# HASTINGS GENERATION PROJECT ENVIRONMENTAL NOISE IMPACT ASSESSMENT

**ESSO**

Rpt01-AU00659-Rev3-31.May.2022

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Vibration, dynamics and noise

# DOCUMENT CONTROL & REVIEW INFORMATION

**Customer:** **Esso**

Customer Contact: Barbara Lucas

Wood Contact: Samuel Turner

Wood Office: Melbourne

Wood Job No: AU00659

**Wood Document No:** **Rpt01-AU00659-Rev2-31.May.2022**

| Rev | Date | Description | Prepared | Reviewed | Approved | |
|---|---|---|---|---|---|---|
| | | | | | Proj Manager | Customer |
| A | 05 Nov 21 | Issued for Review | S Turner | S Lloyd | S Turner | |
| 0 | 12 Nov 21 | Issued for Use | S Turner | S Lloyd | S Turner | |
| 1 | 24 Nov 21 | Updated with vendor data | S Lloyd | S Turner | S Turner | |
| 2 | 25 May 22 | Updated for Cumulative Assessment | S Lloyd / S Turner | PK Lim | S Turner | |
| 3 | 31 May 22 | Issued for Use | S Turner | PK Lim | S Turner | |

| Item | Page | Section | Comments |
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# EXECUTIVE SUMMARY

Esso are seeking to obtain regulatory planning approval for the Hastings Generation Project (The Project). The Hastings Generation Project is to be located at an ExxonMobil owned site adjourning the existing Long Island Point (LIP) facility. The project consists of the use of ethane from LIP to generate power through the installation of three Solar Titan 130 power generation packages producing approximately 40MW of electricity. The power generated will be fed into the existing electricity transmission network via the Tyabb Terminal Station.

This report presents an assessment of potential noise emissions from The Project against Victoria's EPA Noise Limit and Assessment Protocol (Noise Protocol).

Noise levels due to the operation of the facility were predicted at four nearby Noise Sensitive Receivers (NSRs). NSR for the purposes of this report are used to denote *noise sensitive area* as defined in the *Environment Protection Regulations 2021 (*The Regulations*)*.

Determination of background noise levels through attended monitoring and zoning levels has been undertaken at four NSRs surrounding the project site to determine the project noise limits. For the purposes of this project only night-time noise limits have been considered as night-time noise limits are the most stringent and the facility is anticipated to operate under steady-state conditions throughout daytime, evening and night-time periods. The attended monitoring results are shown in Table A-1-1 below.

**Table A-1-1 Receiver Project Noise Limits**

| Receiver | Background Noise Level, dB(A) | Night-time zoning Level, dB(A) | Night-time noise limit, dB(A) |
|---|---|---|---|
| NSR 1 | 37[1] | 55 | **49** |
| NSR 2 | 35 | 41 | **41** |
| NSR 3 | 37 | 42 | **42** |
| NSR 4 | 37[1] | 43 | **43** |

A number of major equipment items associated with the Project have been identified as significant noise emission sources (Section 2.2). Noise emission sources data for this equipment has been supplied by the vendor. Noise modelling has been undertaken to predict noise emissions and propagation associated with the Project at these receivers, and hence to determine the *effective noise level*.

Based on noise characteristics of the proposed equipment it is expected that noise emissions from The Project are unlikely to exhibit tonal or other noise characteristics that may invoke

[1] Due to the presence of significant intrusive noise from an industrial premises at this location. Background measurements undertaken at a background equivalent location (NSR3) have been used for NSR1 in determining project noise limits.

adjustments to predicted noise levels at noise sensitive receivers. Therefore, no adjustments have been made to the predicted levels.

Noise level predictions assume adverse weather conditions for sound propagation towards the noise sensitive receivers and that all items of plant are operational continuously. Cumulative effective noise were assessed considering current ambient noise and the addition of noise generated from The Project at NSRs. These results are shown in Table A-1-2.

**Table A-1-2 Effective and Cumulative Effective Noise Levels**

| Receiver | Address | Noise limit, dB(A) | Effective noise level, dB(A) | Cumulative Effective Noise level, dB(A) |
|---|---|---|---|---|
| NSR 1 | 11 Cemetery Rd, Hastings VIC 3915 | 49 | 46 | 47 |
| NSR 2 | 65 Skinner St, Hastings VIC 3915 | 41 | 34 | 38 |
| NSR 3 | 2 Hodgins Rd, Hastings VIC 3915 | 42 | 34 | 39 |
| NSR 4 | 15A Lyall St, Hastings VIC 3915 | 43 | 31 | 38 |

The modelled noise levels fall below the most stringent (night-time) noise limits at all noise sensitive receivers identified in the assessment.

To ensure that effective noise levels from the proposed facility comply with the project noise limits at noise sensitive areas, it is recommended that a series of noise control measures are incorporated into the Solar equipment packages. These noise control measures are listed in Section 7.

The project has advised that major construction activities involving mobile equipment and loud hand tools will be limited to the normal working hours. It is recommended that The Project follow the guidance outlined in Section 4.3 of EPA's Publication 1834 to minimise noise and vibration risk as far as reasonably practicable.

