



Port Kembla Gas Terminal

*Critical State Significant
Infrastructure Assessment
(CSSI 9471)*



April 2019

© Crown Copyright, State of NSW through its Department of Planning and Environment 2019

Cover photo

FSRU and LNG Carrier at berth. Image provided by Australian Industrial Energy

Disclaimer

While every reasonable effort has been made to ensure this document is correct at time of printing, the State of NSW, its agents and employees, disclaim any and all liability to any person in respect of anything or the consequences of anything done or omitted to be done in reliance or upon the whole or any part of this document.

Copyright notice

In keeping with the NSW Government's commitment to encourage the availability of information, you are welcome to reproduce the material that appears in this report. This material is licensed under the Creative Commons Attribution 4.0 International (CC BY 4.0). You are required to comply with the terms of CC BY 4.0 and the requirements of the Department of Planning and Environment. More information can be found at: <http://www.planning.nsw.gov.au/Copyright-and-Disclaimer>.



Executive Summary

Australian Industrial Energy (AIE) is proposing to develop the Port Kembla Gas Terminal (the project). The project involves the construction and operation of a liquefied natural gas (LNG) terminal at Port Kembla, south of Wollongong.

LNG sourced from worldwide suppliers would be transported by LNG carriers to the Port Kembla Gas Terminal, where it would be transferred and stored on a permanently moored vessel known as a Floating Storage and Regasification Unit (FSRU).

LNG would be converted back to high pressure gas on board the FSRU and would then be transferred via a 6.3 kilometre (km) long gas pipeline from the wharf to southern Spring Hill, where it would tie-in to the existing NSW gas pipeline network.

The project would involve the demolition of an existing wharf in Port Kembla, including excavation and dredging of the wharf and adjacent sea bed, the construction of new wharf facilities and a wider and deeper berth to accommodate the FSRU and LNG carrier vessels side by side.

Strategic Context

The primary use of gas in NSW is for industry (42%), gas fired power generation (21%) and domestic use (37%). Over a million NSW households rely on natural gas for heating and cooking, and about 33,000 NSW businesses and 500 heavy industrial operations rely heavily on gas for their operations. These businesses are estimated to support over 300,000 jobs across NSW.

NSW currently relies on gas produced in Victoria, South Australia and Queensland for 95% of its gas needs and is vulnerable to supply shortages as LNG producers supplement export supplies by contracting gas from reserves that previously served the domestic market.

AGL's Camden coal seam gas (CSG) field which is currently the only NSW domestic gas supplier has announced it will cease its operations in 2023. The only other NSW domestic gas resource project that could supply gas into the NSW market is the Narrabri Gas Project, which is currently undergoing a comprehensive merits-based assessment.

The Australian Energy Market Operator (AEMO) recently released its 2019 Gas Statement of Opportunities (GSOO) which provides AEMO's forecast of gas consumption and demand, and reports on the adequacy of eastern and south-eastern Australian gas markets to supply forecast demand. AEMO predicts supply gaps in southern markets including NSW from 2024 due to pipeline capacity constraints and restricted supply from southern states.

The project could assist in addressing these risks. It could provide 100 petajoules (PJ) of gas a year, which is 70% of NSW's total annual gas demand. It would also increase competition in the gas market, which would potentially exert downward pressure on gas prices, and could support increased gas-fired electricity generation in NSW and facilitate the current transition to a low carbon emission-based economy. The project could also provide up to 12 days of emergency supply should gas supply from other states be disrupted.

The project is located within a highly industrialised port environment and is consistent with the objectives of the *Illawarra Shoalhaven Regional Plan (2015)* to build a strong diversified economy and to grow the port and leverage the competitive advantage that it provides.

Statutory Context

On 19 June 2018, the former Minister for Planning determined that the Port Kembla Gas Terminal was essential to the State for economic reasons because it would potentially supply over 70% of the State's total gas demand and increase the security, reliability and affordability of gas in NSW. Accordingly, the Minister made an order declaring the project to be State significant infrastructure and Critical State significant infrastructure under sections 5.12(4) and 5.13 of the EP&A Act.

As the project has been declared CSSI, the Minister for Planning and Public Spaces is the approval authority for the project.

Engagement

After accepting the EIS for the project, the Department publicly exhibited the EIS from 14 November 2018 until 14 December 2018 and consulted with key government agencies and Wollongong City Council.

The Department received 23 submissions on the project, including 14 submissions from members of the public and special interest groups (including private businesses), and 9 submissions from government agencies. There were 3 public submissions objecting to the project with 7 in support from businesses, special interest groups and individuals.

Objectors raised concerns about the potential impacts of disposal of spoil in the outer harbour and discharges from the FSRU, climate change and greenhouse gas emission, and reduction in amenity, including noise and visual impacts.

Submissions in support of the project focused on the potential for the project to provide a more reliable and affordable supply of gas to the State and the increased security this would bring to many NSW businesses and their employees. Submitters also supported the diversification of industry in the Illawarra region, the jobs that would be generated and flow-on economic benefits of the project, and the utilisation of surplus port capacity.

Assessment and Evaluation

The Department has assessed the merits of the project in accordance with the requirements of the EP&A Act and applicable NSW Government policies and guidelines. The key issues for the assessment relate to:

- **Hazards and Risks** – with a new industry introduced into a highly industrialised port;
- **Contaminated materials** – with potential for excavation of contaminated materials during construction;
- **Water resources** – impacts during construction due to dredging and emplacement of materials from the development of the new berth site to the outer harbour disposal site, and during operations from discharge of large volumes of cooling water into the inner harbour;
- **Port Navigation** – ensuring that impacts on existing and future port navigation are appropriately managed;
- **Biodiversity** – ensuring that impacts on marine and terrestrial ecology are avoided, minimised and/or offset;
- **Other matters** – impacts on amenity, such as noise and visual impacts, heritage, air quality, traffic, social, and climate change.

Hazards and Risks

The project would involve transport, storage and handling of LNG and gas and as such would be a potentially hazardous development. The Environmental Impact Statement (EIS) included a preliminary hazard analysis (PHA) prepared in accordance with the requirements of *State Environmental Planning Policy No. 33 - Hazardous and*

Offensive Development (SEPP 33) to demonstrate that the off-site risks would meet the NSW criteria for risk acceptability.

The Department's specialist hazards section considered the hazards and risks analysis with the project and the Department also engaged an independent hazards and risk specialist, Mr Philip Skinner from Arriscar, to provide advice and recommendations.

The PHA identified that the main potential hazards are associated with potential loss of containment of LNG or gas leading to fire or explosions, and that the level of off-site risk would generally be below the threshold for NSW risk criteria for acceptability for most land uses around the site.

The project would exceed the criteria for individual fatality risk for industrial land use for a small area of the Port Kembla Coal Terminal (PKCT), which adjoins the proposed project area. The area in question is used as a backup truck wash and is infrequently used. Further, the risk assessment was conservative in that not all safety systems were factored in to the risk assessment and the risk is expected to be lower with the application of appropriate engineering controls. Consistent with the Department's policy, a higher industrial risk may be acceptable if the site involves only occasional occupancy.

The risk assessment also identified a potential risk associated with Seawall Road to the east of the project site, which is a private road, but has public access during daylight hours. The individual fatality risk contour for open public spaces extends across the road, noting this criterion does not strictly apply to roads. Nevertheless, the Department considers that risk reduction measures should be undertaken to ensure the risks are as low as reasonably practicable (ALARP principle).

The Department has recommended conditions requiring AIE to prepare a number of additional hazards and risk studies in consultation with key stakeholders such as PKCT and the NSW Ports, prior to commencing operations to demonstrate further how the risks would be managed and mitigated.

Based on the above, and consistent with the requirements for industrial land use in *Hazardous Industry Planning Advisory Paper No 4 – Risk Criteria for Land Use Safety Planning* (HIPAP 4), the Department considers that the risk to land use surrounding the project is acceptable.

Contamination

No significant contamination has been identified along the pipeline route or at Berth 101. However, fill materials along the pipeline route and at the berth comprise dredged materials, by-products from coal and steel works and other anthropogenic materials that reflect the port's industrial history, and it is considered moderately likely that contaminated materials do occur in the materials.

Sediments within the harbour have confirmed elevated concentrations of heavy metals including cadmium, chromium, copper, lead, nickel, mercury and zinc. Elevated levels of Tributyltin (TBT), dioxins and polycyclic aromatic hydrocarbons (PAHs).

Further, acid sulphate soils occur within the harbour sediments and potentially along areas of the pipeline route and beneath Berth 101.

The Environment Protection Authority (EPA) and the Department consider that contamination risks can be managed and have recommended a condition requiring AIE to prepare a protocol for managing unexpected finds of contaminated material in consultation with the EPA, with oversight provided by an EPA accredited contaminated site auditor. The protocol must also include a remediation strategy, if required, and detail how environmental and health risks would be managed.

Water Resources

Construction of the project would involve the dredging or excavation of around 720,000 m³ of material and the disposal of most of this material in the Outer Harbour. Water quality would be impacted by turbidity generated by these activities and the potential mobilisation of contaminants into the water column.

Other activities such as the removal of piles, movement and anchoring of construction vessels and onshore earthworks would also potentially impact water quality. However, these impacts are expected to be minor in comparison to the dredging and disposal works.

The EPA and the Department have recommended conditions to manage the turbidity levels and restrict the dispersal of sediments to areas immediately surrounding the dredging and emplacement works. These include a requirement for AIE to prepare and implement:

- a spoil management plan that provides specific details about how the company would manage the dredge and excavation materials to minimise the dispersion of sediments;
- an emplacement cell report that details the proposed design, construction and maintenance of the materials emplacement cell, and to engage an auditor to confirm that the cell is constructed in accordance with that design;
- a water quality monitoring program with objectives and performance criteria for water quality, and a plan to respond to any adverse water quality impacts.

The Department considers that these conditions would allow an appropriate level of oversight over the proposed handling of sediments and the design of the containment cell, and would also ensure that adverse impacts to water quality could be identified and rectified.

During operations, seawater would be circulated through the FSRU and discharged back to the harbour as part of the regassification process. The discharge would be up to 7° C colder than the ambient water temperature and would contain elevated concentrations of sodium hypochlorite (which degrades to free chlorine).

However, modelling of the discharge plume indicates that any impacts are likely to be confined to a small area around the discharge point, and both the temperature and free chlorine content would meet the relevant ambient water quality criteria at the boundary of the mixing zone.

The Department and the EPA consider that, subject to meeting strict water discharge limits, there are unlikely to be significant impacts to water quality from the discharge of cooling water during operations. Discharge limits would be set in an Environment Protection Licence (EPL) regulated by the EPA and the Department has recommended AIE undertake a water discharge quality verification program to validate the modelled impacts, including ongoing water quality monitoring.

The Department has included a condition requiring AIE to consult with the above agencies to develop appropriate parameters for measuring water quality, and an ongoing water quality monitoring program and response plan in the event water quality parameters are exceeded during construction or operation.

Port Navigation

As the channel between the Inner Harbour and Outer Harbour is relatively narrow and the turning basin within the Inner Harbour is small, the project has the potential to affect the navigability of other vessels, particularly when an LNG carrier is moored alongside the FSRU.

Navigation simulation studies were undertaken in consultation with the Harbour Master to ensure the design of the new berth would allow project vessels and other ships to safely turn and navigate the channel.

The final design of the berth provides for a 40 m offset between a moored LNG carrier and the turning basin. This design would provide sufficient clearance between turning vessels and moored LNG carriers, subject to some modifications to operating practices for vessels turning in the Inner Harbour.

The Port Authority of NSW did not raise concerns about the design of the project in relation to vessel navigation.

The Department considers that the additional LNG carrier movements would not significantly increase traffic in the port. Although there would be a more significant increase in shipping traffic during the construction period, the vessels would be much smaller, and the duration would be limited.

The Department is satisfied that shipping traffic would be managed through ship handling protocols developed by the Harbour Master, and that the risk of collisions would be minor.

Aquatic Biodiversity

Impacts to marine aquatic organisms during the construction phase of the project would be associated with the reduction in water quality discussed above, and the removal of biofouling and benthic communities inhabiting the berth piles and disposal area sediments. However, given marine habitat within the harbour is already affected by the industrial nature of the harbour, turbidity impacts would be limited to the construction phase, and biofouling and benthic communities are likely to re-colonise new infrastructure and surfaces at the end of construction, the Department does not consider the impacts would be significant.

The noise generated during piling activities would also potentially affect the hearing of larger marine mammals. However, the zone of affectation is relatively small (around 109 m around the piling activities), and it is likely the animals would swim away from the noise.

Discharges from the FSRU during operations would be up to 7°C colder than the ambient water temperature and would contain residual levels of chlorine. However, this is not predicted to significantly impact marine ecology, as the dilution effect means that within approximately 43 m of the discharge point temperature and chlorine concentrations would be within acceptable limits.

Notwithstanding this, the Department has recommended conditions requiring AIE to verify the impacts, particularly in relation to acute toxicity near the discharge point, and to monitor the discharges and address any impacts that exceed the predictions.

