



**MARSHALL DAY**  
Acoustics 

**HASTINGS ENERGY CENTRE AND TRUCK STOP  
ASSESSMENT OF NOISE EFFECTS**

Rp 002 20220594 | 13 March 2025

**Project:** HASTINGS ENERGY CENTRE AND TRUCK STOP

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## TABLE OF CONTENTS

|       |  |    |
|-------|--|----|
| 1.0   | REPORT SUMMARY AND CONCLUSIONS.....                  | 4  |
| 2.0   | SITE AND DEVELOPMENT DESCRIPTION.....                | 4  |
| 2.1   | Site Description.....                                | 4  |
| 2.2   | Development Description.....                         | 5  |
| 3.0   | EXISTING NOISE ENVIRONMENT.....                      | 6  |
| 4.0   | NOISE PERFORMANCE STANDARDS AND LEGISLATION.....     | 7  |
| 4.1   | Hastings District Plan.....                          | 7  |
| 4.1.1 | HDP Operation Noise Limits.....                      | 8  |
| 4.1.2 | HDP Construction Noise Limits.....                   | 8  |
| 4.2   | Resource Management Act 1991 (RMA).....              | 9  |
| 5.0   | OPERATIONAL NOISE ASSESSMENT.....                    | 9  |
| 5.1   | Predicted operational noise levels.....              | 9  |
| 5.2   | Predicted night-time maximum noise level events..... | 10 |
| 5.3   | Assessment of Operational Noise Effects.....         | 10 |
| 5.4   | Modelling Methodology.....                           | 11 |
| 5.4.1 | Operational noise.....                               | 11 |
| 5.5   | Closest potentially affected receivers.....          | 12 |
| 6.0   | CONSTRUCTION NOISE ASSESSMENT.....                   | 13 |

APPENDIX A GLOSSARY OF TERMINOLOGY

APPENDIX B PROPOSED SITE LAYOUT

APPENDIX C SUMMARY OF NOISE LOGGING RESULTS

APPENDIX D NOISE SOURCE SOUND POWER LEVEL

## 1.0 REPORT SUMMARY AND CONCLUSIONS

*The proposed Energy Centre and Truck Stop (Energy Centre) can be constructed and operated so that noise emissions will comply with the relevant Hastings District Plan (the HDP) noise levels. No adverse acoustic amenity impacts will result.*

Marshall Day Acoustics has assessed potential noise impacts from a proposed Energy Centre located on the corner of State Highway 2 (SH2) and Evenden Road, Hastings

This report summarises the findings and recommendations of our assessment of noise effects from the construction and operation of the Energy Centre. We anticipate that vibration from construction and operation will not cause adverse effects, therefore, is not assessed further in this report. This report informs an Assessment of Environmental Effects (AEE) which accompanies an application for Land Use Consent.

The predominant activity on site will be traffic movements to and from the site and trucks idling. As such, our assessment focuses on noise generation from these aspects in both and daytime and night-time periods. Secondary noise sources will comprise steady-state noise from building mechanical services and kitchen extraction fan systems. We have predicted cumulative noise from both source types.

We predict operational noise will comply with the relevant noise performance standards.

SH2 controls and dominates the acoustic environment at the surrounding receivers at all times. The character of noise emitted by the Energy Centre will be broadband steady-state noise for the most part, interspersed with periods of traffic noise generation and occasional airbrake releases by trucks, particularly during peak daytime periods.

We conclude that no adverse effects will occur at adjacent residential sites due to the level or character of sound generated by the operation of the Energy Centre.

General compliance with the construction noise limit will be achieved

A Glossary of Terminology is provided in Appendix A.

## 2.0 SITE AND DEVELOPMENT DESCRIPTION

### 2.1 Site Description

The proposed Energy Centre will be located on the corner of SH2 and Evenden Road, Hastings. The site is bounded to the north and east by rural properties. Southwest of the site is the Hawkes Bay Regional Sports Park, with a Deferred Regional Sports Park zoned area directly south. The site will be accessed via Evenden Road.

The Energy Centre site is depicted in Figure 1 together with the surrounding receiving environment.

Figure 1: Aerial overview of Energy Centre site



## 2.2 Development Description

The Energy Centre will comprise the following elements:

- An 8-lane forecourt for car refuelling
- Separate 4-lane truck stop and associated vehicle parking
- Service station shop, fruit shop, booths and cafe

A total of 62 light vehicle parking spaces are proposed, in addition to 12 truck park spaces and a number of long vehicle / camper parking spaces.

