



New South Wales Government
Independent Planning Commission

Narrabri Gas Project SSD-6456

Statement of Reasons for Decision

Mr Stephen O'Connor (Chair)
Mr John Hann
Professor Snow Barlow

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Narrabri Gas Project SSD-6456 Final Report ©
State of New South Wales through the Independent Planning Commission 2020

Independent Planning Commission NSW
Level 3, 201 Elizabeth St Sydney NSW Australia
Telephone: (02) 9383 2100
Email: ipcn@ipcn.nsw.gov.au
ABN: 38755709681

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EXECUTIVE SUMMARY

The Independent Planning Commission of NSW has determined to **approve** the Narrabri Gas Project, subject to stringent conditions, for the reasons outlined in this Statement of Reasons. In making its determination the Commission has relied on material including the whole-of-government assessment conducted on its behalf by the Department of Planning, Industry and Environment. The Commission is satisfied that this assessment was undertaken in line with relevant legislation and guidelines, was informed by appropriate expertise and addressed the mandatory relevant considerations under s 4.15 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) in a manner sufficient to inform the Commission's determination.

The Commission finds that the Project has the potential to improve gas security for Australia's east coast domestic market. It will also deliver economic and social benefits to the people of NSW, including through a diversification of industry for Narrabri and the surrounding region, immediate and ongoing employment opportunities, and significant direct funding for local infrastructure and community projects.

In response to the Chief Scientist & Engineer's *Final Report of the Independent Review of Coal Seam Gas Activities in NSW* (2014), the NSW Government established assessment requirements and regulatory guidelines for the coal seam gas industry under the NSW Gas Plan. The Commission has independently examined the proposed Narrabri Gas Project and found that it is consistent with these requirements and guidelines.

The Commission has granted a phased approval that is subject to stringent conditions, which means that the Applicant must meet specific requirements before the Project can progress to the next phase of development. The four Phases are: Phase 1 - appraisal; Phase 2 - construction; Phase 3 - production; Phase 4 - rehabilitation. The Commission has accepted the Recommended Conditions of consent from the Department and imposed additional conditions which will increase the transparency of the Project's operations, improve groundwater modelling and data acquisition, increase expert involvement in the management and mitigation of impacts, offset specific impacts of the Project and strengthen protective measures for affected stakeholders and the environment. The Commission notes that the approval does not include consent for the proposed gas fired power station at Leewood, the Westport workers accommodation or non-safety flaring infrastructure.

Throughout the public hearing and submissions process, the Commission received a large number of submissions from within the local area, across NSW and from other jurisdictions. These submissions came from people who are directly or indirectly impacted by the Project, community and interest groups, subject matter experts and peak bodies. Under the EP&A Act, the Commission, like all consent authorities, must consider community concerns regarding development applications. The Commission notes that the number of objections to a development application is not in and of itself the sole measure of the public interest nor necessarily a determinative reason for refusal. However, in determining this State significant development application, the Commission has taken into consideration the submissions made regarding the merits and impacts of the Narrabri Gas Project.

The issues raised in public submissions greatly assisted the Commission to critically examine the Department's assessment and have contributed to the Commission's consideration of the merits and impacts of the Project. In making its determination, the Commission has assessed the application of relevant planning instruments, policies and environmental protections, and the capacity to reasonably and satisfactorily identify, avoid, mitigate and manage these impacts by imposing conditions on the consent.

Some public submissions also raised concerns about broader government policy and regulatory issues that fall outside the Commission's role as defined in the EP&A Act. The Commission acknowledges such issues but is tasked with reaching a determination on the merits of this Project

based on the mandatory and relevant considerations under the EP&A Act, which do not include deciding broader questions on legislation and policy.

Key issues covered in this Statement of Reasons are:

Groundwater and agriculture:

The Commission is satisfied that the potential groundwater impacts of the Project, as assessed with the assistance of the independent Water Expert Panel, can be effectively managed under the conditions of consent. The Applicant's groundwater impact modelling was considered fit for purpose for this approval. The Commission imposed conditions requiring further information to improve the groundwater impact modelling before the Project proceeds to Phase 2 to reduce the level of uncertainty with respect to potential groundwater impacts. The Commission also requires the Applicant to update and improve their groundwater impact modelling to be generally in accordance with the features of a Class 3 confidence level model, the features of which must be based on advice from the Water Technical Advisory Group regarding appropriate, development-specific modelling objectives and criteria. The imposed conditions do not permit the Applicant to establish the production field (Phase 2) if the revised groundwater model predicts an exceedance of the water management performance measures identified in the consent. Further to this, the Commission has placed the burden of proof on the Applicant to demonstrate that any adverse and direct impact to a water supply is not due to Project-related activities, and has also strengthened the Applicant's obligation to supply compensatory water or provide other compensation for impacts attributable to the Project.

Greenhouse Gas (GHG) Emissions:

The Commission acknowledges the lower greenhouse gas emissions of coal seam gas compared to coal. In response to concerns that the emissions advantage of coal seam gas may be jeopardised by an underestimation of fugitive emissions, the Commission has imposed a condition to require exceedances of the Applicant's predicted Scope 1 and 2 greenhouse gas emissions to be fully offset. The Applicant will also be required to consult with an expert advisory group in measuring, minimising and reporting these emissions. The Commission is satisfied that the Project is consistent with the *NSW Gas Plan* and *NSW Energy Package Memorandum of Understanding* (31 January 2020), and notes that the task before the Commission is to determine whether to approve or refuse this specific Project, not to speculate about whether gas extraction in general should be permitted or other means by which the State's energy needs could be met.

Biodiversity:

The Commission notes the Project is consistent with strategic land use planning for the Pilliga Forest as outlined in the *Brigalow and Nandewar Community Conservation Act 2005* and is located within an area set aside for forestry, recreation and mineral extraction purposes. The Commission is satisfied that the biodiversity impacts of the Project have been measured and assessed in line with the relevant guidelines, the biodiversity offsets have been calculated in accordance with the *NSW Biodiversity Offsets Policy for Major Projects*, and the imposed conditions provide for appropriate management, mitigation and monitoring of the potential biodiversity impact risks of the Project. The Commission has also introduced new conditions to strengthen protective measures and require consultation with biodiversity experts in the preparation of management and field development plans to mitigate impacts on native flora and fauna and Ecologically Endangered Communities.

Waste Management:

The Commission considered the main waste streams from the Project - being drill cuttings, drilling fluids and 840,000 tonnes of crystallised salt – and is satisfied waste from the Project will be disposed of in accordance with the *NSW Waste Hierarchy*, with landfill disposal being the last

resort. The Commission has also imposed further conditions to minimise the on-site storage of waste and to require arrangements for beneficial reuse or landfill disposal at an appropriately EPA-licensed facility to be in place prior to Phase 1. The enforceability of these conditions has been confirmed by the EPA, as lead regulator.

Aboriginal Cultural Heritage:

The Commission is satisfied that the Aboriginal Cultural Heritage Assessment and consultation has been undertaken in accordance with the relevant guidelines; however, in light of concerns raised in the submission process, it is of the view that the consultation requirements for proponents could be improved. Conditions are in place to require the establishment of an Aboriginal Cultural Heritage Advisory Group and Aboriginal Cultural Heritage Management Plan and ensure the Applicant has proper regard to areas and items of Aboriginal cultural significance.

Bushfire risk:

The Commission is satisfied that bushfire risks from the Project are manageable and has imposed conditions to reduce fire ignition risks by requiring a safety flare stack height of 50m, and other measures that manage methane gas and facility hazards. The Commission has not granted approval for the pilot well flares and is satisfied that the risk of an increase in bushfire events from climate change can be adequately managed through the Recommended Conditions, including well shut-in and automatic fail-safe requirements.

Economic Impacts:

The Commission considered the likely economic impacts of the Project and is satisfied that on balance the Project will provide a net economic benefit for the local community, region and State through increased investment and economic activity. This includes diversification of local industry through the provision of a local gas supply, employment opportunities, royalties and investment in local infrastructure and community projects through the Community Benefit Fund and the Planning Agreement with Narrabri Shire Council. The Commission is also satisfied that the Project has the potential to improve gas security for Australia's east coast domestic market.

Social and health.

The Commission is satisfied that the Project is unlikely to be the source of significant physical health impacts in the local community. The Commission is satisfied the imposed conditions identify opportunities to secure and enhance local community services and facilities and provide a mechanism for the ongoing analysis of potential social risks. The Commission supports the requirement of a Social Impact Management Plan prepared in consultation with Narrabri Council and the local community.

Based on a consideration of all issues, risks and potential impacts, and subject to appropriate conditions, the Commission finds that the Project is compliant with applicable legislation and, on balance, after weighing all relevant considerations, is in the public interest.

DEFINED TERMS

ABBREVIATION	DEFINITION
ACHMP	Aboriginal Cultural Heritage Management Plan
Additional Information	Applicant's Additional Information provided to the Department (undated)
Additional Material	Additional Material from the Department and the Applicant, on which the Commission sought public comments
AIP	<i>NSW Aquifer Interference Policy</i>
Applicant	Santos NSW (Eastern) Pty Ltd
Applicant's Response	Applicant's response to the Commission (dated 17 July 2020)
Application	State Significant Development Application SSD-6456
BCD	Biodiversity and Conservation Division of the NSW Environment, Energy and Science group
BNCCA Act	<i>Brigalow and Nandewar Community Conservation Area Act 2005</i>
CBF	Community Benefit Fund
CH₄	Methane
CO₂	Carbon dioxide
Commission	Independent Planning Commission of NSW
Council	Narrabri Shire Council
Council's Response	Council's response to the Commission (dated 17 July 2020)
CSE Report	NSW Chief Scientist & Engineer <i>Final Report of the Independent Review of Coal Seam Gas Activities in NSW</i>
CSIRO	Commonwealth Scientific and Industrial Research Organisation
Department	Department of Planning, Industry and Environment
Department's AR	Department's Assessment Report
Department's Response	Department's response to the Commission (dated 14 August 2020)
EECs	Endangered Ecological Communities
EIS	The Applicant's exhibited Environmental Impact Statement (dated 31 January 2017)
EPA	NSW Environment Protection Authority
EP&A Act	<i>Environmental Planning and Assessment Act 1979</i>
EPI	Environmental Planning Instrument
EPL	Environmental Protection Licence
ESD	Ecologically Sustainable Development
FCNSW	NSW Forestry Corporation
GAB	Great Artesian Basin
GDEs	Groundwater Dependent Ecosystems
GHG	Greenhouse Gas

GL	Gigalitres
Government Response	<i>NSW Government response to Portfolio Committee No. 4's inquiry report</i>
ha	Hectare
IESC	Commonwealth Independent Expert Scientific Committee on Coal Seam Gas and Large Mining Development
LALC	Local Aboriginal Land Council
LC Inquiry	NSW Legislative Council Portfolio Committee No. 4 Industry <i>The implementation of the recommendations contained in the NSW Chief Scientist's Independent Review of Coal Seam Gas Activities in New South Wales</i>
LEP	Local Environmental Plan
LGA	Local Government Area
Major Projects Offsets Policy	<i>NSW Biodiversity Offsets Policy for Major Projects 2014</i>
Material	The material set out in section 4.4
ML	Megalitre
Mt	Mega tonne
Mining SEPP	<i>State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007</i>
Minister	Minister for Planning and Public Spaces
Minister's Request	Request from the Minister for Planning and Public Spaces on 3 March 2020, set out in paragraph 1
NENWRP	<i>New England North West Regional Plan 2036</i>
NLEP	<i>Narrabri Local Environmental Plan 2012</i>
NSW Energy Package MoU	Memorandum of Understanding – NSW Energy Package (dated 31 January 2020)
Observatory	Siding Springs Observatory
Phases	As defined in the definitions in the Commission's imposed conditions of consent
Produced Water	Water that is extracted from the coal seams
Project	Narrabri Gas Project (SSD-6456) as proposed in the Applicant's EIS, RtS, Supplementary RtS and Additional Information
Project Area	The subject site as described in paragraph 6-9
Public Hearing	The Public Hearing held by the Commission from 20 July 2020 to 25 July 2020 and 1 August 2020
Recommended Conditions	The Department's recommended conditions in the draft Development Consent forwarded to the Commission in June 2020
Regulations	<i>Environmental Planning and Assessment Regulation 2000</i>
RFS	NSW Rural Fire Service
RtS	The Applicant's Response to Submissions (undated)
s4.15 Matters	Relevant matters for consideration, as provided in s 4.15(1) of the EP&A Act
SEARs	Secretary's Environmental Assessment Requirements (dated 27 September 2016)

SEPP	State Environmental Planning Policy
SIA	Social Impact Assessment
SIMP	Social Impact Management Plan
SRD SEPP	SEPP (State and Regional Development) 2011
SSD	State Significant Development
Supplementary RtS	The Applicant's Supplementary RtS (undated)
WIC	<i>NSW Code of Practice for Coal Seam Gas Well Integrity (2012)</i>

1 INTRODUCTION

1.1 The Minister's Request

1. On 3 March 2020, the Minister for Planning and Public Spaces (**Minister**) made a request (**Minister's Request**) under section 2.9(1)(d) of the *Environmental Planning Assessment Act 1979 (EP&A Act)*, that the Independent Planning Commission of NSW (**Commission**):
 1. *Conduct a further public hearing into the carrying out of the Narrabri Gas Project (SSD 6456) prior to determining the development application for the project under the Environmental Planning and Assessment Act 1979, paying particular attention to:*
 - a) *the Department of Planning, Industry and Environment's assessment report, including any recommended conditions of consent;*
 - b) *key issues raised in public submissions during the public hearing; and*
 - c) *any other documents or information relevant to the determination of the development application.*
 2. *Complete the public hearing and make its determination of the development application within 12 weeks of receiving the Department's assessment report in respect of the project, unless the Planning Secretary agrees otherwise.*
2. The Minister's Request, set out above in paragraph 1, was received by the Commission on 11 March 2020.

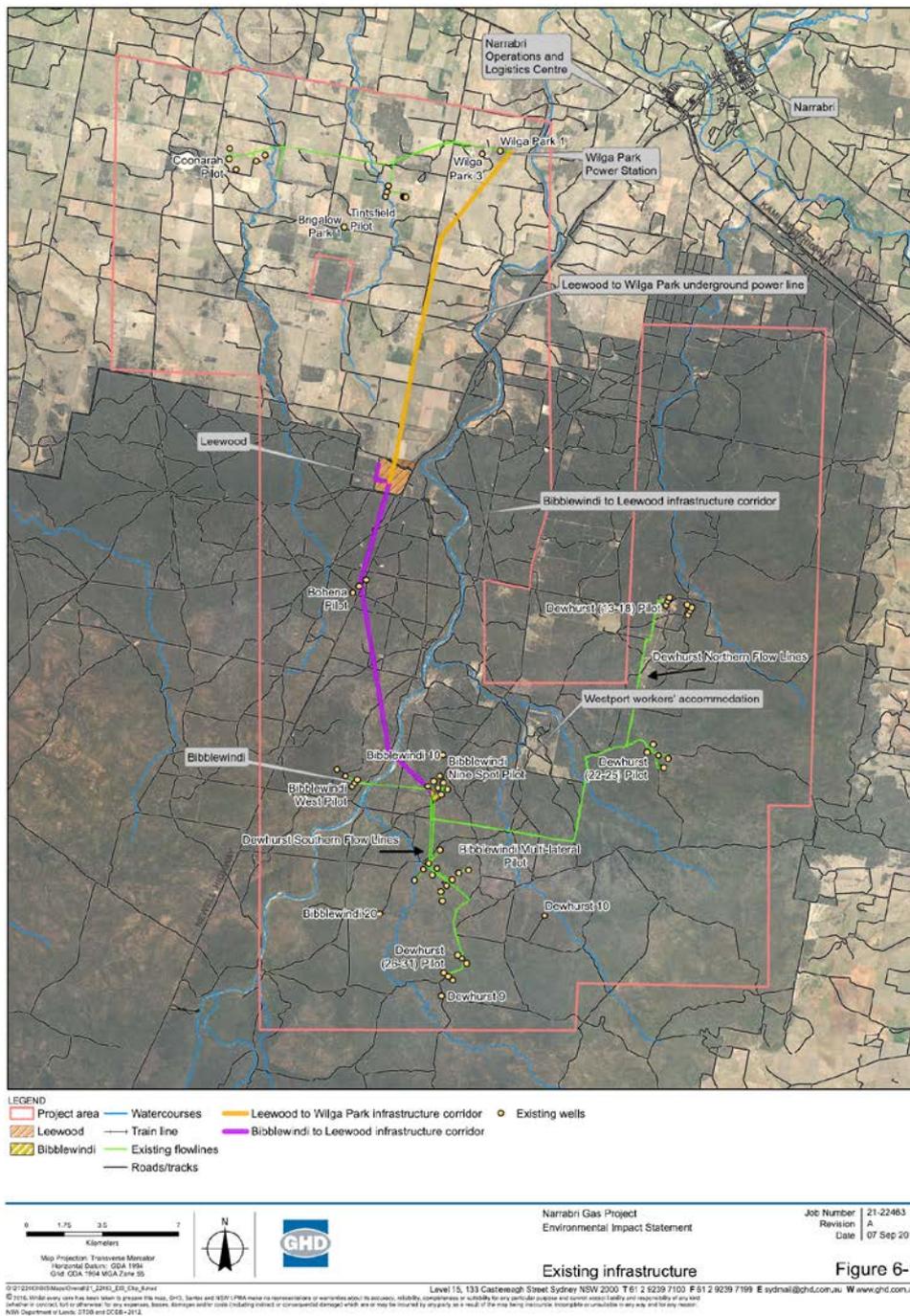
1.2 The Department's Referral

3. On 12 June 2020, the NSW Department of Planning, Industry and Environment (**Department**) referred the State significant development application (**SSD-6456**) (**Application**) from Santos NSW (Eastern) Pty Ltd (**Applicant**) to the NSW Independent Planning Commission (**Commission**) for determination. The Application seeks approval for the Narrabri Gas Project (**Project**) located in the Narrabri local government area (**LGA**) under section 4.38 of the *Environmental Planning and Assessment Act 1979 (EP&A Act)*. More than 50 unique public objections to the Application were received and therefore, under section 4.5(a) of the EP&A Act, the Commission is the consent authority for the Application.
4. In accordance with the Minister's Request, the determination of the Application was due 12 weeks from the referral, on 4 September 2020. On 11 August 2020, the Commission sought an extension of time to determine the Application by 30 September 2020. This request was granted by the Secretary on 14 August 2020.

1.3 The Commission Panel

5. On 12 March 2020, Mr Peter Duncan AM, Acting Chair of the Commission, directed Ms Dianne Leeson to nominate members of the Panel. Ms Leeson nominated Mr Stephen O'Connor (Chair), Mr John Hann and Professor Snow Barlow to constitute the Commission Panel determining the Application.

Figure 2 – Project Area map (Source: Department's AR)



- The Department describes the agricultural land that comprises the Project Area at ARP 117, and states *“the agricultural areas within the site do not include any strategic agricultural land. They are generally used for broad acre grazing and dryland cropping.”*
- The Department's AR identifies 114 residences within the Project Area and a further 103 residences within 3km of the Project Area (ARP 118).
- As described at ARP 119, the Project will target coal seams in the *“Gunnedah geological formation”* that are generally located at depths between 800m and 1,200m.

2.2 Exploration and Existing Infrastructure

10. The Project Area has been subject to “*extensive gas exploration since the early 1960’s*” (ARP 6).
11. In 2002, previous titleholder Eastern Star Gas began producing gas from conventional gas wells in the northern part of the Project Area to produce electricity at the Wilga Park Power Station (ARP 8-10). As gas production did not meet expectations, exploration has since “*focused mainly on finding coal seam gas resources in the Pilliga State Forest and drilling gas wells at Bohena, Bibblewindi and Dewhurst*”. Coal seam gas (**CSG**) is methane trapped within coal seams by water and the confining pressure of overlying geological formations. To extract this gas the coal seam must be dewatered to release the pressure, allowing the gas to escape via wells intersecting that seam.
12. During exploration by previous titleholders and the Applicant, a range of gas-related infrastructure has been developed at the Project Area. This infrastructure includes drill pads, gas wells, underground gas gathering lines that convey gas and extracted water to the Bibblewindi and Leewood processing facilities, the Bibblewindi and Leewood processing facilities, the Wilga Park Power Station, and the Narrabri Operations and Logistics Centre (ARP 12-13). Development consent for the existing infrastructure was obtained under previous development applications. The Department describes at ARP 15 that the Applicant proposes to surrender relevant development consents so that a single development consent would operate for this project (see paragraph 73) – with the exception of the Wilga Park Power Station and the Narrabri Operations and Logistics Centre, which would continue to operate under existing development consents.

2.3 The Narrabri Gas Project

13. The Project includes the development of a new CSG field and associated infrastructure over 95,000 ha near Narrabri, in north-western NSW. The Project will include the construction of up to 850 gas wells on up to 425 well pads over the life of the Project (approximately 25 years) and gas processing and water treatment facilities. The Project will result in the clearing of up to 1,000 ha of the 95,000 ha Project Area.
14. The Project has four proposed phases of development:
 - Phase 1: further exploration and appraisal activities.
 - Phase 2: developing the gas field and associated infrastructure.
 - Phase 3: operating the gas field and associated infrastructure and producing gas for the domestic market.
 - Phase 4: decommissioning the gas field and associated infrastructure and final rehabilitation of the Project Area.
15. The key elements of the Project are outlined in Table 1.

