DOC19/1090173

Ms Rose-Anne Hawkeswood
Department of Planning and Environment
GPO Box 39
SYDNEY NSW 2001

Dear Madam,

Port Kembla Gas Terminal (SSI 9471 MOD 1) – EPA Submission on Modification Report

I refer to your email of 28 November 2019 to the NSW Environment Protection Authority (EPA) containing the above and inviting comments and advice from the EPA on the project modification.

The EPA has reviewed the Modification Report and provides comments in the attachment to this letter (**Attachment 1**) to assist Department of Planning, Industry and Environment (DPIE Planning) in the assessment of this project. The comments highlight areas where the EPA recommends the Proponent provide further information and clarification to assist in the assessment of this proposal.

The EPA considers that a key focus area for further attention by the Proponent is water pollution (cold water discharges) from the Floating Storage and Regasification Unit (FSRU). The modification represents a significant change from the original proposal and modelled cold water impacts. This includes increases in:

- the number and potential size of LNG carriers. The report states up to 52 ships per year (doubled from 26) and up to 180,000 cubic metres in size (from 140,000 cubic metres);
- gas received from 4.4 million cubic metres to potentially 9.4 million cubic metres per annum (113% increase);
- the maximum cold water discharge rate from 10,500 m3/hr to 13,000 m3/hr. This translates to a potential increase in cold water discharges from 98 gigalitres to 152 gigalitres per annum (55% increase); and
- the modelled harbour area impacted by the cold water discharges. The harbour floor areas not achieving relevant temperature criteria, at certain times of the year, increases from 0.5 hectares to 15 hectares (a 30 fold increase).

To minimise environmental impacts, improve operational efficiency and allow “Cold Energy Recovery” there appears to be a growing trend for FSRUs worldwide to incorporate both “open loop” and “closed loop” heat exchange capabilities for regasification. This trend is due in part to environmental concerns in some ports (cold water, antifouling requirements, marine life entrainment). The EPA has recommended the Proponent assess the feasibility of incorporating these systems as part of this modification. Further details are provided in the attachment to this letter (**Attachment 2**).

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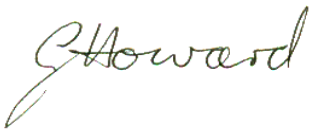
The EPA may have further comments upon receipt and review of this information. The EPA can meet with DPIE (Planning) at a mutually convenient time to discuss any of our comments.

It appears that several additional projects are required to fully realise this modification. New and additional pipeline projects are required for the proposed increase in gas imports to provide greater gas distribution capacity. For example, APA Group (APA) has recently lodged a development application to construct a gas pipeline from the Port Kembla Gas Terminal to its existing Moomba to Sydney Pipeline near Wilton (approximately 37 kilometres long) under a separate project approval. The pipeline project is in the early planning stages (State Significant Development) and EPA is required to provide a response to DPIE (Planning) on the environmental assessment requirements by 25 December 2019. It would be helpful if proponents could continue to be reminded that it is preferable for these linked projects to be considered in an integrated and holistic way. This is so the EPA and others can best ensure projects are delivered on time and with effective measures in place to protect the environment.

Should you require any further information please contact Greg Newman on (02) 4224 4100.

Yours sincerely



18/12/2019

GISELLE HOWARD
Regional Director Metropolitan
Environment Protection Authority

Attachments 1 & 2

ATTACHMENT 1: EPA COMMENTS

WATER QUALITY

Cold Water discharge

Temperature closely influences how an ecosystem functions, both directly (e.g. by influencing primary production), and indirectly (e.g. loss of biota as a consequence of loss of habitat). An organism's growth, metabolism, reproduction, mobility and migration patterns may all be altered by changes in ambient water temperature (ANZECC 2000). Biota, and physical and chemical processes like oxygen solubility and hydrophobic interactions are sensitive to temperature changes (ANZECC 2000). The water quality objectives for temperature in ANZECC (2000) were developed to manage these types of potential impacts.

The modelling of potential impacts of cold-water discharges during periods of increased predicted flow rates indicates that cold water discharge plumes would generally comply with ANZECC requirements for most of the water column at the edge of the near-field mixing zone. However, an area of about 300 x 500m over the bottom 2% of the water column, outside a near-field mixing zone, was found to be in the order of 0.5 degrees colder than the ANZECC guidance under some modelled discharge conditions (outlined below).

