Appendix A

Tuggerah to Doyalson Noise Report (Construction and Operation)

27 April 2016

WM Project Number: 13042-D
Our Ref: A040416 GJ

Ms Zoe Wood
Arcadis
Level 5, 141 Walker Street
NORTH SYDNEY NSW 2060

Dear Zoe

Re: M1 Widening – Construction Noise from Compounds

INTRODUCTION

Wilkinson Murray prepared a Noise Impact Statement (Report No. 13042) to support the Project Review of Environmental Factors (Project REF) for the M1 Pacific Motorway Widening: Tuggerah to Doyalson project (the Project).

Report No. 13042 included a construction noise assessment of three proposed ancillary site compounds and batching plants. This letter report supplements Report No. 13042 and provides an assessment of potential construction noise impacts from three additional ancillary sites, referred to as sites W8, W9 and E5 that are being proposed for use during construction of the project.

This report assesses:

- Noise impact from construction activities;
- Noise from extra traffic movement on public roads; and
- Potential vibration impacts from construction activities.

Noise catchment areas (NCAs) were established within Report No. 13042. The same NCAs are used for the purposes of this assessment.

LOCATIONS & CONSTRUCTION ACTIVITIES

The locations of sites W8 and W9 (to the west of the Pacific Motorway) and the nearest sensitive receivers, are shown on Figure 1. Access to Site W9 would be from Hue Hue Road and access to Site W8 would be along Kiar Ridge Road. Access to Site W8 may be possible from the M1 Pacific Motorway and would be further investigated by Roads and Maritime Services.

The location of Site E5 (to the east of the Pacific Motorway) and the nearest sensitive receivers, is shown on Figure 2. Two additional receivers, the Lakes Grammar School and the Warnervale suburban area which were outside the scope of the previous noise assessment were included for the assessment of Site E5.

The activities which may be carried out at the sites are provided in Table 1.

Table 1 Ancillary Site Activities

Site	Proposed Activities	
W8	Site compound Materials storage & laydown area	Concrete reprocessing Asphalt batching Stockpiles
W9	Site compound Materials storage & laydown area	Concrete reprocessing Asphalt batching Stockpiles
E5	Site compound Materials storage & laydown area	Asphalt batching Stockpiles

Noise Scenarios

Note that as "only one", "none" or "more than one" site may be used, and in order to take a conservative approach, all sites have been modelled with full traffic noise contributions outlined below.

The sites would be leased from the relevant property owners prior to commencement of construction for the duration of the Proposal (i.e. would be used for about three and a half years).

Site W8

All activities outlined in Table 1 may occur at the site however there is insufficient space for both asphalt batching and concrete reprocessing to run simultaneously. Modelling has therefore been based on the activities outlined in Table 2, which includes concrete reprocessing instead of batching as it is the louder of the two activities. Note that where a specific plant / equipment type / model is cited, this is for the purpose of estimating noise levels and similar equipment may be substituted in practice.

Table 2 Site W8 Construction Activities

Day (7am-6pm)	Early Morning (6am-7am) Early Evening (6pm-8pm) & Evening (8pm-10pm)	Night (10pm-6am)
Traffic noise (on roads to site for assessment against *Road Noise Policy*): • 35 trucks per hour • 76 light vehicles per hour	**Traffic noise (on roads to site for assessment against *Road Noise Policy*):** • 76 light vehicles per hour	**Traffic noise (on roads to site for assessment against *Road Noise Policy*):** 76 light vehicles per hour
Asphalt production: Not modelled as insufficient space for both asphalt batching and concrete production on this site. Therefore, only concrete reprocessing modelled as it is the louder of the two activities.	**Asphalt production:** Not modelled as insufficient space for both asphalt batching and concrete production on this site. Therefore, only concrete reprocessing modelled as it is the louder of the two activities.	**Asphalt production:** Assumes no batching at night as trucks to remove asphalt won't be using Kiar Ridge Road at night.

Day (7am-6pm)	Early Morning (6am-7am) Early Evening (6pm-8pm) & Evening (8pm-10pm)	Night (10pm-6am)
Concrete reprocessing: • Jaw crusher (track mounted, mobile) • Screen deck (track mounted, mobile) • Cone crusher (track mounted, mobile) • Vertical shaft impactor (track mounted, mobile) • Front end loader (Cat 972) • Excavator (30T) • Pugmill (Aran 180) Trucks bringing concrete to site and then from stockpiles to reprocessing machine are included in the 35 trucks within the site.	**Concrete reprocessing:** • Jaw crusher (track mounted, mobile) • Screen deck (track mounted, mobile) • Cone crusher (track mounted, mobile) • Vertical shaft impactor (track mounted, mobile) • Front end loader (Cat 972) • Excavator (30T) • Pugmill (Aran 180) Trucks bringing concrete to site and then from stockpiles to reprocessing machine are included in the 35 trucks within the site	**Concrete reprocessing:** Assumes no reprocessing at night
Materials storage and laydown: Crane to get barriers off truck (20-40T capacity).	**Materials storage and laydown:** Crane to get barriers off truck (20-40T capacity).	**Materials storage and laydown:** Crane to get barriers off truck (20-40T capacity).
Stockpiling: • Tipper (single steer tandem axle tipper with legal load about 15T) Assumes no front end loader as the one for the concrete reprocessing and asphalt batching would be the same used for stockpile movements.	**Stockpiling:** • Tipper (single steer tandem axle tipper with legal load about 15T) Assumes no front end loader as the one for the concrete reprocessing and asphalt batching would be the same used for stockpile movements.	**Stockpiling:** • Tipper (single steer tandem axle tipper with legal load about 15T) • Front end loader (Cat 972)

Site W9

Scenario assumes simultaneous operation of the equipment listed in Table 3. Note that where a specific plant / equipment type / model is cited, this is for the purpose of estimating noise levels and similar equipment may be substituted in practice.

Table 3 Site W9 Construction Activities

Day (7am-6pm) Early Morning (6am-7am) Early Evening (6pm-8pm) & Evening (8pm-10pm)	Night (10pm-6am)
Traffic noise (on roads to site for assessment against *Road Noise Policy*): • 35 trucks per hour • 76 light vehicles per hour	**Traffic noise (on roads to site for assessment against *Road Noise Policy*):** • 35 trucks per hour • 76 light vehicles per hour
Traffic noise (within site for assessment against the *Interim Construction Noise Guideline*): • 35 trucks per hour • 76 light vehicles per hour	**Traffic noise (within site for assessment against the *Interim Construction Noise Guideline*):** • 35 trucks per hour • 76 light vehicles per hour

Day (7am-6pm) Early Morning (6am-7am) Early Evening (6pm-8pm) & Evening (8pm-10pm)	Night (10pm-6am)
Concrete reprocessing: • Jaw crusher (track mounted, mobile) • Screen deck (track mounted, mobile) • Cone crusher (track mounted, mobile) • Vertical shaft impactor (track mounted, mobile) • Front end loader (Cat 972) • Excavator (30T) • Pugmill (Aran 180) • Trucks bringing concrete to site and then from stockpiles to reprocessing machine are included in the 35 trucks within the site	**Concrete reprocessing:** • Assumes no reprocessing at night but accommodates for delivery of ripped concrete to the site from M1 night works: • Trucks bringing concrete to site are included in the 35 trucks within the site
Asphalt production: • Large asphalt plant (200-300T per hour) • Front end loader (Cat 972) • Trucks delivering raw materials and removing asphalt from site are included in the 35 trucks within the site	**Asphalt production:** • Large asphalt plant (200-300T per hour) • Front end loader (Cat 972) • Trucks delivering raw materials and removing asphalt from site are included in the 35 trucks within the site
Materials storage and laydown: • Crane to get barriers off truck (20-40T capacity)	**Materials storage and laydown:** • Crane to get barriers off truck (20-40T capacity)
Stockpiling: • Tipper (single steer tandem axle tipper with legal load about 15T) • Assumes no front end loader as the one for the concrete reprocessing and asphalt batching would be the same used for stockpile movements	**Stockpiling:** • Tipper (single steer tandem axle tipper with legal load about 15T) • Assumes no front end loader as the one for the concrete reprocessing and asphalt batching would be the same used for stockpile movements

Site E5

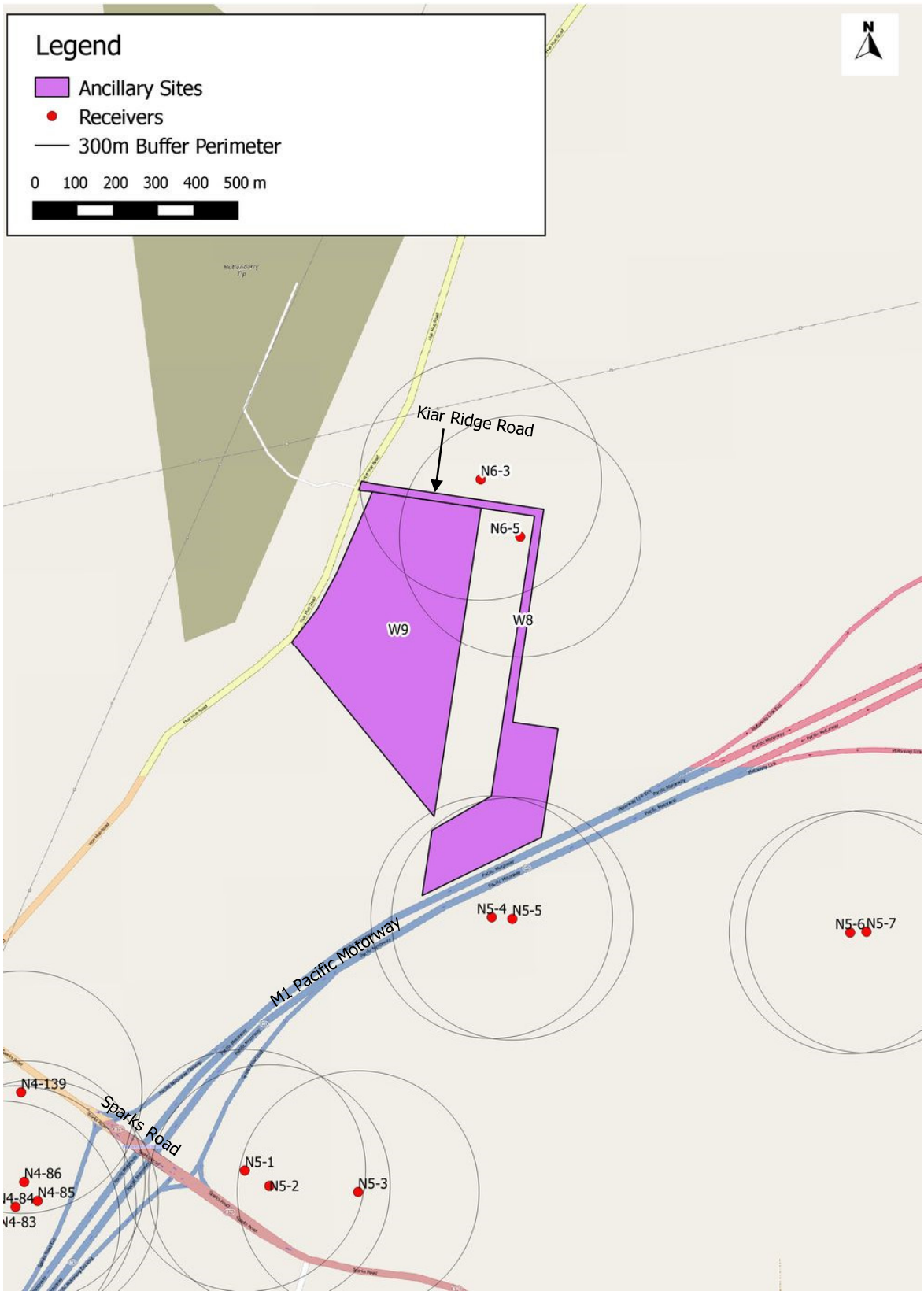
Concrete reprocessing and concrete batching is not proposed at this site; therefore, the noise modelling has assumed simultaneous operation of the equipment listed in Table 4. Note that where a specific plant / equipment type / model is cited, this is for the purpose of estimating noise levels and similar equipment may be substituted in practice.

Table 4 Site E5 Construction Activities

Day (7am-6pm) Early Morning (6am-7am) Early Evening (6pm-8pm) & Evening (8pm-10pm) Night (10pm-6am)
Traffic noise (on roads to site for assessment against *Road Noise Policy*): • 35 trucks per hour • 76 light vehicles per hour
Traffic noise (within site for assessment against the *Interim Construction Noise Guideline):* • 35 trucks per hour • 76 light vehicles per hour

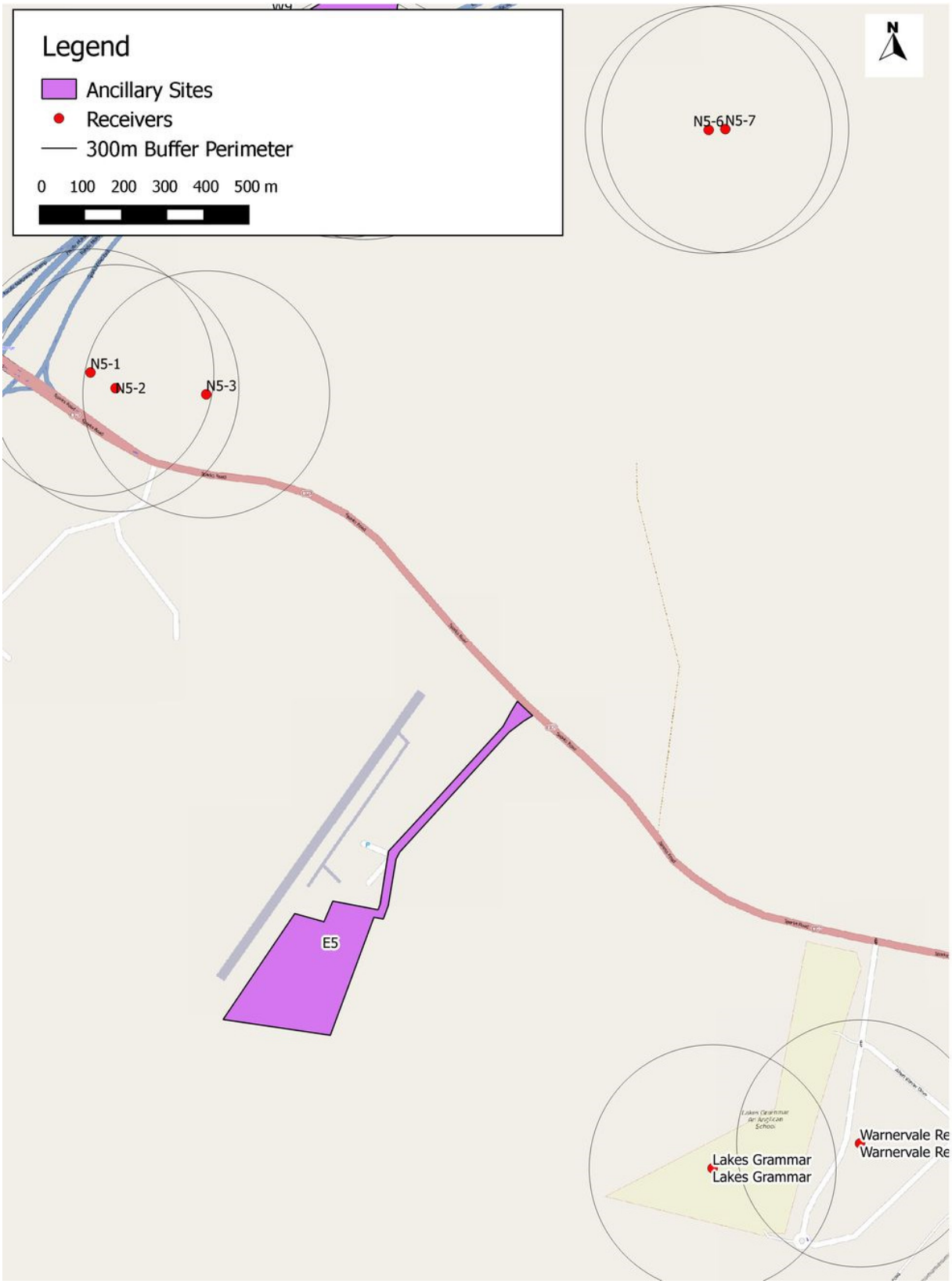
Day (7am-6pm) Early Morning (6am-7am) Early Evening (6pm-8pm) & Evening (8pm-10pm) Night (10pm-6am)
Asphalt production: • Large asphalt plant (200-300T per hour) • Front end loader (Cat 972) • Trucks delivering raw materials and removing asphalt from site are included in the 35 trucks within the site
Materials storage and laydown: • Crane to get barriers off truck (20-40T capacity)
Stockpiling: • Tipper (single steer tandem axle tipper with legal load about 15T) • (assumes no front end loader as the one for the concrete reprocessing and asphalt batching would be the same used for stockpile movements)

Figure 1 Ancillary Sites W8 & W9



(Note: Receiver N5-5, as marked on Figure 1, was subsequently confirmed to be a shed and is not considered as a sensitive receiver herein).

Figure 2 Ancillary Site E5



CONSTRUCTION SOURCE NOISE LEVELS

The sound power level of construction plant and activities used in the noise modelling are listed in Table 5.

Table 5 Source Noise Levels (Sound Power Level) of Construction Activities

Plant / Activity	Noise Level, L_{Aweq}
Asphalt Plant	116
Concrete Reprocessing Plant	120
Concrete or other truck	108
15T Tipper at Stockpile	108
Crane for barrier loading	100

There would be up to 35 trucks and 76 light vehicles per hour accessing any of the sites, except at site W8 where trucks would be restricted to the Daytime period. For the noise assessment, noise from trucks has been distributed from access points to plant and stockpile locations within the sites. Concrete reprocessing and asphalt batching plant were located more than 300m from receivers by drawing a 300m buffer zone. The buffer zone is shown as a 300m radius circle around each receiver on Figure 1 (W8 and W9) and Figure 2 (E5). Outside the buffer zone, the noise sources were grouped to simulate the worst-case noise at receivers.

Maximum noise emission sound power levels from the individual items of construction equipment are typically some 4-5dB higher than the L_{Aeq} sound power levels. A maximum noise emission sound power level of $L_{A1,1min}$ 120dBA has been assumed for any item of equipment. If there would be a steady noise from site, such as from concrete reprocessing, the maximum noise was added to the L_{Aeq} predictions. Therefore for assessment of sleep disturbance from concrete processing, a maximum noise emission LA1,1min 123dBA was assumed.

CONSTRUCTION NOISE GOALS

The NSW EPA *Interim Construction Noise Guideline (ICNG)* recommends that as far as practicable, construction activities should be undertaken between the following hours:

Recommended standard hours of work

- Monday to Friday 7.00am to 6.00pm
- Saturday 8.00am to 1.00pm
- No work on Sundays or Public Holiday

The *ICNG* recognises, however, that by necessity construction works must sometimes be undertaken outside of the standard recommended hours. More stringent noise goals apply during out-of-hours works.

ICNG noise goals are detailed in Table 6.

Table 6 Noise Goals using Quantitative Assessment

Time of Day	Management Level $L_{Aeq,(15min)}$ *	How to Apply
Recommended Standard Hours: Monday to Friday 7am to 6pm Saturday 8am to 1pm No work on Sundays or Public Holidays	Noise affected RBL + 10dBA	• The noise affected level represents the point above which there may be some community reaction to noise. • Where the predicted or measured $L_{Aeq,(15min)}$ is greater than the noise affected level, the proponent should apply all feasible and reasonable work practices to minimise noise. • The proponent should also inform all potentially impacted residents of the nature of works to be carried out, the expected noise levels and duration, as well as contact details.
Recommended Standard Hours: Monday to Friday - 7am to 6pm - Saturday - 8am to 1pm - No work on Sundays or - Public Holidays -	Highly noise affected 75dBA	• - The highly noise affected level represents the point above which there may be strong community reaction to noise. • - Where noise is above this level, the proponent should consider very carefully if there is any other feasible and reasonable way to reduce noise to below this level. • - If no quieter work method is feasible and reasonable, and the works proceed, the proponent should communicate with the impacted residents by clearly explaining the duration and noise level of the works, and by describing any respite periods that will be provided.
Outside Standard Hours	Noise affected + 5dB	• - A strong justification would typically be required for works outside the recommended standard hours. • - The proponent should apply all feasible and reasonable work practices to meet the noise affected level. • - Where all feasible and reasonable practices have been applied and noise is more than 5dBA above the noise affected level, the proponent should negotiate with the community.

Proposed Working Hours

It is proposed that construction may occur on a 24-hour basis wherever there is sufficient justification for out-of-hours work, or noise impact is negligible or manageable.

To allow maximum flexibility in scheduling, separate noise management levels have been set for Early Morning and Early Evening referred to as "shoulder periods". Early Morning is defined as 6.00am to 7.00am, which, though within the standard night time period, has higher background noise levels than the remainder of the night time period. Similarly, Early Evening, defined as 6.00pm to 8.00pm, has higher background noise levels than the remainder of the Evening period.

The assessed times adopted for the purpose of this assessment are:

- Daytime (7.00am to 6.00pm);
- Early Evening (6.00pm to 8.00pm);
- Evening (8.00pm to 10.00pm);
- Night Time (10.00pm to 6.00am); and
- Early Morning (6.00am to 7.00am).

Background levels (i.e. Rating Background Levels (RBLs)) and noise management levels (NMLs), based on the guidance from the *ICNG* provided in Table 2, have been set for each period.

NOISE MANAGEMENT LEVELS

NMLs were interpolated from noise measurements carried out for the Project REF. The method was described in Report No. 13042 as follows:

> *To assess construction noise across all NCAs based on these three measurement locations, a Rating Background Level (RBL) was assigned to each receiver in order to set noise management levels. At receivers close to the M1 Pacific Motorway, the RBL is related to traffic noise emission. Moving away from the M1 Pacific Motorway, noises other than traffic begin to influence the RBL.*
>
> *The RBLs for the proposed construction periods are shown in [Project REF] Table 11-2, based on the measured RBLs at the traffic noise model validation points. Location L2 was close to the M1 Pacific Motorway, and represents the typical maximum RBL at any location. The measurement location in L1 was chosen to reflect the noise environment at the majority of houses in NCA 1. Those houses are generally in the Mardi suburban area and are shielded by topography from the M1 Pacific Motorway. Some isolated receivers are closer to the M1 Pacific Motorway, and in unshielded locations. The closest isolated receivers are at similar distances from the M1 Pacific Motorway as the background measurement location in L2. However, the road surface for the entire length of NCA 1 is open graded asphalt, and the road surface in L2 is concrete. It was assumed that the maximum RBL in NCA 1 was 5dBA lower than the measured RBL at L2 due to the lower emission from road sections paved with OGAC. While there is no direct relation between traffic noise emission and RBL, this procedure is considered reasonable for setting RBLs for construction noise assessment.*
>
> *The noise environment at isolated receivers in NCA 2 would be similar to that in NCA 1, and the same procedure was used to set RBLs at each receiver location.*
>
> *For NCAs 3, 4, 5 and 6 the maximum RBL was taken from L2 and the minimum RBL was taken from L3. At intermediate points the RBL was scaled between L2 and L3 based on the predicted traffic noise from the highway.*
>
> *The minimum and maximum RBLs for each NCA, and the derived Noise Management Levels for each working period, are given in [Project REF] Table 11-3.*

The Project REF tables referred to above are repeated below – Project REF Table 11-2 as Table 7, and Project REF Table 11-3 as Table 8. The approach used in the approved Project REF is considered suitable for the construction noise assessment.

The minimum and maximum RBLs for each NCA, and the derived Noise Management Levels for each working period, are given in Table 9.

Table 7 Recorded Rating Background Levels

Rec.	Address	Period				
		Day	Evening	Night	Early Morning	Early Evening
L1	10 Woolmers Cres, Mardi	46	46	38	41	46
L2	93 Hue Hue Rd, Alison	68	64	46	54	66
L3	34 Holloway Dr, Jilliby	51	49	42	48	51

Table 8 Predicted RBL and Construction Noise Management Levels for NCAs

Rec	RBL or Management Level		Period				
			Day	Evening	Night	Early Morning	Early Evening
NCA 1, NCA 2	RBL	Min	46	46	38	41	46
		Max	63	59	41	49	61
	Management Level	Min	56	51	43	46	51
		Max	73	64	46	54	56
NCA 3, NCA 4, NCA 5, NCA 6	RBL	Min	51	49	42	48	51
		Max	68	64	46	54	66
	Management Level	Min	61	54	47	53	56
		Max	78	69	51	59	71

The RBLs determined for the receivers assessed are shown in Table 9. The NMLs are shown in Table 10. At Lakes Grammar School the NML is not dependent on the RBL, and applies only when the school is in use.

Table 9 Predicted Rating Background Levels (RBL) at Individual Receivers – dBA

NCA	Receiver	Period				
		Day	Evening	Night	Early Morning	Early Evening
4	N4-139	59	56	43	49	43
5	N5-1	60	57	44	51	59
	N5-2	57	54	43	50	56
	N5-3	55	53	43	49	55
	N5-4	66	53	46	53	64
6	N6-1	54	52	43	49	54
	N6-2	54	52	43	49	54
	N6-3	54	52	43	49	54
	N6-5	54	52	43	49	54
	Warnervale Residential Area	54	52	43	49	54

Table 10 Construction Noise Management Levels (NML), $L_{Aeq,15min}$ – dBA

NCA	Receiver	Period				
		Day	Evening	Night	Early Morning	Early Evening
4	N4-139	69	61	48	54	48
5	N5-1	70	62	49	56	64
	N5-2	67	59	48	55	61
	N5-3	65	58	48	54	60
	N5-4	76	58	51	58	69
6	N6-3	64	57	48	54	59
	N6-5	64	57	48	54	59
	Warnervale Residential Area	64	57	48	54	59
	Lakes Grammar	50(1)				

Note: (1) When school is in use.

Construction Noise – Sleep Disturbance Criteria

For assessment of sleep disturbance from construction noise the *ICNG* refers to guidance in the EPA's *Environmental Criteria for Road Traffic Noise (ECRTN)*. The *RNP* which supersedes the *ECRTN* contains some discussion on the matter of sleep disturbance.

The *ECRTN* discussed a guideline aimed at limiting the level of sleep disturbance due to environmental noise – that the $L_{AF1,1min}$ level of any noise should not exceed the ambient L_{AF90} noise level by more than 15dB. This guideline takes into account the emergence of noise events, but does not directly limit the number of such events or their highest level, which are also found to affect sleep disturbance.

The *RNP* also notes that from the research to date it can be concluded that:

- Maximum internal noise levels below 50-55dBA are unlikely to cause awakening reactions; and
- One or two noise events per night, with maximum internal noise levels of 65-70dBA, are not likely to affect health and wellbeing significantly.

It is commonly accepted that an outside-to-inside attenuation of 10dB can be readily achieved through a window partially open for ventilation purposes. On this basis, a level of LA1,1min 60-65dBA would lead to internal levels unlikely to cause awakening reactions. The lower end of the range has been adopted to provide a conservative assessment.

Table 11 Sleep Disturbance Criteria, $L_{Aeq1,min}$ – dBA

NCA	Receiver	Night Time		Early Morning 6am-7am	
		RBL	RBL+15	RBL	RBL+15
4	N4-139	48	63	54	69
5	N5-1	49	64	56	71
	N5-2	48	63	55	70
	N5-3	48	63	54	69
	N5-4	51	66	58	73
6	N6-3	48	63	54	69
	N6-5	48	63	54	69
	Warnervale	48	63	54	69
	Lakes Grammar	N/A	N/A	N/A	N/A

NOISE ASSESSMENT

Noise was predicted using the CadnaA noise modelling software. This model was established for the operational noise assessment and includes topography and receiver locations.

The sites are large and, at this stage of the Project, the location of plant has not been decided. To provide a worst-case assessment, and to provide flexibility for the siting of equipment, plant at sites W8 and W9 was modelled at 300m from the nearest receiver. A second scenario was also modelled with plant located towards the far end of the sites from all receivers. This produces a range of potential noise impacts at sites W8 and W9.

Assessment of Site E5

Site E5 is sufficiently distant, about 1.5km, from receivers that only one scenario was modelled.

Table 12 provides the predicted noise levels from Site E5. Noise is predicted to comply at all receivers for all assessed periods.

Table 12 Predicted Noise from Ancillary Site E5, $L_{Aeq,15min}$ – dBA

NCA	Receiver	Noise Management Levels – dBA					Predicted Noise Levels, $L_{Aeq,15min}$ – dBA				
		Day	Evening	Night	Early Morning	Early Evening	Day	Evening	Night	Early Morning	Early Evening
5	N5-1	70	62	49	56	64	25	25	25	25	25
	N5-2	67	59	48	55	61	25	25	25	25	25
	N5-3	65	58	48	54	60	31	31	31	31	31
Warnervale Residential Area		64	57	48	54	59	36	36	36	36	36
Lakes Grammar		50(1)	N/A	N/A	N/A	N/A	33	33	33	33	33

Note: (1) When school is in use.

Concerning the potential for construction noise to cause sleep disturbance, noise is predicted to comply with the noise criteria (background + 15dBA) at all locations. Noise from the site is predicted to be at most $L_{A1,1min}$ 60dBA at all receivers. Construction noise from the site is unlikely to cause sleep disturbance at any receiver. Noise from the site is predicted to be below the $L_{A1,1min}$ 60dBA at all receivers. Construction noise from the site is unlikely to cause sleep disturbance at any receiver.

Assessment of Site W8

Table 13 provides the predicted noise levels from construction plant at site W8 and assumes all plant are located a minimum of 300m from the nearest receiver. In practice plant / equipment may be able to be located greater than 300m from the nearest receiver however a worst-case assessment (i.e. up to as close as 300m) has been modelled to inform management under such a scenario.

Table 13 Predicted Noise from Ancillary Site W8, $L_{Aeq,15min}$ – dBA

NCA	Receiver	Noise Management Levels – dBA					Predicted Noise Levels, $L_{Aeq,15min}$ – dBA				
		Day	Evening	Night	Early Morning	Early Evening	Day	Evening	Night	Early Morning	Early Evening
4	N4-139	69	61	48	54	48	37	36	24	36	36
5	N5-1	70	62	49	56	64	40	39	27	39	39
	N5-2	67	59	48	55	61	40	39	27	39	39
	N5-3	65	58	48	54	60	37	36	26	36	36
	N5-4	76	58	51	58	69	54	53	40	53	53
6	N6-3	64	57	48	54	59	46	43	30	43	43
	N6-5	64	57	48	54	59	61	51	41	51	51

The impacts at each NCA are:

- NCA 4: Complies at all times;
- NCA 5: Complies at all times; and
- NCA 6: Complies at all times.

Concerning the potential for construction noise to cause sleep disturbance, the predicted worst-case $L_{A1,1min}$ are given in Table 14. Noise is predicted to comply with the noise sleep criteria (background +15dBA) at all locations. Noise from the site is predicted to be below $L_{A1,1min}$ 60dBA at all receivers. Construction noise from the site is unlikely to cause sleep disturbance at any receiver.

Table 14 Site W8 – Assessment of Sleep Disturbance – dBA

NCA	Receiver	Night Time		Early Morning 6am-7am		Predicted Noise Level, $L_{A1,1min}$ – dBA
		RBL	RBL+15	RBL	RBL+15	
4	N4-139	48	63	54	69	35
5	N5-1	49	64	56	71	38
	N5-2	48	63	55	70	38
	N5-3	48	63	54	69	35
	N5-4	51	66	58	73	51
6	N6-3	48	63	54	69	41
	N6-5	48	63	54	69	49
	Warnervale	48	63	54	69	<30
	Lakes Grammar	N/A	N/A	N/A	N/A	N/A

Assessment of Site W9

Table 15 provides the predicted noise levels from construction plant at site W9, with exceedances of NMLs shown in bold red text. The predicted noise levels represent a scenario where all plant are located a minimum of 300m from the nearest receiver. In practice plant / equipment may be able to be located greater than 300m from the nearest receiver however a worst-case assessment (i.e. up to as close as 300m) has been modelled to inform management under such a scenario.