Table 1 – Key Components of the Project (Source: Department's AR)

Project Component	Proposed
Project Summary	Development of the Narrabri Gas Project, including: <ul style="list-style-type: none"> • a coal seam gas field with up to 850 gas wells; • associated infrastructure, including gas and water processing facilities; and • progressively rehabilitating the Project Area.
Project Life	25 years, with around 20 years of gas production
Gas Reserves	1,500 PJ
Target Coal Seams	Coal seams of the Bohena Trough within the Gunnedah Basin, including: <ul style="list-style-type: none"> • the Rutley, Namoi, Parkes and Bohena coal seams within the Maules Creek Formation (800 to 1,200 m deep); and • the Hoskissons Seam in the Black Jack Group (around 500 m deep) <p>The Department confirms at ARP 38 that because the target coal seams are reasonably permeable, this project “does not require fracking to stimulate gas production”.</p>
Gas Production	Up to 200 TJ a day for the domestic market. This equates to approximately 50% of NSW's gas demand.
Gas Field	Progressive development of the coal seam gas field, including: <ul style="list-style-type: none"> • up to 425 well pads located in accordance with Field Development Protocol (Table 4 of the Department's AR describes the proposed Field Development Protocol); • approximately two thirds of the Project Area is located within the Pilliga State Forest, with the balance of the Project Area on privately-owned agricultural land to the north of the Pilliga State Forest; • 1 well pad per 225 ha of the Project Area; • each well pad up to 1 ha in area during construction, reducing to 2,500m² for operations; • up to 850 new gas wells and continued operation of existing wells: <ul style="list-style-type: none"> o developed in accordance with the Code of Practice for Coal Seam Gas Well Integrity (Well Integrity Code); o vertical, deviated and lateral wells; and o no fracking • ancillary infrastructure, including: <ul style="list-style-type: none"> o access tracks; o gas and water separators, gas flares and water tanks; o underground gas and water gathering lines; o diesel/gas generators; and o remote sensing telemetry units.
Gas and Water Processing Facilities	Upgrade the existing gas and water processing facilities on Project Area, including the: <ul style="list-style-type: none"> • Bibblewindi facility: <ul style="list-style-type: none"> o in field gas compression facility and safety flare (stack height of up to 50m); o drilling support facility; and o ancillary infrastructure (including staff amenities; car parking, diesel and chemical storage, and utilities) • Leewood facility, including: <ul style="list-style-type: none"> o gas processing facility; o gas safety flare with a stack height of up to 50m; o gas-fired power station (optional); <p>o produced water treatment facility and associated storage ponds; and ancillary infrastructure (including diesel and chemical storages, laydown areas, offices; car parking, workshops, telecommunication tower, and utilities)</p> <ul style="list-style-type: none"> • Infrastructure Corridor for major gas and water pipelines and utilities, connecting the Bibblewindi and Leewood facilities to the Wilga Park Power Station.

Project Component	Proposed
Water and Waste Management	<ul style="list-style-type: none"> • Extract up to 37.5 gigalitres (GL) over the Project at a rate of up to 10 megalitres (ML) a day • Treat all this water at the Leewood facility using a reverse osmosis plant for: <ul style="list-style-type: none"> o reuse on site (drilling, dust suppression, rehabilitation); o crop irrigation or stock watering in surrounding areas; or o discharge to Bohena Creek in favourable conditions (if reuse is unavailable); • Extract up to 840,000 tonnes of salt from the produced water, which would be beneficially reused off-site or disposed of at a licenced waste facility; • Produce up to 1.1 million cubic metres (m³) of drill cuttings, which would be mixed, turned and buried on-site (rock-based drill cuttings) or sent to a licenced waste facility (coal-based drill cuttings) • Drilling fluids, cement slurry and other waste generated by the Project would also be disposed of at licenced waste facilities.
Ancillary Infrastructure	<ul style="list-style-type: none"> • Westport workers accommodation facility – up to 200 workers; • Upgrade intersections off Newell Highway; • Utilities to support the Project (incl telecommunications and electricity supply); • Water-related infrastructure (irrigation and discharge of water from the Project Area).
Disturbance Area, Vegetation Clearing and Biodiversity Offsets	<ul style="list-style-type: none"> • Proposed vegetation clearing of up to 1,000 ha • Three endangered ecological communities (EECs) potentially disturbed (up to 19.3 ha of Brigalow; up to 5.9 ha of Fuzzy Box Woodland and up to 0.1 ha of Weeping Myall Woodland) • A number of threatened flora and fauna species occur or have the potential to occur in the Project Area, including 27 listed plant species and 57 listed fauna species • Offsets are proposed through a combination of land-based offsets, supplementary measures and payments into the Biodiversity Offsets Fund, and rehabilitation of disturbed areas.
Capital Cost	\$3.6 billion
Employment	Up to 1,300 jobs during construction and 200 jobs during operations.
Voluntary Planning Agreement	<p>\$14.5 million to Narrabri Shire Council (Council) for infrastructure and services, including:</p> <ul style="list-style-type: none"> • \$10 million for projects to drive economic development; • \$3 million for community initiatives; • \$1.5 million towards local roads maintenance.

- As described by the Department at ARP 64, one of the key drivers in the NSW Gas Plan is for the benefits of any gas development to be shared with the local community. As such, 10% of royalties paid for the Project will be contributed to a Community Benefit Fund (**CBF**), resulting in contributions of approximately \$120 million over the life of the Project (ARP 68).
- Prior to producing gas, the Applicant will need to connect the Project to a gas pipeline network, which at present is not available in proximity to the Project Area. The Applicant is not seeking approval for a new pipeline or an extension to an existing pipeline as part of this Project. The Department notes at ARP 72 that there are two possible options for the pipeline connection; however, there are uncertainties with both options. Therefore, the Applicant agreed with the Department to accept a condition on any development consent for this Project requiring it to ensure there is an approved pipeline connection to the Project prior to starting Phase 2 construction and that this connection is in place and commissioned prior to starting any gas production under Phase 3.

3 THE DEPARTMENT'S CONSIDERATION OF THE APPLICATION

18. Table 2 provides an overview of the key steps in the Department's consideration of the Application.

Table 2 – Overview of Key Steps

27 September 2016	The Department issued the Secretary's Environmental Assessment Requirements (SEARs).
2 February 2017	The Applicant lodged the Application and supporting Environmental Impact Statement (EIS) to the Department.
21 February 2017 to 22 May 2017	The Department publicly exhibited the EIS (90 days). Almost 23,000 submissions were received by the Department.
8 June 2017	The Department requested the Applicant provide a response to the submissions received.
Undated	The Applicant provided its Response to Submissions (RtS) to the Department.
Undated	The Applicant provided a Supplementary RtS to the Department.
October 2019	The Applicant provided Additional Information to the Department.
3 March 2020	The Minister requested the Commission conduct a Public Hearing and determine the Application.
12 June 2020	The Department referred the Application to the Commission for determination.

19. The Department notes at ARP 179 that the nearly 23,000 submissions it received during exhibition of the Project is the largest number of submissions ever received on a State significant development application in NSW.
20. The Department is satisfied that the Applicant *"has designed the project in a manner that achieves a reasonable balance between maximising the recovery of a recognised gas resource of State significance and minimising the potential impacts on surrounding land users and the environment as far as is practicable"* (ARP 602).
21. The Department confirms that the Applicant will:
- a. only develop gas related infrastructure on private land with the agreement of the landowner;
 - b. not undertake fracking;
 - c. develop all gas wells in accordance with the *NSW Code of Practice for Coal Seam Gas Well Integrity (WIC)*;
 - d. limit water extraction to the 'base case' volumes modelled for the Project;
 - e. set back Project infrastructure from key water resources and conservation areas; and
 - f. utilise an avoidance and minimisation approach to mitigate impacts on Aboriginal and non-Aboriginal heritage items and key biodiversity.

22. At ARP 603 the Department states that it has recommended what it considers to be a comprehensive and precautionary suite of conditions to ensure that:
 - a. the Project complies with relevant criteria and standards;
 - b. the impacts are consistent with those predicted in the EIS; and
 - c. residual impacts are effectively minimised, managed and/or compensated for.
23. The Department's Recommended Conditions have been reviewed and supported by key NSW Government authorities and the Department believes that the conditions reflect current best practice for the regulation of CSG operations (ARP 604).
24. With respect to the Department's consideration of the impacts of the Project against the significance of the resource and the socio-economic benefits, on balance, the Department believes that the Project's benefits outweigh its residual costs. The Department concludes the Project is in the public interest, and is approvable, subject to the Recommended Conditions.

4 THE COMMISSION'S CONSIDERATION OF THE APPLICATION

4.1 The Department's Assessment

25. Under section 4.6 of the EP&A Act, certain functions of the Commission are to be exercised by the Planning Secretary on behalf of the Commission, including “*undertaking assessments of the proposed development and providing them to the Commission (but without limiting the assessments that the Commission may undertake)*” (section 4.6(b)). The Planning Secretary's assessment of the Project is set out in the Department's AR.
26. Accordingly, the Commission considers that it is required to take into account the Department's AR, but that it is not bound to give the Department's AR any more weight in its consideration than the matters it has taken into account pursuant to section 4.15 of the EP&A Act, or any other consideration relevant to its determination. To the extent that any policy outside of the EP&A Act purports to require the Commission to give the Department's AR greater weight than the other relevant matters, the Commission has not applied that policy.

4.2 The Commission's Meetings

27. As part of its determination, the Commission met with various persons as set out in Table 3. All meeting and site inspection notes were made available on the Commission's website.

Table 3 – Commission's Meetings

Meeting	Date of Meeting	Transcript/Notes Available on
Site Inspection	6 July 2020	7 August 2020
Department	25 June 2020	29 June 2020
Applicant	25 June 2020	30 June 2020
Narrabri Shire Council	7 July 2020	13 July 2020
Public Hearing	20 July 2020 – 25 July 2020 and 1 August 2020	From 23 July 2020 – 3 August 2020
Water Expert Panel	28 July 2020	3 August 2020
Agency meeting – EPA/NRAR/DPIE-Water	28 July 2020	3 August 2020

28. At its meetings with the Department, Applicant and Council, the Commission asked questions that each stakeholder took on notice. The Department provided its response to the Commission on 14 August 2020 (**Department's Response**), the Applicant provided its response to the Commission on 17 July 2020 (**Applicant's Response**) and the Council provided its response to the Commission on 17 July 2020 (**Council's Response**). The responses received from each stakeholder are included in the Material considered by the Commission (paragraph 35) and were placed on the Commission's website.

4.3 Public Comments

29. Further to the Minister's Request outlined in paragraph 1, the Commission conducted the **Public Hearing** over seven days, from Monday 20 July 2020 to Saturday 25 July 2020 and on Saturday 1 August 2020. In addition to listening to the public's views, the Commission also heard from the Department and the Applicant at the Public Hearing. In total, 366 speakers presented to the Commission during the Public Hearing.

30. All persons were offered the opportunity to provide written submissions to the Commission from 12 June 2020 until 5pm on 10 August 2020 (nine (9) days after the conclusion of the Public Hearing). The Commission received written submissions from over 11,000 submitters on the Application, comprising:
- Submissions provided via the Commission’s ‘Have your Say’ portal from 4,873 submitters, including 4,339 who objected to the Project;
 - Campaign and form letter emails from 6028 submitters objecting to the Project; and
 - Emailed and posted submissions from 380 other submitters.
31. The Commission also received two campaign petitions objecting to the Project totalling 13,880 signatures.

Table 4: Summary of written submissions

Number of submissions		
Total submissions	Objections	Support
11,273*	10,720	460
Total unique submissions^	Objections	Support
5,245*	4,692	460
Geographic distribution of unique submissions#		
Local Regional Area	Other NSW	Other Australia
19%	59%	9%
Location	Objections	Support
Local Regional Area	71%	27%
Narrabri Shire LGA (within the Local Regional Area)	51%	48%
Other NSW	97%	2%
Other Australia	83%	15%
No location provided	92%	7%
Public Hearing speakers ~	Objections	Support
364	346	18

* Includes 94 submissions that identified as providing ‘comment’ rather than objecting or supporting the Project.

^ “Unique submissions” excludes form letters or campaign emails.

A further 13% did not provide a location.

~ Excluding the Department and the Applicant.

Note: while all care has been taken to ensure that the data presented in the tables and figures in this Statement of Reasons is accurate, minor and immaterial statistical anomalies may be present.

32. All persons were offered the opportunity to provide further written submissions to the Commission from 14 August 2020 until 5pm on 21 August 2020 in response to Additional

Material received from the Department and the Applicant. The Commission accepted a further 123 submissions on the Additional Material.

33. Submissions made in support of the project emphasised the employment and economic benefits. Key issues raised in unique submissions that objected to the Project are summarised in Figures 3 and 4, and include:

- Groundwater impacts
- Climate change impacts from greenhouse gas emissions
- Biodiversity impacts
- Impacts on agriculture
- Bushfire impacts
- Employment impacts
- Health impacts
- Impacts on Aboriginal cultural heritage
- Management of waste (salt).

Concerns were also raised about traffic impacts, safety, light pollution, noise and vibration impacts, air quality and pipeline options.

Figure 3 – Key issues raised in public submissions that objected to the project

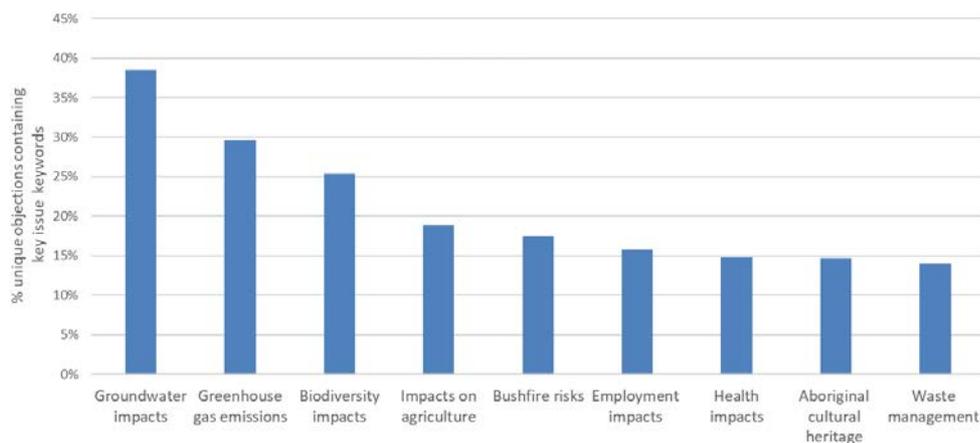
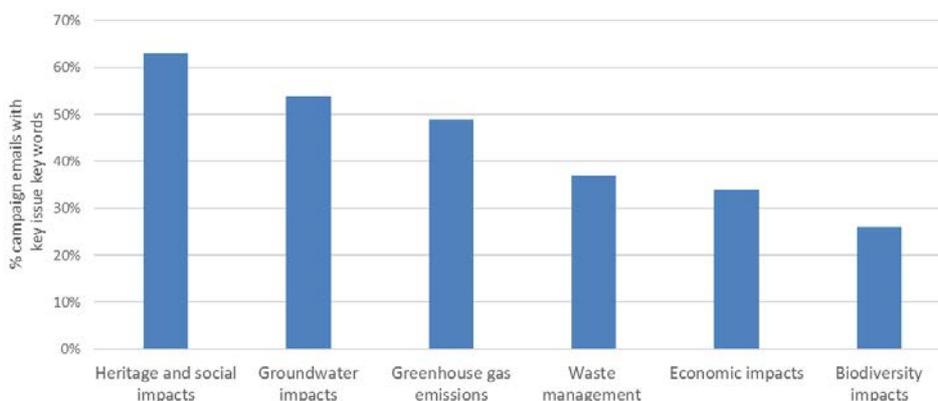


Figure 4 – Key issues raised in campaign emails



34. The Commission's consideration of the key issues in section 7 of this Statement of Reasons includes consideration of the views expressed by the public during the Public Hearing and in written submissions.

4.4 Material considered by the Commission

35. In this determination, the Commission has carefully considered the following material (**Material**) along with the other documents referred to in this Statement of Reasons:
- the SEARs, dated 27 September 2016;
 - the Applicant's EIS, dated 31 January 2017;
 - the Applicant's RTS, undated;
 - the Applicant's Supplementary RTS, undated;
 - the Applicant's Additional Information, undated;
 - the Department's AR, dated 11 June 2020, including material considered in that report;
 - the Department's **Recommended Conditions** of consent, dated June 2020;
 - the Applicant's Response, dated 17 July 2020 (paragraph 28);
 - the Council's response, dated 17 July 2020 (paragraph 28);
 - the Department's response, dated 14 August 2020 (paragraph 28);
 - all speaker comments made to the Commission at the Public Hearing held over 7 days between 20 July 2020 and 1 August 2020;
 - material presented at that Public Hearing;
 - all written comments received and accepted by the Commission in the submission period from 12 June 2020 until 5pm on 10 August 2020; and
 - all written comments received by the Commission in a further submission period from 14 August 2020 up until 5pm AEST on 21 August 2020 in response to Additional Material provided by the Department and the Applicant.

5 STRATEGIC CONTEXT

5.1 New England North West Regional Plan 2036

36. The *New England North West Regional Plan 2036* (**NENWRP**) is a component of the Government's broader strategic policy framework with the intent of delivering new industries, community growth and connection, and a strengthened regional economy. The NENWRP informs future land use plans, development applications and infrastructure funding decisions.
37. The NENWRP acknowledges the mineral and energy exploration and production potential provided by the region's geology and the opportunities this can provide to the region.
38. However, the NENWRP notes "*mineral resource extraction can benefit and affect communities in different ways*" and "*the sustainable management of mineral resources must consider and balance varying impacts to produce sustainable, economic and environmental outcomes*" (page 24).
39. For the reasons set out in this Statement of Reasons, the Commission is satisfied the Project is consistent with the broad policy framework identified in the NENWRP and can achieve a balance between CSG development and other land uses in the Project Area, subject to the imposed conditions.

5.2 Chief Scientist & Engineer Review

40. In February 2013, former NSW Premier Mr Barry O'Farrell commissioned the then NSW Chief Scientist and Engineer, Professor Mary O'Kane, to carry out an independent review of CSG activities in New South Wales. The *Final Report of the Independent Review of Coal Seam Gas Activities in NSW* (**CSE Report**), was released in September 2014 and included 16 recommendations that were accepted by the NSW Government.
41. On 27 February 2020, the NSW Legislative Council Portfolio Committee No. 4 Industry tabled its inquiry report: *The implementation of the recommendations contained in the NSW Chief Scientist's Independent Review of Coal Seam Gas Activities in New South Wales* (**LC Inquiry**). The NSW Government tabled its response to the recommendations of the LC Inquiry on 27 August 2020 (**Government Response**).
42. The Commission notes that many submissions questioned the status of the implementation of the CSE Report recommendations. At its meeting with the Department on 25 June 2020, the Commission requested that the Department provide further detail with respect to how the CSE Report and its recommendations had been addressed in the Department's AR and Recommended Conditions. This was provided as part of the Department's Response (paragraph 28).
43. The Commission has considered the CSE Report, LC Inquiry, Government Response, Department's Response and related submissions as part of its determination. The Commission is satisfied that the Department's AR and Recommended Conditions are generally consistent with the recommendations of the CSE Report, noting that the Commission has strengthened a number of conditions to ensure that the regulation of the Project aligns with the intent of the CSE Report recommendations, including conditions with respect to groundwater modelling, compensatory water, and public access to data.

5.3 NSW Gas Plan and Strategic Energy Projects

44. In 2014, the Project was designated as a Strategic Energy Project in the NSW Gas Plan because of its ability to contribute substantially to the amount of gas available for the NSW gas market, thereby improving energy security and economic stability. This Strategic Energy Project status was granted after the Applicant verified that the gas reserves will benefit NSW gas consumers for the reasons outlined at ARP 94.
45. Strategic Energy Projects receive whole-of-government coordination under the NSW Gas Plan.
46. The Commission is satisfied the Project is consistent with Government policy, as outlined in the NSW Gas Plan, and summarised as the “*safe and sustainable development of an onshore gas industry in NSW [which] will bring significant benefits to households and businesses across the state*” (NSW Gas Plan, page 3).
47. As described by the Department at ARP 107, the NSW Gas Plan resulted in several reforms, including the establishment of a Community Benefits Fund and the ‘*rationalisation of gas exploration licences across NSW*’ (ARP 109). The Commission is satisfied the Project is consistent with the reforms outlined at ARP 108 to 113.
48. The Commission understands that under these reforms, the Environment Protection Authority (**EPA**) has been appointed as “*the lead regulator for all coal seam gas development in NSW and is responsible for monitoring and enforcing compliance with any conditions of approval*” (ARP 114). The Commission met with the EPA (paragraph 27) who confirmed that the Recommended Conditions are enforceable, and that the EPA will have responsibility for compliance and regulation of the Project.
49. Consistent with the goals of the NSW Gas Plan, on 31 January 2020 NSW entered into a Memorandum of Understanding – NSW Energy Package (**NSW Energy Package MoU**) with the Commonwealth, in part aimed at “*increasing gas and electricity supply in NSW*”. Under Schedule C - New Gas Supply of the NSW Energy Package MoU, “[t]he NSW Government will set a target to inject an additional 70 petajoules (PJ) of gas per year into the NSW market.” The Commission is satisfied that the Project, subject to the conditions of consent imposed by the Commission, is consistent with the intent of the NSW Energy Package MoU.

