely impact the species;

iii Investigate formal conservation arrangements;

iv Develop and impellent a suitable fire management strategy for the species; and

v Raise awareness of the species within the local community.

8.236. The Department has considered the conservation advice for *Androcalva procumbens* in making this recommendation and considers that the recommended conditions require the proponent to undertake mitigation measures in accordance with the conservation advice. The recommended conditions also require that an offset be provided for residual significant impacts to *Androcalva procumbens*, which will provide for conservation actions in accordance with the conservation advice.

Approved Conservation Advice for *Bertya opponens*

8.237. The conservation advice for *Bertya opponens* (Attachment G22) came into force in 2016 and identifies major threats to the species as:

i Fire and mechanical disturbance;

ii Agriculture; and

iii Browsing by goats.

8.238. The conservation advice states the priority conservation and management actions to assist in the recovery of the species are to;

i Manage fires to ensure that prevailing fire regimes do not disrupt the life cycle of the species;

ii Avoid physical damage to habitat and individuals from fire, ensuring intervals between successive fires take into account the longevity of the current population;

iii Avoid land clearing that will impact the species and surrounding vegetation and investigate formal conservation arrangements; and

iv Opportunistically monitor the impacts of goat browsing on the species.

8.239. The Department has considered the conservation advice and recovery plan for *Bertya opponens* in making this recommendation and considers that the recommended conditions require the proponent to undertake mitigation measures in accordance with the conservation advice. The recommended conditions also require that an offset be provided for residual significant impacts to *Bertya opponens*, which will provide for conservation actions in accordance with the conservation advice.

Approved Conservation Advice for *Tylophora linearis*

8.240. The conservation advice for *Tylophora linearis* (Attachment G23) came into force in 2008 and identifies major threats to the species as:

i Forestry activities;

ii Disturbances such as grazing and fire; and

iii Invasion of habitat by introduced weeds.

8.241. The conservation advice states the priority conservation and management actions to assist in the recovery of the species are to;

i Protect all known sites from disturbance and monitor the progress of the species' recovery;

ii Ensure government and planning agencies are informed of all known populations;

iii Ensure track widening and maintenance activities do not adversely impact known populations;

iv Develop and implement a suitable fire management strategy, including adequate mapping;

v Manage known sites to ensure appropriate grazing regimes occur; and

vi Raise awareness of the species within the local community and liaise with local Indigenous groups to determine the species' cultural importance.

8.242. The Department has considered the conservation advice for *Tylophora linearis* and in making this recommendation and considers that the recommended conditions require the proponent to undertake mitigation measures that are in accordance with the conservation advice. The recommended conditions also require that an offset be provided for residual significant impacts to *Tylophora linearis*, which will provide for conservation actions in accordance with the conservation advice.

Approved Conservation Advice for Brigalow ecological community

8.243. The conservation advice for Brigalow (Attachment G24) came into force in 2013 and identifies major threats to the ecological community as:

i Clearing;

ii Fire;

iii Invasive species including weeds and pest animals;

iv Inappropriate grazing regimes; and

v Climate change.

8.244. The conservation advice states the priority conservation and management actions to assist in the recovery of the ecological community are to:

i Protect and conserve remnant and regrowth areas of the ecological community. Prevent clearance of this endangered ecological community and of nearby native vegetation including buffer zones and connecting corridors;

ii Manage areas of Brigalow to reduce threats;

iii Manage weeds, foxes and cats appropriately and using a coordinated approach;

iv Encourage landholders to balance primary production and the conservation of native flora and fauna, including Brigalow;

v Undertake regeneration and increase the area of Brigalow managed for conservation, including ensuring adequate buffer zones;

vi Undertake management actions to increase the diversity of species abundance within the ecological community; and

vii Develop and propagate conservation information in consultation with land managers, local and state authorities, and Indigenous groups.

8.245. The Department has considered the conservation advice for Brigalow in making this recommendation and considers that the recommended conditions require the proponent to undertake mitigation measures in accordance with the conservation advice. The recommended conditions also require that an offset be provided for residual significant impacts to Brigalow, which will provide for conservation actions in accordance with the conservation advice.