Table 15 Predicted Noise from Ancillary Site W9, $L_{Aeq,15min}$ – dBA

NCA	Receiver	Noise Management Levels – dBA					Predicted Noise Levels, $L_{Aeq,15min}$ – dBA				
		Day	Evening	Night	Early Morning	Early Evening	Day	Evening	Night	Early Morning	Early Evening
4	N4-139	69	61	48	54	48	31	31	26	31	31
5	N5-1	70	62	49	56	64	36	36	32	36	36
	N5-2	67	59	48	55	61	36	36	32	36	36
	N5-3	65	58	48	54	60	36	36	32	36	36
	N5-4	76	58	51	58	69	39	39	34	39	39
6	N6-3	64	57	48	54	59	61	**61**	**55**	**61**	**61**
	N6-5	64	57	48	54	59	59	**59**	**53**	**59**	59

The impacts at each NCA are:

- NCA 4: Complies at all times;
- NCA 5: Complies at all times; and
- NCA 6: Complies during daytime. Exceedances up to 7dBA are predicted during Evening, Early Evening and Early Morning periods. Exceedance up to 7dBA at two receivers during Night Time.

Mitigations for management of the exceedances to NCA 6 are outlined in Table 17.

Concerning the potential for construction noise to cause sleep disturbance, the predicted worst-case $L_{A1,1min}$ are given in Table 16. Noise is predicted to comply with the noise sleep criteria (background + 15dBA) at all locations. Noise from the site is predicted to be at most $L_{A1,1min}$ 60dBA at all receivers. Construction noise from the site is unlikely to cause sleep disturbance at any receiver.

Table 16 Site W9 – Assessment of Sleep Disturbance – dBA

NCA	Receiver	Night Time		Early Morning, 6am-7am		Predicted Noise Level, $L_{A1,1min}$ – dBA
		RBL	RBL+15	RBL	RBL+15	
4	N4-139	48	63	54	69	36
5	N5-1	49	64	56	71	38
	N5-2	48	63	55	70	38
	N5-3	48	63	54	69	37
	N5-4	51	66	58	73	43
6	N6-3	48	63	54	69	60
	N6-5	48	63	54	69	58
	Warnervale	48	63	54	69	<30
	Lakes Grammar	N/A	N/A	N/A	N/A	N/A

MITIGATION OF NOISE FROM ADDITIONAL ANCILLARY SITES

Noise mitigation and management measures from the original Project REF and Submissions Report have been reviewed and are relevant for the proposed additional ancillary sites. These measures are included with additional specific mitigation measures relevant to the new ancillary sites included in **bold red** text in Table 17. As site E5 and W8 would comply with the relevant NMLs at all times, no additional specific mitigation measures are required.

Table 17 Mitigation & Management Measures

Impact / Issue	Environmental Safeguard(s)	Responsibility	Timing
Noise impacts resulting from - construction activities	• Appropriate mitigation and management measures are to be used to minimise construction noise and vibration at noise sensitive receivers as described in the approved Construction Noise and Vibration Management Plan (CNVMP). • Prepare and implement a CNVMP that identifies reasonable and feasible approaches to reduce noise impacts during construction, including for ancillary facilities. • Undertake at-receiver noise mitigations that are planned to manage operational noise at the commencement of construction. • Inform the community at least 48 hours before any out of hours work is to be undertaken and provide the following information: - programmed times and locations of construction work - construction noise and vibration impact predictions	Construction Contractor	Construction

Impact / Issue	Environmental Safeguard(s)	Responsibility	Timing
	- construction noise and vibration mitigation measures being implemented on site		
	• Provide specific details of all out of hours work to the EPA.		
	• Implement a notification and consultation procedure to identify when noise impacts during extended hours and out of hours work are above relevant criteria and enable appropriate management measures to be developed.		
	• Include specific noise mitigation measures in the CNVMP, including:		
	- noise intensive construction works would be carried out during standard construction hours wherever practicable		
	- noisy activities that cannot be undertaken during standard construction hours would be scheduled as early as possible during the evening and / or night time periods		
	- appropriate plant would be selected for each task to minimise the noise impact		
	- deliveries would be carried out during standard construction hours where practical and safe to do so		
	- non-tonal reversing alarms would be fitted on all construction equipment where possible		
	- if it is safe, night time activities would be planned and conducted in such a manner as to eliminate or minimise the need for audible warning alarms		
	- the offset distance between noisy plant items and nearby residential receivers would be maximised		
	- noisy equipment would be oriented away from residential receivers		
	- site access points, ancillary site accesses and ancillary facilities would be positioned as far as practicable away from residential receivers		
	- plan the internal layout and operation of construction ancillary facilities to maximise the separation distance between sensitive receivers and noisy on-site activities		
	- the use of structures or enclosures will be investigated during detailed design and would be used to shield residential receivers from noise sources where considered practicable and effective		
	- trucks would travel via internal haul routes and major roads and routes where practicable and would not be allowed to queue near residential dwellings		
	- respite periods would be considered during times of noise intensive works where sensitive receivers would be adversely impacted for extended periods. These could include late start and / or early finishes		

Impact / Issue	Environmental Safeguard(s)	Responsibility	Timing
	- wherever practicable, noise intensive works would be scheduled / programmed in the following order of priority to minimise the potential impacts on sensitive receivers:		
	1. standard working hours		
	2. extended working hours		
	3. night time working hours		
Noise from ancillary site W9	**Noise from ancillary site W9 would be managed in line with the requirements of the *RNP, ENMM* and *ICNG* and may include where feasible and reasonable:**	**RMS / Construction Contractor**	**Construction Period**
	• **Design of site layout to minimise noise levels at sensitive receivers. As the concrete reprocessing plant is the noisiest activity, it could be located further from the residences than other activities.**		
	• **Design of the site to take advantage of any shielding provided by natural landforms or construction earthworks.**		
	• **Design of the site layout to take advantage of any 'self shielding' provided by the equipment. For example, the concrete reprocessing plant could provide acoustic shielding for the asphalt batching plant, or vice versa.**		
	• **Noise monitoring at the residences, once the site is operational, to inform the noise management process and the need for structures or enclosures to further reduce noise levels.**		
	Activities and timing of activities would generally conform to the description in Table 3.		

TRAFFIC NOISE ASSESSMENT

The *ICNG* refers to the NSW *Road Noise Policy (RNP)* for the assessment of construction traffic on public roads. Noise criteria are assigned to sensitive receivers using Roads and Maritime's *Noise Criteria Guideline (NCG)*. The *NCG* documents Roads and Maritime's approach to implementing the NSW *Road Noise Policy*.

Road Traffic Noise Goals

To assess noise impacts from construction traffic or a temporary reroute due to a road closure or both an initial screening test should be undertaken by evaluating whether noise levels will increase by more than 2dBA. Where increases are 2dBA or less then no further assessment is required. Where noise levels increase by more than 2dBA (2.1dBA) and noise levels exceed the controlling criterion then the receiver should be considered for noise mitigation.

The *RNP* sets out noise criteria (the controlling criteria) for 'freeway / arterial / sub-arterial roads' and 'local roads'. Of the roads used by construction traffic to access the additional ancillary sites, only Kiar Ridge Road would be considered a local road. All other roads would be considered "'freeway / arterial / sub-arterial roads'.

Criteria for existing residences affected by **additional traffic** are shown in Table 18.

Table 18 *RNP* Criteria for Traffic Noise due to Land Use Development

Road Category	Assessment Criteria – dBA	
	Day (7am-10pm)	Night (10pm-7am)
Freeway / arterial / sub-arterial roads	$L_{Aeq15hr}$, 60 (external)	$L_{Aeq,9hr}$ 55 (external)
Local Roads	L_{Aeq1hr}, 55 (external)	$L_{Aeq,1hr}$ 50 (external)

Where predicted noise levels exceed the project-specific noise criteria, an assessment of all feasible and reasonable mitigation options should be considered. The *RNP* states that *an increase of up to 2 dBA represents a minor impact that is considered barely perceptible to the average person*.

Construction Traffic Movements

Existing traffic movements, and predicted hourly additional movements due to construction, are given in the Hyder Technical Memorandum: *Traffic and Transport Technical Note Addendum: Additional Ancillary Sites*, dated 26 October 2015.

The movements for roads where Sites W8, W9 and E5 could generate extra traffic movements are given in Table 19.

For Sparks Road and Hue Hue Road the increase in traffic noise can be predicted based on the change in traffic volumes.

Kiar Ridge Road east of Hue Hue Road leads to the entrance to Site W8. There are only two residences along this road, and the most potentially impacted is N6-3. Existing traffic volumes are negligible, however there would be existing traffic noise from the M1 Pacific Motorway. Receiver N6-3 was not assessed in Report No. 13042 as it is more than 600m from the M1 Pacific Motorway. It is estimated that the existing traffic noise at Receiver N6-3 is less than $L_{Aeq,1hr}$ 50dBA during the daytime, and less than $L_{Aeq,1hr}$ 45dBA during the night time. The addition of local construction traffic would increase the total traffic noise as shown in Table 19. This is based on prediction of construction traffic noise using the *Calculation of Road Traffic Noise (CoRTN)* procedures and assuming a speed of 50km/h on Kiar Ridge Road.

Table 19 Construction Traffic Impacts

Road	Assessment Parameter	No Upgrade	During Construction
Sparks Road, east of Sparks Road interchange	Hourly traffic flow	1,807	1,918
	Percentage change from no upgrade	0%	6.1%
	Heavy vehicle proportion	5.7%	7.2%
	Noise Impact	N/A	1.1dBA increase
Sparks Road, west of Sparks Road interchange	Hourly traffic flow	600	711
	Percentage change from no upgrade	0%	18.5%
	Heavy vehicle proportion	6.2%	10.2%
	Noise Impact	N/A	1.0dBA increase
Hue Hue Road, north of Sparks Road	Hourly traffic flow	295	406
	Percentage change from no upgrade	0%	37.6%
	Heavy vehicle proportion	6.4%	13.3%
	Increase in noise level, dBA	N/A	No houses
Kiar Ridge Road, east of Hue Hue Road	Hourly traffic flow	0	111
	Percentage change from no upgrade	0%	100%
	Heavy vehicle proportion	0%	31.5%
	Noise Impact	N/A	$L_{Aeq,1hr}$ 55dBA daytime (increase up to 5dBA) $L_{Aeq,1hr}$ 49dBA night time (increase up to 4dBA)

A review of Table 19 indicates:

- - On Sparks Road, noise level increases are predicted to be less than 2dBA, hence no noise mitigation is required
- - On Hue Hue Road north of Sparks Road, there is a projected increase in traffic volumes; however, there are no residences on this section of road
- - On Kiar Ridge Road the noise is predicted to increase up to 5dBA; however, the total noise levels are predicted to comply with the *RNP* noise criteria for local roads, therefore additional mitigation measures to those outlined in Table 17 are not required.

ASSESSMENT OF CONSTRUCTION VIBRATION

The construction vibration assessment undertaken for the original Project REF, documented in Report No. 13042, has been adopted and modified to be relevant to the assessment of potential vibration impacts from the additional ancillary sites.

There are no vibration intensive plant and activities proposed.

Criteria

Impacts from vibration can be considered both in terms of effects on building occupants (human comfort) and the effects on the building structure (building damage). Of these considerations, the human comfort limits are the most stringent. Therefore, for occupied buildings, if compliance with human comfort limits is achieved, it will follow that compliance will be achieved with the building damage objectives.

Human Comfort

The EPA's *Assessing Vibration: A Technical Guideline* provides acceptable values for continuous and impulsive vibration in the range 1-80Hz. Both preferred and maximum vibration limits are defined for various locations and are shown in Table 20.

Table 20 Preferred & Maximum Peak Particle Velocity (PPV) Values for Continuous & Impulsive Vibration

Location	Assessment Period(1)	Preferred Values	Maximum Values
Continuous Vibration			
Receivers	Daytime	0.28	0.56
	Night time	0.20	0.40
Offices, schools, educational institutions and places of worship (Lakes Grammar School)	Day or night time	0.56	1.1
Impulsive Vibration			
Receivers	Daytime	8.6	17.0
	Night time	2.8	5.6
Offices, schools, educational institutions and places of worship (Lakes Grammar School)	Day or night time	18.0	36.0

Note: (1) Daytime is 7.00am to 10.00pm and night time is 10.00pm to 7.00am.

These limits relate to a long-term (15 hours for daytime), continuous exposure to vibration sources. Where vibration is intermittent, a vibration dose is calculated and acceptable values are shown in Table 21.

Table 21 Acceptable Vibration Dose Values for Intermittent Vibration ($m/s^{1.75}$)

Location	Daytime(1)		Night Time(1)	
	Preferred Value	Maximum Values	Preferred Value	Maximum Value
Receivers	0.20	0.40	0.13	0.26
Offices, schools, educational institutions and places of worship (Lakes Grammar School)	0.40	0.80	0.40	0.80

Note: (1) Daytime is 7.00am to 10.00pm and night time is 10.00pm to 7.00am.

Building Damage

In regard to potential building damage, German Standard DIN 4150 (Table 1) shows guideline values for short-term vibration for commercial buildings and houses which are dependent on the frequency of vibration. The recommended vibration level range is 5 to 20mm/s for dwellings.

Source Levels of Vibration

Table 22 provides some estimated vibration levels at a range of distances from two example construction activities.

Concrete reprocessing and asphalt batching will take place more than 300m from any residence. The source levels of this plant is not available, but as a conservative assessment the vibration associated with the use of a heavy hydraulic hammer has been considered, noting that the true vibration would be significantly less than this.

All other activities are assumed to cause less vibration than the use of a heavy hydraulic hammer.

The nearest trucks drive to residences is on Kiar Ridge Road, where the road is 40m from Receiver N6-3 and N6-5.

Table 22 Typical Vibration Emission Levels from Construction Plant

Activity	Peak Particle Velocity Vibration Level (mm/s) at Distance		
	10m	20m	30m
Truck over smooth road surface	0.05	<0.01	-
Heavy hydraulic hammer	2.5	0.5	0.2

Vibration Levels at Residential Receivers

Human Comfort

All activities, including trucks passing in front of residences, will be more than 40m from any residence. Based on the vibration levels in Table 22, vibration is predicted to be below the criteria for human comfort at all receivers for all activities.

Building Damage

As construction will be more than 40m from houses, vibration levels will be below the criteria for building damage.

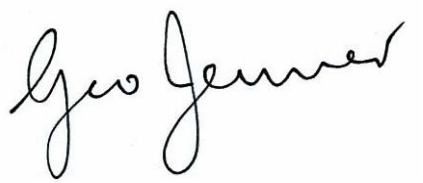
The vibration levels of this proposal will not result in levels that cause damage to buildings.

Vibration Mitigation

Vibration mitigation and management measures from the original Project REF and Submissions Report have been reviewed and are relevant for the proposed additional ancillary sites. In addition, Kiar Ridge Road would be managed to ensure a smooth road surface is established and maintained.

I trust this information is sufficient. Please contact us if you have any further queries.

Yours faithfully
WILKINSON MURRAY



George Jenner
Associate

ACOUSTICS AND AIR

M1 PACIFIC MOTORWAY
TUGGERAH TO DOYALSON

NOISE REPORT FOR 80% DETAILED DESIGN

REPORT NO. 13042-D
VERSION E

APRIL 2016

PREPARED FOR

HYDER CONSULTING PTY LTD
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NORTH SYDNEY NSW 2060

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DOCUMENT CONTROL

Version	Status	Date	Prepared By	Reviewed By
A	Draft	13 July 2015	George Jenner	Rob Bullen
B	Draft	16 September 2015	George Jenner	Rob Bullen
C	Draft	9 October 2015	George Jenner	Rob Bullen
D	Final	15 December 2015	George Jenner	Neil Gross
E	Final	21 April 2016	George Jenner	Rob Bullen

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GLOSSARY OF ACOUSTIC TERMS

Most environments are affected by environmental noise which continuously varies, largely as a result of road traffic. To describe the overall noise environment, a number of noise descriptors have been developed and these involve statistical and other analysis of the varying noise over sampling periods, typically taken as 15 minutes. These descriptors, which are demonstrated in the graph below, are here defined.

Maximum Noise Level (L_{Amax}) – The maximum noise level over a sample period is the maximum level, measured on fast response, during the sample period.

L_{A1} – The L_{A1} level is the noise level which is exceeded for 1% of the sample period. During the sample period, the noise level is below the L_{A1} level for 99% of the time.

L_{A10} – The L_{A10} level is the noise level which is exceeded for 10% of the sample period. During the sample period, the noise level is below the L_{A10} level for 90% of the time. The L_{A10} is a common noise descriptor for environmental noise and road traffic noise.

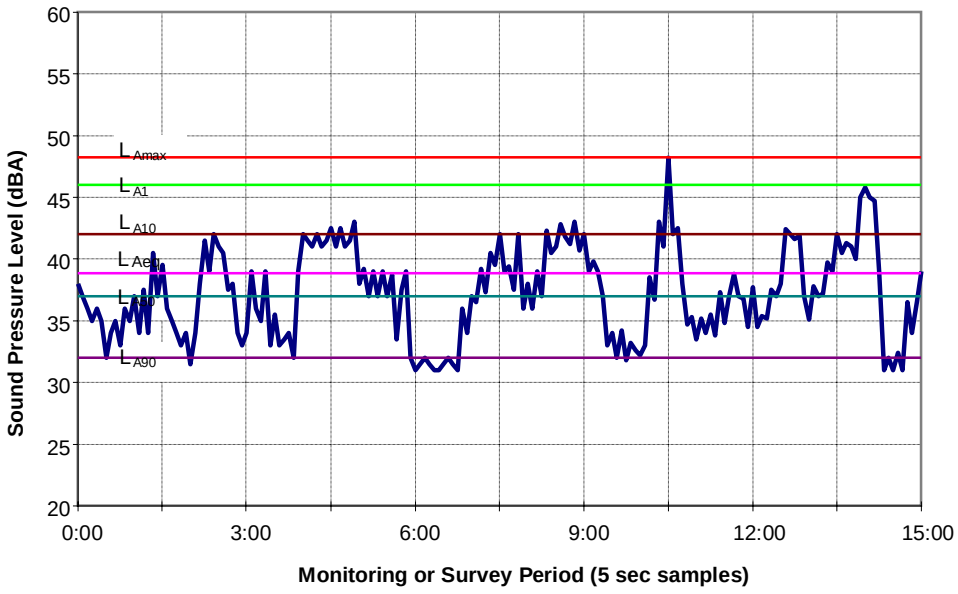
L_{A90} – The L_{A90} level is the noise level which is exceeded for 90% of the sample period. During the sample period, the noise level is below the L_{A90} level for 10% of the time. This measure is commonly referred to as the background noise level.

L_{Aeq} – The equivalent continuous sound level (L_{Aeq}) is the energy average of the varying noise over the sample period and is equivalent to the level of a constant noise which contains the same energy as the varying noise environment. This measure is also a common measure of environmental noise and road traffic noise.

ABL – The Assessment Background Level is the single figure background level representing each assessment period (daytime, evening and night time) for each day. It is determined by calculating the 10th percentile (lowest 10th percent) background level (L_{A90}) for each period.

RBL – The Rating Background Level for each period is the median value of the ABL values for the period over all of the days measured. There is therefore an RBL value for each period – daytime, evening and night time.

Typical Graph of Sound Pressure Level vs Time



1 EXECUTIVE SUMMARY

Roads and Maritime Services (Roads and Maritime) propose to widen the M1 Pacific Motorway from Tuggerah to the Doyalson Interchange. In this report, the noise impact of the proposal is described.

The proposal was assessed previously in Wilkinson Murray Report No. 13042 dated April 2014 (Report No. 13042) as part of the Project Review of Environmental Factors (the Project REF). The conclusion of Report No. 13042 was that at most residences the resulting change in noise level would be minimal. This is because the proposal involved only minor changes to the road alignment, and no change to the type of road surface. Nevertheless, a number of residences currently experience, or are predicted to experience by the design year of 2029, noise levels that are considered "acute" under Roads and Maritime's Environmental Direction Number 24. In these cases, feasible and reasonable mitigation should be considered. In Report No. 13042, with the introduction of the proposal 69 residences were identified as having predicted noise levels that are "acute". Since the Project REF it was found that a number of receivers considered in that report were non-residential buildings. If those buildings were excluded from the REF, the number of residences predicted to experience "acute" noise levels would have been 53. At a further 4 residences, noise levels were predicted to exceed relevant criteria and to increase by more than 2 dBA, also triggering a requirement for consideration of feasible and reasonable mitigation.

At these residences, the use of noise barriers was considered, but due to the isolated nature of the residences the required length of barrier was not considered reasonable. The report recommended that residents be offered architectural treatment to reduce internal noise levels.

Since the Project REF, the design of the proposal has been revised. Most importantly for noise, the road surface has been changed. The existing road has an open grade asphalt surface south of the Wyong River, and a concrete surface north of the Wyong River. In the Project REF design, the pavement was to be the same surface as the existing pavement; that is, open grade asphalt pavement south of the Wyong River, and concrete pavement north of the Wyong River. In the Revised Design, Stone Mastic Asphalt road surface would be used for the whole project. A summary of the number of residences impacted with this design is presented in Table 1-1.

The barrier analysis carried out for the Project REF design was repeated for the Revised Design. Due to the isolated nature of the residences, the required length of barrier is not considered reasonable for the amount of mitigation provided.

South of the Wyong River, the Revised Design is now predicted to increase noise levels by up to 2.6 dBA compared with the "No Build" case in the opening year. However, at residences where the relevant noise level criteria are predicted to be exceeded, the predicted increase is within 2 dBA in all cases. For a road redevelopment project where noise levels are predicted to increase by not more than 2 dBA, provision of at-road mitigation such as noise barriers is not considered reasonable. Without the project, about 12 residences are predicted to experience "acute" noise levels in 2029. This would increase to 15 residences once the project has been built.

North of the Wyong River, the Revised Design is predicted to reduce existing noise levels by up to 6.0 dBA because of the road surface change. Without the project, about 62 residences are predicted to experience "acute" noise levels in 2029. This would reduce to 17 residences once the project has been built.

Of the total of 32 residences predicted to be exposed to "acute" noise levels, 7 have already been provided with architectural treatment under Roads and Maritime Noise Abatement Program. It is

recommended that the remaining 25 residences be offered architectural treatment.

Two non-residential receivers were identified as being potentially impacted by traffic noise. At the Woodbury Park Community Centre, it is recommended that internal noise levels be measured inside noise-sensitive rooms once the project is operational. A childcare centre on Buttonderry Way, Jilliby, has already been provided with architectural treatment under Roads and Maritime's Noise Abatement Program.

A summary of impacts under the Revised Design is given in Table 1-1.

Table 1-1 Summary of Impacts, 10 Year after Opening (2029)

Location	No. of Residences above Noise Criterion	No. of Residences above Acute Level	Non-Residential Receivers Impacted
Without Project	211	74	Woodbury Park Community Centre, Childcare Centre
With Project	106	32	Woodbury Park Community Centre, Childcare Centre

2 INTRODUCTION

A Project Review of Environmental Factors (Project REF) was prepared by Roads and Maritime Services (Roads and Maritime) for the replacement of the existing pavement and widening of around 12.3 kilometres of the M1 Pacific Motorway from 2 lanes in each direction to 3 lanes in each direction between Wyong Road, Tuggerah, and Doyalson Link Road, Kiar (the Project). The Project REF was informed by the M1 Pacific Motorway Noise Assessment (Report No. 13042) which was prepared by Wilkinson Murray in 2014 based on the Project REF Design. Roads and Maritime determined to proceed with the Project in October 2014.

Following the determination to proceed with the Project, detailed design has been undertaken by Hyder Consulting. The detailed design process has resulted in a Revised Design which is the subject of a Supplementary Review of Environmental Factors (Supplementary REF). This report (Report No. 13042-D) assesses the operational noise impacts of the Revised Design and will be used to inform the Supplementary REF.

As in the previous report, the assessment is based on provisions in the Environment Protection Authority's *Road Noise Policy (RNP)* and Roads and Maritime's *Environmental Noise Management Manual (ENMM)*.

3 DESCRIPTION OF THE PROPOSAL & STUDY AREA

3.1 Overview of Proposal

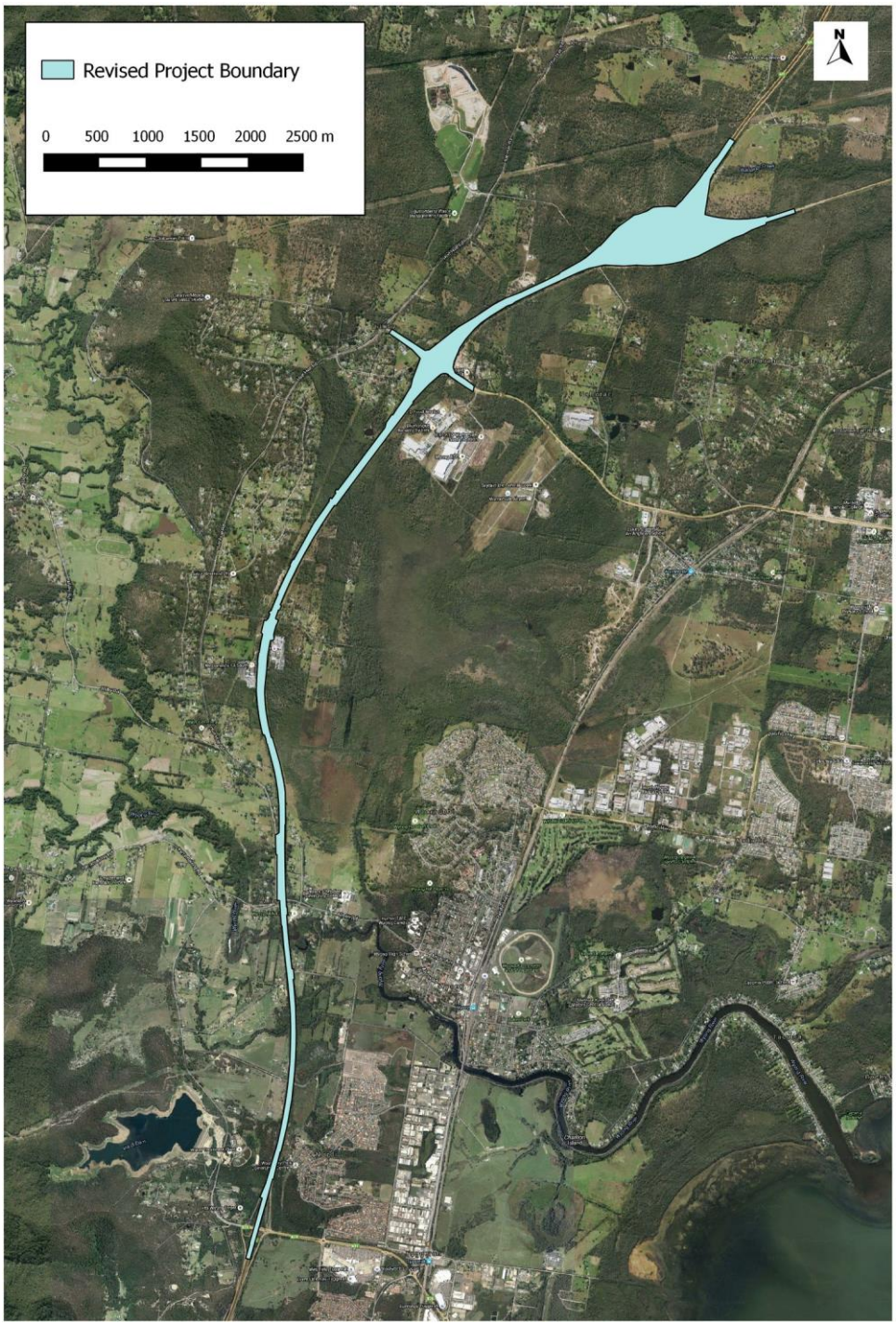
Roads and Maritime Services NSW (Roads and Maritime) proposes to widen around 12.1 kilometres of the M1 Pacific Motorway (formerly known as the F3 Freeway) to 6 lanes between Wyong Road, Tuggerah, and the Doyalson Link Road, Kiar.

The main elements of the proposal include:

- Providing 2 additional lanes (one each northbound and southbound) to provide 3 northbound and 3 southbound lanes, each with 3.5 metre lane widths. Widening to 3 lanes would be undertaken predominantly within the median, with line re-marking and some minor widening on the outside of the carriageway in some locations.
- Replacement of the existing road surface along the entire route with Stone Mastic Asphalt (SMA). In the Project REF the pavement was to be the same surface as the existing pavement: that is open grade asphalt pavement south of the Wyong River, and concrete pavement north of the Wyong River. The change to using SMA has been proposed to improve operation and maintenance of the proposed pavement.
- Upgrades to the existing Warnervale Interchange (Sparks Road) including a new northbound G-type entry ramp, reconfiguration of intersections and approaches, widening the southbound off ramp and widening the existing bridge to address drainage issues and provide pedestrian and cyclist access.
- Provision for a future southbound motorway off ramp on to Doyalson Link Road and a new motorway northbound on ramp from Doyalson Link Road including a new bridge over the motorway (subject to further investigation including traffic modelling).
- Provision of 2 additional lanes (one each northbound and southbound) on each of 6 twin bridges by new line-marking (no physical widening of the bridge structures is proposed with additional lanes accommodated wholly within the existing road pavement with reduced shoulder widths where required).
- Provision of an additional lane by bridge widening and new line-marking on the northbound motorway bridge over St Johns Road.

Figure 3-1 shows the project boundary of the Revised Design.

Figure 3-1 Project Boundary



3.2 Study Area & Noise Catchment Areas

Noise is assessed at receivers whose use is sensitive to noise, such as residences, childcare centres, schools and places of worship. Non-residential sensitive receivers identified within the study are discussed in Section 3.3.

Noise Catchment Areas (NCAs)were identified in order to facilitate labelling of receivers. The NCA's were determined during the Project REF by changes in pavement type or interchange.

Figure 3-4 shows the locations of Noise Catchment Areas used for the assessment.

NCA 1 is on the eastern side of the motorway and extends from the southern end at Wyong Road, Mardi, to the Wyong River bridge crossing. This catchment encompasses the section of the motorway that is paved with flexible pavement (open graded asphaltic concrete). In the southern part of this NCA is the suburb of Mardi, where houses are as close as 130 metres from the Motorway, but generally more than 300 metres. In the northern part of the NCA, there are generally isolated residences.

NCA 2 is on the western side of the motorway from the southern extent at Wyong Road, Mardi, to the Wyong River bridge crossing. There are no conurbations of houses in this NCA which comprises isolated residences, some in small groups.

NCA 3 is on the eastern side of the motorway from the Wyong River to Sparks Road. This NCA comprises isolated residences, some in small groups.

NCA 4 extends from the western side of the motorway from Wyong River to Sparks Road. This NCA comprises mostly isolated residences; however, there are some small groups of residences, for example at Hue Hue Road in Alison and, at the north, near the northbound off-ramp to Sparks Road in Jilliby.

NCA 5 is on the eastern side of the motorway, north of Sparks Road, continuing to the northern extent of the proposal. Seven isolated residences were identified.

NCA 6 is on the western side of the motorway, north of Sparks Road, continuing to the northern extent of the proposal. Two residences were identified on Hue Hue Road.

All NCAs include some residences that would generally be considered to be "isolated". Neither the *RNP* nor the *ENMM* give specific guidance on what constitutes an isolated residence. In Practice Note IV, the *ENMM* states in reference to mitigation: "If residences are closely grouped in numbers of 3 or less, architectural treatments are preferred over roadside barriers, as it is likely that the cost per receiver for barriers will be at least twice that for architectural treatments." That is, roadside barriers are considered where residences are closely grouped in numbers of 4 or more.