We have assumed that the mechanical services plant will be located on the rooftop of the stores.

The construction stage of the Energy Centre will involve minor earthworks. The site will be levelled by removing excess material and reusing it to fill low-lying areas on-site. The nett required fill material will be imported onto the site. The construction schedule is estimated to extend beyond 20 weeks.

The service station and truck stop are anticipated to operate continuously every day. The other retail stores and cafe are anticipated to operate between 6:00am and 10:00pm or thereabouts.

Refer to Appendix B for the proposed site layout concept plan.

### 3.0 EXISTING NOISE ENVIRONMENT

We deployed an unattended noise logger on the site for a 7-day period. We use the sound levels measured by the logger to quantify the existing acoustic environment. The logger measured environmental noise during the daytime and night-time. The processed logging results indicate that the background and ambient noise ranges are fairly typical for a site located close to a state highway.

We installed a noise logger on site at the location shown in Figure 2. The logger automatically measured noise levels in 1-second intervals for a period of 7 days (we derived sound levels in 15-minute intervals through post-processing of the data). We removed any measurement intervals where the weather was outside the allowable meteorological window prescribed in NZS 6801:2008.

Figure 2: Noise logger location

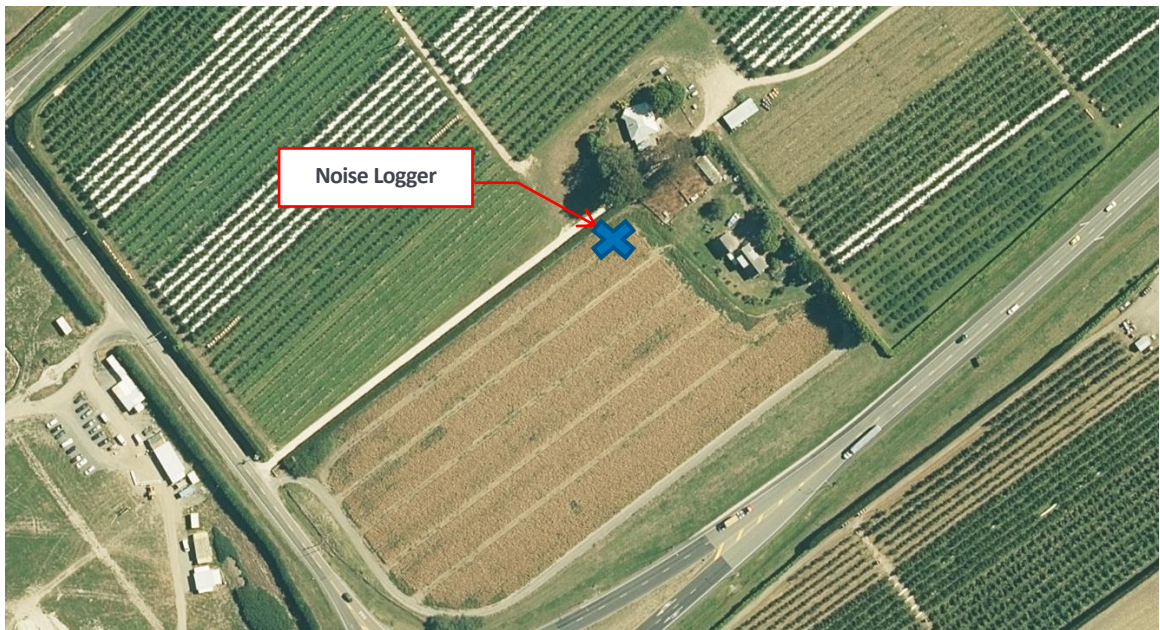


Image source: <https://data.linz.govt.nz>

Noise logger located at coordinates 39.604768°S 176.838101°E

Table 1 summarises the processed noise logger results and shows the range of noise levels and the average per period.

Table 1: Derived existing noise levels

| Day Range       | Period                     | Noise Levels (dB) |                  |
|-----------------|----------------------------|-------------------|------------------|
|                 |                            | L <sub>Aeq</sub>  | L <sub>A90</sub> |
| Monday - Sunday | Daytime (0700-1900 hrs)    | 56 - 62           | 51 - 59          |
|                 | Daytime Average            | 60                | 57               |
|                 | Evening (1900-2200 hrs)    | 52 - 59           | 46 - 53          |
|                 | Evening Average            | 56                | 51               |
|                 | Night-time (2200-0700 hrs) | 52 - 58           | 42 - 54          |
|                 | Night-time Average         | 55                | 50               |

Notes:

- (1) Appendix A provides an explanation of technical terms
- (2) Refer to Figure 2 for location of the noise logger

The processed logging results show:

- Background noise levels range between 51 – 59 dB  $L_{A90}$  daytime, 46 – 53 dB  $L_{A90}$  evening and 42 – 54 dB  $L_{A90}$  night-time; and
- Ambient noise ranges between 52 - 62 dB  $L_{Aeq}$  daytime, 52 – 59 dB  $L_{A90}$  evening and 52 - 58 dB  $L_{Aeq}$  night-time.

