



# ON NOISE AND AGEMENT PLAN

SOUTHERN LINKS 1  
L NORTH DEVELOPMENT

DATE

31 August 2026

## REVISION HISTORY

The CNVMP is a living document. It will be updated throughout the works if necessary to adapt to changing work methodologies or a changing receiving environment.

## CERTIFICATION

The final version of this CNVMP must be certified by Waipa District Council prior to commencement of construction.

## AMENDMENTS TO THIS CNVMP

Any material updates to the certified CNVMP will be clearly marked using underlining for additional text and strikethrough for any deletions. Any amendments to a certified CNVMP will be provided to Waipa District Council for re-certification before being implemented.

All activities must be undertaken in accordance with the latest version of the certified CNVMP.

| Rev: | Date:    | Version:       | Comment:         | Prepared by:                                      | Reviewed by:               |
|------|----------|----------------|------------------|---------------------------------------------------|----------------------------|
| 1    | 21/08/26 | Draft          | Draft for review | Jon Styles,<br>MASNZ<br>Director and<br>Principal | Gemma Styles<br>Consultant |
| 2    | 31/08/26 | Final<br>Draft | Final draft      |                                                   |                            |

*This document is a draft CNVMP. It will be updated to reflect the conditions of consent and the results of further engagement with contractor, prior to construction commencing. The final version will be submitted for certification by Waipa District Council prior to commencement of construction.*

*Sections that must be updated are highlighted in grey.*

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## Table of Contents

|      |                                                                         |    |
|------|-------------------------------------------------------------------------|----|
| 1.0  | Introduction .....                                                      | 1  |
| 2.0  | Objectives of this CNVMP .....                                          | 1  |
| 2.1  | Focus of this CNVMP .....                                               | 2  |
| 3.0  | Contacts .....                                                          | 2  |
| 4.0  | Updates to this CNVMP .....                                             | 3  |
| 5.0  | Project conditions .....                                                | 3  |
| 6.0  | General requirements .....                                              | 3  |
| 7.0  | Permitted hours of construction work .....                              | 3  |
| 8.0  | Management of construction noise .....                                  | 4  |
| 8.1  | Closest receivers .....                                                 | 5  |
| 8.2  | Reference noise levels and set back distances .....                     | 7  |
| 9.0  | Process for managing compliance near to neighbouring buildings .....    | 10 |
| 10.0 | General noise mitigation measures .....                                 | 11 |
| 10.1 | Acoustic barriers .....                                                 | 12 |
| 11.0 | Management of vibration effects .....                                   | 12 |
| 11.1 | Project construction vibration limits .....                             | 13 |
| 11.2 | Vibration mitigation measures within 20m of any occupied building ..... | 14 |
| 12.0 | Community liaison and complaints .....                                  | 15 |
| 12.1 | Community liaison .....                                                 | 15 |
| 12.2 | Complaints about noise and vibration .....                              | 15 |
| 13.0 | Noise and vibration monitoring and reporting .....                      | 15 |
| 14.0 | Corrective action measures .....                                        | 16 |

## Appendices

|            |                       |
|------------|-----------------------|
| Appendix A | Glossary of terms     |
| Appendix B | Consent conditions    |
| Appendix C | Noise monitoring form |

## 1.0 Introduction

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Styles Group has prepared a draft<sup>1</sup> Construction Noise and Vibration Management Plan (**CNVMP**) to ensure the appropriate management of the construction noise and vibration effects associated with the Southern Links 1 (SL1) Industrial North Development (the **Project**).

This CNVMP sets out the measures to be implemented to ensure appropriate management of construction noise and vibration effects generated from the Project and to ensure noise and vibration generated from construction work complies with the resource consent conditions for the Project (the **Project Conditions**).

This CNVMP has been prepared in accordance with the *recommended* conditions that are contained in Appendix C of the *Assessment of Noise Effects* prepared by Styles Group for the SL1 Industrial North Development and Appendix E of NZS 6803:1999 *Acoustics – Construction Noise*.

Appendix B of this CNVMP must be updated to include the final conditions of consent.

This CNVMP is a 'living document' that will be updated as the works progress and if changes become necessary. It must be certified by Waipa District Council before construction work commences.

A glossary of the acoustical terms used in this document is provided as Appendix A.

## 2.0 Objectives of this CNVMP

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The objectives of this CNVMP are:

1. To identify and require the adoption of the best practicable option to minimise construction noise and vibration effects at all receivers.
2. Ensure compliance with the Project Noise and Vibration Conditions.
3. Set out the specific requirements for all construction work within 40m of any occupied building on another site.
4. Set out the requirements for construction activities that are subject to activity-specific noise and vibration limits.
5. Set out the specific requirements for all construction work undertaken outside the hours of 7:30am- 6:00pm, Monday to Saturday.

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<sup>1</sup> This version of the CNVMP is draft and will be updated to reflect the conditions of consent and the results of further engagement with contractor, prior to construction commencing. The final version will be submitted for certification by Waipa District Council prior to commencement of construction.

## 2.1 Focus of this CNVMP

This CNMVP is focussed on the management of construction noise and vibration levels from areas of the Industrial Area that are within 40m of a potentially occupied building on another site. These areas of the Site are shaded blue in Figure 1.

Contractors must carefully consider noise and vibration when selecting plant, equipment and construction methods when working within these areas.



