12 NOISE AND VIBRATION

This chapter describes the potential impacts on the local acoustic environment associated with the construction and operation of the Pipeline Component of the Queensland Curtis LNG (QCLNG) Project, comprising Export, Lateral and Collection Header pipelines of the Pipeline Component for the Queensland Curtis LNG Project.

12.1 PROJECT ENVIRONMENTAL OBJECTIVE AND VALUES

The Project's environmental objective for noise and vibration is to ensure that impacts arising from noise and vibration on ecological health, public amenity or safety are minimised.

The *Environmental Protection Act 1994* (Qld) *(EP Act*) sets out Environmental Protection Policies (EPPs*)* which deal with specific aspects of the environment and identify environmental values to be enhanced or protected. According to the *EP Act*, an EPP may set out objectives and criteria to be used in determining how those environmental values may be enhanced or protected by various actions.

The EPP (Noise) deals specifically with the environmental values to enhance or protect the acoustic environment. These values relate to the wellbeing of the community, a part of the community or an individual; particularly in relation to the individual's opportunity to have sleep, relaxation and conversation without unreasonable interference from intrusive noise.

The EPP (Noise) also specifies parameters for noise impacts associated with infrastructure, however, it does not specify limits in relation to construction activities.

12.2 EXISTING ENVIRONMENT

The proposed Pipeline route predominantly traverses rural areas. There may be instances where the Pipeline will be constructed near an existing residence. In these instances, there is a need to ensure that the construction and operation of the Pipeline does not adversely affect the acoustic environment of the rural residence.

Detailed ambient noise levels have not been monitored along the pipeline routes due to the total length and the predominantly rural nature of the routes. Typical ambient background noise levels have been adopted based on the EcoAccess guideline, Planning for Noise Control *as set out in Table 4.12.1*. The majority of the Pipeline route would fall into the noise area category "very rural (R1)" as defined by this guideline.

Table 4.12.1 Recommended Background Levels (RBL)

Day	Recommended Background Levels dB(A)		
	Day	Evening	Night
Rural residential (R1)	35	30	25
Urban residential (T1)	40	35	30

12.3 NOISE LIMITS FOR CONSTRUCTION

Construction activities will be limited to 12 hours per day, seven days per week, other than where indicated in *Section 12.4.1.* In some circumstances the noisiest activities may be scheduled to occur when they would generate least disruption or managed through negotiation of alternative arrangements with the affected resident. Where construction noise may impact on the acoustic environment of residential premises it is usually recommended that construction hours be limited to:

- 7am to 6pm Monday to Friday
- 7am to 1pm Saturday
- no construction on public holidays or Sundays.

Where the recommended construction hours are not practicable, the former EPA environmental guideline concerning contemporary sleep disturbance limits will be considered. These limits are provided in *Table 4.12.2*.

Table 4.12.2 Recommended Noise Limits

Day	Time	Guideline Level*
Monday to Friday	6pm to 10pm	Background + 10 dB(A)
	10pm to 7am	Sleep awakening criterion of 45 dB(A) L_{Amax} internal
Saturday	1pm to 10am	Background + 10 dB(A)
	10pm to 7am	Sleep awakening criterion of 45 dB(A) L_{Amax} internal
Sunday/public holidays	At all times	Sleep awakening criterion of 45 dB(A) L_{Amax} internal

The relevant noise criteria would be:

1. 10 dB(A) above background for works between 7 am to 6 pm from Monday to Friday
2. 10 dB(A) above background for works between 7 am to 1 pm on Saturdays
3. at all other times the noise criteria would be set at 5 dB(A) above background.

Based on the recommended background noise levels and a noise criterion of 10 dB(A) above background during construction hours and 5 dB(A) outside of these areas, this provides a noise range between 45 dB(A) during the day and 30 dB(A) at night.

In the unlikely event that construction works are required at night near sensitive receptors, the abovementioned sleep disturbance criteria outlined in *Table 4.12.2* may be adopted.

12.4 POTENTIAL IMPACTS AND MITIGATION METHODS

12.4.1 Construction

Construction works will occur during daylight hours, except in the following instances, where extended or continuous operation may be necessary:

- boring or tunnelling for trenchless techniques – once boring or tunnelling has commenced the process is continuous to ensure the opening created does not collapse
- water filling of the Pipeline and pumping pressure are required for hydro-testing as testing cannot cease midway because the pipeline must be maintained at pressure during the testing procedures
- works that do not pose an audible disturbance to any residences (i.e. in rural areas well away from residences)
- transporting plant, equipment and pipe by oversized trucks outside of hours as required by authorities for safety reasons – this is a particular requirement for oversized truck movements, which may travel outside of daylight hours to minimise potential impacts on traffic movements
- in an emergency to avoid injury or loss of life, property and/or to prevent environmental harm
- where agreement is reached with local resident(s) to reduce construction duration and/or manage other traffic, amenity or disturbance issues
- extenuating circumstances which are outside the Project's control such as long periods of bad weather causing delays to the pipeline construction program.

During the construction phase, the noise levels emitted from construction equipment are likely to temporarily increase the background noise levels in the vicinity of the activity.

Generic noise modelling based on typical pipeline construction equipment was conducted and has shown that noise impacts may be heard up to 1 km from the Pipeline. The outcomes of this modelling are provided in *Appendix 4.3* and summarised in *Table 4.12.3.*

These calculations are based on no attenuation for topography and have assumed that the:

- ground is flat and soft
- meteorological conditions are neutral
- continuous operation of all pipeline works equipment.

Actual noise levels may be lower because all equipment is unlikely to operate continuously at the same time. Changes due to adverse weather could increase the impact but this is expected to be only a short term event.

Trenching and restoration work are predicted to create the highest levels of noise during construction.