"Isolated" residences are considered to be residences where the density of housing is so low that provision of noise barriers would be significantly less cost effective than provision of architectural treatment to the individual residences.

3.3 Non-Residential Noise-Sensitive Receivers

Two non-residential noise-sensitive receivers were identified within the study area.

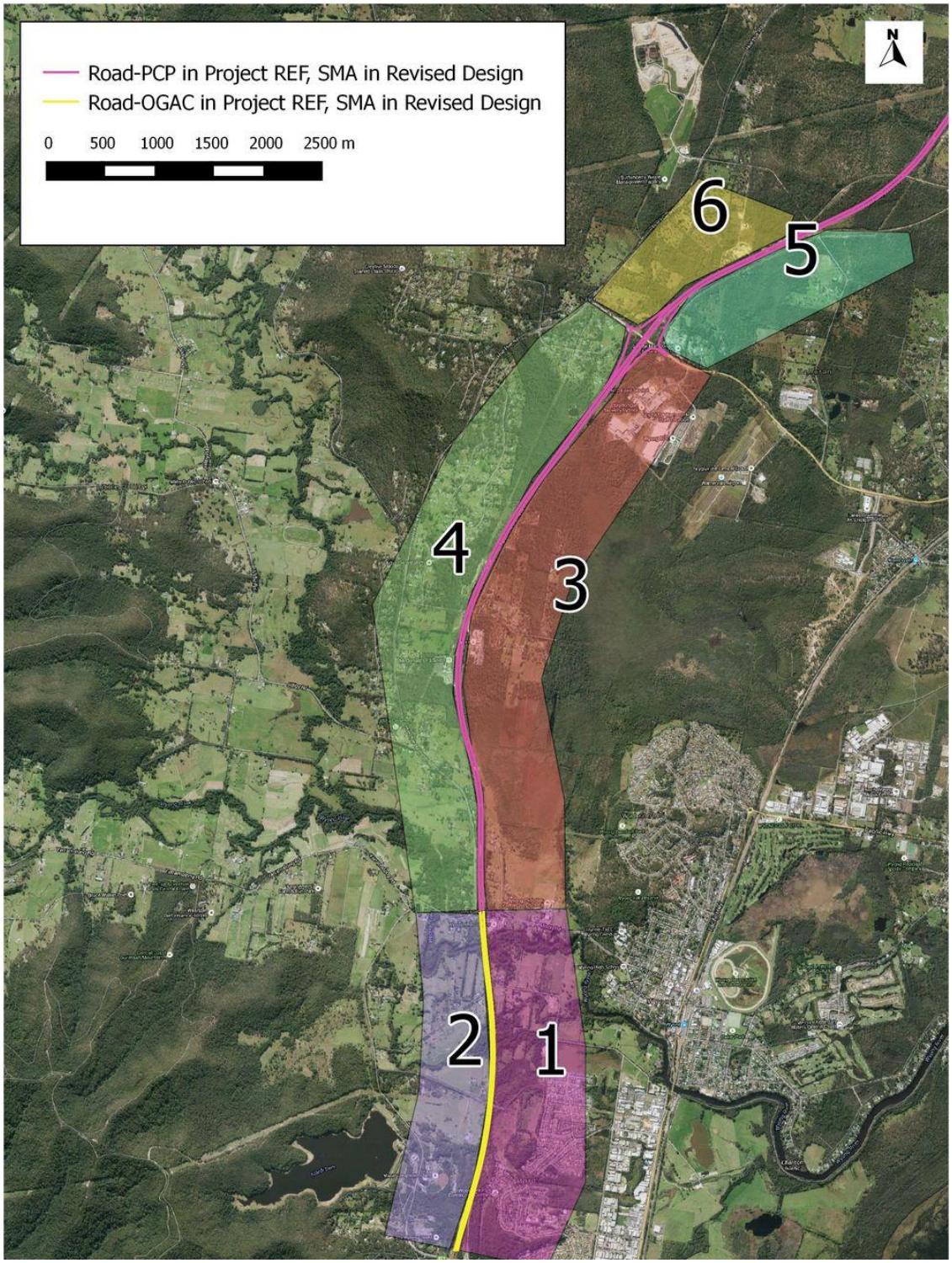
The Woodbury Park Community Centre is in NCA 1 on Woolmers Crescent, Mardi. The centre has interview rooms and activity rooms (Receiver N1-28 shown on Figure 3-2).

Figure 3-2 Location of Woodbury Park Community Centre

A childcare facility operates at 23 Buttonderry Way, Jilliby (Receiver N4-86 as shown on Figure 3-3). The premises have been provided with architectural treatment under the Noise Abatement Program (NAP).

Figure 3-3 Location of Childcare Facility

Figure 3-4 Noise Catchment Areas



4 ROAD TRAFFIC NOISE GOALS

4.1 Noise Criteria for Residential Land Use

Noise criteria are assigned to sensitive receivers using the EPA's *Road Noise Policy (RNP)*. The assessment timeframe for the criteria are in the year of opening and 10 years after opening.

The assessment area extends to 600 metres from the centre line of the outermost traffic lane on each side of the project road.

The motorway and all associated ramps are considered to be in the freeway category and is considered to be a redevelopment because it is not substantially realigned. This is consistent with the *RNP*.

Residences may be assigned redeveloped or relative increase criteria depending on how the project will influence noise levels. The relative increase criterion is made to prevent large increases in noise levels. For each facade of the residence, the most stringent applicable criteria will be used in the assessment.

The criteria for residences are summarised in Table 4-1.

Table 4-1 *RNP* Criteria for Redevelopment of Freeways

Road Category	Assessment Criteria – dBA	
	Day (7am-10pm)	Night (10pm-7am)
Noise Assessment Criteria	$L_{Aeq,15hr}$, 60 (external)	$L_{Aeq,9hr}$ 55 (external)
Relative Increase Criteria	Existing traffic $L_{Aeq,15hr}$ + 12 dBA (external)	Existing traffic $L_{Aeq,9hr}$ + 12 dBA (external)

Note that for both day and night time, the more stringent redeveloped road criteria have been adopted.

The criteria for non-residential sensitive receivers are summarised in Table 4-2.

Table 4-2 Assessment Criteria for Operational Traffic Noise – Non-Residential Receivers

Existing Sensitive Land Use	Assessment Criteria – dBA	
	Day (7am-10pm)	Night (10pm-7am)
1. School classrooms	$L_{Aeq,1hr}$ 40 (internal) when in use	-
4. Open space (active use)	$L_{Aeq,15hr}$ 60 (external) when in use	-
5. Open space (passive use)	$L_{Aeq,15hr}$ 55 (external) when in use	-
8. Childcare facilities	Sleeping rooms $L_{Aeq,1hr}$ 35 (internal) Indoor play areas $L_{Aeq,1hr}$ 40 (internal) Outdoor play areas $L_{Aeq,1hr}$ 55 (external)	-

Criteria for Community Centres depend on their use. The centre has interview rooms and activity rooms and the noise criterion for classrooms will be used.

To predict internal noise levels in school classrooms and childcare facilities, it is assumed that internal noise is 10 dBA less than external noise. This is based on a façade facing the motorway with windows open for ventilation.

Commercial receivers are not considered noise-sensitive receivers and therefore are not assessed for operational noise impacts.

Feasible and reasonable noise mitigation is considered where predicted noise levels exceed the project specific noise criteria. The process for qualifying a receiver for consideration of noise mitigation is included in Section 9.

4.2 Assessment Timeframe

For road redevelopment projects, the *RNP* requires assessment in 2 timeframes:

- Timeframe 1 – within 1 year of changed traffic conditions. This is generally referred to as the Opening Year. The proposed opening year is 2019.
- Timeframe 2 – for a design year (typically 10 years) after changed traffic conditions. This is generally referred to as the Assessment Year. The proposed Assessment Year is 2029.

For each timeframe the *RNP* requires comparison between:

- The road traffic noise levels if the project proceeds (termed the "build option").
- The corresponding road traffic noise levels, allowing for traffic growth, that would have occurred if the project had not proceeded (termed the "No Build option").

Both timeframes are examined in this report, however the focus is on the differences in predicted noise level for the assessment year which is the most important for design of noise mitigation.

5 NOISE MONITORING

5.1 Purpose

For road design purposes, noise monitoring is done to measure existing traffic noise to allow validation of the noise model used for the operational traffic assessment.

For Report No. 13042, 3 locations were monitored. A commitment resulting from the Submissions Report to the Project REF was that further monitoring would be done at 54 Hue Hue Road, Alison. This is because noise levels previously measured at that location showed higher noise levels than predicted in Report No. 13042. This section includes a description of those measurements and the implication of the results.

5.2 Method & Results

For Report No. 13042 monitoring was undertaken simultaneously with traffic counts at 3 locations between 4 April and 16 April 2013.

Monitoring at 54 Hue Hue Road was done with simultaneous traffic counts on both the M1, north of Alison Road, and Hue Hue Road between 14 June and 25 June 2015.

The addresses of the properties where loggers were located are shown in Table 5-1. A map showing the locations of the loggers is provided in Figure 5-1. Close-up location maps are given on the cover pages of result charts in Appendix A.

The noise monitoring equipment used for these measurements consisted of environmental noise loggers set to A-weighted, fast response, continuously monitoring over 15-minute sampling periods. This equipment is capable of remotely monitoring and storing noise level descriptors for later detailed analysis. The equipment calibration was checked before and after the survey and no significant drift was noted.

The logger determines L_{A1}, L_{A10}, L_{A90} and L_{Aeq} levels of the ambient noise. L_{A1}, L_{A10} and L_{A90} are the levels exceeded for 1%, 10% and 90% of the sample time respectively (see Glossary of Acoustic Terms for definitions). The L_{A1} is indicative of maximum noise levels due to individual noise events such as the occasional pass-by of a heavy vehicle. This is used for the assessment of sleep disturbance. The L_{A90} level is normally taken as the background noise level during the relevant period.

The logging results have been edited to exclude periods of rain or excessive wind, as determined using data from the Bureau of Meteorology. Results from 2013 used data from Mangrove Mountain, and results from 2015 used data from Gosford. Both stations are considered suitable. All logging locations have noisy environments primarily due to traffic noise.

Table 5-1 Logger Locations

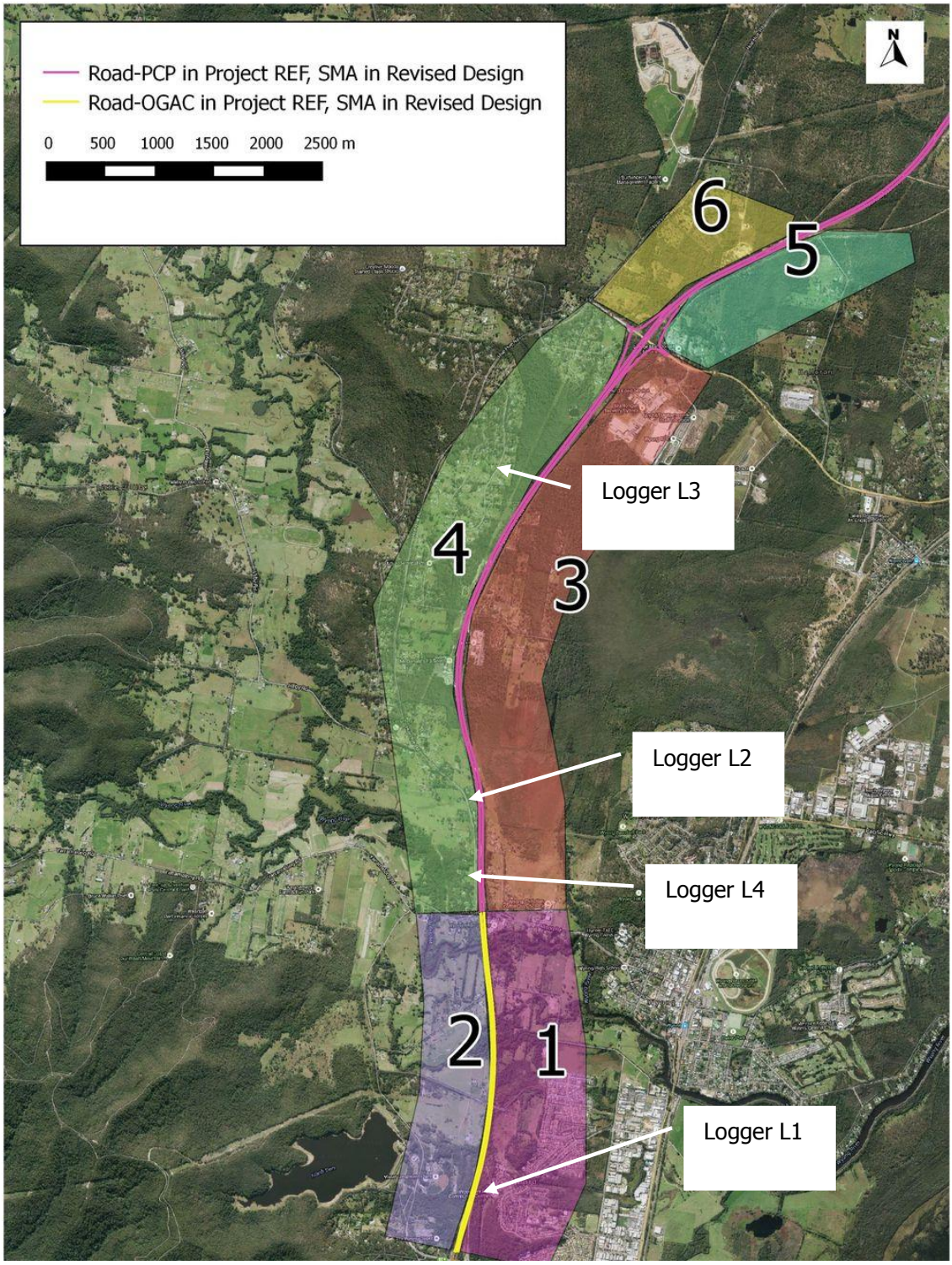
Logger No.	Date	Address	Distance to M1
L1	4/4/2013-16/4/2013	10 Woolmers Crescent, Mardi	96m
L2	4/4/2013-16/4/2013	93 Hue Hue Road, Alison	25m
L3	4/4/2013-16/4/2013	34 Holloway Drive, Jilliby	169m
L4	14/6/2015-25/6/2015	54 Hue Hue Road, Alison	105m

The traffic noise results ($L_{Aeq,period}$) are given in Table 5-2.

Table 5-2 Noise Levels, L_{Aeq}, dBA

Logger No.	Address	$L_{Aeq,15hr}$	$L_{Aeq,9hr}$	
L1 (2013)	10 Woolmers Crescent, Mardi	55.6	48.1	Free field
L2 (2013)	93 Hue Hue Road, Alison	73.8	69.4	Façade measurement
L3 (2013)	34 Holloway Drive, Jilliby	60.2	53.5	Free field
L4 (2015)	54 Hue Hue Road, Alison	67.1	64.3	Free field

Figure 5-1 Logger Locations



6 NOISE MODELLING

6.1 Purpose of Noise Modelling

The purpose of noise modelling is to predict traffic noise levels at sensitive receivers.

A noise model takes inputs such as road alignment, topography, traffic flow and receiver location, and predicts noise levels.

An assessment of a new road or road redevelopment requires prediction of existing and future noise. Hence at all residences and other sensitive receivers the model should predict noise levels for both the "Build" and "No Build" options.

6.2 Modelling Procedure & Assumptions

Noise levels from the existing road alignment were calculated using procedures based on the *Calculation of Road Traffic Noise (CoRTN)* prediction algorithms using CadnaA noise modelling software. Predictions were also verified using SoundPLAN software. The standard *CoRTN* prediction procedures were modified in the following ways.

- Noise predictions were based on the calculation of $L_{Aeq,1hr.}$ To determine the hourly volume the total daytime (15 hour) volume was divided by 15 and night time (9 hour) traffic volumes were divided by 9.

- L_{Aeq} values were calculated from the L_{A10} values predicted by the *CoRTN* algorithms using the well-validated approximation $L_{Aeq,1hr} = L_{A10,1hr} - 3$.

- Noise source heights were set at 0.5 metres for cars, 1.5 metres for heavy vehicle (engine and tyre/road noise component) and 3.6 metres for heavy vehicle exhausts, representing typical values for Australian vehicles. Noise from a heavy vehicle exhaust was assessed as 8 dBA lower than the noise from the engine (Nelson, P. M, *Transportation Noise Reference Book, Chapter 7, Table 7.2,* Butterworth & Co 1987). The combined noise from heavy vehicle exhaust and engine gives the sound level as defined in *CoRTN*. The acoustical energy for the various sources is then derived from speed, road surface and traffic volume.

- Small negative corrections for "Australian conditions", derived from documented validation of the *CoRTN* algorithms, have been included, both for calculations with and without façade correction. For façade predictions the correction is -1.7 dBA (April 1983 Australian Road Research Board report – Research Report ARR No.122).

- Where there are no barriers present, ground was taken to be 75% soft. With barriers, hard ground is assumed as required under the *CoRTN* procedures.

6.3 Model Inputs

6.3.1 Road Alignment & Topography

Details of the surrounding topography, as 2 metre contours, and road alignments were provided digitally by Roads and Maritime. The terrain is generally between 0 metres and 30 metres above sea level with rolling hills. There are no deep cuttings in this section of the motorway.

With the exception of the Doyalson Interchange, the proposed alignment is within the existing alignment, with new lanes, and alignment variations, being built within the existing median. The Doyalson Interchange includes new northbound entry and exit ramps outside the existing pavement alignment; however, this area is not adjacent to receivers.

6.3.2 Traffic Speed

The sign posted speed on the motorway is 110 km/h. Heavy vehicles are speed limited to 100 km/h. Therefore, light vehicles were modelled at 110 km/h, and heavy vehicles at 100 km/h.

Modelled speed on ramps was 80 km/h.

6.3.3 Road Surface Correction

In the Project REF design it was proposed to use a concrete pavement for the M1 north of the Wyong River, and Open Graded Asphaltic Concrete (OGAC) south of the Wyong River. In the Revised Design it was decided to adopt Stone Mastic Asphalt (SMA) for the entire length of the proposal because of its superior structural performance in resisting traffic loads, its longer life which requires less frequent maintenance and reduced construction timeframes.

The performance of SMA is variable. While Wilkinson Murray's standard correction at 100 km/h and 10% heavy vehicles is -3 dBA, and -2 dBA for 40% heavy vehicles, Roads and Maritime has instructed that for this project a correction of -2 dBA should be used. It is understood that the revised correction is based on recent measurements of the surface likely to be used at this project.

For other surfaces, the modelled surface corrections are given in Table 6-1. The corrections are Wilkinson Murray's standard corrections for traffic with 10% heavy vehicles.

The performance of OGAC is also variable. Wilkinson Murray's standard correction for OGAC is -4 dBA, and applies to mid-life of the pavement. As OGAC will not be used on the new road, the performance of OGAC only relates to existing noise. In the model validation, discussed in Section 7, there was good agreement between the model and measurements at the measurement location adjacent to the OGAC section of the M1 Pacific Motorway. Therefore, the Wilkinson Murray standard correction was not altered for the existing model.

The surface correction was not applied to sources for truck exhausts. Because the exhaust is 3.6 metres above the road, it has less interaction with the road surface than the tyre and engine noise emissions.

Table 6-1 Road Surface Corrections

Road Surface Type	Vehicle Speed km/h		
	60	80	100/110
Dense Graded Asphaltic Concrete (DGAC) (on ramps)	0	0	0
Open Graded Asphaltic Concrete (OGAC)	-3.5	-3.5	-4
Concrete	1.5	2	2.5
Stone Mastic Asphalt (RMS provided)	-2	-2	-2

6.3.4 Receiver Heights

Receiver heights used were:

- For traffic noise validation at logger microphone heights – 1.5 metres.
- For residential single storey receivers – 2 metres.
- For residential double storey receivers – 4.5 metres.

6.3.5 Facade Reflections

For prediction of operational noise to residences, a 2.5 dBA correction was added to the noise results.

6.3.6 Australian Conditions

The Australian correction of -1.7 dBA was applied to facade predictions (April 1983 Australian Road Research Board report – Research Report ARR No.122).

7 MODEL VALIDATION

7.1 Revisions since Project REF

For Report No. 13042, model validation was performed at 3 locations. A commitment resulting from the Submissions Report to the Project REF was that further monitoring would be performed at 54 Hue Hue Road, Alison. This is because noise levels previously measured at that location showed higher noise levels than predicted in Report No. 13042. This section includes a description of those measurements and the implication of the results.

The monitoring performed at 54 Hue Hue Road, as described in Section 5, was accompanied by simultaneous traffic counts on Hue Hue Road and the M1 in order to provide a fourth validation point.

The resident at 54 Hue Hue Road indicated that predicted noise levels at that location, as listed in Report No. 13042, were lower than measurements performed in earlier years for the NSW Noise Abatement Program. In validating the model to the measurement it was found that in the "No Build" model used for Report No. 13042, one lane of open grade asphalt pavement had been allowed to continue north of Alison Road. The error lead to under-prediction of noise for approximately 1 km north of the Alison Road overpass. The error was in the "No Build" model only, so the results showed a high increase in noise due to the "Build" model. This can be seen in Figure 8-2, an overview of the impacts from the Project REF, which shows a group of residences near 54 Hue Hue Road indicated by red stars, which indicates higher than 2 dBA increase in noise with the project.

The revised noise model is used for the remainder of the validation. The revision affects only the results at validation points 54 Hue Hue Road and 93 Hue Hue Road.

7.2 2013 Traffic Counts

The weekly counts at the midway point along the M1 Pacific Motorway, near the service centres on both northbound and southbound lanes, are shown in Table 7-1. These are the values used in the noise validation model which was used to compare with the measured noise levels. The count includes a full week of data, including both Saturday and Sunday.

Table 7-1 Traffic Count near Service Centre

Direction	Period	Daily Average			
		Light	Heavy	Total Vehicles	Percent Heavy
Southbound	Nigh time 9hr	2223	651	2874	22.7
	Daytime 15hr	20676	1893	22569	8.4
Northbound	Night time 9hr	3259	634	3893	16.3
	Daytime 15hr	21602	1726	23328	7.4
	Total	**47759**	**4905**	**52664**	

7.3 2015 Traffic Counts

The following traffic counts were provided:

- Hue Hue Road – 15 to 22 June, 7 days both ways. The daily counts are shown in Table 7-2;
- M1 north of Alison Road – 24 June to 1 July Northbound and 24 to 26 June Southbound. The Southbound data was complete for only 3 days due to tube breakages. The missing weekdays and Saturday were filled with data from 24 to 26 June, and Sunday was copied from the Northbound data.

Table 7-2 Traffic Count at Hue Hue Road

Direction	Period	Daily Average			
		Light	Heavy	Total Vehicles	Percent Heavy
Southbound	Night time 9hr	249	20	269	8%
	Daytime 15hr	2304	151	2455	6%
Northbound	Night time 9hr	155	22	178	13%
	Daytime 15hr	2404	277	2681	10%
	Total	**5112**	**470**	**5582**	

Table 7-3 Traffic Count – M1 North of Alison Road

Direction	Period	Daily Average			
		Light	Heavy	Total Vehicles	Percent Heavy
Southbound	Night time 9hr	4673	1086	5759	19%
	Daytime 15hr	27653	3189	30842	10%
Northbound	Night time 9hr	3376	900	4276	21%
	Daytime 15hr	28093	3204	31296	10%
	Total	**63795**	**8379**	**72174**	

7.4 Traffic Speeds

The 2015 traffic counts provided the following 85th percentile speeds which were used for validation of the model at 54 Hue Hue Road:

The following speeds were modelled:

- M1 Pacific Motorway – light vehicles 111 km/h, heavy vehicles 102 km/h.
- Hue Hue Road – all vehicles 85 km/h.

Speed information was not provided in the 2013 traffic counts, so signposted speeds were used in the Project REF. This was maintained in this report for the sites used for validation in the Project REF: the difference between the signposted speeds, and those used for 54 Hue Hue Road validation, is equivalent to approximately 0.1 dBA which would not change the conclusion of the validation process.

7.5 Results

The results of the validation at the 4 noise logger locations are shown in Table 7-4.

The agreement at locations L1 and L2 is within 2 dBA. This is the margin considered satisfactory for a noise model.

At Location L3, the daytime validation was within 1dB; however, the night time level difference was 2.8 dBA. Because the model over-predicts the noise when compared to the measured noise, the model results are considered conservative.

At Location L4, the model was revised to include traffic on Hue Hue Road. The traffic noise due to Hue Hue Road was significantly less than the noise from the M1, and increases the total noise by less than 1 dBA. The predicted levels were within 2 dBA of the measured levels.

Based on the above results, the model is considered valid.

Table 7-4 Noise Validation Results

Rec.	Measurement Condition	Address	Calculated		Measured		Difference – > 0 indicates Over-Prediction	
			Day	Night	Day	Night	Day	Night
L1	Free field	10 Woolmers Crescent, Mardi	55.5	49.4	55.6	48.1	-0.1	1.3
L2[1]	Façade	93 Hue Hue Road, Alison	74.8	69.9	73.8	69.4	1	0.5
L3	Free field	34 Holloway Drive, Jilliby	60.8	56.3	60.2	53.5	0.6	2.8
L4	Free field	54 Hue Hue Road, Alison	68.7	64.1	67.1	64.3	1.6	-0.2

Note 1: Supersedes values in Project REF.

8 OPERATIONAL NOISE ASSESSMENT

8.1 Traffic Volumes for Report No. 13042

Detailed traffic volume predictions for future years were not available for modelling in Report No. 13042. Estimates provided by Roads and Maritime are shown in Table 8-1. To distribute the volumes in Table 8-1 over the northbound and southbound carriageways, and the interchange ramps, the volumes from that table were divided according to ratios determined from the detailed classified count used in the validation process.

Table 8-1 Traffic Volumes used for Project REF

Source	Year	ADT
Roads and Maritime Modelling	2010	65,000
	2016	70,000
	2031	90,000
Interpolated Opening Year (AADT)	2019	73,900
Interpolated Assessment Year (AADT)	2029	88,400

8.2 Traffic Volumes used for Revised Design

The road designations for assignment of traffic volumes are shown in Figure 8-1. The predicted volumes provided for each road section are listed in Table 8-2.

Figure 8-1 Road Designation for Traffic Volumes

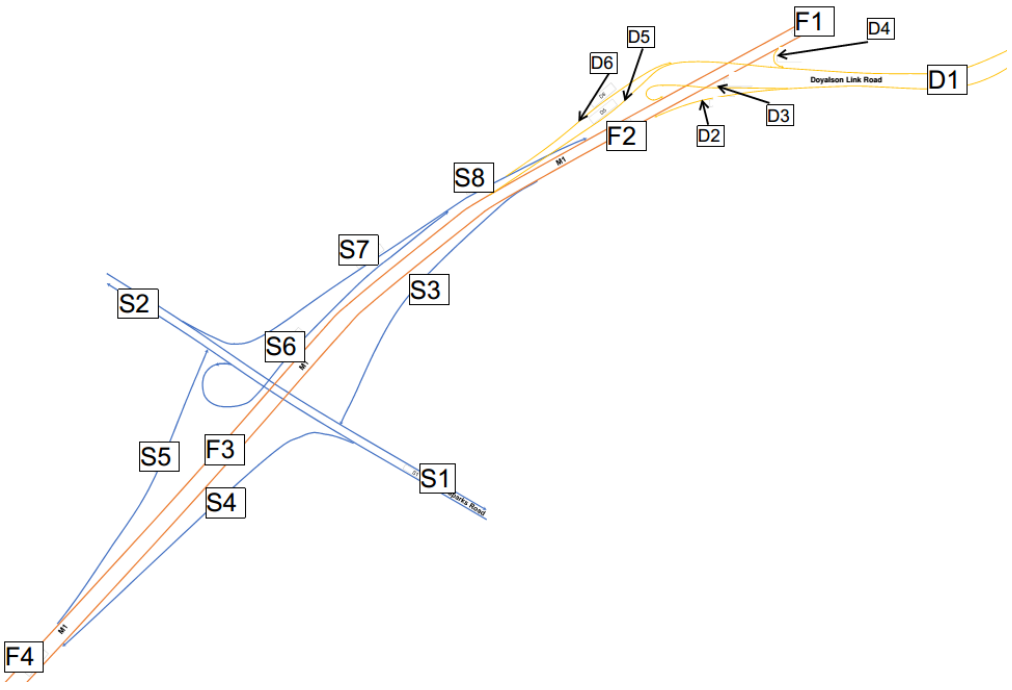


Table 8-2 Traffic Volumes Provided

Road Section ID	2019			2029		
	Daily	15-Hours	9-Hours	Daily	15-Hours	9-Hours
D1	21,670	18,130	3,540	24,800	20,760	4,040
D2	10,770	9,010	1,760	11,690	9,780	1,910
D3	500	420	80	1,140	950	190
D4	140	120	20	1,210	1,010	200
D5	8,700	7,280	1,420	8,770	7,340	1,430
D6	1,570	1,310	260	2,000	1,670	330
F1	47,320	39,600	7,720	51,670	43,240	8,430
F2	57,450	48,070	9,380	61,010	51,060	9,950
F3	56,440	47,230	9,210	58,370	48,850	9,520
F4	76,400	63,930	12,470	80,680	67,510	13,170
S1	26,940	22,540	4,400	31,500	26,360	5,140
S2	9,770	8,180	1,590	11,330	9,480	1,850
S3	5,840	4,890	950	6,560	5,490	1,070
S4	10,620	8,890	1,730	11,970	10,020	1,950
S5	9,330	7,810	1,520	10,340	8,650	1,690
S6	3,560	2,980	580	4,780	4,000	780
S7	1,850	1,550	300	2,070	1,730	340
S8	5,410	4,530	880	6,850	5,730	1,120

Table 8-3 shows the predicted percentage of heavy vehicles for each section.

Table 8-3 Percentage of Heavy Vehicles per Road Section

Road Section ID	Daily % of Heavy Vehicles[1]
D1	6.50%
D2	6.50%
D3	6.50%
D4	6.50%
D5	6.50%
D6	6.50%
F1	12.00%
F2	12.00%
F3	12.00%
F4	12.00%
S1	6.90%
S2	7.20%
S3	7.10%
S4	7.10%
S5	7.10%
S6	7.10%
S7	7.10%
S8	7.10%

Note 1: 24-hour % of HV. Night and day time splits are not available.

Table 8-3 lists the heavy vehicle volume for the 24-hour period. For noise modelling the heavy vehicle volumes for the daytime and night time periods are required. The following procedure was used to determine an appropriate split of heavy vehicles between daytime and night time periods based on previous traffic counts undertaken for noise model validation.

Traffic counts done on the M1 Pacific Motorway in 2013 are shown in Table 8-6. Based on those counts the following heavy vehicle percentages were adopted: daytime 10% and night time 22%. These percentages are higher than the total heavy vehicle counts shown in Table 8-6, and therefore lead to conservative noise predictions. In summary, the assumptions used to determine the light and heavy vehicle volumes for modelling are:

- The total vehicles per day is as shown in Table 8-2 for each road segment;
- The 24-hour percentage heavy vehicles is as given in Table 8-3;
- Daytime percentage heavy vehicles is 10%; and
- Night time percentage heavy vehicles is 22%.

Maintaining those assumptions leads to the traffic volumes given in Table 8-4.

Table 8-4 Day & Night Traffic Assumed for M1

Road	Daily Percentage Heavy	Daytime Total	Day Time Heavy (10%)	Night Time Total	Night Time Heavy (22%)	Total Vehicles
F1	12%	38,916	4324	6,554	1876.4	51,670
F2	12%	45,954	5106	7,735	2215.2	61,010
F3	12%	43,965	4885	7,401	2119.4	58,370
F4	12%	60,759	6751	10,239	2930.6	80,680

Further details of the process have been added in Table 8-5:

1. Given: the total percentage of heavy vehicles for the 24-hour period is 12%.
2. 12% of the 24-hour volume gives the number of heavy vehicles on the road per day.
3. Assume daytime 15-hour volume is 10% heavy vehicles. This column has the number of heavy vehicles for the 15-hour daytime period (10% of "Daily All Vehicles" column).
4. This is the number of trucks remaining for the night time 9-hour period after taking the daily number from the total number of heavy vehicles.
5. The night time percentage of heavy vehicles based on the number of heavy vehicles worked out in step 4.

