



ASSESSMENT OF NOISE EFFECTS

ŌTĀHUHU / MT RICHMOND VEGETATION RESTORATION

PREPARED FOR
Tupuna Maunga Authority

DATE
21 June 2021

Acoustic assessment prepared by Styles Group for the Tupuna Maunga Authority.

REVISION HISTORY

Rev:	Date:	Comment:	Version:	Prepared by:	Reviewed by:
1	21/06/21		Final Draft	Jon Styles, MASNZ Director and Principal Styles Group	Gemma Sands Consultant Styles Group

COPYRIGHT

All material in this document including, without limitation, text, images, graphics, layout, intellectual property and any other information (collectively 'content') is subject to copyright and other proprietary rights, including but not limited to, the Copyright Act 1994 (New Zealand) and international copyrights, trademarks or other intellectual property rights and laws. Unless otherwise stated, the content in this document is owned by Styles Group. The content of this document may not be copied in whole or in part without the permission of Styles Group.

Table of contents

1.0	Introduction	1
2.0	Background and interpretations	1
2.1	The relevant noise standard	1
2.2	Helicopter noise levels	2
2.2.1	Defining helicopter take-off and landing	2
3.0	The proposal	3
3.1	Project duration	5
4.0	The Site and surrounding environment	5
5.0	Noise standards applying to the proposal	6
5.1	Tree removal and processing noise	6
5.1.1	Project noise standards	8
5.2	Helicopter landing and take-offs	9
5.3	New Zealand acoustics standards	10
5.4	Reasons for consent and AUP assessment criteria	10
6.0	Assessment of noise effects	11
6.1	Recommended conditions	12
7.0	Conclusion	14

Appendices

Appendix A	Glossary of terms
------------	-------------------

1.0 Introduction

The Tūpuna Maunga Authority has engaged Styles Group to predict the noise levels from the removal of 278 trees on Ōtāhuhu/Mount Richmond as part of a vegetation restoration project.

This report sets out an assessment of the proposal from an acoustics perspective, including:

- i. Noise level predictions at the surrounding sites prepared using Brüel & Kjær Predictor computer noise modelling software.
- ii. An assessment of the noise in accordance with the Auckland Unitary Plan (AUP), section 16 of the Resource Management Act (the Act) and the relevant New Zealand acoustics standards.
- iii. Recommended noise management measures and conditions of consent based on our findings.

Our assessment is based on our understanding of the proposal following a site visit and discussions with the project team. This report should be read in conjunction with the application site plans and the Assessment of Environmental Effects. A glossary of acoustical terms used within this document is attached as Appendix A.

2.0 Background and interpretations

In 2019, the Tūpuna Maunga Authority engaged Styles Group to assess the likely noise effects arising from the removal of 443 exotic trees from Ōtāhuhu / Mount Richmond.

This revision to the acoustic assessment reflects recent changes to the project. The changes reduce the number of trees proposed to be removed and the method of removal and processing. This acoustic assessment supersedes the version dated May 2019 and has been prepared in accordance with Auckland Council's interpretations below.

2.1 The relevant noise standard

Our May 2019 assessment assessed all project noise sources (including all tree removal, processing and helicopter noise) under E25.6.27 *Construction Noise* on the basis that the project noise sources are a one-off, temporary noise event associated with a revegetation project and do not represent an ongoing, operational noise source on the site.

Auckland Council determined that E25.6.27 cannot be applied to the tree removal works (including helicopter noise emissions) on the basis that:

- a) Tree removal for restoration purposes is not expressly provided for under the definition of "construction work" under NZS 6803:1999. Noise from tree removal works are only included within the NZS 6803:1999's definition of "construction work" where they are undertaken in preparation for or in connection with subsequent construction activities (not vegetation restoration).

- b) E25.6.1 requires that the activity must meet the Standard's definition of "construction work" for the construction noise standards of the AUP to apply.

As requested by Auckland Council, this assessment assesses the tree removal and processing noise levels with reference to the zone interface noise standards in Chapter E25.

2.2 Helicopter noise levels

The project involves helicopter assisted tree removal works over 18 days. The proposal will involve a low flying helicopter operating below 500 feet, and landing and take-offs associated with helicopter refuelling at Processing Site 2.