9 CONDITIONS OF APPROVAL

9.1. Under subsection 134(1) of the EPBC Act, you may attach a condition to the approval of an action if you are satisfied that the condition is necessary or convenient for:

i protecting a matter protected by a provision of Part 3 for which the approval has effect (whether or not the protection is protection from the action); or

ii repairing or mitigating damage to a matter protected by a provision of Part 3 for which the approval has effect (whether or not the damage has been, will be or is likely to be caused by the action).

9.2. Under subsection 134(2) you may attach a condition to the approval of the action if you are satisfied that the condition is necessary or convenient for:

i protecting from the action any matter protected by a provision of Part 3 for which the approval has effect; or

ii repairing or mitigating damage that may or will be, or has been, caused by the action to any matter protected by a provision of Part 3 for which the approval has effect.

9.3. The Department recommends you include the relevant NSW conditions in the EPBC Act approval where necessary to protect matters protected by a provision of Part 3 of the EPBC Act for which the proposed approval has effect. As discussed in this Report and at Attachment B2 of the final decision brief, the Department has recommended additional conditions that strengthen the NSW conditions to protect or mitigate damage to protected matters.

9.4. Subsection 134(3A) states certain conditions cannot be attached to the approval of an action unless the holder of the approval has consented to the attachment of the condition. Following the proposed decision, the Department engaged with Santos to amend and finalise the condition set. Santos agreed to the final conditions on 13 November 2020.

9.5. Subsection 134(3)(c) states that the conditions that may be attached to an approval include conditions requiring a person taking the action to comply with conditions

specified in an instrument made or granted under a State law, such as conditions imposed on the proposed action through the State assessment process. The Department has recommended conditions of this nature.

9.1 CONSIDERATIONS IN DECIDING ON CONDITION

9.6. In accordance with subsection 134(4), in deciding whether to attach a condition to an approval, you must consider the following:

i any relevant conditions that have been imposed, or you consider are likely to be imposed, under a law of a State or self-governing Territory or another law of the Commonwealth on the taking of the action,

ii information provided by the person proposing to take the action or by the designated proponent of the action,

iii the desirability of ensuring as far as practicable that the condition is a cost-effective means for the Commonwealth and the person taking the action to achieve the object of the condition.

9.7. The conditions of approval imposed by NSW are at Attachment D7. The Department has paid close attention to the NSW conditions that are relevant to EPBC Act protected matters and has recommended conditions requiring the proponent to comply with these NSW conditions, where necessary or convenient for the protection of relevant matters. Conditions relevant for the protection of water resources, listed threatened species and communities, and Commonwealth land are discussed in their respective sections above.

9.8. Information provided by the proponent includes the EIS, RTS and additional information, all provided at Attachment F. The Department has considered this information in forming its conclusions and recommending the proposed conditions.

9.9. The MNES report states that the NSW conditions are a cost-effective means of achieving their purpose based on information provided by the proponent during the NSW assessment process, and the Department recommends that you accept this conclusion.

9.10. As far as possible, the Department has recommended conditions that rely on the commitments made by the proponent and/or on measures already required under the NSW conditions.

9.11. The Department recommends that you attach approval conditions that will require the proponent to comply with NSW conditions that are relevant to EPBC Act protected matters. This approach will avoid unnecessary duplication of NSW conditions (which the Department considers are largely adequate to protect relevant matters of national environmental significance) but will still allow the Department to retain an ongoing compliance role for the proposed action.

9.12. In addition to the standard administrative conditions for an approval under the EPBC Act, and the conditions requiring compliance with relevant NSW conditions, the Department recommends you attach Commonwealth-specific conditions relating to:

i notifying the Department of the details of final biodiversity offsets;

ii the establishment of an early-warning monitoring bore system to detect any groundwater changes, and ongoing monitoring, public reporting, assessment of

impacts to groundwater dependent ecosystems, and any necessary corrective actions;

iii cease-work provisions should performance measures for water resources (e.g. groundwater drawdown from shallow aquifers) be exceeded after the implementation of any necessary mitigation and management measures; and

iv the assessment and management of drilling fluid chemicals.

9.13. As discussed in this Report, the Department considers that these conditions are necessary or convenient for protecting the matters protected by the provisions of Part 3 for which the approval would have effect.

9.14. The Department considers that the conditions proposed are a cost-effective means for the Commonwealth and the person taking the action to achieve the object of the condition.