6 STATUTORY CONTEXT

6.1 State Significant Development

50. The Project is SSD under section 4.36 of the EP&A Act because it is ‘*development for the purposes of petroleum production*’, which is listed as SSD under clause 6 of Schedule 1 of the *State Environmental Planning Policy (State and Regional Development) 2011 (SRD SEPP)*.
51. Under section 4.5(a) of the EP&A Act and clause 8A(1) of the SRD SEPP, the Commission is the consent authority for the Application because the Department received more than 50 unique objections to the project during the exhibition period.

6.2 Permissibility

52. At ARP 129 and 130, the Department identifies the Project as being located within the Narrabri LGA, on land zoned RU1 – Primary Production; RU3 – Forestry; and E1 – National Parks and Nature Reserves, as identified in the *Narrabri Local Environmental Plan 2012 (NLEP)*.
53. At ARP 128 the Department states the Project is permissible with development consent under the NLEP, *State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007 (Mining SEPP)* and Section 4.38 of the EP&A Act.
54. The Commission agrees with the Department that the Project is permissible with development consent.

6.3 Section 4.15 Matters under the EP&A Act

55. In determining this application, the Commission has taken into consideration the following matters under section 4.15(1) of the EP&A Act (**s 4.15 Matters**) that are relevant to the Application:
 - the provisions of the following insofar as they apply to the land to which the Application relates:
 - environmental planning instruments; and
 - any proposed instruments; and
 - any planning agreements that have been entered into under section 7.4 of the EP&A Act, and draft planning agreements that a developer has offered to enter into under section 7.4; and
 - matters prescribed under the *Environmental Planning and Assessment Regulation 2000 (Regulations)*;
 - the likely impacts of the development, including environmental impacts on both the natural and built environments, and social and economic impacts in the locality;
 - the suitability of the site for development;
 - submissions made in accordance with the EP&A Act and Regulations; and
 - the public interest.
56. At ARP 155 the Department states it has considered the s 4.15 Matters in detail and reflected the findings of this assessment in the Department’s AR and the Recommended Conditions. The Department’s AR “*reflects the State Government’s position on these matters*” (ARP 156). The Commission is satisfied with this assessment conducted on its behalf by the Department.

57. The s 4.15 Matters are not an exhaustive statement of the matters the Commission is permitted to consider in determining the Application. To the extent that any of the material does not fall within the s 4.15 Matters, the Commission has considered that material where it is permitted to do so, having regard to the subject matter, scope and purpose of the EP&A Act.

6.3.1 Relevant Environmental Planning Instruments

58. The Commission is satisfied with the Department's assessment with respect to the Environmental Planning Instruments (**EPIs**) that are of relevance to the Application. In doing so, the Commission notes that the Department's assessment relies on the consideration given to applicable EPIs in Chapter 4 of the EIS.

6.3.2 Proposed Instruments

59. The Commission has considered relevant proposed EPIs, including the draft *State Environmental Planning Policy (Remediation of Land)* in making its determination.

6.3.3 Development Control Plans

60. Pursuant to clause 11 of the SRD SEPP, development control plans do not apply to SSD. The Commission does not consider any development control plans to be relevant to the determination of the Application.

6.3.4 Relevant Planning Agreements

Council Comments

61. Council, in its letter to the Department dated 28 April 2020, confirmed it has agreed in principle to the terms of a Voluntary Planning Agreement (**VPA**) offered by the Applicant in the total amount of \$14.5 million.

Department Assessment

62. At ARP 57 and 58 the Department confirms the Applicant and Council have agreed to the terms of the VPA involving the payment of \$14.5 million in contributions and how those contributions would be used to fund the delivery of local infrastructure and services.
63. The Department has recommended a condition requiring the Applicant to enter into a Planning Agreement with the Council within six (6) months of the commencement of the development, unless the Planning Secretary agrees otherwise.

Commission's Findings

64. The Commission notes that Council is satisfied in principle with the VPA proposed by the Applicant.
65. The Commission is satisfied with the Department's assessment and has imposed the Department's recommended condition requiring the Applicant to enter into a VPA with Council within six (6) months of the commencement of the Project. The Commission has removed the wording described in paragraph 63, "*unless the Planning Secretary agrees otherwise*" to ensure the VPA is finalised in a timely manner.

6.3.5 Applicable Regulations

NSW Dark Sky Planning Guideline

66. Per clause 92(d)(11) of the Regulations, the Commission has given consideration to the *NSW Dark Sky Planning Guideline* in Section 7.12.5 of this Statement of Reasons.

6.3.6 The Likely Impacts of the Development

67. The potential impacts of the Project have been considered in section 7 of this Statement of Reasons.

6.3.7 The Suitability of the Site for Development

68. The Commission has given consideration to the suitability of the Project Area and is satisfied that the Project Area is suitable for the proposed development.

6.3.8 Submissions

69. Section 4.3 of this Statement of Reasons sets out how the Commission has considered submissions in its determination of the Application.

6.3.9 The Public Interest

70. At the Public Hearing and in several written submissions, the Commission was encouraged to refuse the Application on the grounds it is not in the public interest and does not satisfy the principles of Ecologically Sustainable Development (**ESD**). It was submitted that a range of potential risks to the environment triggered or engaged the precautionary principle in a way that the proportionate response to those risks was said to be a determination of the Application by a refusal. As set out in Section 7 of this Statement of Reasons, the Commission does not agree that the potential risks of the Project require it to be refused.
71. The Commission has given consideration to the principles of ESD in its assessment of each of the “Key Impacts” as set out in Section 7 below, and specifically in Section 7.13.2. The Commission finds the Project to be in the public interest, and consistent with the principles of ESD.

6.3.10 Voluntary Surrender of Consent under section 4.63 of the EP&A Act

72. The Department states at ARP 15 that the Applicant proposes to use most of the existing gas-related infrastructure as part of the Project and surrender the relevant development consents (except for the existing development consents for the Narrabri Operations & Logistics Centre and the Wilga Park Power Station) so there is a single consent for all its operations within the Project Area. The Department has Recommended Conditions giving effect to this.
73. The Commission has imposed the Department’s Recommended Conditions so that prior to the commencement of Phase 1, the Applicant must surrender the development consents for the Bibblewindi Gas Exploration Pilot Expansion and Dewhurst Gas Exploration Pilot Expansion in accordance with section 4.63 of the EP&A Act, with the outcome being that these operations will be regulated under a single development consent.

6.3.11 Integrated and Other NSW Approvals

74. As per ARP 159 of the Department’s AR, the Commission notes that the Department has consulted with relevant public authorities responsible for integrated and other approvals and

has Recommended Conditions of consent covering those aspects of the Application. The Commission is generally satisfied with those Recommended Conditions and acknowledges that the Applicant may also require other approvals which are not integrated into the SSD process, including those listed in ARP 166 of the Department's AR.

6.3.12 Site Verification Certificate

75. The Commission is satisfied that a Site Verification Certificate was submitted with the Application in accordance with the requirements of clause 50A of the EP&A Regulation as stated by the Department in Appendix B of the Department's AR.

6.3.13 Environment Protection and Biodiversity Conservation Matters

76. The Department advises that all matters under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)* have been assessed under the NSW assessment process as per the Bilateral Agreement between the NSW and Commonwealth Governments. As described at ARP 171, under this agreement the Department is required to seek advice from the Commonwealth Independent Expert Scientific Committee on Coal Seam Gas and Large Mining Development (**IESC**) about the potential impacts of the Project on water resources and groundwater dependent ecosystems (**GDEs**) and adequacy of monitoring and mitigation measures; assess the likely impacts of the Project on Commonwealth matters; and prepare an assessment report for the Commonwealth Minister, including Recommended Conditions.
77. The Department's consideration of the IESC's technical advice is set out in ARP 173, 174 and Appendix C of the Department's AR.
78. The IESC identified the potential risks of the Project to be salt and chemical management and disposal, groundwater depressurisation and drawdown in aquifers which may impact GDEs and other groundwater users and changes to surface water flow and quality. The IESC concluded that further data was required to determine the full range of potential impacts to groundwater resources and associated users. The IESC accepted there are limitations associated with the groundwater model that introduce a level of uncertainty but noted that this is expected when modelling complex environments. The IESC made a number of recommendations in order to reduce the associated uncertainties and knowledge gaps.
79. The Department confirms it has considered the IESC technical advice in the assessment of all water related impacts and in preparing the Recommended Conditions (ARP 174).
80. The Commission is satisfied with the Department's findings and that the IESC's recommendations have been adequately considered.
81. At ARP 168, the Department states that on 23 March 2015, the Project was declared to be a "controlled action" under the EPBC Act. ARP 169 confirms that the Project therefore requires the approval of the Commonwealth Minister for the Environment in addition to any NSW approvals before it may proceed.

6.4 Additional Considerations

82. In determining this Project, the Commission has also considered:
- *NSW Aquifer Interference Policy (AIP)*
 - *NSW Code of Practice for Coal Seam Gas Well Integrity (WIC)*
 - NSW Chief Scientist & Engineer *Final Report of the Independent Review of Coal Seam*

Gas Activities in NSW (CSE Report)

- NSW Legislative Council Portfolio Committee No. 4 Industry *The implementation of the recommendations contained in the NSW Chief Scientist's Independent Review of Coal Seam Gas Activities in New South Wales (LC Inquiry)*
- NSW Government response to Portfolio Committee No. 4's inquiry report (**Government Response**)
- *Australian Groundwater Modelling Guidelines*
- *Brigalow and Nandewar Community Conservation Area Act 2005 (BNCCA Act)*
- The Paris Agreement
- *NSW Climate Change Policy Framework*
- *NSW Net Zero Plan Stage 1: 2020–2030*
- Memorandum of Understanding – NSW Energy Package (dated 31 January 2020) (**NSW Energy Package MoU**)
- *Interim Construction Noise Guideline*
- *NSW Road Noise Policy*
- *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales*
- *NSW Risk Assessment Guideline for Groundwater Dependent Ecosystems*

7 CONSIDERATION OF KEY IMPACTS

7.1 Groundwater – Water Security

Public Comments

83. The Narrabri region is within a very productive agricultural area. Local farmers are heavily reliant on the region's water sources, particularly the surface resources of the Namoi River and associated tributaries, and groundwater in the shallow Namoi and Surat aquifers, which form part of the Great Artesian Basin (**GAB**). Many members of the community are concerned that this Project poses significant risks to these water sources.
84. The predominant matters of contention with respect to groundwater security relate to:
- inadequate baseline data and modelling;
 - uncertainty with respect to the underlying geology, including faults and likelihood of aquifer connectivity and aquitard permeability;
 - potential impacts on bores and water entitlements; and
 - provision of compensatory water in the event of adverse consequences (noting contamination is dealt with separately in section 7.2 of this Statement of Reasons).
85. The potential loss of groundwater is a significant community concern. The Commission received submissions concerned that impacts associated with the Project would: not be identified until after they had occurred; be difficult or impossible to remediate; and result in disastrous impacts for agriculture and for the livelihoods of those in the region.

Council Comments

86. In its letter to the Commission dated 17 July 2020, Council provided comments with respect to groundwater matters.
87. Council states that it supports the use of leak detection systems in the wells and the use of government-owned monitoring bores. Council also reiterates that regulatory oversight and transparency are key to community confidence in the safety of the Project.
88. Council agree with the recommendations of the independent Water Expert Panel (**WEP**) established by the Department (see paragraph 97) but requested that the Water Management Plan be finalised prior to determination. In the absence of this, Council requested that key stakeholders be provided with an opportunity to respond to the draft document prior to finalisation. In this respect, the Commission notes Council supports the establishment of a water advisory group and that Council have requested to be involved in the group.
89. With respect to compensatory water, Council raised concerns with the Department's Recommended Conditions B30 to B33. While acknowledging the burden of proof lies with the Applicant in the event of drawdown to privately-owned bores, Council is concerned there will be time delays while a final decision is pending, to the detriment of the private bore owner. Council requests that the Applicant should be required to provide compensatory water to the private bore owner until such time as the Planning Secretary makes a final determination and that reasonable costs incurred by the private bore owner should be reimbursed by the Applicant.

Applicant's Consideration

90. The Applicant's EIS included a groundwater assessment and groundwater modelling of the potential groundwater-related impacts of the Project, which was peer reviewed by the Commonwealth Scientific and Industrial Research Organisation (**CSIRO**). The EIS also included a number of related assessments, including a water monitoring plan, water baseline report, interpretive soils report, managed release study and a contaminated land assessment.
91. The EIS states that while the depressurisation of the target coal seams would occur rapidly (with the extraction of water), the spread of this depressurisation into the higher quality shallow aquifers in the Surat Basin and Namoi Alluvium would be reduced in magnitude and delayed in time by the thick separating aquitards. The EIS conclusions about the hydraulic properties of the aquitards are based on 30 samples of the aquitards and also rely on published literature on the dominant lithologies.
92. The EIS predicts maximum groundwater drawdown in the high value groundwater sources to be less than 0.5m, including less than 0.5m drawdown in the Pilliga Sandstone aquifer of the Surat Basin and less than 0.5m in the Namoi Alluvium aquifer. The EIS concludes these predicted impacts will be "*indiscernible in relation to the existing variations in the groundwater pressures and storage volumes that occur in response to existing uses and replenishment*".
93. The EIS states no significant risks to groundwater resulting from the installation of wells and monitoring bores have been identified and that the lack of faulting extending from the Surat Basin to the underlying Gunnedah Basin means fault zones are unlikely to act as conduits for groundwater or gas flows between the aquifers.
94. The EIS indicates that the simulated groundwater fluxes from the high-quality shallow groundwater sources are very small because the water transfers take place over a long period of time with respect to the base case scenario extraction of 37.5 GL over the life of the Project.
95. The EIS contains a Sensitivity Analysis that looks at the hydraulic conductivity (permeability) of the aquitards. When the sensitivity model (BC-S5) is applied, the drawdown impact is amplified and the time to reach maximum drawdown is reduced. BC-S5 represents the largest potential impact on the Pilliga Sandstone and water table for the range of parameter variations considered in the EIS. The predictions made in the sensitivity model exceed the AIP minimum harm criteria for drawdown in the GAB and upper alluvium. The EIS outlines how if the potential impacts are greater than the base case model, various mitigation measures are proposed including water monitoring plans and the implementation of make good protocols in accordance with the AIP.
96. Overall, the EIS concludes that the residual potential impacts from the Project on groundwater are low.

Department's Assessment, including report of the Water Expert Panel

97. At ARP 219 and 220 the Department describes how it established the WEP to obtain advice about water impacts. The WEP was requested to review the experience gained from CSG development in Australia and internationally, the findings of prior CSG investigations in the Narrabri area and the detailed specialist studies carried out for the Project.
98. The Commission notes the Department relies on the findings of the WEP in making its recommendation to the Commission.

99. In terms of the underlying geology and hydrology of the Project Area, the Department acknowledges that there are information gaps, particularly in relation to the deeper stratigraphic layers that will be targeted by the Project (ARP 252). The uncertainties predominantly relate to how the water resources in different hydrogeological layers will react to CSG development, particularly at the local scale, and whether the water extraction from the coal seams could affect the shallower, higher quality aquifers (ARP 253).
100. The Department describes how the aquifers are separated by various less transmissive layers (aquitards) that have low permeabilities and restrict groundwater connectivity between the aquifers (ARP 260); however, the Department also acknowledges, based on the findings of the WEP, that there is some uncertainty about the connectivity between aquifers, either through greater permeability in the aquitards than has been modelled or through pathways between the aquifers created through geological faults or structures or the construction of the wells (ARP 266).
101. In terms of aquitard permeability, the WEP concluded that the literature-based hydraulic conductivity parameters used in the EIS groundwater flow model combined with laboratory analyses provide confidence in the characterisation of the geology as applied to the EIS model. The WEP also recommended that the Applicant utilise a wider range of subsurface samples as they become available for future modelling to improve the reliability of geological data, including permeability (Recommendation 4).
102. The WEP acknowledges there is a possibility of smaller fault structures that could have a significant local impact but concludes it is unlikely that faulting constitutes a major risk to the Project or is likely to have a major impact on groundwater flow (ARP 288). In this regard, the WEP confirms the risk of unintended groundwater movement, contamination or gas leakage remains small (ARP 287). The WEP states that it believes the Applicant *“has the capability to successfully address the current [Project] geological uncertainties and to manage the ones that may arise in the future”* (page 36).
103. At ARP 253 the Department describes how the groundwater modelling has made a number of *“conservative assumptions”* to address the uncertainties, consistent with the approach applied to many large-scale modelling exercises.
104. The Department states that while the WEP identified some uncertainties, primarily due to the lack of available information about deeper strata, aquifer connectivity and faulting, it concluded they *“could be addressed through ongoing monitoring, adaptive management and a robust regulatory regime that is rigorously and effectively enforced”* (ARP 222).
105. The WEP accepts the base-case scenario modelling in the EIS and notes that, while geological faulting has the potential to enhance the hydraulic connectivity, it concludes that appropriate conditions, together with adaptive management and regulation can be applied to the Project to successfully manage these risks.
106. The groundwater impacts of CSG production are likely to be small and therefore the WEP does not see development of an improved groundwater model as a prerequisite for approval, although it does commend such a model for future consideration. The WEP notes in Key Observation 6 that the Applicant’s steady state groundwater model was found by CSIRO to be *“a suitable platform on which to make decisions”* but that prior to construction the WEP recommends the Applicant be required to develop a transient groundwater flow model.
107. The Department reports at ARP 301 and 302, that the predicted drawdown for the Base Case in the highly valued shallow aquifers complies with the minimum impact considerations of the AIP and that the Project meets the non-discretionary development standards for aquifer interference under the Mining SEPP.

108. In regard to groundwater take, at ARP 306, 308 and 310 the Department and WEP conclude that the predicted water take is low relative to the long term annual average extraction limits, at less than 1% for the high-quality aquifers. The Department and the WEP also conclude that there is adequate depth in the market for the Applicant to obtain necessary entitlements.
109. At ARP 221 the Department confirms that in its detailed investigations, the WEP did not identify any land or water issues that were likely to result in significant impacts on people or the environment or that could not be managed.
110. At ARP 256 the Department confirms that the EPA, IESC, WEP and Department are satisfied that the Applicant's modelling work is fit for purpose and that there is adequate information available to allow a final decision to be made on whether the Project can proceed under the EP&A Act. Overall, the WEP concludes that whilst the baseline data is lacking in some areas, the analysis undertaken provides confidence in the parameters used in the modelling.
111. The Department has recommended several conditions to minimise the groundwater impacts of the Project, including limitations on overall water extraction (37.5 GL cumulatively over the life of the Project, including maximum daily limits), modelling reviews and updates, compensatory water supply, water management performance measures, the establishment of a Water Technical Advisory Group, the preparation of a Water Management Plan and the provision of information to the public.

Commission's Findings

112. With respect to groundwater security, the Commission has considered the material outlined in paragraph 35, the evidence provided during the Public Hearing and submission periods and the discussion during the Commission's meeting with the Department, WEP and DPIE-Water (paragraph 27).
113. The Commission notes Council's request (paragraph 88) to be included in the Water Technical Advisory Group and has imposed a condition accordingly (Condition B38).
114. The Commission acknowledges the concerns raised about the uncertainty in the groundwater model and the fears expressed by some members of the community that the Project will cause drawdown of existing bores and jeopardise the water security of the region.
115. Understanding the geology and hydrogeology of the Project Area is fundamental to any investigation into the potential impacts of the Project. The Commission has considered the uncertainty around aquitard permeability and notes that if the assumed properties of the aquifers and aquitards are incorrect and the worst case scenario occurs (i.e. if the aquitards are more hydraulically connected to the aquifers the drawdown would increase in magnitude over a shorter time), the drawdown impacts could potentially exceed the AIF policy criteria.
116. However, the Commission accepts the WEP's findings that the likely impacts are predicted to be more local rather than regional. The Commission agrees with the WEP that further work must be done to reduce the uncertainty around aquitard permeability and faulting, and agrees with the WEP recommendation 4, that as a "*wider range of sub-surface samples becomes available during further appraisal work*" to provide "*reliable data on geological heterogeneity and on rock properties such as permeability*", "*this additional information should be used in future modelling and be made publicly available*". This is also consistent with submissions made during the Public Hearing, emphasising the importance of strengthening the groundwater model with additional data prior to production.
117. While the Commission considers that more knowledge can ultimately be obtained, it accepts the views and advice of the WEP that it is unlikely that faulting in the rock structures under the Project Area constitutes a major risk, or is likely to have a major impact on groundwater

flow. The Commission accepts that there is no substantial evidence of major geological structures in the region which would produce adverse environmental impacts as a result of the Project; however, it is appropriate for further information on potential localised faults to be gathered as the Project proceeds. This is reflected in the imposed condition B39(e) with respect to updating the groundwater model generally in accordance with a Class 3 confidence level as per the *Australian Groundwater Modelling Guidelines*.

