



**GAS IMPORT JETTY AND PIPELINE PROJECT
ENVIRONMENT EFFECTS STATEMENT
INQUIRY AND ADVISORY COMMITTEE**

TECHNICAL NOTE

TECHNICAL NOTE NUMBER:	TN 026
DATE:	16 October 2020
LOCATION:	Crib Point Jetty Works and Pipeline Works
EES/MAP BOOK REFERENCE:	Technical Report H, section 4.3.1.2, and Appendices B and C
SUBJECT:	Response to RFIs 075, 077 and 084 - Section 9.1 Background noise levels and Section 9.4 Mitigation measures
SUMMARY	Responses relate to subsection: Background noise levels and Mitigation measures
REQUEST:	This technical note has been prepared in response to the Request for Further Information 75, 77 and 84 provided to the proponents by the Crib Point Inquiry and Advisory Committee dated 16 September 2020.

NOTE:

[75] Explain whether consideration was given to adopting the NSW ICNG "Noise affected" level and other management measures

1. The key guideline relevant to the assessment and management of airborne construction noise in Victoria is EPA Publication 1254 – *Noise Control Guidelines*, 2008 (EPA Publication 1254).
2. EPA Publication 1254, *Section 2 - Construction and Demolition Site Noise* states that:
 - a. *"The purpose of this guideline is to protect nearby residential premises from unreasonable noise. Commercial and other premises affected by noise should be considered and reasonable measures implemented to reduce impact on these premises."*
3. To achieve this intention, EPA Publication 1254 nominates levels to be achieved during weekend/evening work hours (Monday to Friday: 6pm - 10pm, Saturdays: 1pm to 10pm and Sundays and public holidays: 7am to 10pm) and recommends that construction noise be inaudible within a habitable room of any residential premises at night (Monday to Sunday: 10pm – 7am). Provision is also made for circumstances of unavoidable works, being "... works that cannot practicably meet the schedule requirements because the work involves continuous work". It is anticipated that some stages of the pipeline installation (i.e. HDD drilling and hydrostatic testing) will meet this definition.
4. EPA Publication 1254 does not nominate a criterion (i.e. a specific decibel value to be achieved during construction works) for EPA *Normal working hours* (Monday to Friday: 7am to 6pm and Saturday: 7am to 1pm) or for non-residential noise sensitive receptors during any hours.
5. A literature review of NSW construction noise guidelines was undertaken as part of the NVIA to assist with the development of a construction noise criterion to supplement EPA Publication

1254. Past Mitigation Measures (MM) and Environmental Performance Requirements (EPR) for other EES NVIAs in Victoria were also considered during this review.

6. The literature review found that the NSW Department of Environment and Climate Change – *Interim Construction Noise Guideline (NSW ICNG)* provides noise management levels that could be used to help assess the severity of the calculated noise impacts during EPA *Normal working hours*. The NSW ICNG has also been referenced in recent Victorian EES NVIAs, notably West Gate Tunnel Project, North East Link and Melbourne Metro, for a similar purpose.
7. It was considered appropriate by the acoustics specialists that prepared the NVIA to adopt the “Highly noise affected” management level of $L_{Aeq(15-min)} 75$ dB (Table 2 of the NSW ICNG) to achieve the intention of EPA Publication 1254, i.e. “to protect nearby residential premises from unreasonable noise”.
8. The “Noise affected” level (also presented in Table 2 of the NSW ICNG as the RBL + 10dB) was not considered to be a reasonable threshold for describing residences that would be exposed to levels of “unreasonable noise” during construction. This is because the derived “Noise affected” level would be similar or lower than the existing ambient level, meaning that construction noise exposure at the “Noise affected” level would be audible at residences in most circumstances but similar or quieter than other environmental noise sources. Accordingly, a sound that can be heard but is not significantly louder than the existing ambient noise level is not considered to be “unreasonable noise” for the purpose of assessing construction impacts.
9. A combination of EPA Publication 1254 and NSW ICNG were used to develop the construction criteria presented in MM-NV02. The NSW ICNG management levels for “Highly noise affected” residences and educational institutions, parks and recreational areas and community and commercial buildings were adopted for EPA *Normal Working Hours* to supplement EPA Publication 1254. The criteria for works outside of EPA *Normal Working Hours* replicated those outlined in EPA Publication 1254.
10. The mitigation measures recommended in MM-NV01 for managing noise and vibration from construction activities were derived using EPA Publication 1254 and EPA Publication 480 as reference. The recommendations within these documents were considered reasonable for managing noise and vibration from the Project’s general construction activities and were not supplemented with other guidelines or standards.