9.2 Consideration of Condition-setting Policy

9.15. In applying this analysis, the Department has had regard to the EPBC Act Condition-setting Policy (the Policy). The Policy outlines the Australian Government's approach to considering state and territory approval conditions when approving a project under the EPBC Act. The NSW Biodiversity Offsets Policy for Major Projects is listed in the Policy as an endorsed state policy which is consistent with the standards of a non-statutory Australian Government policy.

9.16. In accordance with the Policy, the Department considers that it is appropriate to propose conditions that require the proponent to comply with relevant NSW conditions where they relate to offsetting arrangements for EPBC Act protected matters. These conditions will avoid unnecessary duplication of State and Australian Government conditions and allow the Department to retain an ongoing compliance role to ensure the outcomes for the significantly impacted EPBC Act matters are delivered.

9.3 Approval timeframe

9.17. The Department recommends an approval timeframe of 25 years to account for the construction period, proposed operational lifespan of 20 years, and site rehabilitation.

9.18. This approval has effect until 31 December 2045 and aligns with the approval timeframe in the NSW condition set.

10 Conclusion

10.1. Having considered all relevant matters under the EPBC Act, the Department considers that impacts to the matters protected by the provisions of Part 3 will not be unacceptable, provided the proposed action is undertaken in accordance with the recommended conditions of approval.

10.2. The Department recommends that you approve the proposed action, subject to the recommended conditions.

11 Attachments

11.1. The attachments cited in this updated Report are attachments to the proposed briefing package, unless otherwise specified as being attachments to the final decision package.

ATTACHMENT B2

Narrabri Gas Project, how the August 2017 IESC Advice has been reflected in the EPBC Act conditions of approval (19 November 2020)

IESC advice August 2017	EPBC Act conditions
Impacts to groundwater	
Groundwater Model The IESC noted limitations with the groundwater modelling including the ability of the model to predict the full potential magnitude range of the local scale impacts. This had also been identified by NSW DPI Water. The IESC noted that small scale 'daughter models' could be developed for areas of particular concern to address this limitation. Additionally, the IESC suggested further verification and a range of model refinements including using additional data, improving parameterisation, further transient calibration, exploring alternative conceptualisations and incorporating the Bohena Creek alluvium to improve confidence in the predictions of the existing model. Monitoring Additional monitoring was suggested by the IESC, particularly in areas of early field development, and within all potentially impacted aquifers. This is to facilitate the development of an early warning monitoring network with associated triggers and limits to enable verification of the extent and magnitude of impacts.	Groundwater Model State condition B39 requires Santos to update the existing groundwater modelling in consultation with DPIE Water, the NSW EPA and the Water Technical Advisory Group. A range of specific improvements are required under this condition which will address many of the IESC's comments. However, B39 requires updates to the existing modelling and therefore may not fully address the IESC concerns about the ability of the model to adequately predicted the full potential magnitude range of the local scale impacts or the inclusion of local-scale features. Under the Commonwealth conditions, if the future updates to the groundwater modelling result in impact predictions exceeding performance measures, or monitoring detects an exceedance of performance measures, and mitigation measures were unsuccessful, then Santos would be required to undertake further site-specific assessments of the potentially impacted GDEs. These assessments would improve the understanding of the GDEs and the potential magnitude of impacts and would include local-scale modelling. Monitoring State condition B41(iv) addressed many of the IESC comments by requiring Santos to develop a Groundwater Management Plan. This condition contains extensive requirements for monitoring including to: • provide detailed information on the monitoring network which includes the capacity to provide early warning of impacts; • monitor and evaluate geological fracturing and heterogeneity; • obtain baseline data on a range of hydraulic properties;