Night construction works are not anticipated to involve the use of significant mobile or fixed plant noise sources, and the additional power and lighting will be powered by existing power sources, eliminating the need for portable generators. Therefore, it is anticipated that The Project will meet the EPA's guidelines for noise levels for construction works undertaken outside the normal working hours.

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# 1 INTRODUCTION

Esso are seeking to obtain regulatory planning approval for the Hastings Generation Project (The Project). The Hastings Generation Project is to be located at an ExxonMobil owned site adjourning the existing Long Island Point (LIP) facility. The project consists of the use of ethane from LIP to generate power through the installation of power generation packages producing approximately 40MW of electricity. The power generated will be fed into the existing electricity transmission network via the Tyabb Terminal Station. The three components of the project can be summarised as:

- Installation of new piping to transfer ethane from LIP to the adjoining, Esso owned project site;
- Installation of three Solar Titan 130 generators, each with a capacity of 13.5MW producing approximately 40MW of electricity, on the project site that tie-in to the new ethane pipeline; and
- Installing a high voltage electricity line from the generators that links into the existing transmission network powerline on Bayview Road.

The Project is planning to start construction in 2Q 2022 and is anticipated to continue for 6 months. It is anticipated that the facility will remain in operation for 11 years (2023 – 2033).

Noise from The Project has the potential to impact *noise sensitive areas* (hereby referred to as NSRs/noise sensitive receivers) surrounding the proposed operations. Noise impacts at four of the closest noise sensitive receivers have been assessed based on noise modelling and background noise monitoring of The Project.

This report presents an assessment of whether the project could comply with the noise limits (Project Noise Limits) imposed under the Victorian *Noise Limit and Assessment Protocol (Noise Protocol)* at the closest noise sensitive receivers.

# 2 DESCRIPTION OF SITE & OPERATIONS

## 2.1 Site Locality

The Hastings Generation Project will be constructed at a site adjourning the northern end of ExxonMobil's Long Island Point (LIP) facility. The proposed facility is to be located in an existing industrial area approximately 2km west of the town of Hastings. Figure 2-1 displays the proposed project area in relation the existing LIP facility.


**Figure 2-1: Aerial Imagery of Site Locality**

### 2.1.1 Noise Sensitive Receivers

A noise sensitive area has several definitions as per the Victorian Environmental Protection Regulations 2021[2].

For the purposes of this assessment, four noise sensitive receivers (NSRs) nearby the proposed facility have been identified. These receivers have all been identified as private residences. The residential addresses of these receivers are outlined in Table 2-1.

[2] Victorian Environmental Protection Regulations 2021, Part 1.2 – Interpretation and introductory matters, Pages 21-23

**Table 2-1 Residential address' of Assessed Noise Sensitive Receivers**

| Noise Sensitive Receiver | Address |
|---|---|
| NSR 1 | 11 Cemetery Rd, Hastings VIC 3915 |
| NSR 2 | 65 Skinner St, Hastings VIC 3915 |
| NSR 3 | 2 Hodgins Rd, Hastings VIC 3915 |
| NSR 4 | 15A Lyall St, Hastings VIC 3915 |

Figure 2-2 shows an overview of these receivers (yellow) with reference to the proposed project area (red)


**Figure 2-2: Location of Project Area and Noise Sensitive Receivers**

## 2.2 Operational Activities

It is anticipated that the proposed facility will comprise of the following (noise generating) equipment:

- 3 x Solar Titan 130 Gas Turbine Generator packages, consisting of the following:
    - Enclosed compressor package including baseframe
    - Turbine air system
    - Enclosure ventilation

    - Turbine exhaust system
    - Lube oil cooler
- 3 x Fuel gas skid
- 2 x Instrument air package
- 2 x Transformers
- 1 x Water purification pump

# 3 CONSTRUCTION NOISE

Victoria does not have regulatory limits for noise from construction works. Instead, EPA Victoria provides guidance to help operators reduce noise impacts from construction works through EPA Victoria's *Civil construction, building and demolition guide, Publication 1834, 2020 (replaces EPA Publication 480 and Publication 1254).*

The EPA's Publication 1834 states:

*Under the general environmental duty, anyone who is engaging in an activity that poses risk of harm to human health and the environment, from pollution or waste, must manage that risk. You need to do this by* ***eliminating or reducing your specific risks as far as reasonably practicable****. You can do this by putting appropriate controls in place.*

*Key aspects to consider when you are planning include:*

- *Identifying people and sensitive environments (sensitive receivers) that could be affected by your activities*
- *Carrying out appropriate engagement as early as possible*
- *Avoiding the generation of noise and vibration*
- *Facilitating construction during normal working hours, where possible (See* Table 3-1*)*
- *Reducing noise and vibration by using the most appropriate equipment and work practices for your activities*
- *Choosing alternative equipment or methods that generate less noise or vibration*
- *Maintaining equipment and vehicles according to manufacturer's instructions*
- *Attenuating noise by obstructing the path between noise source and receiver*
- *Mitigating offsite noise with measures such as respite offers and acoustic treatment*
- *Considering alternatives if noise and vibration cannot be reduced through avoidance, reduction or attenuation.*

The EPA's Publication 1834 provides recommended working hours for construction sites of major infrastructure works, including the development of power facilities, and guidelines for noise levels for works undertaken outside normal working hours. The recommendations given in Section 4.4 of Publication 1834 are summarised in Table 3-1 below.