**Figure 1 Areas of construction work within the Site that are within 40m of a *potentially*\* occupied building on another Site**

*\*The construction noise limits apply at any occupied building. This map should be updated to prior to construction to reflect the location of all potentially occupied buildings. Many of the structures/ buildings on adjacent sites are used for storage (and may not be occupied) or are prefabricated buildings that may be relocated.*

## 3.0 Contacts

The contact for queries or complaints regarding the project, and the manager responsible for implementing this CNVMP is:

Dillon Kelliher

ph: [REDACTED]

The consultant engaged to provide construction noise and vibration monitoring and advice is:

Styles Group Acoustics & Vibration Consultants

ph: [REDACTED]

## 4.0 Updates to this CNVMP

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The CNVMP is a living document, and it will be updated throughout the works if necessary to adapt to changing work methodologies or a changing receiving environment.

Any material updates to the certified CNVMP must be clearly marked using underlining for additional text and strikethrough for any deletions. Any amendments to a certified CNVMP must be provided to Waipa District Council for re-certification before being implemented.

All activities must be undertaken in accordance with the latest version of the certified CNVMP.

This is a draft CNVMP and not the version to be certified by the Waipa District Council.

## 5.0 Project conditions

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This draft CNVMP is based on the recommended conditions to control construction noise and vibration that are contained in Appendix C of the *Assessment of Noise Effects* prepared by Styles Group for SL1 Industrial North. Appendix B of this CNVMP must be updated to include the conditions of consent.

## 6.0 General requirements

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A copy of this CNVMP must be kept at the work site for the duration of all earthworks and civil works.

This CNVMP may be updated throughout the works with the approval of the Project Manager and in consultation with Waipa District Council.

All personnel must be informed about the need to reduce noise and vibration to a minimum and about the effects of excessive noise on the neighbouring sites. As part of their training, special attention must be given to:

- Proper selection, use and maintenance of tools and plant.
- Positioning of machinery on site.
- Avoidance of unnecessary noise.
- Procedures for receiving, reporting and investigation of noise and vibration complaints.

## 7.0 Permitted hours of construction work

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Noisy construction works may only be undertaken from Monday to Saturday between 7:30 am and 6:00 pm. There can be no works in the evening or on Sundays that may generate audible construction noise at any receiver.

Quieter activities and works inside buildings may occur outside these hours if they do not generate any audible noise at the neighbouring sites. Examples include light vehicle

movements, planting, electrical work, works set well back from receivers, site meetings, surveying or monitoring activities.

Quiet internal works such as internal plastering and painting can be undertaken at any time if they do not generate any audible noise at the neighbouring sites.

If a contractor is unsure whether an activity qualifies as a quieter activity, they must carry it out during normal construction hours or seek advice before doing it outside those hours.

## 8.0 Management of construction noise

This section must be updated to ensure the limits are consistent with the conditions of consent.

The construction noise limits applying at any **occupied residential dwelling** are set out in Table 1.

The construction noise limits applying at any **other occupied building** are set out in Table 2.

The construction noise limits apply when measured 1 m from the façade, and 1.2 to 1.5 m above the relevant floor level, of any building **not on the Site**. The noise limits do not apply at buildings on the Site or at any other buildings that are **unoccupied** during works.

**Table 1: Noise limits for construction work at any occupied residential dwelling**

| Receiver           | Time period                        | Noise limit $L_{Aeq(30min)}$ | Noise limit $L_{AFmax}$ |
|--------------------|------------------------------------|------------------------------|-------------------------|
| Occupied dwellings | 7:30am- 6:00pm, Monday to Saturday | 70 dB                        | 85 dB                   |
|                    | At all other times                 | 45 dB                        | 75 dB                   |

**Table 2: Noise limits for construction work at any other occupied building**

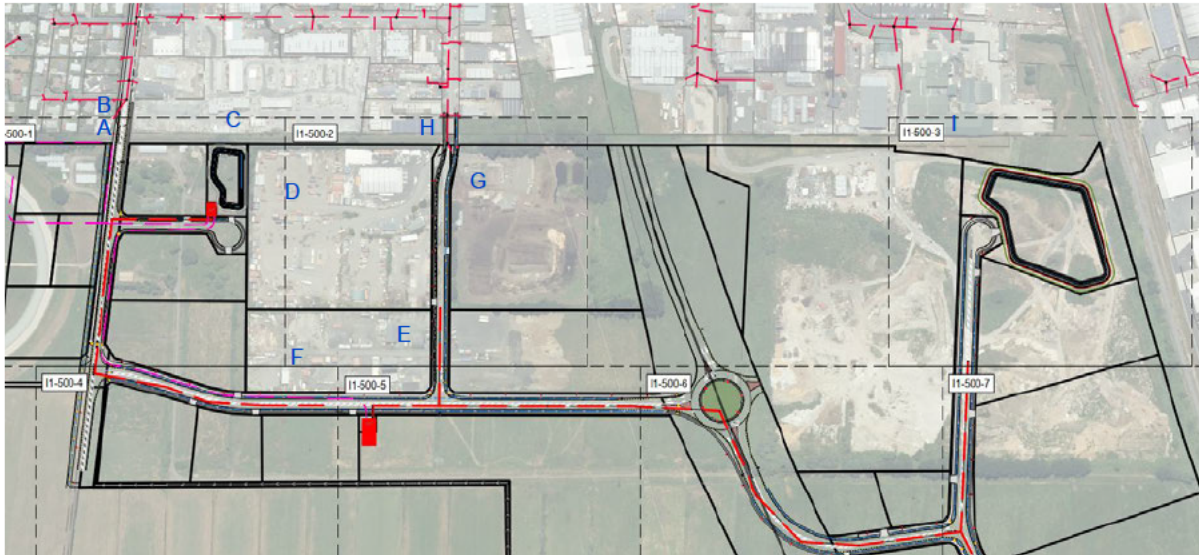
| Receiver                                  | Time period                        | Noise limit $L_{Aeq(30min)}$ |
|-------------------------------------------|------------------------------------|------------------------------|
| Any occupied building (except a dwelling) | 7:30am- 6:00pm, Monday to Saturday | 80 dB                        |
|                                           | At all other times                 | 75 dB                        |

The  $L_{Aeq}$  is the average noise level over a 30min period. The  $L_{Amax}$  is the loudest sound during the same time period.

