BAEconomics
Specialists in minerals, energy and agricultural economics
35 Endeavour Street, Red Hill, ACT Australia 2603

Stephen O'Donoghue
Team Leader, Resource Assessments
Department of Planning & Environment
320 Pitt Street,
Sydney, NSW 2000

Dear Stephen

Re: **Peer Review of the Economic Assessment (cost benefit analysis) and Economic Assessment (macroeconomic analysis) of the Santos NSW (Eastern) Narrabri Gas Project**

I have now completed my draft review of the reports entitled 'Narrabri Gas Project – Environmental Impact Statement Economic Assessment' prepared by GHD and 'Narrabri Gas Project Economic Impact Report' prepared by ACIL ALLEN Consulting. My draft review of these reports is based on versions that that are dated August 2016.

The GHD report consists of a cost benefit analysis designed to estimate the net benefits of the Narrabri Gas Project to the Australian community as a whole. The ACIL ALLEN report contains a general equilibrium analysis of the estimated project impacts on the Narrabri local government area, a region designated as 'Narrabri surrounds' and the rest of NSW. The reports set out the methodology that has been applied in making these assessments, states the assumptions made and includes a sensitivity analysis on key model parameters.

I have not, at this stage, had the benefit of discussing these reports with the authors.

I have been requested to review these reports in the light of the 'Guidelines for the economic assessment of mining and coal seam gas proposals', December 2015, published by the NSW Government. Among other matters those guidelines state that the cost benefit analysis of a project for planning purposes in NSW is 'used to assess the public interest by estimating the net present value of a project to the NSW community'. The NSW 'consent authority' is to have regard to (among other things) the impacts on the NSW community as part of its consideration of a proposal under the EP&A Act. The cost benefit analysis presented in the GHD report does not provide an estimate of the net present value of the project to the NSW community and therefore does not comply with the Guidelines. Taken together the GHD and the ACIL ALLEN reports may contain enough information to construct a cost benefit estimate for NSW but this is not at all clear from the reports as they are presented.

As already mentioned the ACIL ALLEN report provides a general equilibrium analysis of the estimated impacts of the project on NSW and regions within NSW together with some aggregate impacts on NSW as a whole. The modelling uses a well-established methodology, appears to

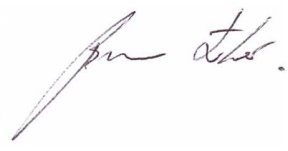
have been carefully done and gives plausible estimates of the likely impacts of the project (given the assumptions made). However, under the guidelines, the 'locality' for the purposes of completing the local effects analysis is defined as the Statistical Area Level 3 (SA3). It is often the case that a project's location and its 'connections' with the local community may not fall neatly within a given SA3 in which case analysis would be conducted and presented in the report to justify the choice of an alternative definition of the 'locality'. The ACIL ALLEN report does not contain such analysis and it is not clear why the consultant chose the regions as defined rather than the Narrabri-Moree SA3 in which the project is located.

In any revision of the economic assessment to ensure that it meets the Guidelines there appear to be a number of specific issues that need to be addressed as follows.

1. The share of foreign ownership of Santos needs to be clarified. I understand that Chinese entities control 15.1% of Santos which is not consistent with the assumptions made in the GHD and ACIL ALLEN reports. In addition, in the introductory chapter to the full EIS it is stated that the proponent (Santos NSW (Eastern) Pty Ltd 'on behalf of its joint venture partners' propose to develop the project. If there are joint venture partners that have foreign shareholdings then this also needs to be taken into account when estimating the benefits that would flow to the NSW community in the event of the project being approved.
2. There is considerable uncertainty regarding the likely trajectory of real east coast gas prices particularly over the short to medium term given the potential impact of possible Commonwealth government export controls and present low oil prices and their possible impact on the LNG market. The assessment would benefit from a careful consideration and discussion of these issues and perhaps testing against two or three different short to medium term gas price trajectories with the long term real price fixed at the 'consensus' projection.
3. In the preparation of a revised assessment it would be helpful to include a more detailed discussion of possible local community impacts of the project and mitigation measures that are planned. I note that the GHD cost benefit analysis has accounted for the cost impacts of additional construction traffic etc but the assessment would benefit from a more detailed discussion.

I recommend that the assessment be revised in the light of the above comments to ensure that it meets the NSW Assessment Guidelines. As part of the review process I am happy to have a detailed discussion with the authors about some of the key assumptions underlying the assessment, the methodology and any other pertinent matters if that is thought to be helpful.

Yours sincerely,



Brian S Fisher PhD DScAgr AO PSM FASSA
Managing Director

29 June, 2017

Santos Ltd
ABN 80 007 550 923
Santos Centre
GPO Box 1010
Brisbane Queensland 4001
Telephone: 61 7 3838 3000
Direct: 61 7 3838 3861
www.santos.com

24 April 2018

Mr Mike Young
Director Resource Assessments
NSW Department of Planning and Environment
GPO Box 39
Sydney NSW 2001

Dear Mr Young

Thank you for the opportunity to provide a response to BAEconomics' questions in relation to the Narrabri Gas Project. Attached is the responses that have been prepared in consultation with the relevant technical consultants for the project.

Santos would be happy to meet with BAEconomics to discuss the responses or provide further information as considered necessary.

Yours sincerely,

Neale House
Manager, Environment and Water
Santos Limited

Att. 1

Attachment 1: Response to BAEconomics' questions on the Narrabri Gas Project

Introduction and background

The Managing Director of BAEconomics, Dr Brian Fisher, was engaged to undertake a peer review of the two economics technical appendices within the Narrabri Gas Project Environmental Impact Statement (EIS). These were:

- Appendix U1: Economic Assessment (Cost Benefit Analysis) (GHD 2016); and
- Appendix U2: Economic Assessment (Macroeconomic Analysis) (ACIL Allen Consulting 2016).

Dr Fisher's letter report to the Department of Planning and Environment (DP&E), dated 29 June 2017, raised five issues which are addressed in our response below.

Issues raised

The first and second issues below relate to the NSW Government's December 2015 *Guidelines for the Economic Assessment of Mining and Coal Seam Gas Proposals* (NSW Department of Planning and Environment 2015) (hereafter referred to as *The Guidelines*). The remaining three issues seek additional explanation / substantiation over and above what is required in *The Guidelines*. The five issues may be summarised as follows:

1. The cost benefit analysis does not provide an estimate of the net present value of the project to the NSW community as recommended under *The Guidelines*.
2. The macroeconomic analysis undertaken to assess the local impacts of the project is not based on the Moree - Narrabri Statistical Area Level 3 (SA3) in which the project is located as recommended under *The Guidelines*.
3. The review sought clarification in relation to the share ownership of Santos.
4. Further discussion or scenario testing of the impact of alternative gas price trajectories.
5. Inclusion of more detail in relation to the possible local community impacts and the mitigation measures that are proposed.

Responses to the five issues are provided below.

1. Net present value of the project to the NSW community

The Guidelines require an estimate of the net present value of benefits to New South Wales, and for this purpose recommend the default attribution of 32 per cent of Australian domestic net benefits to New South Wales. The Economic Assessment (GHD 2016) (being Appendix U1 of the Narrabri Gas Project Environmental Impact Statement) that contained the cost benefit analysis, generally presents tabular information on net present values on a domestic basis without adjustment for the NSW share.

Appendix 1 to this memorandum sets out the cost benefit analysis summary tables that were contained in Appendix U1 of the EIS (GHD 2016) with additional entries showing the net present value to NSW. The text that has been added showing the net present value to NSW is set out in blue for ease of reference.

2. Definition of locality used to assess impacts on the local community

It is understood the intention of *The Guidelines* is to require an examination of how local people who may experience changes incurred from the project would be affected. As the project is located towards the southern extremity of the Moree – Narrabri Statistical Area 3, it was decided, consistent with the approach taken in similar projects[1], that the intent of *The Guidelines* would be best fulfilled by constructing a larger, custom locality that reflects the wider area likely to be affected by a project of this nature.