Our May 2019 assessment assessed all helicopter noise levels (including noise associated with overflying, landing and take-offs) under E25.6.27 on the basis that that the helicopter noise emissions are connected to the overall project, and helicopter lifting works are commonly assessed under the guidance of NZS6803:1999. Furthermore, because the application does not seek to authorise the ongoing use of the Site as a heliport, helipad or formal landing area¹.

Council has determined that the noise effects associated with the use of a helicopter are permitted unless the helicopter lands or takes off from the Site, in which case the noise emissions from take-off and landing must comply with E25.6.32 *Noise levels for helicopters take-off or landing*.

As requested by Council, we have refined our assessment and noise modelling to consider only the noise from take-offs and landings within the Site (as defined below) and have assessed these noise levels under E25.6.32 *Noise levels for helicopters take-off or landing*.

In accordance with Council's interpretation, all helicopter noise generated when the helicopter is "over-flying" (i.e. not landing or taking off) is permitted, and must be disregarded.

2.2.1 Defining helicopter take-off and landing

There is no rule, standard or fixed definition of what constitutes a helicopter take-off or landing that could be applied directly to this proposal.

When assessing noise emissions from a formal helipad or aerodrome, the beginning of an approach procedure is typically defined by when the aircraft descends through an altitude of 500ft above sparsely populated land or bodies of water, and an altitude of 1000ft above areas where people occur in greater numbers. A departure procedure begins at or before lift-off and ends when the aircraft ascends through the altitudes described above. This general approach has been adopted for a significant number of formally identified landing areas, aerodromes and airports around the country.

In this case, the aircraft will not be ascending or descending through those altitudes between landing and take-off procedures. The aircraft will be operating below 500 feet for the entire

¹ Standard E25.6.32 is intended to control the noise emissions from the regular and ongoing use of an airport or base. Typically, this involves an aircraft regularly taking off from the airport/ base, travelling to another location, then returning to land.

operation and will only be higher than this altitude on its way to and from the Site at the beginning and end of each day. Therefore, the traditional use of the 500/ 1000 feet thresholds to define the commencement and conclusion of the procedures cannot be used in this case. In this case it is necessary to define landing and take-off procedures using a different method.

To understand the landing and take-off procedures for this proposal, we have consulted directly with the Maunga Authority's helicopter operator to develop a detailed understanding of the location and duration of time that a helicopter will conduct take-off or landing procedures for the purpose of refuelling.

The following parameters have been used to define taking off or landing for this proposal:

- i. On any day when the helicopter is working, it will need to refuel up to 6 times, and therefore up to 12 movements will be required to land or take-off on any single day. A single movement comprises one landing or take-off; therefore each refuelling will require two movements.
- ii. The landing manoeuvre begins from the time the helicopter disconnects the 45m long line at the processing site, and lands on the ground adjacent to the processing site. This procedure lasts approximately 30- 60 seconds (depending primarily on wind conditions).
- iii. The helicopter will sit idling for approximately 15 minutes while it is refuelled.
- iv. The take-off procedure will last approximately 30-60 seconds, until the machine reaches an altitude of 75-90m (245- 295 ft) above the local ground level. Once the machine reaches that altitude, it will transition immediately back into the lifting and transport work.

3.0 The proposal

The Tūpuna Maunga Authority propose to remove up to 278 exotic trees that are established within the boundaries of Ōtāhuhu / Mt Richmond.

Treescape Arboricultural Consultants's tree removal methodology (May 2021) identifies the proposed tree removal and processing methods. These methods have been determined by feasibility, effectiveness, noise effects and cost, while seeking to avoid damage or disturbance of archaeological, cultural and historical features of the Maunga.

Tree removal methods include:

- Manual felling
- Machine assisted manual felling
- Manual dismantling
- Manual dismantling using rigging techniques

- MEWP assisted dismantling
- Crane assisted dismantling
- Helicopter assisted dismantling

Processing methods have also been determined on the basis of feasibility, effectiveness and cost. Processing methods include:

- Cut and leave
- Mulch on-site
- Mulch off-site
- Cut logs on-site
- Cut logs off-site

Processing machinery will include several wood chippers, chainsaws, excavators, a mobile crane, mobile work platform and trucks to remove material off site.