Construction noise must be measured and assessed in accordance with the New Zealand Standard NZS 6803:1999 *Acoustics – Construction noise*.

## 8.1 Closest receivers

The Project Conditions require compliance with the relevant limits that apply at the closest occupied buildings (**receivers**) adjacent to the Site. The closest receivers are shown in the map at Figure 2 below\* and are identified in Table 3.



**Figure 2 Closest receivers**

*\*This map must be updated to reflect the potentially occupied buildings that exist prior to construction and their location. Many of the adjacent buildings/ structures are used for storage (and may not be occupied) or are prefabricated buildings that may be relocated.*

**Table 3 Closest receivers**

| ID | Address                      | Building type         | Approximate distance between closest potential construction activity within the Site and receiving building façade                                                                                                                                                                                                                                                                                                                                          |
|----|------------------------------|-----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| A  | Dwelling on 158 Higgins Road | Single level dwelling | <p>≈35m from the closest Site boundary, where construction noise will be generated from:</p> <ul style="list-style-type: none"> <li>Road construction, including earthworks and compaction works</li> <li>Heavy construction vehicles accessing the Site from the termination of Higgins Road.</li> </ul> <p><i>This receiver is over 100m from the closest area of the Site where sheet piling is proposed for the Waste Water Pumpstation (WWPS).</i></p> |

| ID | Address                                               | Building type         | Approximate distance between closest potential construction activity within the Site and receiving building façade                                                                                                                                                                                                                                                                                                                     |
|----|-------------------------------------------------------|-----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| B  | Dwelling on 156 Higgins Road                          | Single level dwelling | <p>≈40m from the closest Site boundary, where construction noise will be generated from:</p> <ul style="list-style-type: none"> <li>• Road construction, including earthworks and compaction works.</li> <li>• Heavy construction vehicles accessing the Site from the termination of Higgins Road.</li> </ul> <p><i>This receiver is over 100m from the closest area of the Site where sheet piling is proposed for the WWPS.</i></p> |
| C  | Atlas Auto Limited (car wreckers) at 119 Higgins Road | Single level building | <p>≈20m from the closest Site boundary, where construction noise will be generated from earthworks.</p> <p><i>This receiver is over 80m from the closest area of the Site where sheet piling is proposed for the WWPS.</i></p>                                                                                                                                                                                                         |
| D  | Hamilton Transfer Station                             | Single level building | <p>≈20m from the closest Site boundary, where construction noise will be generated from earthworks.</p> <p><i>This receiver is over 160m from the closest area of the Site where sheet piling is proposed for the WWPS.</i></p>                                                                                                                                                                                                        |
| E  | TI Roadlink (logistics) at 16A Wickham Street         | Single level building | <p>≈20m from the closest Site boundary, where construction noise will be generated from earthworks.</p> <p><i>This receiver is over 80m from the closest area of the Site where sheet piling is proposed for the WWPS.</i></p>                                                                                                                                                                                                         |
| F  | Hamilton Organic                                      | Single level building | <p><i>Location of any occupied building to be verified prior to construction.</i></p>                                                                                                                                                                                                                                                                                                                                                  |
| G  | Landscape Supplies                                    | Single level building | <p>≈20m from the closest Site boundary, where construction noise will be generated from:</p> <ul style="list-style-type: none"> <li>• Heavy construction vehicles accessing the Site from the termination of Wickham Road</li> <li>• Road construction, including earthworks and compaction works.</li> </ul> <p><i>This receiver is over 80m from the closest area of the Site where sheet piling is proposed for the WWPS</i></p>    |

| ID | Address                                                         | Building type         | Approximate distance between closest potential construction activity within the Site and receiving building façade                                                                                                                                                                                                                                                                                                              |
|----|-----------------------------------------------------------------|-----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| H  | Ash Air (service and repair) at 12 Wickham Street               | Single level building | <p>≈17m from the closest Site boundary, where construction noise will be generated from:</p> <ul style="list-style-type: none"> <li>Heavy construction vehicles accessing the Site from the termination of Wickham Road</li> <li>Road construction, including earthworks and compaction works.</li> </ul> <p><i>This receiver is over 80m from the closest area of the Site where sheet piling is proposed for the WWPS</i></p> |
| I  | Greenlea Premier Meats (meat processing plant) at Greenlea Lane | ≈Four story building  | <p>≈35m from the closest Site boundary, where construction noise will be generated from earthworks.</p> <p><i>This receiver is well separated from the closest area of the Site where sheet piling is proposed for the WWPS</i></p>                                                                                                                                                                                             |

## 8.2 Reference noise levels and set back distances

Tables 4 and 5 list the equipment that is typical for this type of project.

**Table 4** sets out minimum separation distances required for the equipment to comply with the daytime noise limits of 70 dB  $L_{Aeq}$  and 85 dB  $L_{AFmax}$  at any **occupied residential dwelling**.

**Table 5** provides minimum separation distances required for the equipment to comply with the daytime noise limits of 80 dB  $L_{Aeq}$  and 85 dB  $L_{AFmax}$  at any **other occupied building (excluding a dwelling)**.