118. The Commission further agrees with the conclusion of the WEP that the model, despite its uncertainties, is fit for purpose for this decision in the knowledge that it is a phased approval subject to a comprehensive suite of conditions. Moreover, based on the report of the WEP, and the matters raised by its Panel members in a meeting with the Commission, the Commission is satisfied that the information and evidence before it from all sources is sufficient and suitable to demonstrate that the overall groundwater risks associated with the Project are low, are manageable, and are capable of being monitored and mitigated by the conditions imposed by the Commission. The Commission has also imposed a condition that the Project cannot proceed to Phase 2 until a Groundwater Management Plan is prepared based on at least three years of baseline monitoring data (Condition B41(d)(iv)).
119. In order to reduce the uncertainty in the groundwater modelling further, the Commission has imposed Condition B39(e), requiring that the groundwater model be improved to be generally in accordance with the features of a Class 3 confidence level. The Commission notes that, at ARP 291 the Department advises it is not technically feasible to achieve all of the Class 2 or Class 3 model attributes within the project lifetime. This is because achieving a higher-class model requires calibration against actual pressure responses to coal seam gas water extraction in the highly valued water sources (i.e. the GAB and Namoi Alluvium), which is not predicted to occur for tens or hundreds of years after the start of coal seam gas production. Nevertheless, the Commission finds it is reasonable to require the groundwater model to be improved to be generally in accordance with the features of a Class 3 confidence level because this requirement is consistent with the intent of the *Australian Groundwater Modelling Guidelines* with respect to this type of project and water resource. The Commission has also imposed a requirement in Condition B39(e) that the features of the groundwater model must be based on advice from the Water Technical Advisory Group on Project specific modelling objectives and criteria. In addition, the imposed conditions do not permit the Applicant to proceed to Phase 2 if the revised groundwater model predicts an exceedance of the water management performance measures identified in Table 7 of the consent.
120. The Commission is satisfied with the findings of the Department and WEP that the predicted water take is very low relative to the long term annual average extraction limits and complies with the minimal impact considerations of the AIP.
121. With respect to loss of water in private bores, the Commission has imposed the Department's Recommended Conditions requiring a compensatory water supply to be provided commensurate with the quality and volume of the loss attributable to the Project. The Commission has converted a notation in the Department's draft consent into a condition mandating that the burden of proof for Project-related impacts to water supplies lies with the Applicant rather than the landholder.
122. The Commission has also sought to protect landholders by imposing Condition B30 to ensure that the Applicant makes provision for compensatory water supplies.
123. The Commission finds that the conditions recommended by the Department, along with the additional conditions imposed by the Commission are appropriate to reduce the uncertainty around the groundwater modelling and potential impacts on water sources and users. The conditions require the Applicant to comply with a range of water management performance measures (Table 7 of the consent) and provide appropriate mechanisms to ensure that the

impacts are appropriately predicted, avoided, mitigated and managed with respect to groundwater security. The Commission has strengthened the conditions with respect to groundwater matters by requiring the groundwater model to be updated to be generally in accordance with the features of a Class 3 confidence level prior to the commencement of Phase 2.

7.2 Contamination – Surface and Groundwater

Public Comments

124. The Commission heard concerns from speakers at the Public Hearing and received written submissions regarding the potential for the Project to contaminate land and water resources, including the following:
- contamination of groundwater from drilling fluids;
 - underground migration of methane and other contaminants into groundwater due to disruption caused by drilling and depressurisation (extracting the water from the coal seams);
 - cross contamination of the different aquifers penetrated by drilling, with the drilling itself potentially exacerbating fault lines and increasing connectivity or leaking saline water from the deeper aquifers into the shallow aquifers; and
 - long term legacy issues if the gas wells are not decommissioned properly, resulting in contamination or facilitating migration of contaminants between aquifers.
125. The submissions identified concerns relating to contamination resulting from the water that is extracted from the coal seams to allow the gas to flow (**Produced Water**), which in this case is saline water. The key issues raised in relation to Produced Water management include risks of spills, leaks or uncontrolled discharges during operations, resulting in surface or groundwater contamination. Many members of the community referred to the spill incident that occurred in the Pilliga State Forest during the operations of Eastern Star Gas.
126. The Commission heard submissions that the Project Area is in the Southern Recharge Zone of the GAB and that the Pilliga Sandstone acts as a recharge area into the GAB. The submissions raised concerns that surface spills of Produced Water or other contaminants within this zone are likely to contaminate the GAB via the Pilliga Sandstone. Contamination of the GAB is seen by the public to be a catastrophic impact on the primary production industry of the region that will sever access to product markets.
127. Several submissions also informed the Commission of evidence recently published implying connectivity between the target coal seams and the shallow aquifers, which wasn't considered by the Department in its assessment. The submissions state this research indicates geological structures (such as faulting) occur throughout the GAB and facilitate the vertical movement of gas and water within the geological strata.

Council Comments

128. In Council's Response (paragraph 28), Council raised concerns about the risk of contamination of water resources from decommissioned wells.
129. At its meeting with the Commission (paragraph 27), Council noted that the Project will need to comply with the WIC but identified that there had not been any long-term studies on decommissioned wells and their potential impacts. Therefore, Council advocates for ongoing

monitoring to ensure the wells do not result in groundwater contamination. Council supports the recommendation from the Department with respect to the comprehensive suite of monitoring mechanisms.

Applicant's Consideration

130. Chapter 14 (Soils and land contamination) and Chapter 25 (Hazards and risks) of the EIS include an assessment of the potential for the Project to cause spills or leaks.
131. In its EIS the Applicant maintains the Project will be designed in accordance with the relevant codes of practice to minimise the risk of spills or leaks occurring.
132. The EIS also states the Project would incorporate a range of monitoring systems in the wells and storage ponds that would enable the quick detection and rectification of a leak or spill, including continuous pressure monitoring of Produced Water gathering lines and leak detection and monitoring bores for Produced Water ponds.
133. The Applicant states that with the proposed risk controls in place, the likelihood of a significant spill progressing undetected and unmanaged is very small and the likelihood of small spills causing significant impact is extremely small since the spill would be localised.
134. In relation to drilling fluids, the EIS states that water-based drilling fluids would be used for the Project, including either bentonite or a polymer to aid the drilling process. The Applicant claims this fluid would comprise non-hazardous constituents and meet drinking water guidelines for benzene, toluene, ethylbenzene and xylene (BTEX) compounds.
135. The risk assessment undertaken by the Applicant indicates that the likelihood of fault-induced groundwater contamination is remote, and the Applicant has committed to implementing the Water Monitoring Plan to manage and mitigate this risk.
136. The Applicant also responded to claims that depressurisation could cause the poorer quality water in the deeper strata to move upwards into the higher quality groundwater sources above. The Applicant states the risk of this occurrence is negligible because the direction of groundwater flow induced by the Project would be downward toward the depressurised coal seams.
137. In the Applicant's Response (paragraph 28), the Applicant replied to concerns raised during the Public Hearing that evidence has been recently published implying connectivity between the target coal seams and the shallow aquifers (paragraph 127). The evidence points to observations of methane in shallow aquifers, implying some connectivity to the target coal seams. The Applicant notes methane is observed at low and varying levels in all formations above the target coal seams, although most groundwater samples do not record methane above the limits of reporting. The Applicant concludes "*gas may be migrating over geological time scales, but there is no evidence to support significant connectivity through faults*".
138. The Applicant notes the risk of gas contamination of the overlying aquifers is unlikely and concludes that with mitigation through the Groundwater Monitoring Plan and make good provisions, the consequence of this risk is minor.

Department's Assessment, including the report of the Water Expert Panel

139. At ARP 403 the Department notes the WEP has reviewed the hazards and risks to land and water resources associated with surface spills from the Project.

140. The WEP indicates the Applicant's measures for spill management are appropriate and while potential spills could have localised impacts, they are unlikely to significantly impact regional water resources due to the relatively low spill volumes and their composition (ARP 404).
141. At ARP 405 the Department describes the WEP's conclusion that the current regulatory framework for handling chemicals used in the Project provides reassurance that the likelihood for potential harm is low, subject to the implementation and enforcement of those regulations.
142. The WEP is also satisfied that rapid and effective treatment is achievable in the event of a spill through the proposed monitoring and detection regimes.
143. In terms of potential groundwater contamination, the WEP agrees with the Applicant that risks associated with drilling fluids can be adequately mitigated by strict adherence to the WIC.
144. The WEP identified a potential contamination risk associated with abandoned horizontal wells, where cement plugging may require specialist procedures compared to vertical wells. In this regard the WEP recommends the Applicant be required to demonstrate, prior to the construction of the wells, that wells with inclined or horizontal sections can be adequately sealed during plug and abandonment (Recommendation 29). The WEP ultimately concludes that *"if correct procedures are followed...the risk of trans-aquifer contamination from drilling procedures is considered by the WEP to be minimal"*.
145. The WEP also raised concerns that the legacy wells in the Project Area may not have been adequately plugged and recommended a requirement for the Applicant to provide evidence that these wells had been decommissioned effectively prior to the Project proceeding to Phase 2.
146. With respect to gas migration, the WEP considers that subject to the construction and maintenance of wells in accordance with the WIC, significant subsurface migration should not occur and is unlikely to result in significant impacts.
147. The WEP accepts that there is potential for cross contamination of aquifers where pathways are created by faults or well integrity failure, with localised salt contamination of the GAB & Namoi aquifers. The WEP also notes that the depressurisation of the coal seams would typically have the effect of downward migration of groundwater, thereby reducing the potential for contamination of the higher quality upper aquifers.

Commission's Findings

148. The Commission notes the concerns raised in public submissions regarding the potential for the Project to contaminate groundwater sources through pathways such as well leaks, faults, greater aquifer connectivity than has been assumed in the EIS, methane migration and drilling fluid leaks.
149. With respect to potential surface spills, the Commission concurs with the findings of the WEP as set out in paragraphs 140 - 142. In this regard, the Commission finds the imposed conditions to be acceptable to ensure the implementation of an effective monitoring and detection system to manage the risk of leaks. The Commission also finds any potential leaks are unlikely to have significant regional impacts due to the relatively low spill volume and composition.
150. The Commission notes the WEP accepts the conclusion of the Applicant that impacts on surface water quality from Produced Water spills would be low. The Commission interrogated this further at its meeting with the Applicant (paragraph 27) regarding climate

change and whether the Produced Water storage facilities have been designed to withstand extreme weather events. The Applicant advised the Commission that during an extreme weather event the Produced Water levels would still be below the storage pond spillway. Further, the Commission is satisfied that the imposed conditions require the storage facilities to be designed to maintain enough freeboard to accommodate a 72-hour 1-in-100-year flood event (ARP 360) and that the risk of overflow is unlikely.

151. In relation to inter-aquifer contamination, the Commission has considered the Applicant's conclusion that the consequence of inter-formation groundwater and gas flow is low. The Commission notes these conclusions are supported by the WEP in Key Observation 21 and Key Observation 22. Further, the Commission accepts the overall view and advice of the WEP that – on the basis of all the information and evidence in the EIS and other material before the Commission, and because of the depth from which the CSG is to be produced – the risk of migration of methane into overlying aquifers and particularly groundwater bores is low.
152. The Commission accepts the WEP's conclusions that the risk of inter-aquifer contamination from drilling procedures is minimal if correct procedures are followed and has imposed conditions requiring the Applicant to comply with the WIC.

7.3 Greenhouse gas emissions

Public Comments

153. The Commission heard concerns from speakers at the Public Hearing and received written submissions regarding the greenhouse gas impacts of the Project. Greenhouse gas issues were frequently raised in submissions that objected to the Project. The key concerns were the contribution of greenhouse gases from the Project to climate change, and the view that fugitive emissions and the carbon dioxide (**CO₂**) content of the gas produced from the target coal seams had been underestimated in the EIS and not adequately addressed in the Department's AR.
154. Public submissions raised concerns about the environmental impacts of Scope 1, 2 and 3 greenhouse gas emissions from the Project in contributing to global climate change.
155. In relation to Scope 1 emissions, the Panel heard concerns that the estimated 10% CO₂ content of produced gas presented in the EIS was based on a narrow selection of existing wells in the Project Area and was too low. An analysis of publicly available NSW Geological Survey data to 2014 was presented as indicating that the CO₂ content of the produced gas could be in the order of 25-30%. This increase was said to be material.
156. In relation to the fugitive methane (**CH₄**) emissions of the Project, submissions were concerned that the estimates presented in the EIS were too low in comparison to the real-world experience of other jurisdictions and CSG operations. Evidence was presented that fugitive CH₄ emissions were likely to be higher in practice and that this was of particular concern given that CH₄ is 28 times more effective over 100 years in trapping heat than CO₂.
157. In reference to Scope 3 emissions from the combustion of CSG within NSW, public submissions presented evidence that the Project would exceed the carbon budget required for Australia to meet its Paris Agreement commitments to reduce emissions.
158. Concern was raised that once the additional emissions referenced above in paragraphs 155-156 were taken into account, the greenhouse benefit from the reduction in emissions expected from the combustion of CSG as compared to coal for electricity generation could be negated.

Applicant's Consideration

159. The Applicant considers that gas is a transition fuel that supports renewables by providing firming power generation and having lower greenhouse gas emissions than coal: "...on a lifecycle basis, where both upstream and downstream emissions are taken into account, energy (such as heat or electricity) produced by the combustion of natural gas has significantly lower greenhouse gas emissions than the emissions intensity of the NSW electricity grid" (p 24-25 EIS)
160. The Applicant also maintains that the Project will be a significant source of domestic gas for industry in eastern Australia and complements renewable energy (page 1-2).
161. An assessment of the greenhouse gas emissions associated with the Project is presented in Appendix R of the EIS. The total greenhouse gas emissions over the life of the Project (using grid power) are presented as 15.5Mt CO₂~e (Scope 1), 18Mt CO₂~e (Scope 2) and 94.3Mt CO₂~e (for Scope 3 emissions from downstream gas use).
162. The Applicant's estimated 10% CO₂ content of the produced gas was based on their analysis of 32 exploration wells in the Project Area post 2014, and global industry averages. In its submission to the Commission dated 10 August 2020, the Applicant maintains that the "conservative average of 10% CO₂ across the Project area over the 25-year assessment period" is appropriate. The Applicant differentiated between *in situ* CO₂ content of the coal seam and CO₂ content of produced gas, stating that produced gas CO₂ content would not be as high as the CO₂ content within the coal seams. The Applicant's submission states:

"Between 2014 and 2019, over 250 gas samples were taken from approximately 32 operating appraisal wells. The average CO₂ content of the gas in these samples is less than 5 per cent. This sampling data, which is Commercial in Confidence due to commercial considerations linking gas content, composition to resource and asset value was provided to the EPA. While produced gas CO₂ content is below 5 per cent in these areas, the average in-situ CO₂ content is around 15 per cent and up to 24 per cent in some locations" (page 13).
163. In calculating its fugitive methane emissions, the Applicant has used the CSG industry standard CH₄ factors for fugitive emissions consistent with the National Greenhouse Accounts Factors and industry standards.

Department's Assessment

164. The Department accepts the greenhouse gas emissions values as presented in Appendix R of the EIS, summarised in paragraph 161 above, and set out in ARP 522.
165. The Department's overall assessment of the greenhouse gas emissions of the Project is that: "[i]n relative terms, the emissions of the project are expected to be low: background levels of methane and carbon-dioxide are low in the area; the target coal seams are very deep and generally sealed off from the surface by several aquitards; and the leakage from gas wells is expected to be very low given they would be drilled in accordance with the Well Integrity Code and fitted with leak detection systems." (Department's AR page xvi).
166. In relation to Scope 3 emissions, the Department cited the lower emissions intensity of CSG relative to coal and referenced CSIRO research that showed up to 50% emissions reduction from the combustion of CSG for electricity generation compared to coal (ARP 532-533).
167. The Department's Response (paragraph 28) also states:

“[indirect or downstream emissions] are associated with the ongoing use of gas in NSW over the next 20-25 years by heavy industry, business and over 1.4 million households.

As the Department pointed out in its assessment report, these emissions are likely to occur whether the Narrabri Gas Project is approved or not.

Essentially, these emissions form part of the “background” emissions in NSW and would be more than offset by the substantial reduction in greenhouse emissions that is likely to occur as a result of NSW’s coal-fired power stations and as a result of the implementation of a range of other State and Commonwealth policy initiatives aimed at ensuring there is an orderly transition to a lower emissions economy in NSW” (page 8).

168. In relation to the environmental impact of the greenhouse gas emissions of the Project in contributing to climate change, the Department’s Response (paragraph 28) states that “[it] does not support the use of the carbon budget approach to the Narrabri Gas Project. Instead, the project should be assessed in accordance with existing government policy, which is set out in the Mining SEPP” (page 7).
169. The Department’s Response confirms that the “Project is consistent with all government policy on climate change and the aim of ensuring an orderly transition to a lower emissions economy, just as it is consistent with the policy of the NSW government to facilitate the development of a safe and sustainable gas industry in NSW” (page 6).

Commission’s Findings

170. The Commission accepts that the expected greenhouse gas emissions from the Project are as predicted in Appendix R of the EIS and summarised in paragraph 161, noting that these have been based on established National Greenhouse Accounts Factors and industry standards.
171. The Commission has considered public submissions stating that the Scope 1 CO₂ and CH₄ emissions in the EIS have been underestimated (paragraphs 155 -156). The Commission agrees that substantial exceedance of these predicted emissions would jeopardise the expected greenhouse gas emissions advantages of CSG over coal, which is a strategic justification for the Project presented by the Department (paragraph 165) and the Applicant (paragraph 159). In consideration of this justification and the environmental impacts of greenhouse gases, the Commission has determined that the Project should not be permitted to exceed its predicted Scope 1 and 2 emissions.
172. The Commission has therefore imposed conditions B20 and B21 to require any exceedance of the predicted Scope 1 and 2 greenhouse gas emissions of the Project to be fully offset in accordance with a national government program concerning the offsetting of greenhouse gas emissions. Scope 3 emissions are not included in these conditions because the Commission’s view is that these emissions are outside the direct control of the Applicant and therefore not able to be reasonably conditioned.
173. The Commission has had regard to all the likely indirect and direct greenhouse gas emissions associated with the Project in its determination. In addition to the imposed conditions requiring any exceedance of the Applicant’s predicted Scope 1 and 2 greenhouse gas emissions to be fully offset, the Commission has imposed a further condition B19 requiring the Applicant to establish a Greenhouse Gas Emissions Advisory Group to inform the proper management and reporting of the Project’s greenhouse gas emissions.
174. With regards to the Australian Government’s international commitment to reduce greenhouse gas emissions, the Commission notes the expected emissions advantage of

CSG compared to coal for electricity generation and the Government's intent through the Commonwealth's endorsement of the Paris Agreement and the NSW Gas Plan and NSW Energy Package MOU (Section 5.3) to increase the supply of gas in NSW. The Commission notes that petroleum production is a permitted use of the land and agrees with the Department (paragraph 168) that existing government policy relevant to the greenhouse gas emissions of fossil fuel and other mining operations is contained in the Mining SEPP.

175. The Commission has had regard to the likely extent of the emissions resulting from the Project, and the matters raised by the Department in its assessment referred to in paragraphs 165 to 169 above. The Commission considers that these emissions are justified because of the strategic alignment of the Project with the NSW Gas Plan and the NSW Energy Package MOU.

7.4 Biodiversity impacts

Public Comments

176. The Commission heard concerns from speakers at the Public Hearing and received written submissions regarding the potential biodiversity impacts of the Project. In summary, the main areas of concern include:
- the adequacy of the biodiversity assessment and survey;
 - the importance of the Pilliga Forest and the impact of proposed clearing;
 - fragmentation impacts resulting in detrimental edge effects and increased invasion of native vegetation communities by introduced predators and other pest animals and weeds;
 - the Recommended Conditions for micro-siting under the Field Development Protocol are unlikely to be effective as assessments will be limited in time and season; and
 - the inability of proposed offsetting to mitigate the most significant likely impacts on threatened species.

Applicant's Consideration

177. Appendix J2 of the Applicant's EIS includes a Biodiversity Assessment Report, which was supplemented by the RtS and Supplementary RtS. The EIS states that the Biodiversity Assessment Report has been prepared in compliance with relevant legislation, policies & SEARs.
178. Apart from the infrastructure sites at Leewood and Bibblewindi, the exact location of the gas wells and associated linear infrastructure is not known at this stage and will be subject to detailed investigations and assessment in accordance with the Field Development Protocol.
179. The EIS describes the landscape value of the Project Area as over 80,000 ha of highly connected continuous vegetation. The EIS acknowledges the Project would further fragment this habitat.
180. The Applicant's EIS included a draft Field Development Protocol, which includes the following restrictions to minimise biodiversity impacts:
- exclusion of the Brigalow Park Nature Reserve from the Project Area;

- exclusion of surface infrastructure from the Brigalow State Conservation Area;
 - exclusion of surface infrastructure within 200 m of Yarrie Lake;
 - location of large ponds and dams in areas of low ecological sensitivity;
 - exclusion of non-linear infrastructure from riparian corridors;
 - setting maximum disturbance limits for each Plant Community Type;
 - setting maximum disturbance limits for threatened flora species; and
 - maximising the use of existing roads, tracks and disturbance corridors.
181. The Applicant proposes avoidance and mitigation measures to minimise impacts on EECs to the greatest extent possible through measures such as co-locating linear infrastructure (e.g. gas and water pipes and access tracks with existing roads) and placing infrastructure in previously cleared areas.
182. The Applicant proposes a process for siting gas field infrastructure, including: a detailed constraints and avoidance analysis; a cumulative disturbance review; micro-siting surveys; and detailed infrastructure design.
183. The Applicant identifies an upper disturbance limit of 988.8 ha of clearing for the Project and proposes for residual impacts on threatened species and EECs to be offset as part of a Biodiversity Offset Strategy in accordance with the *NSW Biodiversity Offset Policy for Major Projects*.
184. The Applicant's EIS concludes that with the various proposed avoidance and mitigation measures, there will be no significant impacts on species or ecological communities.