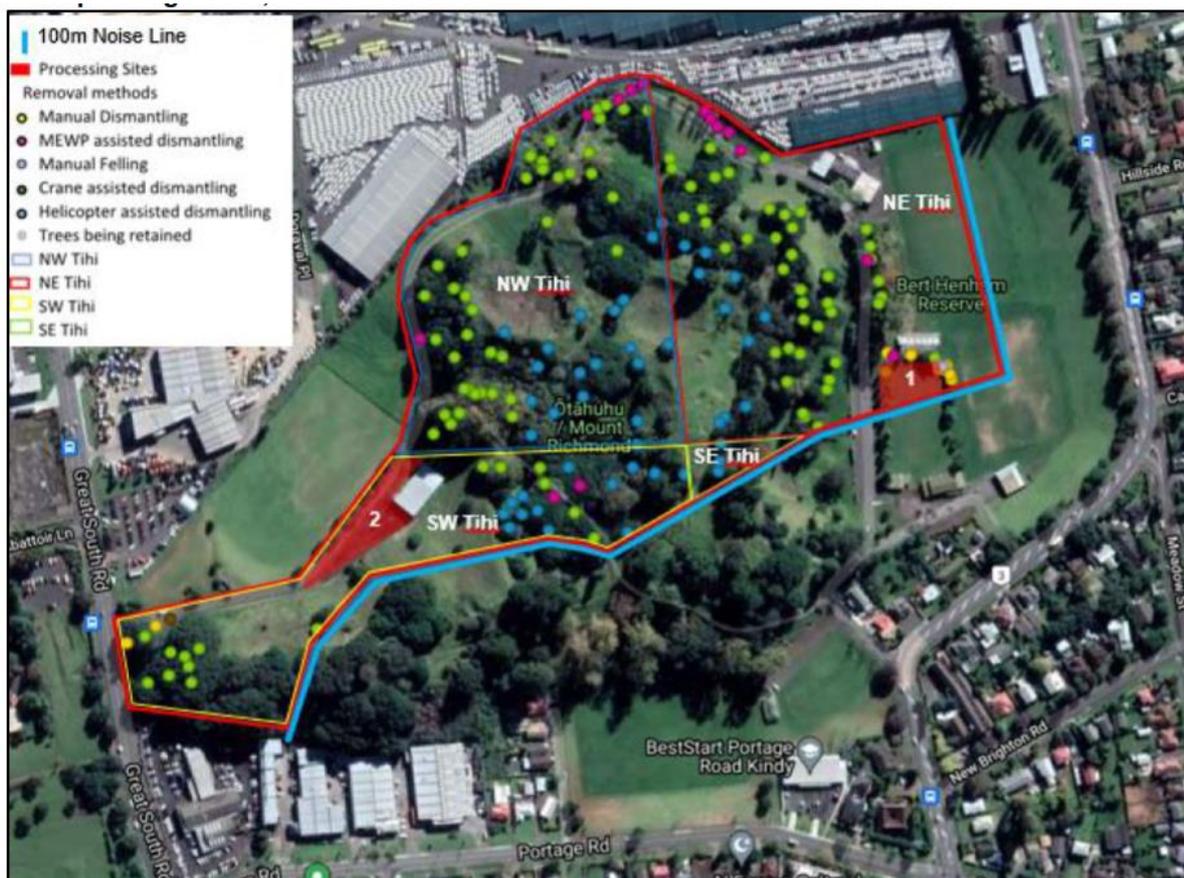


Figure 1 Tree location and tree removal methods (Treescape methodology May 2021)

Figure 1 identifies the proposed tree removal method by location and the locations of the two processing sites. Processing Site 1 is located on the Bert Henman Park sports field and Processing Site 2 occupies the hard stand area by the motor club. All helicopter landing and take-offs (for helicopter refuelling) will be undertaken from Processing Site 2 (the processing site most separated from residential receivers).

Minor processing sites (small mobile working sites comprising a crane, truck, chipper and excavator with rubber tracks) may also be utilised on the formed roads within the site on a short-term basis, provided they are more than 100m from any residential site.