Terrestrial Biodiversity

The project has been designed to avoid and minimise the amount of native vegetation to be cleared. However, a small amount (0.25 hectares) of Woollybutt-White Stringybark-Forest Red Gum would need to be removed for the construction of the pipeline. This vegetation is not an endangered ecological community but provides habitat for the threatened Southern Myotis, which is likely to use the area.

Two man-made ponds that provide potential habitat for the threatened Green and Golden Bell Frog would also be removed from the berth area.

The Department has included a condition requiring AIE to offset the impacts of this clearing by retiring credits in accordance with the NSW *Biodiversity Offset Policy*.

Other Impacts

The project would be located within an industrial precinct, and amenity impacts are largely limited to noise, dust and traffic that would be generated during the construction period. AIE has proposed mitigation measures in accordance with government policy and guidelines. The Department has recommended operational conditions

to manage construction noise in accordance with the *Interim Construction Noise Guideline* and to prepare and implement air quality and traffic management plans for the project.

Views of the project would be consistent with the existing views of the port noting that there is limited wharf infrastructure developed, with the main view of the FSRU and LNG carriers when at the berth.

Greenhouse gas emissions from the site would be minor and associated mainly with the FSRU and LNG carrier engines, rather than any fugitive leaks. The conditions include a requirement to minimise greenhouse gas emissions from the project and to implement a gas leak detection and repair program.

There would be no impacts to Aboriginal or historic heritage, as the project has been designed to avoid areas with high potential for artefacts to occur.

Project Benefits

The project could potentially provide 100 PJ of gas a year, which is 70% of NSW's total annual gas demand. It could also provide up to 12 days of emergency supply should gas supply from other states be disrupted.

The project would support 33,000 NSW businesses and 500 heavy industrial operations that rely heavily on gas for their operations. These businesses are estimated to support over 300,000 jobs across NSW. In addition, the project would inject \$200-\$250 million into the economy and provide direct employment to around 150 people during construction and 40-50 people during operations.

Evaluation

Overall, the Department considers the project risks are reasonably low and the impacts can be effectively managed. The key concerns relate to hazards and risks associated with the development of a new major hazardous facility in the port; dredging, excavation and disposal of spoil; management of contaminated materials; potential impacts to water quality and marine ecology from the construction stage and discharges of cooling water during operations.

The Department has carefully considered the impacts during the construction and operational stages and has recommended conditions to avoid and/or mitigate these predicted impacts.

The Department considers the project would be in the public interest as it would assist in addressing the gas security, reliability and affordability risk posed by NSW's reliance on gas from other states.

On balance, the Department considers that the benefits of the project outweigh its impacts and the project should be approved, subject to the recommended conditions.



Contents

1. Introduction.....	1
2. Project	2
2.1 Project Overview	2
2.2 Project Components.....	4
3. Strategic Context.....	7
3.1 Project Setting	7
3.2 NSW Gas Market	7
3.3 Regulatory Authorities.....	8
3.4 Relationship to other Approvals.....	9
4. Statutory Context	11
4.1 Critical State Significant Infrastructure.....	11
4.2 Permissibility and Environmental Planning Instruments.....	11
4.3 Other Approvals	12
4.4 Commonwealth Legislation	12
5. Engagement	13
5.1 Summary of Submissions.....	13
5.2 Key Issues - Individual and Special Interest Groups.....	13
5.3 Key Issues - Government Agencies	14
6. Assessment.....	16
6.1 Hazards and Risks.....	16
6.2 Contaminated materials and groundwater	20
6.3 Water Resources	21
6.4 Port Navigation.....	25
6.5 Aquatic and Terrestrial Biodiversity	26
6.6 Other Issues	29
7. Evaluation	34
8. Recommendation	35
Appendices.....	36
Appendix A – List of Documents.....	36
Appendix B – Environmental Impact Statement	37
Appendix C – Submissions and Agency Advice.....	38
Appendix D – Submissions Report.....	39

Appendix E – Additional Information.....40

Appendix F – Recommended Instrument of Approval.....41



1. Introduction

Australian Industrial Energy (AIE) is proposing to develop the Port Kembla Gas Terminal (the project). The project involves the construction and operation of a liquefied natural gas (LNG) import terminal at Port Kembla, in the Wollongong City local government area (see **Figure 1**).

In June 2018, the former Minister for Planning determined that the Port Kembla Gas Terminal was essential to the State for economic reasons because it would potentially supply over 70% of the State's total gas demand and increase the security, reliability and affordability of gas in NSW. The project could also provide up to 12 days of emergency supply should gas supply from other states be disrupted. Accordingly, the former Minister made an order declaring the project to be State significant infrastructure and Critical State significant infrastructure under sections 5.12(4) and 5.13 of the EP&A Act.



Figure 1 | Regional/Local Context Map



2. Project

2.1 Project Overview

The project involves the construction and operation of a liquified natural gas (LNG) import terminal at Berth 101 in Port Kembla, and consists of four key components (see **Figure 2**):

- LNG carrier vessels that would make approximately one delivery of LNG every two to three weeks;
- a floating storage and regasification unit (FSRU) – a 300 (metre) m long vessel that would receive, store and convert LNG back to gas;
- wharf and berth facilities including offloading arms to transfer gas from the FSRU into a gas pipeline located on shore; and
- an approximately 6.3 kilometre (km) long underground gas pipeline from Berth 101 to southern Spring Hill, that would transfer gas from the wharf to an existing gas pipeline (the Port Kembla Lateral) owned and operated by Jemena.

The FSRU would be permanently moored at Berth 101 on the eastern side of the Inner Harbour at Port Kembla. It would have a total capacity of around 170,000 cubic metres (m³), which is equivalent to about 4 Petajoules (PJs) of gas.

LNG carriers would likely match the FSRU capacity to maximise the transfer of LNG. The LNG vessels would moor alongside the FSRU during the transfer of LNG, which would take approximately two to three days.

The project would also involve the demolition of the existing wharf facilities at Berth 101 and the construction of new wharf facilities and a wider and deeper berth to accommodate the FSRU and LNG carrier vessels side by side (see **Figures 3 and 4**).

Demolition of the existing berth would involve excavation and dredging of approximately 720,000 m³ of spoil material that would be disposed of in the Outer Harbour as part of land reclamation for the Port Kembla Outer Harbour Development project.

The proposed disposal area largely overlaps the development footprint for the Outer Harbour Development project, although a small part of the disposal area extends beyond the boundaries of the Port Kembla Outer Harbour Development footprint (see **Figures 1, 5 and 6**).

Management and disposal of the excavation and dredge material would be consistent with the requirements of the Port Kembla Outer Harbour Development approval. However, AIE is seeking separate approval for these activities as part of the current development application (that is, AIE would be responsible for the management of the materials under any approval for the project, if granted).

The disposal area was selected in consultation with NSW Ports, which is intending to modify the design of the Port Kembla Outer Harbour Development. That modification would be the subject of a separate approvals process.

The major components of the project are summarised in **Table 1**, and the project is described in full in the Environmental Impact Statement (EIS) (See **Appendix B**).

Subject to planning approvals, the project is expected to be operational within 2 years (i.e. by 2020).



Figure 2 | Project Layout

2.2 Project Components

Table 1 | Main components of the project

Aspect	Description
Project Summary	- Demolition of existing wharf facilities including the excavation and dredging of around 720,000 m³ (including bulking factors) of material from the existing wharf and adjacent sea bed; - Disposal of excavated and dredged material, including: - temporary stockpiling of excavated material at a stockpile area at Berth 101; - transport of excavated and dredged material by barge and truck to the disposal area in the Outer Harbour; - subaqueous (final height of 3 m below sea level) and subaerial (final height of 4 m above sea level) deposition of excavated and dredged material in the disposal area - Construction of new berth and wharf facilities, including the: - establishment of a temporary construction compound (site offices, storage sheds, hardstand areas and stockpile areas); - realignment of existing utilities (bunker oil pipeline, domestic water pipeline, electricity supply and communications); - construction of quay wall and topside facilities; - Construction of an approximately 6.3 km long, underground high-pressure gas pipeline from the wharf to Spring Hill connecting to the Port Kembla Lateral gas pipeline; and - Operation of the FSRU, berth, wharf, ancillary facilities and gas pipeline to: - receive and store LNG from LNG carrier vessels (operated by external suppliers); - convert LNG to high pressure gas; - transfer gas from the wharf to the existing gas network for distribution to the market.
Ancillary Infrastructure	- Access roads; - Fencing and security; - Lighting; - Telecommunications; - Utilities, including, electricity, water, sewerage etc.
Construction period	Approximately 10 to 12 months for the berth and wharf, and 6 months for the pipeline (to be constructed concurrently)
Road Traffic	- A maximum of 112 heavy vehicles per day (on a campaign basis) during construction (i.e. 224 vehicle movements) - An occasional heavy vehicle delivery during operations
Shipping Traffic	- Approximately 2-3 barges per day during construction (1,200 m³ capacity) - Approximately 24 LNG carrier deliveries per year (up to 170,000 m³ capacity)
Employment	- Peak construction workforce of up to 150 personnel - Operational workforce of 40 to 50 personnel

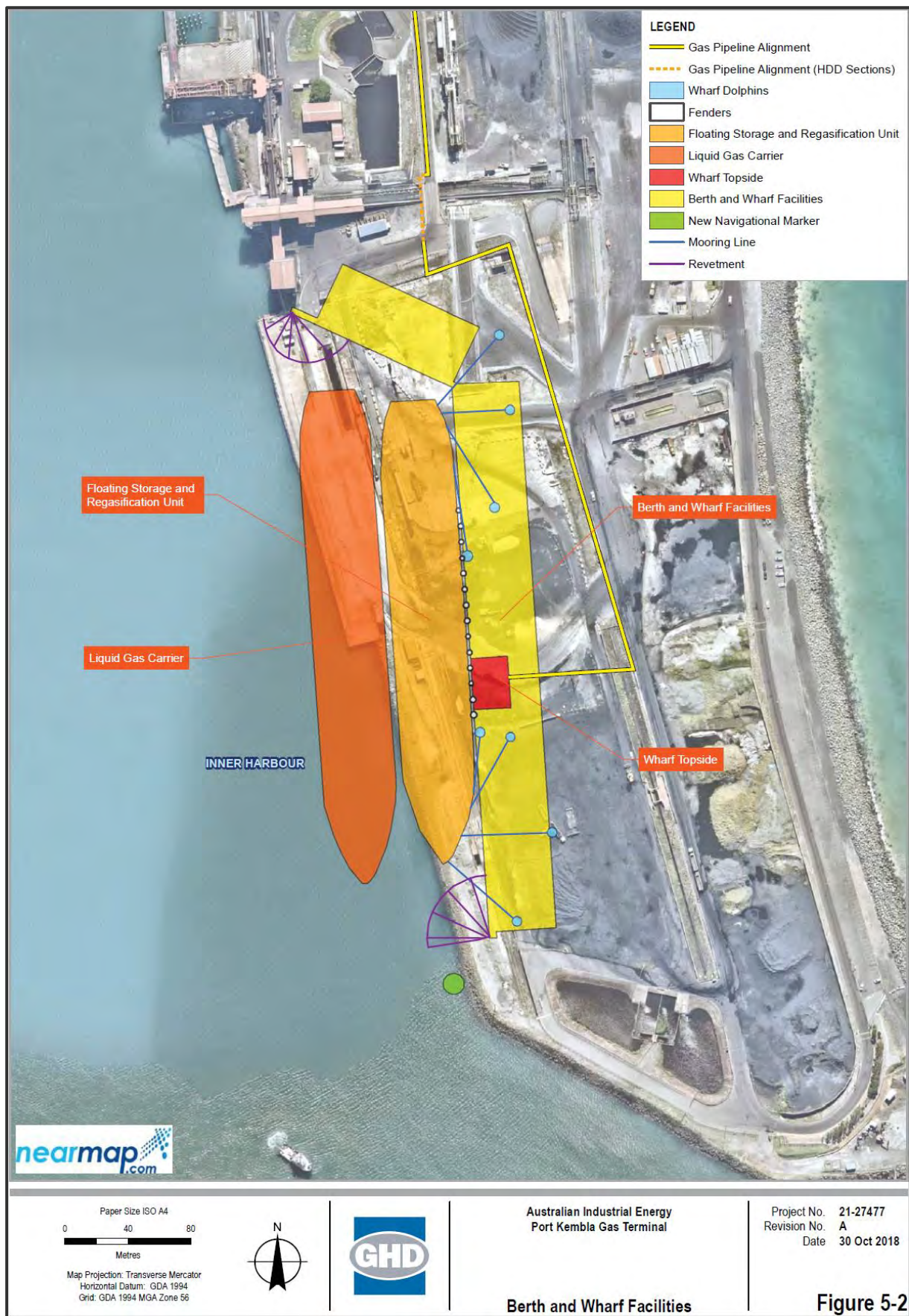


Figure 3 | Berth and Wharf Facilities



Figure 4 | Area to be Excavated and Dredged



3. Strategic Context

3.1 Project Setting

Port Kembla was first established in 1883 to facilitate the export of coal and has a continuous history as a working port. The port has become a major industrial precinct within the Illawarra region and is recognised in the *Illawarra Shoalhaven Regional Plan (2015)* as an economic asset of regional and national significance that is important for helping to drive economic growth across the region.