Table 4.12.3 Buffer Distances for Various Predicted Noise Levels

Activity	Buffer Distance (metres)							
	85 dB(A)	**55 dB(A)**	**50 dB(A)**	**45 dB(A)**	**40 dB(A)**	**35 dB(A)**	**30 dB(A)**	**25 dB(A)**
Clear and grade	<15	180	260	375	575	825	1,250	1,800
Blasting preparation	<5	190	280	400	600	825	1,200	1,700
Trenching	20	260	375	575	900	1,350	2,000	2,800
Welding and joint coating	<15	160	220	325	500	750	1,200	1,800
Testing	<15	110	150	200	325	500	725	1,150
Padding	<15	180	260	400	600	900	1,300	1,850
Backfilling	<15	180	270	400	575	825	1,250	1,850
Restoration and rehabilitation	20	290	450	725	1,100	1,650	2,400	3,300

Other sources of noise associated with construction of the pipelines include campsites (generators and general domestic noise) and traffic movements.

Impacts will be mitigated by the relatively short period of intensive construction activity at any one point along the line. The construction contractor will liaise with the community to advise the likely duration of noisy activities and, in certain circumstances, will undertake particularly noisy activities (e.g. rock hammering) at periods less likely to cause nuisance to nearby residents.

Other noise mitigation measures will include:

- limiting construction activities near residential areas as far as practicable to between the hours of 7am and 6pm
- ensuring machinery and equipment are well maintained
- locating campsites to ensure noise impacts at nearest residences are at an acceptable level
- managing vehicle movements and access locations to avoid adverse noise impacts.

12.4.1.1 Vibration

The major potential source of vibration other than blasting would be from the operation of bulldozers during clearing and rehabilitation works, and the operation of trenching equipment. Typical ground vibration from working bulldozers ranges from 1 mm/s to 2 mm/s at a distance of approximately 5 m, and 0.2 mm/s at around 20 m. Therefore, it is expected that vibration impacts would remain predominantly within the 40 m Right-of-Way (RoW).

12.4.1.2 Blasting

Blasting is not anticipated for any of the pipelines. In the event that hard rock was located during construction and blasting was required the extent of the nuisance caused by such works would depend largely upon the:

- volume of blasting required
- depth of drilling
- character of the rock
- blasting techniques employed.

Blasting is not expected to occur in proximity to any buildings or structures.

Fauna species are not expected to be affected by blasting as:

- blasting is not anticipated
- other construction noise would have caused any fauna to vacate the area of potential impact prior to blasting commencing.

12.4.2 Operations

The operating Pipeline does not emit any discernible noise. On rare occasions it may be necessary to depressurise a section of the Pipeline for safety or maintenance reasons. During this time – four to six hours – the noise emitted by the gas release will be in the vicinity of 130 dB(A) at the point of release, and the noise will be audible over a distance of 6 km to 10 km. Depressurisation would occur at main line valve and scraper station locations. Special procedures will be implemented to manage this event should it be necessary.

12.4.2.1 *Vibration*

Vibrations are not likely to occur from normal operation of the Pipeline Component or compressor station.

12.4.2.2 *In-line Compressor Station*

The exact location, type, configuration and installation date of the in-line compressor has not been determined. As discussed in *Volume 4, Chapter 11* the in-line compressor station is expected to be similar to a Field Compressor Station. On this basis computer noise modelling was conducted for one in-line compressor station comprising eight screw compressors and with a worst-case weather scenario. Details of the methodology used for modelling are included in *Volume 3, Chapter 13* and in *Appendix 3.6*. This provides a reasonable approximation of the noise that will be generated by the actual in-line compressor.

The noise modelling was conducted for an average source height of 2 m. The estimated distance from the in-line compressor at which the daytime, evening, and night-time noise limits are exceeded is shown in *Table 4.12.4.*

Table 4.12.4 Distances at which Noise Limits are Exceeded

Noise Limit	Distance (m)
Night-time – 28 dB(A)	4,300
Evening – 35 dB(A)	2,800
Daytime – 40 dB(A)	2,100

As the final location, type and configuration of compressors are not yet known, it is not possible to provide site and equipment-specific noise mitigation measures. However, there is flexibility in locating in-line compressors and it is expected that the location can be optimised to avoid exceedences of noise limits at sensitive receptors.

If this were not possible one, or a combination, of the following noise mitigation measures could be used. This could reduce noise levels by between 10 and

40 dB(A) at an affected sensitive receptor.

Noise mitigation measures for the in-line compressor could include:

- selecting the optimal location for the infrastructure
- purchasing the least noisy equipment for a particular infrastructure location
- construction of a complete or partial acoustic enclosure around the noise source
- construction of acoustic barriers (i.e. walls)
- noise reduction techniques at any affected receptor.

12.5 CONCLUSION

No long-term adverse noise impacts are expected from the Pipeline Component of the QCLNG Project. This is due to the predominantly rural location of the pipelines which comprise the Pipeline Component and the temporary nature of construction works. In most instances, construction works will be located more than 1 km from any residence and noise will be indiscernible.

There may be isolated homesteads where the works will be closer than 1 km and in such instances appropriate mitigation measures will be developed with the relevant landholder.

The location of the in-line compressor station can be selected to ensure that adverse impacts do not affect sensitive receptors.

A summary of the impacts outlined in this chapter is provided in *Table 4.12.5*.

Table 4.12.5 Summary of Impacts for Noise and Vibration

Impact assessment criteria	Assessment outcome
Impact assessment	Negative
Impact type	Direct
Impact duration	Short term
Impact extent	Local
Impact likelihood	High

Overall assessment of impact significance: minor, due to the predominantly rural location of the pipelines and the temporary and short-term nature of the construction activities.