Figure 1 displays the “100m noise line”. This line refers to the minimum separation distance required for tree removal and processing noise to comply with the project noise limit of 57 dB L_{Aeq} , when measured and assessed at any site in the Residential zone. Section 5 of this assessment provides further discussion on the project noise limit.

3.1 Project duration

The overall project will be completed in approximately 40 days (allowing for set up and pack down). Table 1 provides a breakdown of predicted timeframes for both helicopter and all other removal methods.

Table 1 Tree removal operational times (from May 2021 Treescape methodology)

	Helicopter removals	Other removal methods	Total
Northwest (NW) tihi, Sector 1	7 days	6 days	13 days
Southwest (SW) tihi, Sector 2	2 days	4 days	6 days
Northeast (NE) tihi, Sector 3	8 days	10 days	18 days
Southeast (SE), Sector 4	1 day	2 days	3 days
Total days	18	22	40

4.0 The Site and surrounding environment

Figure 1 displays the Site in the Open Space- Conservation Zone (OSCZ) with the Open Space –Sport and Active Recreation Zone (OSSAR) applying to Bert Henham Park on the eastern side of the Maunga and the western flanks.

The receivers surrounding the Site are zoned Business and Residential:

- i. The Site adjoins the Light Industry Zone (LIZ) to the north, north-west, south-west, part of the southern boundary with a small area zoned Business- Local Centre adjoining the north-east corner of the Site. The Heavy Industry Zone is located on the western side of Great South Road.
- ii. Several sites within the Residential Mixed Housing Suburban Zone adjoin the southern and south-eastern parts of the Site; however Port Road and Mount Wellington Highway separate the receivers within the Residential Terrace Housing and Apartment Buildings Zone from the Site.