The port is characterised by existing import and export terminals and multiple other business, cargo, logistics, bulk goods and heavy industrial facilities. There are currently 18 import and export berths and six major independently operated terminals (see **Figure 1**).

The harbour itself is divided into an Inner Harbour and an Outer Harbour and includes a deep-water shipping channel to accommodate larger vessels.

Water quality within the harbour has been impacted by industrial discharges and port activities, including numerous dredging campaigns. The harbour sediments contain elevated concentrations of heavy metals (cadmium, chromium, copper, lead, nickel, mercury and zinc), and elevated levels of Tributyltin (TBT), dioxins and polycyclic aromatic hydrocarbons (PAHs).

Land uses in the areas surrounding the port are a mix of mostly residential and commercial. The closest residences to the proposed project are in the suburbs of Coniston (approximately 250 m to the pipeline route and 2 km to the north of Berth 101), Cringila to the south west of the port (approximately 100 m to the pipeline route and 2 km to Berth 101), and Port Kembla and Warrawong to the south of the port. The centre of Wollongong is approximately 2 km to the north of the port.

There are a number of popular tourist attractions within 4km of the port, including Wollongong Head Lighthouse and Wollongong Beach to the north and Port Kembla Heritage Park and Lookout Hill 60 to the south.

The Illawarra Escarpment State Conservation Area is located approximately 5 km to the west of the port and Lake Illawarra located approximately 2.5 km to the south of the port. The escarpment is valued by the community for its high aesthetic value and has a number of lookouts, including Mount Keira (which has 180° views up and down the coastline), while the lake is one of several nationally recognised wetlands in the region and is valued as a recreational and fishing resource.

3.2 NSW Gas Market

The primary use of gas in NSW is for industry (42%), gas fired power generation (21%) and domestic use (37%). Over a million NSW households rely on natural gas for heating and cooking, and about 33,000 NSW businesses and 500 heavy industrial operations rely heavily on gas for their operations. These businesses are estimated to support over 300,000 jobs across NSW.

NSW currently relies on gas produced in Victoria, South Australia and Queensland for 95% of its gas needs.

Until 2015, gas in NSW remained relatively cheap by world standards because produced gas could not be sold overseas. However, the development of several LNG export terminals in Queensland since then has meant that gas can now be exported (as LNG) to global markets. This means that the NSW gas market has become more expensive as LNG producers favour more lucrative export contracts.

The rising costs of gas has affected heavy industries reliant on gas. It has also impacted the electricity sector, which is reliant on dispatchable energy sources such as gas-fired generation to support intermittent renewable generation.

NSW is also vulnerable to supply shortages as LNG producers supplement export supplies by contracting gas from reserves that previously served the domestic market.

Further, substantially smaller quantities of uncontracted reserves and little prospect of new development in Victoria due to regulatory restrictions on onshore gas development means that NSW is likely to become increasingly reliant on gas from Queensland. Some analysts are predicting that gas production in Queensland may also start to shrink from 2025 because of underperforming coal seam gas reserves. This means NSW may face gas shortages in the medium term.

The Australian Energy Market Operator (AEMO) recently released its 2019 Gas Statement of Opportunities (GSOO) which provides AEMO's forecast of gas consumption and demand, and reports on the adequacy of eastern and south-eastern Australian gas markets to supply forecast demand. The report summary states:

"The 2019 GSOO highlights that the gas supply-demand balance remains tight, with gas production in southern Australia continuing to decline, and supplies from Queensland limited by pipeline capacity"

From 2024, major southbound pipeline infrastructure upgrades would be required to deliver more gas from northern to southern states (predominantly over the winter months when southern demand is highest). AEMO forecasts potential for supply gaps from 2024 onwards, unless additional southern reserves and resources, or alternative infrastructure, are developed.

The only current domestic NSW source of gas is from AGL's Camden coal seam gas (CSG) field which supplies around 5% of the gas demand in NSW. AGL has announced that it will cease gas production from this field by 2023. The Narrabri Gas Project is currently under assessment by the Department and could provide a new supply of domestic gas.

However, this is subject to a comprehensive assessment of the merits of this project and determination by the Independent Planning Commission and assessment and determination of the proposed Western Slopes Pipeline to connect this project to the east coast gas network. Santos has also advised that further appraisal of the coal seam gas field would be required prior to commencing production, even if approval was granted.

The project could assist in addressing these risks. It could potentially provide 100 petajoules (PJ) of gas a year, which is 70% of NSW's total annual gas demand. It would also increase competition in the gas market, which would potentially exert downward pressure on gas prices. The project could also provide up to 12 days of emergency supply should gas supply from other states be disrupted.

3.3 Regulatory Authorities

As the project would involve operations on a ship within a port, a range of maritime and safety legislation would apply to the project.

Vessels operated as part of the project would be subject to the provisions of the *Marine Safety Act 1998* (Marine Safety Act), which aims to ensure the safe and responsible operation of vessels in ports and other waterways to protect the safety and amenity of other users of those waters and occupiers of adjoining land.

The Marine Safety Act provides that the Australian Maritime Safety Authority (AMSA) is the National Marine Safety Regulator and is responsible for developing national standards for marine safety and undertaking monitoring and enforcement. AMSA would be responsible for the safety of vessels operated under the project, including the FSRU.

The Marine Safety Act also outlines the appointment and functions of harbour masters. These functions include establishing port operational procedures (port instructions) relating to vessel navigation protocols, ship scheduling, berthing and under keel depth requirements. The Port Authority of NSW is responsible for the provision of harbour master functions and would regulate any activity that could pose a risk to safety or security within the port operations, including fixed facilities and vessels.

The *Ports and Maritime Administration Act 1995* (Ports and Maritime Act) regulates the operation of ports in NSW across a range of matters including commercial operation and port charges that apply, management of port infrastructure, port safety and the function of port corporations in relation to port operations. The Ports and Maritime Act provides broad powers to port operators to regulate activities that may pose a risk to the safety or security of the port, including but not limited to the movement of vehicles and the loading and unloading of material. NSW Ports is the port operator at Port Kembla.

The project would also be considered a Major Hazards Facility (MHF) under the *Work Health and Safety Regulation 2017* because of the volume of gas to be stored and processed aboard the FSRU. As such, operations on the FSRU would also fall under the jurisdiction of SafeWork NSW.

A number of other regulatory approvals would also be required for the project. These are discussed further in **section 4.2**.

3.4 Relationship to other Approvals

Port Kembla Outer Harbour Development

The *NSW Port 30 Year Master Plan* (the Master Plan) provides the long-term strategy for ports to ensure NSW continues to benefit from strong future trade levels by expanding port capacity to meet demand. A key component of the Master Plan is the development of additional port facilities in the Outer Harbour of Port Kembla to cater for the projected growth in trade.

Concept approval for the Port Kembla Outer Harbour Development was granted under Part 3A of the *Environmental Planning and Assessment Act 1979* (EP&A Act) in March 2011. The approval allows for the progressive development of the Outer Harbour over a 27-year period and includes dredging and reclamation of 42 hectares (ha) of land in the Outer Harbour. The approved concept plan is depicted in **Figure 5**.

Development of the port will take place in three stages, with most of the dredging and reclamation activities occurring during stage 1. Project approval for Stage 1 was also approved in March 2011. The approved Stage 1 footprint is shown in **Figure 6**.

Although some of the fill required for the Port Kembla Outer Harbour Development reclamation area is approved to come from the Outer Harbour itself, it was envisaged that the balance would be imported from elsewhere.

The project would provide some of this fill, as the proposal involves disposing of the spoil from excavation and dredging activities in the Outer Harbour reclamation area.



Eastern Gas Pipeline

Jemena owns and operates the EGP, a major gas supply pipeline linking the Gippsland Basin in Victoria with the ACT and NSW. The pipeline passes through Kembla Grange to the west of Port Kembla. Jemena also owns and operates the Port Kembla Lateral, a gas pipeline that branches off the EGP and extends approximately 6.5 km from the EGP at Kembla Grange to a metering station in Cringila to provide gas to industrial customers at Port Kembla.

The project gas pipeline would connect to the Port Kembla Lateral in Spring Hill (near its border with Cringila).



4. Statutory Context

4.1 Critical State Significant Infrastructure

On 19 June 2018, the former Minister for Planning determined that the Port Kembla Gas Terminal was essential to the State for economic reasons because it would increase the security, reliability and affordability of gas in NSW. Accordingly, the Minister made an order declaring the project to be State significant infrastructure and Critical State significant infrastructure under sections 5.12(4) and 5.13 of the EP&A Act.

The project would increase the security, reliability and affordability of gas in NSW by:

- supplying approximately 100 PJ of gas to the State, which represents over 70% of the State's gas demand;
- providing up to 12 days of emergency gas supply that would address any disruption in gas supply from other states;
- increase competition in the gas market, thereby asserting downward pressure on gas prices.

As the project has been declared CSSI, the Minister for Planning and Public Spaces is the approval authority for the project.

4.2 Permissibility and Environmental Planning Instruments

In accordance with Section 5.22(2) of the EP&A Act, no environmental planning instruments substantially govern the carrying out of the project other than the *State Environmental Planning Policy (State and Regional Development) 2011* identifying the project as CSSI. Notwithstanding this, consideration was given to Environmental Planning Instruments (EPIs) that would have applied, including:

- *State Environmental Planning Policy No. 33 – Hazardous and Offensive Development* (SEPP 33): requires consideration of a project's potential to cause hazards or be offensive. The EIS included an assessment of potential hazards and proposed measures for storage, handling and transport of dangerous goods.
- *State Environmental Planning Policy (Three Ports) 2013* (Three Ports SEPP): provides a consistent planning regime for the development and delivery of infrastructure on land in Port Botany, Port Kembla and the Port of Newcastle. The project meets the definitions of a port facility and is consistent with the land zonings of the Three Ports SEPP. Under the Three Ports SEPP, the project would be permissible with consent.
- *State Environmental Planning Policy No 55 – Remediation of Land* (SEPP 55): promotes the remediation of contaminated land for minimising the risk to human health and the environment. A contamination assessment is included in the EIS.
- *State Environmental Planning Policy (Infrastructure) 2007*: facilitates the delivery of infrastructure across NSW. Under clause 53(1), the gas pipeline would be considered permissible without consent as it would require a licence under the *Pipelines Act 1967*.

- *State Environmental Planning Policy (Coastal Management) 2018* (Coastal Management SEPP): promotes a coordinated approach to land use planning in the coastal zone consistent with the objects of the *Coastal Management Act 2016*. As the project is partly within the Port Kembla lease area as defined by the Three Ports SEPP, the Coastal Management SEPP would not apply. However, the principles and assessment considerations of the Coastal Management SEPP were considered in the development of the project.
- *Wollongong Local Environment Plan 2009* (LEP): the LEP does not apply to infrastructure within the Port Kembla lease area as defined by the Three Ports SEPP.

4.3 Other Approvals

A number of additional approvals would be required if the project were to proceed.

The excavation and dredging of 720,000 m³ of materials and the storage of LNG would both be scheduled activities requiring an Environment Protection Licence (EPL) under the *Protection of the Environment Operations Act 1997* (POEO Act).

The project site would be defined as a Major Hazards Facility (MHF) under the *Work Health and Safety Regulation 2017* because the project involves the storage and processing of over 200 tonnes of natural gas and, although the site is in a port operational area under the control of a port authority, it includes long-term storage areas where dangerous goods would be kept for more than 5 days. Accordingly, a licence for an MHF would be required under Part 9.7 of the *Work Health and Safety Regulation 2017*.

A licence under the *Pipelines Act 1967* would be required for the construction and operation of the gas pipeline.

The gas pipeline would traverse several road verges, and a permit under section 138 of the *Roads Act 1993* would be required.

Permits under the *Fisheries Management Act 1994* are not required for critical State significant infrastructure. The impacts on fisheries and marine vegetation associated with dredging and disposal of sediments has been considered in the EIS. No significant detrimental impacts on fisheries resources are predicted.

Water Management Act 2000: The project would involve excavation within 40 m of the shoreline and has the potential to intercept water within an aquifer during excavation or directional drilling. However, no major dewatering from a water source is predicted. Approvals for water use, water management works and controlled activities under this Act are not required for critical State significant infrastructure.

4.4 Commonwealth Legislation

No impacts on matters protected under the *Environmental Protection and Biodiversity Conservation Act 1999* have been identified and consequently a referral to the Commonwealth Minister for the Environmental and Energy has not been made.

Permits are required for sea dumping operations within Commonwealth waters under the *Environment Protection (Sea Dumping) Act 1981*. The Project includes deposition of 720,000 m³ of excavated and dredged material within the Outer Harbour of Port Kembla. However, no material would be disposed of within Commonwealth waters, and accordingly no permit would be required.