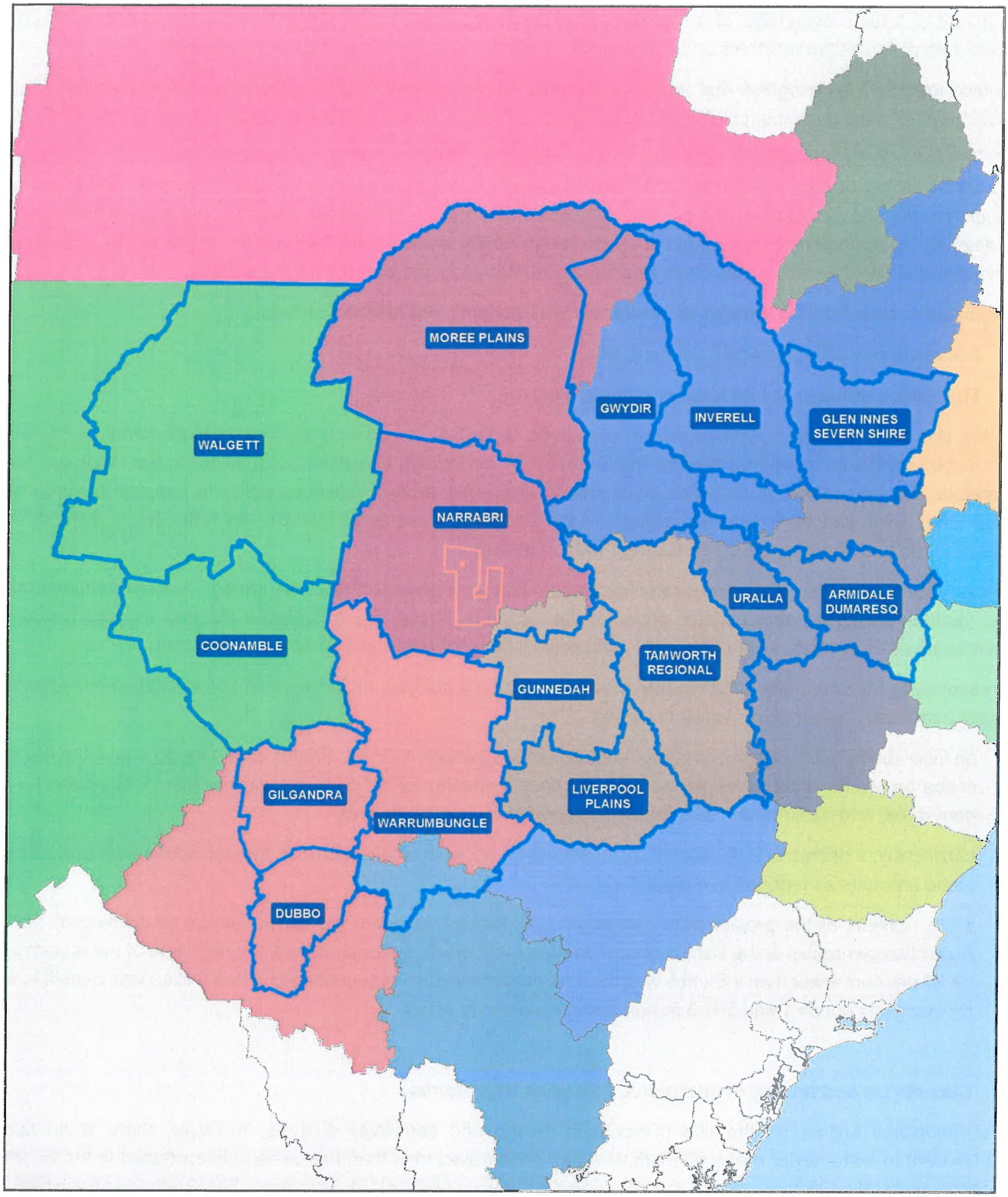
In that regard, the towns / local Government areas (LGAs) incorporated into the 'Narrabri and surrounds' locality assessed in the EIS were considered to be those with a realistic potential to be part of the project's direct local supply

[1] A number of economic assessments for resource proposal EISs have been conducted in New South Wales in the recent past on the basis of custom localities that best suited the expected impacts of each project. For example, Vickery Coal (2012) and Watermark Coal (2012) both used selected LGAs as the relevant locality, while Maules Creek (2011) used a combination of Statistical Local Areas (SLAs), which preceded the ABS' current geographical classification system using SA3s. The locality for the latter extends across the border of the current SA3s of Moree – Narrabri and Tamworth – Gunnedah.

chain, potentially providing labour, goods and services. This included towns with a population of more than two thousand people that are within a driving distance of 285 km from Narrabri, being a one day return trip to Narrabri. This allowed for the inclusion of the towns of Dubbo (with a population of over 30,000 people and a driving distance to Narrabri of around 277 km) and Armidale (with a population of over 20,000 people and a driving distance of approximately 283 km to Narrabri). On this basis, the 'Narrabri and surrounds' locality was constructed using 15 Local Government Areas (LGAs), including those in the Moree – Narrabri Statistical Area 3 (SA3) in which the project area is located. The LGAs included were:

- Narrabri
- Armidale-Dumaresq
- Coonamble
- Dubbo
- Gilgandra
- Moree Plains
- Uralla
- Warrumbungle
- Glen Innes-Severn
- Gunnedah
- Gwydir
- Inverell
- Liverpool Plains
- Tamworth Regional
- Walgett

The 15 LGAs are shown on Figure 1, below, which also shows their spatial relationship to the Statistical Areas - Level 3, including the Moree-Narrabri Statistical Area – Level 3.



LEGEND

Project area

Local Government Areas (LGA)

LGA Label

2011 SA3 (ABS)

- Armidale
- Bourke - Cobar - Coonamble
- Clarence Valley
- Coffs Harbour
- Darling Downs (West) - Maranoa
- Dubbo
- Granite Belt
- Inverell - Tenterfield
- Kempsey - Nambucca
- Lithgow - Mudgee
- Moree - Narrabri
- Tamworth - Gunnedah
- Taree - Gloucester
- Upper Hunter

0 20 40 80

Kilometers

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Narrabri Gas Project

Job Number 21-22463
Revision A
Date 19 Sep 2017

Economic area of influence considered in the Narrabri Gas Project EIS

Figure 1

G:\21\22463\GIS\Maps\21_22463_Z160.mxd

Data source: Data Custodian, Data Set Name/Title, Version/Date. Created by: afoddy

Level 15, 133 Castlereagh Street Sydney NSW 2000 T 61 2 9239 7100 F 61 2 9239 7199 E sydmail@ghd.com.au W www.ghd.com.au

3. Impact of share of domestic ownership

The Guidelines require analysis of net benefits flowing to Australian residents and therefore some understanding of the extent of foreign ownership of the project. The Economic Assessment (GHD 2016) was undertaken from the perspective of Australian residents and is therefore consistent with *The Guidelines* in this respect.

It is also important to recognise that an EIS is a 'point-in-time' assessment. It is routinely necessary during impact assessment to make a number of informed assumptions, which is the case for the Economic Assessment (GHD 2016) that uses modelling to estimate economic impacts from the project.

The actual values of data represented by these assumptions are dynamic and subject to change throughout time, including during the assessment and operational phases of a project. Meaningful modelling results can therefore best be attained by apportioning a reasonable range within which those appropriate values might lie, then testing the significance of changes within that range to generate outcomes of the economic assessment.

Assumptions made for the purposes of conducting the Economic Assessment included:

- Australian ownership being 87 per cent; and
- The Santos group as the beneficiary of the project.

Santos, like many Australian publically listed companies, is partially owned by non-domestic institutional investors and, as a public company, its shares may be freely traded by individuals and other companies on the stock exchange. Therefore, the percentage of domestic ownership is constantly in flux. Whilst recognising this, the assumption of 87 per cent Australian ownership was utilised in the Economic Assessment which was reflective of Santos' share registry at the time the Economic Assessment was undertaken.