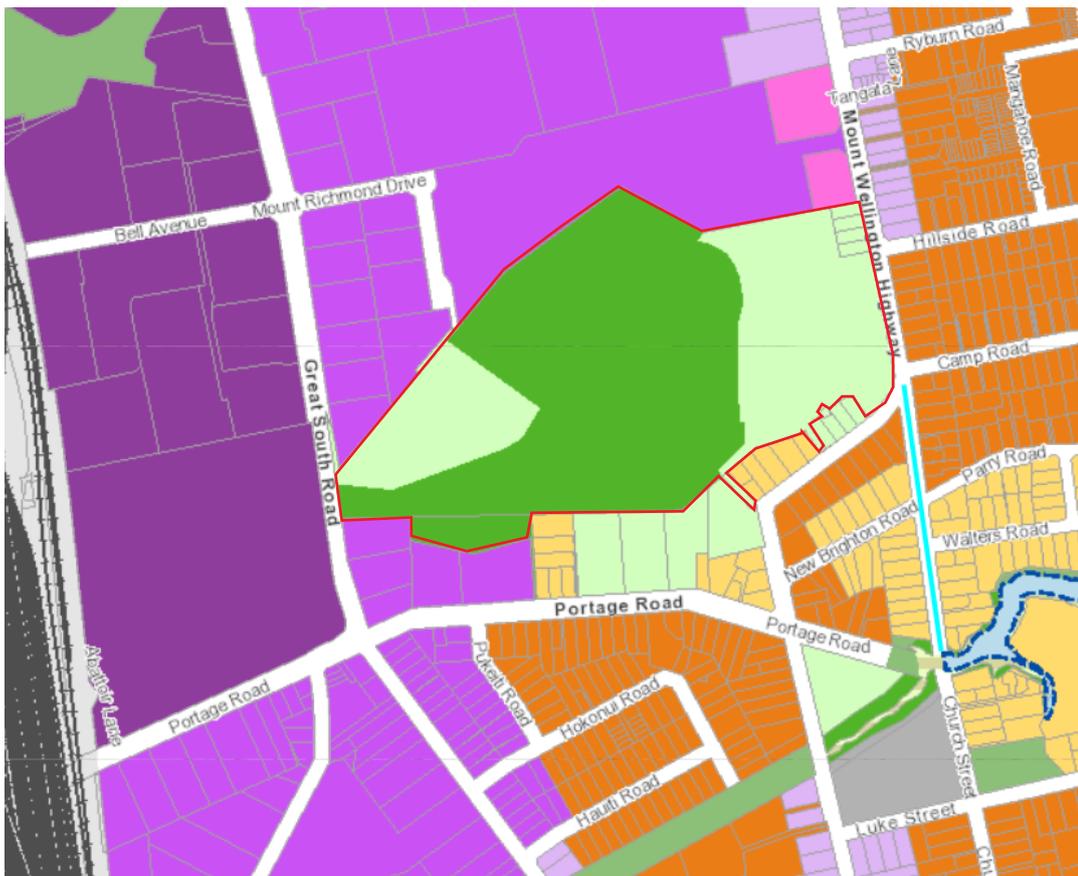


Figure 2 AUP Zoning of the Site (outlined in red) and surrounding environment

5.0 Noise standards applying to the proposal

5.1 Tree removal and processing noise

Chapter E25 of the AUP prescribes interface noise limits according to the zoning of the site generating the noise, and the sensitivity of the receiving zone. The Site is zoned Open Space with proximate receivers located in Business and Residential Zones (Figure 2).

Table 1 below provides a summary of the relevant noise standards and noise limits applying to the project. Table 1 identifies whether resource consent is required to exceed the noise

levels pursuant to Table E25.5.1 (A2), based on the minimum compliance distances provided in Table 2.

Zoning of work area	Zoning of receiver (and assessment location)	Relevant AUP standard	Noise level	Comment	Resource consent required to infringe noise levels (see Table 2 for distances)
Open Space Conservation Zone	Boundary of any site in the Light Industry Zone	E25.6.5 via E25.6.22	65 dB L _{Aeq}	Under the catch-all “all other zone interfaces” standard, the activity generating the noise must comply with the noise limits and standards of the zone at the receiving site*.	Works will comply
	Boundary of any site in the Heavy Industry Zone		70 dB L _{Aeq}		Works will comply
Open Space Conservation Zone	Boundary of a site in a Residential zone	E25.6.18	50 dB L _{Aeq}		Resource consent is sought to authorise noise levels of up to 57 dB L _{Aeq} at the closest receivers.
Open Space Sport and Active Recreation Zone	Boundary of any site in the Light Industry Zone	E25.6.5 via E25.6.22	65 dB L _{Aeq}	*as above	Works will comply
	Boundary of any site in the Heavy Industry Zone		70 dB L _{Aeq}		Works will comply
Open Space Sport and Active Recreation Zone	Boundary of a site in a Residential zone	E25.6.2 via E25.6.22	50 dB L _{Aeq}	E25.6.17 only controls recreational noise received in the residential zones. As the noise levels are not associated with recreational activity, application of the catch-all “all other zone interfaces” standard (E25.6.22) requires the activity to comply with the maximum noise levels in residential zones under E25.6.2.	Resource consent is sought to authorise noise levels of up to 57 dB L _{Aeq} at the closest receivers.

Zoning of work area	Zoning of receiver (and assessment location)	Relevant AUP standard	Noise level	Comment	Resource consent required to infringe noise levels (see Table 2 for distances)
Open Space Conservation Zone or Open Space Sport and Active Recreation Zone	Business Local Centre Zone	E25.6.7 via E25.6.22	60 dB L _{Aeq}	Under the catch-all “all other zone interfaces” standard, the activity generating the noise must comply with the noise limits and standards of the zone at the receiving site. Noise levels received in the Business- Local Centre Zone are controlled by E25.6.7.	Works will comply

Table 2: Minimum compliance distances

Noise Source	Sound Power Level (dBA)	Minimum separation distance to comply with 50 dB L _{Aeq} (at Residential sites)	Minimum separation distance to comply with 57 dB L _{Aeq} (at Residential sites)	Minimum separation distance to comply with 65 dB L _{Aeq} (at Light Industry sites)
Chainsaw (33% on time)	112	150m	100m	20m
Log chipper	114	320m	190m	75m
Crane	95	48m	23m	10m

We note that the activities on the site are dynamic and the assessment procedures are relatively complex. Our setback recommendations are inherently conservative. Many activities will likely comply at closer distances for much of the time.