Department's Assessment

185. The Department's AR considers the key biodiversity issues to be: the adequacy of the assessment; the importance of the Pilliga; impacts on threatened communities; and the adequacy of offsets.
186. Ultimately, the Department concludes that each of these issues have been addressed and are acceptable within the bounds of legislation.
187. The Department considered the prospect that the Pilliga Forest should be protected from resource extraction due to its conservation value and that it is the largest intact remnant forest in western NSW (ARP 425). The Department describes the strategic land use planning for the Pilliga Forest as addressed in the BNCCA Act, noting the State forest has been allocated to four different zones. Zones 1 to 3 protect almost half of the Pilliga forest (240,000 ha) as reserves for biodiversity and/or cultural heritage conservation (ARP 428 – 429), with these areas being permanently protected under the *National Parks and Wildlife Act 1974*.
188. Under the BNCCA Act, the Project Area is located within Zone 4, which is set aside for forestry, recreation and mineral extraction (ARP 430). The Department concludes the Project is "*consistent with this comprehensive strategic land use planning for the Pilliga and surrounding region*" (ARP 434).
189. The Department also notes two conservation areas (Brigalow Nature Reserve & Brigalow State Conservation Area) have been excluded from the Project Area (ARP 431).

190. The Department accepts the Applicant's estimate that approximately 1,000 ha of native vegetation would be cleared across the 95,000 ha Project Area and supports the measures proposed by the Applicant to avoid and mitigate impacts, including: setting limits for clearing of each vegetation community; carrying out detailed surveys to inform the Field Development Protocol; rehabilitating the site after construction; and offsetting the residual biodiversity offsets in accordance with the *NSW Biodiversity Offsets Policy for Major Projects 2014 (Major Projects Offsets Policy)* (ARP 494-496).
191. The Department's AR describes that three EECs would potentially be impacted, together with potential impacts on 27 listed plant species and 57 listed fauna species (ARP 438, 447 and 452). The Department is satisfied that the measures proposed to minimise these impacts are reasonable and that the most sensitive biodiversity values can be avoided. These measures rely heavily upon the application of the Field Development Protocol, including micro-siting processes, to avoid high biodiversity values and EECs.
192. The Department acknowledges the impacts of fragmentation (ARP 442-444) and notes that the Applicant proposes to cover fragmentation impacts with additional offsets even though these are not required under the Major Projects Offsets Policy.
193. The Department is satisfied that residual biodiversity impacts can be offset in accordance with Government policy (ARP 495). The Department has Recommended Conditions with respect to the total offset liability for the Project, requiring the Applicant to retire at least 70% of its total offset liability prior to the construction of the Project.
194. The Department also notes the micro-siting approach to siting gas field infrastructure is standard for the gas industry, where a level of flexibility is required in the placement of gas wells as the field develops over time, driven by evolving knowledge of the gas resource and geology (ARP 416).
195. In conclusion, the Department found the surveys undertaken for the Project adequately informs the biodiversity assessment (ARP 424), that the Project has been planned in a manner that is consistent with the strategic land use planning for the Pilliga (ARP 434) and that clearing up to the maximum clearing limits is unlikely to significantly impact any EECs (ARP 440). The Department further notes it is "*satisfied that the measures proposed to minimise impacts to biodiversity are reasonable, and that the most sensitive biodiversity values can be avoided*" (ARP 494).

Commission's Findings

196. The Commission recognises that the Biodiversity and Conservation Division of the NSW Environment, Energy and Science group (**BCD**) is satisfied with the Project and raises no objection subject to the Recommended Conditions being imposed.
197. The Commission is satisfied with the Department's findings that the biodiversity survey has been undertaken in accordance with the applicable guidelines and has taken into account the maximum limit of clearing, which factors in all components of the Project, including elements such as tracks, roads, pipes etc. The Commission has imposed the Department's Recommended Conditions setting disturbance limits on vegetation communities and threatened species.
198. The Commission has heard the community's concerns that the Project would have a significant impact on the high biodiversity value of the Pilliga and will negatively impact threatened animals and unique vegetation, however, the Commission notes that under the BNCCA Act, significant areas of the Pilliga have been protected through Zones 1 to 3 and these significant conservation areas are outside the Project Area. The Project is only

permitted within Zone 4, which has specifically been identified for mineral extraction purposes.

199. The Commission concurs with the Department's assessment at paragraph 191 and is satisfied that the proposed avoidance and mitigation approach provides scope to reduce the biodiversity impacts of the Project during detailed design. The Commission is satisfied that the Recommended Conditions will ensure the biodiversity impacts are minimised and any residual impacts will be accounted for and offset in accordance with NSW Government policy. In addition to the Recommended Conditions, the Commission has imposed a requirement for the Applicant to establish a Biodiversity Advisory Group to provide ongoing advice on project-related biodiversity management issues, including the preparation and implementation of the Biodiversity Management Plan and the Field Development Plan (including micro-siting investigations).
200. The Commission notes the concerns raised by the community that the Project would result in fragmentation of vegetation, resulting in potentially detrimental 'edge' effects and giving rise to localised population extinctions. In this regard, the Applicant proposes to offset indirect and cumulative biodiversity impacts to compensate for the effects of fragmentation (ARP 443) and will seek to co-locate linear infrastructure or place it within previously cleared areas (paragraph 181). The Commission finds these measures to be appropriate when combined with new conditions that require further investigations in consultation with BCD and biodiversity experts in a Biodiversity Advisory Group.
201. With respect to offsets, the Commission heard submissions that offsetting is unable to mitigate the most significant likely impacts on threatened species. The Commission notes that it has no role in setting biodiversity offsets policy. The Commission is satisfied with the Department's assessment that the biodiversity offsets have been calculated in accordance with the Major Projects Offsets Policy. The Commission has imposed the Recommended Conditions with respect to the total offset liability and the requirement for the Applicant to retire at least 70% of its total offset liability prior to the construction of the Project through staged retirement conditions.
202. Overall, the Commission is satisfied that the imposed conditions provide for appropriate management, mitigation and monitoring of the potential biodiversity impacts of the Project.

7.5 Groundwater Dependent Ecosystems

Public Comments

203. The Commission heard concerns from speakers at the Public Hearing and received written submissions raising concerns about GDEs, primarily that GDEs have not been adequately surveyed & characterised and that the monitoring program is inadequate.
204. In summary, the Commission heard submissions raising the following concerns:
 - potential drawdown impacts from the Project may be detrimental to GDEs beyond the levels currently assumed.
 - potential contamination of GAB waters will have consequential impacts on GDEs.
 - a comprehensive monitoring program is required to ensure the effects on groundwater and GDEs is thoroughly understood before the Project commences.
 - that the EIS did not identify any stygofauna, but stygofauna have been identified in the Pilliga Sandstone and alluvial aquifers.

Applicant's Consideration

205. The EIS provides a GDE impact assessment within Appendix F. The EIS states that no significant impacts on GDEs within the assessment area are predicted, including Hardy's Spring and Eather Spring, which are listed as high-priority springs under the AIP.
206. The Applicant's EIS states that no protected GDE species or habitats were identified and no stygofauna were detected. The EIS concludes the likelihood of Stygofauna occurrence was assessed as low. The EIS identified nine potential GDEs, all classified as low ecological value.
207. In response to concerns raised by the IESC that the EIS included a number of deficiencies (paragraph 212), the RTS provided detailed reasoning on why the EIS methodology, assessment & monitoring is adequate. The RtS states that the groundwater modelling demonstrates there will be negligible impact to the Namoi alluvial groundwater from the Project (with a maximum drawdown predicted in shallower aquifers of less than 0.5m), which will be indiscernible from variations that already occur in the groundwater due to seasonal fluctuation. Therefore, the RtS concludes the Project presents a low risk to GDEs.
208. The Applicant's Submission further confirms this low risk, stating that: "*there is an insignificant risk of impact to alluvial groundwater dependent ecosystems due to the large degree of physical separation, both vertically in the sub-surface and horizontally at the surface, and therefore lack of connectivity between the target coal seams and groundwater dependent ecosystems*".
209. The Applicant also notes the Water Monitoring Plan will include triggers, warnings and thresholds for groundwater resources to allow the early identification of potentially significant impacts on groundwater sources and will allow the impact to GDEs to be monitored and managed through the life of the Project.

IESC

210. The IESC notes the Project Area contains GDEs including Hardys and Eather Springs, which are identified as high priority GDEs by the NSW Government, and riparian vegetation along Bohena Creek.
211. The IESC identified the potential impacts of the Project to include a reduction in water availability to springs and other GDEs as a result of groundwater depressurisation and drawdown, which may impact on surface water and groundwater connectivity.
212. The IESC listed a number of deficiencies in the EIS, including knowledge gaps, uncertainties and data limitations and noted that the proposed groundwater model in the EIS is not suitable to provide an early warning of groundwater depressurisation and potential impacts to GDEs.
213. In order to reduce these uncertainties, the IESC recommended the Applicant provide a groundwater monitoring plan detailing an early warning monitoring system that includes management, mitigation and contingency measures for potential groundwater impacts, undertake appropriate field assessment of further GDEs and identify the hydrogeological characteristics and source aquifers for Hardys and Eather Springs.
214. The IESC states that no evidence is provided to support the subsequent claim that less than 0.5 metres drawdown in the shallow alluvium will result in no significant ecological impacts to low flows, the persistence of remnant pools, or groundwater levels adjacent to ephemeral creeks. In pools connected by subsurface flow along low-gradient stream beds (e.g. Bohena Creek and Jacks Creek), "*a drawdown of 0.2-0.5 metres may alter low flows and the persistence of pools connected by subsurface flow potentially impacting biota that rely on*

shallow refugial pools as drought refuges” and that to assess the likelihood of these potential impacts the Applicant should undertake field analysis targeting locations that are likely to be inhabited by GDEs.

Department's Assessment

215. The Department notes at ARP 323 that GDEs within the Project Area include waterholes on Bohena Creek and other watercourses (Type 2 GDEs); riparian vegetation (Type 3 GDEs) and potential stygofauna (subterranean fauna) (Type 1 GDEs).
216. The Department acknowledged that submissions made to the Department, similar to those made to the Commission, report occurrence of stygofauna in the Pilliga Sandstone and alluvial aquifers, but ultimately agrees with the Applicant and the WEP's conclusion that the Project is “*unlikely to adversely affect GDEs*” (ARP 326).
217. The Department also concludes that compliance with the minimal harm criteria in the AIP would ensure any high-value GDEs within the Project Area would be protected from any unacceptable cumulative impacts associated with CSG production (ARP 326).
218. The Department provided Recommended Conditions to ensure the protection of GDEs, including a requirement for the Water Management Plan to detail criteria for identifying, investigating and mitigating any potentially adverse impacts on GDEs and stygofauna.
219. In drawing its conclusion, the Department relies on the findings of the WEP, which noted GDEs are protected under the AIP and water sharing plans that cover the Project Area. The WEP confirms that the groundwater modelling predicted drawdown impacts below the AIF minimum harm criteria.
220. The Department also refers to the advice it received from DPI Water, which accepted the Applicant's RtS assessment of GDEs, subject to conditions requiring improved data collection and monitoring networks to facilitate the necessary upgrades of the groundwater model and to ensure the impacts are monitored and managed in accordance with the AIP.
221. Ultimately, the Department accepts the conclusions of the WEP, that the application of the AIP in the Project Area will protect GDEs from unacceptable cumulative impacts and the Recommended Conditions will ensure further studies are undertaken to improve the groundwater model and allow early detection of potential groundwater impacts, and therefore impacts on GDEs.

Commission's Findings

222. The Commission acknowledges the concerns raised by the IESC and in public submissions about potential adverse impacts from the Project on GDEs. The Commission also heard concerns that gaps in the groundwater model mean there is uncertainty about the likelihood of depressurisation and drawdown and therefore uncertainty with respect to risks for GDEs, and that the impact on stygofauna has not been properly assessed in the EIS.
223. The Commission's consideration of the potential for groundwater contamination is addressed at Section 7.2 of this Statement of Reasons. The Commission finds the risk of inter-aquifer contamination is low if the correct procedures are followed and wells are constructed and operated in accordance with the WIC (paragraph 152).
224. The Commission's findings with respect to uncertainty in the groundwater model leading to unknown risks to GDEs are summarised at Section 7.1 of this Statement of Reasons. Ultimately, the Commission finds the Recommended Conditions and those imposed by the Commission are appropriate to reduce the uncertainty in the groundwater model and aquifer

connectivity (paragraph 123). Therefore, by improving the groundwater model, any potential impacts on GDEs can be identified, avoided and/or mitigated.

225. The Commission acknowledges that the Groundwater Management Plan and the groundwater model is critical for the protection and risk mitigation of GDEs. The Commission agrees with the conclusions of the Department, the WEP and DPI-Water that any impact on GDEs can be appropriately monitored through the groundwater model and the groundwater management plan. The Commission is satisfied that the impacts can be adequately managed, subject to the conditions imposed, including the requirement to improve the groundwater model to be generally in accordance with the features of a Class 3 confidence level. In addition, the imposed conditions do not permit the Applicant to proceed to Phase 2 if the revised groundwater model predicts an exceedance of the water management performance measures identified in Table 7 of the consent.

7.6 Waste Management

Public Comments

226. The Commission heard widespread concerns from speakers at the Public Hearing and written submissions with respect to waste management, particularly with respect to the uncertainty around how the salt waste from the Produced Water will be managed.
227. In summary, the Commission heard concerns regarding the following:
- the lack of a detailed Waste Management Plan with respect to the significant volume of solid waste that will be produced over the life of the Project.
 - the lack of available landfill facilities with the capacity to accept the waste from this Project, which, without a final Waste Management Plan, will likely result in the onsite storage of the salt waste for a long period of time, increasing the risk of potential spills and irreversible environmental impacts.
 - that the EPA's Waste Classification Guidelines did not contemplate and were not developed to deal with large volumes of water-soluble waste.
 - the pre-emptive classification of the salt as 'general solid waste' under the EPA's Waste Classification Guidelines.
 - the risk of Produced Water spills.
 - the potential for the drill cuttings, which may contain radioactive materials and chemicals of particular concern, to contaminate the GAB.
228. Many submissions encouraged the Commission to ensure waste management arrangements for the Project are confirmed prior to determination.

Council Comments

229. Through the course of the assessment undertaken by the Department, Council raised concerns with the size of the Produced Water and brine ponds, the chemical composition of the Produced Water, the composition and classification of the salt waste, the capacity of local facilities to accept the salt waste, and waste management generally.
230. Ultimately, Council is satisfied that its concerns have been addressed through further information provided by the Applicant, advice from the EPA or through the Department's

Recommended Conditions. Council did reiterate to the Commission at its meeting on 7 July 2020 that Council would not accept the salt waste at any local Council-operated waste management facilities. Notwithstanding this, in its letter to the Department on 28 April 2020, Council identified its support for the Project subject to the EPA's satisfaction that the facility to be utilised for salt waste disposal has long-term capacity to accept that waste.

Applicant's Consideration

231. Chapter 28 of the Applicant's EIS and Part 6.28 of the RtS address waste management and identify potential waste streams during the construction and operation of the Project including: green waste; construction materials; drill cuttings; drilling fluids; maintenance materials; salt; and sewage. The EIS identifies that up to 1.1 million cubic metres of drill cuttings would be produced, which would be mixed, turned and buried on site or sent to a licenced waste facility.
232. With respect to drill cuttings, the EIS identifies two types that will be generated: rock-based drill cuttings (approximately 400,000m³), predominantly derived from the vertical wells, and coal-based drill cuttings (approximately 720,000m³) that will be derived from the lateral wells. The EIS proposes that rock-based drill cuttings will be beneficially re-used on the well pads where appropriate (mixed, turned and buried at the well pads), and coal-based drill cuttings (and other drill cuttings not suitable for use on the well pads) will be transported off-site to a facility that can lawfully accept those wastes.
233. The drilling fluid waste would be recycled, reducing the volume of drilling fluid for disposal by approximately 90 per cent while the remaining 10 per cent will be disposed of to an appropriately licensed facility.
234. Waste generated by the construction and operation of the Project would be managed through the implementation of a Waste Management Plan developed in accordance with the *Waste Avoidance and Resource Recovery Act 2001*.
235. The EIS states drilling fluids and cuttings would be covered by the Waste Management Plan and classified and managed in accordance with all relevant statutory requirements under the *Protection of the Environment Operations Act 1997* and *Protection of the Environment Operations (Waste) Regulation 2014*.
236. The EIS also included a Chemical Risk Assessment that concludes the potential for release of drilling chemicals to groundwater is negligible.
237. The EIS ultimately found the residual environmental risk presented by waste generated by the Project with the management plan in place would be "low to very low".
238. In its submission to the Commission dated 10 August 2020, the Applicant confirms that:

"In accordance with the waste hierarchy, Santos will continue to explore all beneficial use opportunities. Beneficial re-use opportunities include but are not limited to: Natural Soda Bicarbonate production following the recent completion of the pre-feasibility study and subsequent MOU to progress the concept Design and Engineering Study, and the Front End Engineering Design through 2021. Assisting to neutralise acid mine leachate in mine rehabilitation, following extensive laboratory trials and discussions with the EPA, Santos and a trial partner are planning field trials through a trail heap leach pad within an existing mine."

Department's Assessment

239. The Department notes at Table 6 that the advice received from the EPA concludes that, following detailed investigations into several matters including waste (particularly produced salt, Produced Water and drill cuttings), the EPA has no outstanding concerns about the Project and supports the Recommended Conditions.
240. At ARP 395, the Department notes the WEP's consideration of the salt waste composition and available data suggests the salt waste would be low in heavy metals and other pollutants. The WEP agrees with the Applicant that the salt waste is likely to be classified as general solid waste. However, the WEP recommends that the Applicant be required to confirm whether any COPCs are present in the salt waste on an ongoing basis because this may affect the salt waste classification and disposal requirements.
241. At ARP 398, the Department describes how the WEP acknowledges the beneficial reuse of salt waste from other CSG operations has had limited success. Notwithstanding, the WEP also notes the higher sodium bicarbonate concentration in the Project's salt waste may make it more attractive to the development of a sodium bicarbonate industry and, therefore, the WEP recommends further investigation into the potential beneficial uses for the salt waste.
242. The Department has Recommended Conditions requiring the Applicant to investigate the beneficial reuse options and to prepare a Waste Management Plan to comply with several performance measures.
243. In the Department's Response (paragraph 28), the Department confirms its position that all wastes associated the Project would be properly managed and either reused or disposed of in a manner consistent with the waste hierarchy and the objectives of the *Waste Avoidance and Resource Recovery 2001*. The Department is satisfied that the majority of water extracted during the Project would be treated and put to beneficial use on site or in the surrounding area, and the salt generated would either be beneficially used or sent to an appropriate waste management facility.

EPA's Advice

244. At its meeting with the Commission (paragraph 27), the EPA did not raise concerns with the preparation of a Waste Management Plan as a recommended condition rather than that Plan being finalised prior to determination. The EPA confirmed the Waste Management Plan will be required to follow the waste hierarchy that prioritises beneficial re-use of waste and then steps through the waste hierarchy before arriving at landfill disposal as a last resort.
245. The EPA also confirmed at its meeting with the Commission that the evidence before it suggested that the salt waste would be classified as general solid waste if it did need to be land-filled and could therefore go to general solid waste facilities.
246. In response to the concerns raised in the submissions that the waste classification guidelines never contemplated significant volumes of water soluble waste, the EPA again reiterated that disposal is the last priority in the waste hierarchy and the Waste Management Plan should aim to beneficially reuse as much of the salt waste as possible. If disposal to landfill is required, any facility that accepts the waste would need to accommodate the storage of the waste appropriately to ensure the risk of leaching is minimised.
247. As identified at its meeting with the Commission (paragraph 27), the EPA is satisfied with the recommended approach from the Department and concluded "*to be absolutely clear, we do believe that all the conditions are enforceable*".

Commission's Findings

248. The Commission has considered the Project's waste generation and management, including the following:
- Treatment of the Produced Water using a reverse osmosis plant, which produces brine that is concentrated and passed through a salt crystalliser to produce up to 840,000 tonnes of crystallised salt and produces water that is proposed to be used for irrigation, stock watering, dust suppression, construction and drilling;
 - Generation of up to 1.1 million m³ of drill cuttings; and
 - Generation of up to 178,000 m³ of drilling fluids.
249. The Commission acknowledges the concerns raised in public submissions around the classification, storage and disposal of the waste generated by the Project. The Commission has considered the evidence before it with respect to this issue, including the Material set out in paragraph 35.
250. Based on the evidence presented to it by the EPA, the Commission is satisfied the Applicant will need to dispose of the waste in accordance with the NSW Waste Hierarchy, with landfill disposal being the last resort. If landfill disposal of residual waste is required, the Applicant will need to ensure the disposal occurs at an appropriately EPA-licenced waste management facility.
251. The Commission has imposed condition B70 to require the Applicant to provide evidence that arrangements for the beneficial reuse of waste or suitable licensed receiving facilities are in place to accept the waste prior to the commencement of Phase 1.
252. The Commission has also imposed condition B69 requiring the Applicant to explore beneficial reuse and disposal options prior to the commencement of Phase 1 and these options will form part of the Waste Management Plan, which is also required to be prepared prior to the commencement of Phase 1. The Waste Management Plan must be prepared to the satisfaction of the Planning Secretary and be prepared in consultation with the EPA, Council and any waste facility operators where the waste is proposed to be disposed.
253. Finally, the Commission has also imposed condition B67 requiring the Applicant to minimise the on-site storage of waste and is of the view the conditions are appropriate to manage and mitigate any impacts associated with waste management.
254. The Commission notes the EPA (as lead regulator) is satisfied that the Department's Recommended Conditions are reasonable and enforceable and will address and mitigate any potential impacts associated with the Project's wastes.

7.7 Bushfire risk

Public Comments

255. The Commission heard concerns from speakers at the Public Hearing and received written submissions raising concerns about bushfire matters, including the following:
- The Pilliga is a very dry landscape, and the risk of bushfires is increased by the Project due to increased human activity in the forest and the nature of chemicals and gases associated with the Project.

