

Subject	Operational Noise Statement for Whangaparāoa Road Intersection OP		
Date	12 July 2023	Document No.	MEMO-06020-014
Prepared by	s 9(2)(a)	Reviewed by	s 9(2)(a)
Prepared for	Outline Plan of Works		

1 Introduction

This memo provides a summary of the findings and assumptions of the operational road traffic noise assessment in relation to the O Mahurangi Penlink Project (the Project), from CH6700 onwards, in support of the Whangaparāoa Intersection Outline Plan of Works.

This memo does not provide assessment for the Project's Main Alignment.

2 Designation conditions

The operational noise designation conditions applicable for the Whangaparāoa Road Intersection are replicated in **Table 2.1**.

Table 2.1: Designation consent conditions – operational noise

Condition	Content																	
3.5	<p>The road alignment shall be designed to achieve the following noise standards:</p> <p>a) For the properties identified in Table B - the relevant traffic noise design limit contained in Table B</p> <p>b) For all other dwellings, the relevant noise standards contained in Transit New Zealand's Draft Guidelines for the Management of Traffic Noise for State Highway Improvements, December 1999</p>																	
	Table B – Traffic Noise Design Limits																	
	<table border="1"> <thead> <tr> <th>Location</th> <th>Traffic Noise Design Limits Leq (24 hours)</th> </tr> </thead> <tbody> <tr> <td>Dwelling A (at the western end of the proposed road as indicated on the AEE document) (1695 East Coast Road)</td> <td>65 dBA</td> </tr> <tr> <td>All other existing* dwellings west of the Wēiti River</td> <td>55 dBA</td> </tr> <tr> <td>Dwelling 1 on Lot 1 DP 138956 (43 Cedar Tce)</td> <td rowspan="4">55 dBA</td> </tr> <tr> <td>Dwelling 2 on Lot 4 DP 64380 (45 Cedar Tce)</td> </tr> <tr> <td>Dwelling 3 on Lot 6 DP 64380 (41 Cedar Tce)</td> </tr> <tr> <td>Dwelling 4 on Lot 7 DP 64380 (39 Cedar Tce)</td> </tr> <tr> <td>Dwellings at 7 to 37 Cedar Terrace inclusive</td> <td>62 dBA</td> </tr> <tr> <td>Dwellings at 39A – 39H Cedar Terrace inclusive</td> <td>57 dBA</td> </tr> <tr> <td>All existing* dwellings on Whangaparāoa Rd</td> <td>65 dBA or ambient (whichever is greater)</td> </tr> </tbody> </table>	Location	Traffic Noise Design Limits Leq (24 hours)	Dwelling A (at the western end of the proposed road as indicated on the AEE document) (1695 East Coast Road)	65 dBA	All other existing* dwellings west of the Wēiti River	55 dBA	Dwelling 1 on Lot 1 DP 138956 (43 Cedar Tce)	55 dBA	Dwelling 2 on Lot 4 DP 64380 (45 Cedar Tce)	Dwelling 3 on Lot 6 DP 64380 (41 Cedar Tce)	Dwelling 4 on Lot 7 DP 64380 (39 Cedar Tce)	Dwellings at 7 to 37 Cedar Terrace inclusive	62 dBA	Dwellings at 39A – 39H Cedar Terrace inclusive	57 dBA	All existing* dwellings on Whangaparāoa Rd	65 dBA or ambient (whichever is greater)
Location	Traffic Noise Design Limits Leq (24 hours)																	
Dwelling A (at the western end of the proposed road as indicated on the AEE document) (1695 East Coast Road)	65 dBA																	
All other existing* dwellings west of the Wēiti River	55 dBA																	
Dwelling 1 on Lot 1 DP 138956 (43 Cedar Tce)	55 dBA																	
Dwelling 2 on Lot 4 DP 64380 (45 Cedar Tce)																		
Dwelling 3 on Lot 6 DP 64380 (41 Cedar Tce)																		
Dwelling 4 on Lot 7 DP 64380 (39 Cedar Tce)																		
Dwellings at 7 to 37 Cedar Terrace inclusive	62 dBA																	
Dwellings at 39A – 39H Cedar Terrace inclusive	57 dBA																	
All existing* dwellings on Whangaparāoa Rd	65 dBA or ambient (whichever is greater)																	
	<i>*Existing at 22 September 2015</i>																	
	Note: The assessment point for Table B is 1m in front of the most exposed point on the facades of the dwellings.																	