**Table 3-1 Construction Noise Working Hours**

| Period | Working Hours | Description |
|---|---|---|
| Normal Working Hours | • 0700 – 1800, Monday – Friday; and<br>• 0700 – 1330 Saturday | No noise level guidelines apply |
| Weekend / Evening | • 1800 – 2200, Monday – Saturday;<br>• 1300 – 2200, Saturday; and<br>• 0700 – 2200, Public Holidays | Construction noise levels should not exceed the background LA90 level by:<br>• 10dBA or more for up to 18 months after project commencement;<br>• 5dBA or more, after 18 months after project commencement |
| Night | • 2200 – 0700, Monday – Sunday, (inc. Public Holidays | Noise is to be inaudible within a habitable room of any residential premises |

The project has advised Wood that major construction activities involving mobile equipment and loud hand tools will be limited to normal working hours. Night construction works may be undertaken, however they will be limited to activities such as cable laying activities which are not anticipated to involve the use of significant mobile or fixed plant noise sources. Additionally, it is anticipated that additional lighting and power may be required but will be powered by existing power sources, eliminating the need for portable generators.

# 4 PROJECT NOISE LIMITS

Noise emissions from commercial, industrial, trade premises and entertainment venues in Victoria are regulated under the *Noise Limit and Assessment Protocol (Noise Protocol)*[3]. The Noise Protocol specifies the procedure for determining noise limits at noise sensitive areas near a proposed facility or activity.

The proposed Esso Power Generation facility is located in Hastings, Mornington Peninsular and within the Melbourne major urban area, as shown in Figure 4-1. Therefore, noise limits have been determined using the Urban Area Method as defined by The Noise Protocol Part 1, Section A, Subsection 1.

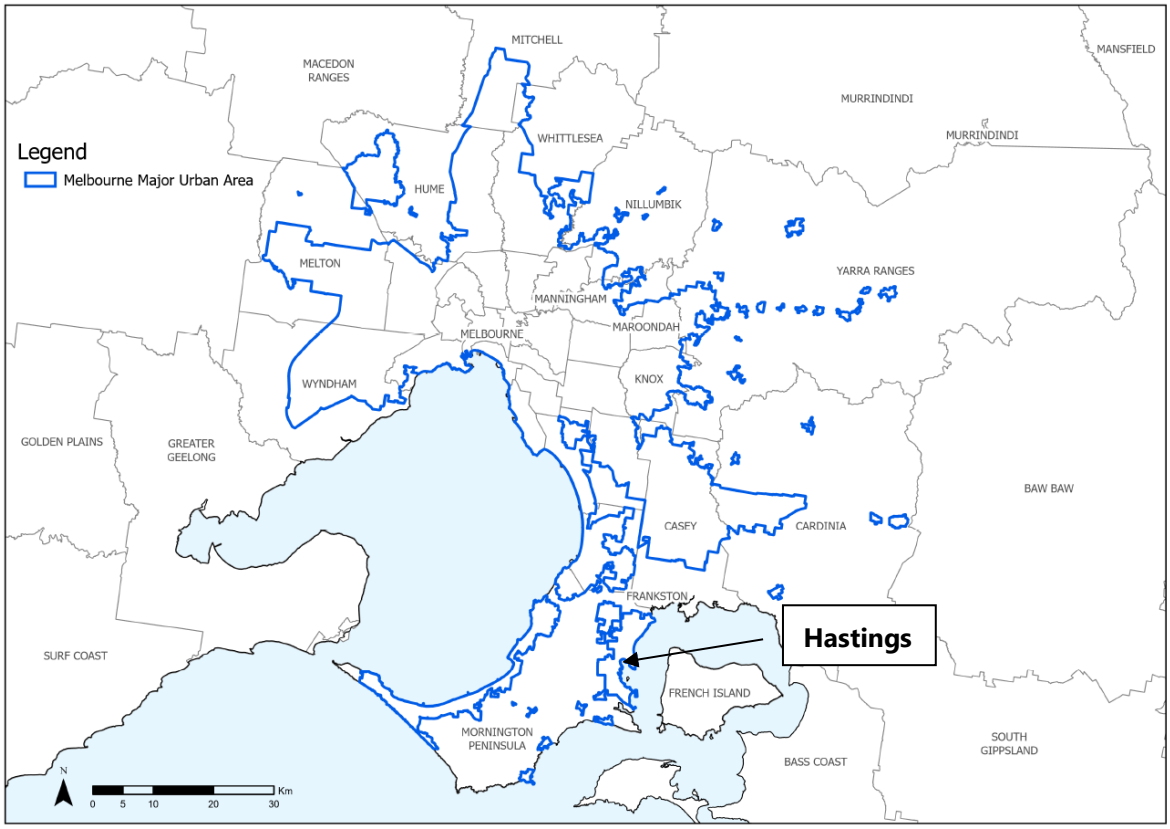


**Figure 4-1: Location of Hastings within the Melbourne Major Urban Area**

The following operational time periods (day, evening and night) as outlined in Table 4-1 are defined in the Noise Protocol.