This procedure has been checked by a traffic engineer at Hyder Consulting.

Table 8-5 Working for Table 8-4

Road Section ID	2029			1. Daily % of Heavy Vehicles	2. Total Daily Heavy Vehicles	3. Heavy Vehicles Daytime, Assuming 10% Heavy	4. How many Heavy Vehicles are left for night time?	5. What percentage is that?
	Daily All Vehicles	15hrs	9hrs	Daily	Daily	15hrs	9hrs	9hrs
F1	51,670	43,240	8,430	12%	6200	4324	1876	22%
F2	61,010	51,060	9,950	12%	7321	5106	2215	22%
F3	58,370	48,850	9,520	12%	7004	4885	2119	22%
F4	80,680	67,510	13,170	12%	9682	6751	2931	22%

Table 8-6 Traffic Count near Service Centre, 2013

Direction	Period	Daily Average			
		Light	Heavy	Total Vehicles	Percent Heavy
Southbound	Nigh time 9hr	2223	651	2874	22.7
	Daytime 15hr	20676	1893	22569	8.4
Northbound	Night time 9hr	3259	634	3893	16.3
	Daytime 15hr	21602	1726	23328	7.4
	Total	**47759**	**4905**	**52664**	

8.3 Noise Modelling Results

The model has been used to predict noise levels at 603 receivers, representing all identified noise-sensitive receives within 600 metres of the M1 Pacific Motorway along the study route. Predictions are presented for 2029 for both the "Build" option and "No Build" option. Note that although both daytime and night time noise levels are presented, in all cases the night time values are the most critical, in the sense that if daytime noise levels exceed relevant criteria, night time levels also exceed criteria at the same residence.

8.3.1 Project REF Results

This section presents the results from Report No. 13042. The following tables present overall numbers of exceedances, broken down by NCA. The tables show the number of exceedances and number of residences where predicted levels are acute for both 2019 and 2029. Details of noise predictions at each residence are given in Appendix C for 2029 and F for 2019. Appendices B, D and E also show individual receiver numbers.

Table 8-7 identifies the number of residences in each catchment area which either exceed the *RNP* noise criteria or are acute noise for the "No Build" Option.

Table 8-8 identifies the number of residences in each catchment area where predicted noise levels either exceed the *RNP* noise criteria or are acute for the "Build" Option.

Since the Project REF, 19 of the receivers previously considered have been determined to be non-residential and removed from the model. Therefore the number of receivers in Table 8-7 and Table 8-8 is lower than in Report No. 13042. One extra residence has been added to the model and designated N4-85. The Project REF noise model was used to predict noise at that residence.

Table 8-7 Project REF Design – Number of Residences where Predicted Noise Levels exceed Noise Criteria – "No Build" Option

NCA	Receivers in Catchment	Year	"No Build" Option Exceeds *RNP* Criterion		Residences where Predicted Levels are Acute	
			Day	Night	Day	Night
NCA 1	374	2019	11	11	3	3
		2029	14	15	3	3
NCA 2	29	2019	11	11	5	5
		2029	15	15	5	5
NCA 3	36	2019	20	21	5	5
		2029	22	23	6	6
NCA 4	158	2019	74	78	23	26
		2029	90	92	26	28
NCA 5	6	2019	5	5	2	2
		2029	6	6	2	2
NCA 6	0	2019	0	0	0	0
		2029	0	0	0	0
Total	**603**	**2019**	121	126	38	41
		2029	147	151	42	44

Table 8-8 Project REF Design – Number of Residences where Predicted Noise Levels Exceed Noise Criteria – "Build" Option

NCA	Receivers in Catchment	Year	"Build" Option Exceeds *RNP* Criterion		Residences where Predicted Levels are Acute	
			Day	Night	Day	Night
NCA 1	374	2019	9	13	1	2
		2029	13	13	2	2
NCA 2	29	2019	8	8	3	4
		2029	9	10	4	4
NCA 3	36	2019	23	24	7	8
		2029	25	26	9	10
NCA 4	158	2019	83	96	27	29
		2029	104	115	31	35
NCA 5	6	2019	3	3	2	2
		2029	5	6	2	2
NCA 6	0	2019	0	0	0	0
		2029	0	0	0	0
Total	**603**	**2019**	126	144	40	45
		2029	156	170	48	53

8.3.2 Results for Revised Design

This section presents the results from modelling of the Revised Design.

Table 8-9 identifies the number of residences in each catchment area where predicted noise levels either exceed the *RNP* noise criteria or are acute for the "No Build" Option.

Table 8-10 identifies the number of residences in each catchment area where predicted noise levels either exceed the *RNP* noise criteria or are acute for the "Build" Option.

Table 8-9 Revised Design – Number of Residences where Predicted Noise Levels exceed Noise Criteria – "No Build" Option

NCA	Receivers in Catchment	Year	"No Build" Option Exceeds *RNP* Criterion		Residences where Predicted Levels are Acute	
			Day	Night	Day	Night
NCA 1	374	2019	12	26	2	4
		2029	16	26	2	6
NCA 2	29	2019	10	16	4	6
		2029	10	16	5	6
NCA 3	36	2019	23	27	7	13
		2029	24	28	8	14
NCA 4	158	2019	81	121	25	35
		2029	100	135	30	46
NCA 5	6	2019	5	6	2	2
		2029	6	6	2	2
NCA 6	0	2019	0	0	0	0
		2029	0	0	0	0
Total	**603**	**2019**	131	196	40	60
		2029	156	211	47	74

Table 8-10 Revised Design – Number of Residences where Predicted Noise Levels exceed Noise Criteria – "Build" Option

NCA	Receivers in Catchment	Year	"Build" Option Exceeds *RNP* Criterion		Residences where Predicted Levels are Acute	
			Day	Night	Day	Night
NCA 1	374	2019	17	24	4	6
		2029	19	25	4	8
NCA 2	29	2019	10	15	4	7
		2029	10	17	5	7
NCA 3	36	2019	6	15	1	3
		2029	8	18	1	3
NCA 4	158	2019	24	35	7	11
		2029	28	44	9	13
NCA 5	6	2019	2	2	1	1
		2029	2	2	1	1
NCA 6	0	2019	0	0	0	0
		2029	0	0	0	0
Total	**603**	**2019**	59	91	17	28
		2029	67	106	20	32

Table 8-11 Summary of Total Exceedances – Project REF & Revised Design

NCA	Year	Residences where Predicted Levels Exceed *RNP* Criterion		Residences where Predicted Levels are Acute	
		Day	Night	Day	Night
Project REF – No Build	2019	121	126	38	41
	2029	147	151	42	44
Project REF – Build	2019	126	144	40	45
	2029	156	170	48	53
Revised Design – No Build	2019	131	196	40	60
	2029	156	211	47	74
Revised Design – Build	2019	59	91	17	28
	2029	67	106	20	32

8.4 Discussion

The changes in predictions from the Project REF to the Revised Design are generally consistent with the different road surfaces adopted.

In NCA 1 and NCA 2, where predicted noise levels exceed the RNP criterion, noise levels are predicted to increase by up to 2 dBA due to the Revised Design. The *RNP* states that *an increase of up to 2 dB represents a minor impact that is considered barely perceptible to the average person*. Thus the overall impact in NCA1 and NCA 2 is considered minor. The increase in noise leads to predicted acute noise levels at 2 extra receivers in NCA 1, and 1 extra receiver in NCA 2, compared with the "No Build" case. An analysis of potential noise barriers in these sections is given in Section 9.

In NCA 3, NCA 4, NCA 5 and NCA 6, noise levels are predicted to reduce by up to 6 dBA due to the change from concrete surface to SMA. This leads to significantly fewer exceedances of the *RNP* criteria, and fewer residences with acute noise levels. The residences in these NCAs are spread out or in small groups, and cost-effective noise barriers would not benefit large numbers of residences. The change to SMA, and the consequent lower noise emission from the road, benefits these NCA's because it not only reduces the number of houses where architectural treatment would need to be considered, but also lowers the noise levels external to residences.

A summary of the impacts from the Project REF and Revised Design roads is shown in Table 8-12.

An overview of the noise impacts from the Project REF is shown in Figure 8-2. This can be compared with the overview of impacts due to the Revised Design shown in Figure 8-3. Each symbol on these figures represents the predicted noise impact at a sensitive receiver. For the Revised Design, this figure is shown in detail in Appendix B. The cover page of Appendix B also provides a detailed explanation of the Key and symbols shown on the figures.

The predicted noise levels at receivers are listed in Appendix C, and noise contour maps for daytime and night time are shown in Appendix D and Appendix E respectively.

Table 8-12 Summary of Noise Impacts 2029

Impact at Residences	Exceedances in Project REF	Exceedances in Revised Design
Acute, increase by 2 dBA or less	36	32
Acute, increased by more than 2 dBA	17	0
Above the *RNP* Criteria (but not acute) and increased by 2 dBA or less	113	74
Above the *RNP* Criteria (but not acute) and increased by more than 2 dBA	4	0

Figure 8-2 Overview of Traffic Noise Impacts, "Build" Option 2029, Project REF

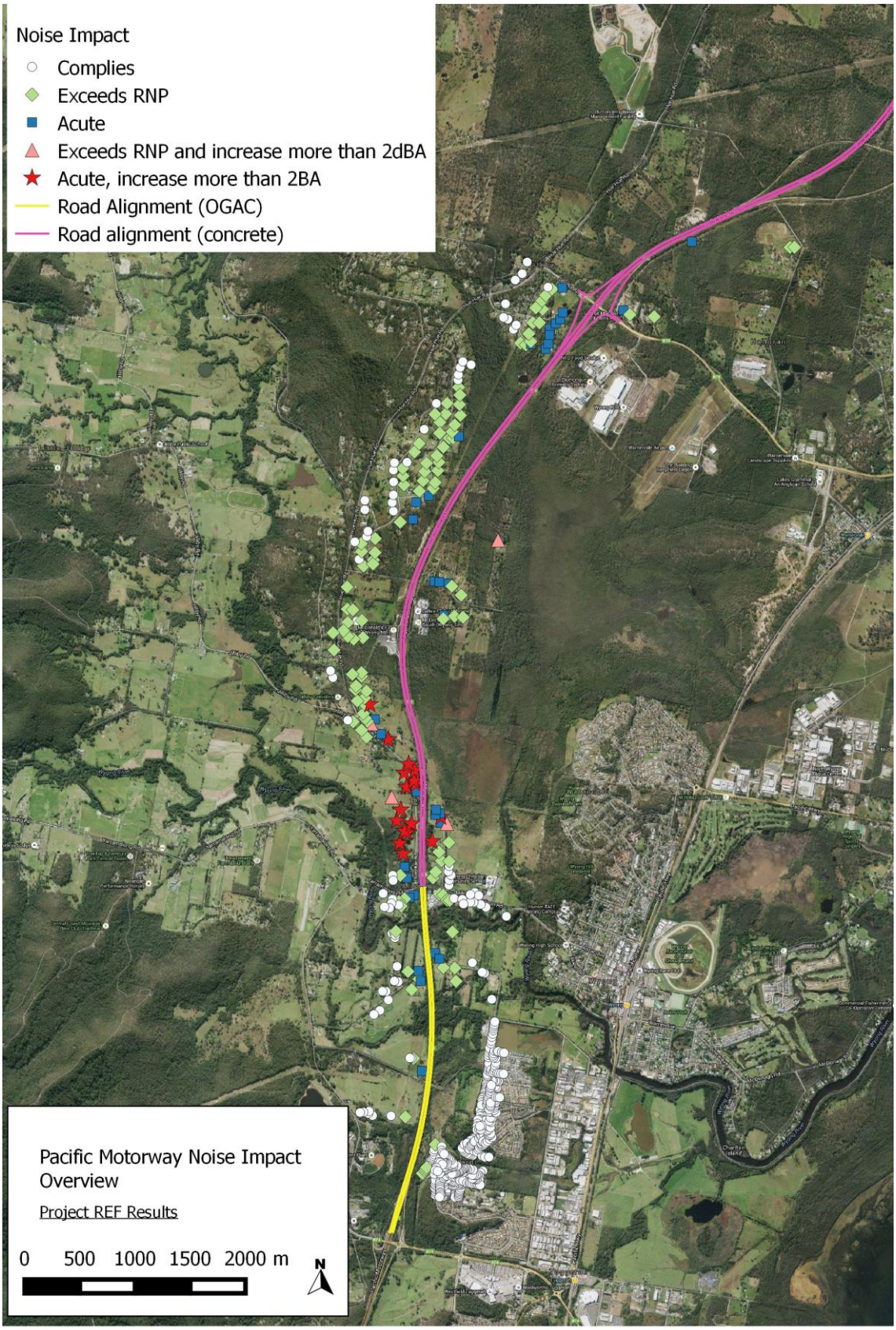


Figure 8-3 Overview of Traffic Noise Impacts, "Build" Option 2029, Revised Design

9 OPERATIONAL NOISE MITIGATION

9.1 Process for Consideration of Mitigation

The *ENMM*, together with the RMS Environmental Direction No. 24, documents the process of qualifying a residence for consideration of feasible and reasonable noise mitigation.

The *ENMM* calls for application of all feasible and reasonable noise mitigation with the aim of achieving noise criteria where, following a road redevelopment (beyond the adoption of road design and traffic management measures):

1. there is predicted to be a noticeable increase in road traffic noise of more than 2.0 dBA (i.e. the noise predictions for the "Build" minus the "No Build") and the noise level is above the RNP criteria; or

2. Road traffic noise levels are predicted to be acute (daytime $L_{Aeq,15hr}$ 65 dBA, night time $L_{Aeq,9hr}$ 60 dBA or greater).

The *RNP* notes that the most effective way of minimising noise from vehicles and traffic is to control vehicle noise at the source. Where source measures are not practical, or do not provide sufficient noise reduction, additional methods are required to reduce levels to within acceptable margins. Such additional methods may include noise barriers and/or consideration of at-property treatment.

Report No. 13042 showed a detailed analysis of potential mitigation measures. Due to revisions to the alignment, pavement type, traffic volumes and inclusion of extra double storey residences, the analysis is updated for the Revised Design in this section.

9.2 Residences Already Treated

Roads and Maritime have advised that residences treated under the Noise Abatement Program (NAP) are considered as already mitigated. Residences that have been treated under the NAP are listed in Table 9-1.

With consideration of the residences listed in Table 9-1, the number of remaining residences to be considered for mitigation is reduced from 32 to 25.

Table 9-1 Receivers Treated under NAP

NCA	Receiver No.
1	N1-30, N1-375
3	N3-17, N3-19, N3-28, N3-29
4	N4-20, N4-27, N4-31, N4-33, N4-83, N4-84, N4-86, N4-132

9.3 Cost-Effective Noise Barriers

The *ENMM* Practice Note IV gives the following guidance concerning selection of cost-effective noise barriers:

In order to be considered cost-effective and therefore warrant consideration as a viable noise

treatment option, noise barriers must provide an "insertion loss" — the actual noise reduction, taking account of the barrier's reduction of noise from the proposal and noise from all other road traffic noise sources — of at least 5 dBA at the most affected residence.

And;

- *For noise barriers more than 3 m high, the insertion loss must be more than 5 dBA at the most affected residence.*
- *For barriers which are 5 m high or higher, the insertion loss must be at least 10 dBA at the most affected residence.*
- *Noise barriers more than 8 m high are generally considered visually unacceptable* (Practice Note IV Page 108).

Because many exceedances of the *RNP* criteria are at isolated receivers, or small groups of receivers (3 or less receivers, as described in the *ENMM*), it is not generally considered reasonable to provide noise barriers. Such measures are not generally considered cost-effective when only a few receivers benefit. In such cases, it may be considered reasonable to provide at property mitigation. Such treatment is usually in the form of acoustic architectural treatment to the residential building.

As advised by Roads and Maritime, noise barriers have been considered in areas where there are groups of four or more receivers, each with predicted acute noise levels. Roads and Maritime have advised that residences treated under the NAP are considered as already mitigated and should be excluded when counting the number of receivers with acute noise levels in a group.

The analysis has been performed in accordance with the recommendations of the *Environmental Noise Management Manual (ENMM).* The methodology includes the following steps:

- Calculation of noise mitigation provided by barriers from 1m to 8m high in 0.5m steps.
- Determining the height where the *RNP* criteria are achieved at the most affected residence. The height of a barrier that achieves this outcome is called the "Target Barrier" option.
- If the "Target Barrier" was not considered a feasible option, further analysis of lower height barriers was carried out.
- Calculation of Marginal Benefit Value (MBV). Peaks in the curve of MBV vs barrier height correspond to barrier options with the greatest marginal cost-effectiveness.
- Calculation of Total Noise Benefit per Unit Area (TNBA). Peaks in the curve of TNBA vs barrier height correspond to barrier options with the greatest overall cost-effectiveness.
- Identification of the most cost-effective barrier height based of analysis of the MBV and TNBA, known as the "Assessed Barrier" option.
- Consideration of the feasibility and reasonableness of barriers where they are found to meet the requirements of the ENMM.

Whilst the ENMM requires information to be presented for barrier heights which achieve a 5dBA noise reduction, RMS have requested information be provided for all heights up to 8m.

9.4 NCA 1 Mitigation

NCA 1 includes residences in the southern 2.1 kilometre section of the project where there is currently OGAC pavement.

In this NCA, noise at residences where the RNP criterion is predicted to be exceeded is predicted to increase by up to 2 dBA, and this is predominantly due to the change from OGAC to SMA.

Figure 9-1 shows the southern part of NCA 1, where the alignment passes the suburban area of Mardi. In this area, there are 5 residences with predicted acute noise levels, and 9 others where the *RNP* criteria are exceeded. The figure shows a potential 500 metre barrier east of the alignment.

The 500 metre barrier was analysed as a potential noise mitigation measure for this group of houses. The Target Barrier height was assessed and found to be over 8 metres, a height which is considered visually unacceptable, and therefore the Assessed Barrier height was considered.

Barrier heights from 1 metre to 8 metres were analysed as shown in Figure 9-2. The figure plots MBV, TNBA and the highest noise level at the most affected residence against the height of the barrier.

The MBV peaks at 4 metres with smaller peaks at 2 metres and 3 metres. The TNBA peaks at 4.5 metres, but there is only 0.4 dBA more attenuation than for a 4 metre barrier. Considering this small increase, and the MBV peaks at lower heights, the Assessed Barrier height adopted is 4 metres.
Table 9-2 shows of the range of attenuations achieved at the most affected residence (N1-4). Because the most affected residences are 2-storey, and the buildings are elevated approximately 10 metres above the level of the motorway, the attenuation provided by the barrier does not exceed 5 dBA at the most affected residence with barrier heights up to 8 metres.

Concerning the attenuation provided by the barrier to the most affected residence:

- Barrier heights from 3 metres to 5 metres do not provide at least 5 dBA attenuation as required by the *ENMM*;
- Barrier heights 5 metres and higher do not provide at least 10 dBA attenuation as required by the *ENMM*; and
- The attenuation at the Assessed Barrier height is 2.7 dBA, which is less than the 5 dBA required by the *ENMM*.

Therefore, a barrier at this location does not meet the minimum requirements of the *ENMM* and is not considered feasible and reasonable.

Excluding the two residences already treated, Receiver N1-32 is the sole remaining residence in this NCA where noise levels are predicted to be acute. Receiver N1-32 is isolated, and a barrier at this location wold not be reasonable.

Figure 9-1 Possible Barrier – NCA 1 Woolmers Crescent

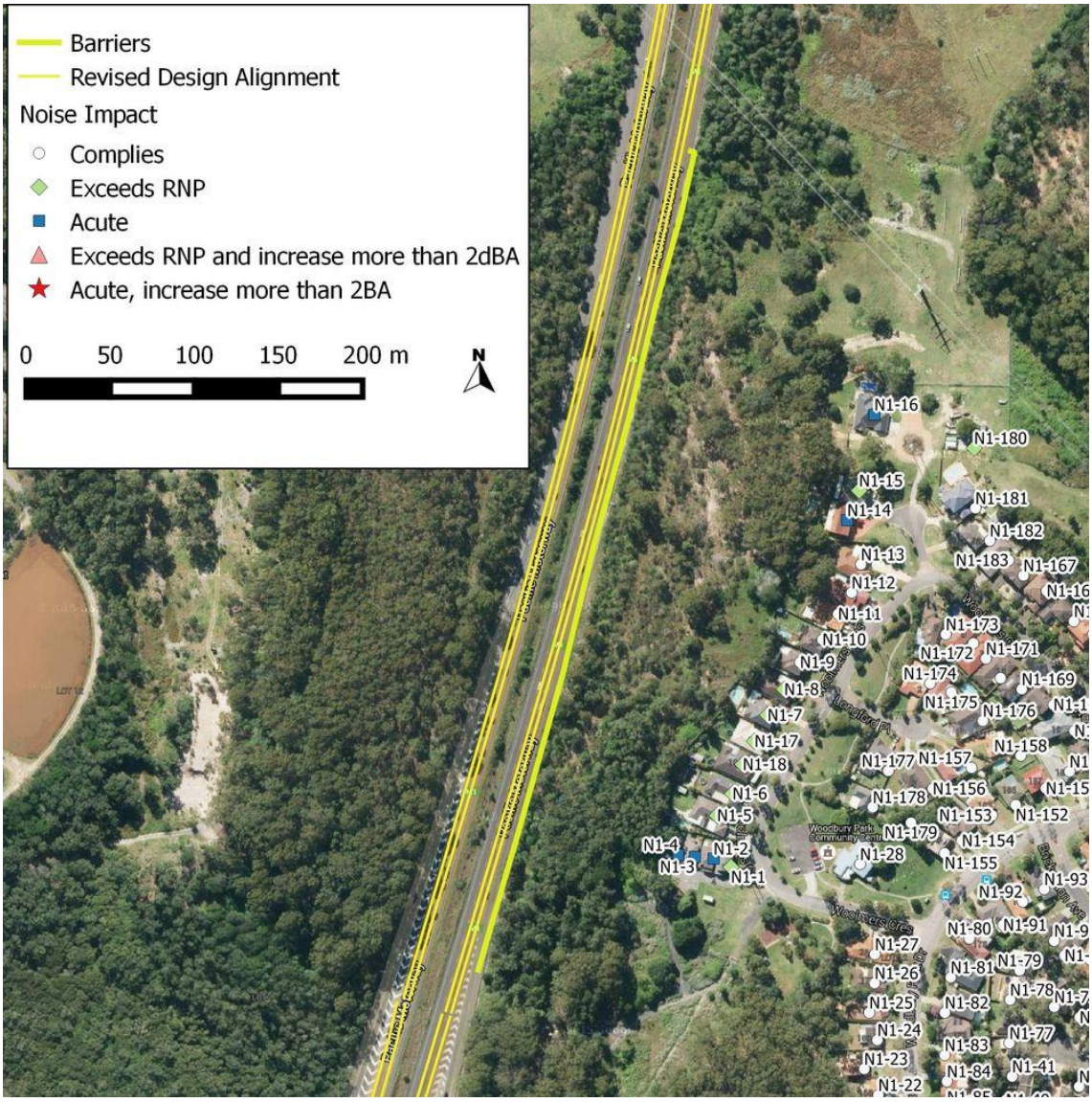
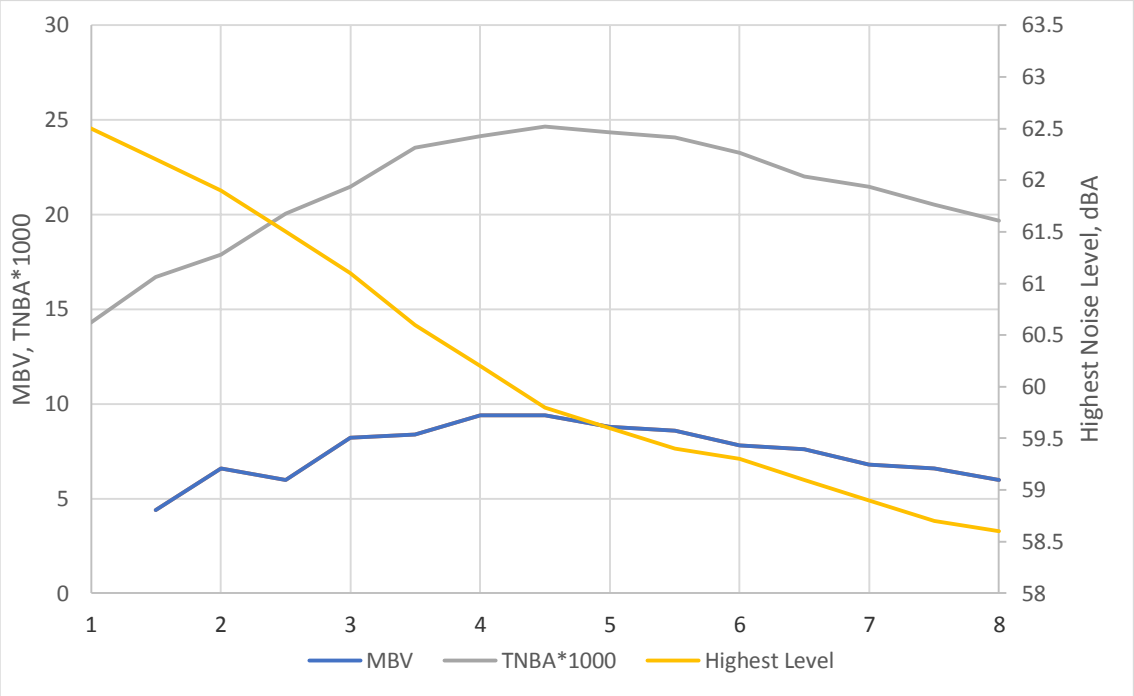


Table 9-2 NCA 1 Woolmer Cr – Barrier Attenuation & Number of Acute Residences

	Barrier Height, m															
	No Barrier	**1**	**1.5**	**2**	**2.5**	**3**	**3.5**	**4**	**4.5**	**5**	**5.5**	**6**	**6.5**	**7**	**7.5**	**8**
Attenuation at Most Affected, dBA	0	0.4	0.7	1	1.4	1.8	2.3	2.7	3.1	3.4	3.7	3.9	4	4.2	4.3	4.4
Number of Acute Residences	5	5	4	4	3	3	3	3	2	2	0	0	0	0	0	0

Figure 9-2 *ENMM* analysis of Barrier at NCA 1 – Woolmers Crescent Group



9.5 NCA 2 Mitigation

NCA 2 includes houses in the southern 2.1 kilometre section of the project where there is currently OGAC. Noise is predicted to increase by up to 2 dBA at residences in this NCA, and this is predominantly due to the change from OGAC to SMA.

Noise is predicted to be acute at 7 residences in NCA2. There is one location, near Collies Lane, where 4 or more residences are predicted to be acute and a noise wall has been considered in the location shown in Figure 9-3.

A 340 metre long barrier which was considered for the group of residences near Collies Lane. Four residences in this area are predicted to have acute noise levels (N2-11, N2-14, N2-16 and N2-18), and 4 residences have noise levels exceeding the *RNP* criteria (N2-15, N2-19, N2-20 and N2-21). The Target Barrier height was assessed and found to be over 8 metres, a height which is considered visually unacceptable, and therefore the Assessed Barrier height was considered. Barrier heights from 1 metre to 8 metres were analysed.

Attenuations at the most affected residence are shown in Table 9-3. The table also shows the reduced number of acute residences as the barrier height increases.

Figure 9-4 plots MBV, TNBA and the highest noise level at the most affected residence against the height of the barrier. The *RNP* noise criterion is not achieved at the most affected residence at barrier heights up to 8 metres.

The MBV peaks at 2.5 metres and the TNBA peaks at 3 metres. The higher barrier (3m) provides more attenuation so is adopted as Assessed Barrier.

Concerning the attenuation provided by the barrier to the most affected residence:

- Barrier heights from 4 metres to 5 metres do provide at least 5 dBA attenuation as required by the *ENMM*;
- Barrier heights 5 metres and higher do not provide at least 10 dBA attenuation as required by the *ENMM*; and
- The attenuation at the Assessed Barrier height is 3.9 dBA, which is less than the 5 dBA required by the *ENMM*.

The Assessed Barrier does not meet the minimum requirements of the *ENMM* and is not considered feasible and reasonable.