Santos NSW (Eastern) Pty Ltd, is the project proponent on behalf of its joint venture partners. Similar to shareholdings, joint venture arrangements of major projects often change throughout a project's life and in accordance with commercial arrangements, financial benefits of a project may not necessarily follow title interests.

In response to the comments made in the review, a sensitivity analysis undertaken on the Australian ownership and project beneficiary assumptions which finds that:

- an increase from 87 per cent to 92 per cent Australian ownership of the Santos group would cause the net value of the project to NSW to increase by six per cent (equating to $24.6 million less for electricity option 1 - self-generated, and $26.2 million less for electricity option 2 - grid supplied);
- conversely, a decrease in Australian ownership to 82 per cent would decrease the net value of the project by the same amounts as reported in dot point one; and
- if the benefits of the project were shared 80 / 20 per cent between the Santos group (assuming 87 per cent Australian ownership of the Santos group) and another non-domestic company, the net value of the project would be 20 per cent lower than if Santos was the sole project beneficiary (equating to $85.5 million less benefit to NSW for electricity option 1 and $91.3 million less for electricity option 2).

4. Discussion and testing of alternative gas price trajectories

The Guidelines encourage the use of scenario testing and sensitivity analysis, however, there is no specific requirement to test a wider range of alternative gas price trajectories than has already been tested in the Economic Assessment for the EIS that contains the cost-benefit analysis (GHD 2016). Therefore, *The Guidelines* have been met with regard to scenario testing and sensitivity analysis.

Specifically, the cost benefit analysis (in which the alternative, lower gas price was tested) established the net benefits of the project to Australia, New South Wales and the locality. The Economic Assessment (GHD 2016) was progressed on the assumption that if the gas price was so low that net benefits were expected to be negative, the project would be unlikely to proceed.

Further, the Economic Impact Analysis (ACIL Allen 2016) provides an estimate of the project's wider economic benefits, including income and employment flow-on effects. Variations in the gas price will have direct impacts on the project's revenue stream and on taxes and royalties, and indirectly on Gross State Product (GSP) via industries that use gas. However, the most significant part of local impact will likely occur via construction, operation and employment in the locality, which (provided the project remains economically feasible) is largely independent of gas prices.

Consistent with the standard approach to impact assessment, the cost benefit analysis was conducted on the project's maximum production of 200 terajoules per day and associated infrastructure. In practice, the project would be developed progressively allowing for scaled development of project infrastructure and preferential targeting of high yield zones within target seams that could reduce capital and operating expense relative to produced benefits.

Acknowledging the potential for scalability in project implementation, the Economic Assessment (GHD 2016) considers various scenarios, including that of a reduced gas price. Scenarios applying a 10 per cent, 20 per cent and 30 per cent reduction in gas price were analysed and reported. Other scenarios were also considered in the sensitivity analysis including increased discount rate, decreased production and increased capital and operating costs. The results of these sensitivity analyses were also presented in the Economic Assessment (GHD 2016).

In analysing the economic impact of the Narrabri Gas Project, it was assumed that the project did not add to total gas supply at a national level. Rather, it was assumed that it benefited energy security in NSW by being an alternative to new gas supply located outside of NSW. Therefore, it was assumed that the project itself did not drive changes to gas market prices. In effect, the project was a price taker and not a price maker.

Gas price variations will directly affect the "bottom line" for Santos. Higher gas prices than those assumed in the modelling will increase profits, while those below the prices assumed will decrease profits. In the economic modelling, profits are distributed amongst stakeholders, being shareholders, Governments (State and Federal) and the community (as a result of the Gas Community Benefit Fund). Changes to this distribution will have both direct and indirect impacts as the changed distributions are spent.

In terms of wider economic impact, lower gas prices in the East Coast market would have beneficial effects on industries that use gas. Computable general equilibrium (CGE) analysis that included price reductions resulting from a gas supply project would generate additional benefits due to increased industry competitiveness.

For context, the development of an export liquefied natural gas (LNG) market has changed the east coast gas market. Prior to 2009, the Cooper Basin in South Australia and the Gippsland and Otway Basins in Victoria provided gas to NSW via the main transmission pipelines (the Moomba to Sydney Pipeline and the Eastern Gas Pipeline). In recent years, natural gas from coal seams in eastern Queensland has augmented supply to NSW. However, with LNG shipments from Gladstone now underway, this has changed. Exports of LNG have increased from zero to around 1,300 petajoules (PJ). This export demand is effectively 'locked in' by long-term contracts between LNG suppliers and their customers. The volume of gas tied up in these export arrangements exceeds total domestic consumption in eastern Australia, which is around 590 PJ per annum – of which about 22 per cent is consumed in NSW.

Historically, approximately 40 per cent of NSW's natural gas came from the Cooper Basin in South Australia, approximately 55 per cent has come from Victoria, and up to 5 per cent has come from supplies in NSW. From 2017, a major shift occurred when all three LNG facilities in Queensland reached stable production levels. The majority of the gas that was previously contracted from the Cooper Basin is no longer available to supply NSW, as it has been contracted to meet some of the supply requirement of the Queensland LNG facilities.

Energy company AGL has also announced it will not develop its coal seam gas assets in NSW, including its proposed Gloucester Project, which had the capacity to supply around 15 per cent of NSW's gas needs. AGL have also announced its Camden natural gas field will cease production in 2023, ten years earlier than expected. As the only producing natural gas field in NSW, closure of Camden could result in NSW importing 100 per cent of its gas from interstate.

The absence of alternative sources of gas going forward, coupled with the diversion of gas from the Cooper Basin to fulfil LNG export contracts, means NSW will require the vast majority of its gas to be supplied from Victoria. This reliance on a single supply source may pose significant security of supply risk in the event of an interruption, as occurred in 1998 when there was an event at Longford gas plant in Victoria that resulted in severe gas shortages across the state.

The proposed new pipeline connecting the Northern Territory with eastern gas markets is also unlikely to provide NSW with access to a new gas source. The Northern Gas Pipeline will connect Tennant Creek to Mt Isa through a small capacity pipeline, suitable only to meet the needs of Mt Isa. It is unlikely that NSW will benefit from this development due to the capacity of the pipeline, the distance that the gas would need to travel, and the associated cost.

Annual gas demand in NSW is estimated at 127,850 TJ in 2017 (AEMO 2017) and is divided between:

- Gas-powered electricity generation facilities comprising 17 per cent of demand compared to seven per cent in Victoria, although this share is forecasted to reduce as gas supply tightens.
- The residential and commercial sector, which includes homes and small to medium sized businesses, comprised 39 per cent of NSW demand in 2017 and is forecast to remain steady. Residential and commercial use in NSW as a proportion of total demand is the second highest in eastern Australia, reflecting its importance as an energy source for homes and businesses.
- Other large industrial users who consume more than 10 TJ each per year. It is this segment that will result in the biggest impact for the NSW economy as a whole. Industrial demand reduced from 66.9 PJ in 2010 to 52.6 PJ in 2015. It is this decline in the manufacturing and industrial segment that has raised concerns by industry and Governments. As a result, industry associations, major gas users and the Commonwealth Government have called for more supply to be made available to maintain supply security in NSW, and put downward pressure on prices.

Gas prices in the eastern Australia gas market have increased in recent years as the export LNG market has opened up. Prices may rise further due to uncertainty over the development of future gas projects. East coast residential and commercial sector long–term gas price forecasts published by AEMO (2017) range between 7.5 and 9.5 $/GJ.

Since the release of the Narrabri Gas Project EIS, AEMO has released a further update to the 2017 *Gas Statement of Opportunities* where the predictions for gas shortfalls was significantly increased. In the update, AEMO (AEMO 2017a) stated:

In real terms and based on no further response to today's information, the projected shortfall risk for 2018 is between 54 petajoules (PJs) to 107 PJs, and in 2019 between 48 PJs to 102 PJs. To put this into context, total projected demand for domestic gas is expected to be approximately 642 PJs in 2018, and 598 PJs in 2019.