The Modification states that the high demand scenario (discharge rates up to 13,000 m^3/hr) will operate for up to six months from April through to September. It is stated that the water quality objectives will be exceeded beyond the edge of the near field zone during one month of Spring and two months of Autumn (April and May). Under the worst-case scenario, the water quality objectives will not be protected in the bottom 2% of the water column and seafloor over an area of about 300m x 500m.

Even within a near-field mixing zone, impinging on the seafloor should be avoided where possible. The modification represents a significant increase in affected area of seafloor and benthic habitat outside the near-field mixing zone over the periods outlined above. This warrants further investigation of mitigation options. When a single discharge source does not meet the water quality objectives outside the near-field mixing zone this can limit the capacity for future proposals to configure a discharge into the waterbody without potential significant environmental impacts or cost impacts for those future projects.

This EPA response is based on the modelling assessment in the Modification Report. Hydrodynamic plume modelling (Appendix B) incorporates 2007 Port Kembla Steelworks hot water discharges as model inputs. Further consideration and advice from the Proponent on the Updated Hydraulic Plume report to better account for Bluescope "cooling water flows" is required. The report claims this hot water will partially offset the FSRU cold water discharges. The data used in the Modification assessment however appears to be inaccurate and out of date and could overestimate the current Bluescope heated water contribution. This is because the premises was running 2 blast furnaces at that time. Around 2013, 1 blast furnace was closed and production essentially halved and therefore cooling water flows and warm water discharges have reduced since this time.

The modelling undertaken for the project also predicts that the cold-water discharges will not meet the water quality objectives when Bluescope discharges are removed from the model, under most of the simulated conditions for a discharge of 13,000m3/hr. This means that if Bluescope stops discharging in the future there will likely be greater exceedances (both in temperature and physical extent) of the water quality objective described above.

The EPA requested clarification on modelling input data used in the Updated Hydraulic Plume Report in relation to Port Kembla Steelworks hot water discharges from the Proponent on 4 December 2019. To date no response has been received. The EPA requests confirmation from the Proponent that the:

I. model input information accurately reflects the current situation in the Inner Harbour and;
II. model outputs as presented in the Report are accurate.

A summary table with limited details of potential mitigation measures for FSRU discharged water is included in the report (Table 5-9). The Modification states that "*given the relatively small extent and seasonality of intermittent impacts, management measures 4 and 5 in Table 5-9 (ME1 and ME3 as proposed in the Port Kembla Gas Terminal EIS) are considered adequate in light of the additional modelling scenarios associated with the proposed modification."* Management measures 4 and 5 are "Visual Inspection and Relocation During Construction (of protected mobile fauna)" and "Water Temperature Monitoring" respectively. Management measure such as alternative locations and dilution and diffuser options were considered unnecessary.

Impacts from FSRU cooling water and the antifouling system were a key consideration in the original approval. This risk was dealt with by strict discharge limits (supported by extensive modelling). Residual risks were identified (eg limitations/assumptions in modelling, restrictions in retrofitting equipment on commercial FSRU units etc). These were addressed by a Water Discharge Quality Verification Program, independent audits etc.

The proposed extent of the impact under the Modification proposal, however, is increased during some periods of increased flow rate (identified above). The aims should be to avoid mixing zones where possible and, if a mixing zone is initially required, eventually remove the need for a mixing zone through improved practices that prevent or further control, abate or mitigate the pollution. The modified proposal would further limit these aims.

Given this increased scale of the proposed modification and significant increase in affected area of seafloor and benthic habitat outside the near-field mixing zone at certain times of the year, further investigation of discharge mitigation options appears warranted. The EPA recommends further mitigation options be assessed or re-assessed to achieve water quality objectives at the edge of the near-field mixing zone and minimise the area affected by cold water discharges. Further information is provided in **Attachment 2** of this letter. These include "closed loop" regasification, alternate cold water discharge management options which would remove the cold water from the Inner Harbour to more accommodating environments.

Marine Growth Prevention System (MGPS)

The Modification indicates that risks associated with the MGPS will continue to be contained with a similar sized near-field mixing zone. The modelling indicated that higher flow rates resulted in improved mixing characteristics with regard to residual sodium hypochlorite resulting in similar near-field mixing zone (42.5 metres and 42.6 metres). The EPA recommends the existing consent conditions also apply to this Modification.