Figure 9-3 Possible Barrier in NCA2

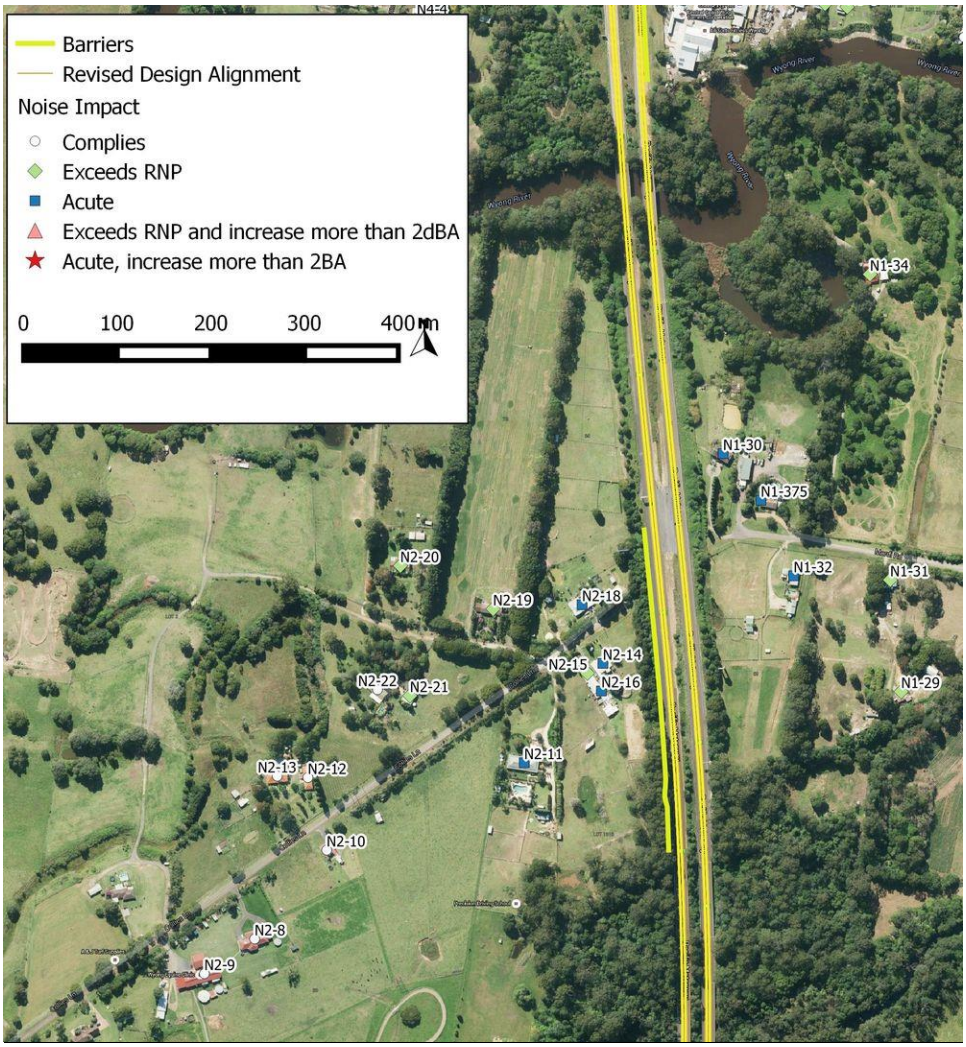
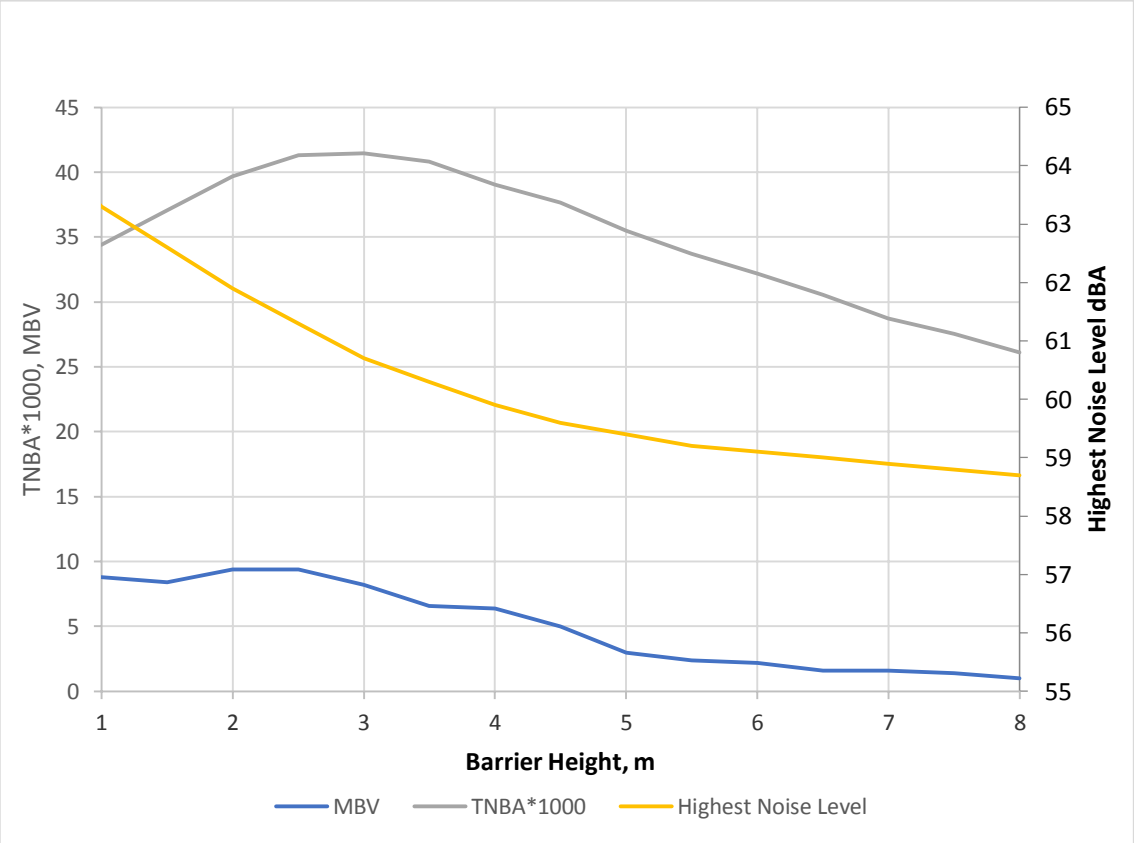


Table 9-3 NCA 2 Collies Lane – Barrier Attenuation & Number of Acute Residences

	Barrier Height, m														
	No Barrier	**1**	**1.5**	**2**	**3**	**3.5**	**4**	**4.5**	**5**	**5.5**	**6**	**6.5**	**7**	**7.5**	**8**
Attenuation at Most Affected, dBA		1.3	2.1	3	3.9	4.7	5.4	5.9	6.4	6.7	7	7.3	7.5	7.6	7.8
Number of Acute Residences	4	4	3	3	2	2	1	1	1	0	0	0	0	0	0

Figure 9-4 NCA 2 Collies Lane – Barrier Analysis



9.6 NCA 3 Mitigation

There are only three residences in this NCA with predicted noise levels that are acute and two have been treated under the NAP. Mitigation will be through consideration of architectural treatment.

9.7 NCA 4 Mitigation

North and west of Alison Road in NCA 4 there is a group of residences with acute noise levels, as shown on Figure 9-5. The receivers are west of Hue Hue Road.

In this group, there are 5 residences with acute noise levels, and 6 with levels exceeding the *RNP* criterion. Under the design analysed for the Project REF, there were 10 residences with acute noise levels in this group. Due to the change in pavement type to SMA, noise levels are predicted to decrease by up to 5 dBA to residences in NCA 4.

These receivers are elevated 13 metres above the road, leading to a noise reduction of less than 1 dBA using barriers up to 8 metres. The barrier does not meet the minimum requirements of the *ENMM* and is not considered feasible and reasonable.

A barrier on the median was also considered. A barrier on the median would mitigate noise from the southbound carriageway only. At most, a 3 dBA reduction would be possible if noise from the southbound carriageway was eliminated entirely, but this may be offset by reflection of northbound traffic noise from the wall. Disregarding this reflected noise, total noise reduction by a median wall was modelled. The predicted total noise reductions at impacted receivers are 1 dBA for a 3 metre barrier on the median, and 2 dBA for an 8 m barrier on the median.

To illustrate the reason barriers are not effective in this location, a cross section through the noise model at Receiver N4-20, typical of the impacted receivers in this area, is shown in Figure 9-6. The figure shows that even with a 5 metre barrier west of the carriageway, or a 3 metre barrier on the median, some noise sources are visible over the top of the barrier from Receiver N4-20.

A barrier on the median is not considered feasible and reasonable as it provides at most 2 dBA attenuation for an 8 metre barrier.

Figure 9-5 Possible Barrier at NCA4 North of Alison Road

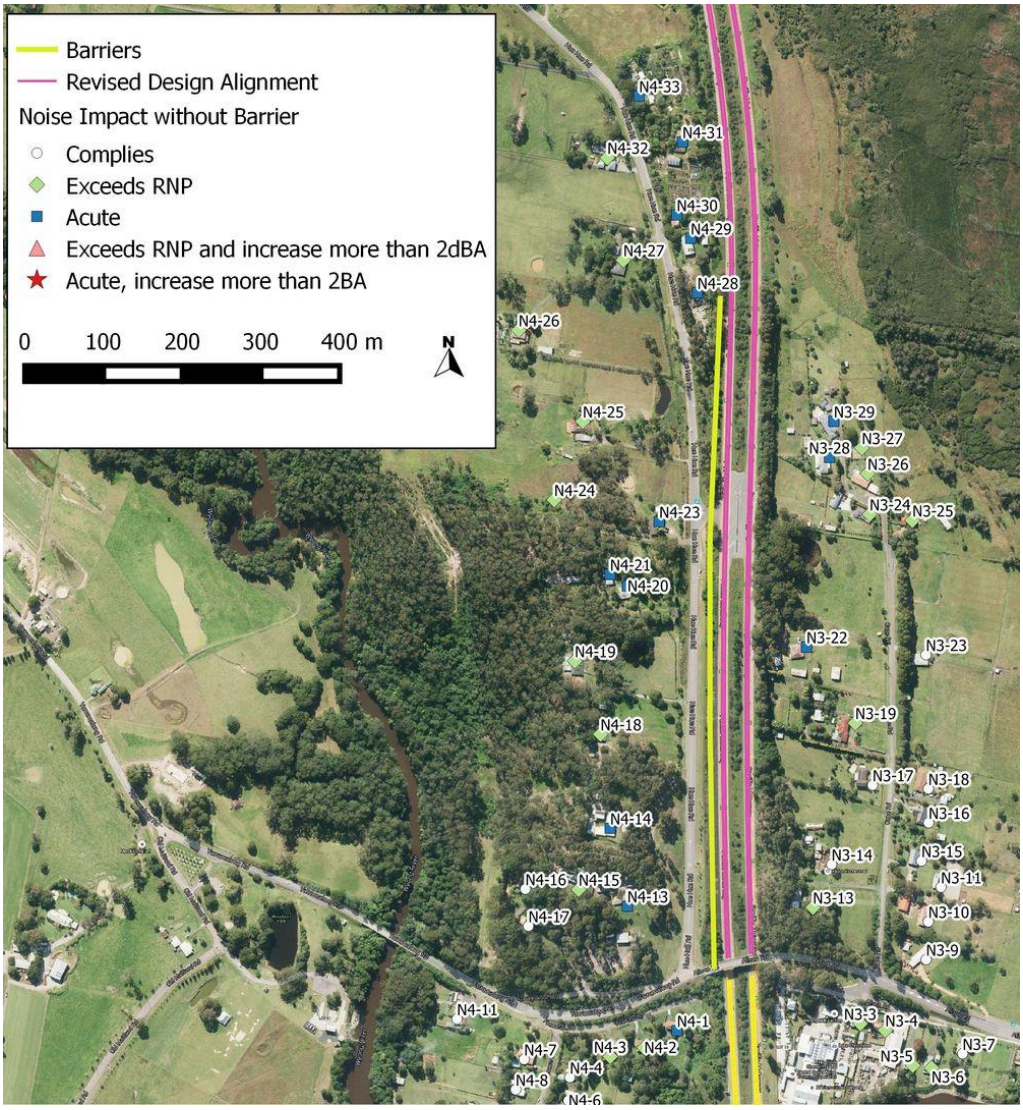
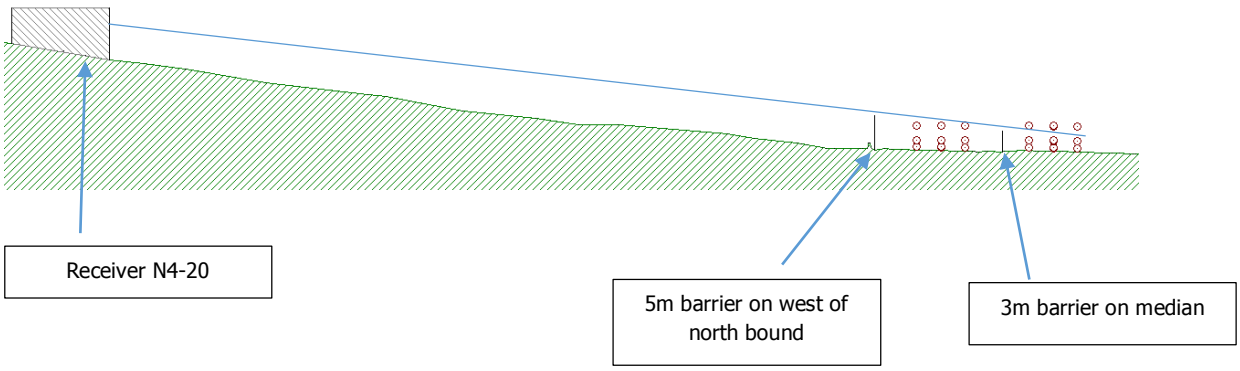


Figure 9-6 Model Cross-Section at Receiver N4-20 – Looking North



9.8 NCA 5 Mitigation

There is only one residence residences in this NCA with predicted noise levels that are acute. Mitigation will be through consideration of architectural treatment.

9.9 Architectural Treatment

At residences where the *RNP* criteria are exceeded and the noise is not predicted to be acute or more than 2 dBA higher than under the "No Build" option, it is not considered reasonable to consider take action, such as architectural treatment, to reduce predicted noise levels to target noise levels.

At residences where *RNP* criteria are exceeded and the predicted level is acute or more than 2 dBA higher than under the "No Build" option, and noise barriers are not considered feasible and reasonable, architectural treatment should be considered.

There are 32 residences with noise levels predicted to be acute under the "Build" option, of which 7 have been architecturally treated under the NAP. These are spread along the route, with a few low density clusters as discussed in the barrier analyses in Section 9. The residences are shown in Table 9-4.

Table 9-4 Residences with Acute Noise Levels

NCA	Receivers with acute levels to be considered for architectural treatment (2029 Build)	Receivers with acute levels (2029 Build) – Treated under NAP and not considered for further mitigation
1	N1-2, N1-3, N1-4, N1-14, N1-16, N1-32	N1-30, N1-375
2	N2-1, N2-3, N2-5, N2-11, N2-14, N2-16, N2-18	
3	N3-22	N3-28, N3-29
4	N4-1, N4-13, N4-14, N4-21, N4-23, N4-28, N4-29, N4-30, N4-74, N4-76	N4-20, N4-31, N4-33
5	N5-4	
6	-	

At these residences, acoustic architectural treatment should be considered.

It is sometimes possible to provide localised shielding at a residence, for example by building a curtain wall around a courtyard or garden. This has the benefit of reducing noise at a façade, thus reducing requirements for treatment to the house itself, and providing outdoor areas with reduced noise levels.

The suitability of such treatment is decided on a case-by-case basis, and property owners would be consulted during this process.

Appendix B lists predicted noise levels at all residences. The final column indicates whether the residence could be considered for mitigation due to an increase of more than 2 dBA, or acute noise levels.

9.10 Receivers with Revised Mitigation Outcome under the Revised Design

Some receivers have a changed outcome from Report No. 13042 to Report No. 13042-D with respect to the requirement for mitigation. Those receivers are listed in Table 9-5.

Table 9-5 Receivers with Revised Mitigation Outcome under Revised Design

Residence	Consider Mitigation under Project REF Design?	Consider Mitigation under Revised Design
N1-2	No	Yes - Acute
N1-3	No	Yes - Acute
N1-4	No	Yes - Acute
N1-4	No	Yes - Acute
N1-5	Yes	No
N1-6	Yes	No
N1-14	No	Yes - Acute
N1-18	Yes	No
N1-29	Yes	No
N1-31	Yes	No
N1-34	Yes	No
N1-277	Yes	No
N2-15	Yes	No
N2-19	Yes	No
N2-27	Yes	No
N3-3	Yes	No
N3-4	Yes	No
N3-5	Yes	No
N3-6	Yes	No
N3-13	Yes	No
N3-14	Yes	No
N3-17	Yes	No
N3-18	Yes	No
N3-19	Yes	No
N3-23	Yes	No
N3-24	Yes - Increase >2, Acute	No
N3-25	Yes- Increase>2dBA	No
N3-26	Yes - Increase >2, Acute	No
N3-27	Yes - Increase >2, Acute	No
N3-31	Yes - Acute	No
N3-32	Yes	No
N3-33	Yes	No
N3-34	Yes	No
N3-35	Yes - Acute	No
N3-36	Yes - Acute	No
N3-42	Yes - Acute	No
N3-43	Yes	No
N3-44	Yes	No
N3-45	Yes - Increase >2	No
N4-2	Yes - Acute	No
N4-3	Yes	No
N4-4	Yes	No
N4-5	Yes	No

Residence	Consider Mitigation under Project REF Design?	Consider Mitigation under Revised Design
N4-15	Yes	No
N4-18	Yes - Increase >2, Acute	No
N4-19	Yes - Increase >2, Acute	No
N4-24	Yes - Increase >2, Acute	No
N4-25	Yes - Increase >2, Acute	No
N4-26	Yes - Increase >2	No
N4-27	Yes - Increase >2, Acute	No
N4-32	Yes - Increase >2, Acute	No
N4-34	Yes - Increase >2, Acute	No
N4-36	Yes - Acute	No
N4-37	Yes - Increase >2, Acute	No
N4-38	Yes- Increase >2	No
N4-39	Yes	No
N4-40	Yes	No
N4-41	Yes	No
N4-42	Yes	No
N4-43	Yes	No
N4-44	Yes - Increase >2, Acute	No
N4-45	Yes	No
N4-46	Yes	No
N4-47	Yes	No
N4-48	Yes	No
N4-49	Yes	No
N4-50	Yes	No
N4-52	Yes	No
N4-53	Yes	No
N4-54	Yes	No
N4-55	Yes	No
N4-56	Yes	No
N4-57	Yes	No
N4-58	Yes	No
N4-59	Yes - Acute	No
N4-60	Yes - Acute	No
N4-61	Yes - Acute	No
N4-62	Yes	No
N4-63	Yes	No
N4-64	Yes	No
N4-65	Yes	No
N4-66	Yes	No
N4-67	Yes	No
N4-68	Yes	No
N4-69	Yes	No
N4-70	Yes - Acute	No
N4-71	Yes	No
N4-72	Yes	No
N4-73	Yes	No
N4-77	Yes	No
N4-78	Yes	No
N4-79	Yes - Acute	No
N4-80	Yes	No
N4-81	Yes	No
N4-82	Yes - Acute	No
N4-83	Yes - Acute	No

Residence	Consider Mitigation under Project REF Design?	Consider Mitigation under Revised Design
N4-84	Yes - Acute	No
N4-85	Yes - Acute	No
N4-86	Yes - Acute	No
N4-91	Yes	No
N4-92	Yes	No
N4-95	Yes	No
N4-96	Yes	No
N4-97	Yes	No
N4-98	Yes	No
N4-102	Yes	No
N4-103	Yes	No
N4-104	Yes	No
N4-105	Yes	No
N4-106	Yes	No
N4-107	Yes	No
N4-108	Yes	No
N4-113	Yes	No
N4-114	Yes	No
N4-116	Yes	No
N4-117	Yes	No
N4-118	Yes	No
N4-119	Yes	No
N4-120	Yes	No
N4-121	Yes	No
N4-123	Yes	No
N4-124	Yes	No
N4-131	Yes	No
N4-132	Yes	No
N4-133	Yes	No
N4-134	Yes	No
N4-135	Yes	No
N4-136	Yes	No
N4-137	Yes	No
N4-139	Yes - Acute	No
N4-140	Yes	No
N4-141	Yes	No
N4-145	Yes	No
N4-146	Yes	No
N4-147	Yes	No
N4-148	Yes	No
N4-152	Yes	No
N4-153	Yes	No
N4-154	Yes	No
N4-155	Yes	No
N5-1	Yes - Acute	No
N5-2	Yes	No
N5-3	Yes	No
N5-6	Yes	No
N5-7	Yes	No

10 NON-RESIDENTIAL NOISE-SENSITIVE RECEIVERS

Two non-residential noise-sensitive receivers were identified.

10.1 Woodbury Park Community Centre

The Woodbury Park Community Centre is in NCA 1 on Woolmers Crescent, Mardi. The centre has interview rooms and activity rooms and the noise criterion is $L_{Aeq,1hr}$ 40 dBA (internal) when the rooms are in use. The predicted $L_{Aeq,1hr}$ daytime noise is 59 dBA external.

With windows closed the noise levels would comply in all rooms at the centre. The main windows at the centre do not face the M1 Pacific Motorway. The predicted external noise levels on the façade facing away from the M1 Pacific Motorway is $L_{Aeq,1hr}$ 40-45 dBA. The predicted noise level at the side facades is 55 dBA. With windows open, the predicted levels in the centre are 32-45 dBA. Hence there may be 5 dBA exceedances in some rooms if used at peak traffic times.

It is recommended that internal noise monitoring be done at the Woodbury Park Community Centre once the project is operational. Monitoring should be done inside any noise-sensitive rooms, and the results for each type of room assessed against the noise criteria of the *RNP*. If noise is found to exceed the criteria of the *RNP*, those rooms should be considered for architectural treatment.

10.2 Childcare Facility

A childcare facility operates at 23 Buttonderry Way, Jilliby (Receiver N4-86). The daytime noise level is predicted to be 66 dBA under the "No Build" scenario in 2029. This is 11 dBA above the recommended playground noise level. Under the "Build" scenario the level is predicted to reduce to 61 dBA. This is 6 dBA above the goal. The premises have been architecturally treated under the NAP and no further mitigation is required.

11 CONCLUSION

11.1 Operational Noise Goals

It is proposed to widen the M1 Pacific Motorway between Tuggerah and Doyalson by building an extra lane in each direction on the existing median. The existing lanes will be replaced. As the alignment is generally not changed, this constitutes a "road redevelopment" for assessment according to the guidelines of the *Road Noise Policy (RNP).*

As well as comparing predictions to *RNP* goals, this report notes receivers where noise levels are predicted to be "acute" under the "Build" and "No Build" options.

11.2 Noise Monitoring

Noise monitoring was performed at 4 locations. The noise monitoring determined background noise levels and provided existing traffic noise values for validation of the noise model.

11.3 Noise Modelling & Validation

Noise from the existing M1 Pacific Motorway was modelled. The model from the Project REF was updated to include the Revised Design. The model was validated using measured noise from the existing M1 Pacific Motorway, by comparing these values with noise measured while traffic was counted. Good agreement was found. At one location there was an over-prediction of noise level in one time period. As the over-prediction was relatively minor, and indicated a conservative assessment model, this discrepancy was not considered sufficient to invalidate the model.

The validation at 54 Hue Hue Road included traffic noise from Hue Hue Road. Hue Hue Road was found to contribute less than 1 dBA to the total noise level at that residence.

11.4 Summary of Proposed Mitigation of Operational Noise

Of the 603 receivers in the study area:

- Noise is predicted to be acute, but to have increased by 2 dBA or less due to the project, at 32 receivers;
- Noise is predicted to be acute, and to have increased by more than 2 dBA due to the project, at 0 receivers;
- Noise is predicted to be above the *RNP* criteria (but not acute) and to have increased by 2 dBA or less at 74 receivers.
- Noise is predicted to be above the *RNP* criteria (but not acute) and to have increased by more than 2 dBA at 0 receivers.

As the traffic flow under both "Build" and "No Build" options is the same, and the horizontal alignment very similar, the increase in noise impact is due to the change in vertical alignment and the change in road surface.

There are 32 residences with noise levels predicted to be acute under the "Build" option. Of those, seven have been treated under the NAP and will not be considered further for mitigation. These are spread along the route, with a few low density clusters. The residences are presented by NCA in Table 11-1. As noise barriers were found not to be feasible and reasonable, architectural treatments should be considered for the 25 residences in Table 11-1 that have not already been treated under the NAP.

Table 11-1 Residences with Acute Noise Levels

NCA	Residences with acute levels (2029 Build) to be considered for architectural treatment	Residences with acute levels (2029 Build) – Treated under NAP and not considered for further mitigation
1	N1-2, N1-3, N1-4, N1-14, N1-16, N1-32	N1-30, N1-375
2	N2-1, N2-3, N2-5, N2-11, N2-14, N2-16, N2-18	
3	N3-22	N3-28, N3-29
4	N4-1, N4-13, N4-14, N4-21, N4-23, N4-28, N4-29, N4-30, N4-74, N4-76	N4-20, N4-31, N4-33
5	N5-4	
6	-	

APPENDIX A

NOISE MEASUREMENT RESULTS

Report 13042 – M1 Widening Noise Study

Noise Logger Results

Logger	L1
Address	10 Woolmers Cres, Mardi
Start	4 April 2013
Finish	16 April

Overall Noise – L_{Aeq} dBA

$L_{Aeq,15hr}$	55.6
$L_{Aeq,9hr}$	48.1

Source: Dept Lands

Rating Background Level (RBL)

Daytime (7.00am -10.00pm)	45
Evening (6.00pm-10.00pm)	36
Night time (10.00pm-7.00am)	38

For Logger Locations on Google Maps see: http://goo.gl/maps/1Qpf7

Location: 10 Woolmers Crescent, Mardi
Data shaded: extraneous; Met.; Rain

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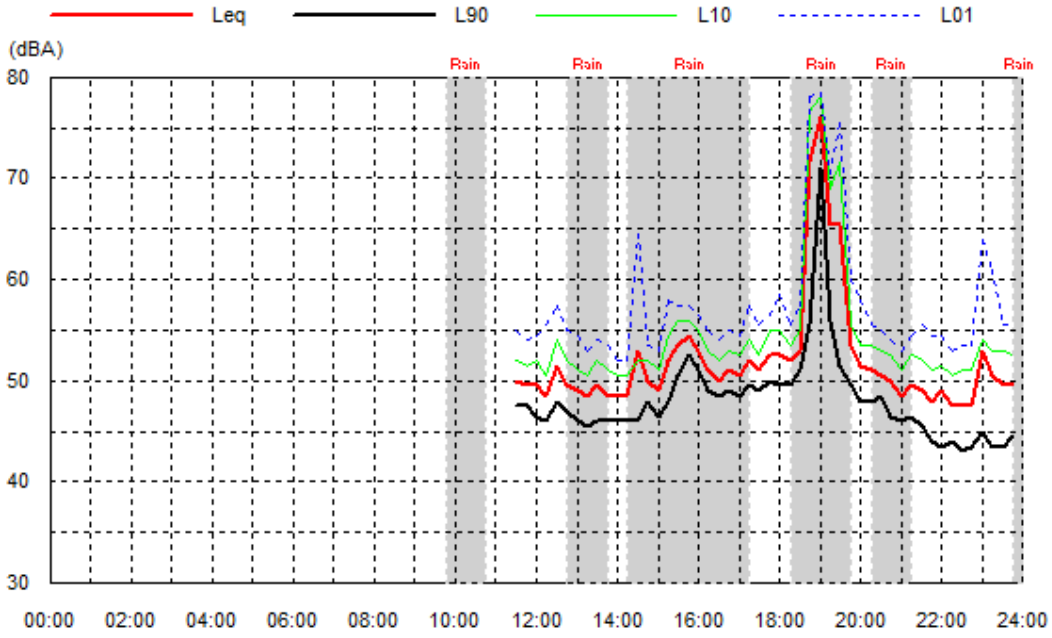

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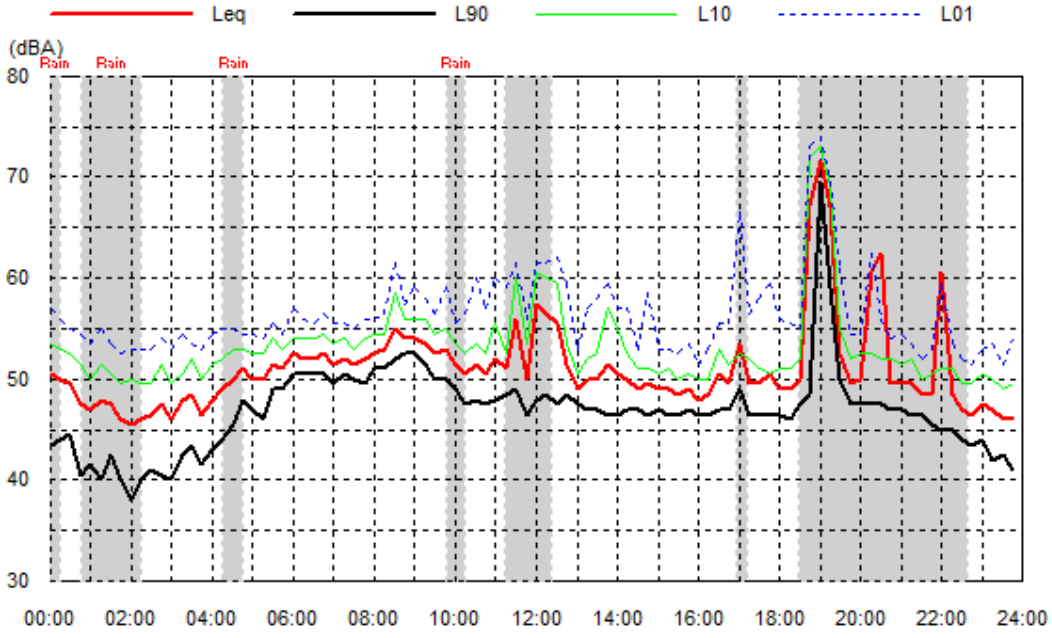

Location: 10 Woolmers Crescent, Mardi
Data shaded: extraneous; Met.; Rain

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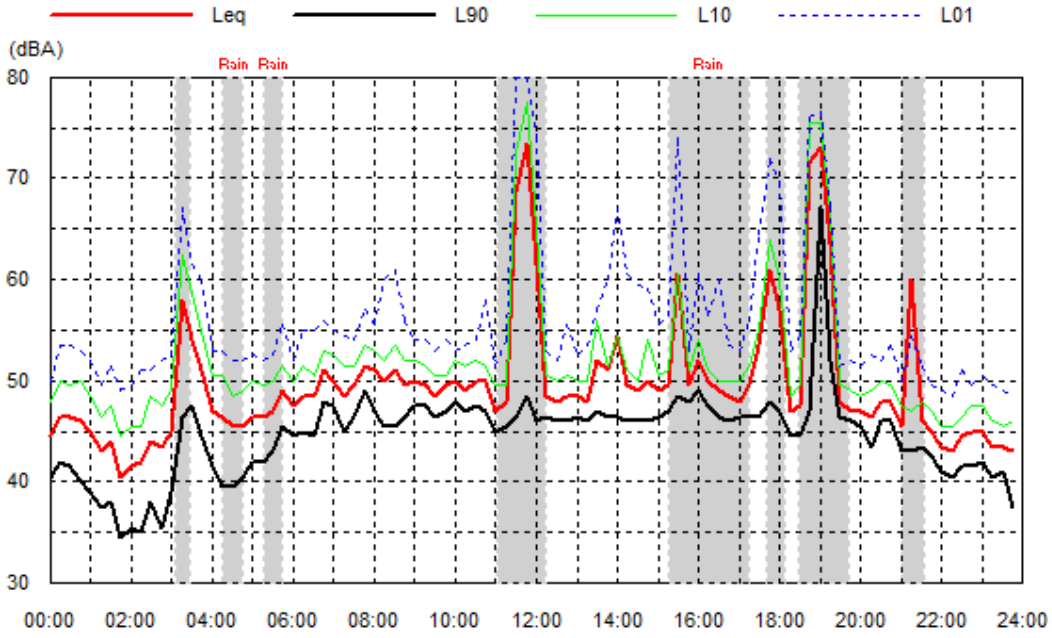

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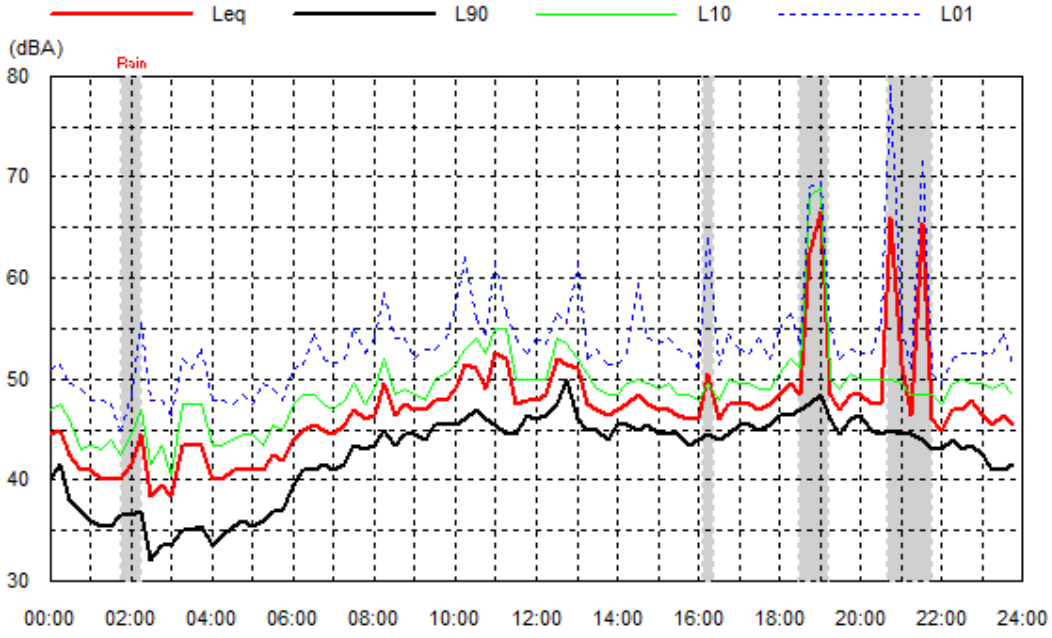

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Data shaded: extraneous; Met.; Rain