The Australia Competition and Consumer Commission confirmed this outlook in their *Gas Inquiry 2017–2020 Interim Report* in September 2017 (ACCC 2017). The updated outlook similarly increased the urgency for additional new gas supplies, highlighting the critical strategic need for the Narrabri Gas Project.

Rod Sims, as Chairman of the Australian Competition and Consumer Commission, on the release of the *Gas Inquiry 2017–2020 Interim Report* (ACCC 2017), stated:

Steps are needed to address the underlying problems of lack of gas supply and lack of diversity of suppliers in the east coast gas market. Supply-side solutions are needed to bring more supply and suppliers into the domestic market, particularly in the southern states.

In the gas market, the 'southern states' are considered anything south of Queensland. The project meets the criteria that the Australia Competition and Consumer Commission have identified for essential supply side solutions and would accordingly address gas supply issues for NSW.

The Narrabri Gas Project EIS reports that the project has the potential to supply up to 200 terajoules of natural gas per day; which is sufficient gas to meet up to half of NSW's natural gas demand. The EIS states that the gas would be made available to the NSW market via a high-pressure gas transmission pipeline which would connect to the existing Moomba to Sydney gas pipeline.

With regard to the gas being directed to export markets via Gladstone in Queensland and its potential impact on domestic users, in October 2017, the Prime Minister announced the National Energy Guarantee (NEG). Under this initiative, a range of energy solutions are championed as the Australian energy system transitions.

The NEG notes an ongoing role for coal, gas, wind, solar, batteries and hydro power in the nation's mix. This includes 'secured agreements from gas companies, including Santos, to ensure there is enough gas for Australian consumers before it is shipped overseas, helping to keep prices down and covering any projected shortfalls over the next two years' (i.e. the Gas Supply Commitment backed by the safety net of the Australian Domestic Gas Security Mechanism). Therefore, since lodgement of the Narrabri Gas Project EIS, there are now Commonwealth Government policies in place that would ensure the east coast market retains sufficient gas to keep prices in check for consumers.

5. Mitigation measures for adverse community impacts

The Guidelines require an economic assessment of environmental and social impacts of the locality. Clearly, any proposed mitigation measures would provide positive offsetting benefits. The Economic Assessment meets these requirements (refer to Table 2-2 on page 10 of GHD (2016) for details).

Potential impacts to the community and associated mitigation and management measures were discussed in detail in the Social Impact Assessment (EIS Appendix T1 – GHD 2016a). Overall the assessment found that the potential social impacts such as impacts to landholders, community values and social infrastructure, and housing and accommodation would be readily manageable while there would be significant economic benefits at the local, regional and state scales including employment, income generation and broader economic output.

The Social Impact Assessment found potential impacts to landholders could be mitigated and managed through measures such as the negotiation and implementation of Land Access Agreements and Farm Management Plans for landholders that wished to host activities on their land. It found that potential impacts to community values and social infrastructure would be minor and managed through workforce management strategies such as a Workers Code of Conduct and Worker Health and Safety Management Plan. It also stated that the proponent would engage with relevant service providers and local councils regarding the housing and accommodation of the workforce to ensure potential impacts are identified, mitigated and managed.

Social impacts will be monitored through the development and implementation of a Social Impacts Management Plan.

The Economic Assessment (GHD 2016) quantified costs for residual social and environmental risks as determined from the environmental assessment as far as was reasonably practicable. Costs were based on known management and mitigation measures required and committed to in the EIS by the proponent. For example, traffic impacts are described and amelioration costs quantified in the Economic Assessment (GHD 2016). Further details are referenced to the Traffic Impact Assessment technical appendix (EIS Appendix P – GHD 2016b). The Economic Assessment also considers separately a number of potential local impacts that are not quantified.

Other quantified costs as described in Table 2-2 of GHD (2016) include foregone agricultural production, foregone forestry production, noise impacts, net greenhouse gas impacts and ecosystem / biodiversity loss, Where the impact assessment process considered there to be a negligible residual impact, and therefore, only routine management and mitigation measures were required, no additional costs were included in the cost-benefit analysis.

Other unquantified local benefits are identified that may include increased youth population as a result of the change in employment opportunities, an increase in employment requiring specific skills and a reduction in poverty. The latter benefits may or may become significant in the Narrabri area as a result of the project, but are identified in peer-reviewed research based on existing coal seam gas producing areas in Queensland.

The Social Impact Assessment (GHD 2016a) also discussed local and community benefits arising from the proposed development.

References:

ACIL Allen (2016). *Narrabri Gas Project – Environmental Impact Assessment. Economic Impact Report.* 56 pp.

Australian Competition and Consumer Commission (ACCC) (2017). *Gas Inquiry 2017-2020 Interim Report*. Accessed at https://www.accc.gov.au/system/files/ACCC%20gas%20inquiry%20first%20interim%20report%20%20September%202017%20-%20FINAL.PDF

Australian Energy Market Operator (AEMO) (2017). *Gas Statement of Opportunities*. Accessed at https://www.aemo.com.au/Gas/National-planning-and-forecasting/Gas-Statement-of-Opportunities

Australian Energy Market Operator (AEMO) (2017a). *Update to gas statement of opportunities*. Accessed at https://www.aemo.com.au/-/media/Files/Gas/National_Planning_and_Forecasting/GSOO/2017/2017-Gas-Statement-of-Opportunities---Update.pdf

GHD (2016). *Narrabri Gas Project – Environmental Impact Assessment. Economic Assessment*. 44 pp.

GHD (2016a). *Narrabri Gas Project – Social Impact Assessment.* 117 pp.

GHD (2016b). *Narrabri Gas Project – Traffic Impact Assessment.* 132 pp.

Measham T.G. and Fleming D.A. (2014) Impacts of unconventional gas development on rural community decline. *Journal of Rural Studies*, Vol 36, pp 376-385.

NSW Department of Planning and Environment (2015). *Guidelines for the Economic Assessment of Mining and Coal Seam Gas Proposals.*

Appendix 1: Revised Cost Benefit Analysis results

Table 1 Summary of the Cost Benefit Analysis Results

Category of cost/benefit ($2016/17 million) (discounted at 7% discount rate)	Electricity Option 1 (Self-generated)	Electricity Option 2 (Grid supplied)
Costs		
Capital costs	2,004.3	2,004.3
Operating costs	1,578.0	1,578.0
Foregone agricultural production	3.1	3.1
Noise and vibration costs	1.7	1.7
Biodiversity offsets	43.5	43.5
Social cost of carbon	267.5	164.0
Residual value (land and infrastructure)	0.0	0.0
Total project costs	**3,898.1**	**3,794.6**
Benefits		
Project revenue	5,403.4	5,403.4
Additional agricultural output (amended water)	0.8	0.8
Compensation to landholders	29.7	29.7
Total project benefits	**5,433.9**	**5,433.9**
Project net present value	**1,535.8**	**1,639.3**
Project benefit-cost ratio	**1.39**	**1.43**
Additional measures		
Australian net present value	1,336.1	1,426.2
Australian benefit-cost ratio	1.34	1.38
NSW net present value	427.6	456.4
NSW benefit-cost ratio	1.11	1.12
Existing assumptions		
Domestic ownership ratio	87%	87%
NSW proportion	32%	32%

Note: Figures may not add up due to rounding.

