8. Appendix F – Acoustic Assessment
Assessment of Noise Effects

Mixed Industrial Development at 28 Inlet Road, Takanini
Quality Information

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<th>Details</th>
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<td>Claire Drewery Associate Director - Acoustics</td>
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1.0 Introduction

AECOM have been engaged to provide acoustic advice in relation to a Resource Consent Application for a proposed 16 unit mixed industrial unit development at 28 Inlet Road, Takanini. Each unit will be two levels and consist of light industrial use on the ground floor, and either commercial or residential use on the first floor. The four units facing Inlet Road will be commercial on the first floor.

This report is based on architectural drawings prepared by Maxwell Project Management, entitled “INLET POINT DEVELOPMENT” and dated 13 March 2017; and information provided by HFT Limited.

2.0 Site and Surrounding Area

The application site is located at 28 Inlet Road, Takanini and is zoned Business – Light Industry under the Auckland Unitary Plan Operative In Part (“AUP(OiP)”). The area to the north and east is also zoned Business – Light Industry. Directly adjoining to the site to the west is an Open Space – Informal Recreation Zone while further to the west is an area zoned Residential – Mixed Housing Suburban. The site and surrounding area zoning is shown below in Figure 1.

Figure 1 Auckland Unitary Plan zoning and site location

The Waste Management Papakura Refuse Transfer Station adjoins the site to the north (at 25 Inlet Road), while the land to the southeast (at 26 Inlet Road) is undeveloped. There are a number of light industrial sites to the east on the opposite side of Inlet Road.
3.0 Acoustic Criteria

The site is zoned Business – Light Industry under in the AUP(OiP) and as such the following rule applies to noise from the site received at or within other sites zoned Business – Light Industry:

<table>
<thead>
<tr>
<th>Time</th>
<th>Business – Light Industry Zone</th>
</tr>
</thead>
<tbody>
<tr>
<td>All times</td>
<td>65 dB $L_{Aeq}$</td>
</tr>
</tbody>
</table>

The same limit applies to noise from surrounding properties zoned Business – Light Industry received at the proposed development site. The Waste Management site to the north is subject to additional Resource Consent conditions (7528:WPTPGEN, Conditions 6 to 8) in relation to noise received at residential sites to the west. Noise levels are required to comply with a limit of 55 dB $L_{A10}$ Monday to Friday 8am to 4pm and Saturday 8am to 12pm; and 45 dB $L_{A10}$ at all other times. The consent conditions are appended in full in Appendix C. In practice, these noise limits are likely to restrict noise emissions from the facility received at 28 Inlet Road to significantly lower levels than would otherwise be permitted under the AUP(OiP).

The Business – Light Industry Zone rules do not include an internal noise limit for noise-sensitive development, presumably because this type of development is not generally anticipated in this zone. In other zones where high noise levels may be expected (for example Business – City Centre Zone Business – Metropolitan Centre Zone Business – Town Centre Zone and Business – Mixed Use Zone), new buildings must be designed to achieve maximum internal noise levels in noise sensitive spaces such as bedrooms and living rooms within dwellings.

Rule E25.6.10.1 requires new noise sensitive uses for new noise sensitive spaces in Business – City Centre Zone Business – Metropolitan Centre Zone Business – Town Centre Zone and Business – Mixed Use Zone to be designed such that the internal noise limits described in Table 2 are not exceeded.

<table>
<thead>
<tr>
<th>Unit affected</th>
<th>Time</th>
<th>Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bedrooms and sleeping areas</td>
<td>Between 11pm and 7am</td>
<td>35 dB $L_{Aeq}$</td>
</tr>
<tr>
<td></td>
<td></td>
<td>45 dB at 63 Hz $L_{eq}$</td>
</tr>
<tr>
<td></td>
<td></td>
<td>and</td>
</tr>
<tr>
<td></td>
<td></td>
<td>40 dB at 125 Hz $L_{eq}$</td>
</tr>
<tr>
<td>Other noise sensitive spaces</td>
<td>At all other times</td>
<td>40 dB $L_{Aeq}$</td>
</tr>
</tbody>
</table>

We recommend that these limits are applied to residential units within the proposed development. This is expected to ensure that the occupants are afforded a similar level of health and amenity protection to those in other Business Zones. These limits are also expected to mitigate potential reverse sensitivity effects on neighbouring light industrial activities.
4.0 Site Measurements

4.1 Measurement Methodology
Unattended noise measurements were undertaken during a period of 125 hours, from Friday 16 December to Tuesday 20 December 2016. A Svantek SVAN 957 Type 1 Sound Level Meter (Serial Number 20614) was used to perform the measurements. The sound level meter was factory calibrated on 28/07/2015, and was verified to be compliant with all class 1 requirements.