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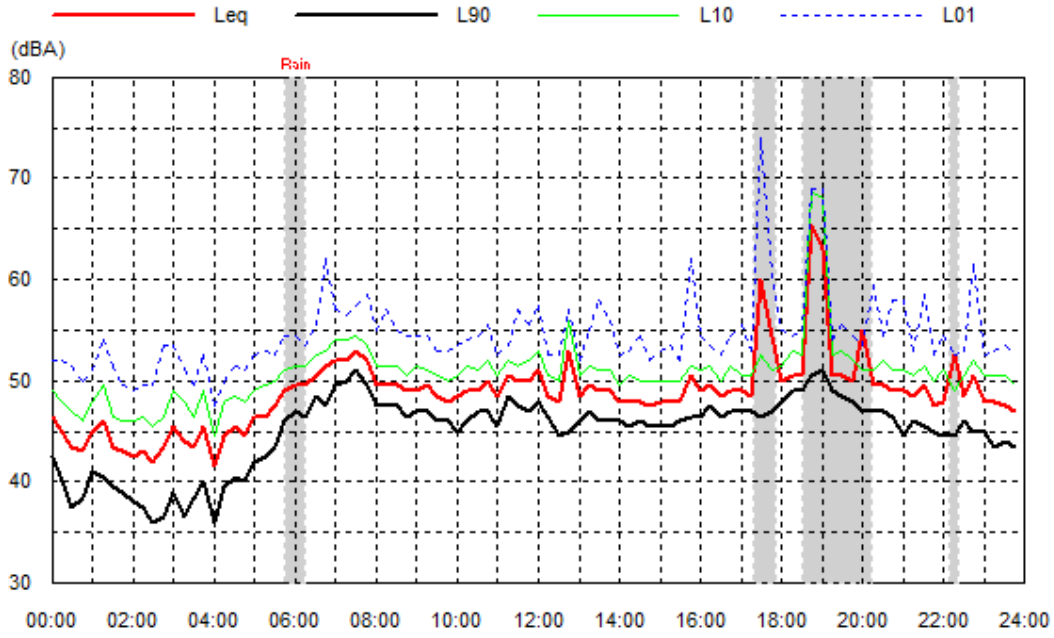

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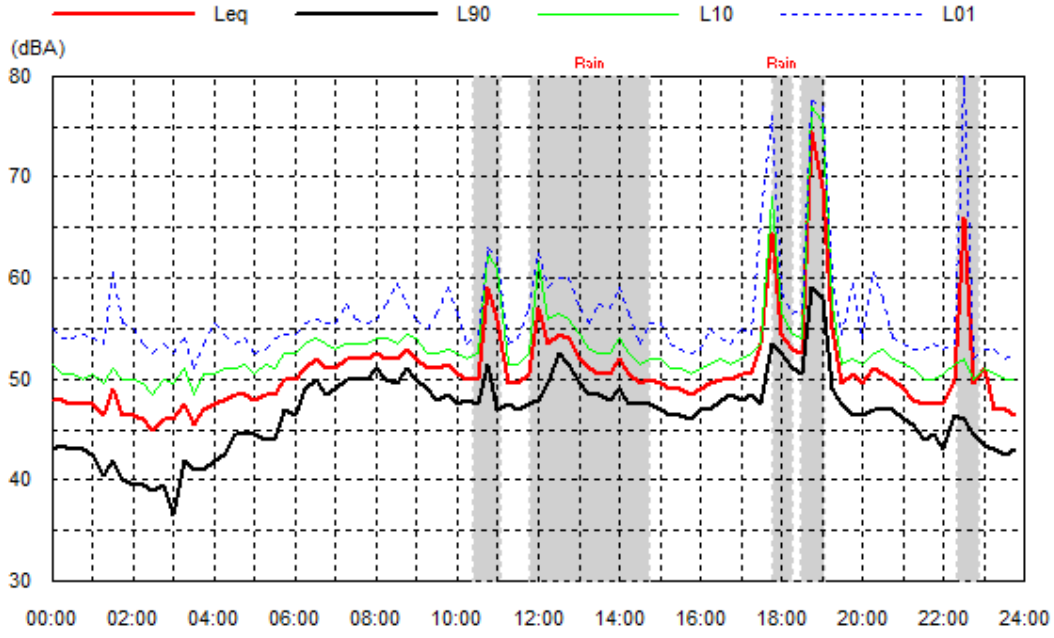

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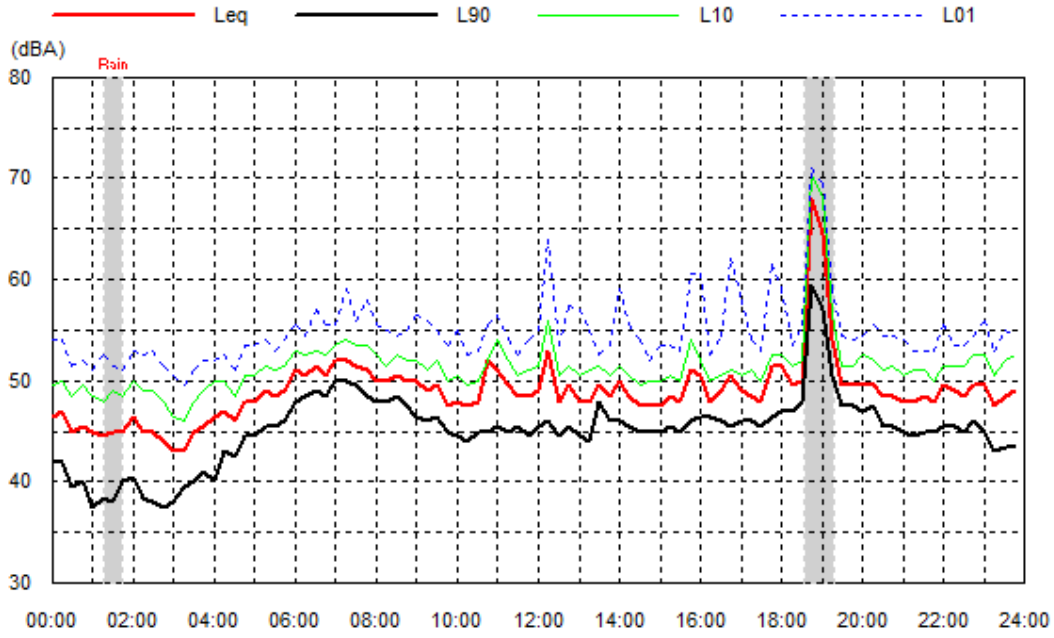

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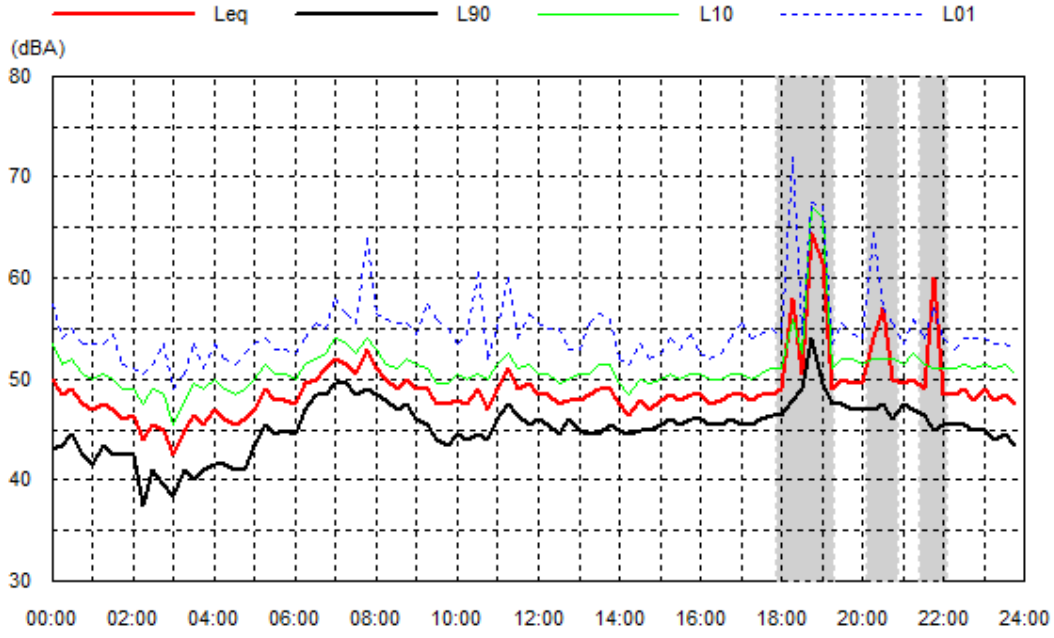

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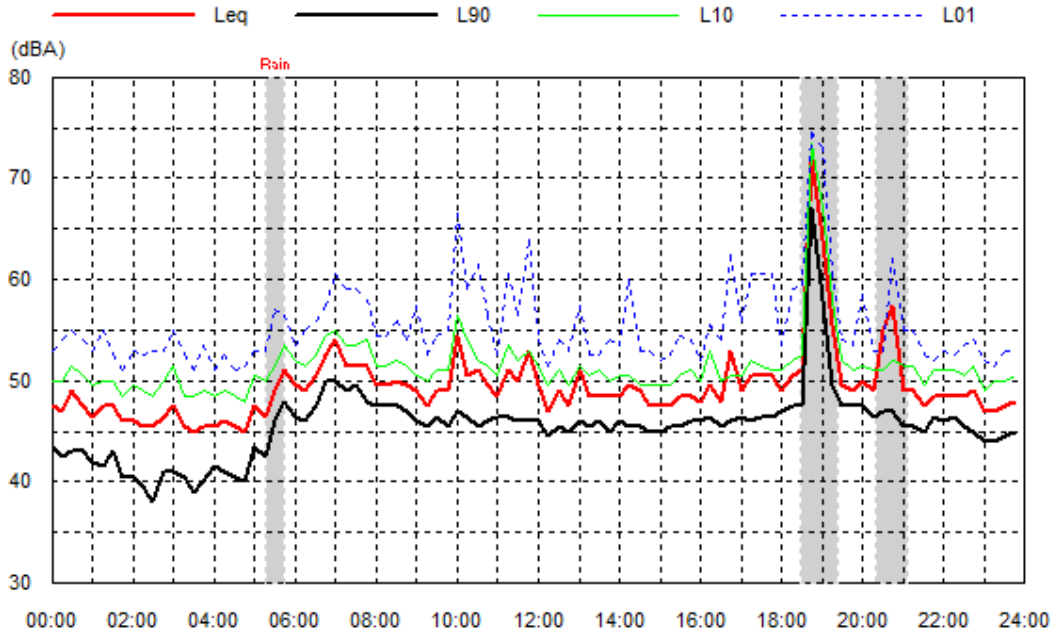

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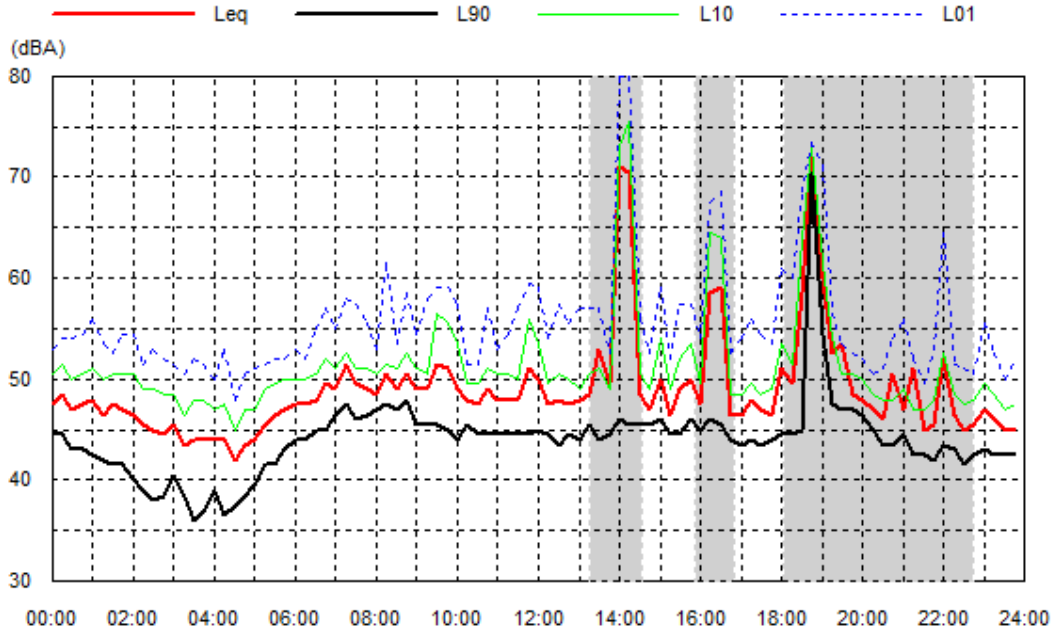

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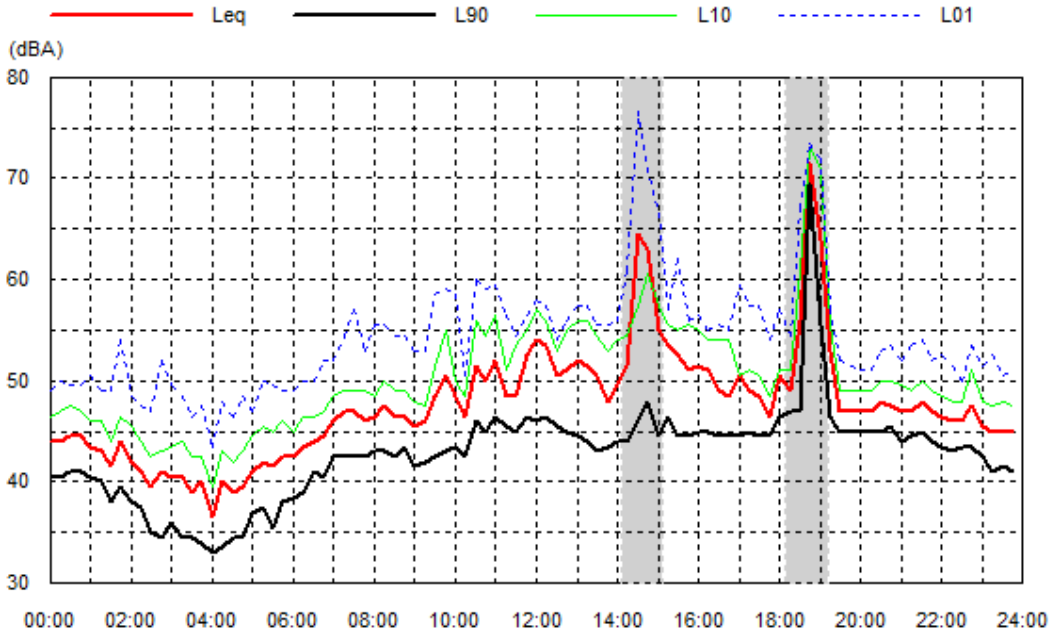

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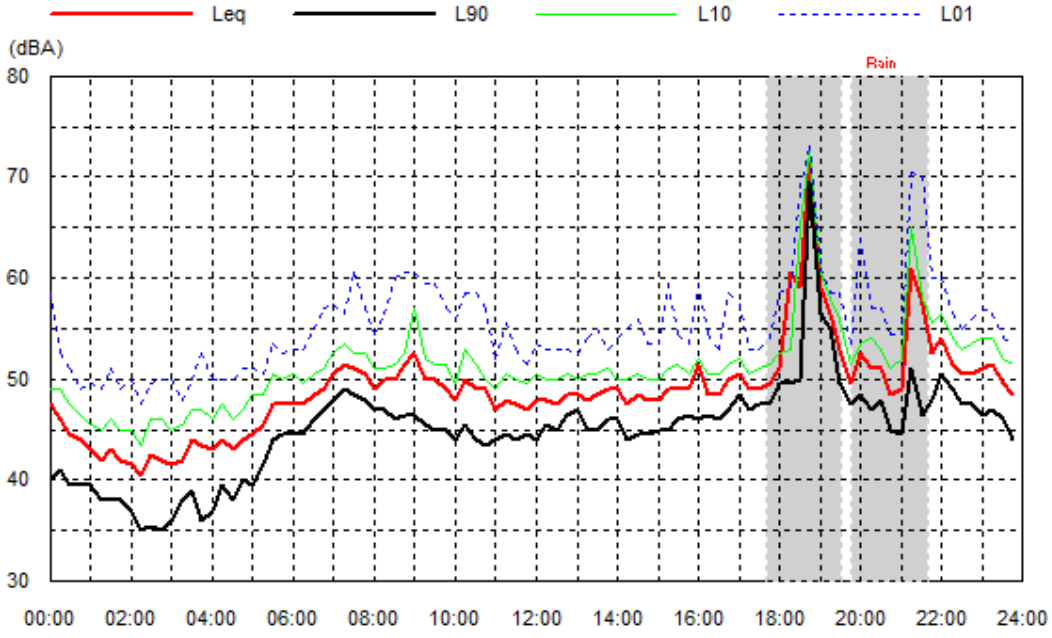

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Data shaded: extraneous; Met.; Rain

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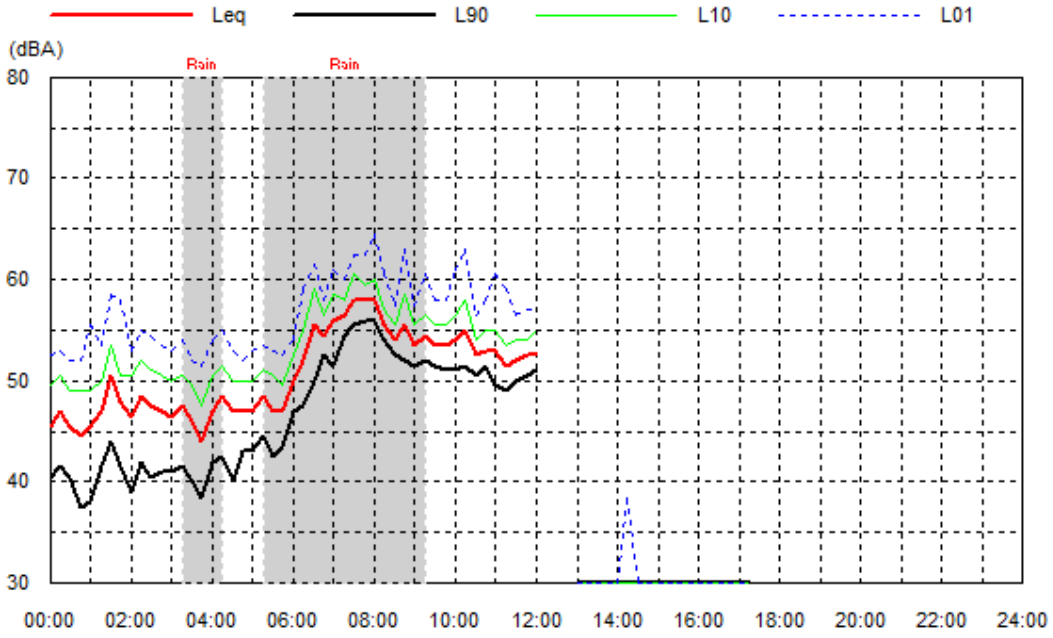

Report 13042 – M1 Widening Noise Study

Noise Logger Results

Logger	L2
Address	93 Hue Hue Rd, Alison
Start	4 April 2013
Finish	16 April

Overall Noise – L_{Aeq} dBA

$L_{Aeq,15hr}$	73.8
$L_{Aeq,9hr}$	69.4

Rating Background Level (RBL)

Daytime (7.00am -10.00pm)	68
Evening (6.00pm-10.00pm)	64
Night time (10.00pm-7.00am)	46

Source: Dept Lands

For Logger Locations on Google Maps see: http://goo.gl/maps/1Qpf7

Location: 93 Hue Hue Road, Alison

Data shaded: Rain

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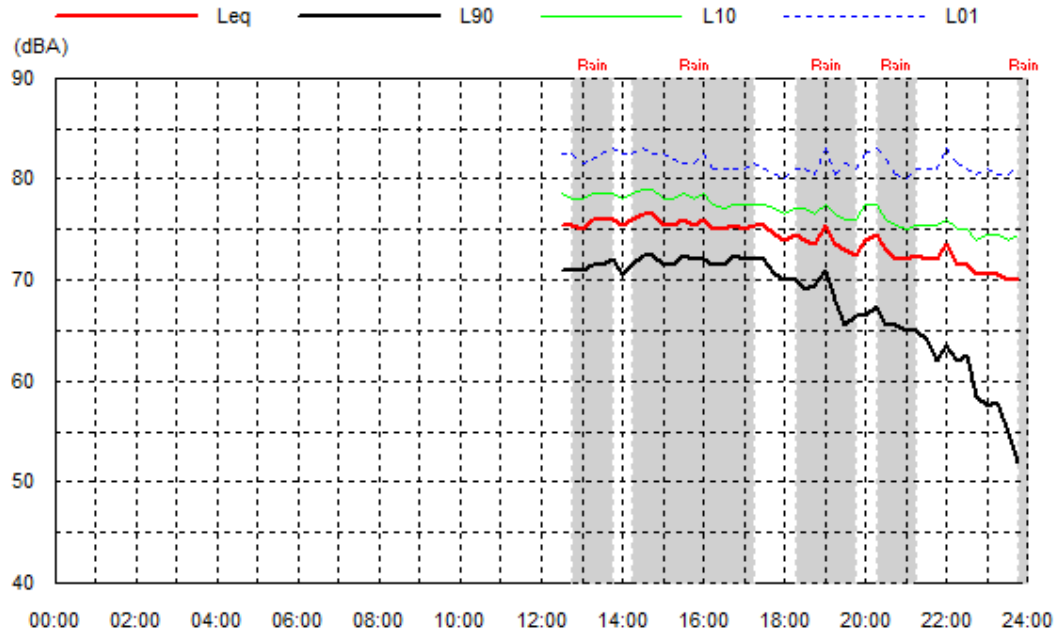

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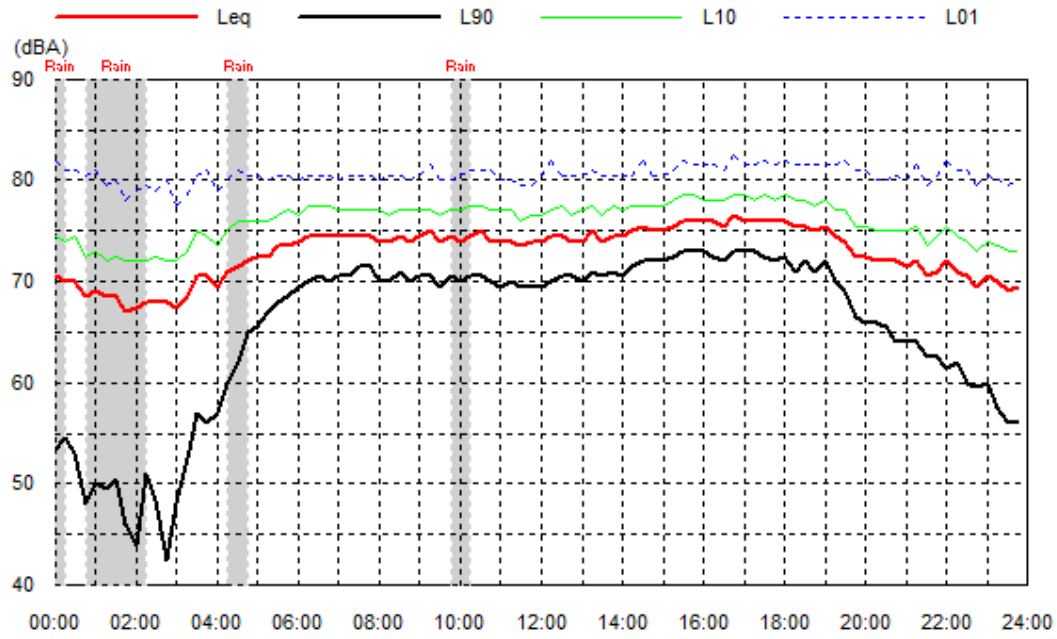

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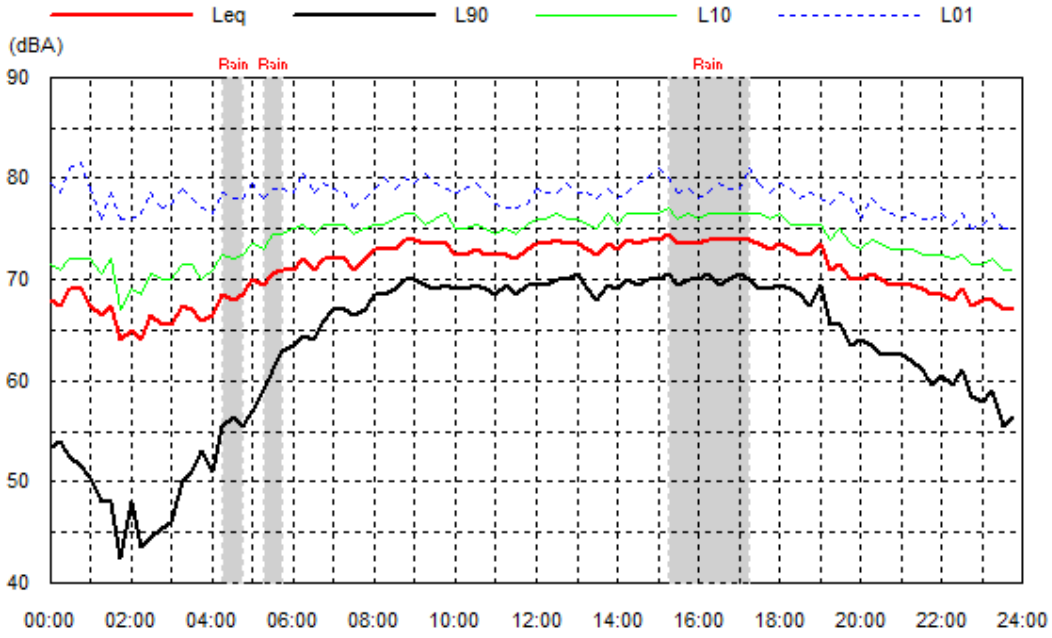

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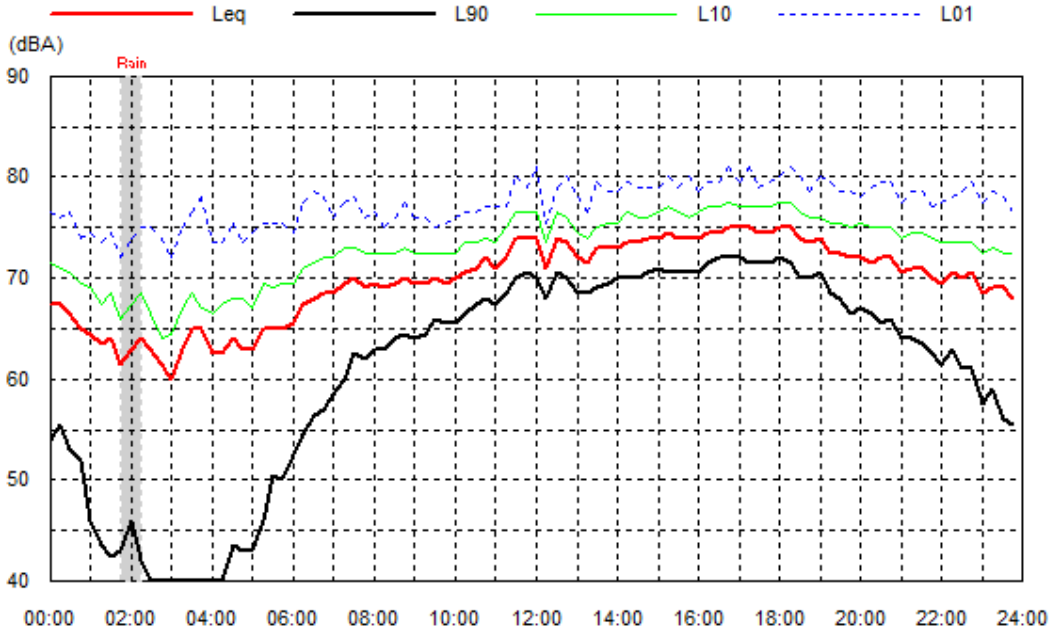

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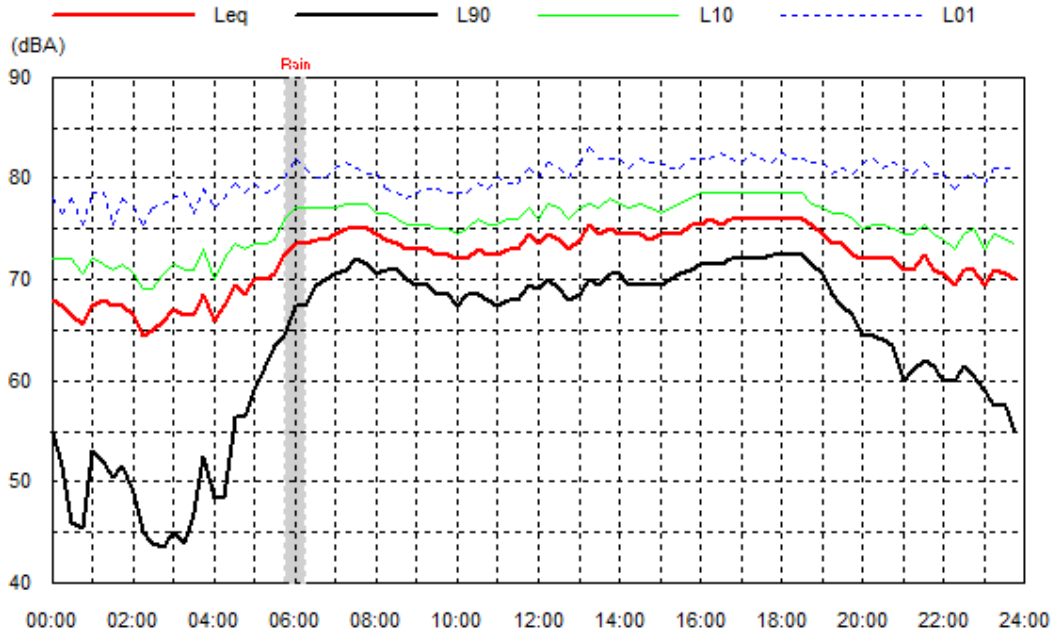

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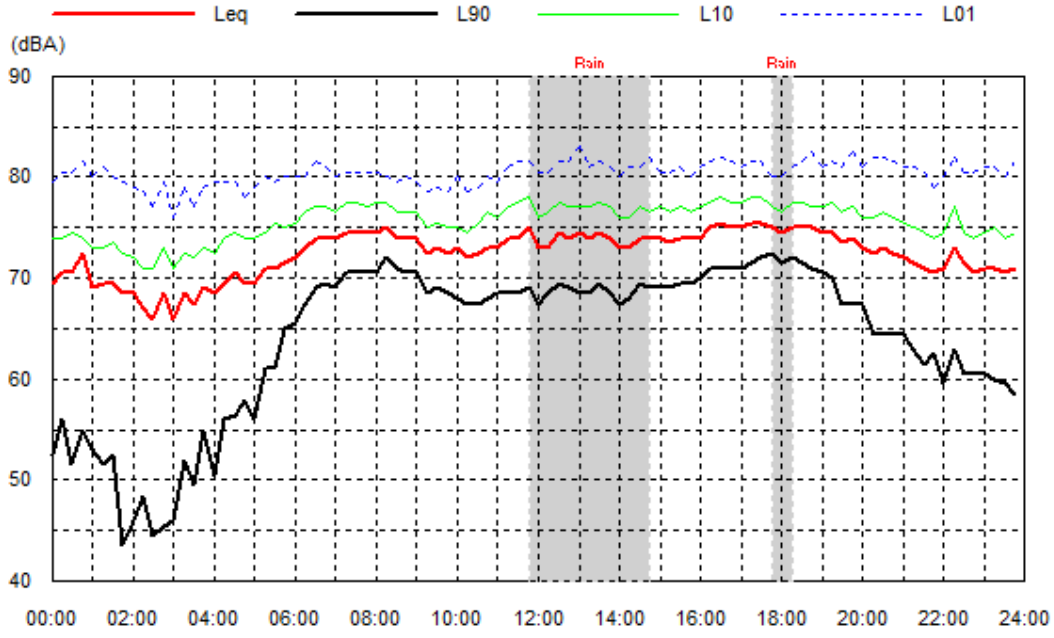