The calculated separation distances are based on the following assumptions:

- The minimum distance stated is from the noise generating plant to the assessment position at 1 m from the most exposed façade of the building.
- The plant is being used continuously at the reference distance over a 15-minute sample period (i.e. 100% on-time) unless otherwise stated.
- The distances include a +3 dB adjustment to the noise levels for reflections from the façade of the receiving building (as required by NZS 6803:1999).
- Acoustically reflective ground is assumed between the noise source and the Receiver for distances up to 30 m, as recommended by NZS 6803:1999. Ground absorption has otherwise been considered in the calculations.
- The mitigated compliance distances are based on barriers effectively screening the assessment point from the noise generating activity and reducing the  $L_{Aeq}$  noise level by 10 dB (see Section 10.1)

**Table 4: Noise sources levels and minimum separation distances where a noise limit of 70 dB  $L_{Aeq}$  applies at any occupied residential dwelling**

| Construction activity                                                   | Unmitigated $L_{Aeq}$ noise level at 10 m | Unmitigated compliance distance | Mitigated compliance distance (based on 2m noise barrier) <sup>2</sup> |                    |
|-------------------------------------------------------------------------|-------------------------------------------|---------------------------------|------------------------------------------------------------------------|--------------------|
|                                                                         |                                           |                                 | One story dwelling                                                     | Two story dwelling |
| Sheet piling for stormwater ponds                                       | 86 dB                                     | 85 m                            | n/a                                                                    | n/a                |
| Bored piling with a 20-t excavator                                      | 79 dB                                     | 38 m                            | 12 m                                                                   | 21 m               |
| Chainsaw works to remove trees (33% on-time)                            | 77 dB                                     | 30 m                            | 10 m                                                                   | 18 m               |
| D6, D7, or D8 bulldozer working in small area                           | 76 dB*                                    | 27 m                            | 9 m                                                                    | 16 m               |
| Vibratory compaction roller 15t – 20-t                                  | 76 dB*                                    | 27 m                            | 9 m                                                                    | 16 m               |
| Cut and fill, clearing, and loading trucks with a 40-t – 50-t excavator | 75 dB                                     | 24 m                            | 8 m                                                                    | 14 m               |
| Retaining wall construction using a 14 - 20-t excavator and auger       | 74 dB                                     | 22 m                            | 7 m                                                                    | 12 m               |
| Cat 825 static compactor 30-t                                           | 72 dB*                                    | 17 m                            | 6 m                                                                    | 10 m               |
| Cut and fill, clearing, and loading trucks with a 20-t excavator        | 69 dB                                     | 12 m                            | 4 m                                                                    | 7 m                |
| Cat 815 static compactor 18-t                                           | 69 dB*                                    | 12 m                            | 4 m                                                                    | 7 m                |
| Concrete pump and truck discharging                                     | 69 dB                                     | 12 m                            | 4 m                                                                    | 7 m                |
| Cut and fill, clearing, and loading trucks with a 12-t excavator        | 67 dB                                     | 10 m                            | 3 m                                                                    | 6 m                |

<sup>2</sup> In accordance with the barrier specifications set out in Section 10.1.

| Construction activity                                       | Unmitigated<br>$L_{Aeq}$ noise level<br>at 10 m | Unmitigated<br>compliance<br>distance | Mitigated compliance distance<br>(based on 2m noise barrier) <sup>2</sup> |                       |
|-------------------------------------------------------------|-------------------------------------------------|---------------------------------------|---------------------------------------------------------------------------|-----------------------|
|                                                             |                                                 |                                       | One story<br>dwelling                                                     | Two story<br>dwelling |
| Large generator                                             | 66 dB                                           | 9 m                                   | 3 m                                                                       | 5 m                   |
| Terrex TS14 30-t motor<br>scraper                           | 65 dB*                                          | 8 m                                   | 3 m                                                                       | 4 m                   |
| 7,000 L watercart                                           | 65 dB                                           | 8 m                                   | 3 m                                                                       | 4 m                   |
| Grader                                                      | 62 dB*                                          | 6 m                                   | 2 m                                                                       | 3 m                   |
| Idling delivery truck,<br>dump truck, moxy, tractor         | 62 dB                                           | 6 m                                   | 2 m                                                                       | 3 m                   |
| Paving works (with all<br>ancillary equipment<br>operating) | 75 dB                                           | 25 m                                  | 8 m                                                                       | 14 m                  |

\*Reference noise level is for a moving noise source.

**Table 5: Noise sources levels and minimum separation distances where a noise limit of 80 dB  $L_{Aeq}$  applies at any occupied building (excluding a dwelling)**

| Construction activity                                                      | Unmitigated<br>$L_{Aeq(15\text{ min})}$ noise<br>level at 10 m | Unmitigated<br>compliance<br>distance | Mitigated<br>compliance<br>distance<br>(with noise barrier) |
|----------------------------------------------------------------------------|----------------------------------------------------------------|---------------------------------------|-------------------------------------------------------------|
| Sheet piling for WWPS                                                      | 86 dB                                                          | 27 m                                  | n/a                                                         |
| Bored piling with a 20-t excavator                                         | 79 dB                                                          | 12 m                                  | 4 m                                                         |
| Chainsaw works to remove trees<br>(33% on-time)                            | 77 dB                                                          | 10 m                                  | < 4 m                                                       |
| D6, D7, or D8 bulldozer working in<br>small area                           | 76 dB*                                                         | 9 m                                   | < 4 m                                                       |
| Padfoot vibratory compaction roller<br>15t – 20-t                          | 76 dB*                                                         | 9 m                                   | < 4 m                                                       |
| Cut and fill, clearing, and loading<br>trucks with a 40-t – 50-t excavator | 72 dB                                                          | 6 m                                   | < 4 m                                                       |
| Cat 825 static compactor 30-t                                              | 72 dB*                                                         | 6 m                                   | < 4 m                                                       |
| Cut and fill, clearing, and loading<br>trucks with a 20-t excavator        | 69 dB                                                          | 4 m                                   | < 4 m                                                       |

| Construction activity               | Unmitigated<br>$L_{Aeq(15\text{ min})}$ noise<br>level at 10 m | Unmitigated<br>compliance<br>distance | Mitigated<br>compliance<br>distance<br>(with noise barrier) |
|-------------------------------------|----------------------------------------------------------------|---------------------------------------|-------------------------------------------------------------|
| Cat 815 static compactor 18-t       | 69 dB*                                                         | 4 m                                   | < 4 m                                                       |
| Concrete pump and truck discharging | 69 dB                                                          | 4 m                                   | < 4 m                                                       |