[3] *Noise Limit and Assessment Protocol for the Control of Noise from Commercial, Industrial and Trade Premises and Entertainment Venues*, EPA Publication 1826.4 Part 1A

**Table 4-1 Operating time periods**

| Period | Details |
|---|---|
| Day | 0700—1800, Monday - Saturday (excluding public holidays) |
| Evening | 1800—2200, Monday - Saturday |
| | 0700—2200, Sunday and public holidays |
| Night | 2200—0700 |

For the purposes of this project only night-time noise limits have been considered in the assessment as these limits are the most stringent. The facility is anticipated to operate under steady-state conditions throughout daytime, evening and night-time periods.

The noise limits set by the Noise Protocol are influenced by the zoning of land uses surrounding a noise sensitive receiver and the existing background noise level.

## 4.1 Zoning Levels

In accordance with the Noise Protocol, the zoning level[4] is determined by applying two concentric circles of diameters of 140 m and 400 m, reproduced to scale, with the centre of the circles placed at the centre of each identified sensitive receiver. From each of these circles the area of each zoning types was determined and from this the zoning levels were calculated.

The night-time zoning levels for each noise sensitive receiver are summarised in Table 4-2.

**Table 4-2 Influencing Factor and Zoning Levels**

| Noise Sensitive Receiver | Land Zoning for NSR | | Influencing Factor | Zoning Levels, dB(A) |
|---|---|---|---|---|
| | 140 m diameter | 400 m diameter | | Night time period |
| NSR1 | SUZ1 | SUZ1<br>PCRZ<br>PUZ5 | 0.93 | 55 |
| NSR2 | PPRZ<br>PUZ3<br>RDZ2<br>GRZ1 | PPRZ<br>PUZ3<br>RDZ2<br>GRZ1<br>PUZ6 | 0.09 | 41 |
| NSR3 | GRZ1<br>C1Z | GRZ1<br>C1Z | 0.19 | 42 |

[4] *Noise Limit and Assessment Protocol for the Control of Noise from Commercial, Industrial and Trade Premises and Entertainment Venues*, EPA Publication 1826.4 Part 1A, Section 1.1 Zoning Level

| Noise Sensitive Receiver | Land Zoning for NSR | | Influencing Factor | Zoning Levels, dB(A) |
|---|---|---|---|---|
| | 140 m diameter | 400 m diameter | | Night time period |
| | RDZ2<br>PUZ2 | RDZ2<br>PUZ2<br>PPRZ | | |
| NSR4 | GRZ1<br>RDZ2<br>IN3Z | GRZ1<br>RDZ2<br>IN3Z | 0.25 | 43 |

## 4.2 Background Noise Levels

### 4.2.1 Methodology

Attended background noise monitoring was undertaken on the night of 11th October 2021 at the noise sensitive receivers listed in Table 2-1. The attended monitoring and analysis was conducted in accordance with the short background method[5] detailed in The Noise Protocol.

### 4.2.2 Measurement Equipment

A Brüel & Kjaer Sound Level Meter (SLM) was used to undertake the attended noise monitoring. The meter is designed to meet the requirements for Type 1 instruments as specified in AS IEC 61672.1-2004 and for 1/3 octave band filters as specified in AS/NZS 4476:1997 *Acoustics—Octave-band and fractional-octave-band filters*.

The SLM was field calibrated prior to starting measurements and on completion of measurements using a Brüel and Kjaer Type 4231 reference sound source. A list of equipment used is given in Table 4-3 below.

**Table 4-3 Noise Monitoring Equipment**

| Equipment Type | Serial Number |
|---|---|
| Sound Level Meter, Brüel & Kjaer Type 2270 | 3000342 |
| Reference Sound Source, Brüel & Kjaer Type 4231 | 2253111 |

[5] *Noise Limit and Assessment Protocol for the Control of Noise from Commercial, Industrial and Trade Premises and Entertainment Venues*, EPA Publication 1826.4 Part 1A, Section 4. Assess background level to set noise limits for the urban area method or the rural area method

### 4.2.3 Noise Level Descriptors

The noise parameters outlined in Table 4-4 were measured throughout the logging period. The noise parameters were logged over at least two intervals of 10 minutes over the (night-time) period.

**Table 4-4 Noise Level Descriptors**

| Parameter | Definition |
|---|---|
| $L_{AF\ 1}$ | A sound level, determined as an $L_{A\ Slow}$ value, exceeded for 1% of the time period over which the level is determined. |
| $L_{AF\ 10}$ | A sound level, determined as an $L_{A\ Slow}$ value, exceeded for 10% of the time period over which the level is determined. |
| $L_{AF\ 90}$ | A sound level, determined as an $L_{A\ Slow}$ value, exceeded for 90% of the time period over which the level is determined (commonly referred to as the background noise level if a measurement of ambient noise is made before the proposal is in operation). |
| $L_{A\ eq}$ | The equivalent continuous sound level that has the same energy as the fluctuating sound under consideration over the time period which the level is determined. |

### 4.2.4 Monitoring Locations

Attended monitoring background measurements were undertaken at locations representative of the NSRs identified in Table 2-1. The measurement location at each of the corresponding NSR (in degrees, minutes, seconds) are listed in Table 4-5 below.