Marine Biota Entrainment

The existing approval condition (Schedule 3 Condition 2) states "*the FSRU will be designed and constructed to minimise entrainment of aquatic organisms and plankton"* The modifications' increased water throughput appears to have implications for additional biota entrainment through the open cycle cooling water system. Other proposals such as the Sydney Desalination Plant incorporated engineering modifications to water intakes to reduce entrainment. The Report contains no information on the potential scale or mitigation of any impacts. The EPA requests an assessment of the potential entrainment of biota and details of the measures incorporated in the FSRU to minimise entrainment of aquatic organisms and plankton.

AIR QUALITY

Gas Engine Utilisation Limit

The Modification indicates that 120 TJ/day of natural gas would be supplied during the low season (~ 6 months), and up to 500 TJ/day supplied during the high season (~6 months), as compared with the 300 TJ/day proposed for project approval.

The Modification does not propose an increase in the number of Liquefied Natural Gas (LNG) trains above what was proposed for the original project approval. Each LNG Train consists of 2 High Pressure LNG Booster Pumps and heat exchangers / vaporizers.

The Air Quality Impact Assessment (AQIA) has assessed three operating scenarios. The scenarios being:

- Scenario 1 – gas fuelled FSRU and liquid fuelled LNG carrier, 2 engines operating on each;
- Scenario 2 – liquid fuelled FSRU and liquid fuelled LNG, 2 engines operating on each; and
- Scenario 3 – gas fuelled FSRU and gas fuelled LNG, 2 engines operating on each.

The three (3) scenarios assessed are consistent with scenarios presented for normal operation in the original project approval. As such the assessment outcomes have not changed from the original project approval. That is, exceedances of the EPA's impact assessment criteria under normal operations are not predicted.

The EPA recommends a condition of approval that the operation of the FSRU and LNG carriers whilst at berth be restricted to only 2 engines, consistent with the assessed scenarios; namely

a) Whilst at berth the FSRU must not utilise more than 2 engines at any one time;
b) Whilst at berth the LNG carriers must not utilise more than 2 engines at any one time

Marine Diesel Oil (MDO) Operation Restriction

The Proponent is requesting a possible change to Condition 8 of the consent which states that the proponent must not operate the FSRU using marine diesel oil (MDO) for more than 72 hours in any calendar year while berthed at the site. The Environment Assessment states "*Hoegh LNG has requested a possible change to the Condition, which removes the 72 hour limit, subject to compliance with the Protection of the Environment Operations (Clean Air) Regulation 2010 being demonstrated"*

The Proponent is requesting the 72 hour per year MDO restriction (Schedule 2, Condition 8) be removed if compliance can be demonstrated with NSW Protection of Environment Operations (Clean Air Regulation 2010 (Nitrogen Oxides). The Report states, "*Given the pace of technological change, it is possible that technology may become available which could reduce NOx emissions when the FSRU is running on marine diesel oil (MDO mode) to a level below the … Regulation 2010 limit".*

The EPA makes the following observations:

- The 72 hours operating limit was based on a commitment presented in the original project approval and not a result of air quality impacts being predicted when utilising MDO for periods longer than 72 hours:
- Crown Solicitors Office advice obtained by EPA/DPIE (Planning) for the original project approval indicates that state legislation (e.g. Protection of the Operations Act 1997 & associated regulations) could be inoperative; and
- The 72 hour limit condition does not have a direct connection with prescribed limits contained in the NSW Clean Air Regulation.

Given the above, EPA provides the following advice:

- The condition (and any amendments) should not be related to prescribed limits in the Clean Air Regulation.
- The proponent should limit the use of MDO as far as practical.
- EPA does not object to this request and the suggested air emission monitoring scenario could be managed through a verification program. The EPA requests any verification / monitoring program is undertaken per EPA Approved Methods documents.

GENERAL

Operational limit

The Proponent is requesting the removal of approval condition 6 which limits operations to 26 LNG vessel per annum. The Proponent states this is consistent with NSW Ports policy and offers no alternate operational limits. The Proponent also requests that no upper limit be placed on the operation meaning throughput / operations could potentially increase beyond the assessed levels.