[77] Describe cumulative impacts from other nearby noise generators, including tug boats and Berth 1 activities, and the basis of any assumptions

11. Potential cumulative noise impacts at Crib Point Jetty are described in Section 8.5 *Risk NV10 – Cumulative operational noise at Crib Point* of the NVIA.

Key assumptions used in the operational cumulative noise impact assessment

12. The following key assumptions were used in the assessment of potential operational cumulative noise impacts at Crib Point:
 - a. The combined worst-case noise from the activities associated with the Project include all noise sources associated with the FSRU, Jetty Infrastructure, Crib Point Receiving Facility, LNG carriers (when berthed) and tug boats (when berthing);

- b. United Petroleum's operation at Berth 1 of the Crib Point Jetty includes petroleum carriers, tug boats (when berthing), and the operation of a landside pump when the petroleum carrier is offloading;
 - c. The arrival of a United Petroleum carrier occurs one or two times per month;
 - d. Each arrival berths for approximately 24 – 48 hours. During this offloading period the landside pump that services Berth 1 operations operates continuously.
13. The assumed activities at Berth 1 are included in the cumulative impact assessment in Section 8.5 of the NVIA.

Summary results of the operational cumulative noise impact assessment

14. Measurements at 103 The Esplanade, Crib Point, suggested that the highest contribution to the overall noise level was between 33 and 35 dBA when Berth 1 was being used by United Petroleum. The source producing the highest noise from United Petroleum's operation at Berth 1 was found to be the landside pump, which is in use when offloading petroleum from a petroleum carrier.
15. The measured noise levels, and the identification of tonal noise characteristics indicated a high risk that the noise levels from the United Petroleum operations could exceed the Recommended Maximum Levels at The Esplanade without the Project.
16. Section 8.5.3 of the NVIA notes that receptors located on The Esplanade may be exposed to cumulative noise levels above the Recommended Maximum Levels for the night time period if noise sources associated with United Petroleum's use of Berth 1 at the Crib Point Jetty were operating at the same time as the Gas Import Facility.
17. The modelling carried out for the NVIA, which assumes worst case operating conditions, indicates that the highest noise levels are likely produced when the following activities occur simultaneously:
- a. United Petroleum's operation is unloading at Berth 1 between 10pm and 7am;
 - b. An LNG carrier is being moored at Berth 2 between 10pm and 7am (night time period);
 - c. The FSRU is operating at peak regasification capacity (which, for the purposes of the assessment, was assumed to be closed loop mode); and
 - d. Prevailing winds assist noise propagation from source to receptor.
18. The duration of any concurrent unloading and mooring at Berth 1 and Berth 2, let alone at the conservative parameters adopted in the assessment, is expected to be low.
19. Furthermore, the 9am/3pm and seasonal wind rose data is provided Table 5-3 and Table 5-4 of EES Technical Report G: Air Quality. These figures show that prevailing winds that assist noise propagation from source to receptor (from the north-west) have historically occurred for less than 15 per cent of the time for all seasons.
20. Were non-compliances to be detected, the most effective means of reducing cumulative noise levels from the Crib Point Jetty would be to ameliorate noise from the existing landside pump being operated by United Petroleum during offloading. Amelioration could include a bespoke acoustic casing or enclosure that reduces the overall noise level and removes the tonal

characteristic of the noise being produced by the pump. No further mitigation is likely to be required if this action occurs.

21. Alternatively, if on-site mitigation measures are not feasible, off-site acoustic treatment could be provided to the affected residences in accordance with Gas Import Jetty Works EPR-NV13.
22. Gas Import Jetty Works EPR-NV11 – Operational noise cumulative controls has been included to manage potential cumulative noise impacts in accordance with Section 5 - Managing Noise from Multiple Premises within the EPA Publication 1413 - Applying NIRV to Proposed and Existing Industry. EPR-NV11 includes a commitment to, where required, engage with other infrastructure operators on the jetty and Project surrounds to offset noise sources contributing to potential cumulative impacts. Additional cumulative impact management strategies will be developed in consultation with EPA, if required.