Refer to Appendix C for the full summary of noise logging results and level versus time histogram.

We observed that the existing acoustic environment is typical for a site adjacent to a state highway. The ambient environment is typically controlled by vehicle movements on SH2<sup>1</sup>.

## 4.0 NOISE PERFORMANCE STANDARDS AND LEGISLATION

### 4.1 Hastings District Plan

The Energy Centre site is zoned *Plains Production* in the HDP and has a partial designation overlay of D50 New Zealand Transport Agency Proposed Motorway. The closest potentially affected properties are also zoned *Plains Production*.

Figure 3 shows the HDP zoning map for the site and surrounding area.

Figure 3: HDP Zone Map



<sup>1</sup> mobileroad.org traffic count for 2021 measured 7,376 vehicles AADT and 8.7% heavy vehicles

#### 4.1.1 HDP Operation Noise Limits

Rule 25.1.6D Rural Zones:

*The following noise conditions shall apply to all land uses within all Rural Zones*

*(a) The following noise limits shall not be exceeded at any point within the notional boundary of any noise sensitive activity on any other site within a Rural Zone, or at any point within the boundary of any site, in any Zone other than an Industrial Zone:*

| <u>Control Hours</u>                 | <u>Noise Level</u>       |
|--------------------------------------|--------------------------|
| 0700 to 1900 hours                   | 55 dB $L_{Aeq}$ (15 min) |
| 1900 to 2200 hours                   | 50 dB $L_{Aeq}$ (15 min) |
| 2200 to 0700 hours the following day | 45 dB $L_{Aeq}$ (15 min) |
| 2200 to 0700 hours the following day | 75 dB $L_{AFmax}$        |

#### 4.1.2 HDP Construction Noise Limits

Rule 25.1.6I Construction Noise:

*(a) Any noise arising from construction, maintenance and demolition work in any Zone shall comply with NZS 6803:1999 Acoustics - Construction Noise.*

*(b) Construction noise shall be measured and assessed in accordance with NZS 6803:1999 Acoustics - Construction Noise.*

*(c) To avoid doubt, Standards 25.1.6C to 25.1.6H above shall not apply to construction noise.*

The relevant tables from NZS 6803:1999 are reproduced below.

*Table 2 – Recommended upper limits for construction noise received in residential zones and dwellings in rural areas*

| <b>Time of week</b>         | <b>Time period</b> | <b>Duration of work</b>         |                             |
|-----------------------------|--------------------|---------------------------------|-----------------------------|
|                             |                    | <b>Long-term duration (dBA)</b> |                             |
|                             |                    | <b><math>L_{eq}</math></b>      | <b><math>L_{max}</math></b> |
| Weekdays                    | 0630-0730          | 55                              | 75                          |
|                             | 0730-1800          | 70                              | 85                          |
|                             | 1800-2000          | 65                              | 80                          |
|                             | 2000-0630          | 45                              | 75                          |
| Saturdays                   | 0630-0730          | 45                              | 75                          |
|                             | 0730-1800          | 70                              | 85                          |
|                             | 1800-2000          | 45                              | 75                          |
|                             | 2000-0630          | 45                              | 75                          |
| Sundays and public holidays | 0630-0730          | 45                              | 75                          |
|                             | 0730-1800          | 55                              | 85                          |
|                             | 1800-2000          | 45                              | 75                          |
|                             | 2000-0630          | 45                              | 75                          |

Industrial or commercial areas:

Table 3 – Recommended upper limits for construction noise received in industrial or commercial areas for all days of the year

| Time period | Duration of work                                  |
|-------------|---|
|             | Long-term duration<br><i>L<sub>eq</sub></i> (dBA) |
| 0730-1800   | 70  |
| 1800-0730   | 75  |

In summary, the relevant limits are 70 dB  $L_{Aeq}$  / 85 dB  $L_{AFmax}$  0730 - 1800 hours Monday to Saturday as measured and assessed 1m from the façade of occupied buildings. Long-term duration means construction work exceeding 20 weeks.