Table 2 Summary of the Cost Benefit Analysis Results under various discount rate assumptions

Category of cost/benefit ($2016/17 million) (discounted at 7% discount rate)	Electricity Option 1 (Self-generated)		Electricity Option 2 (Grid supplied)	
	at 4% discount rate	at 10% discount rate	at 4% discount rate	at 10% discount rate
Costs				
Capital costs	2,333.7	1,757.4	2,333.7	1,757.4
Operating costs	2,229.7	1,161.5	2,229.7	1,161.5
Foregone agricultural production	4.1	2.4	4.1	2.4
Noise and vibration costs	2.4	1.2	2.4	1.2
Biodiversity offsets	44.7	42.3	44.7	42.3
Social cost of carbon	377.4	198.7	225.1	125.6
Residual value (land and infrastructure)	0.0	0.0	0.0	0.0
Total project costs	**4,991.9**	**3,163.5**	**4,839.6**	**3,090.4**
Benefits				
Project revenue	7,733.9	3,914.0	7,733.9	3,914.0
Additional agricultural output (amended water)	1.1	0.6	1.1	0.6
Compensation to landholders	42.1	22.0	42.1	22.0
Total project benefits	**7,777.1**	**3,936.7**	**7,777.1**	**3,936.7**
Project net present value	**2,785.2**	**773.1**	**2,937.5**	**846.2**
Project benefit-cost ratio	**1.56**	**1.24**	**1.61**	**1.27**
Additional measures				
Australian net present value	2,423.1	672.6	2,555.6	736.2
Australian benefit-cost ratio	1.49	1.21	1.53	1.24
NSW net present value	775.4	215.2	817.8	235.6
NSW benefit-cost ratio	1.16	1.07	1.17	1.08
Existing assumptions				
Domestic ownership ratio	87%	87%	87%	87%
NSW proportion	32%	32%	32%	32%

Note: Figures may not add up due to rounding.

Table 3 Summary of the Cost Benefit Analysis Results under a 10 per cent reduction in production estimates

Category of cost/benefit ($2016/17 million) (discounted at 7% discount rate), 10 % reduction in gas production estimates across all years	Electricity Option 1 (Self-generated)	Electricity Option 2 (Grid supplied)
Costs		
Capital costs	2,004.3	2,004.3
Operating costs	1,578.0	1,578.0
Foregone agricultural production	3.1	3.1
Noise and vibration costs	1.7	1.7
Biodiversity offsets	43.5	43.5
Social cost of carbon	267.5	164.0
Residual value (land and infrastructure)	0.0	0.0
Total project costs	**3,898.1**	**3,794.6**
Benefits		
Project revenue	4,863.1	4,863.1
Additional agricultural output (amended water)	0.8	0.8
Compensation to landholders	29.7	29.7
Total project benefits	**4,893.6**	**4,893.6**
Project net present value	**995.5**	**1,099.0**
Project benefit-cost ratio	**1.26**	**1.29**
Additional measures		
Australian net present value	866.1	956.1
Australian benefit-cost ratio	1.22	1.25
NSW net present value	277.1	306.0
NSW benefit-cost ratio	1.07	1.08
Existing assumptions		
Domestic ownership ratio	87%	87%
NSW proportion	32%	32%

Note: Figures may not add up due to rounding.

Table 4 Summary of the Cost Benefit Analysis Option 1 Results under a 10-30 per cent reduction in gas price estimates

Category of cost/benefit ($2016/17 million) (discounted at 7% discount rate)	Electricity Option 1 (Self-generated)		
	10 % reduction in the real gas price across all years	20 % reduction in the real gas price across all years	30 % reduction in the real gas price across all years
Costs			
Capital costs	2,004.3	2,004.3	2,004.3
Operating costs	1,578.0	1,578.0	1,578.0
Foregone agricultural production	3.1	3.1	3.1
Noise and vibration costs	1.7	1.7	1.7
Biodiversity offsets	43.5	43.5	43.5
Social cost of carbon	267.5	267.5	267.5
Residual value (land and infrastructure)	0.0	0.0	0.0
Total project costs	**3,898.1**	**3,898.1**	**3,898.1**
Benefits			
Project revenue	4,863.1	4,322.7	3,782.4
Additional agricultural output (amended water)	0.8	0.8	0.8
Compensation to landholders	29.7	29.7	29.7
Total project benefits	**4,893.6**	**4,353.2**	**3,812.9**
Project net present value	**995.5**	**455.1**	**-85.2**
Project benefit-cost ratio	**1.26**	**1.12**	**0.98**
Additional measures			
Australian net present value	866.1	395.9	-74.1
Australian benefit-cost ratio	1.22	1.10	0.98
NSW net present value	277.1	126.7	-23.7
NSW benefit-cost ratio	1.07	1.03	0.99
Existing assumptions			
Domestic ownership ratio	87%	87%	87%
NSW proportion	32%	32%	32%

Note: Figures may not add up due to rounding.

Table 5 Summary of the Cost Benefit Analysis Option 2 Results under a 10-30 per cent reduction in gas price estimates

Category of cost/benefit ($2016/17 million) (discounted at 7% discount rate)	Electricity Option 2 (Grid supplied)		
	10 % reduction in the real gas price across all years	20 % reduction in the real gas price across all years	30 % reduction in the real gas price across all years
Costs			
Capital costs	2,004.3	2,004.3	2,004.3
Operating costs	1,578.0	1,578.0	1,578.0
Foregone agricultural production	3.1	3.1	3.1
Noise and vibration costs	1.7	1.7	1.7
Biodiversity offsets	43.5	43.5	43.5
Social cost of carbon	164.0	164.0	164.0
Residual value (land and infrastructure)	0.0	0.0	0.0
Total project costs	**3,794.5**	**3,794.5**	**3,794.5**
Benefits			
Project revenue	4,863.1	4,322.7	3,782.4
Additional agricultural output (amended water)	0.8	0.8	0.8
Compensation to landholders	29.7	29.7	29.7
Total project benefits	**4,893.5**	**4,353.2**	**3,812.9**
Project net present value	**1,099.0**	**558.7**	**18.4**
Project benefit-cost ratio	**1.29**	**1.15**	**1.00**
Additional measures			
Australian net present value	956.1	486.1	16.0
Australian benefit-cost ratio	1.25	1.13	1.00
NSW net present value	306.0	155.5	5.1
NSW benefit-cost ratio	1.08	1.04	1.00
Existing assumptions			
Domestic ownership ratio	87%	87%	87%
NSW proportion	32%	32%	32%

Note: Figures may not add up due to rounding.

Table 6 Summary of the Cost Benefit Analysis Results under a 10 per cent reduction in gas production and gas price estimates

Category of cost/benefit ($2016/17 million) (discounted at 7% discount rate), 10 % reduction in gas production and gas price estimates across all years	Electricity Option 1 (Self-generated)	Electricity Option 2 (Grid supplied)
Costs		
Capital costs	2,004.3	2,004.3
Operating costs	1,578.0	1,578.0
Foregone agricultural production	3.1	3.1
Noise and vibration costs	1.7	1.7
Biodiversity offsets	43.5	43.5
Social cost of carbon	267.5	164.0
Residual value (land and infrastructure)	0.0	0.0
Total project costs	**3,898.1**	**3,794.6**
Benefits		
Project revenue	4,376.8	4,376.8
Additional agricultural output (amended water)	0.8	0.8
Compensation to landholders	29.7	29.7
Total project benefits	**4,407.3**	**4,407.2**
Project net present value	**509.2**	**612.7**
Project benefit-cost ratio	**1.13**	**1.16**
Additional measures		
Australian net present value	443.0	533.0
Australian benefit-cost ratio	1.11	1.14
NSW net present value	141.8	170.6
NSW benefit-cost ratio	1.04	1.04
Existing assumptions		
Domestic ownership ratio	87%	87%
NSW proportion	32%	32%

Note: Figures may not add up due to rounding.