The need for further baseline data collection prior to impacts was noted by the IESC and NSW DPI Water. Additional monitoring and data collection were also suggested to improve the understanding of: faults and their potential impacts on groundwater flow; aquifer hydraulic properties to improve the groundwater model parameterisation; and the sources of water, inter aquifer mixing and conceptualisations. The IESC suggested that an adaptive management framework including trigger action response plans and contingency measures should be in place prior commencement of gas production. These frameworks should include timely responses to mitigate impacts.	• characterise temporal and spatial variations of all potentially affected water sources; and • provide data to improve the groundwater model. The Commonwealth conditions additionally require Santos to install and maintain an early-warning monitoring system in the Napperaby Sandstone and/or Digby Formation and to provide annual compliance reporting. This will provide assurance that impacts are within the ranges predicted by Santos in the EIS. By using the Napperby Sandstone and/or Digby Formation as an early warning system potential impacts can be identified before they become actual impacts in the shallow aquifers that support GDEs and agricultural production. If greater impacts are observed within the early-warning monitoring system then Santos is required to undertake further work to characterise the potential impacts and identify scientifically robust cease-work triggers. If the cease-work triggers are exceeded then groundwater extraction has to stop at specific production wells identified as contributing to potential impacts. The Commonwealth conditions also require Santos to undertake additional site-specific studies should future updates to the groundwater model predict impacts in excess of performance measures. By using the groundwater model predictions, an early warning of potential future impacts is obtained and further work to characterise these potential impacts can be undertaken prior to the impact occurring. Additional work required by the conditions will include site-specific field studies and local scale modelling.
<u>Groundwater extraction rates</u> The IESC highlighted that there was uncertainty in the simulated groundwater extraction as information on rates used in the groundwater modelling were not clearly provided.	<u>Groundwater extraction rates</u> State condition A15 addresses the IESC's comments through setting a maximum cap on groundwater extraction annually and on a cumulative basis at various stages of the development. These caps can be reflected in groundwater modelling scenarios to better understand the likely impacts

Groundwater dependent ecosystems The IESC noted that the effort to identify and characterise GDEs including stygofauna, Hardys and Eather Springs, and terrestrial groundwater-dependent vegetation was limited, and that further field studies should be undertaken to characterise the baseline condition of these GDEs and to understand potential impacts. Additionally, monitoring of GDEs would need to be improved and continued throughout the life of the development.	associated with a specific level of groundwater extraction. State condition B39 requires the current groundwater modelling to be updated prior to the commencement of Phase 2. This modelling update would consider the take permitted under the state conditions. State condition B40 prevents Santos from commencing Phase 2 if the updated groundwater modelling predicts an exceedance of the performance measures identified in Table 7. Groundwater dependent ecosystems Table 7 of the state conditions sets a performance measure of negligible impact to groundwater-dependent ecosystems. It is unclear though that the NSW conditions would require improved effort to characterise all potential GDEs that the development may impact and hence fully address the issue identified in the IESC advice. The Commonwealth conditions require Santos to install and maintain an early-warning monitoring system in the Napperby Sandstone and/or Digby Formation. If this system detects, or modelling updates predict, an exceedance of performance measures then Santos is required to undertake further studies to better characterise the potential impacts including to any GDEs. If mitigation and management measures cannot be identified that will successfully address the predicted impacts then Santos must undertake further detailed studies to enable the development of cease-work limits in order to protect GDEs from unapproved impacts. If the cease-work limit is exceeded, groundwater extraction from production wells identified as contributing to the predicted impact must cease.
Impacts to surface water	
Discharges to Bohena Creek – Risk Assessment The IESC noted discrepancies between the dilution factors used in the mixing zone modelling and the risk assessments plus some issues with proposed concentrations for ammonia, boron and fluoride in released water.	Discharges to Bohena Creek – Risk Assessment The performance measures in Table 7 of the state conditions require a minimum dilution factor of 1 in 10 based on the natural stream flow trigger for discharge to Bohena Creek and the maximum volume Santos can discharge daily. State condition B36 addresses issues relating to water quality as it requires Santos to ensure that the quality of all surface

	discharges comply with the EPL. The EPL will identify what parameters are to be monitored in discharge water and surface waters.
Discharges to Bohena Creek – characterising discharge events The IESC identified that that a daily maximum discharge volume and the proportion of discharge water compared to natural creek water needed to be considered to understand contaminant concentrations in Bohena Creek.	Discharges to Bohena Creek – characterising discharge events Table 7 of the state conditions identify performance measures for discharges to Bohena Creek that limit discharges to 10 ML/day when the flow in the creek is greater than 100 ML/day. This addresses the IESC comments.
Water balance modelling Confidence in water balance modelling was considered to be low by the IESC for multiple reasons including uncertainty in the predictions of produced water volumes, the lack of analysis of uncertainty in the inputs to the water balance modelling, the lack of contingencies if beneficial reuse options were unavailable, and the inadequacy of current gauging equipment in Bohena Creek.	Water balance modelling IESC comments are addressed by several State conditions. B41 (ii) requires Santos to develop a Site Water Balance that updates the predicted inputs and outputs to the water management system, includes details of water storage and treatment capacity, and provides information on water use, transfers and sharing. Table 7 sets a performance measure requiring all produced water storages to have sufficient freeboard (available storage volume) to accommodate a 72 hour 1 in 100 year ARI event. Condition B41 (v) requires a Produced Water Management Plan to be developed that includes details of fail-safe, redundancy and contingency measures. Condition B41 (viii) requires a Managed Release Protocol that includes measure to upgrade stream flow gauging and monitoring station/s. The state conditions do not explicitly address the issue of limited analysis of the uncertainties of the inputs and outputs of the water balance modelling. The risk of this is that more water could be produced onsite than the water management system can contain. While state condition A15 limits the annual and cumulative volumes of produced water, rainfall cannot be controlled which is what the uncertainty analysis suggested by the IESC would examine. The outcomes for groundwater and surface water proposed by the Department in combination with the state conditions will ensure that controlled discharges from the development do not adversely impact water resources. The Commonwealth conditions require Santos to