#### 4.2 Resource Management Act 1991 (RMA)

Under the provisions of the RMA there is a duty to adopt the best practicable option to ensure that noise (including vibration) does not exceed a reasonable level. Specifically, Sections 16 and 17 reference noise effects as follows.

Section 16 states that “every occupier of land (including any premises and any coastal marine area), and every person carrying out an activity in, on, or under a water body or the coastal marine area, shall adopt the best practicable option to ensure that the emission of noise from that land or water does not exceed a reasonable level”.

Section 17 states that “every person has a duty to avoid, remedy, or mitigate any adverse effect on the environment arising from an activity carried on by or on behalf of the person, whether or not the activity is in accordance with –

- (a) Any of sections 10, 10A, 10B and 20A; or
- (b) A national environmental standard, a rule, a resource consent, or a designation”

This report uses the guiding principles of Section 16 and 17 of the RMA as noted above in assessing effects and recommending mitigation measures.

#### 5.0 OPERATIONAL NOISE ASSESSMENT

*We predict operational noise from the Energy Centre will comply with the relevant HDP noise performance standards. No adverse acoustic amenity impacts will result.*

##### 5.1 Predicted operational noise levels

Operational noise will primarily be generated by site vehicle movements and building mechanical services.

Table 2 overleaf presents the predicted cumulative noise levels as assessed at the identified receivers. The results in the table confirm that Energy Centre noise will comply with the relevant noise performance standards.

**Table 2: Predicted noise levels to receivers**

| Rec. No. | Address                                    | Noise Limits<br>[D/ES/N] <sup>1</sup> | Predicted Noise Level (dB L <sub>Aeq</sub> ) <sup>2</sup> |                  |            | Complies? |
|----------|--|---------------------------------------|---|------------------|------------|-----------|
|          |  |                                       | Daytime   | Evening Shoulder | Night-time |           |
| R1       | 157 Morley Road                            | [55 / 50 / 45]                        | 42  | 39               | 39         | Yes       |
| R2       | 142 Evenden Road                           | [55 / 50 / 45]                        | 41  | 38               | 38         | Yes       |
| R3       | 126 Evenden Road                           | [55 / 50 / 45]                        | 37  | 34               | 34         | Yes       |
| R4       | 16 Percival Road                           | [55 / 50 / 45]                        | 35  | 32               | 32         | Yes       |
| R5       | Hawkes Bay Regional Sports Park            | [55 / 50 / 45]                        | 36  | 34               | 34         | Yes       |
| R6       | Delegat Wine Estate, Evenden Road          | [55 / 50 / 45]                        | 45  | 42               | 42         | Yes       |
| R7       | Hill Country Speckle Park, 225 Ormond Road | [55 / 50 / 45]                        | 42  | 39               | 39         | Yes       |

Notes to table:

- (1) D = Day, ES = Evening Shoulder, N = Night
- (2) Appendix A provides an explanation of technical terms

## 5.2 Predicted night-time maximum noise level events

As a truckstop will operate from the site we have predicted noise emissions from maximum noise level events ( $L_{max}$ ) and assessed compliance with the 75 dB  $L_{Amax}$  night-time limit of the HDP.

Maximum sound levels from typical service station activities such as truck air brakes, car door ‘slams’ and dropping of valve cover plates typically have an upper sound power level of approximately 120 dB  $L_{WA}$ .

Based on the above and with the recommended mitigation in place we calculate a level of 62 dB  $L_{Amax}$  will be experienced by closest receiver R1 (157 Morley Road). This complies with the night-time noise performance standard of 75 dB  $L_{Amax}$  and results in a low risk of sleep disturbance effects.

## 5.3 Assessment of Operational Noise Effects

SH2 controls and dominates the acoustic environment at the surrounding receivers at all times. For example the predicted operational noise levels at the nearest sensitive receiver, R1, are below the existing measured (average) noise levels by 18 dB during the day, 17 dB in the evening and 16 dB in the night-time period.

The character of noise emitted by the Energy Centre will be broadband steady-state noise, given the predominance of mechanical services plant on site, interspersed with periods of traffic noise generation and the occasional airbrake release by trucks, particularly during peak daytime periods.

We conclude that no adverse effects will occur at adjacent residential sites due to the level or character of sound generated by the operation of the Energy Centre.