- The increased fire risk is considered a major threat to farmers and communities, already vulnerable due to their rural locality.
- The risk of bushfire was not adequately addressed and was understated, and the EIS does not provide appropriate mitigation measures.
- The safety and pilot flares pose a hazard because windblown debris could be ignited.
- Gas emissions and leakages would increase the likelihood of severe bushfire events.
- Firefighters would be at greater risk in the event of a bushfire because new tracks could be confusing to firefighters and the chemicals and gases could have an explosive effect.
- The Applicant and the Department failed to consider the increased likelihood of extreme bushfire events due to climate change.

Council Comments

256. Council's comments in its letter to the Commission dated 17 July 2020 note the Department's conclusion that the bushfire risks can be reduced to an acceptable level during the design of the project and through the Bushfire Management Plan. In response to this, Council identified a preference for *"the various Bushfire Planning documents to be finalised prior to determination"*.

Applicant's Consideration

257. The potential bushfire risk posed by the Project has been documented through the Applicant's EIS (Appendix S), RtS (Section 6.25) and Supplementary RtS (Appendices E4 and E5).

258. The EIS identifies one of the key bushfire related risks arises from the proposed safety and pilot flares. The proposal includes two safety flares – one each at the Bibblewindi and Leewood facilities – as well as flares at pilot wells. The EIS describes the function of the safety flares being to manage gas during commissioning and maintenance activities or in non-routine situations. The pilot well flares combust methane and are designed to manage fluctuations in gas volume and composition. If the pilot well is successful and is converted to a production well, the well would be connected to the gas gathering network and the flare will no longer be required.

259. Appendix S – Hazard and Risk Assessment of the EIS considers bushfire risk and states *"a risk ranking of 'medium' is recorded for the risk of a bushfire igniting from a project related activity"* but *"the proponent is able to apply mitigation measures to...reduce the likelihood for the bushfire risk ...to 'remote', the lowest likelihood classification"* (page 61).

260. The EIS committed to formalise the mitigation measures in a Bushfire Management Plan, prepared in conjunction with landholders and the NSW Rural Fire Service.

261. The Applicant's RtS identifies specific measures that minimise the risk of bushfire ignition associated with the construction and operation of the facility, including:

- Mitigation measures incorporated into the Project design;
- Well head infrastructure surrounded by cleared areas and asset protection zones;

- Hot works permits will be required to carry out types of works that may have an increased fire potential. The hot works permits identify requirements to adjust, modify or cease activities which may cause ignitions and are restricted between October and February. Fire units are assigned at hot work sites during periods of higher fire danger ratings;
 - Safety flares at Leewood and Bibblewindi will be surrounded by a vegetation free zone of up to 130m radius and the pilot flares will be surrounded by a vegetation free zone of up to 40m radius. The EIS identifies a maximum radiant heat flux at the nearest vegetation of 6.31 kW/m² at both the ground level and the tree canopy;
 - Preparation of a Bushfire Management Plan in consultation with the NSW Rural Fire Service (**RFS**) and Forestry Corporation of NSW (**FCNSW**).
262. The EIS considers the potential for windblown debris to pass through safety flares or pilot flares and result in the ignition of a bushfire to be negligible. This is because the heavier debris types that would be required to ignite and spread a fire are most likely to be blown along or near the ground, not at the height of the flares. If a heavier particle were to pass through the flame it is highly unlikely to then stay ignited for the distance between the flare and the forest vegetation beyond the asset protection zone and vegetation free zone. Small airborne particles, if they were to pass through the flares, are expected to incinerate within the flare or burn-out prior to reaching that vegetation, as is typical of smaller embers.
263. In response to concerns regarding increased risk to firefighters or residents in the event of a bushfire due to the Project, the Applicant's RtS states "*the facility itself poses no additional risk to firefighters or residents as gas shut off valves are activated by various means including a fail-safe final shutoff in the event of other systems not operating...that would enable the proponent to quickly cease operations in the event of a bushfire.*"
264. In response to further concerns raised by the NSW RFS, the Applicant submitted a Supplementary RtS to the Department, which included additional bushfire material (Appendices E4 and E5). The Supplementary RtS identifies potential bushfire risk from Project related infrastructure, including at the safety flare locations of Leewood and Bibblewindi.
265. The EIS describes the Leewood (major facility) infrastructure as being located on farmland to the north of the forest that has been cleared for agriculture. Therefore, the EIS concludes the Leewood safety flare is located on managed agricultural land and poses a "*low to negligible bushfire risk*".
266. The Bibblewindi (major facility) infrastructure is located in the Pilliga State Forest. The Applicant states this facility will be located behind fences, on hardstand areas and will be appropriately set back from uncleared forest.
267. The RtS provides further details on the pilot and safety flares and confirms the radiant heat levels on the nearest vegetation will not exceed 6.31 kW/m², in compliance with the RFS requirement that radiant heat levels on surrounding vegetation shall not exceed 10 kW/m².
268. Overall, it is the Applicant's position that the Project does not exacerbate bushfire risk in the Pilliga and the likelihood of fire from increased human activity has been assessed as remote and is mitigated by the improved fire detection and response procedures associated with the development. The Applicant concludes the bushfire ignition risk from all phases of operation is classified as remote, the overall bushfire risk is assessed as medium and the risk to firefighters/emergency responders can be well managed through the multi-agency Bushfire Management Plan.

269. In the Applicant's Submission to the Commission, the Applicant also responded to concerns raised during the Public Hearing that there was increased risk to residents and firefighters in the event of a bushfire if the CSG infrastructure cannot withstand the bushfire event and is damaged, releasing hazardous and flammable gas or chemicals, and intensifying the bushfire. The Applicant confirms all gas pipelines for the Project will be designed and constructed to the relevant Australian Standards and will be at least 750mm below ground and will therefore be protected from fire. The above ground infrastructure will be surrounded by asset protection zones and will be designed to withstand the radiant heat expected in the event of a bushfire.

Department's Assessment

270. *Table 19 – Other Issues* of the Department's AR addresses the Department's consideration of bushfire risk. The Department identifies gas flaring activities as one of the key bushfire-related risks. The Department agrees with the Applicant's conclusion that *"the maximum radiant heat at the nearest vegetation in a catastrophic fire event would be 6.3 kW/m², which is comfortably below the RFS recommended standard of 10 kW/m²".*

271. The Department's AR confirms the Department's Hazard Unit is:

"satisfied that hazards can be appropriately managed, and have recommended a number of conditions to manage these risks, including requiring Santos to comply with the asset protection requirements in the RFS' Planning for Bushfire Protection guidelines and maintain suitable equipment to respond to any fires in the project area".

272. The Department also commissioned an Independent Risk Review of the Project, which recommended, if the development is approved, a Bushfire Management Plan should be prepared in consultation with relevant stakeholders and an independent audit should be undertaken prior to commissioning and periodically thereafter to verify the implementation of the control measures identified in the Bushfire Management Plan.

273. The Department recommended a condition requiring the Applicant to prepare a Fire Management Plan in consultation with the RFS, FCNSW and landowners upon which CSG infrastructure is proposed to be located.

274. In response to the concerns raised that the Department did not consider the increased fire risk due to climate change, the Department acknowledged there is expected to be an increase in the frequency and severity of fires in the region. The Department advised the Commission that its risk assessment was based on the worst-case scenario of a catastrophic fire danger, so while the frequency might change, the assessment has been based on catastrophic events. The Department is satisfied that the worst-case scenario hazards can be managed and mitigated through the Recommended Conditions.

275. The Commission sought further information from the Department regarding the pilot flares at the Public Hearing. The Department noted the flares on those appraisal wells are not necessary because they can be connected easily to the gas gathering system. The Department states *"it has always been the assumption that those flares would not be installed on site"* and the Department would have no objection to a condition excluding the use of pilot flares.

Commission's Findings

276. The Commission has considered the Material before it and identifies the following four components relating to bushfire risk that have been identified for the Project:

- Fire ignition risks posed from flaring activities;

- Hazards posed by methane gas in the event of a bushfire;
 - Risks to the facility from catastrophic bushfire events;
 - Potential increase in the frequency and severity of bushfire events due to climate change.
277. With respect to the potential for fire ignition, the Commission notes that two safety flares are proposed, one at the Leewood Facility and one at the Bibblewindi Facility. The Commission notes the EIS includes an indicative location for the safety flare at the Bibblewindi Facility but that an indicative location is not provided for the Leewood Facility. The Commission notes the Applicant's statement that the safety flare at Leewood is located within managed agricultural lands, is not in proximity to significant vegetation and therefore is not considered to be a potential bushfire risk; however, given that the specific location of the safety flare has not been provided and there appears to be some vegetation in proximity to the Leewood Facility, the Commission does not accept the Applicant's statement. Therefore, the Commission has applied a merit-based risk assessment to the bushfire risk mitigation measures proposed for the safety flare at Leewood.
278. The Commission has also undertaken a risk-based assessment from the evidence before it of the safety flare at Bibblewindi, noting it is within the Pilliga Forest and has some potential to pose a bushfire risk.
279. For both safety flares, the EIS describes the safety flare stack height of up to 50m, with a flame height of 1.5m during normal operations and up to 30m at the design flow rate. The safety flares will be provided with a safety zone of 60m and a vegetation free zone of 130m. The Commission agrees with the Applicant's position that the potential for windblown debris to pass through safety flares at that height and result in the ignition of a bushfire is low (paragraph 262); however, the Commission is concerned about the uncertainty around the proposed safety flare stack height of "up to 50m", noting that a lower stack height might increase the likelihood of the ignition of windblown debris. Therefore, the Commission has imposed condition B78 to require the safety flare stack height to be 50m. With the imposition of this condition, the maintenance of appropriate asset protection zones around both safety flares and further safety measures required in the preparation of the Bushfire Management Plan, the Commission is satisfied the bushfire risk is manageable.
280. With respect to the pilot flares, the Commission acknowledges the Department's advice summarised at paragraph 275 and has imposed condition A11 stating that approval is not granted for the pilot well flares.
281. The Commission is satisfied with the Recommended Conditions for the Fire Management Plan and notes the Department has included the recommendations from the RFS in the Recommended Conditions.
282. In relation to increased frequency and intensity of fires due to climate change, the Commission is satisfied with the Department's assessment against the worst-case scenario so even if the frequency changes, the risks associated with the worst-case scenario event can be adequately managed through the Recommended Conditions, including shut-in and automatic fail safe requirements.

7.8 Aboriginal Cultural Heritage

Public Comments

283. Several speakers at the Public Hearing and several written submissions raised concerns with Aboriginal cultural heritage issues. The concerns raised are summarised below:

- The Project is detrimental to the spiritual significance of the Pilliga and the Gomeroi people's cultural values and traditions;
 - Inadequate consultation has occurred;
 - Government assessment and engagement processes are culturally exclusive; and
 - Intergenerational equity issues through loss of culture.
284. The Commission heard that there are many sacred places in the Pilliga, including all of the trees and water. The cultural values and traditions are passed from generation to generation and the disturbance posed by the Project significantly impacts on these values and traditions.
285. The submissions also objected to the development assessment process, which is seen to disadvantage Aboriginal groups. The Commission heard how Aboriginal culture is an oral tradition, and many of the elders and knowledge holders are prevented from discussing certain culturally sensitive information in typical engagement processes such as written submissions and in public forums. Additionally, the high significance of the area is based on layers of restricted knowledge, held and safeguarded by different knowledge holders. The Commission heard from one speaker, saying *"it is difficult for the Gomeroi elders and knowledge holders to articulate the significance of the sites to our traditions, unless we are on country and in context, which enables us to disclose culturally sensitive information without significantly breaching the cultural protocols, which are central to our tradition and law"*.
286. The submissions stated that water is sacred and is protected in Gomeroi culture by lore and to allow any interference in the Project Area will desecrate important Gomeroi land. The Commission heard how if the water is contaminated or impacted in any way, stories about Dreaming figures will be lost.

Council Comments

287. In Council's Response (paragraph 28), Council noted its support of the Department's recommended condition to establish an Aboriginal Cultural Heritage Advisory Group.

Applicant's Consideration

288. The Applicant addresses Aboriginal Cultural Heritage in Appendix N1 of the EIS and Appendix J of the RtS.
289. *Appendix N1: Aboriginal Cultural Heritage Assessment Report* notes the Applicant will proceed with the Project on the basis of implementing best practice in relation to Aboriginal cultural heritage management through the implementation of the Avoidance Principle. This means that, rather than mitigating impacts, the Applicant will avoid impacts so that Aboriginal cultural heritage sites are preserved and will *"largely remain as they were prior to the commencement of the Project"* (page 8).
290. Appendix N1 also notes there are three pieces of infrastructure that have a fixed location: the Bibblewindi and Leewood facilities and the Bibblewindi to Leewood pipeline. All other infrastructure associated with this Project is not fixed and can be relocated to give effect to the Avoidance Principle. The EIS states that no Aboriginal cultural heritage sites have been found in proximity to the fixed infrastructure components of the Project.
291. In its EIS, RtS and the submission to the Commission dated 10 August 2020, the Applicant confirmed consultation was undertaken in accordance with the SEARs and *Aboriginal*

cultural heritage consultation requirements for proponents (NSW Government 2010). The process involved providing hard copies of the Aboriginal Cultural Heritage Assessment Report and draft Cultural Heritage Management Plan to over 550 Registered Aboriginal Parties from a wide geographic area, all of whom were given the opportunity to make a submission.”

292. The Applicant also highlighted in its submission that the consultation process exceeded the minimum requirements of the NSW government by holding discussions in “*approximately 10 towns / localities across the Gomeroi Nation, often at the invitation of the local Aboriginal community including Toomelah in the north, Coonabarabran and Gunnedah in the south, and Walgett in the west*”. Field tours or field inspections were also offered, including providing transport to Narrabri.
293. The Applicant prepared landscape mapping to identify potential cultural heritage sensitivity zones within the Project Area and guide gas field infrastructure planning and micro-siting field surveys.
294. The Applicant has committed to implementing buffers to culturally sensitive areas, such as watercourses and Yarrie Lake.
295. The Applicant has committed to prepare an Aboriginal Cultural Heritage Management Plan (**ACHMP**) which will be reviewed every five years.

Department's Assessment

296. The Department engaged an independent archaeologist to review the EIS and the Draft ACHMP (ARP 499), including the adequacy of the consultation process.
297. At ARP 176 the Department also indicated it consulted with Aboriginal groups, including the Narrabri Local Aboriginal Land Council (**LALC**), Wee Waa LALC and Dharriwaa Elders Group as part of its assessment process.
298. At ARP 503 the Department states BCD, the Department's independent archaeologist and the Department have reviewed the consultation process and are satisfied that the assessment and consultation have been undertaken in accordance with the applicable guidelines, including the BCD's *Aboriginal Cultural Heritage Consultation Requirements for Proponents* (2010).
299. At ARP 508 the Department notes the advice from the independent archaeologist cautioned around the limitations of the landscape mapping provided by the Applicant, given the large Project Area and limited existing cultural heritage surveys and noted it would be refined over time as surveys are undertaken for the gas field infrastructure.
300. The Department notes at ARP 509 that the limitations of the sensitivity mapping can be mitigated by the application of the Avoidance Principle. The Department states the Applicant has “*committed to avoiding all of the known Aboriginal sites within the project area, regardless of their archaeological or cultural heritage significance*”.
301. The Department and BCD accept the Applicant's commitment to avoid all known Aboriginal sites and accept that the Project is able to be managed such that it “*would not significantly impact the wider cultural heritage values of the project area and region, subject to the implementation of a number of mitigation measures*”.
302. As described at ARP 513 and 514, the Department has Recommended Conditions to reflect the recommendations from BCD and the Department's independent advisor requiring the Applicant to establish an Aboriginal Cultural Heritage Advisory Group for the Project

(Recommended Condition B54), to finalise and implement a comprehensive ACHMP and to avoid all direct and indirect disturbance of Aboriginal sites (Recommended Condition B55).

303. The Aboriginal Cultural Heritage Advisory Group for the Project would comprise representatives from BCD, the scientific community, the Narrabri Local Aboriginal Land Council, the Wee Waa Local Aboriginal Land Council and the Gomeroi native title claimants. In addition, the Department has Recommended Conditions which require ongoing involvement of all Registered Aboriginal Parties (RAP) and other knowledge holders in establishing the advisory group, finalising the Aboriginal Cultural Heritage Management Plan (ACHMP), assessing and managing any Aboriginal sites identified during micro-siting investigations and the conservation and management of cultural heritage in any biodiversity offsets landholdings which the Applicant may propose.
304. The Department has also Recommended Conditions requiring the Applicant to make relevant information and documents publicly available, including all management plans, monitoring results and minutes from advisory group meetings (Recommended Condition D13).

Commission's Findings

305. The Commission notes BCD, the Department and the Department's independent expert are satisfied with the EIS. In consideration of this evidence, the Commission is satisfied that the Aboriginal Cultural Heritage Assessment has been undertaken in accordance with the relevant guidelines.
306. Consultation needs to occur within the framework of government policy. Government agencies identified that all of the protocols were followed. The Commission has heard the concerns raised but concludes the consultation process was in accordance with Government requirements and is therefore adequate for the purposes of this determination, however, the Commission does recommend that BCD's *Aboriginal Cultural Heritage Consultation Requirements for Proponents* (2010) should be reviewed to take into consideration the concerns expressed regarding effective consultation with Aboriginal groups, with the intent of improving participation in a culturally sensitive manner.
307. The Commission is satisfied that the Department's Recommended Conditions with respect to the establishment of an Aboriginal Cultural Heritage Advisory Group are an appropriate mechanism to guide the development of the Project, to the satisfaction of the Planning Secretary. Additionally, the micro-siting process, application of the Avoidance Principle and the preparation of the Aboriginal Cultural Heritage Management Plan will ensure the Applicant has proper regard to items and areas of Aboriginal cultural significance.

7.9 Social impacts

Public Comments

308. The Commission received some submissions in support of the Project for reasons of social impacts. The main social benefits cited relate to the opportunities for growth in the region, which will boost confidence in the region and result in improved access to services and diversification of employment opportunities.
309. Some submissions identified an emerging trend where people are forced to leave the region in search of employment and that this Project means there is a future for Narrabri.
310. However, contrary views were expressed by many of those who presented at the Public Hearing, raising concerns about the adverse social impacts that would result from the Project:

- The Applicant was criticised for a lack of community consultation about the Project, indicating a disregard for community values.
- Many concerns were raised about mental health issues, claiming this Project has been detrimental to mental health for a significant period of time, predating the SSD Application, due to the ongoing threat and uncertainty posed by CSG operations.
- The Commission heard how this Project has fractured the social cohesion of the town of Narrabri.
- The Commission was urged to consider the balance between social benefits and costs in the context of the public interest and ESD.
- Numerous submissions stated that the Project did not have a social licence to proceed and should therefore be refused.

311. More specific concerns included:

- The lack of information about employment and training opportunities for Aboriginal residents to give credibility to the one-line assurance in the documents.
- The Project would only result in minor impacts on local job diversity from the Project.
- Only 21% of the VPA funds are earmarked for social purposes. This was seen to be insufficient given the cost of social infrastructure.
- Deficiencies in the CBF, including the cap on the amount that can be distributed to any one project.
- The Social Impact Assessment (**SIA**) has not addressed the distributional inequity of the Project, that is, the expectation that most of the social and economic benefits accrue to people outside the region while most of the social costs will accrue locally.

Council Comments

312. Council is supportive of the Project, and at the Public Hearing the Mayor of Narrabri Shire stated: *“With the right safeguards in place and with the proponent’s commitment to fund further research in the area of abandoned gas wells, I believe this project should be approved. Our support for the project is largely premised on social and economic benefits.”*
313. During its meeting with the Commission (paragraph 27), Council explained its vision for an inland port development, noting that an inland port would provide extensive opportunities for new industry to establish in the region and that the Project aligns with this vision.
314. However, in Council’s letter to the Commission dated 17 July 2020 (paragraph 64), Council identified *“the social impacts relating to the Project are not insignificant, therefore, we submit that the proponent maintains regular communication channels with Council and the local community to avoid any potential issues if the Project is approved”*. Council also state in paragraph 65 of its letter: *“we have been most satisfied with the way the proponent has maintained regular communication channels with Council to date”*.
315. Council concludes that it *“supports the Project on balance”* and *“believe[s] the Project represents overall value to our community”*.