Condition	Content
3.6	In addition to the standards in Table B above, the road alignment shall be designed with the appropriate noise mitigation measures to achieve compliance with a single event noise limit of 78 dBA Lmax at the facade of any residential building situated within 12 metres from the new road carriageway. This shall not apply to residential buildings currently located within 12 metres of the existing road carriageway. Explanation: This is in accordance with the Transit New Zealand Draft Guidelines for the Management of Road Traffic Noise, 1994
3.7	If the adoption of the BPO for noise mitigation within the road corridor is insufficient to meet the Design Limits in condition 3.5, then prior to completion of the road, the Requiring Authority (or its agents) shall: <ol style="list-style-type: none"> With the agreement of the owner of the dwelling and if so required by them, provide insulation (and, if required mechanical ventilation and provision for adequate thermal comfort where windows must be closed) to all living rooms (including kitchens) and bedrooms, to ensure that an internal criterion of 40 dBA Leq (24 hours) is not exceeded. This offer and mitigation shall be applied in conjunction with the adoption of the BPO for minimisation of noise in the road corridor; or If it is impracticable to design mitigation to achieve this internal criterion then the Requiring Authority (or its agents) shall, with the agreement of the owner, and at a price not exceeding market value, purchase the property.

2.1 Whangaparāoa Road dwellings

Where dwellings along Whangaparāoa Road have an ambient noise level greater than 65 dB LAeq(24h) (designation condition 3.5), then ambient levels, as visually represented in **Figure 2-1**, have been used (as taken from the NoR technical noise assessment¹ Appendix B Table 1). These ambient levels were measured in 2014 when the Designation was approved. Urban growth in the area since then will likely have increased existing ambient noise levels due to increased road traffic volumes. It is, therefore, considered a conservative approach to assess against these levels.



Figure 2-1 Whangaparāoa Road Dwellings Designation Noise Limits

¹ Penlink – Assessment of Acoustic Effects, Ep 002 R04 2014038A, Marshall Day Acoustics, 6 November 2014

3 Assessment approach

An assessment of road traffic noise for the 100% design has been carried out in accordance with Waka Kotahi “Guide to assessing road traffic noise using NZS 6806:2010 for state highway asset improvement projects”. Designation noise limits have been assessed at 1 m from the most exposed point on the façades of the dwellings (as required by the Transit Guidelines referenced in designation condition 3.5), and modelling has been carried out using best practice as set out in the Waka Kotahi guide.

Noise levels have been predicted using sound propagation modelling software, SoundPLAN version 8.2. The software enables noise contours and façade noise maps to be produced and location specific noise levels to be calculated within a 3-D model of the Project site and local area. The road traffic noise model employs the “Calculation of Road Traffic Noise” (CRTN) algorithm, as recommended in NZS 6806:2010.

The propagation of road traffic noise is affected by multiple factors which the model takes into account:

- Geometric divergence;
- Atmospheric adsorption;
- Ground effect;
- Reflection from surfaces; and
- Screening by obstacles (buildings and topography).

3.1 Modelling methodology

Table 3.1: Road traffic noise modelling parameters

Parameter	Setting / Source
Software	SoundPLAN 8.2
Algorithm	CRTN
Reflection	CRTN
Parameter	L _{Aeq} (24h)
Ground absorption	0.6 for urban areas; 0 for water; 0.8 for grassed areas
Receiver height	1.5 m above height of each floor
Noise contour grid	1.5 m height, 5 m resolution
Receivers and grid position	1.0 m from façade*

* As per Designation conditions

3.2 Road traffic data

All traffic data, including modelled AADT movements, percentage of heavy vehicles (%HCV) and posted speed limit has been provided to the Alliance by Waka Kotahi. NZS 6806:2010 and Transit Guidelines specify noise levels to be assessed based on forecast traffic flows at least 10 years after intended open year/completion of the road (design year). The traffic volumes used for the noise assessment are based on the 2038 data (Table 3.2), which is 12 years after intended opening date of 2026.

The 24-h AADT entered into the CRTN (based on 18-h traffic) results in a +0.2 dB conservative modelling prediction.