\* Reference noise level is for a moving noise source.

The reference noise levels in Table 4 and 5 may be updated based on the results of any noise measurements undertaken during the project.

Any of the activities in Tables 4 and 5 can occur without the need for mitigation, provided that they are undertaken at a distance that meets or exceeds the Unmitigated Compliance Distance when measured from the closest area of construction work and 1m from the façade of the closest occupied building.

## 9.0 Process for managing compliance near to neighbouring buildings

Before starting construction work **within 40m of any occupied building on another site**, the contractor must follow these steps:

1. Identify the proposed construction activity and the equipment required.
2. Determine the shortest distance between the proposed work area and the nearest occupied dwelling or occupied building.
3. Find the applicable compliance distance for the activity and equipment in Tables 4 and 5.
4. Compare the actual distance with the compliance distance:
  - If the dwelling or building is outside the compliance distance, the activity may proceed without further noise mitigation.
  - If the dwelling or building is within the compliance distance, noise mitigation must be implemented before the activity begins.
5. Where mitigation is required, select one or more of the following mitigation measures:
  - Use smaller or quieter equipment. Check Tables 4 and 5 to confirm that the revised equipment will comply or seek specific advice from Styles Group.
  - Install a noise barrier in accordance with the guidance set out in Section 10.1 and use the mitigated compliance distance in Tables 4 and 5 to confirm compliance. Position the barrier as close to the activity as practicable and ensure it blocks the line of sight between the equipment and the dwelling. Section 10.1 sets out the barrier requirements.
  - Use a combination of quieter equipment and a noise barrier to achieve the applicable compliance distance in Table 4 and Table 5.

- Carry out the work while the dwelling or building is unoccupied. The construction noise limits do not apply when the receiving building is unoccupied.
- 6. Seek advice from Styles Group. Further assessment may include on-site noise measurements to determine whether an exceedance is likely.
- 7. Confirm that the selected mitigation measures are in place and that compliance has been demonstrated before commencing the activity.

## 10.0 General noise mitigation measures

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The contractor will reduce noise emissions from the Site by implementing the mitigation measures outlined in this section. These include:

- a) The minimum separation distances set out in Section 8.2 must be complied with at all times unless the noise levels can be made to comply using other methods (e.g. screening).
- b) The quietest machinery and methods available will be used where practicable. This includes using plant that is no larger than necessary to complete the works.
- c) All machinery will be maintained throughout the project to ensure it is not generating unnecessary noise e.g. plant will be lubricated to reduce squeaking.
- d) When machinery or plant is not required to be running, it will be switched off and not left idling.
- e) Stationary machinery will be set back from the boundaries to minimise noise levels for neighbours.
- f) Plant on site will use broadband reverse alarms in place of traditional pure tone 'beepers' where practicable.
- g) The tail gates of trucks will not be slammed or allowed to fall closed.
- h) Material will not be dropped from height into empty trucks.
- i) Tools, equipment, and materials will not be dropped on hard ground or dragged across the Site.
- j) Vehicle horns will only be used for emergencies.
- k) Any radios or music played on the Site must be inaudible at the nearest dwellings.
- l) Communication over distance will be by radio or phone.
- m) Equipment generating excess or unnecessary noise will be stopped (when safe) and reported to the Site Manager.
- n) Daily pre-start meetings held by the Site Supervisor will include discussions about any noise and vibration issues, and any complaints received.
- o) All personnel on site will be made aware of the potential impacts of noise on neighbours.

## 10.1 Acoustic barriers

Acoustic barriers will be required when any construction plant is proposed to be operated within the unmitigated compliance distances specified in Tables 4 and 5. These barriers could either be fixed or localised barriers, dependant on the location of construction work.

Acoustic barriers shall meet the following specifications:

- a) All acoustic barriers will be at least 2.4 m high and have a surface mass of no less than 7 kg/m<sup>2</sup> e.g. 12 mm plywood. They will be solid with no gaps between panels or between the barriers and the ground.

Proprietary construction noise barriers with a lower surface mass may be used if they equal or exceed the overall noise reduction properties of a solid barrier. Examples of proprietary construction noise barriers are below. Please note that the reductions stated for these products by the manufacturers are at isolated frequency bands and they do not reflect the overall  $L_{Aeq}$  reductions. The overall reduction will be approximately 8-10 dBA.

- SFI Echo Barrier  
<https://supplyforce.co.nz/construction-noise-barrier/>
- Ultimate Solutions Acoustic Curtain  
<https://www.ultimatesolutions.co.nz/product/soundbuffer-curtain/>
- Hushtec construction noise barriers  
<https://www.hushtecsolutions.com/nz/industries-we-serve/construction-noise-control/>

- b) Acoustic barriers will block the line of sight between the noise source and the receiver.
- c) Acoustic barriers will be positioned on the boundary or close to an activity (localised) where construction plant must be operated within the unmitigated compliance distances (Tables 4 and 5)
- d) Localised acoustic barriers should extend past the noise source by a distance of 1.5 times the height of the plant/machinery. If possible, the screening should partially surround the noise source.