Monitoring The need for adequate monitoring frequency and a suitable analyte suite was noted by the IESC.	report annually to the Department on compliance. The state conditions minimise the likelihood of uncontrolled discharges from the development. Monitoring Condition B41 (iii) requires Santos to develop a Surface Water Management Plan that includes detailed performance criteria including triggers that will identify potentially adverse impacts to downstream surface water flows, quality and riparian vegetation. Condition B36 requires all surface discharges to comply with limits set in the EPL. The Commonwealth conditions require Santos to report on compliance to the Department annually.
Management of salt and wastes/chemicals	
Salt management The IESC noted that long-term management of salt needed to consider the composition of the salt, potential risks of onsite storage, appropriate waste classification and, preferred, available and contingency management options.	Salt management State conditions address these issues through: • Table 7 sets performance measures for salt management including onsite storage within a weather-proof structure prior to transport offsite; • Condition B41 (ix) requires a Salt Management Plan including protocols for waste classification; • Condition B67 which requires waste to be classified in accordance with EPA guidelines; • Condition B69 requires, prior to the commencement of Phase 1, that Santos undertake a Produced Salt Beneficial Reuse and Disposal Study that includes identifying reasonable and feasible beneficial reuse options, maximising beneficial reuse, and contains a strategy for disposal of salt including demonstration that the waste facility occupiers can lawfully accept and dispose of the salt (including consideration of volume and composition); and • Condition B70 requires a Waste Management Plan consistent with the Produced Salt and Beneficial Reuse and Disposal Study.

Produced water The IESC noted that treated produced water may be discharged to Bohena Creek without being amended. They also noted that water used for dust suppression should be of a quality that would not impact terrestrial vegetation.	Produced water Table 7 sets performance criteria relating to irrigation and beneficial reuse management that permits only amended treated water to be reused. It is not clear if reuse incorporates discharges to Bohena Creek, although Table 7 also requires negligible impact to surface water quality in any watercourse. The outcomes proposed by the Department for surface water require no adverse impact to aquatic ecosystems. The Commonwealth conditions will require Santos to report on compliance to the Department annually.
Irrigation reuse The lack of site-specific soil studies was noted by the IESC within the Irrigation Management Plan.	Irrigation reuse Condition B41 (vi) addresses this issue as it requires Santos to develop an Irrigation Management Plan that includes baseline analysis of soil conditions and measures to ensure soil structure, stability and agricultural productivity is maintained.
Waste management The IESC identified that limited information had been provided about the management of several waste streams including drilling fluid/waste, produced water and associated waste products.	Waste management State condition B70 addresses this concern. Santos is required to identify all waste streams and the fate of the waste including identification of the facility that has agreed to accept the waste, while condition B67 requires all waste to be classified in accordance with EPA guidelines and disposed of at an appropriately licensed waste facility.
Drilling chemicals The need to rigorously and transparently assess the hazards and risks posed by the drilling chemicals used, and where necessary identify risk mitigation processes was noted by the IESC.	Drilling chemicals While state conditions B67 and B71 require all waste streams to be identified, classified and managed in accordance with EPA guidelines this does not address the IESC comments about assessing the risk associated with the use of a chemical prior to it becoming a waste stream. The Commonwealth conditions require Santos to develop and implement a

	tiered risk-based framework to assess the chemicals to be used in drilling. The tiers correspond to potential risks posed by the chemicals and higher tiers require increasing assessment and regulatory requirements.