Table 3.2: AADT flows - 2038

Section	AADT Tolled 2038		% HCV	Posted Speed
	East Bound	West Bound		
Whangaparāoa Road (North)	5,500	6,100	5 %	50 km/h
Whangaparāoa Road (South)	12,600	12,800	5 %	50 km/h

3.3 Road surfaces

The road surface for the base design has been modelled as per the minimum requirements with agreed departures as per the design philosophy statement.

Do minimum road surface for the Whangaparāoa Road Intersection have been modelled as asphaltic concrete (AC14) at the Whangaparāoa Road Intersection from CH 6700 on the main alignment.

Surface corrections relative to asphaltic concrete (AC10) appropriate for New Zealand were applied in accordance with Transit Research Report 28² and the Waka Kotahi Guide to State Highway Road Surface Noise³. The surface corrections for cars and heavy vehicles have been included using the relevant equation in the Waka Kotahi Guide.

3.4 Road alignments

Road alignments for existing and new roads were provided by the Project team as centrelines and widths for each carriageway section. Gradients have been calculated by SoundPLAN. The two lane carriageway has been modelled separately as two lanes in single directions to represent the design. Connecting roads with less than 2,000 AADT have not been modelled (such as Wiriana Place).

3.5 Topography

Topographic contours for the existing terrain have been provided from the Project team at 1 m resolution. Contours for the design scenarios were obtained from the Project team for the assessment area and joined with the existing contours for the surrounding areas. The gradients automatically calculated by the noise software have been manually disabled for downhill sections.

3.6 Buildings

The footprints for all buildings, building usage and all other structures within 200 m of the roads have been obtained from the LINZ database. All buildings have been modelled at 5 m uniform height for single storey buildings, 7 m for two storey buildings and 9 m for three storey buildings. Buildings were identified during site visits and using Google Street View. The number of floors was determined assuming 2.8 m height per floor. Low auxiliary buildings that potentially block the direct line of sight between the carriageway and the dwelling are modelled at 3.5 m uniform height.

Noise levels were calculated at 1 m from the centre of each façade, 1.5 m above each floor height with the stated noise levels being the highest of any façade.

4 Predicted noise levels

Predicted noise levels for PPFs along the Whangaparāoa Intersection within 200m of the carriageway are provided in façade noise maps in **Figure 5-1** and tabulated in **Table 5.1**.

Grid noise maps are modelled at 1.5 m above ground level in line with noise survey measurements undertaken in accordance with NZS 6801:2008 to enable comparison. Where buildings are more than one storey high, predicted façade levels may be greater than those shown on the grid noise contours.

² Research Report 28. Traffic noise from uninterrupted traffic flows, Transit, 1994.

³ NZTA Guide to state highway road surface noise, version 1.0, Jan 2014

5 Conclusions

The 100% roading design has been modelled and assessed against the Designation noise limits using 2038 traffic flows and the do minimum road surface. Predicted noise levels at PPFs along Whangaparāoa Intersection from CH 6700 onwards are predicted to comply with the applicable designation noise limits (**Figure 2-1**).

No mitigation options are required along the Whangaparāoa intersection.

Designation condition 3.6 does not apply to the Project design as there are no receivers located within 12 m of the new road alignment.