[84] Provide further information on the following Mitigation Measures:

- **MM-NV03 – Explain what criterion for vibration would be triggered when works are within safe working distances to occupancies, structures and assets, and any additional management measures that would be applied to mitigate vibration.**
- **MM-NV04 – Explain the triggers for enacting the Relocation Policy in the event that noise impacts residents during unavoidable works at night and/or explain how this mitigation measure would be achieved.**
- **MM-NV06 – Provide details on the response plan to confirm that in the event nominated noise and vibration criterion are exceeded during construction, subsequent mitigation will be applied to effectively reduce noise and vibration.**
- **MM-NV12 – Provide details on the likelihood of Recommended Maximum Levels for noise being exceeded at night and whether MM-NV12 should require residual Mitigation Measure that LNG carriers not arrive between 10pm and 7am.**
- **MM-NV13 – Explain the reasoning for noise monitoring proposed within six months of commissioning the FSRU, and consideration for increased monitoring frequency to confirm compliance with the Recommended Maximum Levels. Clarify the options to manage noise at the source, opposed to an intent to mitigate offsite noise at impacted dwellings.**

MM-NV03

23. The criterion for each of the listed standards were included in Section 3.2 *Construction vibration* of the NVIA and have been attached to this technical note for reference (see Attachment A and Attachment B).
24. Mitigation measures for vibration are now included in Gas Import Jetty Works EPR-NV01, EPR-NV03, EPR-NV06 and EPR-NV08, and the Pipeline CEMP Appendix J performance standards E6, E9 and E10.

MM-NV04

25. Offsite management measures will be considered where measured or predicted construction noise exceeds noise management levels for an extended period.
26. Noise and vibration monitoring for out-of-hours work is specified in Gas Import Jetty Works EPR-NV06 and Pipeline CEMP Appendix J performance standard E10.

27. Gas Import Jetty Works EPR-NV04 and Pipeline CEMP Appendix J performance standard E7 specify noise management levels to trigger offsite action to minimise the noise impact at the receptor. For night works, external construction noise levels (LAeq(15min)) predicted or measured above:
- LA₉₀ (night) + 5 dB for one night. Management measures may include Respite offers.
 - 55 dBA for two or more nights. Management measures may include either Respite or Relocation offers.
 - Residents with special requirements will be consulted with on a case-by-case basis.
28. The implementation of this mitigation measure would be developed as part of the plan to manage noise and vibration during construction in consultation with the EPA as per MM-NV01 (Pipeline CEMP Appendix J performance standard E6).

MM-NV06

29. The response plan will be developed as part of the plan to manage noise and vibration during construction in consultation with the EPA as per MM-NV01.
30. A typical response plan would include the following steps where the monitored level is higher than the criteria:
- Comparison of measured construction noise or vibration level to Project criteria
 - Determine the cause or causes of non-compliance
 - Develop and implement corrective and preventative actions (using EPA Publication 1254 and EPA Publication 480 as referenced in MM-NV01) to control noise or vibration from the construction activity causing the non-compliance
 - Verify the effectiveness of the corrective actions
 - Document any changes in procedures that may be required to prevent future non-compliance
31. As per Gas Import Jetty Works EPR-NV01 and Pipeline CEMP Appendix J performance standard E6, where the construction noise levels are predicted or measured to be exceeded at sensitive receptor locations, reasonable and proportionate mitigation measures will be implemented to minimise the impact on the receptors.

MM-NV12

32. The noise modelling shows that compliance with the Recommended Maximum Levels would be achieved for the worst-case scenario, based on the assumptions presented within the NVIA.
33. The worst-case scenario includes all noise sources operating concurrently at maximum capacity under weather conditions that would assist noise propagation from the source receiver. These conservative assumptions included within the noise model suggest that it is unlikely that the Recommended Maximum Levels would be exceeded in practice.
34. The Project would be designed to comply with the Recommended Maximum Levels. However, residual mitigation measures in Gas Import Jetty Works EPR-NV12 and EPR-NV13 have been

recommended to ensure actions are taken as soon as practicable if the measured noise levels demonstrate that the Recommended Maximum Levels are being exceeded.

35. Accordingly, it was not considered necessary or appropriate to recommend that arrival times be restricted.
36. The Master and Owner of any vessel entering Port of Hastings waters must comply with all of the requirements outlined in the Port of Hastings Harbour Masters Directions.