The *Protection of the Sea (Prevention of Pollution from Ships) Act 1983* sets out standards for marine vessels, such as the FSRU. It adopts the *International Convention for the Prevention of Pollution from Ships 1973*¹, also known as MARPOL. Where there is an inconsistency with Commonwealth legislation, NSW requirements cannot apply. This is applicable to air discharges from the FSRU where the NSW emission standard for Nitrogen Dioxide (NO_x) emissions is inconsistent with standards set in MARPOL. The NSW standards require a more stringent NO_x

¹ The *International Convention for the Prevention of Pollution from Ships 1973* was modified by the Protocol of 1978. Together these are known as the MARPOL Convention.

standard than is achieved by marine vessels when using marine diesel oil (MDO) to generate power. This issue is discussed further in **section 6.6**.



5. Engagement

After accepting the EIS for the project, the Department:

- publicly exhibited the EIS from 14 November 2018 until 14 December 2018 at the:
 - Wollongong City Council offices;
 - Warrawong District Library;
 - Nature Conservation Council's office; and
 - Department's website;
- advertised the exhibition of the EIS in the Sydney Morning Herald, Daily Telegraph, Illawarra Mercury, Advertiser Wollongong, and Kiama Independent; and
- notified relevant State government authorities and Council by email;

The Department also arranged a planning focus meeting with the proponent and its consultants, Council, NSW Ports and NSW Port Authority, SafeWork NSW, and other key Government agencies in Port Kembla on 24 July 2018.

5.1 Summary of Submissions

The Department received 23 submissions on the project, including 14 submissions from members of the public and special interest groups (including private businesses), and 9 submissions from government agencies.

The table below summarises the views of special interest groups and public submitters towards the proposal.

Table 2 | Summary of Council, Community and Special Interest Group Submissions

Submitters	Number	Position
Community	5	
• < 5 km	2	Object
	1	Comment
• 5 – 10 km	1	Object
	1	Support
Special Interest Groups (including private businesses)	9	
• Endeavour Energy	0	Object
• NSW Ports	7	Support
• NSW Business Chamber		
• Illawarra Business Chamber		
• Illawarra Innovative Industry Network		
• Regional Development Australia	2	Comment
• AI Group		
• Park Pty Ltd		
• Office of the Lord Mayor of Wollongong City Council		
TOTAL	14	

5.2 Key Issues - Individual and Special Interest Groups

Submissions from the public raised concerns about the potential disturbance of contaminants during construction and the consequential impacts of the surrounding coastal area and Lake Illawarra, and health impacts associated with fugitive emissions. Submissions also objected to the reduction in amenity and beauty of the region from further industrialisation of the area. These matters are considered in **section 6** of this report.

Other public submissions were concerned about the source of the gas (in particular, whether the gas would be sourced from unconventional gas sources) and the impacts of the gas industry on climate change. In this regard, submitters also raised concerns that importation of gas would delay the deployment of renewable energy solutions, and that the capital injected into the project could be better used to develop a local sustainable renewable energy industry.

One business raised concerns about the impact of the project on its activities and infrastructure during construction of the project.

Submissions in support of the project focused on the potential for the project to provide a more reliable and affordable supply of gas to the State and the increased security this would bring to many NSW businesses and their employees.

Submitters also supported the diversification of industry in the Illawarra region, the jobs that would be generated and flow-on economic benefits of the project, and the utilisation of surplus port capacity.

5.3 Key Issues - Government Agencies

The **Environment Protection Authority (EPA)** requested additional information about a range of matters relating to the:

- handling and management of spoil during construction, and the containment of spoil in the disposal area;
- management of contaminated or potentially contaminated materials;
- management of noise and dust during construction;
- impacts on water quality from discharges from the FSRU during operations; and
- potential for the project to exceed NSW emissions standards for nitrogen oxide emissions during operations.

AIE provided this information in the Submissions Report and a number of follow-up emails.

The EPA generally accepted the proposed mitigation and management measures but recommended a range of conditions including that AIE be required to:

- prepare a Dredge Management Plan;
- provide a report detailing the design and construction of the emplacement cells and to engage an independent auditor to verify the construction of the emplacement cells;
- undertake water quality monitoring during construction and operation of the project; and
- verify the predicted impacts from discharges from the FSRU;

The EPA also recommended that AIE should engage a NSW EPA Accredited Site Auditor to endorse management plans associated with the management of contaminated material and to issue a certificate confirming the suitability of the site for its intended use.

The Department has incorporated the EPA's recommendations into the conditions of approval.

These matters are discussed in more detail in **section 6**.

Department of Industry – Lands and Water (Dol Lands and Water) Dol Lands and Water recommended that AIE should be required to prepare trigger levels for responding to water quality impacts, contamination and turbidity, and a description of the actions that would be taken in the event the trigger levels are reached.

The Department has included a condition requiring AIE to prepare a Dredge and Excavation Management Plan and a Water Quality Monitoring Plan, and to consult with Dol Lands and Water in the preparation of these plans.

Dol Lands and Water also recommended that the water inlet structure on the FSRU should be designed to minimise the entrainment of aquatic organisms and plankton. The Department has included a condition to ensure the design is consistent with this recommendation.

The **Office of Environment and Heritage (OEH)** advised that the proposed removal of habitat for the Green and Golden Bell Frog and Southern Myotis should be offset. An updated credit calculation accounting for the impacts on those species was included in the submissions report.

OEH also requested additional information about how risks to water quality and marine environment receptors would be managed, and about how risks to life, infrastructure and the environment in the event of a large coastal event due to climate change would be addressed in the design of the project infrastructure.

These matters are discussed in **sections 6.4** and **6.6** of this report.

OEH did not raise concerns about Aboriginal heritage and supported the avoidance of a recorded Aboriginal heritage site along the pipeline route. OEH recommended that an unanticipated finds procedure be included as a condition of approval. The Department has included this in the conditions.

Wollongong City Council was concerned about the adequacy of the Aboriginal heritage assessment (which was undertaken in accordance with *the Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales* (2010)), largely because the pipeline route appears to intersect the location of a recorded Aboriginal site. Council also raised concerns about the potential for harm to sub-surface archaeological deposits from the construction of the pipeline and recommended further test excavations be undertaken.

The Department notes that the location of the Aboriginal site was incorrectly recorded, and the pipeline has been designed to avoid the actual site. Other potential impacts to Aboriginal heritage and the need for test excavations are discussed further in **Section 6.6** of this report.

Council also raised concerns about the use of potentially contaminated material for the construction of an embankment on the eastern side of the berth area. AIE has subsequently amended the proposal to exclude construction of the embankment.

A separate submission from the office of the Lord Mayor of Council supported the proposal because of the economic benefit it would bring to the region.

SafeWork NSW requested clarification and additional information on aspects of the hazard and risk assessment and recommended that AIE should consult with it in the preparation of a Safety Case (which is required under Work Health and Safety legislation). SafeWork NSW was satisfied that most of the issues were addressed in AIE's submissions report but recommended that some outstanding issues should be addressed in the Safety Case.

Safework NSW and the **NSW Police** recommended that AIE be required to consult with the counter terrorism units of the NSW Police and NSW Fire and Rescue in relation to the ongoing security of the facility.

The Department has included a condition requiring AIE to consult with the police in developing a Safety Management System for the project.

Fire and Rescue NSW (FRNSW) recommended that a Fire Safety Study should be prepared and outlined a range of matters that should be included in this study. The Department has included this as a condition of approval.

Roads and Maritime Services (RMS) raised no concerns about the proposal but noted that AIE would need to apply for a consent under section 138 of the Roads Act and obtain a Road Occupancy Licence prior to commencing any works that would impact the operation of the road.

The pipeline would be constructed beneath all State roads using horizontal direct drilling. AIE has confirmed that it would consult further with the RMS during the detailed design of the pipeline.

The submissions and agency advice on the EIS are provided in **Appendix C**. AIE's response to the submissions is provided in **Appendix D** and additional agency advice is provided in **Appendix E**.



6. Assessment

The Department has assessed the merits of the project in accordance with the requirements of the EP&A Act and applicable NSW Government policies and guidelines.

The Department considers that the key assessment issues relate to:

- hazards and risks associated with the transport, storage and handling of LNG and natural gas;
- the potential for construction of the project to disturb existing contaminated soils, sediments and groundwater;
- potential impacts to water quality and marine ecology from construction and operation of the project; and
- the impacts on the safety and navigability of other vessels using the harbour.

The Department has also provided a summary of its assessment of other relevant issues in **section 6.7**, including amenity impacts including noise emissions, impacts on heritage and terrestrial biodiversity, traffic impacts, and the social and economic impacts and benefits of the project.

6.1 Hazards and Risks

The project introduces a new industrial premise into an existing highly industrialised harbour. There are few sensitive land uses located near the proposed FSRU berth site, with the closest adjoining land used for industrial purposes (Port Kembla Coal Terminal).

There are some open spaces around the harbour used for recreation. The closest residences are located more than 2 km from the FSRU, although there are residences in closer proximity to the proposed pipeline. However, the Department notes that gas pipeline infrastructure is commonly located within urban residential areas.

The key risk/hazard issues for the project relates to the additional risk from this new activity on these surrounding land uses, including the propagation risk of an incident at the import terminal impacting on adjoining hazardous industries and conversely propagation risk from adjoining industries impacting the import terminal.

Hazard assessment approach

The EIS included a preliminary hazard analysis (PHA) carried out in accordance with the Department's *Hazardous Industry Planning Advisory Paper No 6 Hazard Analysis*. The PHA identified and modelled the probability and consequence of a range of hazardous events occurring under a range of scenarios based on different environmental and operating conditions. The assessment then determined an overall risk to people and property in relation to defined risk criteria, as set out in *Hazardous Industry Planning Advisory Paper No. 4 Risk Criteria for Land Use Safety Planning* (2011b) (HIPAP 4) and summarised in Table 3 below.

The PHA is required to consider:

- fatality and injury risks to individuals (for example from heat radiation, explosion and toxicity);
- propagation risks to and from other hazardous operations, with potential to trigger additional hazards;
- societal risks (fatality to larger populations); and

- risks of incidents to the biophysical environment.

Table 3 | Risk criteria (HIPAP 4)

Acceptable Level of Risk (per annum)	Land Use
Fatality (contours in Figures 7 and 8)	
0.5 in a million (5E-007)	Sensitive land uses such as hospitals, care facilities or schools
1 in 1 million (1E-006)	Residential areas including hotels and motels
5 in 1 million (5E-006)	Commercial areas including shops and offices
10 in 1 million (1E-005)	Active open space including sport complexes
50 in 1 million (5E-005)	Industrial area
Injury	
50 in 1 million	Sensitive land uses and residential areas
Propagation Risk	
50 in 1 million	Industrial operations

The Department's hazards and risk section reviewed the PHA and the Department also engaged an independent hazard and risk specialist, Mr. Philip Skinner of Arriscar Pty Ltd, to provide advice on the adequacy of the hazard analysis.

Mr Skinner requested supplementary information (see **Appendix E**) to clarify some of the assumptions used in the PHA and questioned whether all potentially hazardous events had been adequately considered, including risks associated with ship collision and grounding and multiple hose and marine loading arm failure. AIE provided detailed supplementary information in its Submissions Report (see **Appendix D**) to address these concerns, including a revised cumulative individual fatality contour.

Overall, the Department and Mr Skinner considered that the assessment was adequate for the preliminary assessment and that conservatism was built into the analysis. However, as not all design information and safety systems were factored into the assessment, Mr Skinner recommended that the final design of the project should undergo further review prior to construction of the project.

This is a standard approach in accordance with HIPAP 4, with a final hazard analysis required to be undertaken for the detailed design stage. That is, there is sufficient information available to conclude that the risks would be able to be appropriately managed. This is discussed further below.

The PHA identified that the main hazards associated with the project would be fires or explosions caused by loss of containment of LNG or natural gas from the LNG carriers, FSRU, gas pipeline, or connecting arms and pipes. The key driver of risk was found to be associated with incidents that could generate a fire at the FSRU, rather than associated with the gas pipeline or with the LNG carrier, as the overall risk is associated with the frequency that these carriers are unloading LNG to the FSRU.

Risk of fatality

Contours showing the level of individual risk of fatality were prepared for each potential hazardous event (see **Figures 7 and 8**). The contours show that risks to sensitive, residential and commercial areas near the project, including along the pipeline route, would be well within acceptable risk thresholds (i.e. less than the risk thresholds of 0.5, 1 and 5 chances in a million per annum respectively). However, a small area of land within the

adjoining Port Kembla Coal Terminal would exceed the HIPAP criteria for industrial land use.