**Table 4-5 Attended Monitoring Locations**

| NSR | Latitude | Longitude |
|---|---|---|
| NSR 1 | 38°18'8.1"S | 145°12'47.3"E |
| NSR 2 | 38°18'33.3"S | 145°11'47.3"E |
| NSR 3 | 38°18'57.9"S | 145°11'23.8"E |
| NSR 4 | 38°17'34.8"S | 145°11'26.8"E |

### 4.2.5 Results

The measured background noise levels for each receiver are presented in Table 4-6.

Detailed results for the attended noise monitoring undertaken are presented in APPENDIX A.

**Table 4-6 Measured Background Noise Levels**

| NSR | Address | Measured Background Noise Level, LAF 90 | Observations |
|---|---|---|---|
| NSR1 | 11 Cemetery Rd, Hastings VIC 3915 | 42.6 | Constant industrial noise from Esso LIP facility. |
| NSR2 | 65 Skinner St, Hastings VIC 3915 | 35.4 | Distant fluctuations of industrial noise from industrial facilities. When faint, fan sound from nearby recreation centre can be heard. |
| NSR3 | 2 Hodgins Rd, Hastings VIC 3915 | 37.3 | Faint industrial noise from Esso facility. Fairly constant noise from traffic. |
| NSR4 | 15A Lyall St, Hastings VIC 3915 | - (**note 1**) | Constant industrial noise likely from United Plant facility. |

**Note 1:** Background noise measurements were not undertaken at this location due to the presence of intrusive noise from an industrial premises. However, observations were recorded.

## 4.3 Project Noise limits

The background noise levels were compared to the night-time zoning levels and a determination on whether the background noise level, relative to the zoning level, is neutral, low or high was made in accordance with Clause 4[6] of the Noise Protocol. Where background noise is dominated by intrusive noise from a commercial, industrial, or trade premises, background noise measurements undertaken at an equivalent location have been used in accordance with Clauses 40 & 42[7] of the Noise Protocol. Table 4-7 details the background noise level assessment and outlines the project noise limits which were determined in accordance with Clauses 5 or 6[8] of the Noise Protocol

[6] *Noise Limit and Assessment Protocol for the Control of Noise from Commercial, Industrial and Trade Premises and Entertainment Venues*, EPA Publication 1826.4 Part 1A, Section 1. Noise limits – urban area method, Clause 4

[7] *Noise Limit and Assessment Protocol for the Control of Noise from Commercial, Industrial and Trade Premises and Entertainment Venues*, EPA Publication 1826.4 Part 1A, Section 4. Assess background level to set noise limits for the urban area method or the rural area method, Clause 40 & 42.

[8] *Noise Limit and Assessment Protocol for the Control of Noise from Commercial, Industrial and Trade Premises and Entertainment Venues*, EPA Publication 1826.4 Part 1A, Section 1. Noise limits – urban area method, Clause 5 / Clause 6

**Table 4-7 Background Noise Level Assessment & Project Noise Limits**

| Receiver | Background Noise Level, dB(A) | Night time zoning Level, dB(A) | Background Noise Level Assessment | Comment | Project Night time noise limit, dB(A) |
|---|---|---|---|---|---|
| NSR 1 | 37[9] | 55 | Low | Project noise limit is ½ (zoning level + background level) + 3 dB | **49** |
| NSR 2 | 35 | 41 | Neutral | Project noise Limit based is zoning Level | **41** |
| NSR 3 | 37 | 42 | Neutral | Project noise Limit based is zoning Level | **42** |
| NSR 4 | 37[10] | 43 | Neutral | Project noise Limit based is zoning Level | **43** |

### 4.3.1 Cumulative Noise Levels

In accordance with the Noise Protocol, and Regulation 119 from The Regulations, this assessment has considered potential for cumulative noise impacts. Review of the EPA's approved projects and Engage Victoria website suggests that there are no other applicable proposed developments in the Hastings area which may contribute cumulatively to noise levels at noise sensitive areas. However, as Esso has an existing facility at LIP which contributes to levels at NSR1, noise from Esso's existing operations combined with predicted noise from The Project has been considered as cumulative. As described in Table 4-6, background noise levels at the noise sensitive area NSR1 are dominated by noise from Esso's LIP facility. As such, the cumulative noise levels for all NSRs will additionally be assessed against the noise limits defined above.

[9] Due to the presence of significant intrusive noise from an industrial premises at this location. Background measurements undertaken at a background equivalent location (NSR3) have been used for NSR1 in determining project noise limits.

[10] Due to the presence of significant intrusive noise from an industrial premises at this location. Background measurements undertaken at a background equivalent location (NSR3) have been used to determine project noise limits.

# 5 NOISE MODELLING METHODOLOGY

## 5.1 Noise Model

A noise propagation model has been developed using the SoundPlan 8.2 program developed by SoundPLAN LLC. This program calculates sound pressure levels at nominated receiver locations or produces noise contours over a defined area of interest around the noise sources. SoundPlan can be used to model different types of noise, such as industrial noise, traffic noise and aircraft noise, and it is professionally recognised in Australia and internationally. The inputs required in SoundPlan are noise source data, ground topographical data, meteorological data and receiver locations.