## 5.4 Modelling Methodology

### 5.4.1 Operational noise

We have predicted operational sound levels in accordance with ISO 9613-2: 1996<sup>2</sup> using SoundPLAN. ISO 9613 considers a range of frequency dependent attenuation factors including atmospheric absorption, ground and barrier effects, directivity, as well as spherical spreading.

The model considers the noise emission from all significant noise sources associated with the operational Energy Centre as described in Section 2.2. Refer to Appendix D for the relevant sound power level of each modelled source and Figure 4 for vehicle trip generation data.

We have predicted total site noise emissions based on the contribution from the following noise sources:

- Mechanical services plant, and
- Total site vehicle movements

The following describes our modelling method and assumptions for the identified noise sources.

#### ***Mechanical Services***

The detailed design of the mechanical services for the development will be undertaken later in the project. As such, we have assumed that the mechanical plant servicing the cafe will be located at rooftop and will operate 24/7. Therefore, the night-time limit provides the most stringent noise criterion. We have assumed all retail store mechanical plant will operate during the daytime only (0700 - 1900) with the plant split between the rooftop of buildings and ground level.

We have used the sound power level data contained in Appendix D to predict mechanical plant noise originating from restaurant kitchen extract fans, refrigeration condensers and packaged air-conditioning units that will commonly operate on a development such as this.

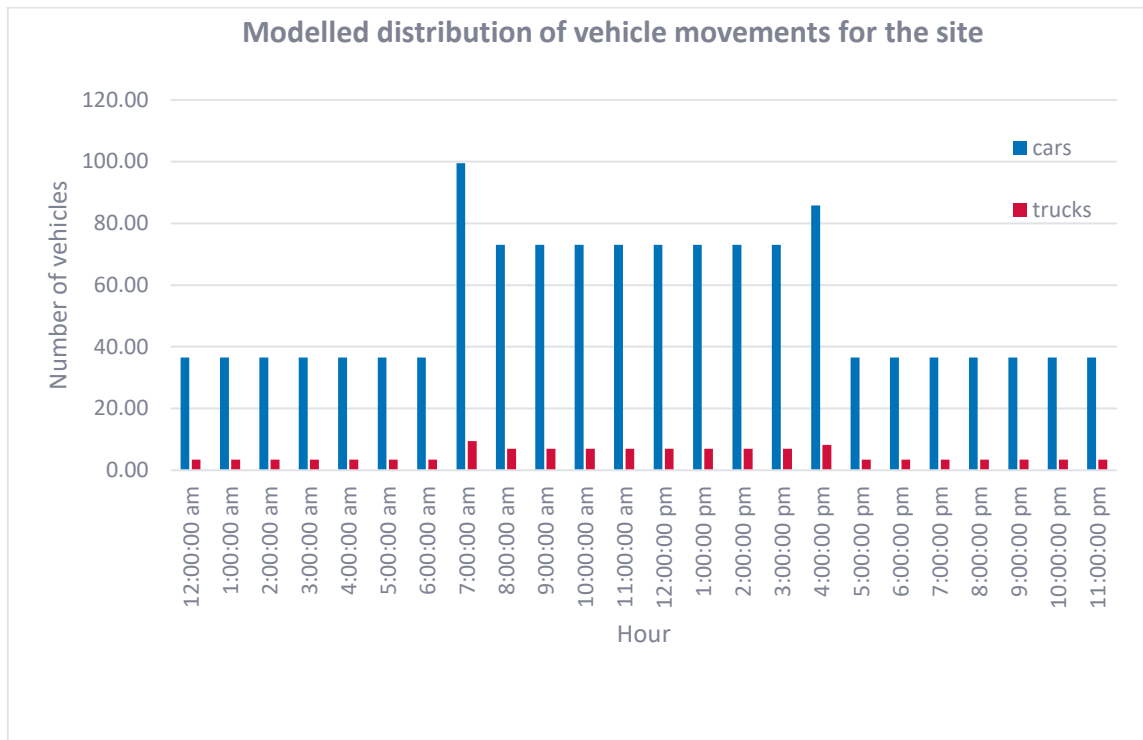
#### ***Vehicle Movements***

The traffic report, *Evenden Road Fuel Station, Hastings – Transportation assessment Report, 24 October 2019, Stantec*, states that traffic volumes to the Energy Centre are expected to be between 40 – 80 vehicles per hour. Figure 4 overleaf shows the daily vehicle histogram.