Figure 7 | Fatality Risk Contours- Pipeline and Berth

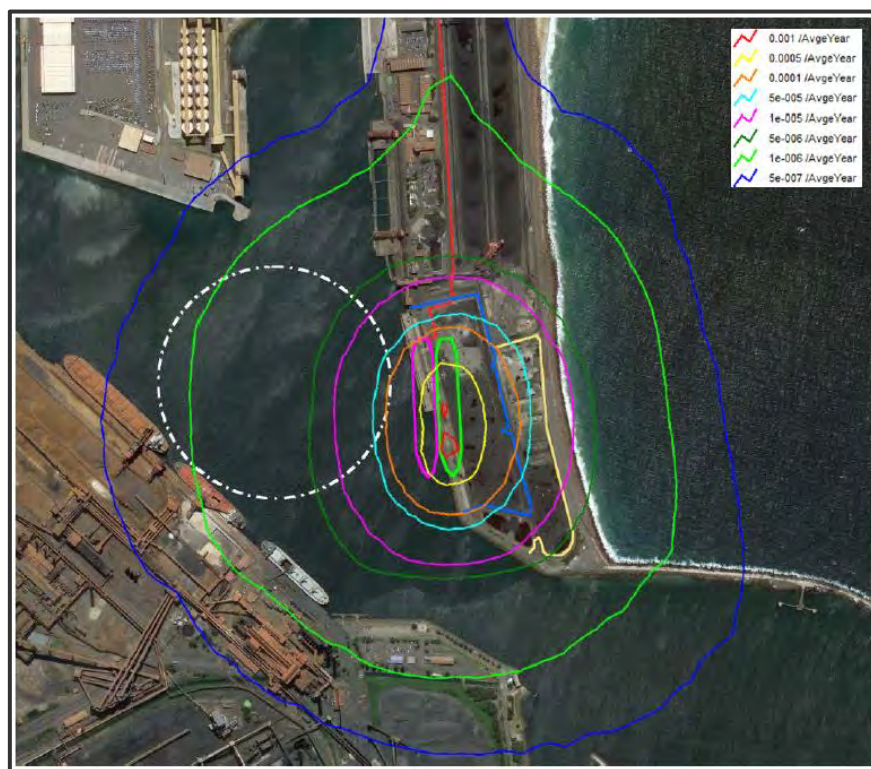


Figure 8 | Berth 101 Fatality Risk Contours

HIPAP 4 allows for a higher risk for industrial land if the site involves only the occasional presence of people. In this regard, the operators of the coal terminal have advised that this area is only used as a backup truck wash when its normal truck wash area is out of service. Infrastructure in the area would typically undergo routine maintenance once per quarter for 2-3 hours. This means that people would be using the area infrequently, and therefore the individual fatality risk would be lower than indicated by the contour.

Further, the Department understands that the risk assessment was conservative in that not all safety systems were factored in and additional engineering controls could further reduce the risk. Consequently, both the

Department and Mr Skinner consider that the risk is acceptable, but that AIE should consider additional engineering and operational controls to reduce the risk. Accordingly, the Department has included a condition requiring AIE to provide details of measures that would be implemented to minimise the risk prior to commencing operations, if the project were approved.

NSW Ports owns Seawall Road that parallel to Berth 101 on its eastern side. Under HIPAP 4, individual fatality risk criteria do not apply to roads. However, the road is sometimes used by fisherman, surfers and other members of the public, and the risk contour for active open spaces extends over the road (i.e. if the road were an active open space, the risks would not comply with the HIPAP 4 criterion for that land use).

However, the risk criterion for active open spaces assumes that people might use the land at any time. Seawall Road is generally only open during daylight hours and the road is gated and fenced and can be closed by NSW Ports for operational reasons. Accordingly, the Department considers the risk is significantly lower than indicated by the PHA. Further, the Department is satisfied that the abovementioned condition would require AIE to consider further options for reducing the risk.

Injury and Propagation Risk

The PHA demonstrated that the risk of individual injury, damage to property and propagation risk of heat radiation and overpressure impacts would be confined to the project site and therefore the project meets the HIPAP risk criteria for these aspects.

Societal Risk

As there is limited land use or opportunity surrounding the site for large groups of people to congregate societal fatality risks are considered low. Residential land use is more than 2 km distance from the site and while there is public access to the private Seawall Road in the order of 10s of people access the area, rather than numbers where the risks are exacerbated. The Department considers the project complies with the societal risk criteria.

Biophysical Risk

The PHA also considered the risks to the biophysical environment from the release of diesel and odorant, and the potential for toxicity irritation to nearby residents from the release of odorant. Both were considered low.

Summary

AIE has undertaken a comprehensive hazard assessment in accordance with the requirements of State Environmental Planning Policy No 33—Hazardous and Offensive Development (SEPP 33). Following a thorough expert review by Mr Skinner, the Department is satisfied that the project would not significantly increase the hazards to people or the environment.

Nevertheless, to ensure the project would operate safely, Mr Skinner and the Department's risk specialists have made recommendations to ensure that the risks of the project would be appropriately constructed and managed through the project life. The Department has included conditions requiring AIE to undertake several additional studies based on the final design of the project, and to prepare a number of safety and emergency plans for the development, including:

- a hazard and operability study;
- a final hazard analysis;
- a safety management study;
- a fire safety study in consultation with Fire and Rescue NSW;
- a construction safety plan;
- a pipeline safety management study;
- an emergency plan; and

- a safety management system

AIE would be required to consult with the relevant regulatory agencies in the preparation of these plans and studies.

In addition, as the FSRU and berth site would be an MHF, AIE would be required to complete a detailed safety case in accordance with the *Work Health and Safety Act 2011* and *Work Health and Safety Regulation 2017* to ensure the safety of the project's workforce.

6.2 Contaminated materials and groundwater

Port Kembla has a long history as an industrial site, and any disturbance of existing contamination could lead to environmental and health risks. The EIS included a comprehensive assessment of the likelihood for land and groundwater contamination and acid sulphate soils to exist on the project site and considered options for managing any contaminated materials encountered during construction activities.

Land Contamination

The pipeline route traverses areas where there has been significant landform changes including the reclamation of land within Tom Thumb Lagoon, transport infrastructure development, and the construction of the steelworks and port facilities. This has introduced fill materials including dredged materials, coal and coal by-products, steel production by-products and other anthropogenic materials.

Although comprehensive soil sampling undertaken for the project did not identify any widespread contamination, excavated materials along the pipeline route are considered to have a moderate likelihood of contamination, based on current and historical land uses.

Berth 101 is constructed of material possibly dredged from the Inner Harbour and steelworks slag, and although there is evidence of historical contamination of the berth, the results of soil sampling show that contamination in the fill material is relatively minor.

Two soil samples exceeded the health limits for benzo(a)pyrene (BaP TEQ) and the management limits for petroleum hydrocarbons. However, as the samples are spatially separate and BaP TEQ concentrations at all other sample sites were significantly lower, the assessment concluded contamination is isolated, rather than there being significant broadscale contamination.

Fragments of Asbestos Containing Material (ACM) were found on the ground in the vicinity of Berth 101 which are assumed to be remnants from the demolition of former buildings on site. No asbestos was identified in sub surface samples and it is considered unlikely that asbestos is present in the fill material.

The Department and the EPA are satisfied that no significant contamination has been identified and that any risks to the environment and human health can be mitigated by appropriate management of the materials.

To this end, the EPA and the Department have recommended conditions requiring AIE to prepare and implement a protocol for managing contaminated or asbestos containing material in consultation with the EPA, with oversight provided by an EPA accredited contaminated site auditor. The protocol must include a remediation strategy if required, and detail how environmental and health risks would be managed.

Acid Sulphate Soils

Acid sulphate soils occur in natural sediments below the Berth 101 at depths between 2.5 m and 5.5 m. Some areas along the pipeline route are also mapped as having a high potential for acid sulphate soils, with two samples confirmed the presence of acid sulphate soils at depths of 7.5 m and over 12 m respectively. There is also a high probability that acid sulphate soils occur within the harbour sediments that may be dredged.

To limit the exposure of materials with higher acid sulphate potential to oxygen, AIE has committed to emplacing these materials underwater in the disposal area within 48 hours of excavation. Lower risk materials would potentially be temporarily stockpiled. However, AIE would test and, if necessary, neutralise the materials with lime.

The Department has recommended conditions requiring construction activities to be undertaken in accordance with the *Acid Sulfate Soil Manual* and *Managing Urban Stormwater: Soils and Construction*. Further, the process for managing these materials are required to be documented in an Excavation and Dredging Management Plan prepared in consultation with the EPA and other government agencies, and to the satisfaction of the Secretary, prior to commencing construction.

Harbour Sediments

Previous studies of marine sediments in Port Kembla harbour have determined that the upper soft silty clays within the harbour contain elevated concentrations of heavy metals including cadmium, chromium, copper, lead, nickel, mercury and zinc. Elevated levels of Tributyltin (TBT), dioxins and polycyclic aromatic hydrocarbons (PAHs) were also reported in several studies.

The results of additional sampling of the proposed dredge footprint and disposal area were consistent with the previous findings, with elevated concentrations of heavy metals found in both the proposed dredge footprint and proposed disposal area.

The Dredging and disposal activities would disturb harbour sediments and mobilise contaminants into the water column and/or expose acid sulphate soils to oxygen.

Groundwater

Groundwater sampling at Berth 101 indicates a lens of fresh to brackish groundwater is perched above the denser saline marine water with elevated concentrations of arsenic and copper, zinc and ammonia.

However, groundwater leakage to the harbour is likely to be limited as the excavation of the berth would involve the installation of piles between the groundwater wells and the excavation area which would act as a retaining wall to limit the flow of groundwater into the harbour, and saturated sands from the berth would also be removed during excavation.

The shallowest natural soils (buried lagoon sediments) along the pipeline route are deeper than 5 m and groundwater is inferred to be between 4.5 m and 8.2 m below ground level. Except where directional drilling is used beneath roads, railway lines and waterways, the pipeline trench would typically be 1 - 1.5 m deep. Consequently, construction is unlikely to disturb the deeper natural sediments or groundwater.

AIE is proposing to undertake further assessment of groundwater quality to inform construction management in sections where directional drilling is likely to intercept groundwater.

Summary

The Department considers that there is a reasonable likelihood that demolition and construction activities would disturb contaminated or acid sulphate soils, and a possibility that contaminated groundwater would be intercepted. However, the Department considers that, subject to the recommended conditions, any adverse impacts can be minimised and that the project site would not pose an ongoing risk to the environment or human health.

6.3 Water Resources

The project has the potential to impact water resources during construction, through excavation, dredging and disposal activities, and during operations from water discharges from the FSRU.

Construction Impacts

AIE has estimated that the total volume of material to be dredged or excavated from the site would be around 720,000 m³, accounting for bulking factors. As discussed above, there is likely to be excavation and dredging of contaminated materials and the disposal of these materials in emplacement cells in the Outer Harbour.

Other activities such as the removal of piles, movement and anchoring of construction vessels and onshore earthworks would also potentially impact water quality. However, these impacts are expected to be minor in comparison to the dredging and disposal works.

Numerical modelling was undertaken to determine the likely extent of sediment plumes caused by the dredging and dumping of sediments within the Inner and Outer Harbours. The modelling predicts that the extent of the dredge plume would be confined to the port, and significant total suspended sediment concentrations would be confined to the vicinity of the dredging and disposal areas.

AIE has proposed a range of measures to limit the spread of suspended sediments and reduce the risk of exposure of acid sulphate soils to oxygen. These measures include:

- enclosing the active disposal area with silt curtains;
- constructing a bund around the perimeter of the disposal area to contain the sediments/spoil;
- placing contaminated silts and muds and high-risk acid sulphate soils at depth within the bunded disposal area and covering with a layer of lower risk clays followed by sandy materials to the final height; and
- placing materials from Berth 101 with higher acid sulphate potential underwater in the disposal area within 48 hours of excavation.

The Department is satisfied that managing turbidity levels and restricting the dispersal of sediments to areas immediately surrounding the dredging and emplacement works would be a reasonable and effective means to prevent the spread of contaminants. In this regard the EPA and the Department consider that the controls proposed by AIE are generally suitable for preventing the spread of sediments.

The EPA and DoL Lands & Water recommended that the measures for managing contaminant levels and turbidity should be included in a Dredge and Excavation Management Plan, and that AIE should be required to monitor the effectiveness of these measures and take ameliorative action in the event of significant impacts to water quality.

The Department agrees and has included a condition requiring AIE to submit a Spoil Management Plan that includes a Dredge and Excavation Management Plan and a Water Quality Monitoring Plan detailing how contaminated and potentially acid forming materials would be managed, and how impacts would be monitored and managed. AIE would be required to consult with the EPA and DoL Lands & Water in the preparation of the plan.

The Department also considers it appropriate that contaminated sediments emplaced within the disposal area should be encapsulated to prevent dispersal of sediments in the longer term. To ensure that the emplacement cells are suitably designed, the Department has recommended conditions requiring AIE to provide a detailed design and construction methodology for the emplacement cells and, following construction, to engage an independent auditor to verify that the cell is constructed in accordance with the approved design.

Hydrodynamic Impacts

Emplacement of the large volume of material in the Outer Harbour would potentially affect ocean processes, including wave action, tidal hydraulics and water levels in the port.

The EIS included a hydrodynamic assessment that predicts long wave heights could increase by up to 5 cm near the northern breakwater of the Outer Harbour (in the vicinity of Berth 201) and by up to 13 cm at some locations at the southern end the Outer Harbour.

However, the Department considers that these effects are relatively small and localised and, while these effects may need to be considered during the design and development of new infrastructure in the Outer Harbour, they are unlikely to significantly impact the existing or future operation of the port.