Noise measurements were performed in general accordance with NZS 6801:1991, 1.5 metres above ground level at the location shown in Figure 2.

Noise sources observed at the time the logger was set up included distant traffic on State Highway 1, occasional refuse truck movements on Inlet Road, wind induced noise, and some noise from nearby light industrial sites including the waste management refuse station at 25 Inlet Road.

Weather during the measurement period was clear, with wind speeds generally below 3m/s.

Figure 2 Noise measurement location

4.2 Measured Noise Levels
$L_{Aeq}$, $L_{A(max)}$ and $L_{90}$ noise levels were obtained during the 5 day measurement period, resulting in a total of 500 measurements during the measurement period.
Average daytime and night time measured noise levels are shown in Table 3 below.

**Table 3  Measured Noise Levels**

<table>
<thead>
<tr>
<th>Date / day</th>
<th>dB $L_{Aeq}(0700-2300)$ (Daytime)</th>
<th>dB $L_{Aeq}(2300-0700)$ (Night-time)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Friday 16th December</td>
<td>-</td>
<td>49</td>
</tr>
<tr>
<td>Saturday 17th December</td>
<td>56</td>
<td>47</td>
</tr>
<tr>
<td>Sunday 18th December</td>
<td>53</td>
<td>52</td>
</tr>
<tr>
<td>Monday 19th December</td>
<td>59</td>
<td>52</td>
</tr>
<tr>
<td>Tuesday 20th December</td>
<td>58</td>
<td>52</td>
</tr>
</tbody>
</table>

Graphs of continuous $L_{Aeq}$, $L_{AFmax}$ and $L_{90}$ noise levels measured at 15 minute intervals can be found in Appendix B.

The measurements show that noise levels received at the site were significantly less than the limit of 65 dB $L_{Aeq}$ permitted in the AUP(OiP) during the measurement period, particularly at night time. However, proposed residential units will be designed to meet the internal noise level criteria assuming neighbouring sites could generate maximum permitted noise levels at the site boundaries in the future. This is expected to ensure that internal noise levels are significantly less than maximum recommended limits based on the current noise environment, and allows for potential increases in noise level.

### 5.0 Acoustic Insulation

The façade construction for proposed residential units has been determined based on maximum permitted noise emissions from neighbouring sites as described above and typical noise spectra obtained from measurement results.

We note that a 3m high precast concrete wall is proposed along the northern boundary with Waste Management, extending from the eastern façade of Unit 1 to Inlet Road. We understand that the wall was requested by Waste Management to provide a visual and acoustic barrier between their site and the proposed development. The wall is expected to provide some reduction to noise from the Waste Management site received at the ground floor level of Units 1 to 7, and is also expected to result in lower noise levels within outdoor areas. The proposed wall will provide a negligible reduction to sound received at the first floor façade of these units.

No reliance is placed on either the proposed wall or the existing Waste Management resource consent conditions in terms of mitigating noise from this site within habitable areas of the proposed residential units. The proposed façade construction shown below will achieve the internal noise levels shown in Table 2 assuming all neighbouring sites produce the maximum allowable noise level (65 dB $L_{Aeq}$ at all times) under the AUP(OiP) rules for Business – Light Industrial zoned sites, without any additional physical or other mitigation. In practice, the proposed wall and consent conditions associated with the Waste Management site are expected to result in significantly lower noise levels received within the northern portion of the subject site, and therefore compliance with the internal noise limits in Table 2 is expected to be achieved by a comfortable margin.
Based on the above, the recommended façade construction required to achieve proposed internal noise criteria is detailed in Table 4 below:

### Table 4  Recommended façade construction

<table>
<thead>
<tr>
<th>Façade element</th>
<th>Bedrooms</th>
<th>Other habitable rooms</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Façade Type 1</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Glazing</td>
<td>10.38mm acoustic laminate or 10.38mm acoustic laminate / 12mm air space / 6mm float glass</td>
<td>6.38mm acoustic laminate or 6.38mm acoustic laminate / 12mm air space / 6mm float glass</td>
</tr>
<tr>
<td>Walls</td>
<td>150mm precast concrete with internal strapping and wall lining</td>
<td>150mm precast concrete with internal strapping and wall lining</td>
</tr>
<tr>
<td>Roof / Ceiling*</td>
<td>0.55mm Colorsteel / R1.8 Ceiling insulation / 2 x 13mm Gib Noiseline ceiling</td>
<td>0.55mm Colorsteel / R1.8 Ceiling insulation / 2 x 13mm Gib Noiseline ceiling</td>
</tr>
<tr>
<td><strong>Façade Type 2</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Glazing</td>
<td>6.38mm acoustic laminate or 6.38mm acoustic laminate / 12mm air space / 6mm float glass</td>
<td>Standard single or double glazing</td>
</tr>
<tr>
<td>Walls</td>
<td>150mm precast concrete with internal strapping and wall lining</td>
<td>150mm precast concrete with internal strapping and wall lining</td>
</tr>
</tbody>
</table>
6.0 Operational Noise

The proposed development may generate noise levels from vehicle movements, light industrial activity and external mechanical plant associated with ventilation.

Whilst the full details of the above are not yet known, it is expected that any noise generated will comply with the Business – Light Industry Zone noise limit of 65 dB L_Aeq when received at other sites, by a comfortable margin.

7.0 Construction Noise and Vibration

Construction activities are expected to be typical for a development of this scale and type, and are not likely to include plant or operations which generate significant levels of noise or vibration.

It is expected that construction activities will comply with the relevant noise and vibration limits under Rule E25.6.27 and E25.6.30 of the AUP(OiP) provided they are managed appropriately and restricted to daytime hours only (7.00am to 8.00pm).

8.0 Conclusions

Noise effects associated with a proposed live-work development at 28 Inlet Road, Takanini have been considered, including potential reverse sensitivity effects on neighbouring light industrial land uses. Internal noise level criteria have been proposed based on rules for other zones under the AUP(OiP).

Measurements have been undertaken to determine the current levels of environmental noise at the site. Based on the measurements, noise levels are lower than is permitted under the AUP(OiP) at the site. However, residential units have been designed based on the maximum permitted level. This is expected to ensure that internal noise levels comply with the proposed criteria by a substantial margin and allows for future growth in light industrial activity in the surrounding area.

A façade design is recommended for dwellings based on the proximity of each unit to the northern, eastern and southern boundaries where the highest external noise levels could be received. This includes mechanical ventilation to allow for external doors and windows to be closed for noise relief in all bedrooms and other habitable rooms. The purpose of this design at Resource Consent stage is to demonstrate that it is practicable to achieve satisfactory internal noise levels. At later design stages alternative constructions may be adopted based on the advice of a suitably qualified acoustic professional.

Whilst the full details of operational and construction activities and noise sources are not known at this stage, it is expected that noise from these sources can easily comply with the appropriate limits.
Appendix A

Acoustic Nomenclature
Appendix A  Acoustic Nomenclature

$\text{dB(A)}$  A-weighted decibels. The ear is not as effective in hearing low frequency sounds as it is hearing high frequency sounds. That is, low frequency sounds of the same dB level are not heard as loud as high frequency sounds. The sound level meter replicates the human response of the ear by using an electronic filter which is called the “A” filter. A sound level measured with this filter switched on is denoted as dB(A). Practically all noise is measured using the A filter. The sound pressure level in dB(A) gives a close indication of the subjective loudness of the noise.

$L_{A\text{eq}(T)}$  The Time-Average ‘A’-weighted Sound Pressure Level (previously known as Equivalent Continuous Sound Pressure Level). The Time-Average A-Weighted Sound Press Level is the constant value of A-weighted Sound Pressure Level for a given period (T) that would be equivalent in sound energy to the time-varying A-Weighted Sound Pressure Level measured over the same period. [Unit: dB(A)].

$L_{A\text{max}(T)}$  The maximum sound pressure level measured over a given period (T). [Unit: dB(A)].

STC Sound Transmission Class. A single figure rating, in decibels, for the airborne sound insulation of a building element. A higher value indicates better insulation.

$L_{90(T)}$  The sound pressure level that is exceeded for 90% of the time (T) for which the given sound is measured.
Appendix B

Measurement Results
Appendix B  Measurement Results

LAeq, LAFmax & L90 Logged at 28 Inlet Road on 16th - 22nd December 2016

![Graph showing noise levels from 16/12/2016 to 21/12/2016 for various times of day. The graph includes data for LAeq, LAFmax, and L90. The y-axis represents noise level in dBA, ranging from 0 to 100, while the x-axis represents date and time from 9:41 a.m. to 11:26 p.m. on each day of the week.]
Appendix C

Waste Management
Land Use Consent Conditions