EPA suggests that with any modification approval that DPIE (Planning) incorporate an operational limit which matches the assessed impacts. Options which could be considered, aside from vessel numbers, include gas throughput or cooling water discharge limits (Volume, temperature etc).

Power Supply

Power supply for the anticipated doubling in vessel movements is proposed to be generated from the LNG fired engines. While power supplied from LNG has fewer emissions than traditional power sources, consideration of and deriving power from a Cold Energy Recovery System associated with a closed loop system (see **Attachment 2** for further details) could make use of the energy lost through an open cycle system and eliminate any local air emissions from FSRU LNG combustion.

Another option eliminating local LNG combustion emissions could be implementation of a Shore Side Power System. The increased number of vessels delivering LNG and the associated energy needs, could make this option more feasible.

ATTACHMENT 2 – REGASIFICATION ENVIRONMENTAL IMPACT MITIGATION OPTIONS

The work of the community, government and industry since the 1970's has led to a significant reduction in pollution across Port Kembla Harbour and the quality of the marine environment has markedly improved. There has been an increase in marine biodiversity and aquatic organism productivity. Marine life is more abundant across the whole harbour and the levels of contaminants in fish have decreased. These improvements are well documented. The EPA recognises the importance of a productive port at Port Kembla and believes all opportunities and technologies should be assessed to facilitate new developments and avoid compromising the above environmental improvements.

The EPA requests additional information on the assessed impacts as well as feasibility assessments of other management regimes which could reduce potential impacts. These include:

- Use of "closed loop" regasification systems
- Outlet (diffuser) design.
- Alternate discharge location - ocean outfall
- transfer to BSL cooling water inlet canal

Additional information on these options are provided below.

Closed Loop Regasification System

The EPA submission on the previous Development Application (DA) (our reference DOC19/89968-2) included recommended conditions on water pollution – including cold water discharges (ambient minus 7 degrees Celsius) and operation of the Floating Storage and Regasification Unit (FSRU) antifouling system. The water pollution matters in the original DA were largely managed through conditions to verify the predictions in the Environmental Impact Statement and manage discharges of cold water and antifouling compounds to the harbour.

The EPA believes that given the scale of the proposed increase in operations and associated increases in cold water discharges, consideration should now be given to other operational regimes such as "Closed Cycle" regasification systems.

To minimise environmental impacts and improve operational efficiency there appears to be a growing trend for FSRUs worldwide to incorporate both "open loop" and "closed loop" heat exchange capabilities. This trend is due in part to environmental concerns in some ports (cold water, antifouling requirements, marine life entrainment). The current proposal is an open loop system where heat exchange water is extracted from the harbour, passed through the heat exchange system, and the cold water discharged straight back to the harbour. "Closed loop" systems rely on a circulating medium for the heat exchange process which minimises water extraction and discharge. This more energy efficient system can also incorporate "Cold Energy Recovery" where the energy transferred from the extremely cold gas is reclaimed (e.g. LNG cold power generation).

The Proponent should assess the feasibility of incorporating a closed loop heat exchange system within the FSRU proposal. For example, an "Open loop" configuration could be used for the base LNG load and secondary regasification techniques while a "closed loop" configuration could be used during times of increased (peak) throughput.

Some advice can be found in the following references. These references are provided as examples only and the proponent should conduct its own consideration of relevant information

https://www.oxfordenergy.org/wpcms/wp-content/uploads/2017/07/The-Outlook-for-Floating-Storage-and-Regasification-Units-FSRUs-NG-123.pdf

https://www.semanticscholar.org/paper/LNG-Regasification-Terminals%3A-The-Role-of-Geography-Agarwal-Rainey/62d73916bb18e3e5e2a41b9bfa10236758cfa95d

Outlet diffuser design

The use of multiple discharge ports and reconfiguration of those ports with different types of diffusers could be further explored for the periods of increased flow rates. Pre-discharge dilution should also be re-examined for those periods of increased flow rates.

Ocean outfall

The Modification states that “the marine environments beyond the Outer Harbour have been impacted to a lesser extent by historical activities and are considered of higher value.” The zone of potential impact could be minimised with a properly designed outfall and mixing process model, e.g. avoiding shallow nearshore habitats. The overall level of impact could be reduced due to the greater capacity for mixing and dispersion compared to the harbour that is restricted by the harbour boundaries and hydrodynamics.