Applicant's Consideration

316. The Applicant maintains that they will work in partnership with local communities and will invest in social infrastructure that addresses any adverse impacts the Project may create as they wish to leave a positive legacy for future generations. In its submission to the Commission, the Applicant states *"benefits will be applied across the local community in the areas of health, education, environment, economic development, heritage, sport, arts and culture."* The Applicant's submission also states that: *"If approved, the Project will contribute up to \$120 million to a Community Benefit Fund (CBF)... Santos will continue to engage with Narrabri Council and the NSW Government to finalise the CBF Framework including governance, long-term community benefit and the process for identifying projects."*
317. Finally, the Applicant has committed to preparing a Social Impact Management Plan (**SIMP**) in consultation with key stakeholders to guide the actions it will take to redress any negative social impacts experienced as a result of the Project: *"The SIMP will include detailed action plans including impacts, corresponding mitigation/ management strategies, monitoring measures, reporting and reviewing processes."*

Department's Assessment

318. In the Department's AR the Department acknowledges that *"The project would generate a range of major positive social impacts in the local community through job creation and economic opportunities... 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"* (ARP 555 - 556).
319. However, the Department also acknowledges there may be negative social impacts that need to be addressed, including increased pressure on local services and facilities and adverse impacts on social dynamics and mental health (ARP 558).
320. The Department engaged an independent expert to provide advice on the social impact assessment which the Applicant undertook as part of the EIS. The independent expert concluded *"that, overall, the negative social impacts of the project 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"* (ARP 562). Amongst the specific issues which were investigated were the potential impacts on accommodation (house purchase and rental prices), demand on services and infrastructure, potential recreational impacts, social cohesion, community wellbeing and distributive equity.
321. In order to address potential negative social impacts, the Department has Recommended Conditions requiring the Applicant to:
- establish and maintain a Community Consultative Committee (**CCC**) to ensure that the views and concerns of the community through its representatives are considered during the life of the Project;
 - enter into a VPA with Narrabri Council to provide contributions to community services and facilities;
 - prepare a detailed Social Impact Management Plan in consultation with Council, the CCC, affected communities and other relevant stakeholders;
 - prepare Field Development Plans in consultation with the CCC and applicable landholders;

- prepare Property Management Plans as part of the Field Development Plans to manage impacts on privately-owned land upon which infrastructure is proposed to be located, in consultation with landholders;
- prepare Public Safety Management Plans as part of the Field Development Plans to ensure public safety and manage access in the project area;
- prepare noise and air quality management plans in consultation with the CCC;
- establish a Water Technical Advisory Group and Aboriginal Cultural Heritage Advisory Group, with representatives from local water users and local Aboriginal groups, respectively;
- independently review potential exceedances of applicable environmental criteria, at the request of applicable landowners;
- maintain complaints and incident management and reporting systems; and
- make a range of project-related information publicly available, including:
 - the EIS and related information;
 - management plans;
 - monitoring results;
 - minutes of CCC and advisory group meetings;
 - annual reviews and audit reports; and
 - complaints and incidents.

322. The Department concludes “...that Santos has committed to a range of other measures that would offset the social impact of the project” (ARP 599). The Department ultimately concludes the Project would “generally meet all relevant health and amenity criteria and result in major socio-economic benefits for the locality, region and State” (ARP 596).

Commission’s Findings

323. The Commission has carefully considered the potential social impacts of the Project and considers that the key likely social benefits and risks of the Project are as summarised in Table 5 below:

Table 5: Key Likely Social Benefits and Risks

Likely Social Benefits	Likely Social costs and risks
Construction jobs – projected 1300	Increased traffic generation around Narrabri
Operational jobs – projected 200 (noting this figure includes approximately 50 existing Project-related jobs)	Increase in potential traffic accidents
Opportunities for skills training for Aboriginal employees	Decrease in housing availability/affordability in Narrabri

Diversification of local industry and jobs - multiplier flow on in employment generation	Masculinisation of Narrabri during construction period
Increase in local procurement	Potential loss of jobs from agriculture to the Project
Small increase in the population of Narrabri	Continuing social conflict/division around Narrabri
Compensation to landholders for duration of the project	Increased demand on social infrastructure and services around Narrabri
CBF grants (no more than \$500,000 per project)	Potential distributional inequity of benefits
VPA with Council worth \$14.5 million (21% (\$3 million) of VPA funds for community initiatives or local infrastructure)	Potential increased cost of living
Catalyst for Inland Port Employment Precinct	Potential decline in mental health indicators from perceived CSG impacts (noting the project will not involve fracking)

324. The Commission supports the Department's Recommended Conditions with respect to the preparation of a SIMP to the satisfaction of the Planning Secretary prior to the commencement of Phase 2.
325. The Commission notes the concerns that the CBF is limited for individual projects and therefore has included a requirement that the SIMP include the identification of adaptive management and mitigation measures to avoid and minimise any negative social impacts, and the source of funding for these measures.
326. The Commission is satisfied that the Recommended Conditions identify opportunities to secure and enhance local community services and facilities and provide a mechanism for the ongoing analysis of social risks. The Commission supports the requirement that the SIMP be prepared in consultation with the CCC, Council and the local community in the Narrabri LGA.
327. The Commission finds the social risks associated with the Project can be monitored, managed and mitigated through the conditions imposed.
328. The Commission has heard community concerns that the Project does not have a 'social licence'; however, the principle of 'social licence' does not have an accepted meaning in planning and environmental law and is not a legislated consideration for the consent authority. Despite that, with respect to its relevance to social impacts and the public interest, the Commission has addressed the issue of social licence under sections 6.3.9, 7.9 and 7.13.2 of this Statement of Reasons.

7.10 Economic impacts

Public Comments

329. The economic impacts of the Project were highly contested at the Public Hearing and in many public submissions. These concerns are summarised as follows:

- CSG will have impacts on the long-term viability of the farming economy and agricultural land, which have not been factored into the Applicant's cost-benefit analysis.
- The job creation estimated in the Applicant's EIS was questioned, stating the Project would likely employ only a small number of local people on an on-going basis with the remainder being from outside the region. This small number of net jobs gained would be offset by job losses in other sectors as a result of the Project's impacts.
- Supporters of the Project made submissions to the Commission regarding the benefits the Project will bring with respect to diversification and stability of the regional economy, including the facilitation of the inland port and the industries that will follow.
- Conversely, objectors to the Project stated diversification is possible through other means, such as farming, tourism, indigenous economies and the renewable energy industry.
- Objectors also questioned the Applicant's and Department's claims that this Project would increase gas supply to the NSW market and put downward pressure on gas prices.
- Narrabri gas is expensive in comparison to other gas sources, and therefore the Project would be uneconomic on that basis and is likely to become a stranded asset.
- Submitters also claimed that because gas exporters (including the Applicant) control the domestic market and Narrabri gas is relatively high cost there is little likelihood of NSW gas prices falling substantially.
- A number of objectors raised concerns about the independence of the independent economist engaged by the Department to undertake a review of the economic assessments and impact associated with the Project.
- The Commission also received several objections to the revised economic modelling included in the Applicant's submission to the Commission dated 10 August 2020, claiming the revised modelling contains misleading claims and flawed analysis that overstate the case for the Project. Submissions made to the Commission indicate the revised modelling includes "*major changes in project assumptions and justifications, and a number of impossible-to-validate statements and figures*".

Applicant's Consideration

330. The Applicant's EIS addresses the economic justification for the Project at Chapter 27 and provides a cost-benefit analysis at Appendix U1 and a macroeconomics analysis at Appendix U2. The Applicant contends that the Narrabri Gas Project would provide major economic and social benefits for Narrabri, the North West region and to NSW, including:
- a direct capital investment of \$3.6 billion, and a further \$5.5 billion in operating costs over the life of the Project;
 - generating 1,300 jobs during peak construction, 200 jobs at the project during operations, and over 500 direct and indirect jobs in the surrounding region and NSW;
 - increasing NSW real economic output by approximately \$12 billion;

- generating more than \$3 billion in direct revenue for the NSW Government through royalties and taxes;
 - providing significant funding for local infrastructure and community service projects over the life of the Project, including via:
 - o a Community Benefit Fund with a value of around \$120 million; and
 - o a Voluntary Planning Agreement and Road Maintenance Agreement with Narrabri Council, with a value of approximately \$14.5 million.
331. The Applicant's cost benefit analysis, including consideration of all environmental impacts and downstream externalities, indicates that the Project's economic benefits would significantly outweigh its costs, with a net economic benefit of between \$1.5 and \$1.6 billion.
332. The EIS concludes that the Project is expected to generate a net positive economic impact for the economies of the Narrabri LGA, the wider region and NSW through real economic output and incomes, the establishment of the CBF, and direct and indirect employment during the construction and operational phases of the Project.
333. The Applicant's submission to the Commission dated 10 August 2020 included a revised benefit cost analysis. The impact of changed assumptions in the revised benefit cost analysis resulted in greater employment and economic benefit than originally modelled, and the new analysis found the benefit from the local community and the State has strengthened.
334. With respect to the domestic supply of gas from the Project, in Attachment 1 of Applicant's Response the Applicant commits to selling the gas produced from the Project to the domestic gas market, noting the Applicant would accept a condition on the renewed title under the *Petroleum (Onshore) Act 1991* to this effect.

Council Comments

335. Council is largely supportive of the economic modelling provided by the Applicant in the EIS and the predicted outcomes of employment. Council's Response (paragraph 28) also recognises the economic opportunities that are likely to come out of the Project, including *"downstream industries and the future development of an industrial hub, alongside inland rail"*. Council also supports the Applicant's proposal to employ local people, particularly those from Aboriginal and Torres Strait Islander backgrounds.
336. Council's Response (paragraph 28) lists what it considers to be the economic benefits of the Project, including the potential to lower gas prices by increasing overall supply, and to increase the economic strength of the region and support other businesses and industries (in conjunction with the Inland Rail and the Inland Port).

Department's Assessment

337. The Department engaged an independent economist to undertake a review of the economic assessments and economic impact associated with the Project. As described at ARP 543, the independent review confirmed that the Applicant's economics assessments in its EIS had been undertaken in accordance with applicable economic guidelines and give reasonable estimates of the likely impacts of the Project.
338. At ARP 555, the Department acknowledges that *"there are different views on the value that should be placed on various costs and benefits, particularly the externalities (impacts on third parties not directly related to the project) when conducting an economic assessment"*.

339. The Department accepts the economic analysis provided in the EIS, noting the assessment included a number of sensitivity analyses which predominantly showed positive outcomes (only the 30% reduction in gas price scenario showed a negative outcome) (ARP 551).
340. The Department raises concerns at ARP 91 that any shortfalls in gas supply or increases in gas prices could have significant economic consequences for the NSW economy, resulting in the closure of several major industrial facilities and businesses and significant job losses in regional areas.
341. The Applicant provided additional analysis in the RtS to show that the Project will have a net positive benefit for both NSW and Australia (ARP 552). The Department's AR describes how it considers the Project will promote economic development in northern NSW by creating jobs and supporting the creation of new businesses, including the development of a new industrial hub outside Narrabri adjoining the Inland Rail Project.
342. While the Department's AR describes how the Project will result in increased competition in the domestic gas market and put downward pressure on gas prices, the Department acknowledged at the Public Hearing that it did not expect the price of gas to decrease, due primarily to the small size of the Project relative to the broader gas market.
343. At ARP 534, the Department supports the Applicant's commitment to delivering all gas generated by the Project to the domestic market. The Department also notes that the regulation of the Applicant's commitment to domestic supply would occur through the renewed title for the Project under the *Petroleum (Onshore) Act 1991* (ARP 535).
344. Ultimately, the Department accepts the modelling in the EIS and the findings of the independent economics expert, and notes that it is "*highly likely that the net benefits to the NSW community flowing from the development would be positive*" (ARP 553) and that "*the Project's benefits to society (especially to the State and region) would significantly outweigh its costs, including externalities*" (ARP 555).
345. The Commission notes the Applicant provided revised modelling to the Commission in its submission dated 10 August 2020. The Department did not assess the revised modelling. However, in the Department's Response (paragraph 28), the Department confirms "*the project would result in significant economic and social benefits for both NSW and the local community*" (page 5), citing benefits in terms of investment, jobs, regional spending, gas supply, benefit sharing, royalties and taxes.

Commission's Findings

346. The Commission heard many submissions pertaining to the broader gas market and price of gas proposed to be supplied by this Project. The Commission notes domestic gas prices are subject to the broader operation of the East Australian and Asian gas markets and are not a relevant planning consideration under the EP&A Act.
347. However, the consent authority must consider the likely economic impacts of the Project under s 4.15(b) of the EP&A Act and the economic welfare of the locality and the State pursuant to the Mining SEPP.
348. The Commission notes the revised modelling provided in the Applicant's submission dated 10 August 2020, and also the criticisms of that submission in the public submissions, claiming the revised modelling contains misleading claims and flawed analysis that overstate the case for the Project. The Commission finds that without a peer review of the revised modelling, less weight can be given to the revised model. Therefore, for the purpose of this assessment, the Commission has relied on the modelling in the EIS that has been assessed by the Department and its independent economics expert.

349. The Commission accepts that the expected economic benefits from the Project are as summarised in paragraphs 330 and 345, The Commission has considered the evidence provided by the Applicant, the Department's AR and the public submissions and finds, on balance, that the Project will provide a significant net economic benefit for the local community, region and the State through increased investment and economic activity, as well as securing existing and future industries through the provision of a local gas supply and increased gas supply to the East Australian market. The Commission also finds that the Project will result in direct benefits to the locality through the CBF, VPA and job creation.
350. The Commission notes that the Applicant has committed to supplying all of the Project's gas to the domestic market (paragraph 334) and that the Department has committed to including a condition to this effect in the relevant *Petroleum (Onshore) Act 1991* titles (paragraph 343). The Commission notes that this is not a relevant planning consideration under the EP&A Act and has therefore not imposed a condition to this effect.

7.11 Agriculture

Public Comments

351. With respect to submissions made to the Commission at the Public Hearing and during the period in which the Commission was accepting written comments, the community raised concerns about the following impacts on agriculture in the region:
- Potential impacts on groundwater supply affecting the capacity to supply stock and domestic and irrigation water, which could be detrimental for agricultural producers.
 - Potential contamination of groundwater (including the GAB) from well failure, leaking drill fluids and Produced Water, threatening the integrity and marketability of agricultural produce and therefore the agricultural viability of the region.
 - Insurance and insurability concerns, particularly for farmers with CSG infrastructure on their properties.
 - Reduction of agricultural investment in the region due to CSG operations creating uncertainty for the agricultural viability of the region.
 - Leakage of agricultural labour to the Project.

Council Comments

352. At its meeting with, and in Council's Response (paragraph 28), Council notes that it shares the concerns raised in the CSE Report that primary producers and others fear that CSG developments will negatively impact agricultural land by depleting aquifers and contaminating groundwater reserves, resulting in reduced food production.

Applicant's Consideration

353. Appendix K of the EIS provides an Agricultural Impact Statement to consider the impacts on agricultural land that could arise from the Project. The EIS identifies direct and indirect impacts on agricultural production during the construction and operation phases.
354. The EIS confirms the Project Area does not contain any Biophysical Strategic Agricultural Land under the Mining SEPP.

355. The EIS describes the direct impacts as the removal of land required for the construction of well pads and various storage and treatment facilities.
356. The EIS describes the indirect impacts as relating to the interruption of farming activities during construction and operation which could reduce agricultural production and therefore landholder profitability.
357. The Applicant states the direct and indirect impacts can be mitigated through various actions, including the maintenance of land and soil capability as well as groundwater and surface water integrity during and after the Project. The Applicant has committed to only placing CSG infrastructure on privately-owned land with the agreement of the landholder, and as part of those agreements the Applicant proposes to develop access agreements and farm management plans to ensure the coexistence of farming and CSG activities is managed effectively.
358. The EIS also commits to compensate for loss of production and/or increased costs caused by Project activities.
359. In the Applicant's Submission, the Applicant referred to advice from the Insurance Council of Australia that insurance providers were available to cover landholders with CSG infrastructure on their properties.
360. In its submission to the Commission dated 10 August 2020, the Applicant confirmed that farmers who host gas activities will continue to benefit from the combined effect of insurance, legislative protections, and indemnities provided by petroleum operators. The Applicant indemnifies landholders that host the Applicant's infrastructure for losses arising out of petroleum operations. This indemnity is provided in the Applicant's land access conduct and compensation agreement that is entered into with landholders prior to the commencement of activities.

Department's Assessment

361. The Department's analysis of groundwater security and contamination is summarised at sections 7.1 and 7.2 of this Statement of Reasons.
362. Ultimately, the Department is of the view that any impacts to groundwater can be appropriately managed and mitigated through the Recommended Conditions and therefore there are unlikely to be any significant impacts on the agricultural viability of the region.
363. The Department also notes at ARP 354 that the NSW Government has committed to a three-layered policy to provide safeguards for any risks associated with CSG activities, including security deposits for rehabilitation (under the *Petroleum (Onshore) Act 1991*); insurance/assurance mechanisms (under the *Protection of the Environment Operations Act 1997*) and the ongoing implementation of the Legacy Mine Program to deal with impacts from legacy wells.

Commission's Findings

364. The Commission has heard the concerns of farmers about the potential impacts of the Project on farming businesses, particularly with respect to potential impacts on the quantity and quality of water supplies. For this reason, the Commission has strengthened the Department's Recommended Conditions to:
 - require the groundwater model be updated to be generally in accordance with a Class 3 confidence level to reduce the uncertainty with respect to groundwater impacts;

- require that the Applicant must not commence Phase 2 of the development if the updated groundwater model predicts an exceedance of the water management performance measures;
 - place the burden of proof on the Applicant to demonstrate that any adverse and direct impact to a water supply is not due to the impacts of the Project; and
 - provide security for compensatory water supply to affected landowners.
365. With the imposition of these conditions, the Commission is satisfied that the Project is unlikely to have any significant impacts on the quantity and quality of water supplies to farming businesses.
366. The Commission has also imposed conditions to ensure that all drill cuttings, drilling fluids and salt waste must be removed from the Project Area and disposed of in a licensed waste facility capable of accepting those wastes to minimise the risk of groundwater contamination (paragraphs 250 - 253). The Commission has further conditioned that arrangements for wastes to be beneficially reused or disposed of at EPA licensed waste disposal facilities must be in place before the commencement of Phase 1 of the Project.
367. The Commission notes the community's concerns with respect to insurance and insurability concerning potential environmental liabilities associated with the Project. Recommendation 9 from the CSE Report was in the following terms:
- "That Government consider a robust and comprehensive policy of appropriate insurance and environmental risk coverage of the CSG industry to ensure financial protection short and long term. Government should examine the potential adoption of a three-layered policy of security deposits, enhanced insurance coverage, and an environmental rehabilitation fund."*
368. The Commission notes the Applicant holds an Environment Protection Licence (**EPL**) granted by the EPA in relation to the Applicant's existing activities, and that the EPL will be required to cover the activities of this Project. The EPA has statutory powers to require the holder of an EPL to ensure it maintains sufficient insurance to cover potential environmental liability risks: for example under s 72 of the *Protection of the Environment Operations Act 1997*.
369. Rather than attempting to draft a condition that might cover environmental liability or compensation risks associated with the Project, the Commission considers that the EPA (which is the lead regulator for the Project) is best placed to assess and ensure that the Applicant is appropriately placed to cover groundwater, spill, contamination, waste, fire and any other environmental risks associated with the Project.

7.12 Other issues

370. There were a range of other issues raised by those who presented to the Commission during the Public Hearing and in the many submissions received by the Commission. A number of the more frequently raised issues are discussed briefly in the following pages.

7.12.1 The Need to Consider Alternative Options

371. The Commission heard from many speakers at the Public Hearing about the benefits of generating energy from renewable sources including wind, solar, hydro and green hydrogen as opposed to fossil fuels such as oil, coal and gas which when burnt emit greenhouse gases and contribute to climate change.

372. The Commission notes the concerns from some members of the community that this Project will delay further investment in renewable energy projects and will lead to a proliferation of CSG projects in north-west NSW.
373. However, the task before the Commission is to determine whether to approve or refuse the Application as lodged, not to speculate about other means by which electricity may be generated to meet the State's energy needs. Further, the gas from this Project has uses other than generating power, including industrial uses and domestic heating.
374. The Commission notes that the Project is a permitted use under the relevant planning legislation (see Section 6.2). The Commission's obligation is to be satisfied with the permissibility and the merit of the Application before it, rather than to speculate about alternative power generation options that are not proposed or assessed in the Project application before the Commission.

7.12.2 Health Impacts

375. The Commission was asked to take into consideration the potential negative human health impacts associated with CSG production. Evidence provided to the Commission highlighted a potential connection between CSG operations and health impacts, including *"acute respiratory and cardiac issues, blood and immune disorders, neoplasms and neonatal issues, such as low birth rate and pre-term births"*.
376. Although concerns about potential health impacts were raised in numerous submissions, the Commission notes that NSW Health provided advice to the Department that the Project is predicted to comply with all applicable health-based criteria but that this should be validated through detailed monitoring (Table 6 of the Department's AR). The Department's AR also indicates NSW Health supports the Department's Recommended Conditions.
377. The Commission notes that many of the health concerns raised in submissions are anecdotally related to the practice of fracking and the chemicals involved in fracking, which is not proposed as part of the Project.
378. At ARP 592 to 595, the Department also describes its assessment of physical and mental health considerations and confirms it has Recommended Conditions requiring the Applicant to establish and consult with the CCC to monitor potential issues associated with the Project. The Department further notes the Field Development Protocol will be developed to avoid and minimise the potential impacts of the Project (ARP 27).
379. Given the lack of directly relevant evidence presented to the Commission as to the likely health impacts of the Project and the fact that NSW Health did not object to the Project, the Commission is satisfied that the Project is unlikely to be the source of significant health impacts on the local community. In drawing this conclusion, the Commission acknowledges the mental health impacts suffered by some local residents and others which have arisen over the past decade while the Project has been under investigation.

7.12.3 SEARs Not Adequately Addressed

380. The Secretary's Environmental Assessment Requirements (SEARs) are issued by the Department to guide the preparation of the EIS for State Significant Developments. The Commission heard from many speakers at the Public Hearing that the SEARs were not adequately addressed in the EIS and hence the EIS did not provide members of the public with the necessary information to properly inform them about the Project.
381. In order to ascertain whether the Department considered that the SEARs had been properly addressed, the Commission formally requested the Department to respond to this concern.

The Department's response (paragraph 28) stated that "*The Department undertook a comprehensive review of the contents of the Environmental Impact Statement (EIS) prior to accepting it for exhibition to ensure that it adequately addressed the Secretary's Environmental Assessment Requirements (SEARs), including the general requirements required under Schedule 2 Clauses 6 and 7 of the Environmental Planning & Assessment Regulation 2000. In undertaking this review, the Department was satisfied the EIS addressed the SEARs and incorporated the relevant information*" (page 26).