NSW Government agencies and NSW Ports did not raise concerns about these impacts.

Operational Impacts

During operations, potential impacts to water quality and hydrology are primarily associated with discharges of seawater used in the regassification process. These discharges would be colder than the surrounding water temperature and would contain elevated levels of free chlorine, as discussed below.

Cold Water Pollution

Regasification of the LNG would involve pumping the LNG through a series of heat exchangers that use seawater as a source of heat. The seawater would be drawn into the FSRU, circulated through the heat exchangers and released back into the harbour at a rate of up to 10,000 m³/ hour through a discharge outlet in the hull of the vessel. The discharged water would be up to a maximum of 7° Celsius (C) cooler than the ambient sea water temperature at the point of discharge.

The ANZECC water quality guideline² includes an ambient water quality target for cold water discharges whereby *“the median temperature should not be permitted to fall below the 20%ile temperature value obtained from the seasonal distribution of temperature from the reference ecosystem”*. This is in recognition that large unnatural changes in temperature can affect physiology of aquatic biota and ecosystem functions.

Thermal plume modelling was undertaken to predict the likely dispersion of the cold water in Port Kembla Harbour. The modelling included a range of scenarios to consider the effect of tidal conditions on plume dispersion and included both near field (Cormix model) in the mixing zone near the discharge point and far field modelling (Delft3D model) to look at dispersion through the harbour.

The modelling indicates that initial mixing would reduce the temperature differential to just 1° C at each end of the proposed berth, and that the seawater temperatures within the port would generally decrease by an average of 0.1 to 0.2 degrees.

In response to the EPA’s request for additional assessment of the thermal discharges, the submissions report included a revised plume model which considered the effects of changes in ambient water temperatures within the Inner Harbour over all seasons with and without existing warm water discharges from other nearby industrial sources.

The revised model predicted that median temperatures of the thermal plume would comply with the ANZECC guideline in all seasons unless Bluescope Steel stops discharging warm water into the harbour. In that event, the far-field plume modelling predicts that the median temperature of the cold-water plume would be colder than the ANZECC temperature requirements during summer and autumn in a small area (approximately 50 m by 100 m) adjacent to the FSRU on the harbour floor.

² The Australian New Zealand Guidelines for Fresh and Marine Water Quality (ANZWQG) was released in 2018 as an on-line guideline that is updated with new information as it becomes available. As a starting point it has adopted the ANZECC 2000 Water Quality Guideline values, including for cold water discharges.

However, the ANZECC guidelines also allow for a mixing zone where water quality may still be below that required to protect the designated environmental values. The near field mixing zone (i.e. the area where initial mixing occurs) extends to 42.5 m from the discharge point and consequently the colder water would be largely confined to the mixing zone and would not extend to surface waters.

The EPA and the Department are satisfied that the modelling indicates cold water discharges from the FSRU would have only a minor impact on seawater temperatures, and these would be confined to the near field mixing zone.

The EPA recommended that AIE be required to undertake a verification program to confirm the modelling predictions and identify any contingency measures that could be implemented to address any unacceptable impacts or deviation from the modelled impacts.

The Department notes that any discharges would need to be undertaken in accordance with an Environmental Protection Licence (EPL) that would be issued by the EPA.

Chlorine Dispersion

The FSRU would be fitted with a Marine Growth Prevent System (MGPS) to prevent marine growth in the pipes and systems using seawater. The MGPS uses natural salts in the seawater to produce a solution of sodium hypochlorite that acts as a natural biocide.

Sodium hypochlorite degrades naturally and most of the solution would be used within the vessel. However, some excess sodium hypochlorite would persist, and the water discharged back to the harbour would contain total residual chlorine (TRC) and other reaction products that could impact water quality and ecosystem health.

AIE initially proposed to manage the production of sodium hypochlorite to ensure the free chlorine would remain below 200 micrograms per litre of water ($\mu\text{g}/\text{litre}$), which is in line with the World Bank Group Environmental, Health, and Safety Guidelines for Liquefied Natural Gas Facilities. However, the ANZECC guideline recommends a moderate reliability trigger value for TRC required to protect 95% of species of $3 \mu\text{g}/\text{litre}$ for freshwater ecosystems. The ANZECC guideline also recommends this as a low reliability trigger level for marine waters.

In its initial advice, the EPA noted that the water quality objectives of $3 \mu\text{g}/\text{litre}$ should be met at the edge of the near field mixing zone and the limit at the discharge point should be no more than $13 \mu\text{g}/\text{litre}$ at any time to avoid acute toxicity impacts within the mixing zone.

Following further consultation with Hoegh, the supplier and operator of the FSRU, AIE confirmed that the discharge concentration would be able to meet an 80%ile $20 \mu\text{g}/\text{litre}$ limit without compromising the effectiveness of the sodium hypochlorite as a biocide. However, the company contends that operating to meet a limit below $20 \mu\text{g}/\text{litre}$ would not be possible due to the limitations of the in-situ testing methods, which would not detect concentrations levels below $20 \mu\text{g}/\text{litre}$.

To address EPA's concerns, AIE undertook revised discharge modelling based on a discharge concentration of $20 \mu\text{g}/\text{litre}$. The model predicted that at the edge of the near field mixing zone (42.5 m from the discharge point) the TRC concentration would be less than $2 \mu\text{g}/\text{litre}$, meeting the ANZECC trigger level of $3 \mu\text{g}/\text{litre}$.

Although this would still be above the limit for acute toxicity in the immediate vicinity of the discharge point, it is predicted that chlorine levels would be below $13 \mu\text{g}/\text{litre}$ within 15 to 20 m of the discharge point and that the average concentration within the mixing zone plume would be around $3 \mu\text{g}/\text{litre}$.

The EPA advised that where the recommended acute TRC limits could not be met at the point of discharge, further practical measures should be investigated to mitigate potential impacts.

AIE investigated a number of mitigation measures, including: the use of diffusers to increase dilution at the point of discharge; alternatives to using sodium hypochlorite such as ultrasound and manual cleaning; discharges to alternative locations; and the use of sodium sulphite to neutralise the sodium chlorite.

However, the company argues that these options would not necessarily lead to better environmental outcomes, there are engineering constraints given the FSRU is a leased vessel and not land-based infrastructure and the significant volume of water that is discharged; and/or the options would involve significant additional costs.

The Department and the EPA accept that it may not be feasible to reduce the discharge to below 20 µg/litre and consider that a 100%ile limit of 25 µg/litre may be acceptable to allow for necessary process adjustments when discharge concentrations exceed the proposed threshold of 20 µg/litre.

However, the EPA has advised that the company should be required to undertake daily monitoring of water quality to verify the predicted value of 3 µg/litre at the edge of the near-field mixing zone and the acute toxicity risk in the immediate area around the discharge point. The EPA has also identified a test method that could potentially detect levels of just 2 µg/litre and subject to assessment for its suitability, has recommended that this method be used for the monitoring.

If discharge concentrations differ or impacts risks are greater than predicted, the EPA has advised that the limits may need to be revised.

Based on the plume modelling, the Department considers that a 20 µg/litre discharge concentration would meet the ANZECC objectives and environmental values for ambient water quality, and any toxicity risk would be restricted to a small area (within 15 - 20 m of the discharge point). This area would already be disturbed by the construction of the new berth and would be exposed to strong currents generated by visiting LNG carriers. Consequently, it is not likely that a large number of marine species would colonise or visit the area and impacts to marine life would be minor.

The Department notes that the EPL would include the limits and monitoring requirements discussed above and is also likely to require AIE to undertake a verification program to confirm the predictions, and to adjust its processes in the event of any significant changes from the predicted impacts.

6.4 Port Navigation

Port Kembla has a deep-water channel that can accommodate ships with a length of up to 311 m and has capacity for Capesize vessels (with a loaded capacity of up to 205,000 deadweight tonnage (DWT) at nominated berths (including Berth 102). Pilotage is compulsory for all vessels over 30 m long.

Existing shipping traffic in the harbour averages around 1,680 to 1,702 vessel movements per year. The *Port Kembla 30 Year Master Plan (2015)* forecast that this would increase to between 2,050 and 2,380 movements per year from 2020 onwards.

The Harbour Master and the Port Authority of NSW are responsible for the safe navigation of all vessels. Port operational procedures relating to vessel navigation protocols, ship scheduling, berthing and under keel depth requirements, as well as performance standards to achieve safe, effective, and reliable shipping are established by the Harbour Master, and emergency response and navigational safety within the port is managed by the Port Authority of NSW.

During construction, assuming all dredged and excavated material is transported to the disposal area by barge, around two barge loads per day (4 to 6 vessel movements) would be required for the duration of the construction period (10 to 12 months). Typical capacity of these vessels would be around 1,200 m³.

Movement of the barges would be coordinated by the Port Authority Vessel Traffic Information Centre, and operation of the barges would be controlled through a permit system under the control of the Harbour Master. Barge masters would also be required to obtain Certificates of Local Knowledge as required by the Harbour Master and the *NSW Marine Safety Regulation 2016*.

During project operations, based on one LNG delivery every two to three weeks, there would be around 48 LNG carrier movements per year. The size of the LNG carriers would vary but would likely be around 170,000 m³ to match the capacity of the FSRU.

As the channel between the Inner Harbour and Outer Harbour is relatively narrow and the turning basin within the Inner Harbour is small, the project has the potential to affect the navigability of other vessels, particularly when an LNG carrier is moored alongside the FSRU.

Navigation simulation studies were undertaken in consultation with the Harbour Master to ensure the design of the new berth would allow project vessels and other ships to safely turn and navigate the channel.

The final design of the berth provides for a 40 m offset between a moored LNG carrier and the turning basin. This design would provide sufficient clearance between turning vessels and moored LNG carriers, subject to some modifications to operating practices for vessels turning in the Inner Harbour (vessels would have to commence turning further towards the north-west quadrant of the turning basin, particularly in westerly winds). This would require additional pilot trainings, navigation aids for pilots, and additional monitoring by the Vessel Traffic Information Centre. Additionally, the Harbour Master may need to modify protocols for vessels using the turning basin in higher wind conditions, which may also involve the use of tugs.

It is also likely that larger vessels departing from Berth 102 would also have to reduce speed when passing the LNG carrier. This would potentially affect the steering ability of the ships and would consequently require the use of tugs for ship handling, particularly when the wind speed is over 10 knots.

The final design would result in moored LNG carriers partially obscuring the navigation light located at the north-western side of channel. AIE is proposing to relocate the navigation light in consultation with the Port Authority of NSW.

The Port Authority of NSW did not raise concerns about the design of the project in relation to vessel navigation.

The Department considers that the additional LNG carrier movements would not significantly increase traffic in the port. Although there would be a more significant increase in shipping traffic during the construction period, the vessels would be much smaller, and the duration would be limited.

The Department is satisfied that shipping traffic would be managed through ship handling protocols developed by the Harbour Master, and that the risk of collisions would be minor.

6.5 Aquatic and Terrestrial Biodiversity

Marine Ecology

Marine habitat within the harbour is reflective of the industrial nature of the harbour. Habitat is restricted mainly to the soft sediments and hard surfaces such as piles, quay walls and breakwaters. Up to half of the coverage of the hard substrate within the port are pest species, and the area does not support key fish habitat.

Some species listed under the *Fisheries Management Act 1994* (FM Act) the *Biodiversity Conservation Act 2016* (BC Act), and/or the *Commonwealth Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)) may potentially occur in the harbour, and six threatened species are considered likely to, including:

- Southern right whale (*Eubalaena australis*);

- Humpback whale (*Megaptera novaeangliae*);
- Long-nosed fur seal (*Arctocephalus forsteri*);
- Australian fur seal (*Arctocephalus pusillus*);
- Indian ocean bottlenose dolphin (*Tursiops aduncus*); and
- Bottlenose dolphin (*Tursiops truncatus* s. str.)

During construction, key potential impacts to marine ecology would be associated with:

- toxic effects on sessile invertebrates caused by the mobilization of contaminants into the water column. Re-suspension of contaminants has also been identified as a driver to the establishment of tolerant invasive species;
- turbid plumes generated by piling and dredging activities that could affect filter feeding organisms and fish feeding ability, particularly for fish that visually identify prey;
- toxic dinoflagellate blooms caused by the disturbance of sediments with potential dinoflagellate cysts;
- the removal of biofouling communities on piles and other submarine infrastructure during demolition of the berth, and the death or displacement of associated mobile fauna and slow-moving fish such as Syngnathids;
- burial of benthic communities in the disposal area;
- underwater noise from piling activities that would potentially displace fauna from the area or affect the hearing of sensitive fauna that rely on acoustics for navigation or communication; and
- collisions with marine fauna by construction vessels

The Department considers that potential impacts relating to turbidity, mobilisation of contaminants and re-suspension of toxic dinoflagellate cysts during dredging and disposal works can be managed by implementing measures to limit the spread of sediments. As discussed in **section 6.2**, the Department has included a number of conditions to this effect, and AIE would also be required to undertake water quality monitoring during the construction period to ensure the activities do not result in exceedances of marine water quality criteria.