Proactively released

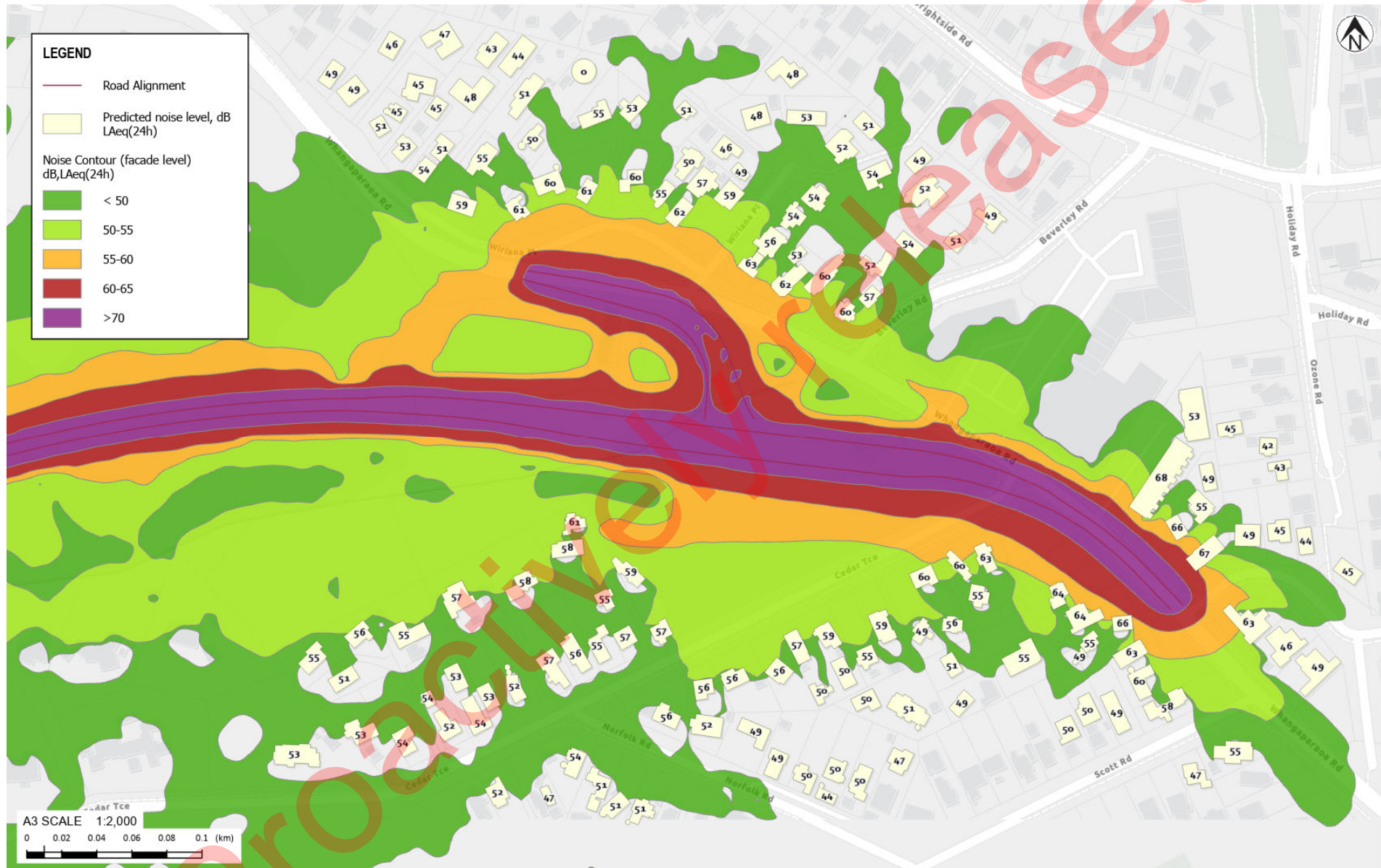


Figure 5-1 Predicted façade noise level – Whangaparāoa Intersection

Table 5.1 Predicted noise levels due to Project for Whangaparāoa Intersection at PPFs (façade level)

Address	Noise Limit, dB $L_{Aeq}(24h)$	Do Minimum scenario, dB $L_{Aeq}(24h)$
2 Cedar Terrace	67	64
4 Cedar Terrace	66	63
6A Cedar Terrace	65	55
6 Cedar Terrace	65	60
7A Cedar Terrace	62	57
7B Cedar Terrace	62	59
8 Cedar Terrace	62	55
9B Cedar Terrace	62	61
9B Cedar Terrace	62	58
10B Cedar Terrace	62	49
10A Cedar Terrace	62	51
11 Cedar Terrace	62	57
11 Cedar Terrace	62	55
12 Cedar Terrace	65	60
12A Cedar Terrace	62	56
13 Cedar Terrace	62	55
14 Cedar Terrace	62	49
15 Cedar Terrace	62	56
16C Cedar Terrace	62	51
16C Cedar Terrace	62	50
17 Cedar Terrace	62	57
18 Cedar Terrace	62	59
19 Cedar Terrace	62	58
20 Cedar Terrace	62	55
21 Cedar Terrace	62	57
22 Cedar Terrace	62	59
23 Cedar Terrace	62	52
25 Cedar Terrace	62	53
26 Cedar Terrace	62	56
2/27 Cedar Terrace	62	54
28 Cedar Terrace	62	56
29 Cedar Terrace	62	52
30 Cedar Terrace	62	56
31 Cedar Terrace	62	55
32 Cedar Terrace	62	56
33C Cedar Terrace	62	56
33B Cedar Terrace	62	55