## 11.0 Management of vibration effects

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The operation of tracked excavators, vibratory compaction rollers, and other heavy plant and vehicles on site have the potential to generate vibration that may be felt within the nearest buildings. This section sets out the following measures must be observed when working within 20 m of any occupied building, to ensure that vibration complies with the project conditions and does not cause unreasonable disturbance:

## 11.1 Project construction vibration limits

The applicable vibration limits for the project are set out in Table 6.

**Table 6: Applicable vibration limits**

| Location                                 | Limit                     |
|------------------------------------------|---------------------------|
| All neighbouring buildings, at all times | DIN 4150 guideline values |

All construction vibration will be measured and assessed in accordance with DIN 4150-3:1999

The DIN 4150-3:1999 Standard uses a three-tiered classification system for buildings according to their susceptibility to vibration damage, as follows:

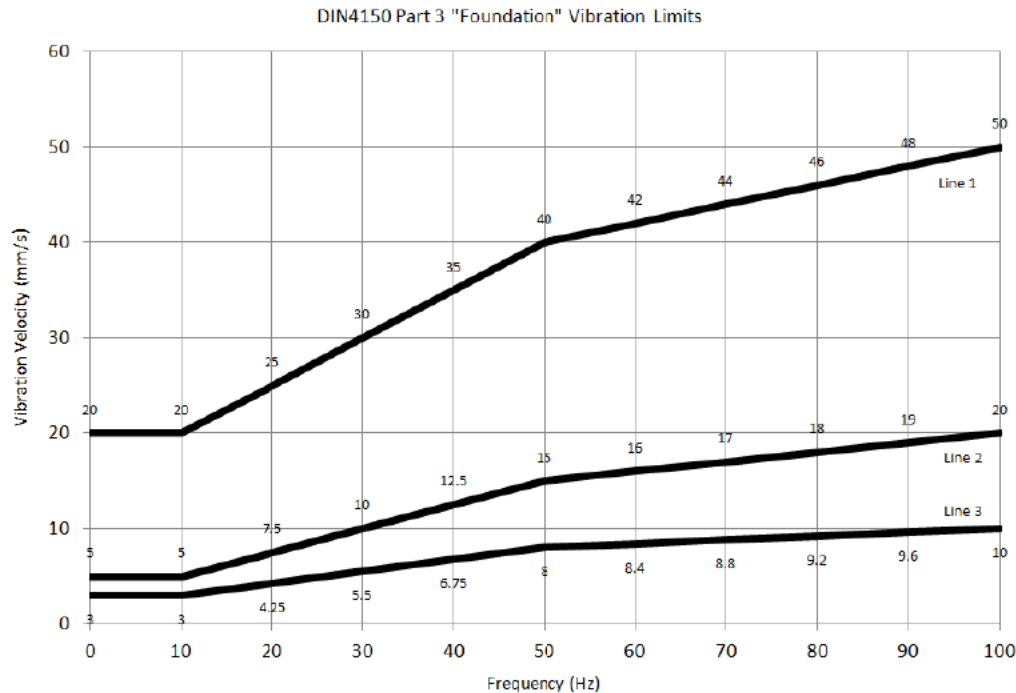
- Line 1: Buildings used for commercial purposes, industrial buildings and buildings of similar design (Line 1);*
- Line 2: Dwellings and buildings of similar design and/or occupancy (Line 2);*
- Line 3: Structures that, because of their particular sensitivity to vibration, cannot be classified under lines 1 and 2 and are of great intrinsic value e.g. buildings listed buildings under preservation order (Line 3).*

The DIN Standard is specifically concerned with the structure of the building, not the effect of the vibration on the people within the building. Assessment is in terms of a reduction in 'serviceability' as defined in the DIN standard, which includes minor cosmetic damage such as cracked plaster.

The DIN standard frequency-dependant vibration limits for short-term vibration are reproduced in graphical form as Figure 3.

Line 2 of the DIN criteria is very typically applied to residential dwellings unless the receiving structure is particularly sensitive to vibration. A suitably qualified structural expert should be consulted: where there are concerns about a building's susceptibility to vibration; or where the appropriate assessment classification under DIN 4150-3:1999 requires confirmation.

The DIN standard includes many other recommendations and prescribes more stringent limits for long-term vibration (which may induce fatigue or resonant movement). The DIN standard should therefore be referred to in full when being applied.



**Figure 3: Curves for guideline values (short-term vibration) specified in DIN 4150-3:1999**

## 11.2 Vibration mitigation measures within 20m of any occupied building

The operation of tracked excavators, vibratory compaction rollers, and other heavy plant and vehicles on site have the potential to generate vibration that may be felt within the nearest dwellings.

The vibration received within the nearest dwellings will depend largely on the equipment used, the separation distance, the ground conditions, how the plant is operated, and the response of the receiving structure.

The following measures will be observed when working within 20m of any occupied building to ensure that vibration complies with the project conditions and does not cause unreasonable disturbance:

- Workers will be informed of the need to reduce vibration effects at the nearest dwellings and the mitigation measures available to achieve this.
- Excavators and heavy vehicles will be driven slowly (fast movement across an uneven site can generate high vibration levels).
- The lightest plant practicable and available will be used for the works.
- Wheeled plant will be selected over tracked plant where practicable.
- Excavator operators will avoid banging buckets on the ground.
- Any vibratory compaction works necessary will be undertaken making passes parallel to the site boundary. The operator will not change direction or stop in the nearest part of the site to an occupied dwelling.