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<sup>2</sup> ISO 9613-2: 1996 “Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation”

Figure 4: Distribution of vehicle movements for the site



### 5.5 Closest potentially affected receivers

There are a number of receivers who may be potentially affected by construction and operational noise from the Energy Centre. The following table identifies the closest potentially impacted receivers, zoning / primary use and distance to closest site boundary.

We note that where compliance is shown at these receivers, then it can be inferred with a high degree of confidence at all other receivers not included in the assessment.

Table 3: Receiver locations

| Pos. No. | Address/location                           | Zoning / Usage  | Distance to Site Boundary or Notional Boundary <sup>1</sup> (m) |
|----------|--|---|---|
| R1       | 157 Morley Road                            | Plains Production / Dwelling                            | 118 <sup>1</sup>  |
| R2       | 142 Evenden Road                           | Plains Production / Dwelling                            | 200 <sup>1</sup>  |
| R3       | 126 Evenden Road                           | Plains Production / Dwelling                            | 380 <sup>1</sup>  |
| R4       | 16 Percival Road                           | Plains Production / Dwelling                            | 430 <sup>1</sup>  |
| R5       | Hawkes Bay Regional Sports Park            | Hawkes Bay Regional Sports Park / Sports and Commercial | 400   |
| R6       | Delegat Wine Estate, Evenden Road          | Plains Production / Commercial                          | 161   |
| R7       | Hill Country Speckle Park, 225 Ormond Road | Plains Production / Commercial                          | 230   |

Notes to table:

- (1) Notional boundary
- (2) Figure 5 indicates the locations of the identified receivers.

Figure 5: Receiver locations relative to the site



Image source: <https://data.linz.govt.nz>

## 6.0 CONSTRUCTION NOISE ASSESSMENT

*We predict construction noise will comply with the relevant limits during typical daytime construction. We have recommended management measures to mitigate potential adverse effects. With these implemented, adverse effects will be mitigated.*

We anticipate the plant and activities shown in Table 6 will be used during construction. The table includes the per unit sound power level and the minimum distance required to comply with the 'long-term' duration limit of 70 dB  $L_{Aeq}$  (refer to Sections 4.1.1 and 4.1.2).

**Table 3: Predicted construction noise levels**

| Activity                          | Equipment                    | Sound Power<br>(dB L <sub>WA</sub> ) | Façade Noise Level (dB L <sub>Aeq</sub> ) <sup>1,2</sup> |                   |                   |                   | Limit<br>Setback (m)<br>70dB L <sub>Aeq</sub> |
|-----------------------------------|------------------------------|--------------------------------------|--|-------------------|-------------------|-------------------|---|
|                                   |                              |                                      | 138m <sup>3</sup>  | 220m <sup>4</sup> | 161m <sup>5</sup> | 230m <sup>6</sup> |   |
| Site enabling works               | 20T excavator                | 103                                  | 52   | 46                | 50                | 46                | 25  |
|                                   | Truck and trailer            | 105                                  | 54   | 48                | 52                | 48                | 30  |
| Piling / foundations              | Excavator mounted piling rig | 111                                  | 60   | 54                | 58                | 54                | 52  |
|                                   | Concrete pump                | 106                                  | 55   | 49                | 53                | 49                | 33  |
|                                   | 20T Excavator                | 103                                  | 52   | 46                | 50                | 46                | 25  |
|                                   | Truck                        | 105                                  | 54   | 48                | 52                | 48                | 30  |
|                                   |                              |                                      |  |                   |                   |                   |   |
| Structural and fitout             | 30T mobile crane             | 98                                   | 47   | 41                | 45                | 41                | 14  |
|                                   | Grinder (hand tools)         | 108                                  | 57   | 51                | 55                | 51                | 40  |
|                                   | Compressor                   | 93                                   | 42   | 36                | 40                | 36                | 8   |
|                                   | Generator (150kVA)           | 93                                   | 42   | 36                | 40                | 36                | 8   |
| Site landscaping and access roads | 7T excavator                 | 102                                  | 51   | 45                | 49                | 45                | 22  |
|                                   | 20T excavator                | 103                                  | 52   | 46                | 50                | 46                | 25  |
|                                   | 3-axle dump trucks           | 106                                  | 55   | 49                | 53                | 49                | 33  |
|                                   | 7t vibratory roller          | 102                                  | 59   | 49                | 46                | 40                | 22  |
|                                   | Bitumen truck                | 103                                  | 52   | 46                | 50                | 46                | 25  |

Notes to table:

- (1) Appendix A provides an explanation of technical terms
- (2) In accordance with the requirements of NZS 6803: 1999 (Section C.2) inclusive of 3 decibels facade reflection
- (3) This setback represents the distance from all works to R1 closest façade
- (4) This setback represents the distance from all works to R2 closest façade
- (5) This setback represents the distance from all works to R6 closest façade
- (6) This setback represents the distance from all works to R7 closest façade

Noise from construction activities is predicted to readily comply with the relevant noise limit. No adverse effects will occur.