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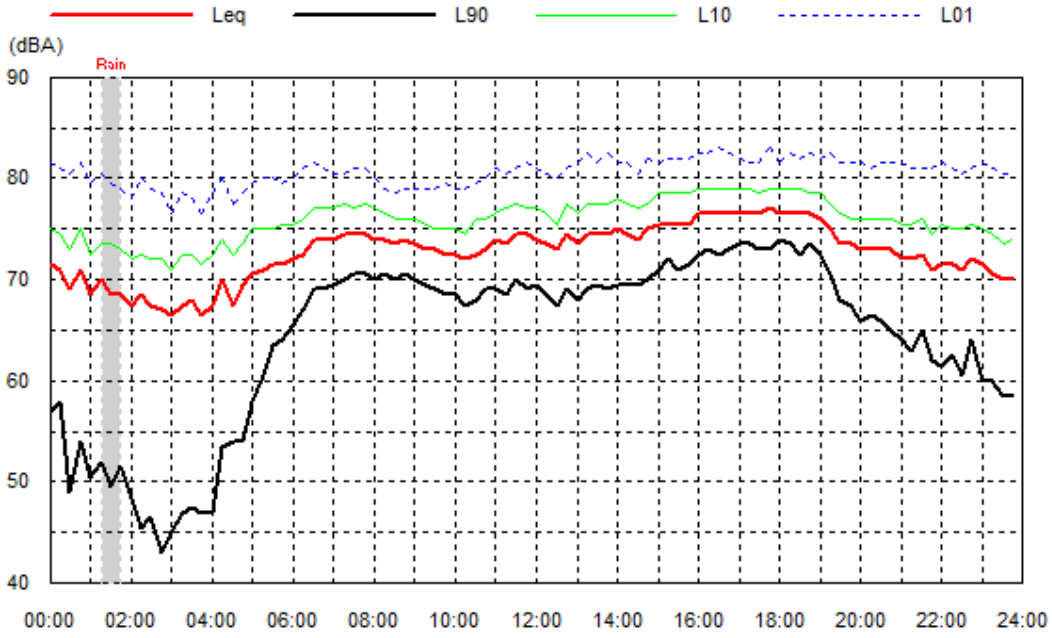

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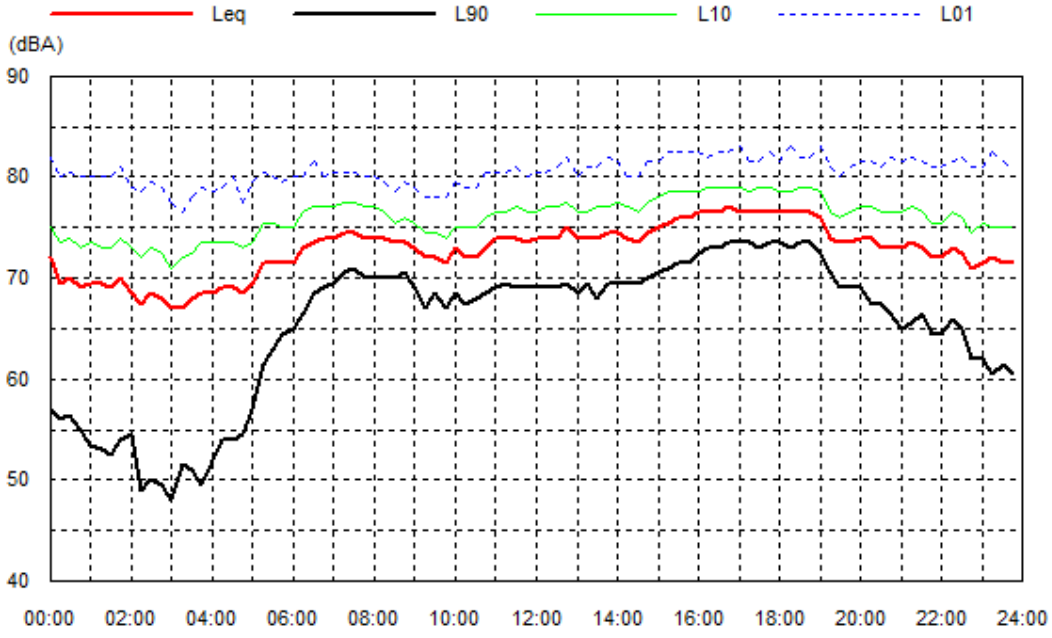

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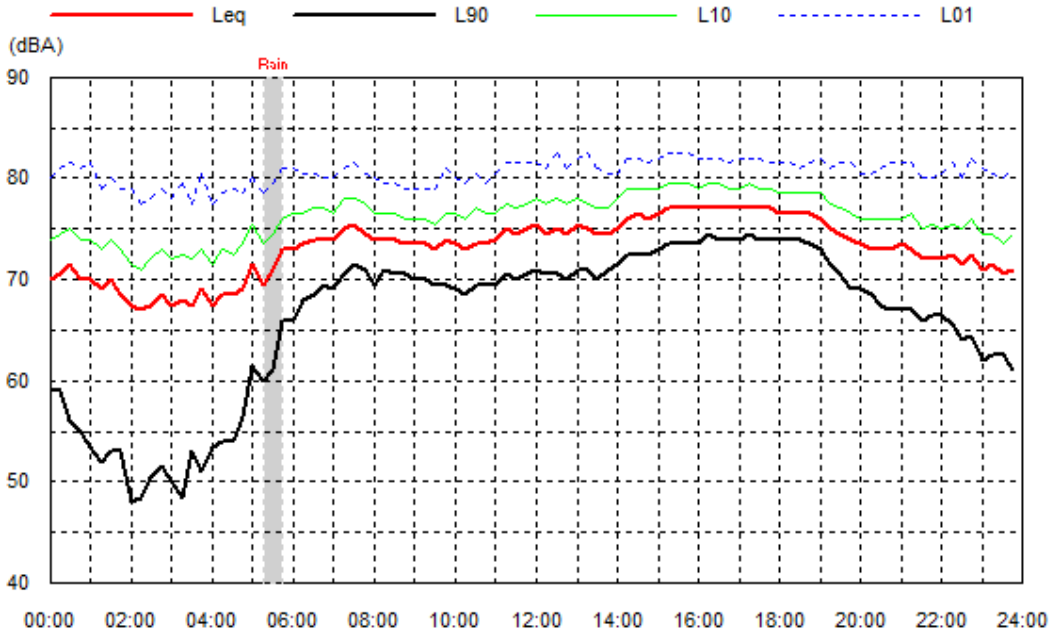

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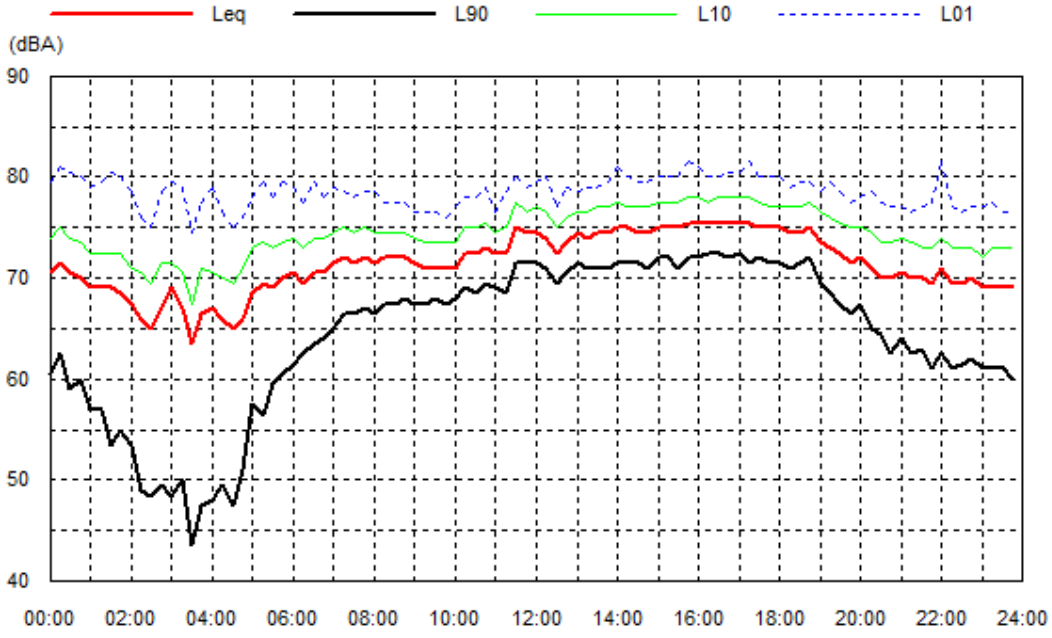

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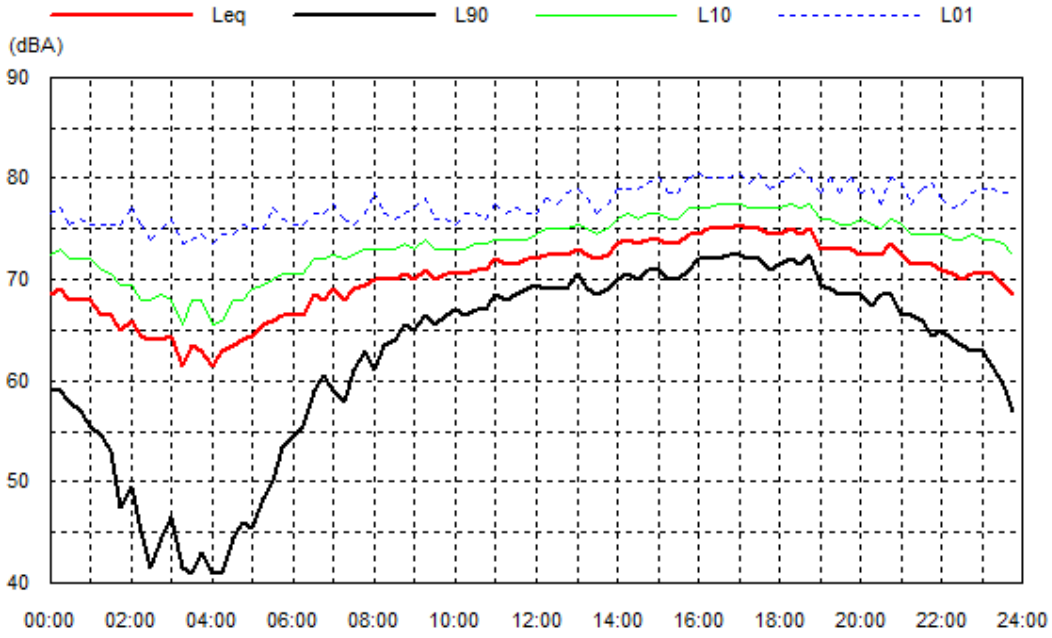

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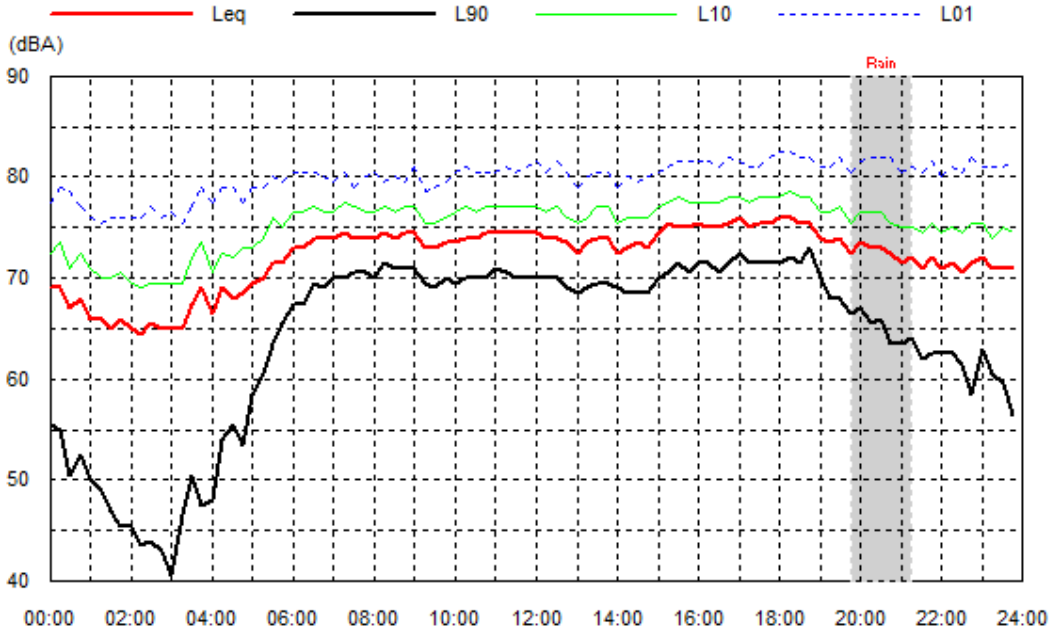

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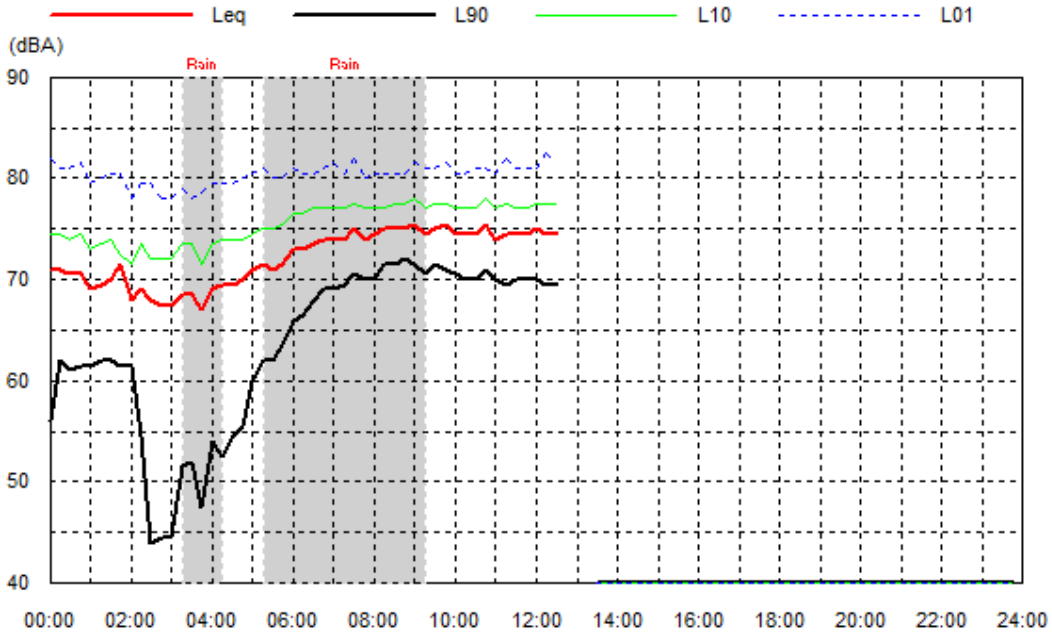

Report 13042 – M1 Widening Noise Study

Noise Logger Results

Logger	L3
Address	34 Holloway Dr, Jilliby
Start	4 April 2013
Finish	16 April

Overall Noise – L_{Aeq} dBA

$L_{Aeq,15hr}$	60.2
$L_{Aeq,9hr}$	53.5

Source: Dept Lands

Rating Background Level (RBL)

Daytime (7.00am - 10.00pm)	50
Evening (6.00pm-10.00pm)	49
Night time (10.00pm-7.00am)	46

For Logger Locations on Google Maps see: http://goo.gl/maps/1Qpf7

Location: 34 Holloway Drive, Jilliby
Data shaded: extraneous; Met.; Rain

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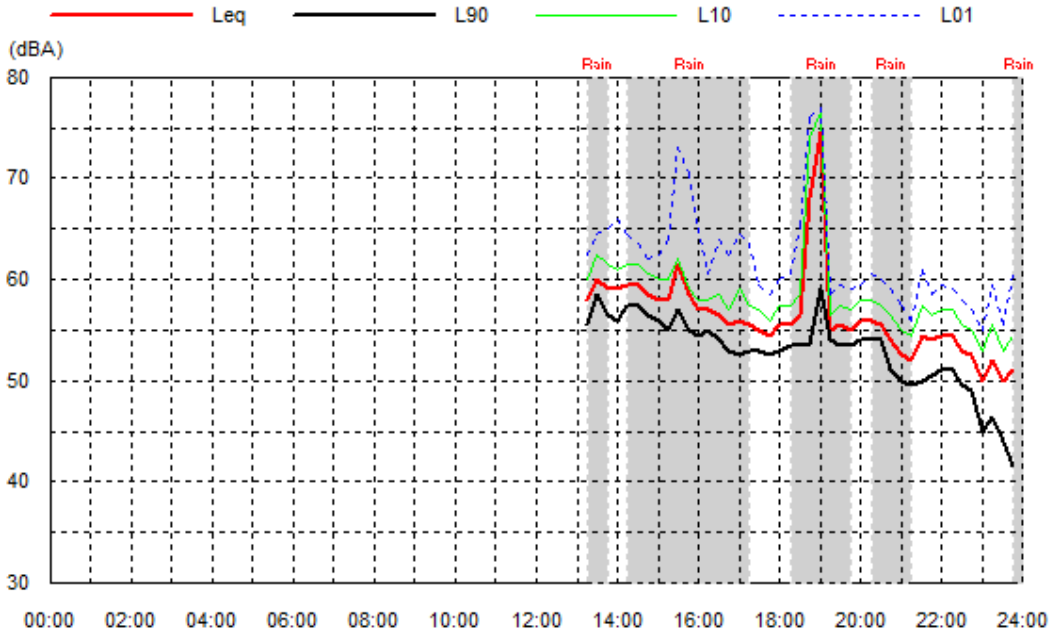

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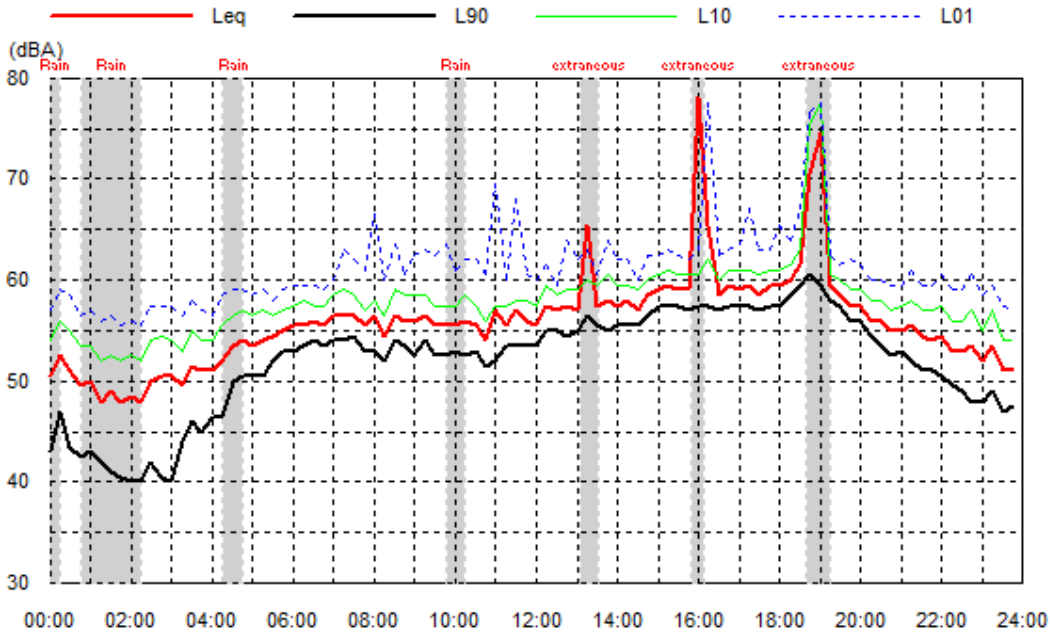

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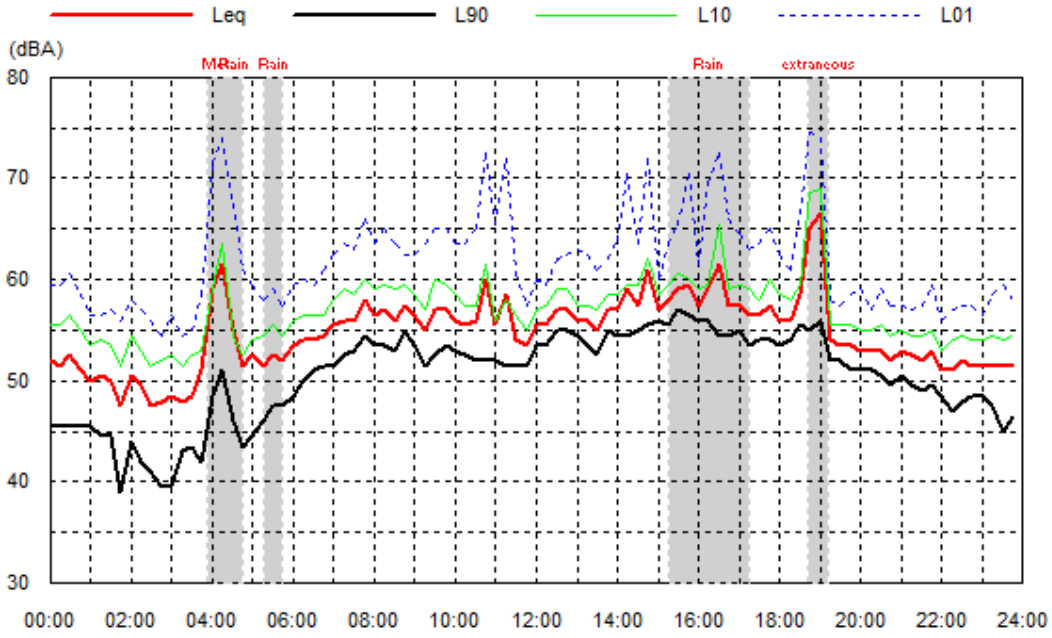

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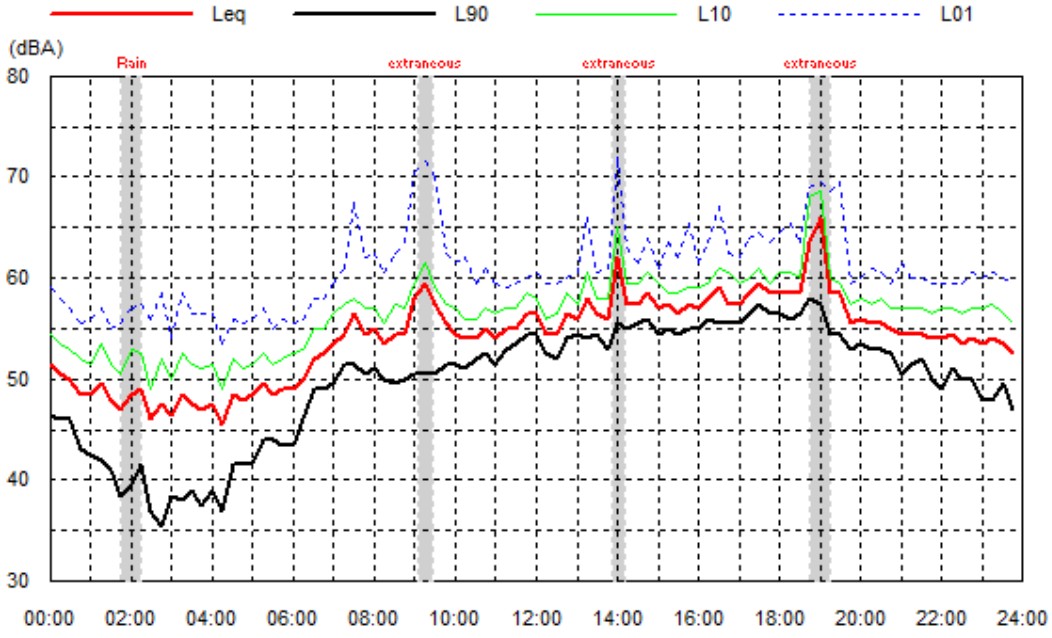

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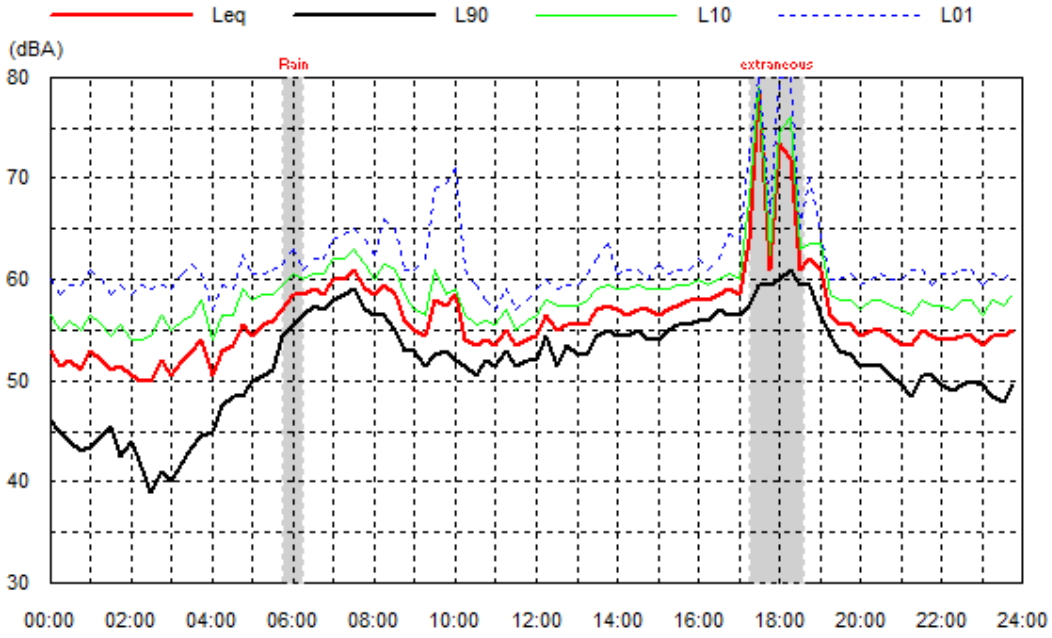

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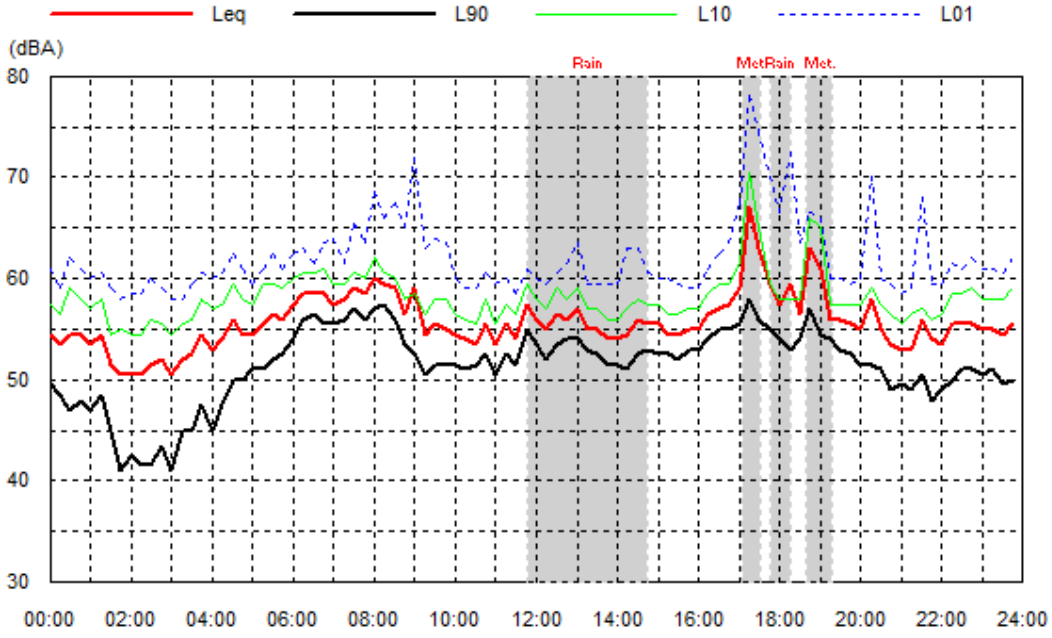

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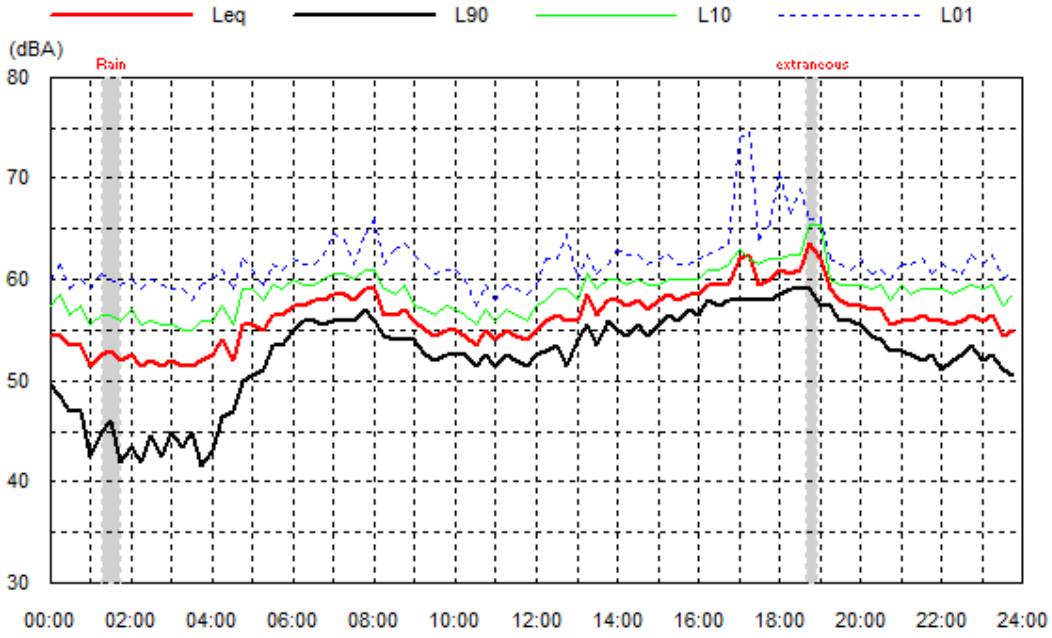

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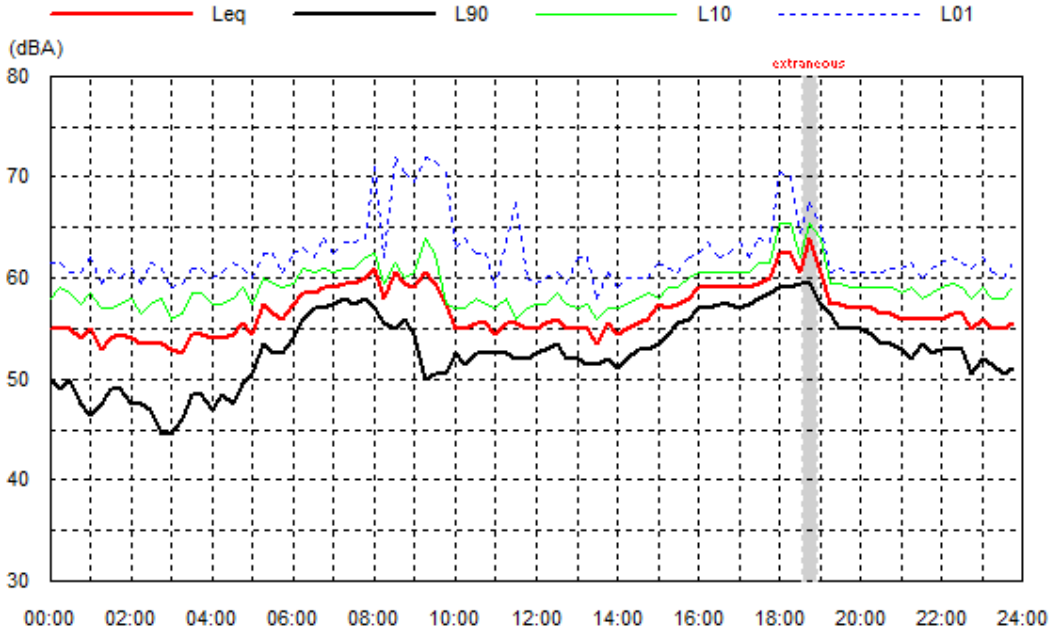