5.1.1 Project noise standards

We have worked with the Project Team to identify the noise management measures that can be adopted to ensure the project noise levels from tree removals and processing works do not exceed 57 dB L_{Aeq}² at any residentially zoned receiver. This can be achieved through the adoption of the following measures:

² When assessed in accordance with E25.6.1

- Using only processing sites 1 and 2 (most separated from the residential receivers).
- Ensuring the use of chainsaws, mobile elevated work platforms and/or an excavator must be undertaken at least 100m from any residentially zoned site. This requirement has been incorporated into the project (as per the 100m noise line shown in the proposed tree removal plan).
- Adherence to the following operational noise management measures for works within Processing Site 1.

Processing Site 1		
Chippers	Crane	Excavator
No more than one log chipper can operate at any single time. The chipper must be at least 190m from nearest receiver (663 Mt Wellington Hwy). The chipper should be placed at the northern end of processing site 1 to meet this separation distance.	Can be placed anywhere on processing site 1	

5.2 Helicopter landing and take-offs

Noise from helicopter landings and take-offs will occur for between 6 and 12 minutes per day throughout the project. Noise from helicopter take-off and landing procedures are subject to E25.6.32:

E25.6.32 Noise levels for helicopters take-off or landing

The take-off or landing of a helicopter on any site except for emergency services must not exceed L_{dn} 50dB or 85dB L_{AFmax} measured within the boundary or the notional boundary of any adjacent site containing activities sensitive to noise and L_{dn} 60dBA within the boundary of any other site.

Styles Group have undertaken extensive noise modelling of the helicopter noise levels arising from landing and take-off procedures on various sites on the Maunga. This noise modelling has resulted in the project team electing to use Processing Site 2 for all helicopter landing and take-off procedures.

The noise modelling we have undertaken confirms that the use of Processing Site 2 will:

- Comply with a noise limits of 60 dB L_{dn} at all sites that do not contain an Activity Sensitive to Noise.
- Comply with a noise limit of limit of 50 dB L_{dn} and 85dB L_{AFmax} at all Activities Sensitive to Noise (in the Residential Zones).

The proposal is a permitted activity under E25.6.32.

5.3 New Zealand acoustics standards

Standard E25.6.1(1) *General Standards* of the AUP requires noise levels to be measured and assessed in accordance with the New Zealand Standards NZS 6801:2008 *Acoustics – Measurement of environmental sound* and NZS 6802:2008 *Acoustics – Environmental noise* except where more specific requirements apply.

All measurement and assessment of noise has been undertaken in accordance with the requirements of the abovementioned standards. Further discussion on the application of NZS 6802:2008 to our assessment is set out below.

5.4 Reasons for consent and AUP assessment criteria

The project has been designed to achieve sufficient separation distances such that tree removal and processing noise levels do not exceed 57 dB L_{Aeq} at any residential receiver. Resource consent is sought to exceed the noise limit of 50 dB L_{Aeq} applying at the closest Residential receivers (Figure 3) by up to 7 dB L_{Aeq} , over the 40 days of works.



Figure 3: Residential receivers where noise levels of up to 57 dB L_{Aeq} are predicted

The receivers are located at:

- 17-19, 15A, 15 and 57, 59, 61, 63, 65, 67 Portage Road
- 659, 661, 683, 663, 665, 667, 667A, 683-685 and 681 Mount Wellington Highway.

Table E25.5.1 (A2) specifies that activities that do not comply with a permitted activity standard require resource consent as a restricted discretionary activity.

E25.8 *Assessment – restricted discretionary activities* prescribes the following matters of discretion (E25.8.1) and assessment criteria (E25.8.2) that are relevant to the proposal:

- The effects on adjacent land uses particularly activities sensitive to noise; and
- Measures to avoid, remedy or mitigate the adverse effects of noise.
- Whether activities can be managed so that they do not generate unreasonable noise and vibration levels on adjacent land uses particularly activities sensitive to noise;
- The extent to which the noise or vibration generated by the activity:
 - i. will occur at times when disturbance to sleep can be avoided or minimised; and
 - ii. will be compatible with activities occurring or allowed to occur in the surrounding area; and
 - iii. will be limited in duration, or frequency or by hours of operation; and
 - iv. will exceed the existing background noise and vibration levels in that environment and the reasonableness of the cumulative levels; and
 - v. can be carried out during daylight hours, such as road works and works on public footpaths.
- Whether the measures to minimise the noise or vibration generated by the activity represent the best practicable option;
- The background noise at the affected receivers and the extent to which this is proposed to be exceeded;
- The frequency and duration of the exceedance.