382. Consistent with the process envisaged under the relevant legislation, the Department also stated that it went on to seek additional information in relation to a broad range of technical issues from the Applicant as well as commissioning independent expert advice and liaising with Government departments and agencies. The Commission is therefore satisfied that the EIS did adequately address the SEARs as required and that the Department conducted further relevant investigations and consultation following the exhibition of the EIS in 2017.

7.12.4 Pipeline Options

383. The EIS for the Project refers to two pipeline options which could be considered in future as a means of transporting the gas to market, should the Project be approved. The Commission heard from many speakers at the Public Hearing about the concerns they hold in relation to potential and approved pipeline routes. Given that the Project may be the catalyst for these to be approved and potential pipelines to be constructed, the Commission was urged to refuse the Project.
384. However, the Commission notes that the Application does not include any proposed pipeline infrastructure. Therefore, it is beyond the scope of the Commission's deliberations to consider the benefits and costs of a future pipeline. The relevant approvals for any pipeline will need to be secured prior to the construction of that pipeline and that is the appropriate time for the assessment of the relevant environmental, social and economic impacts to be formally considered.
385. The Commission notes the uncertainties around the pipeline options and imposes the Department's recommended condition that Phase 2 of the Project cannot commence until planning approval has been granted for a pipeline and Phase 3 cannot commence until the approved pipeline is commissioned.

7.12.5 The Impacts on Siding Springs Observatory

386. Pursuant to clause 92(1)(d)(ii) of the Regulations, any State significant development on land less than 200km from Siding Springs Observatory (**Observatory**) must be assessed in relation to the *Dark Sky Guidelines*. As the Project is approximately 100km from the Observatory, the Commission has considered the *Dark Sky Guidelines*.
387. The Commission notes the proposed safety and pilot flares might adversely impact the Observatory.
388. The Applicant's RtS (at Appendix K) provides a Gas Flare Light Assessment to assess the light impacts of the proposed flares and their potential to contribute to skyglow that would affect observing conditions at the Observatory. The RtS notes the proposed flaring operations during both routine and non-routine scenarios would result in limited vertical light impacts, well below the Dark Sky Guidelines. The RtS also notes the flaring would contribute to horizontal skyglow within a narrow band but that this would have negligible impact on the Observatory's operations.
389. The RtS concludes that the safety flares may be visible on occasions from the Observatory but given they are infrequently used above a height of 1.5 metres that they are unlikely to

cause an impact on the long-term operation of the Observatory. The RtS also raised the potential for the Project to generate air quality impacts including dust and nitrogen dioxide which may have the potential to impact on the clarity of the night sky. The RtS states that these emissions are within regulatory requirements and given the distance of the Project from the Observatory, the observing conditions at night at the Observatory are likely to be unaffected.

390. At Table 6 of the Department's AR, the Department confirms potential light pollution was raised as a concern during the exhibition period. Following an additional lighting assessment, the Department notes the flaring operations would comfortably meet the Dark Sky Guidelines. The Department notes the Observatory requested the Applicant should be required to minimise routine flaring when the moon is more than 50% illuminated (a gibbous moon).
391. The Commission heard from the Director of the Observatory and Chair of the Observatory's Dark Sky Guidelines Committee, who notes *"If the project follows [the Dark Sky Guidelines], then it would be a satisfactory outcome from the perspective of the Observatory."*
392. The Commission notes, for the reasons outlined in paragraph 280, the flares associated with the pilot wells are not approved. Therefore, in considering potential impacts on the Observatory the Commission has taken into account the two safety flares.
393. In consideration of the evidence before it, the Commission is satisfied that the conditions imposed will ensure the Project is unlikely to have a detrimental impact on the operation of the Observatory.

7.12.6 Power Supply

394. The Applicant's EIS identifies two options to provide power to the infrastructure at Leewood and Bibblewindi, including connecting to the NSW power grid or the construction and operation of a gas-fired power station at Leewood. The Commission notes limited supporting documentation was provided with respect to the design and impact details of the Leewood gas-fired power generation facility.
395. The Department's AR did not comprise an assessment of the on-site power generation option, other than in terms of GHG emissions.
396. While the Commission does not oppose the on-site power generation facility at Leewood in principle, it finds that to enable a proper assessment of this component, additional details are required before approval could be granted. Therefore, the Commission does not grant approval for the on-site power generation facility at Leewood.

7.12.7 Noise and Vibration

397. The Applicant has committed to meeting key noise criteria at sensitive receiver locations, unless the relevant landowner agrees otherwise, and has demonstrated in its technical studies that this can be achieved. The Applicant has advised there is flexibility with the well locations and that they can be positioned to minimise noise and vibration impacts on sensitive receivers.
398. The Department addresses the matter of Noise and Vibration in Table 19 of the Department's AR. The Department notes some exceedances to noise criteria are predicted during non-routine operations at Leewood and Bibblewindi, affecting up to 15 receivers at Leewood and 2 at Bibblewindi.

399. The Department concludes these non-routine operations would occur infrequently, during emergencies and scheduled maintenance only. The Department advised that given the infrequent and short-term nature of these emergency and maintenance activities, the EPA and the Department accept that the predicted exceedances are unlikely to significantly impact the amenity of sensitive receivers. The Department has Recommended Conditions to mitigate noise impacts.
400. The Commission is satisfied with the findings of the Department and the EPA that the potential noise and vibration impacts are acceptable and manageable. The Commission has imposed the Department's Recommended Conditions requiring the Applicant to: implement all reasonable and feasible measures to comply with the noise criteria during non-routine operations; advise the public of scheduled maintenance activities; and prepare and implement a detailed Noise Management Plan for the Project, including a monitoring mechanism.

7.12.8 Air Quality

401. The Applicant's EIS provides an assessment of Air Quality at Appendix L to review the potential impacts of all pollutants generated by the Project. It is noted GHG emissions are discussed separately in section 7.3 above.
402. The EIS finds the main project emissions during construction to be dust, and during operation to be oxides of nitrogen. The Air Quality Assessment found all assessed emissions meet air quality criteria at sensitive receptors.
403. The Department (at ARP 584) notes the Applicant is committed to meeting air quality criteria at sensitive receiver locations and has Recommended Conditions requiring the Applicant to comply with a number of other locational criteria, including the proximity of Project related infrastructure to residences, privately owned land and the spacing of infrastructure.
404. The Commission is satisfied with the Department's assessment that the pollutant emissions associated with the Project would comply with the applicable criteria at sensitive receivers. The Commission has imposed conditions requiring the preparation of an Air Quality Management Plan, which provides an effective mechanism for monitoring and mitigating potential air quality impacts.

7.12.9 Worker's Accommodation

405. The Applicant's EIS describes proposed supporting infrastructure, including workers' accommodation at a private property located centrally in the Project Area, known as 'Westport'. The EIS indicates the site for the worker's accommodation was previously used during exploration and appraisal activities but is proposed for expansion under the project to provide accommodation for up to 200 workers.
406. The Commission notes the EIS includes a description of the facilities that would be included at the worker's accommodation, an indicative image of demountable buildings to be used and the footprint of the expansion. The Applicant did not provide a detailed design for the proposed worker's accommodation, or detailed servicing, bushfire management or evacuation management measures.
407. The Department's AR provides a limited consideration of the workers accommodation but includes a comment that by providing workers accommodation on site any adverse impacts on the housing market will be mitigated (page xvii).
408. The Commission is of the view that to enable a proper assessment of the worker's accommodation component of the Project, additional details are required. The Commission

does not oppose the workers accommodation in principle but does not support the design, servicing and safety measures being left to the post-approval stage. Therefore, the workers accommodation is not granted approval.

7.12.10 Traffic and Transport

409. The Applicant has provided a Traffic Impact Assessment at Chapter 22 and Appendix P of the EIS. The Traffic Impact Assessment was based on the peak construction period, which is expected to be the worst-case scenario with respect to traffic volumes.
410. The Applicant proposes to upgrade two intersections along the Newell Highway to provide access to the Project.
411. The EIS indicates, with these upgrades, the traffic generated would be within the functional class on all roads and the level of service at key intersections would be unaffected. The EIS concludes the Project would have low to negligible impacts on road network efficiency and is not expected to create significant delays.
412. The Department's AR agrees the road network is suitable for the Project subject to minor upgrades to two intersections. The Department's Recommended Conditions require the Applicant to prepare a Traffic Management Plan for the Project and consult with Transport for NSW prior to carrying out any works on the State road corridor.
413. The Department also notes the VPA with Council includes provision for local road upgrades through a road maintenance agreement. During the Department's assessment, Council and Transport for NSW (Roads and Maritime) did not raise any significant concerns.
414. The Commission is satisfied with the Department's assessment that the traffic generation impacts from the Project are acceptable subject to the two intersection upgrades, the preparation of a Traffic Management Plan for the construction and operational phases of the Project, and further consultation with the relevant agencies with respect to road related upgrades.

7.13 Objects of the EP&A Act and Public Interest

7.13.1 Objects of the EP&A Act

415. The Commission has assessed the Project against the relevant Objects of the EP&A Act.
416. The Commission notes that the CSG resources are located within existing exploration licence areas, are in saline aquifers that are largely not used for productive agriculture and are within seams that are permeable enough to not require fracking to release the gas. The Commission is of the view that the extraction of CSG as part of the Project is an efficient use of the land and represents a suitably managed use of the State's natural gas resources. The Commission is satisfied with the Department's assessment outlined in the Department's AR and finds that the Project will provide ongoing socio-economic benefits to the people of NSW, a diversification of industry in the Narrabri region, and ongoing employment opportunities for members of the local community. Further, the Project is likely to produce sufficient gas to meet up to 50% of NSW's gas demand. This would be in circumstances where currently only about 5% of NSW's gas demand is met from the State's own resources, and (absent this Project) is likely to reduce to nil by 2024. The Project therefore has the potential to contribute to gas security for NSW and could be available for the production of electricity and for use in homes and in NSW's industries and businesses. Therefore, the Project accords with Object (a).

417. The Commission is satisfied with the Department's assessment in the Department's Response (paragraph 28) and is of the view that the Project can be carried out in a manner that is consistent with the principles of ESD as set out in Section 7.13.2, thereby satisfying Object (b).
418. The Commission notes the Project is a permissible land use under the applicable planning policies and can be carried out in an orderly and economic manner, subject to the conditions, and achieves Object (c).
419. The conditions imposed by the Commission: seek to protect groundwater supply and quality through a suite of conditions designed to avoid serious or irreversible damage; and avoid, minimise and manage potential impacts on biodiversity and heritage and offset residual biodiversity impacts in accordance with the NSW and Commonwealth Government Policy. The Commission is satisfied Object (e) is achieved.
420. The Commission is satisfied with the Department's assessment and is of the view that the potential impacts on culturally significant resources can be managed and mitigated in consultation with key stakeholders under the conditions, thereby satisfying Object (f).
421. The Commission notes that the Department has consulted with the EPA, DPI-Water, BCD, Council and other agencies and has carefully considered all responses in its assessment. The Commission has also engaged with the Department, EPA, DPI-Water and Council and has considered the responses from NSW Government authorities. The Commission notes that the Department publicly exhibited the Application and the Commission has held a multi-day Public Hearing to hear the public's views on the Project. The Commission is satisfied Objects (i) and (j) are met.
422. For the reasons set out above, the Commission is of the view that the Project is in accordance with the Objects of the EP&A Act.

7.13.2 The Public Interest

423. Through the Public Hearing and submissions process, the Commission received a large volume of submissions made in objection to the Project. Objections were submitted by directly impacted community members, other individuals, experts, interest groups and bodies, and from within the local area, across NSW and from other jurisdictions. The Commission, like all consent authorities, must consider community concerns regarding development applications, however, the number of submissions that object to a Project is not the only measure of the public interest which the Commission is bound to consider.

Ecologically Sustainable Development.

424. As described in paragraph 70, the Commission was also encouraged in public submissions to refuse the Application on the grounds it does not satisfy the principles of ESD. It was submitted that a range of potential risks to the environment triggered or engaged the precautionary principle in a way that the proportionate response to those risks was said to be a determination of the Project by a refusal. As outlined in Section 7 of this Statement of Reasons, the Commission does not agree that the potential risks of the Project warrant a refusal.
425. Section 4.15 of the EP&A Act sets out matters that the Commission as decision maker is bound to take into account to the extent they are relevant to the determination of the Project. Included in the relevant matters are the likely impacts of the Project, including "environmental impacts" (s 4.15(1)(b)), and the "public interest" (s 4.15(1)(e)). The principles of ESD are relevant to the Commission's determination on an assessment of the "Key Impacts" (see from 7.1), as is reinforced by the objects of the EP&A Act which include the facilitation of

ESD (s 1.3(b)), and the protection of the environment (s 1.3(e)). The EP&A Act adopts the definition of ESD found in the *Protection of the Environment Administration Act 1991*, as follows:

ecologically sustainable development requires the effective integration of social, economic and environmental considerations in decision-making processes. Ecologically sustainable development can be achieved through the implementation of the following principles and programs:

- (a) the precautionary principle...*
- (b) inter-generational equity...*
- (c) conservation of biological diversity and ecological integrity.... and*
- (d) improved valuation, pricing and incentive mechanisms.*

426. The Commission has given consideration to the principles of ESD in its assessment of each of the “Key Impacts” as set out in Section 7. The aspects of ESD considered include those set out in the paragraphs immediately following.

(a) the precautionary principle;

427. The precautionary principle is triggered where both of the following preconditions are satisfied:

- a. There is a threat of serious or irreversible environmental damage; and
- b. There is scientific uncertainty as to the environmental damage.

428. The Commission has considered the evidence before it with respect to the potential for serious or irreversible harm, predominantly in association with groundwater contamination, water security, bushfire, greenhouse gas emissions, biodiversity and Aboriginal cultural heritage impacts. Based on the material before it, the Commission is of the view that the risk of the Project causing serious or irreversible environmental damage is low. The low level of the threat is such that the Commission does not consider that a proportionate response – in light of the benefits of the Project – would be refusal of the Project. All threats or risks to the environment that have been raised in the material and submissions before the Commission are capable of being mitigated and monitored by the conditions the Commission intends to impose on the Project.

429. The Commission notes that the nature of this Project means there is a small degree of uncertainty relating to its impacts due to the extent of information available on the deeper geology of the area and uncertainty due to the exact location of the well pads. The Commission has sought to reduce the level of uncertainty through the imposed conditions, including the requirement to improve the groundwater model to be generally in accordance with the features of a Class 3 confidence level.

430. The Commission is satisfied that the range and magnitude of the potential impacts has been appropriately categorised and assessed.

431. In this case, the monitoring and adaptive management approach recommended by the Department and imposed by the Commission in the conditions is appropriate to reduce or mitigate areas of uncertainty.

(b) inter-generational equity;

432. There are three principles that underpin intergenerational equity, namely the conservation of options (maintain the natural and cultural diversity), the conservation of quality (maintain

the quality of the earth) and the conservation of access (maintain access to the natural and cultural resources of the earth).

433. The Department's Response (paragraph 28) concludes that the Project is consistent with the principle of intergenerational equity because "*it can be carried out in a way that would maintain the health, diversity and productivity of the environment now and into the future*".
434. The Commission has considered the evidence before it and is satisfied that intergenerational equity has been appropriately considered and addressed for the reasons outlined below:
- The Project will use a relatively small amount of the region's water resources, in comparison with other agricultural water users in the region, and it will be extracted from the target coal seams;
 - Conditions requiring further groundwater modelling before proceeding with Phase 2 of the Project will provide greater certainty about the potential risks to groundwater from contamination and drawdown;
 - The Commission is satisfied the imposed conditions provide appropriate mechanisms for the identification, avoidance and management of potential risks;
 - All wastes associated with the Project will be managed in accordance with the waste hierarchy that underpins the *Waste Avoidance and Resource Recovery Act 2001* and relevant guidelines;
 - The Project will not disturb any strategic agricultural land;
 - All gas wells will be constructed, plugged and abandoned in accordance with the WIC to ensure they do not create a future liability or contamination of the region's natural resources;
 - The imposed conditions require the ongoing participation of the community and various advisory groups, which will ensure a consultative, adequately informed and rigorous process in developing the management plans for the Project.

(c) conservation of biological diversity and ecological integrity

435. For the reasons outlined in paragraphs 197 - 202, the Commission is satisfied, subject to conditions, the Project will not have any significant impacts on any listed threatened species or ecological communities. The imposed conditions provide appropriate mechanisms by which to identify, avoid and mitigate biodiversity impacts and require all residual biodiversity impacts to be offset in accordance with government policy.

(d) improved valuation, pricing and incentive mechanisms

436. The Commission is satisfied that under the imposed conditions, the Applicant is liable for any costs associated with mitigating and/or offsetting the impacts of the Project and for addressing any incidents or compensating landowners in the event of damage associated with the Project.
437. In summary, the Commission finds that the Project is consistent with the Objects of the EP&A Act, the Public Interest and the principles of ESD, because the Project, if approved, would achieve an appropriate balance between relevant environmental, economic and social considerations.

438. The Commission finds that on balance, and when weighed against the relevant climate change policy framework, objects of the EP&A Act, ESD principles and socio-economic benefits, the potential impacts associated with the Project are manageable, and the risks of adverse impacts on the environment are low. The likely benefits of the Project warrant the conclusion that an appropriately conditioned approval is in the public interest.

8 CONCLUSION: THE COMMISSION'S FINDINGS AND DETERMINATION

439. The views of the community were expressed through public submissions and comments received (as part of exhibition and as part of the Commission's determination process), as well as in oral presentations to the Commission at the Public Hearing (section 4.3). The public submissions have greatly assisted the Commission in critically examining the Department's assessment. The Commission has considered these submissions in weighing, among other factors, the assessed merits of the Project, the relevant planning instruments, policies and environmental protections, the impacts of the Project and the capacity to reasonably and satisfactorily mitigate and manage these impacts by imposing stringent conditions on the consent.
440. Based on its consideration of the Material before it (section 4.4), the Commission has determined to approve the Project but does not grant approval for the workers accommodation (paragraph 408), the Leewood power generation plant (paragraph 396) or the pilot well flares (paragraph 280). The reasons for the Commission's position (outlined in Section 7 above) are summarised as follows:
- The Project is consistent with the relevant Strategic Planning documents and the NSW Gas Plan;
 - The Project is permissible under the applicable EPIs;
 - The Project is located where the geology and hydrogeology are suitable for CSG development, subject to ongoing monitoring, management and mitigation as required by the conditions;
 - The Project has the potential to meet about 50% of the State's gas requirements, in circumstances where (absent the Project) NSW is unlikely to be able to meet any of its gas needs from the State's own resources by 2024.
 - The gas produced from the Project will potentially be available to meet some of the State's gas needs, including industrial and domestic uses.
 - The target coal seams are deep and saline (therefore not suitable for productive purposes) and are separated by thick layers of relatively impermeable rock (aquifers) which limits the potential impacts to the shallow, high quality productive aquifers;
 - Any potential groundwater impacts in terms of water security and contamination from the Project can be managed and mitigated through the conditions imposed by the Commission including the requirement for further modelling to a high confidence level that will assist in ensuring the connectivity between aquifers and permeability of the aquifers is understood prior to the commencement of Phase 2 of the Project;
 - Scope 1 and 2 emissions can be minimised through conditions that require any exceedance of the predicted emissions to be fully offset so that the Project delivers its expected emissions advantage from using CSG for electricity generation as compared to coal.
 - The Applicant will only undertake Project-related activities on privately-owned land with the agreement of the landowner;
 - The Commission has determined the conditions requiring the preparation of Management Plans to address impacts such as air quality and greenhouse gas emissions, water, biodiversity, Aboriginal cultural heritage, waste, bushfire, rehabilitation and social impacts are appropriate mechanisms to provide a rigorous framework for monitoring, management, mitigation and reporting on the various impacts associated with the Project;
 - The Commission is satisfied the conditions imposed provide an effective framework for adaptive management for the various issues, including the ability to shut down wells if necessary and to ensure best practice CSG operations are implemented;
 - The EPA has been appointed as the lead regulator, and the Commission is satisfied

- that the conditions imposed are reasonable and enforceable to minimise and mitigate risks associated with the Project;
- The imposed conditions will ensure the Applicant engages with the community, government agencies, Council and various advisory groups in preparing the management plans and the ongoing operations of the Project;
 - The Commission is satisfied the imposed conditions require the Applicant to make all relevant information publicly available as soon as possible.
 - The Project will deliver significant economic benefits for the people of NSW, including the diversification of industry for Narrabri and the surrounding region, employment opportunities, royalties and tax revenue for the NSW Government and direct funding for local infrastructure and community projects through the CBF and VPA.
 - Based on a consideration of all issues, risks and potential impacts, and subject to appropriate conditions the Commission is satisfied the Project is in the public interest.

441. Following its detailed deliberations, the Commission concludes the Project is in the public interest and that any negative impacts can be effectively mitigated with strict conditions. As set out above in paragraph 440, the Commission has determined that the consent should be **granted** subject to conditions, which are designed to:

- prevent, minimise and/or offset adverse environmental impacts;
- set standards and performance measures for acceptable environmental performance
- require regular monitoring and reporting; and
- provide for the on-going environmental management of the development.

442. The reasons for the Decision are given in this Statement of Reasons for Decision dated [30 September 2020](#).



Mr Stephen O'Connor (Chair)
Member of the Commission



Mr John Hann
Member of the Commission



Professor Snow Barlow
Member of the Commission