Equipment generating excessive or unnecessary vibration will be stopped (where safe) and reported to the Site Manager.

## 12.0 Community liaison and complaints

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### 12.1 Community liaison

All receivers within 50 m of works must be informed of the following information by letter drop at least 10 working days before works commence on site:

- i. A brief overview of the works;
- ii. The expected start date of works;
- iii. The expected duration of the works;
- iv. The days and hours of the week when works may be undertaken;
- v. The approximate timing of the highest noise and vibration activities;
- vi. The noise and vibration mitigation to be implemented; and
- vii. Contact details for the receipt of any noise or vibration complaints or concerns.

### 12.2 Complaints about noise and vibration

Any complaints received will be directed to the manager identified in Section 3.0.

A register will be kept and maintained on site to record the details of any complaints, including:

- i. The time and date of the noise and/or vibration causing the complaint.
- ii. The nature of the noise and/or vibration and what it was caused by (if known).
- iii. The name and contact number of the complainant (if given).
- iv. The action taken in response to the complaint.
- v. Any corrective action measures taken in accordance with Section 14.0.

The complaints register must be made available to Waipa District Council on request.

## 13.0 Noise and vibration monitoring and reporting

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This section sets out requirements for construction noise and vibration monitoring during the construction of the Project.

Noise and vibration measurements will be performed:

- i. At the beginning of any activity within the mitigated (with barrier) setback distances specified in Tables 4 and 5 to monitor compliance with the Project noise limits.

- ii. If the noise or vibration from any activity on the site appears excessive in the opinion of the Site Manager or Waipa District Council.
- iii. Following the receipt of any reasonable construction noise or vibration complaint.
- iv. By a suitably qualified and experienced person (e.g., MASNZ) or any person trained by the project construction noise and vibration consultant.
- v. Using a sound level meter conforming to at least IEC651 Type 2 criteria, and in accordance with NZS 6803:1999 Acoustics - Construction Noise (noise only).
- vi. In accordance with DIN 4150-3:1999 Structural Vibration – Part 3 Effects of Vibration on Structures (vibration only).

A noise monitoring form is attached as Appendix C .

The results of any site and plant specific noise and vibration monitoring will be used to update this CNVMP to ensure that minimum compliance distances and mitigation measures are specifically tailored to the project.

The results of all noise and vibration monitoring will be retained for the duration of the project and made available to Waipa District Council on request.

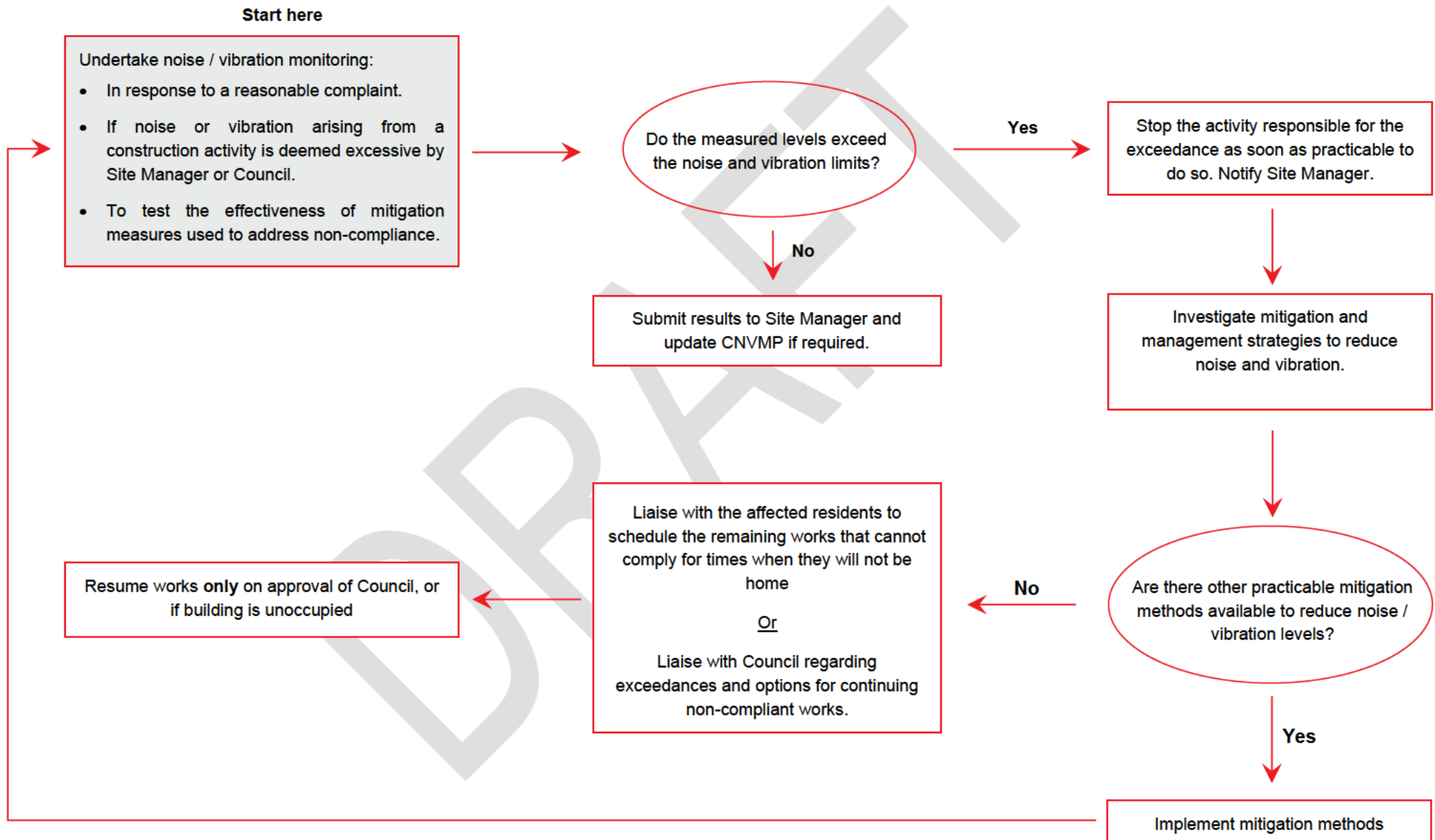
Any non-compliance with the noise limits identified through monitoring will be addressed by following the corrective action measures in Section 14 of this CNVMP.