Table 7 Summary of the Cost Benefit Analysis Results under a 10 per cent increase in capital and operating costs

Category of cost/benefit ($2016/17 million) (discounted at 7% discount rate), 10 % increase in CAPEX and OPEX estimates across all years	Electricity Option 1 (Self-generated)	Electricity Option 2 (Grid supplied)
Costs		
Capital costs	2,425.3	2,425.3
Operating costs	1,909.4	1,909.4
Foregone agricultural production	3.1	3.1
Noise and vibration costs	1.7	1.7
Biodiversity offsets	43.5	43.5
Social cost of carbon	267.5	164.0
Residual value (land and infrastructure)	0.0	0.0
Total project costs	**4,650.5**	**4,547.0**
Benefits		
Project revenue	5,403.4	5,403.4
Additional agricultural output (amended water)	0.8	0.8
Compensation to landholders	32.7	32.7
Total project benefits	**5,436.9**	**5,436.9**
Project net present value	**786.4**	**889.9**
Project benefit-cost ratio	**1.17**	**1.20**
Additional measures		
Australian net present value	684.2	774.2
Australian benefit-cost ratio	1.15	1.17
NSW net present value	218.9	247.7
NSW benefit-cost ratio	1.05	1.05
Existing assumptions		
Domestic ownership ratio	87%	87%
NSW proportion	32%	32%

Note: Figures may not add up due to rounding.

BAEconomics
Specialists in minerals, energy and agricultural economics
35 Endeavour Street, Red Hill, ACT Australia 2603

Stephen O'Donoghue
Team Leader, Resource Assessments
Department of Planning & Environment
320 Pitt Street,
Sydney, NSW 2000

Dear Stephen

Re: **Review of Response to Comments on the Economic Assessment (cost benefit analysis) and Economic Assessment (macroeconomic analysis) of the Santos NSW (Eastern) Narrabri Gas Project**

I have now had the opportunity to review the response from Santos (dated 24 April 2018) regarding the questions I raised in my review of the economic assessment of the project in June 2017 undertaken in the light of the 'Guidelines for the economic assessment of mining and coal seam gas proposals', December 2015, published by the NSW Government.

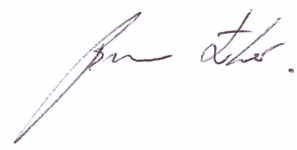
In my original review I pointed out that the GHD cost benefit analysis designed to estimate the net benefits of the Narrabri Gas Project to the Australian community as a whole did not satisfy the guidelines because it did not directly provide an estimate of the benefits of the project to the NSW community. Santos has now provided an estimate of the net benefits of the project to NSW which meets the guidelines. In my opinion, given the methodology used to reach the new estimate, it is likely that the estimated net benefits of the project to NSW have been under-stated. In other words, it is likely that the estimate provided is conservative because the methodology does not account for the trade effects between NSW and the remaining Australia states and territories.

The original ACIL ALLEN report on the local effects of the project contained a general equilibrium analysis of the estimated project impacts on a region designated as 'Narrabri surrounds' and the rest of NSW. As pointed out in my review, in my opinion the analysis appeared to have been carefully done and gives plausible estimates of the likely impacts of the project (given the assumptions made). In my review I raised the issue of whether the choice of the definition of the local region met the guidelines because the region chosen was much broader than the local SA3 region. It is often the case that a project's location and its 'connections' with the local community may not fall neatly within a given SA3. In its response, Santos has set out their reasoning for the choice of region which points out that the area chosen has 'a realistic potential to be part of the project's direct local supply chain…'. I have no reason to disagree with this assessment regarding the potential supply chain. However, I remain of the view that the choice of a region more tightly defined by the location of the project could have brought the net benefits of the project to the local community more sharply into focus.

In addition to the above matters, in my review I raised some issues around the share of foreign ownership of the project and gas price trajectories. In my opinion, these matters have been adequately covered in the Santos response.

As part of the review process I am happy to discuss the above matters with either yourself or the project proponent if that is thought to be helpful.

Yours sincerely,



Brian S Fisher PhD DScAgr AO PSM FASSA
Managing Director

1 June, 2018

ACIL ALLEN CONSULTING

REPORT TO
SANTOS NSW (EASTERN)
11 SEPTEMBER 2018

NARRABRI GAS PROJECT

ECONOMIC IMPACT SUPPLEMENTARY REPORT

FINAL REPORT

ACIL ALLEN CONSULTING PTY LTD
ABN 68 102 652 148

LEVEL NINE
60 COLLINS STREET
MELBOURNE VIC 3000
AUSTRALIA
T+61 3 8650 6000
F+61 3 9654 6363

LEVEL ONE
50 PITT STREET
SYDNEY NSW 2000
AUSTRALIA
T+61 2 8272 5100
F+61 2 9247 2455

LEVEL FIFTEEN
127 CREEK STREET
BRISBANE QLD 4000
AUSTRALIA
T+61 7 3009 8700
F+61 7 3009 8799

LEVEL ONE
15 LONDON CIRCUIT
CANBERRA ACT 2600
AUSTRALIA
T+61 2 6103 8200
F+61 2 6103 8233

LEVEL TWELVE, BGC CENTRE
28 THE ESPLANADE
PERTH WA 6000
AUSTRALIA
T+61 8 9449 9600
F+61 8 9322 3955

167 FLINDERS STREET
ADELAIDE SA 5000
AUSTRALIA
T +61 8 8122 4965

ACILALLEN.COM.AU

AUTHORS:

ANTONIA HODBY | PETER JOHNSON

INTRODUCTION 1

Santos is proposing to develop natural gas to be made available to the NSW gas market. The Narrabri Gas Project (the Project) is located south west of the town of Narrabri in the Gunnedah Basin in New South Wales. It will include production and appraisal wells, gas and water gathering systems and supporting infrastructure. Natural gas will be treated at a central gas processing facility at Leewood, a rural property owned by Santos near Narrabri.

Previous analysis of the Project did not express the economic impacts at the level of the Australian Bureau of Statistics Statistical Area Level 3 (SA3) of Moree-Narrabri. The Moree-Narrabri SA3 being the statistical region in which the project is located. This supplementary report addresses this by modifying the previous analysis (ACIL Allen report: *Narrabri Gas Project – Economic Impact Report*, August 2016).

1.1 Methodology

The results in this report build on the previous economic modelling of the Narrabri Gas Project, which examined the impact of the Project on the Narrabri LGA and surrounding region, and on the rest of New South Wales. The analysis was undertaken using ACIL Allen's *Tasman Global* Computable General Equilibrium (CGE) model.

In the previous analysis, the regions modelled were the Narrabri LGA and a purpose-built grouping of surrounding LGAs termed Narrabri surrounds. To estimate the results in the Moree-Narrabri SA3 required that the results for the two original regions be reallocated to the SA3.

Using input-output tables developed for the Narrabri LGA and Narrabri surrounds, and input-output tables developed for the sub-regions of Narrabri LGA and Narrabri surrounds that belong the Moree-Narrabri SA3, industry shares (based on production, employment and value added (contribution to GDP)) were estimated. Using these shares the modelling results from the previous analysis have been reallocated to produce the results found in this report.

ECONOMIC IMPACT ANALYSIS 2

The projected economic impacts for each region associated with the Narrabri Gas Project are presented in the following sections.

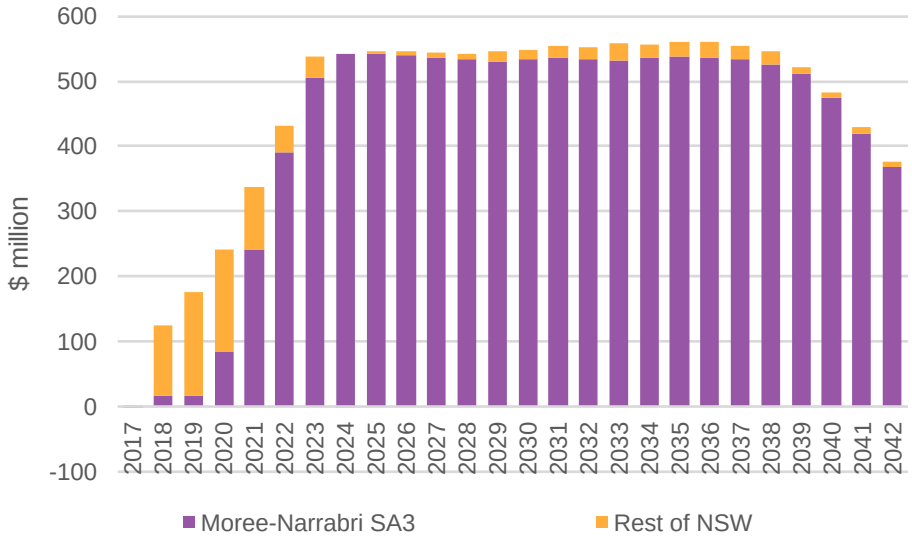
2.1 Real economic output

Real economic output or the contribution to the Gross Regional Product of the Moree-Narrabri SA3 region and the Gross State Product of New South Wales (excluding the Moree-Narrabri SA3 region) is presented in **Figure 2.1** and **Table 2.1**. During the construction phase, the bulk of the impact is realised in the rest of New South Wales. This is because a large amount of goods and services will have to be sourced from outside the SA3 region to construct the Project thereby creating economic benefits to those areas. In the operations phase, more of the goods and services will be sourced from within the region. In addition, the value of production from the Project is attributed to the SA3 region.