SoundPlan provides a range of prediction algorithms that can be selected by the user. The CONCAWE prediction algorithms were selected for this assessment[11,12]. The acoustic model has been used to generate a noise contour for the area surrounding the Project and predict noise levels at the nearby noise sensitive (residential) locations.

The acoustic model does not include noise emissions from any source other than the proposed operations from The Project. Therefore, noise emissions from other neighbouring industrial sources, road traffic, aircraft noise, animals, domestic sources, etc are excluded from the modelling.

## 5.2 Noise Modelling Scenarios

### 5.2.1 Operational Scenarios

For the purposes of this project only one operating scenario (night-time) of the proposed Hastings Generation Project has been considered as night-time noise limits are the most stringent and the facility is anticipated to operate under steady-state conditions throughout daytime, evening and night-time periods.

Table 5-1 outlines the equipment and respective quantity used for this modelling scenario.

[11] CONCAWE (Conservation of Clean Air and Water in Europe) was established in 1963 by a group of oil companies to carry out research on environmental issues relevant to the oil industry.

[12] The propagation of noise from petroleum and petrochemical complexes to neighbouring communities, CONCAWE Report 4/81, 1981

**Table 5-1 Quantity of Operational Equipment for Modelled Scenario**

| Equipment | No. of units |
|---|---|
| Solar Titan 130 Power Generator Package, including:<br>• Enclosure;<br>• Enclosure ventilation<br>• Turbine air inlet system,<br>• Combustion outlet system. | 3 |
| Lube Oil Cooler | 3 |
| Fuel Gas Skid | 3 |
| Instrument Air Compressor (2 x units at 100% standby / duty) | 1 |
| Water Purification Pumps | 1 |
| Transformers | 2 |

## 5.3 Meteorological Conditions

The CONCAWE prediction algorithm includes consideration of the effect on noise propagation of defined meteorological conditions. The following variables are included that will affect the predicted noise level: temperature; Pasquill stability (temperature inversion); relative humidity; wind speed; and wind direction.

Noise emissions have been predicted under adverse weather conditions favourable for noise propagation from the facility to the nearest residences, in accordance with this requirement.

These noise model inputs are summarized in Table 5-2 below.

**Table 5-2 Meteorological Model Inputs for Adverse Conditions**

| Input | Adverse Conditions |
|---|---|
| Wind Speed (m/s) | 3 |
| Wind Direction | Source to Receiver |
| Pasquill-Gifford stability class (Atmospheric Stability) | F |
| Humidity (%) | 50 |
| Temperature (degrees Celsius) | 15 |
| Air Pressure (mbar) | 1013.3 |

## 5.4 Ground Topography, Buildings and Barriers

Topographical information for the acoustic model has been imported from Google Earth. A moderately absorptive (ground factor 0.6) ground is assumed for forest, farmland surrounding the facility and a relatively reflective (ground factor 0.3) is assumed for the facility and other nearby industrial premises, and water surrounding the facility is assumed to be fully reflective (ground factor 0.0)

The model also includes the acoustic barrier effects and reflections associated with buildings within the locality.

## 5.5 Noise Source Emission Data

Sound power levels for the modelled equipment items are shown in Table 5-3.

Equipment sound power levels for the Titan 130 Package and associated equipment were provided by the nominated vendor (Solar). The noise emissions (sound power levels) associated with this Solar equipment assume incorporation of the following noise reduction treatments in the package:

- Acoustic blanket on engine air inlet silencer and flex duct;
- Acoustic blanket on engine exhaust expansion joint;
- Cladding on web of skid beam;
- Additional enclosure door seals; and
- Acoustic blanket on ventilation inlet elbow and fans.

The performance of these noise control treatments, and effective reduction in emissions of the standard Solar Titan 130 package has been estimated by Solar based on design/materials data, and not based upon direct measurement of performance.

Where vendor sound pressure level or sound power level data was not available (additional equipment items), Wood has used library data of similar equipment measured at existing compression or power generation facilities.

Octave-band noise source sound power levels for the equipment in the noise model are listed in APPENDIX B.

For the purposes of this assessment, it has been assumed that all items of plant are continuously operating.

**Table 5-3 Noise Source (Sound Power) Levels for Operational Equipment for Modelled Scenario**

| Equipment | No. of units | Sound Power Level, Lw, dB(A) |
|---|---|---|
| Solar Titan 130<br>• Enclosure (+ventilation)<br>• Turbine air inlet system<br>• Combustion exhaust stack | 3 | <br>107<br>97<br>103 |
| Lube Oil Cooler | 3 | 98 |
| Fuel Gas Skid | 3 | 96 |
| Instrument Air Package | 1 | 95 |
| Water Purification Pump | 1 | 92 |
| Transformer | 2 | 90 |

## 5.6 Cumulative Noise Levels

Due to the dominance of noise from Esso's LIP facility in measured background levels at NSR1, these have been used to establish the cumulative noise levels from Esso's combined facilities (LIP + The Project). The cumulative effective noise level is determined by logarithmic addition of the background noise level, from LIP, and the predicted level from The Project.