MM-NV13

37. Gas Import Jetty Works EPR-NV13 requires that noise produced by the Gas Import Facility be measured within six months of the beginning of commercial operations to confirm compliance with the Recommended Maximum Levels. Compliance noise measurements are not limited to one occasion or that they can only be undertaken within six months of the beginning of commercial operations to confirm compliance with the Recommended Maximum Levels. The frequency and timing of the compliance monitoring would be developed in accordance with the current Victorian EPA requirements.
38. EPR-NV13 does not imply that there is an intent to mitigate offsite noise at impacted dwellings. The third paragraph of EPR-NV13 prioritises onsite noise mitigation if the Recommended Maximum Levels are exceeded.
39. Offsite noise mitigation should be considered where onsite noise mitigation cannot be feasibly constructed to reduce external noise to below the Recommended Maximum Levels as stated in paragraph four of EPR-NV13.
40. Feasible onsite noise mitigation (administrative, operating or engineering controls) listed in EPR-NV13 would be developed where required. Administrative or operating controls may include scheduling operations so that noisier work is done during a particular time of the day. Engineering controls typically include modifying equipment, installation of additional noise suppression (silencers, mufflers or lagging) or installing physical structure to reduce the transmission of noise from the source to receiver (enclosures or noise walls).

CORRESPONDENCE: N/A

ATTACHMENTS: 2 Attachments:

1. British Standard BS6472-1:2008 Guide to evaluation of human exposure to vibration in buildings. Vibration sources other than blasting (BS6472-1:2008)
2. German Standard DIN4150-3:2016 Structural vibration in buildings – Effects on structures (DIN 4150-3)

ATTACHMENT 1

British Standard BS6472-1:2008 Guide to evaluation of human exposure to vibration in buildings. Vibration sources other than blasting (BS6472-1:2008)

British Standard BS6472-1:2008 includes Vibration Dose Value (VDV) ranges for workshops, offices, residences (daytime and evening). These ranges highlight the values where adverse vibration impacts for most persons could be expected. The vibration dose values for these building types are presented below. For offices and workshops, multiplying factors of 2 and 4 respectively should be applied to the VDV ranges for a 16-hour day.

Place and time	Low probability of adverse comment $\text{ms}^{-1.75}$	Adverse comment possible $\text{ms}^{-1.75}$	Adverse comment probable $\text{ms}^{-1.75}$
Residential buildings 16-hour day	0.2 to 0.4	0.4 to 0.8	0.8 to 1.6
Residential buildings 8-hour night	0.1 to 0.2	0.2 to 0.4	0.4 to 0.8
Offices	0.4 to 0.8	0.8 to 1.6	1.6 to 3.2
Workshops	0.8 to 1.6	1.6 to 3.2	3.2 to 6.4

ATTACHMENT 2

German Standard DIN4150-3:2016 Structural vibration in buildings – Effects on structures (DIN 4150-3)

DIN 4150-3 outlines 'safe limits' as Peak Particle Velocity (PPV) levels up to which no damage due to vibration effects have been observed for particular classes of buildings. Damage is defined as anything from minor non-structural effects such as superficial cracking in cement render to the separation of partitions or intermediate walls from load bearing walls. Safe limits applied to vibration levels of a short-duration are summarised below.

Group	Type of structure	Peak particle velocity (PPV) in millimetres per second (mm/s)		
		At foundation at a frequency of:		
		Less than 10 Hz	10 Hz to 50 Hz	50 Hz to 100 Hz ¹
1	Buildings used for commercial purposes, industrial buildings and buildings of similar design	20	20 to 40	40 to 50
2	Dwellings and buildings of similar design and/or occupancy	5	5 to 15	15 to 20
3	Structures that because of their particular sensitivity to vibration, do not correspond to those listed in Lines 1 or 2 and have intrinsic value (e.g. heritage-listed)	3	3 to 8	8 to 10

Note: 1. For frequencies above 100 Hz, the higher values in the 50 Hz to 100 Hz column should be used.

The more stringent values shown below can be applied when evaluating the effects of long-term or continuous vibration on structures.

Group	Type of structure	Guideline values for velocity (mm/s) Vibration at horizontal plane of highest floor (All frequencies)
1	Buildings used for commercial purposes, industrial buildings, and buildings of similar design	10
2	Dwellings and buildings of similar design and/or occupancy	5
3	Structures that, because of their sensitivity to vibration, cannot be classified under lines 1 and 2 and are of intrinsic value (e.g. Heritage buildings)	2.5