6.0 Assessment of noise effects

Noise from tree removal and processing works is predicted to exceed the permitted noise limits by up to 7 dB L_{Aeq} intermittently and for a small portion of time throughout the 40 total days of works at any of the residential receivers identified in Section 5.4.

Due to the various tree removal locations within and around the perimeter of the Maunga, and the dynamic nature of works, it is not possible to determine the precise level of noise that will be experienced by each receiver during each stage of works. However the project has been designed to ensure tree removal and processing noise levels do not exceed 57 dB L_{Aeq} at any residential receiver. The level and duration of noise experienced at any one receiver will vary based on their distance from the works, the screening afforded by buildings and the Maunga itself, and the nature of works being undertaken at any one time.

The noise effects arising from the project will be influenced by the degree to which the noise of chainsaws and processing is audible above or intrusive relative to the other noise sources in the area.

The residential receivers that are predicted to receive noise levels exceeding 50 dB L_{Aeq} are directly adjacent to Portage Road and Mt Wellington Highway. The high traffic noise levels will continue to dominate the ambient noise levels at the receiver close to these roads while the works are undertaken.

Council has determined that the helicopter noise generated when the helicopter is over-flying is a permitted activity. The noise from the over-flying helicopter will generally be much louder than the noise of chainsaws and processing. For the duration of the project involving the use of a helicopter, the noise of chainsaws and processing work will range from inaudible to noticeable at times. The helicopter will be the dominant noise source by a significant margin and the noise from the rest of the project works will be negligible.

We also note that the Portage Road receivers are located at the immediate zone interface with the Light Industry Zone. The AUP authorizes noise levels of up to 55 dB L_{Aeq} at these receivers (via E25.6.19). The project noise levels will be experienced in the context of traffic noise and noise levels from the Light Industry Zone. In the context of the elevated noise environment along Portage Road, project noise levels of up to 57 dB L_{Aeq} (i.e. 2 dB above the permitted level) are unlikely to generate annoyance throughout the short duration of works.

The works will be undertaken between 9:00am - 4:30pm, therefore residents who are out during the day will not experience any adverse noise effects. Although the project will be completed in 40 days, individual receivers will only experience noise levels over 50dB L_{Aeq} for a portion of that time.

We have recommended a condition requiring that the receivers identified in Section 5.4 are provided with advanced written notice, ensuring that occupiers are aware of the very short duration of the works and enabling them to plan around the works if required. In our experience, setting expectations for the receivers is a critical factor in reducing the adverse noise effects. In our experience, the likelihood of complaints or adverse reaction can be significantly reduced if the receivers understand when the noise levels will be generated, for how long, and what to expect during the work.

We consider that the noise effects arising from the aspects of the project requiring consent (i.e. excluding the over-flying helicopter) are unlikely to generate any appreciable degree of annoyance and will be reasonable taking into account the short duration of works, the predicted noise levels and provision of advanced notice.

We have recommended the following conditions of consent.

6.1 Recommended conditions

We have worked with the Project Team to identify the noise management measures that can be adopted to ensure the project noise levels from tree removals and processing works do not

exceed 57 dB L_{Aeq}^3 at any residentially zoned receiver. This can be achieved through the adoption of the following measures.

Log chipping activities in processing site 1

1. The consent holder shall ensure no more than one log chipper operates at any one time in processing site 1. The chipper must be at least 190m from nearest receiver (663 Mt Wellington Highway). The chipper should be placed at the northern end of processing site 1 to meet this separation distance.