## 14.0 Corrective action measures

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The corrective action measures illustrated in Figure 4 will be followed if non-compliance with the project noise or vibration limits is identified through monitoring.

**Figure 4: Process for corrective action measures**



## Appendix A Glossary of terms

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|                   |                                                                                                                                                                                                                                                                                                       |
|-------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Noise             | <p>A sound which serves little or no purpose for the exposed persons and is commonly described as 'unwanted sound'.</p> <p>The Resource Management Act definition of noise is "includes vibration".</p>                                                                                               |
| dB (decibel)      | <p>The basic measurement unit of sound. The logarithmic unit used to describe the ratio between the measured sound pressure level and a reference level of 20 micropascals (0 dB).</p>                                                                                                                |
| A-weighting       | <p>A frequency filter applied to the full audio range (20 Hz to 20 kHz) to approximate the response of the human ear at lower sound pressure levels.</p>                                                                                                                                              |
| $L_{Aeq(t)}$ (dB) | <p>The A-weighted equivalent sound pressure level with the same energy content as the measured varying acoustic signal over a sample period (t). The preferred metric for sound levels that vary over time because it takes into account the total sound energy over the time period of interest.</p> |
| $L_{AFmax}$ (dB)  | <p>The maximum A-weighted sound pressure level recorded during the measurement period using a fast time-weighting response.</p>                                                                                                                                                                       |
| NZS 6803:1999     | <p>N.Z. Standard NZS 6803:1999 <i>Acoustics – Construction noise</i>.</p>                                                                                                                                                                                                                             |
| DIN 4150–3:1999   | <p>German Standard DIN 4150-3:1999 <i>Structural Vibration – Part 3: Effects of vibration on structures</i>. Typically adopted for the assessment of structure borne vibration in New Zealand.</p>                                                                                                    |
| PPV               | <p>Peak particle velocity, measured in mm/s. The standard metric for the measurement of ground borne vibration in New Zealand. The instantaneous maximum velocity reached by a vibrating element as it oscillates about its rest position.</p>                                                        |
| CNVMP             | <p>Construction noise and vibration management plan. A document to help the contractor manage noise and vibration emissions during construction works.</p>                                                                                                                                            |

## Appendix B Consent conditions

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This section must be updated to include the conditions of consent.

DRAFT

## Appendix C Noise monitoring form

Name:

Date:

### Notes for noise monitoring

*All sections of this form must be completed when undertaking construction noise measurements for the project. Please provide a sketch of the area, sound sources and measurement position on the rear of this form.*

*Measurements are to be undertaken at 1 m from the façade of the receiving building most exposed to the sound under investigation, and 1.2 m to 1.5 m above the relevant floor level. No adjustment to the measured level is to be made for reflected sound from the façade. Valid measurements cannot be undertaken in persistent rain or in wind speeds greater than 5 m/s.*

*Adjustments to the measured level may be required to correct for distance and façade reflections if measurements must be undertaken at a proxy location.*

### Sound source and instrumentation

|                                                      |  |
|------------------------------------------------------|--|
| Location of works                                    |  |
| Description of construction activity being monitored |  |
| Measurement instrumentation (type and serial number) |  |
| Date of most recent laboratory calibration           |  |
| Field calibration check (time and adjustment)        |  |

### Meteorological conditions

|                          |  |
|--------------------------|--|
| Cloud cover (octas)      |  |
| Rain                     |  |
| Wind speed and direction |  |

### Methodology

|                                                                                |  |
|--------------------------------------------------------------------------------|--|
| Location/orientation of microphone                                             |  |
| Height of microphone above ground and distance to facade of receiving building |  |
| Distance between microphone and sound source                                   |  |
| Ground conditions between sound source and microphone                          |  |
| Any barriers or objects between sound source and microphone                    |  |
| Distance to any reflective surfaces other than receiving facade                |  |
| Extraneous noise sources                                                       |  |

## Measurement results

| Sample start time | Duration of sample | L <sub>Aeq</sub> (dB) | L <sub>AFmax</sub> (dB) | Sound source controlling the measured levels | Adjustments required for distance, facade correction or barriers |
|-------------------|--------------------|-----------------------|-------------------------|----------------------------------------------|------------------------------------------------------------------|
|                   |                    |                       |                         |                                              |                                                                  |
|                   |                    |                       |                         |                                              |                                                                  |
|                   |                    |                       |                         |                                              |                                                                  |
|                   |                    |                       |                         |                                              |                                                                  |
|                   |                    |                       |                         |                                              |                                                                  |
|                   |                    |                       |                         |                                              |                                                                  |

***Do the measurements show full compliance with the project noise limits?***

**Yes:** *The measurement results shall be used to update the site specific noise levels and construction separation distances within the CNVMP.*

**No:** *The CNVMP shall be referred to for the appropriate corrective action measures and further noise mitigation options*