In relation to the loss of biofouling and benthic communities, the Department considers that new infrastructure would likely be re-colonised following construction and mature biofouling communities would be established within a few years. Loss of benthic communities in the disposal area would be offset by the establishment of new infrastructure in that area, which would provide additional surfaces for colonisation by biofouling communities.

An assessment of the noise impacts on larger aquatic fauna was undertaken that considered the noise attenuation distance under various scenarios. The assessment concluded that, based on 30 minutes of continuous piling, fish or mammals within 109 m of the activity would be at risk of injury. However, the Department agrees that animals would naturally be expected to move away from noise impacted areas and return following the cessation of construction works, and injury is unlikely and any displacement would be temporary.

AIE has committed to monitoring for the presence of marine mammals while piling and, if mammals are sighted within or approaching 109 m of the works, stopping piling works and re-commencing gradually to allow the animals time to move away.

The Department also considers the risk of collisions with marine fauna are low due to the slow speed of the vessels associated with dredging and disposal activities.

Potential impacts on marine ecology during operations include detrimental effects from discharges of cold water and residual chlorine, the introduction/proliferation of marine pests, marine fauna collisions, and accidental release of solid waste, hydrocarbons, chemicals or other liquid wastes.

As discussed in **section 6.3**, the release of cold water from the project would have minor impacts on seawater temperatures which would be confined to the harbour, and residual chlorine is expected to be significantly diluted at distance from the discharge point, with concentrations maintained below 3 µg/litre at the edge of the near-field mixing zone. Consequently, only benthic and biofouling marine communities in very close proximity to the discharge point would be at risk.

However, as this area would already be disturbed by the construction of the new berth and would be exposed to strong currents generated by visiting LNG carriers, it is not likely the area would be re-colonised by a large number or variety of marine species, and mobile species would probably avoid the area. Consequently, impacts on marine species are likely to be very minor.

Groundwater Dependent Ecosystems

No aquatic Groundwater Dependent Ecosystems (GDEs) are mapped in the study area. However, areas of native vegetation at the northern end of Springhill Road and along Gurungaty Waterway and Allans Creek, and the waterways themselves may be terrestrial GDEs.

The Department is satisfied that impacts to these GDEs from the pipeline construction would be avoided by direct drilling under the rivers.

Terrestrial Biodiversity

14.30 ha of exotic grasses, planted flora and weeds would be removed for the project, mostly for construction of the pipeline. In addition, 0.25 ha of planted vegetation identified as Woollybutt-White Stringybark-Forest Red Gum grassy woodland on coastal lowlands occurs midway along the pipeline route and would be cleared for the project. This vegetation is not an endangered ecological community.

A remnant patch of the same plant community type occurs in the north west of the pipeline alignment. However, this patch comprises some Illawarra Lowland Grassy Woodland, which is listed under both the BC Act and the EPBC Act. The project has been designed to avoid this vegetation by installing the pipeline beneath the area using horizontal direct drilling.

The Department and OEH are satisfied that the project has been designed to avoid and minimise the amount of native vegetation to be cleared, and that the small amount of clearing can be offset. A credit calculation performed in accordance with the Biodiversity Assessment Method (BAM) determined that 3 ecosystem credits would be required to offset the clearing of the Woollybutt – White Stringybark.

Green and Golden Bell Frogs, which are listed under both the BC Act and the EPBC Act, have previously been recorded in highly disturbed habitats within the coal terminal and are known to be associated with artificial habitats in the area. Four small detention ponds that may be used by these frogs would be removed during construction of the project, and construction of the pipeline would temporarily impact a movement corridor for the species.

Several other fauna species listed under the BC Act and/or the EPBC Act may potentially use habitat in or near the project site. This includes the Southern Myotis, which use Woollybutt-White Stringybark-Forest Red Gum as habitat, and the White-bellied Sea-eagle and Eastern Osprey, which forage in the harbour on a regular basis and could be exposed to pollutants released in sediments during dredging activities.

OEH advised that offsets should be calculated for loss of Southern Myotis habitat and recommended that, although not strictly required under the BAM, the removal of the Green and Golden Bell Frog habitat (the artificial ponds) should also be offset.

AIE has calculated the number of credits required to offset for both (2 species credits for the loss of Southern Myotis habitat, and 1 species credit for the loss of Green and Golden Bell Frog habitat), and the Department has recommended conditions to retire the offset liability.

Exposure to disturbed contaminants is not considered likely to cause long-term toxic effects on the White-bellied Sea eagle or Eastern Osprey as the harbour makes up a small proportion of the foraging range of the birds, and any exposure would be short-term.

6.6 Other Issues

The Department has also considered the project's impacts and benefits in its assessment of the project, which is summarised in the table below.

Table 5 | Summary of other issues raised

Issue	Findings	Recommended Condition
Visual	- The Illawarra Escarpment rises to the west of the site and the elevated topography would provide views of the site from a number of residential suburbs and tourist lookouts. Headlands with clear open views across the harbour would also have views of the project. - Views from the nine most sensitive viewpoints towards the project were assessed. The assessment considered the change to the existing views due to the project, the sensitivity of the viewpoint to change, the magnitude of the change, and the overall significance of the impact. - The assessment concluded that views from the Wollongong Head Lighthouse lookout, the lookout at Hill 60 Park, and from the Port Kembla Heritage Park would be <i>moderately</i> impacted, and views from the residential suburbs of Figtree and Coniston would experience <i>moderate to low</i> impacts. The visual impacts from the other four viewpoints would be low or negligible. - This conclusion was largely based on the sensitivity of the viewpoints due to the high value place on the views, or the long duration of the view (in the case of the two residential areas). - In all cases, the magnitude of the change to the existing views would be low or negligible as the project components would be of similar scale and colour as the surrounding port features and not uncharacteristic in appearance. - The Department considers that, while the FSRU and visiting LNG carriers would be visible from key viewpoints, they would not be inconsistent in size or capacity of other vessels using the port or other infrastructure currently present within the port area, including sheds, silos and stockpiles. - The gas pipeline would be buried and hence would not have a visual impact, apart from during the construction period.	- The Department has recommended conditions of approval requiring AIE to ensure the visual impacts of the project are minimised including lighting impacts. - With these conditions, the Department considers that the visual impacts are acceptable.
Noise and Vibration	- Noise monitoring was undertaken at two representative residential receivers in the suburbs of Coniston and Cringilla. The monitoring locations are around 340 m north and 170 m south of the proposed pipeline respectively (and around 2.5 km north west and 2.2 km west of Berth 101 respectively). - Operational noise from the project is expected to be constant through the day, evening and night time periods, and is predicted to comply with all criteria during all periods. - Construction noise is predicted to exceed the noise management levels identified in the <i>Interim Construction Noise Guideline (DEC 2009)</i> (Construction Noise Guideline) by up to 10 dBA at residences within 300 m of the pipeline alignment in Coniston, and by 10-22 dBA at residences within 300 m of the pipeline alignment in Cringilla. - Demolition and construction of the new berth would also cause exceedances of up to 10 dBA above the noise management levels at isolated residences to the south west of the disposal area.	- Minimise the noise of the development and implement all reasonable and feasible measures to achieve the vibration limits set out in the relevant guidelines for structures and human exposure - Construction activities to be undertaken during standard construction hours (7:00 am to 6:00pm Mondays to Fridays and 8:00 am to 1:00 pm Saturdays), unless noise generated by construction activities is within the Construction Noise Guideline management levels set out in Table 3 of

Issue	Findings	Recommended Condition
	- Construction noise would not be above the highly noise affected level of 75 dBA at any sensitive receivers. - Vibration impacts from the construction activities are not predicted to exceed the vibration criteria due to the large distance between the construction areas and the nearest residential receivers. - AIE is seeking to undertake construction 24 hours per day, 7 days per week, noting that noise levels at the worst affected receivers to the south of the disposal area (48 to 52 dBA) would be similar to the existing ambient noise levels (49 dBA during the evening and 50 dBA during the night), and that noise impacts at affected residences along the pipeline route would be temporary in nature as construction would occur sequentially along the length of the pipeline corridor. - AIE has committed to implementing noise mitigation during construction to limit the noise impacts. These measures include, notifying receivers of construction activities, minimising construction activities near sensitive receivers during the evening and night, reducing the simultaneous operation of noisy equipment near sensitive receiver, and shielding stationary noise sources. - The EPA has recommended that construction outside of standard hours should only be allowed if noise levels can be kept to within the noise management levels set out in the Construction Noise Guideline. - The Department agrees and has limited construction to standard construction hours unless noise can meet the Construction Noise Guidelines management levels.	that Guideline, or within 5 dB(A) of the background rating level or an agreement is reached with affected receptors.
Air Quality	- Bulk earthworks, dredging and disposal activities are not likely to generate significant dust as the materials would mostly have a high moisture content and would be transferred directly to the disposal area, thereby limiting the potential for stockpiles to dry out. Drying materials would be watered to maintain moisture if necessary. - Particulate matter (PM₁₀, PM_{2.5}), total suspended particles and deposited dust levels are not predicted to exceed the relevant EPA assessment criteria specified in the <i>Approved Methods for the Modelling and Assessment of Air Pollutants NSW</i> (EPA 2016) (Approved Methods). - Notwithstanding this, given the large volume of materials to be handled, the EPA has recommended that real-time dust monitoring be undertaken during the construction period to support proactive dust management. The Department has included conditions of approval to this effect. - During operations, the primary emissions sources would be associated with the FSRU and LNG carrier engines. Both vessels can be operated using LNG or marine diesel oil (MDO). - Six operating scenarios were modelled based on both vessels operating simultaneously with different combinations of gas or MDO used to fuel the engines. - No exceedances of the assessment criteria set out in the Approved Methods for any pollutants at any sensitive receivers are predicted under any operating scenario. - Nitrogen oxides (NO_x) emissions would exceed the emissions standards set out in the <i>Protection of the Environment Operations (Clean Air) Regulation 2010</i> (POEO Regulation) when the FSRU engines operate on MDO. - However, air emissions from discharge points on marine vessels, including the FSRU, are also regulated under the Commonwealth <i>Protection of the Sea (Prevention of Pollution from Ships) Act 1983</i> and the emissions standards of the POEO Regulation would not apply where there is an inconsistency with Commonwealth legislation. - The FSRU is required to comply with the Commonwealth requirements for the 72-hour period when operating MDO. The FSRU would meet the emission requirements for NO_x and restrictions on sulphur content in MDO, limited to 0.5% sulphur content in the fuel.	- Minimise the dust, odour, and fume emissions of the project. - Ensure a suitable meteorological station is operating near the site for the duration of the construction period. - Prepare and implement an Air Quality Management Plan for monitoring and managing air emissions and gas leaks. - Restrict the use of MDO as a fuel to 72 hours cumulative over a calendar year.

Issue	Findings	Recommended Condition
	- Regardless, AIE has stated that it would only operate the FSRU on MDO for engine maintenance or in emergency situations, and this would be for a maximum cumulative duration of 72 hours per year. - The Department has included a condition limiting the use of MGO to operate the FSRU to 72 hours per year while the FSRU is moored at Berth 101. - Fugitive emissions would be minor, and the EPA and the Department considers that any fugitive emissions can be minimised by establishing a leak detection and repair plan.	
Climate Change/ Greenhouse Gases	- The air quality assessment includes a greenhouse gas assessment, which indicates that scope 1 and 2 greenhouse gas emissions from the project (i.e. emissions from direct energy use and indirect energy use from imports and exports of electricity, heat or steam) would be around 8,314 tonnes (t) of CO₂ equivalent during construction (mainly due to diesel consumption), and around 44,145 t of CO₂ equivalent a year during operations. - Annual emissions during operations would be about 0.03% of emissions in NSW and 0.01% of emissions in Australia. - AIE has committed to a range of greenhouse gas mitigation measures, including implementation of a detailed energy monitoring program, which would be administered via the Air Quality Management Plan. - Whilst the Department acknowledges the significant global threats posed by climate change, it has considered the greenhouse gas emissions associated with the project and believes that the project's contribution to Australian and global greenhouse emissions would be very small.	Minimise the greenhouse gas emissions from the project.
	- The EIS included an assessment of the risks from variable weather conditions as a result of climate change. This identified that the key risks from climate change with the potential to impact the project would be from sea level rises and extreme weather conditions associated with east coast lows. - Sea level rise is projected to be up to 14 cm by 2030 in the Wollongong LGA and up to 22 cm by 2050 (which is well past the proposed life of the project). These rises would have implications for coastal erosion, inundation and storm surge height. Extreme winds would have the potential to disrupt gas supply by damaging the facility or restricting the safe movement of carriers. - The project has been designed to make allowance for sea level rises by constructing the berth 14 cm higher than the existing berth. - Most of the project infrastructure would be located on the FSRU, a floating vessel built to withstand extreme open ocean conditions, and which could be put to sea quickly if required during extreme weather conditions; - The gas pipeline is the key onshore infrastructure component. This would be built to Australian Standard 2885, which governs the safety and maintenance and operation of all gas pipelines in Australia. - On-shore infrastructure on the wharf would mainly be limited to the pipeline tie-in, offloading arms and ancillary infrastructure (access road, fencing, lighting etc). - The Department notes that NSW Ports, as the port asset manager, has responsibility for maintaining the port infrastructure including the road and wall separating the project site from the ocean. - The Department considers that in the event of a major coastal event, the project would not pose a significant risk to life, infrastructure and the environment.	No specific conditions
Social and Economic	- The project could potentially provide 100 PJ of gas a year, which is 70% of NSW's total annual gas demand. It could also provide up to 12 days of emergency supply should gas supply from other states be disrupted. - Industrial gas users employ over 300,000 jobs in NSW, 15,000 of which are located in the region of the project. By providing a new	No specific conditions.