# 6 NOISE ASSESSMENT

The noise levels that would be generated at the noise sensitive receivers by operation of the Hastings Generation Project were modelled under the adverse weather conditions set out in Section 5.3. The predicted noise levels are presented in Table 6-1 below.

**Table 6-1 Predicted Noise Levels**

| Receiver | Address | Predicted noise level, dB(A) |
|---|---|---|
| NSR1 | 11 Cemetery Rd, Hastings VIC 3915 | 46.4 |
| NSR2 | 65 Skinner St, Hastings VIC 3915 | 33.8 |
| NSR3 | 2 Hodgins Rd, Hastings VIC 3915 | 34.3 |
| NSR4 | 15A Lyall St, Hastings VIC 3915 | 31.4 |

A noise contour displaying the predicted noise impact from The Project is presented in APPENDIX C.

Based on noise characteristics from the proposed equipment it is expected that noise emissions from The Project are unlikely to exhibit tonal or other noise characteristics that may invoke adjustments to predicted noise levels at noise sensitive receivers. Therefore, no adjustments have been made to the predicted levels to obtain the *effective noise levels (*Table 6-2*)*, which form the basis of the assessment.

**Table 6-3 Effective Noise Levels**

| Receiver | Address | Noise limit, dB(A) | Effective noise level, dB(A) |
|---|---|---|---|
| NSR1 | 11 Cemetery Rd, Hastings VIC 3915 | 49 | 46 |
| NSR2 | 65 Skinner St, Hastings VIC 3915 | 41 | 34 |
| NSR3 | 2 Hodgins Rd, Hastings VIC 3915 | 42 | 34 |
| NSR4 | 15A Lyall St, Hastings VIC 3915 | 43 | 31 |

## 6.1 Cumulative Noise Assessment

Estimation of the cumulative noise from Esso's facilities (LIP and The Project) is presented in Table 6-3 below. The cumulative noise assessment considers the ambient noise and the addition of predicted noise generated from The Project.

**Table 6-4 Cumulative Effective Noise Level**

| Receiver | Address | Noise limit, dB(A) | Cumulative Effective Noise level, dB(A) |
|---|---|---|---|
| NSR1 | 11 Cemetery Rd, Hastings VIC 3915 | 49 | 47 |
| NSR 2 | 65 Skinner St, Hastings VIC 3915 | 41 | 38 |
| NSR 3 | 2 Hodgins Rd, Hastings VIC 3915 | 42 | 39 |
| NSR 4 | 15A Lyall St, Hastings VIC 3915 | 43 | 38 |

# 7 DISCUSSION

The assessment results presented in Table 6-1 indicate that noise emissions (*effective noise levels*) due to the operation of The Project would fall below the noise limits at all noise sensitive receivers identified in the assessment, and are thus compliant with the relevant regulations.

Additionally, assessment of cumulative noise levels from Esso's facilities, LIP and The Project, suggest that these are below the Noise Limit and are also compliant with the relevant regulations.

Based on noise characteristics from the proposed equipment it is expected that noise emissions from The Project are unlikely to exhibit tonal or other noise characteristics that may invoke adjustments to predicted noise levels at noise sensitive receivers. Therefore, no adjustments have been made to the predicted levels.

The predictive noise modelling undertaken for the assessment incorporates the following noise attenuation measures within the Solar Titan 130 equipment packages:

- Acoustic blanket on engine air inlet silencer and flex duct;
- Acoustic blanket on engine exhaust expansion joint;
- Cladding on web of skid beam;
- Additional enclosure door seals; and
- Acoustic blanket on ventilation inlet elbow and fans.

It is recommended that to ensure compliance with the noise limits once operating, these noise control measures are clearly specified in the Project procurement and design details, and their inclusion verified for the as-built plant.

# 8 CONCLUSION

## 8.1 Construction Noise

The project has advised that major construction activities involving mobile equipment and loud hand tools will be limited to the normal working hours detailed in Table 3-1. For construction activities undertaken during normal working hours it is recommended that The Project follow the guidance outlined in Section 4.3 of EPA's Publication 1834 to minimise noise and vibration risk as far as reasonably practicable. Guidance in Section 4.3 of the EPA's Publication 1834 covers:

- Scheduling of works
- Community information and consultation
- Controlling noise at the source
- Limiting vibration and regenerated noise (jackhammers, rock breakers etc..)
- Noise reduction between noise source and receiver

Night construction works are not anticipated involve the use of significant mobile or fixed plant noise sources, and the additional power and lighting will be powered by existing power sources, eliminating the need for portable generators. Therefore, it is anticipated that The Project will meet the EPA's guidelines for noise levels for construction works undertaken outside the normal working hours.

## 8.2 Project Noise

Noise impacts at four of the closest noise sensitive receivers have been assessed based on noise modelling and background noise monitoring of The Project.

The modelling and analysis undertaken indicate compliance is met for all assessed noise sensitive receivers, under adverse meteorological conditions including consideration of cumulative noise effects, and therefore it is demonstrated that the Project can operate in compliance with the Victorian *Noise Limit and Assessment Protocol (Noise Protocol)*.