#### 6.1.2 Construction noise prediction methodology

The developer or contractor will develop a detailed construction programme prior to the commencement of construction activities. This will form part of the Construction Management Plan. We have assumed an indicative construction methodology for our predictions in its absence.

We have assumed that typical construction techniques will be employed on this project. Initial earthworks will be required, followed by ground improvement measures around building foundations. Following this, cranes will be used to install precast panels and steel beams or large trusses. A large component of the remaining works will be internal fitout.

Construction noise has been predicted in general accordance with the method detailed in Annex D<sup>3</sup> of NZS 6803:1999. The method considers the sound power level, periods of operation, distance from source to receiver and screening of each source, as well as façade reflection and the degree of soft ground attenuation.

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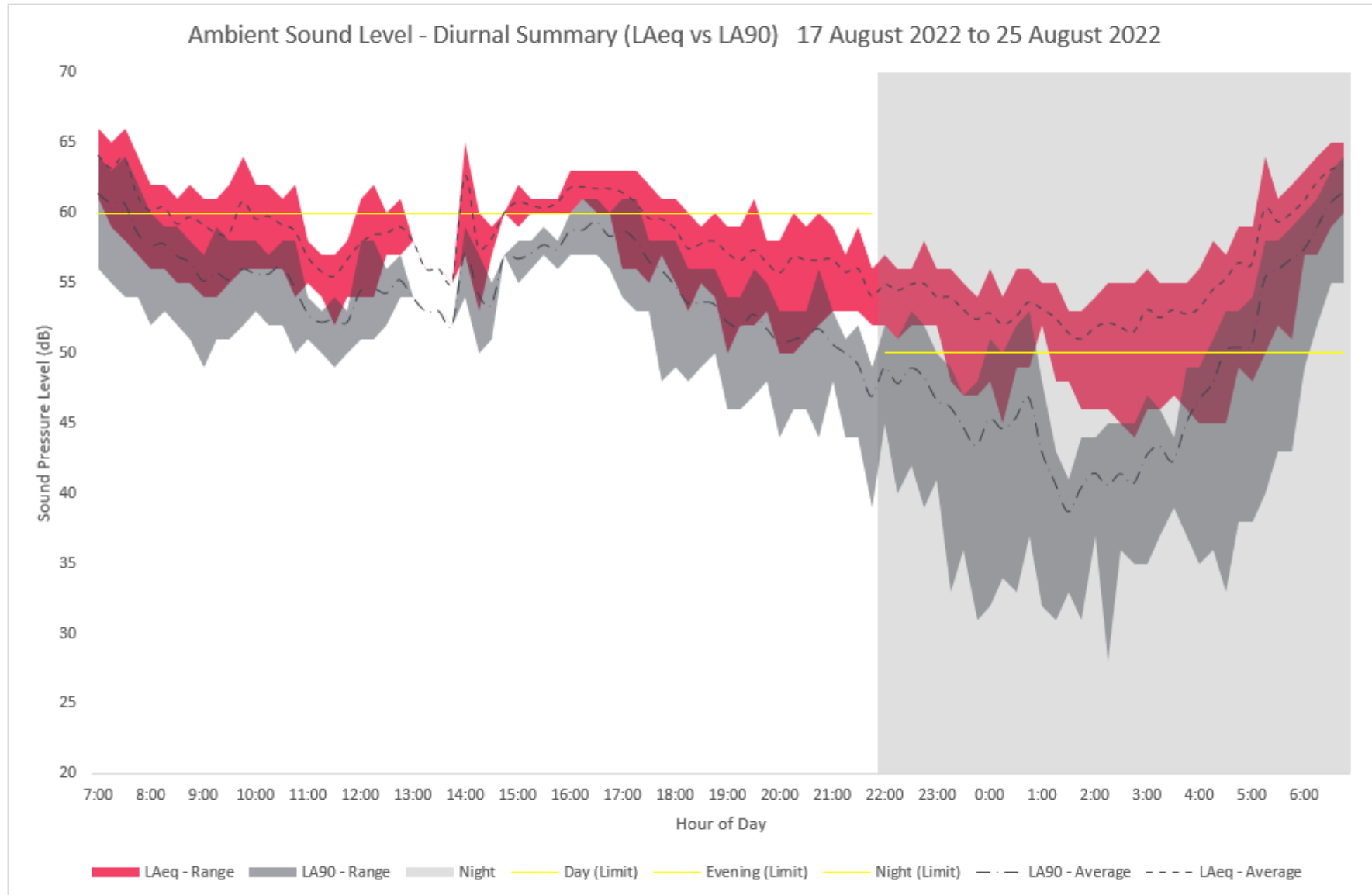
<sup>3</sup> Annex D refers to BS5228-1: 1997 (now superseded by BS 5228-1:2009)