Issue	Findings	Recommended Condition
	source of reliable gas to these industries, the project would support those jobs. • In addition, the project would inject around \$200-\$250 million into the economy and provide direct employment to around 150 people during construction and around 40-50 people during operation, and • There would be some amenity impacts to nearby residences during construction from noise, dust and traffic. However, the impacts would not be significant and would be of short duration. • During operation, although the project would be visible from some locations, it would be consistent with the existing visual character of the port and surrounding industrial land. • Consequently, the Department considers that any negative social impacts of the project would be relatively minor and would be far outweighed by the overall social and economic benefits of the project.	
Waste Management	• Construction of the project would generate various waste streams including demolition and construction waste, excavated and dredged material and potentially contaminated materials. • Waste generated by the project during operation would largely be limited to the waste generated by the workforce stationed on board the FSRU (including sewage, wastewater, general rubbish and food waste). • AIE has committed to managing waste in accordance with the <i>Protection of the Environment Operations Act 1997</i>, the <i>Waste Avoidance and Resource Recovery Act 2001</i>, and the <i>Marine Pollution Act 2012</i>. • In addition, as a marine vessel the FSRU must adhere to the International Convention for the Prevention of Pollution from Ships (MARPOL), which includes regulations aimed at preventing both accidental pollution and pollution from routine vessel operations.	• Minimise waste generated by the project. • Classify all waste generated on site in accordance with the waste classification guidelines. • Store and handle all waste generated on site in accordance with its classification. • Ensure all waste is disposed of off-site at appropriately licensed facilities.
Traffic	• Construction of the project would generate up to 112 heavy and 150 light vehicles per day. • Traffic would primarily use the State roads that surround the site, including Port Kembla Road, Springhill Road, Master Road, Five Islands Road, Flinders Street and Old Port Road. Access to the disposal area would be via Foreshore Road, which is a local road. • An assessment of the impacts of this traffic on the road network found that all roads could continue to operate well within their operating capacity even during morning and evening peak periods, and that key intersections would continue to operate to an acceptable level of service. • The project would generate little traffic during operation. Light vehicle movements would mainly be due to the transport of the operational workforce (40 to 50 personnel). Heavy vehicles would be limited to occasional deliveries or waste services (a conservative maximum of one delivery per day). • The assessment conservatively assumed that 100% of the spoil may be transported to the Outer Harbour disposal area by truck. The EPA recommended that barges should be preferentially used over truck movements to reduce traffic related impacts. • AIE undertook further assessment of spoil transport movements and committed to ensuring that 50% of the estimated spoil, 360,000 cubic metres, would be able to be relocated via barge. • Neither the RMS nor Council raised concerns about the traffic impacts, and the Department is satisfied that traffic impacts can be effectively managed and limited to the duration of construction.	• Prepare and implement a Construction Traffic Management Plan in consultation with Council and RMS that includes measures to minimise traffic safety issues and a driver's code of conduct. • Restrict the amount of spoil that is moved by road transport to 360,000 cubic metres and keep records to demonstrate compliance.
Aboriginal Heritage	• One Aboriginal site has previously been recorded in the vicinity of Spring Hill, and the archaeological assessment undertaken for this project determined that there is moderate to high potential for Aboriginal cultural material to be found in the reserve along Springhill Road and other areas around Spring Hill, including an area of Crown land known as The Horse Paddock. • Fig trees on Spring Hill are also culturally important to the local Aboriginal people.	• Prepare and implement an Unexpected Finds Protocol including procedures for managing Aboriginal items found during construction.

Issue	Findings	Recommended Condition
	• The project has been designed to avoid the identified Aboriginal heritage site, the fig trees and the areas with potential Aboriginal heritage significance. • Although the pipeline would cross The Horse Paddock, it would be installed by horizontal direct drilling at a depth of 2 m to avoid impacts to potential archaeological deposits. • Council initially raised concerns about the potential for harm to sub surface archaeological deposits and recommended further test excavations to determine the potential depth of Aboriginal objects. • The submissions report noted that under the <i>Aboriginal Code of Practice for Archaeological Investigations of Aboriginal Objects in NSW</i> (2010) excavations should only be undertaken when there is a high probability of sub surface objects being present, to avoid potential harm from the test activities themselves. • OEH considers that, given that there would be no excavation in the Horse Paddock, impacts to Aboriginal heritage are unlikely, and that further assessment of Aboriginal heritage, including test excavation, is not required unless the alignment of the pipeline changes. However, OEH recommended that AIE should prepare a plan for managing any unexpected Aboriginal objects found. • The Department is satisfied that the project has been designed to avoid impacts to Aboriginal cultural heritage.	
Historic Heritage	• Most of the project site has been heavily modified for port and other industrial development. However, an area around Spring Hill, including The Horse Paddock, may potentially include the remains of a house and outbuilding foundations associated with the Springhill Estate, which dates to the earliest formalised settlement in the area. • Although most of the area has been modified by previous construction and the widening of Springhill Road, two areas in the reserve along Springhill Road have been less heavily modified and have a higher potential to contain heritage features or relics. • The pipeline has been designed to avoid these areas and no impacts are anticipated. • Council initially raised concerns that the area to the west of and immediately adjacent to Springhill Road could also potentially have a higher potential for historic heritage and should be further investigated. • Council's advice was based on visible evidence of building rubble and rubbish in an aerial photo of the area from 1937. However, in its submissions report, AIE noted that since that photo was taken, the area has been heavily modified, and Springhill Road widened to a six lane dual carriageway. Consequently, any historic heritage in this area is likely to have been destroyed. • The Department referred the matter to the Heritage Council of NSW, which did not raise concerns. • The Department considers that the project would be unlikely to impact historic heritage, but has recommended that procedures for managing any historic heritage items found during construction should be included in an Unexpected Finds Protocol.	• Prepare and implement an Unexpected Finds Protocol including procedures for managing historic heritage artefacts found during construction.



7. Evaluation

The Minister has declared the project to be Critical state significant infrastructure reflecting the project's potential to increase the security, reliability and affordability of gas in NSW.

This is because the project could provide up to 70% of NSW's total annual gas demand and an emergency supply of gas for 12 days. It would introduce an additional source of supply to the NWS gas market, which would increase competition and potentially exert downward pressure on gas prices.

The project would be located on an industrial site which is suitable for the purpose, and would be consistent with the goals of the *Illawarra Shoalhaven Regional Plan (2015)* to grow a strong, resilient and diversified economy.

The main environmental impacts of the project would be associated with construction activities. In particular, excavation, dredging and disposal of spoil would potentially expose or mobilise existing contamination on the site. However, although there are elevated levels of some contaminants on the site, the Department considers that the proposed measures to avoid or ameliorate impacts would reduce the impacts to an acceptable level of environmental risk.

The pipeline has been designed to avoid known Aboriginal heritage sites and high value vegetation. A small amount of native vegetation would need to be cleared for the construction of the pipeline, and two man-made ponds that provide habitat for the threatened Green and Golden Bell Frog would be removed from the berth area. The Department is satisfied that these impacts would not be significant and would be offset by retiring credits in accordance with the *NSW Biodiversity Offset Policy*.

The project would be classified as a hazardous industry because it would involve the transport, handling and storage of LNG and natural gas. However, the PHA indicates that the project could comply with the risk criteria for most land uses surrounding the project.

Although the PHA indicates there would be some residual risk at the Port Kembla Coal Terminal and on parts of the seawall road, given the infrequent use of these areas by members of the public and the fact that the PHA does not consider all engineering controls and management measures to reduce risk, the Department considers it likely that risks would be further reduced. Accordingly, the Department considers that the project can be designed and operated in such a way that the risks to surrounding land users would not be increased to unacceptable levels.

The project has been designed to minimise disruption to port navigability, and some adaptations have been incorporated into the design to account for extreme weather events associated with climate change.

Discharges from the FSRU during operations are not predicted to significantly impact water quality or marine ecology, as the dilution effect means that within approximately 43 m of the discharge point temperature chlorine concentrations would be within acceptable limits.

There is still some uncertainty regarding the acute toxicity effects of residual chlorine in proximity to the discharge point. However, given the existing poor quality of the harbour water, the absence of abundant marine life, and the small area of impact, the Department considers that this uncertainty is not grounds for refusal of the project.

The project would be located within an industrial precinct, and amenity impacts are largely limited to some noise, dust and traffic that would be generated during the construction period. There would be slight changes to the view of the port from some viewpoints in the surrounds. However, the project infrastructure would be in keeping with other infrastructure in the port and would not change the character of the port and the Department considers the visual impacts would be minor.

Overall, the Department considers that the project, subject to the relevant management strategies and conditions, would not result in significant impacts to the environment.

In addition to the significant social and economic benefits to the State of NSW from the provision of an alternative source of gas to NSW, the project would inject \$200 - \$250 million into the economy and provide direct employment to around 150 people during construction and 40-50 people during operations.

On balance, the Department considers that the benefits of the project outweigh its impacts and the project should be approved, subject to the recommended conditions.



8. Recommendation

It is recommended that the Minister for Planning and Public Spaces:

- **considers** the findings and recommendations of this report; and
- **accepts and adopts** all of the findings and recommendations in this report as the reasons for making the decision to grant approval to the application;
- **agrees** with the key reasons for approval listed in the notice of decision;
- **grants approval** for the application in respect of CSSI 9471 as amended, subject to the conditions in the attached project approval; and
- **signs** the attached project approval and recommended conditions of approval (see **Appendix F**).

Recommended by:

Recommended by:

Stephen O'Donoghue

A/ Director
Resource and Energy Assessments

David Kitto

Executive Director
Resource Assessments and Business Systems



Appendices

Appendix A – List of Documents

- Environmental Impact Statement (GHD, November 2018) (**Appendix B**);
- Submissions and Agency Advice (**Appendix C**);
- Submissions Report (GHD, February 2019) (**Appendix D**);
- Updated Hydrodynamic Plume Modelling (Cardno, 1 February 2019) (**Appendix D**);
- Biodiversity Development Assessment Report (GHD, February 2019) (**Appendix D**);
- EPA Advice on Submissions Report (**Appendix E1-1**);
- EPA Advice on Submissions Report – Attachment A (**Appendix E1-2**);
- EPA Advice on Submissions Report – Attachment B (**Appendix E1-3**);
- EPA Advice on Submissions Report – Attachment C (**Appendix E1-4**);
- Additional Information from GHD – Discharges (**Appendix E2-1**);
- Additional Information from AIE – Discharges (**Appendix E2-2**);
- Additional Information from AIE – MDO (**Appendix E2-3**);
- EPA Additional Advice (**Appendix E3**);
- OEH Advice on Submissions Report (**Appendix E4**);
- Additional Information from AIE – Climate Change (**Appendix E5**);
- DoI Advice on Submissions Report (**Appendix E6**);
- SafeWork NSW Advice on Submissions Report (**Appendix E7**);
- Preliminary Hazard Assessment Addendum (**Appendix E8**);
- Additional Information from Advisian – Hazards (**Appendix E9**);
- Independent Expert Advice – Hazards – Arriscar (**Appendix E10**)

Appendix B – Environmental Impact Statement

See the Department's website at <https://www.planningportal.nsw.gov.au/major-projects/project/11651>

Appendix C – Submissions and Agency Advice

See the Department's website at <https://www.planningportal.nsw.gov.au/major-projects/project/11651>

Appendix D – Submissions Report

See the Department's website at <https://www.planningportal.nsw.gov.au/major-projects/project/11651>

Appendix E – Additional Information

See the Department's website at <https://www.planningportal.nsw.gov.au/major-projects/project/11651>

- E1-1: EPA Advice on Submissions Report
- E1-2: EPA Advice on Submissions Report – Attachment A
- E1-3: EPA Advice on Submissions Report – Attachment B
- E1-4: EPA Advice on Submissions Report – Attachment C
- E2-1: Additional Information from GHD – Discharges
- E2-2: Additional Information from AIE – Discharges
- E2-3: Additional Information from AIE – MDO
- E3: EPA Additional Advice
- E4: OEH Advice on Submissions Report
- E5: Additional Information from AIE – Climate Change
- E6: DoI Advice on Submissions Report
- E7: SafeWork NSW Advice on Submissions Report
- E8: Preliminary Hazard Assessment Addendum
- E9: Additional Information from Advisian – Hazards
- E10: Independent Expert Advice – Hazards - Arriscar

Appendix F – Recommended Instrument of Approval

See the Department's website at <https://www.planningportal.nsw.gov.au/major-projects/project/11651>