In comparison to the operations phase (which begins in 2020), the projected changes in real economic output from the initial investment phase are relatively small. This is because the largest changes in real economic output are projected to occur broadly in line with the value of production.

More specifically, it is the operations phase where the key benefits of the Project are expected to be realised through the monetisation of otherwise unutilised resources and additional factors of production. In contrast, the construction phase is largely increasing demand for scarce factors of production and so has a smaller effect on economic output compared to the size of the investment.

FIGURE 2.1 REAL ECONOMIC OUTPUT: NARRABRI GAS PROJECT ($2016)



SOURCE: ACIL ALLEN

Over the period 2017 to 2042, the Narrabri Gas Project is projected to increase the real economic output of:

— the Gross Regional Product of the Moree-Narrabri SA3 region by just over $11.0 billion relative to the Base Case (with a net present value of $4.5 billion, using a 7 per cent real discount rate. This is equivalent to an average of $425 million per annum over the construction and operation phases of the Project.

— the Gross State Product of New South Wales (excluding the Moree-Narrabri SA3 region) by $864 million relative to the Base Case (with a net present value of $583 million, using a 7 per cent real discount rate), or an average of $33 million per annum over the life of the Project.

— the Gross State Product of New South Wales by $11.9 billion relative to the Base Case (with a net present value of $5.1 billion, using a 7 per cent real discount rate).

TABLE 2.1 PROJECTED CUMULATIVE CHANGE IN REAL ECONOMIC OUTPUT AND REAL INCOME IN EACH REGION AS A RESULT OF THE NARRABRI GAS PROJECT RELATIVE TO THE BASE CASE ($2016)

	Real economic output			Real income		
	Total (2017 to 2042)	Net present value*		Total (2017 to 2042)	Net present value*	
		4%	7%		4%	7%
	2016 A$m	2016 A$m	2016 A$m	2016 A$m	2016 A$m	2016 A$m
Moree-Narrabri SA3 region	11,058	6,450	4,516	605	397	307
Rest of NSW	864	674	583	5,388	3,324	2,450
Total NSW	**11,926**	**7,125**	**5,100**	**5,993**	**3,722**	**2,757**

*SOURCE: ACIL ALLEN. NOTE: * THE USE OF THE 4 PER CENT AND 7 PER CENT ARE CONSISTENT WITH NSW GOVERNMENT (2012)*

2.2 Real incomes

The contribution of the Narrabri Gas Project to the real incomes of people living in the Moree-Narrabri SA3 region and the rest of New South Wales is presented in **Figure 2.2** and **Table 2.1**.

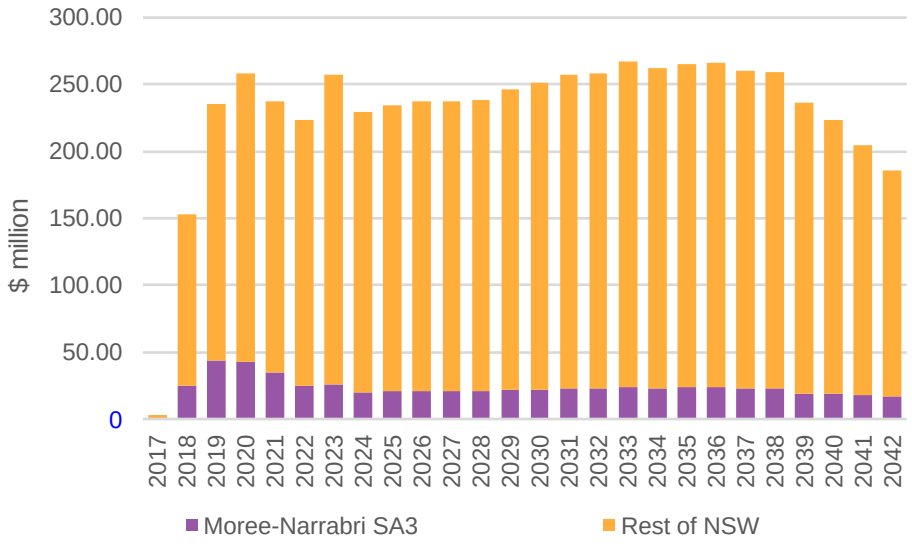
The impact on real incomes is similar to the impact on real economic output with the bulk of the impacts realised in the operations phase when the production from the Project has the greatest impact.

The extent to which the local residents will benefit from the additional economic output depends on the level of ownership of the capital (including the natural resources) utilised in the business as well as wealth transfers undertaken by Australian governments as a result of the taxation revenues generated by the Narrabri Gas Project.

The additional economic activity associated with the Project has a noticeable effect on the real income of residents in the rest of New South Wales. This is because, a significant portion of the wealth generated by the economic activity from the Project is transferred outside of the Moree-Narrabri SA3 region (primarily to Australian shareholders who have been assumed to be evenly disbursed across Australia) and this boosts incomes in the rest of New South Wales relative to the baseline.

Most of the real income benefit associated with the Project is projected to accrue, in absolute terms, to residents outside of the Moree-Narrabri SA3 region. Despite this, there will be a significant and far greater per capita boost to the real incomes of people living in the Moree-Narrabri SA3 region than elsewhere in New South Wales.

FIGURE 2.2 REAL INCOMES: NARRABRI GAS PROJECT ($2016)



SOURCE: ACIL ALLEN

Over the period 2017 to 2042, the Narrabri Gas Project is projected to increase real incomes raising the ability of residents to consume goods and services and to accumulate wealth in the form of financial and other assets. This includes an increase in the real incomes of:

- The residents of the Moree-Narrabri region by a cumulative total of $605 million, relative to the Reference Case (with a net present value of $307 million, using a 7 per cent real discount rate), or an average of $23 million per annum over the construction and operations phases of the Project.
- The residents of New South Wales (excluding those in the Moree-Narrabri SA3 region) by a cumulative total of $5.4 billion, relative to the Reference Case (with a net present value of $2.5 billion, using a 7 per cent real discount rate), or an average of $207 million per annum over the construction and operations phases of the Project.
- All residents of New South Wales by $6.0 billion, relative to the Reference Case (with a net present value of $2.8 billion, using a 7 per cent real discount rate).