## APPENDIX A GLOSSARY OF TERMINOLOGY

|                                |  |
|--------------------------------|--|
| <b>Ambient</b>                 | The ambient noise level is the noise level measured in the absence of the intrusive noise or the noise requiring control. Ambient noise levels are frequently measured to determine the situation prior to the addition of a new noise source.   |
| <b>dB</b>                      | Decibel. The unit of sound level.<br><br>Expressed as a logarithmic ratio of sound pressure P relative to a reference pressure of $P_r=20 \mu\text{Pa}$ i.e. $\text{dB} = 20 \times \log(P/P_r)$   |
| <b>dBA</b>                     | The unit of sound level which has its frequency characteristics modified by a filter (A-weighted) so as to closely approximate the frequency bias of the human ear.  |
| <b><math>L_{Aeq}(t)</math></b> | The equivalent continuous (time-averaged) A-weighted sound level. This is commonly referred to as the average noise level.<br><br>The suffix "t" represents the period to which the noise level relates, e.g. (8 h) will represent a period of 8 hours, (15 min) will represent a period of 15 minutes and (2200-0700) will represent a measurement time between 10 pm and 7 am. |
| <b><math>L_{A90}(t)</math></b> | The A-weighted noise level equalled or exceeded for 90% of the measurement period. This is commonly referred to as the background noise level.   |
| <b><math>L_{Amax}</math></b>   | The A-weighted maximum noise level. The highest noise level which occurs during the measurement period.  |
| <b>Notional Boundary</b>       | A line 20 metres from and parallel to the exterior wall of a dwelling or the legal boundary where this is closer   |
| <b>NZS 6801:2008</b>           | New Zealand Standard NZS 6801:2008 "Acoustics – Measurement of environmental sound"  |
| <b>NZS 6802:2008</b>           | New Zealand Standard NZS 6802:2008 "Acoustics - Environmental Noise"   |
| <b>NZS 6803: 1999</b>          | New Zealand Standard NZS 6803: 1999 "Acoustics - Construction Noise"   |
| <b>SPL or <math>L_p</math></b> | <u>Sound Pressure Level</u><br>A logarithmic ratio of a sound pressure measured at distance, relative to the threshold of hearing ( $20 \mu\text{Pa}$ RMS) and expressed in decibels.  |
| <b>SWL or <math>L_w</math></b> | <u>Sound Power Level</u><br>A logarithmic ratio of the acoustic power output of a source relative to $10^{-12}$ watts and expressed in decibels. Sound power level is calculated from measured sound pressure levels and represents the level of total sound power radiated by a sound source.   |



APPENDIX C SUMMARY OF NOISE LOGGING RESULTS



**APPENDIX D NOISE SOURCE SOUND POWER LEVEL**

| Source                 | Octave Band Centre Frequency (Hz) |     |     |     |      |      |      | dBA |
|------------------------|-----------------------------------|-----|-----|-----|------|------|------|-----|
|                        | 63                                | 125 | 250 | 500 | 1000 | 2000 | 4000 |     |
| Truck Moving           | 104                               | 101 | 99  | 101 | 104  | 97   | 93   | 110 |
| Truck Idling           | 91                                | 88  | 86  | 88  | 91   | 84   | 80   | 93  |
| Truck Airbrake Release | 95                                | 90  | 89  | 94  | 100  | 114  | 116  | 120 |
| Passenger Car          | 94                                | 90  | 86  | 82  | 82   | 78   | 73   | 86  |
| Condenser Unit         | 69                                | 69  | 69  | 66  | 63   | 58   | 56   | 68  |
| Kitchen Extract        | 87                                | 85  | 80  | 75  | 74   | 74   | 67   | 80  |
| Chiller                | 86                                | 86  | 86  | 83  | 80   | 75   | 73   | 85  |