Address	Noise Limit, dB $L_{Aeq(24h)}$	Do Minimum scenario, dB $L_{Aeq(24h)}$
33A Cedar Terrace	62	51
35 Cedar Terrace	62	54
36 Cedar Terrace	62	47
37 Cedar Terrace	62	53
39A Cedar Terrace	57	53
40B Cedar Terrace	62	52
3 Hiwi Crescent	65	49
4/602 Hiwi Crescent	68	46
5 Hiwi Crescent	65	45
7 Hiwi Crescent	65	44
3 Norfolk Road	62	47
5 Norfolk Road	62	50
7 Norfolk Road	62	44
7 Norfolk Road	62	50
9 Norfolk Road	62	50
11 Norfolk Road	62	49
12 Norfolk Road	62	51
13 Norfolk Road	62	49
14 Norfolk Road	62	51
15 Norfolk Road	62	52
1/16 Norfolk Road	62	51
18 Norfolk Road	62	54
7B Ozone Road	65	45
9 Ozone Road	65	42
11 Ozone Road	65	43
14 Ozone Road	65	45
1 Scott Road	67	58
3 Scott Road	65	49
4 Scott Road	65	47
5 Scott Road	65	50
7 Scott Road	65	50
522A Whangaparāoa Road	65	49
524A Whangaparāoa Road	65	49
526 Whangaparāoa Road	65	47
528 Whangaparāoa Road	65	51
529 Whangaparāoa Road	65	53
1/532 Whangaparāoa Road	65	48
2/532 Whangaparāoa Road	65	45

Address	Noise Limit, dB $L_{Aeq(24h)}$	Do Minimum scenario, dB $L_{Aeq(24h)}$
3/532 Whangaparāoa Road	65	53
4/532 Whangaparāoa Road	65	54
5/532 Whangaparāoa Road	65	51
534 Whangaparāoa Road	65	43
536 Whangaparāoa Road	65	44
538 Whangaparāoa Road	65	51
540 Whangaparāoa Road	67	59
540A Whangaparāoa Road	65	55
542A Whangaparāoa Road	65	50
544 Whangaparāoa Road	65	61
546 Whangaparāoa Road	65	60
548 Whangaparāoa Road	65	61
550 Whangaparāoa Road	65	55
552 Whangaparāoa Road	65	53
554 Whangaparāoa Road	65	60
556A Whangaparāoa Road	66	55
556 Whangaparāoa Road	65	50
558 Whangaparāoa Road	65	57
1/558 Whangaparāoa Road	69	62
564 Whangaparāoa Road	72	62
566 Whangaparāoa Road	71	60
568 Whangaparāoa Road	73	60
585 Whangaparāoa Road	68	64
587B Whangaparāoa Road	65	55
587 Whangaparāoa Road	70	66
589 Whangaparāoa Road	70	63
591 Whangaparāoa Road	68	60
592L Whangaparāoa Road	71	68
595 Whangaparāoa Road	67	55
596 Whangaparāoa Road	69	66
2/596 Whangaparāoa Road	65	55
3/596 Whangaparāoa Road	65	49
598 Whangaparāoa Road	68	67
600 Whangaparāoa Road	71	63
604 Whangaparāoa Road	65	49
1/7 Wiriana Place	65	49
1A Wiriana Place	65	56
1 Wiriana Place	71	63

Address	Noise Limit, dB $L_{Aeq(24h)}$	Do Minimum scenario, dB $L_{Aeq(24h)}$
2 Wiriana Place	66	59
3 Wiriana Place	65	54
4 Wiriana Place	65	49
5 Wiriana Place	65	54
6 Wiriana Place	65	51
7 Wiriana Place	65	54
9A Wiriana Place	65	51
9 Wiriana Place	65	52
10 Wiriana Place	65	48
12A Wiriana Place	65	48
14 Wiriana Place	65	53

Proactively released