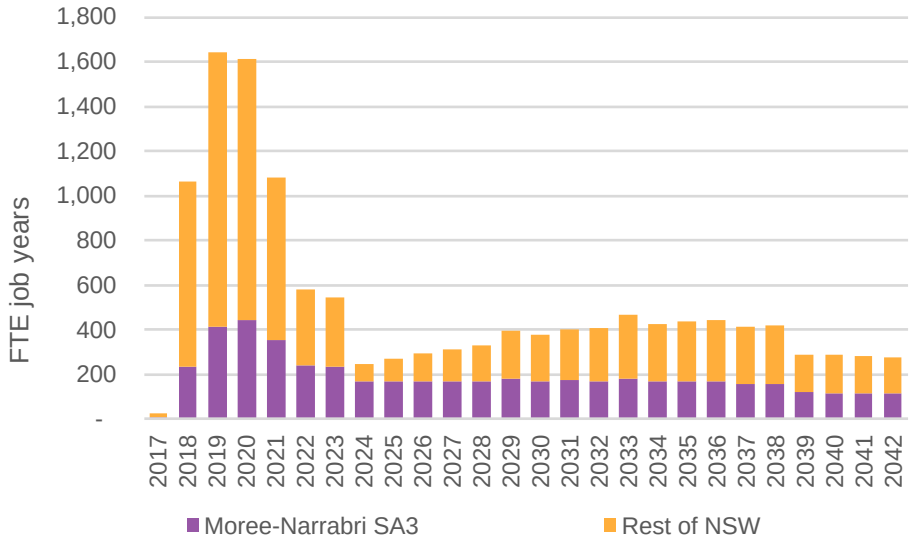
2.3 Job creation

In addition to the direct jobs generated on-site, the construction and operation phases of the Narrabri Gas Project will require other New South Wales sourced goods and services including engineering and management services, transportation, OH&S and various business services. Supply of these inputs will further increase the demand for labour across the New South Wales economy.

Over the life of the Narrabri Gas Project it is projected that an average of 512 full time equivalent direct and indirect jobs will be created in New South Wales. More specifically, over the period 2017 to 2042 it is projected that the Narrabri Gas Project will increase employment (by place of residence) in:

- the Moree-Narrabri region by an average of 190 FTE job years each year
- New South Wales (excluding the Moree-Narrabri SA3 region) by an average of 322 FTE job years each year
- New South Wales as a whole by an average of 512 FTE job years each year.

FIGURE 2.3 JOB CREATION: NARRABRI GAS PROJECT (FTE JOB YEARS)



SOURCE: ACIL ALLEN

2.4 Industry impacts

Table 2.2 shows the average impacts over the life of the Narrabri Gas Project on industry employment and output at the local, regional and state levels. The impacts shown do not include the Narrabri Gas Project within the mining industry; therefore, the industry effects shown relate only to the pre-existing mining industry. The results show employment and output change relative to baseline, i.e. relative to where they would be without the Project.

TABLE 2.2 INDUSTRY EMPLOYMENT AND OUTPUT IMPACTS OVER THE PROJECT LIFE – PER CENT DEVIATION FROM THE BASELINE

	Employment		Output	
	Moree-Narrabri SA3 region	NSW	Moree-Narrabri SA3 region	NSW
Agriculture and forestry	-0.15	-0.03	-0.08	-0.02
Mining	-0.56	-0.04	-0.74	-0.04
Manufacturing	-0.19	-0.04	-0.40	-0.05
Utilities	0.69	0.01	0.16	0.00
Construction	0.93	0.02	0.74	0.02
Trade	0.64	0.02	0.38	0.01
Transport	0.49	0.01	0.48	0.00
Services	0.45	0.01	0.18	0.00
TOTAL	**0.28**	**0.01**	**0.09**	**-0.01**

SOURCE: ACIL ALLEN

The results in **Table 2.2** demonstrate that on both an employment and output level the impacts of the Narrabri Gas Project are positive on most of the sectors shown. The negative impacts shown to agriculture and forestry, mining and manufacturing are small and are likely mainly due to the competition for labour and small increases in local costs. The positive benefits seen for the construction industry will be mainly a result of demand from the Project while trade will benefit not only from project demand but from the increased levels of income at the local, regional and state levels.

Due to its domestic sales orientation, modest direct employment demand and relatively low land requirements, the Narrabri Gas Project has relatively little potential to have detrimental effects on NSW industries at the local, regional and state level. The positive demand and income effects are offsetting of the potential negative effects.

The anticipated reduction in mining output relative to the baseline projection is the largest of all industries shown in **Table 2.2**. Workers in the existing mining industry possess skills that match the needs of the Narrabri Gas Project. The existing Mining industry will therefore face strong competition for labour from the Project. The mining industry also has a strong export orientation and so the changes in domestic costs and the exchange rate, though relatively small, will also have a negative effect on the pre-existing industry (relative to the baseline).

At the state level, the negative impact on mining in NSW is sufficient to generate a small negative output effect on NSW as a whole: -0.01 per cent relative to baseline. This effect is completely reversed by including the output of the Narrabri Gas Project into the output estimation. The impact on NSW output is then a positive 0.03 per cent.

2.5 Interstate trade

The Narrabri Gas Project is an import replacement project. The project will allow NSW to replace imports of natural gas from other states with locally sourced natural gas.

TABLE 2.3 PROJECTED CUMULATIVE CHANGE IN NSW INTERSTATE TRADE AS A RESULT OF THE NARRABRI GAS PROJECT RELATIVE TO THE BASE CASE ($2016)

Imports				Exports			
Total (2017 to 2042)	Average	Net present value*		Total (2017 to 2042)	Average	Net present value*	
		4%	7%			4%	7%
2016 A$m	2016 A$m	2016 A$m	2016 A$m	2016 A$m	2016 A$m	2016 A$m	2016 A$m
-9,604	-369	-5,462	-3,736	-1,560	-60	-986	-740

*SOURCE: ACIL ALLEN. NOTE: * THE USE OF THE 4 PER CENT AND 7 PER CENT ARE CONSISTENT WITH NSW GOVERNMENT (2012)*

The results in **Table 2.3** show that the project will reduce imports into NSW by an average of $369 million annually over the life of the project. This figure is less than the value of gas produced by the project, which is to be expected. The construction and operation of the project require the purchase of goods and services, some of which will be sourced from other states of Australia, thus adding to the state's import bill. In addition, the income generated by the project will lead to an increase in demand for goods and services, some which will be met from other states of Australia. Finally, the Narrabri Gas Project – as with all projects of this nature – will see an increase in the rate of inflation in NSW relative to the other states of Australia. And although this effect is slight, it will result in some substitution away from goods and services produced in NSW and towards imports, including interstate imports.

For similar reasons exports form NSW also decrease during the life of the project, by an average of $60 million annually. The slight increase in NSW inflation relative to other states will suppress demand for NSW interstate exports. Also, the same increase in demand that leads to an increase in interstate imports into NSW will lead to the local consumption of goods and services produced in NSW that might otherwise have been exported.

3 ECONOMIC IMPACT SUMMARY

This report investigated the economic impact of the Narrabri Gas Project on the Moree-Narrabri SA3 region, and New South Wales (excluding the Moree-Narrabri SA3 region).

The economic impact of the Narrabri Gas Project has been analysed using the CGE model *Tasman Global*. The results of the analysis show that the Project will, over the construction and operation phases of the Project life:

- Increase the real economic output of:
  - The Moree-Narrabri SA3 region by $11.0 billion
  - New South Wales (excluding the Moree Narrabri SA3 region) by $864 million
  - New South Wales by $11.9 billion
- Increase real incomes in:
  - The Moree-Narrabri SA3 region by $605 million
  - New South Wales (excluding the Moree-Narrabri SA3 region) by $5.4 billion
  - New South Wales by $6.0 billion
- Increase average employment each year by:
  - 190 FTE job years each year in the Moree-Narrabri SA3 region
  - 322 FTE job years each year in the rest of New South Wales
  - 512 FTE job years each year in New South Wales.

ACIL ALLEN CONSULTING PTY LTD
ABN 68 102 652 148

ACILALLEN.COM.AU

ABOUT ACIL ALLEN CONSULTING

ACIL ALLEN CONSULTING IS THE LARGEST INDEPENDENT, AUSTRALIAN OWNED ECONOMIC AND PUBLIC POLICY CONSULTANCY.

WE SPECIALISE IN THE USE OF APPLIED ECONOMICS AND ECONOMETRICS WITH EMPHASIS ON THE ANALYSIS, DEVELOPMENT AND EVALUATION OF POLICY, STRATEGY AND PROGRAMS.

OUR REPUTATION FOR QUALITY RESEARCH, CREDIBLE ANALYSIS AND INNOVATIVE ADVICE HAS BEEN DEVELOPED OVER A PERIOD OF MORE THAN THIRTY YEARS.