Helicopter landing and take-offs

2. Any helicopter landing or take-offs shall be undertaken from processing site 2
3. The noise from the landing, take-off and refuelling of the helicopter shall comply with a noise limit of L_{dn} 50dB or 85dB L_{AFmax} measured within the boundary or the notional boundary of any adjacent site containing activities sensitive to noise and L_{dn} 60dBA within the boundary of any other site, when measured and assessed in accordance with condition 3.
4. Any noise level measurements undertaken to determine compliance with condition shall be based on the definitions of landings, take-offs and refuelling procedures set out in the application documents. Those definitions are:
 - a) The landing procedure beginning from the time the helicopter disconnects its load over the processing site, and ending when the machine lands on the ground adjacent to the processing site.
 - b) The noise measurement then includes the period when the helicopter is on the ground for refuelling.
 - c) The take-off procedure beginning when the machine lifts off the ground, and ends when the machine reaches an altitude of 75-90m (245- 295 ft) above the local ground level. Once the machine reaches that altitude, it will transition immediately back into the lifting and transport work and the noise measurement shall cease.
 - d) The noise level of the full procedure in (a) to (c) shall be aggregated into one Sound Exposure Level measurement for use in the calculation to derive the L_{DN} level for comparison with condition 2 in accordance with the requirements of NZS6801:2008.
 - e) Any reference in NZS6801:2008 to other standards for the measurement and assessment of helicopter noise shall be ignored.

³ When assessed in accordance with E25.6.1

Communications

5. The Communications Plan shall require that owners and occupants of the neighbouring buildings* are advised of the works in writing at least ten (10) days prior to the commencement of works on site.

The Plan shall set out a brief overview of the tree works, the expected duration, the mitigation measures to be implemented, the working hours, and a contact phone number for any concerns regarding noise.

*The neighbouring buildings that shall be provided with written notice are: 17-19, 15A, 15 and 57,59 61, 63, 65, 67 Portage Road and 659, 661, 683, 663, 665, 667, 667A, 683-685 and 681 Mount Wellington Highway.

7.0 Conclusion

Styles Group have assessed the potential noise effects of the proposed tree removal works on Ōtāhuhu / Mount Richmond.

Our assessment demonstrates that the noise from tree removal and processing noise will generate noise levels of up to 57 dB L_{Aeq} during the 40 days of works. These noise levels are predicted at several receivers adjacent to the Maunga, on Portage Road and Mt Wellington Highway. The project will comply with the permitted noise limits at all other receivers. The noise from helicopter landing and take-offs will comply with E25.6.32 *Noise levels for helicopters take-off or landing* at all receivers.

We have recommended that the Portage Road and Mt Wellington Highway receivers are provided with advanced notice of the works.

We consider that the noise effects arising from the aspects of the project requiring consent (i.e. excluding the over-flying helicopter) are unlikely to generate any appreciable degree of annoyance and will be reasonable taking into account the short duration of works, the predicted noise levels and provision of advanced notice.

Appendix A Glossary of terms

Noise	A sound which serves little or no purpose for the exposed persons and is commonly described as ‘unwanted sound’. The definition of noise includes vibration under the Resource Management Act.
Best practicable option	Defined in section 2 of the Resource Management Act as: in relation to a discharge of a contaminant or an emission of noise, means the best method for preventing or minimising the adverse effects on the environment having regard, among other things, to— a. the nature of the discharge or emission and the sensitivity of the receiving environment to adverse effects; and b. the financial implications, and the effects on the environment, of that option when compared with other options; and c. the current state of technical knowledge and the likelihood that the option can be successfully applied.
dB (decibel)	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).
A-weighting	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.
$L_{Aeq(t)}$ (dB)	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.
L_{AFmax} (dB)	The maximum A-weighted sound pressure level recorded during the measurement period using a fast time-weighting response.
Noise rating level	A derived noise level used for comparison with a noise limit.
NZS 6801:2008	N.Z. Standard NZS 6801:2008 Acoustics – Measurement of environmental sound.
NZS 6802:2008	N.Z. Standard NZS 6802:2008 Acoustics – Environmental noise.
NZS 6803:1999	N.Z. Standard NZS 6803:1999 Acoustics – Construction noise.
The Act	The Resource Management Act 1991.
s16	Section 16 of the Act 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”.