It is recommended that to ensure compliance with the noise limits once operating, the noise control measures for the Solar Titan 130 packages outlined in Section 7 are clearly specified in the Project procurement and design details, and their inclusion verified for the as-built plant.

# APPENDIX A ATTENDED NOISE MONITORING DATA

| NSR | Start Time / Date | Elapsed Time | LAeq | $LAF_{10}$ | $LAF_{90}$ | Weather Observations | Noise Observations |
|---|---|---|---|---|---|---|---|
| NSR 1 | 11/10/2021 22:40:46 | 00:10:00 | 42.8 | 43.7 | 41.7 | Calm, clear skies | Constant industrial noise from Esso LIP facility. |
| | 11/10/2021 22:50:46 | 00:10:00 | 43.3 | 44.1 | 42.3 | | |
| | 11/10/2021 23:00:46 | 00:10:00 | 43.4 | 44.2 | 42.5 | | |
| NSR 2 | 11/10/2021 23:30:37 | 00:10:00 | 37.9 | 40.5 | 34.2 | Light breeze, E 1m/s, clear skies | Distant fluctuations of industrial noise from industrial facilities. When faint, fan sound from nearby recreation centre can be heard. |
| | 11/10/2021 23:40:37 | 00:10:00 | 36.9 | 38.7 | 34.2 | | |
| | 11/10/2021 23:51:27 | 00:10:00 | 40.3 | 41.1 | 34.0 | | |
| NSR 3 | 12/10/2021 0:13:53 | 00:10:00 | 43.5 | 44.9 | 36.7 | Calm, clear skies | Faint industrial noise from Esso facility. Fairly constant noise from traffic. |
| | 12/10/2021 0:23:53 | 00:10:00 | 40.8 | 42.4 | 37.1 | | |
| | 12/10/2021 0:33:53 | 00:10:00 | 42.3 | 45.0 | 37.3 | | |
| NSR 1 | 12/10/2021 2:03:24 | 00:10:00 | 44.0 | 45.1 | 43.0 | Calm, clear skies | Constant industrial noise from Esso LIP facility. |
| | 12/10/2021 2:13:24 | 00:10:00 | 44.0 | 44.8 | 43.2 | | |
| | 12/10/2021 2:23:24 | 00:10:00 | 43.9 | 44.9 | 42.9 | | |
| | 12/10/2021 2:33:24 | 00:10:00 | 44.0 | 45.1 | 43.0 | | |
| NSR 2 | 12/10/2021 2:57:25 | 00:10:00 | 38.1 | 39.8 | 35.9 | Light breeze, E 3m/s, clear skies | Distant fluctuations of industrial noise from industrial facilities. |
| | 12/10/2021 3:07:25 | 00:10:00 | 38.4 | 39.9 | 36.3 | | |

| NSR | Start Time / Date | Elapsed Time | LAeq | $LAF_{10}$ | $LAF_{90}$ | Weather Observations | Noise Observations |
|---|---|---|---|---|---|---|---|
| | 12/10/2021 3:17:25 | 00:10:00 | 38.5 | 40.0 | 36.4 | | |
| | 12/10/2021 3:27:25 | 00:10:00 | 39.4 | 41.2 | 36.9 | | |
| NSR 3 | 12/10/2021 3:55:55 | 00:10:00 | 45.4 | 46.7 | 37.8 | Light breeze, SE 1m/s, clear skies | Faint industrial noise from Esso facility. Fairly constant noise from traffic. Traffic more constant later in period. |
| | 12/10/2021 4:05:55 | 00:10:00 | 43.6 | 43.4 | 37.4 | | |
| | 12/10/2021 4:15:55 | 00:10:00 | 46.6 | 51.3 | 38.1 | | |
| | 12/10/2021 4:25:55 | 00:10:00 | 43.6 | 47.8 | 36.9 | | |

# APPENDIX B SOURCE SOUND POWER LEVELS

| Source Name | Octave Band Sound Power Level, in dB | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 31 Hz | 63 Hz | 125 Hz | 250 Hz | 500 Hz | 1k Hz | 2k Hz | 4k Hz | 8k Hz | Lw dB(A) |
| Titan 130 GTG Package | 119 | 117 | 114 | 109 | 103 | 99 | 96 | 98 | 94 | **107** |
| Combustion Exhaust Stack Outlet | 120 | 121 | 113 | 106 | 94 | 89 | 89 | 89 | 92 | **103** |
| Turbine Air Inlet | 105 | 110 | 109 | 103 | 86 | 70 | 54 | 64 | 61 | **97** |
| Lube Oil Cooler | 104 | 104 | 103 | 100 | 95 | 93 | 87 | 81 | 75 | **98** |
| Instrument Air Package | 86 | 96 | 91 | 89 | 90 | 83 | 90 | 87 | 83 | **94.6** |
| Fuel Gas Skid Valve | 72 | 72 | 72 | 72 | 77 | 82 | 87 | 92 | 92 | **96.1** |
| Water Purification Pump | 78 | 80 | 83 | 88 | 87 | 86 | 87 | 77 | 70 | **91.5** |
| Transformer | 77 | 86 | 91 | 90 | 90 | 84 | 79 | 74 | 67 | **90.2** |

# APPENDIX C PREDICTED NOISE IMPACT FROM THE PROJECT