Location: 34 Holloway Drive, Jilliby
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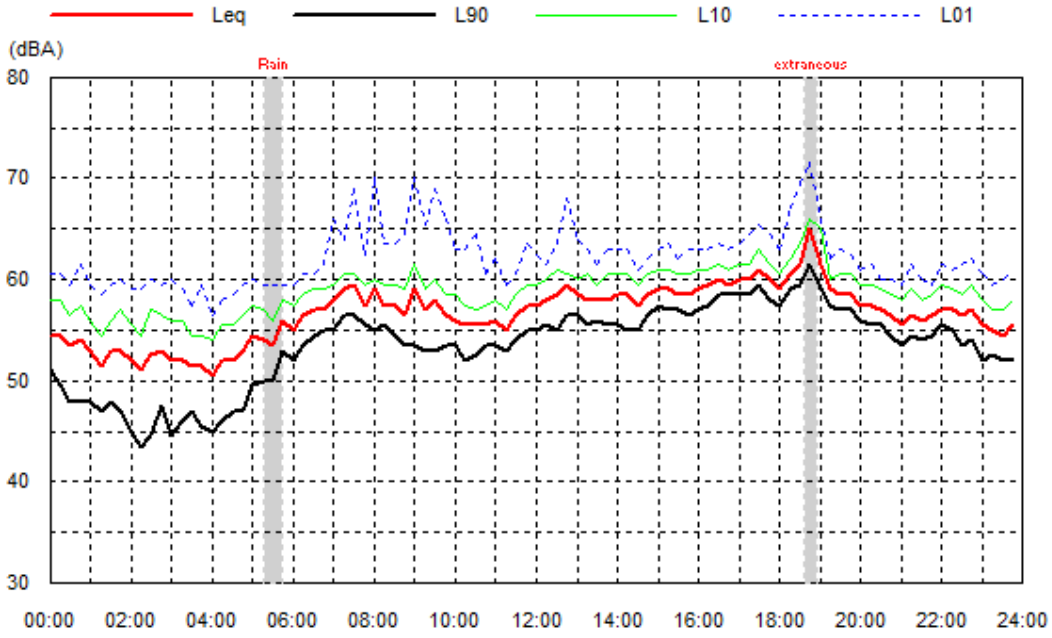

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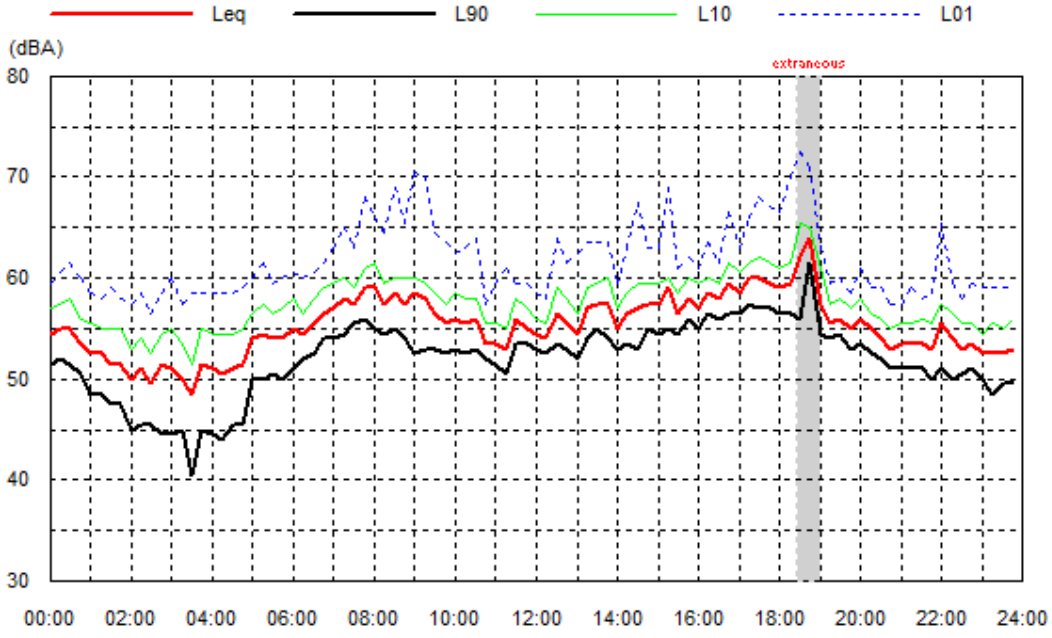

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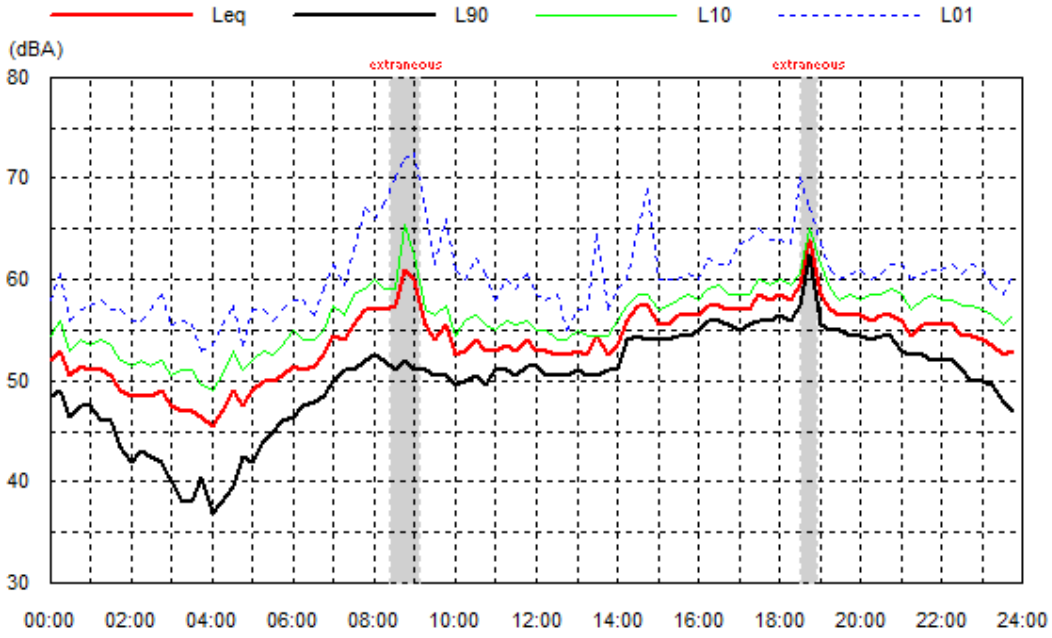

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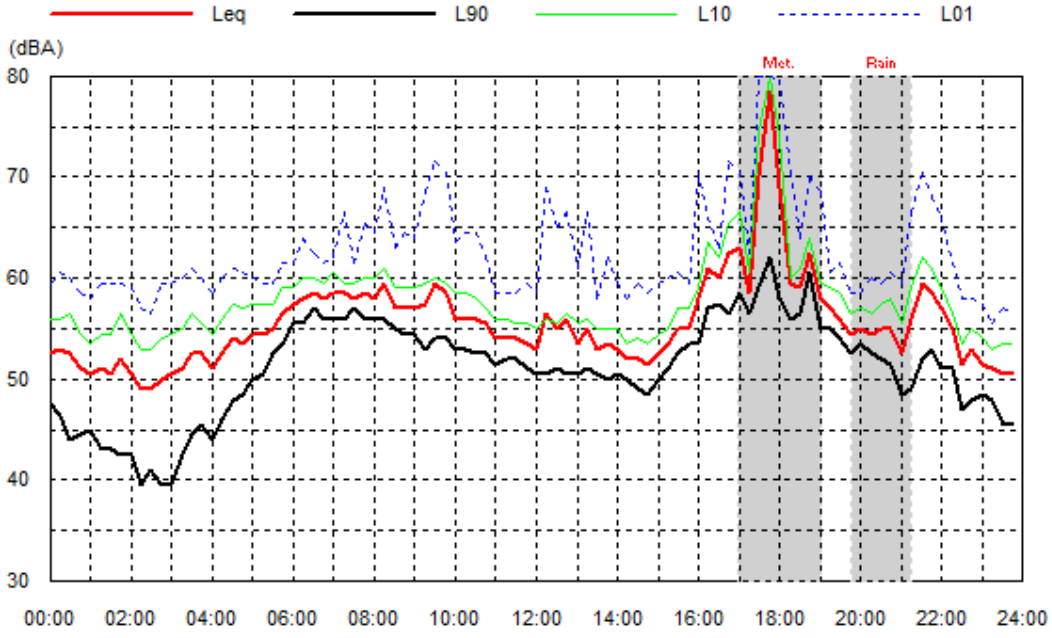

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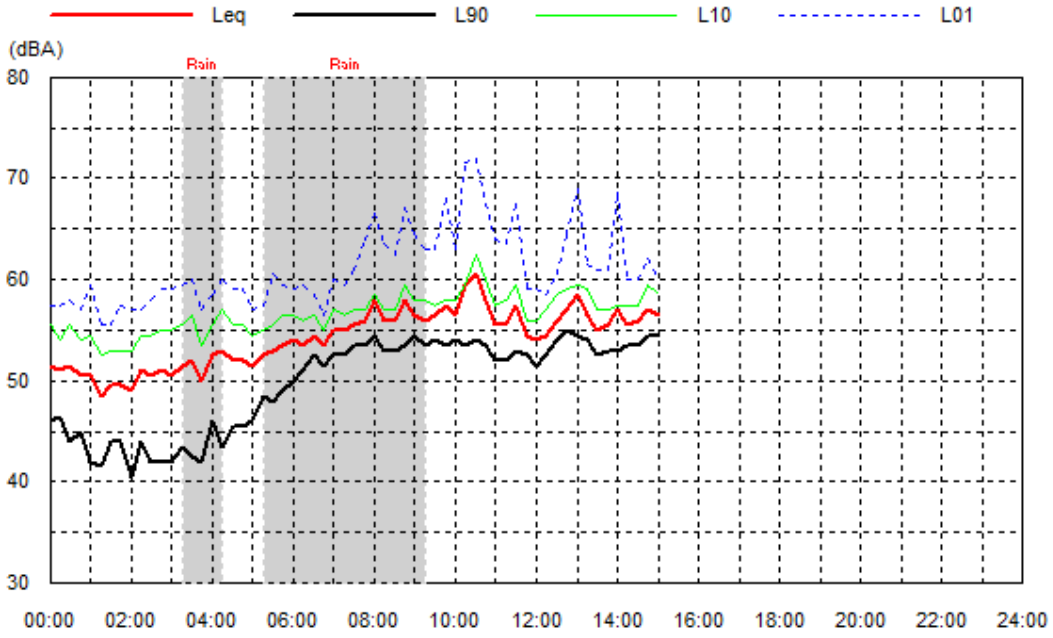

Report 13042 – M1 Widening Noise Study

Noise Logger Results

Logger	L4
Address	54 Hue Hue Road
Start	15 June 2015
Finish	25 June 2015

Overall Noise – L_{Aeq} dBA

$L_{Aeq,15hr}$	67.1
$L_{Aeq,9hr}$	64.3

Rating Background Level (RBL)

Daytime (7.00am -10.00pm)	64
Evening (6.00pm-10.00pm)	59
Night time (10.00pm-7.00am)	49

Source: Dept Lands

For Logger Locations on Google Maps see: http://goo.gl/maps/1Qpf7

Location: 54 Hue Hue Road
Data shaded: Wind; Rain

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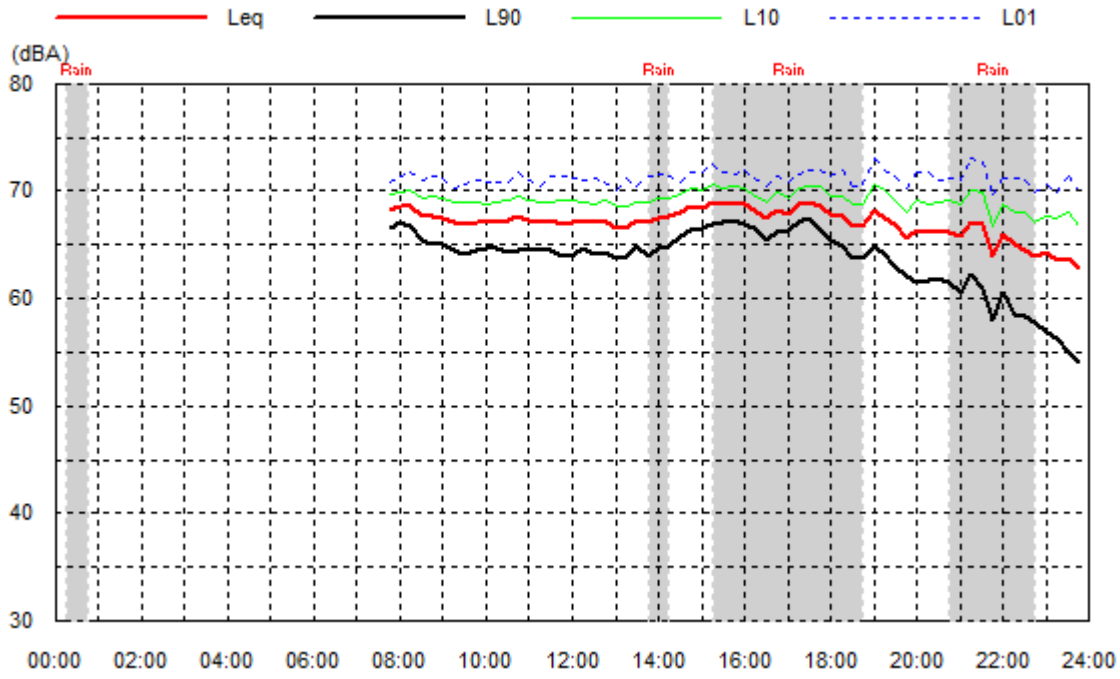

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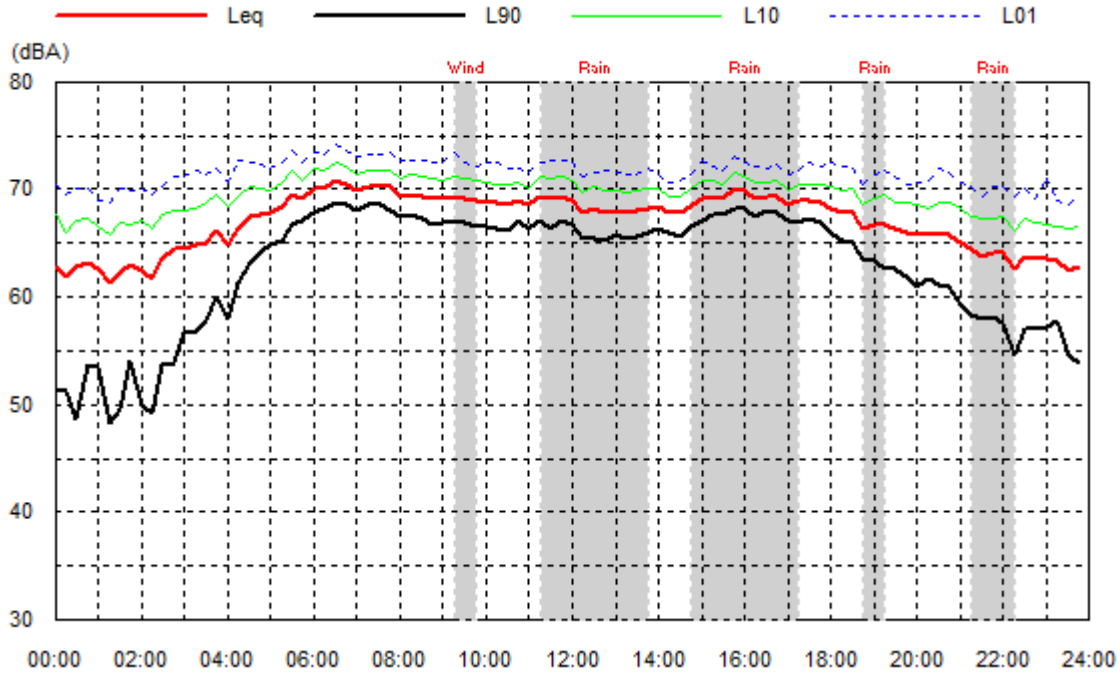

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Location: 54 Hue Hue Road

Data shaded: Wind; Rain

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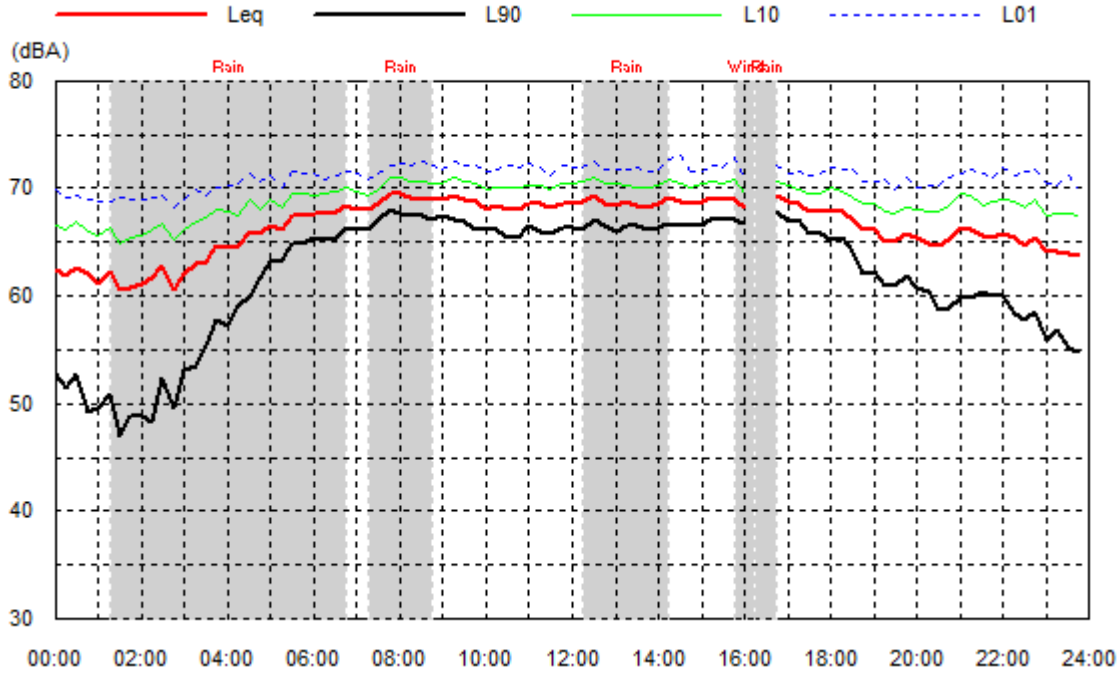

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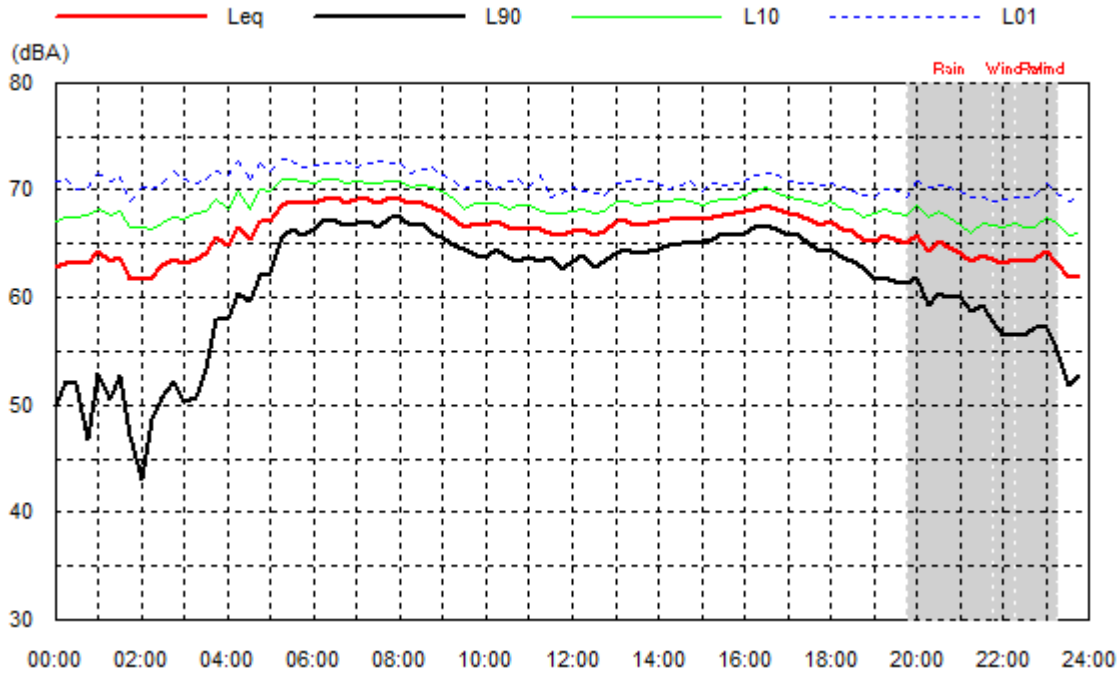

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Data shaded: Wind; Rain
Location: 54 Hue Hue Road
Data shaded: Wind; Rain

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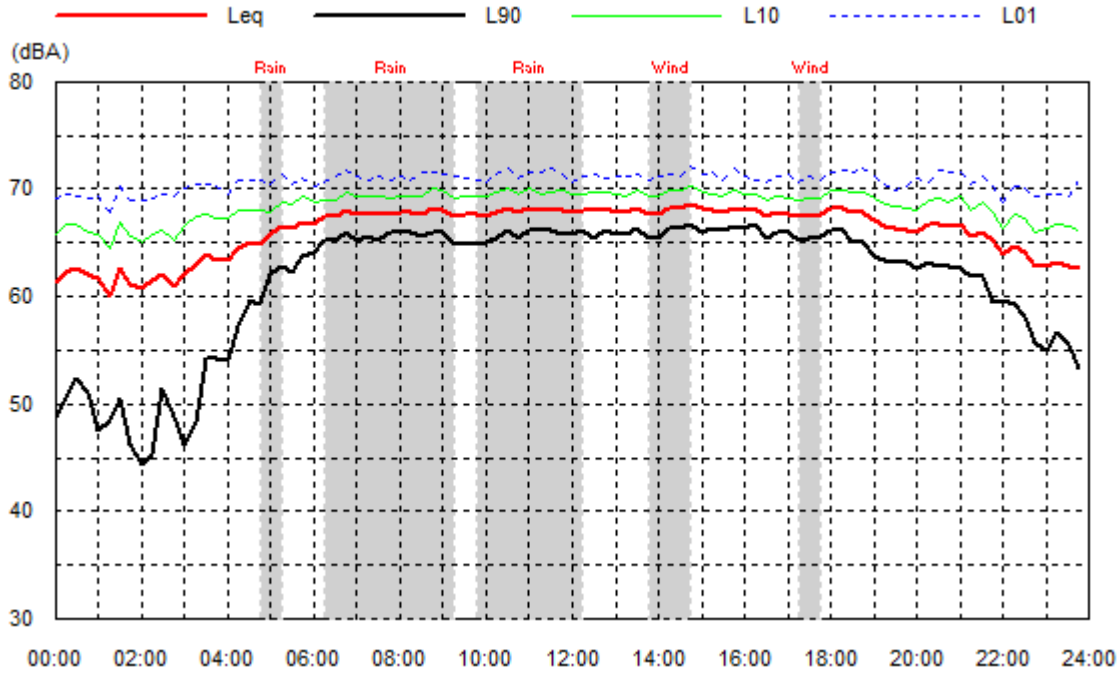

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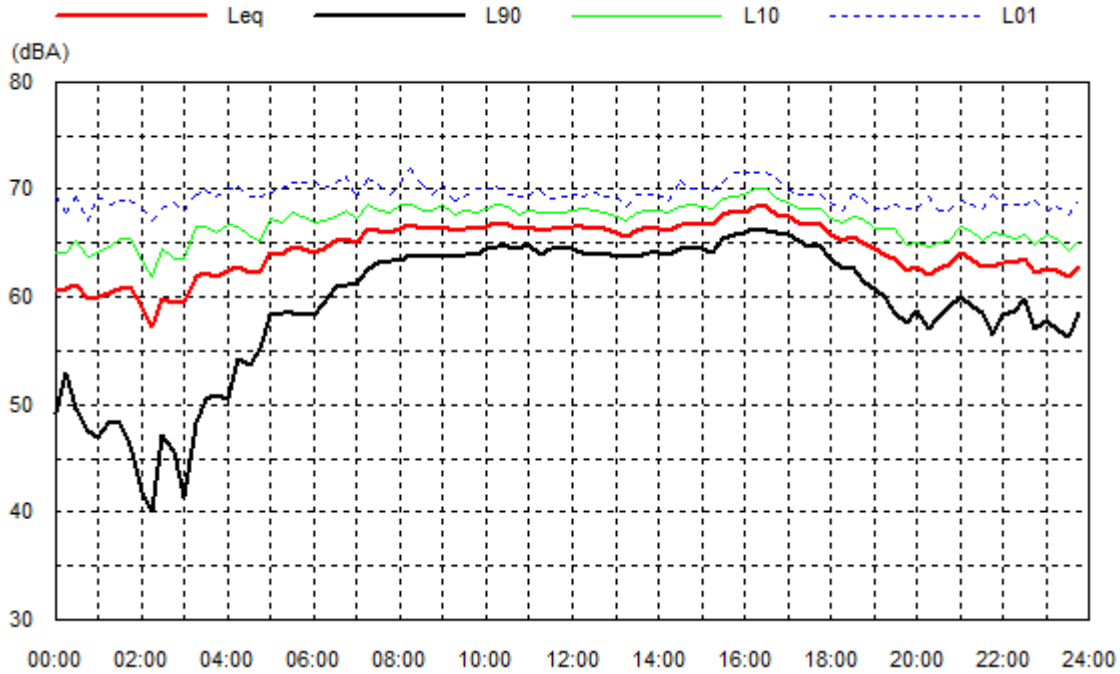

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Data shaded: Wind; Rain
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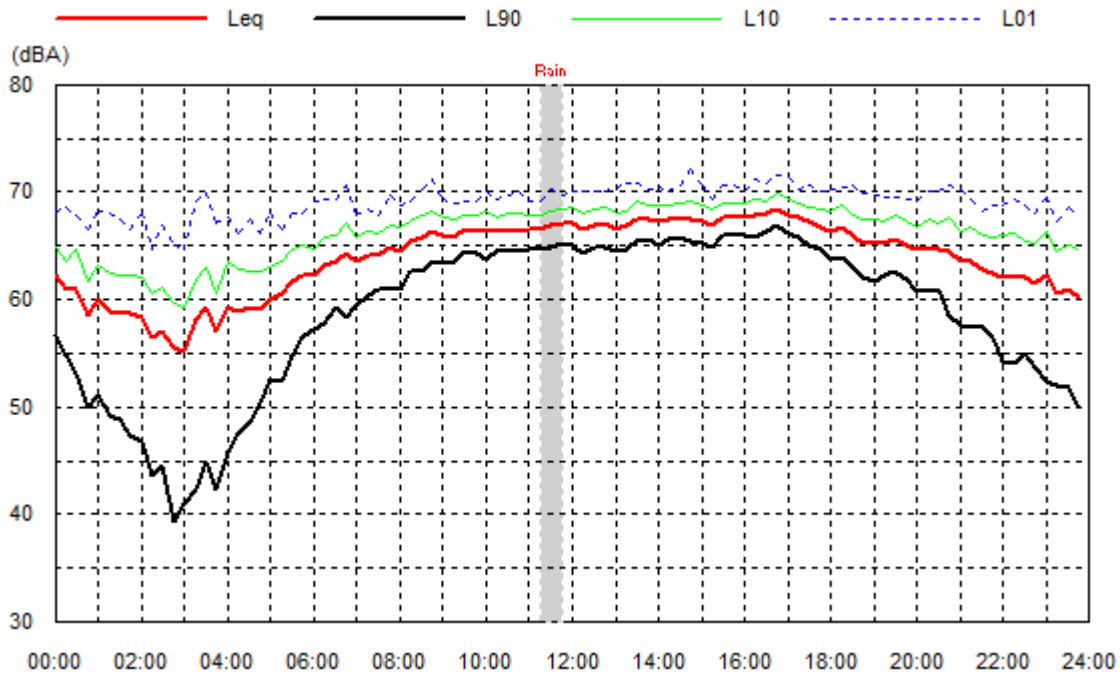
Data shaded: Wind; Rain

Sun 21 Jun 15



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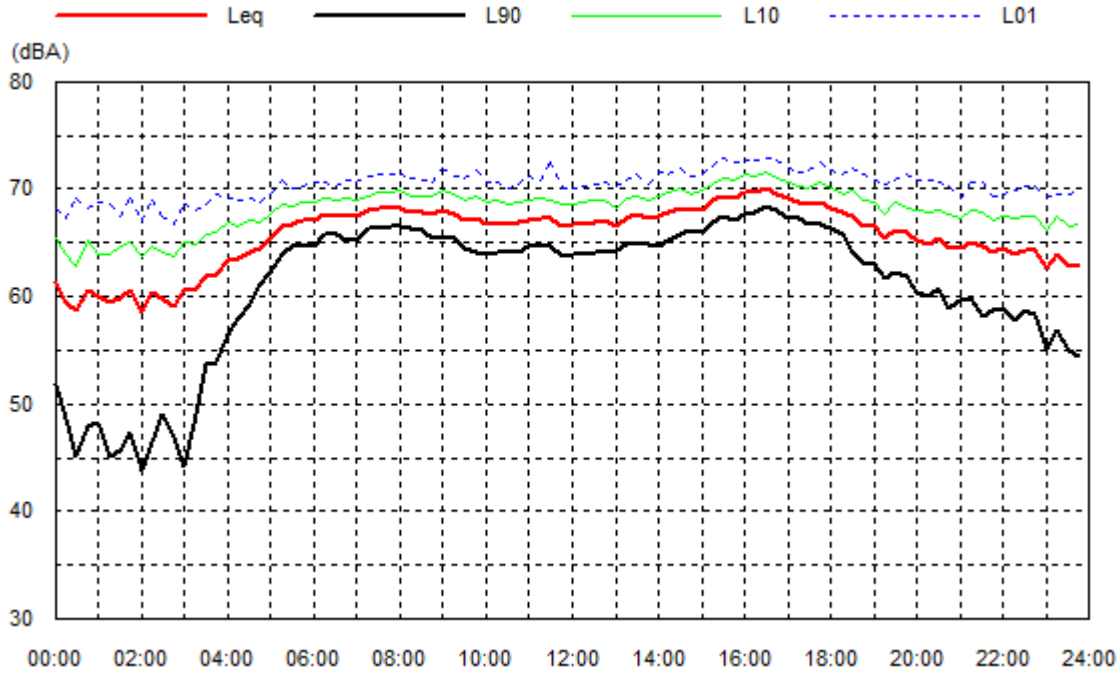
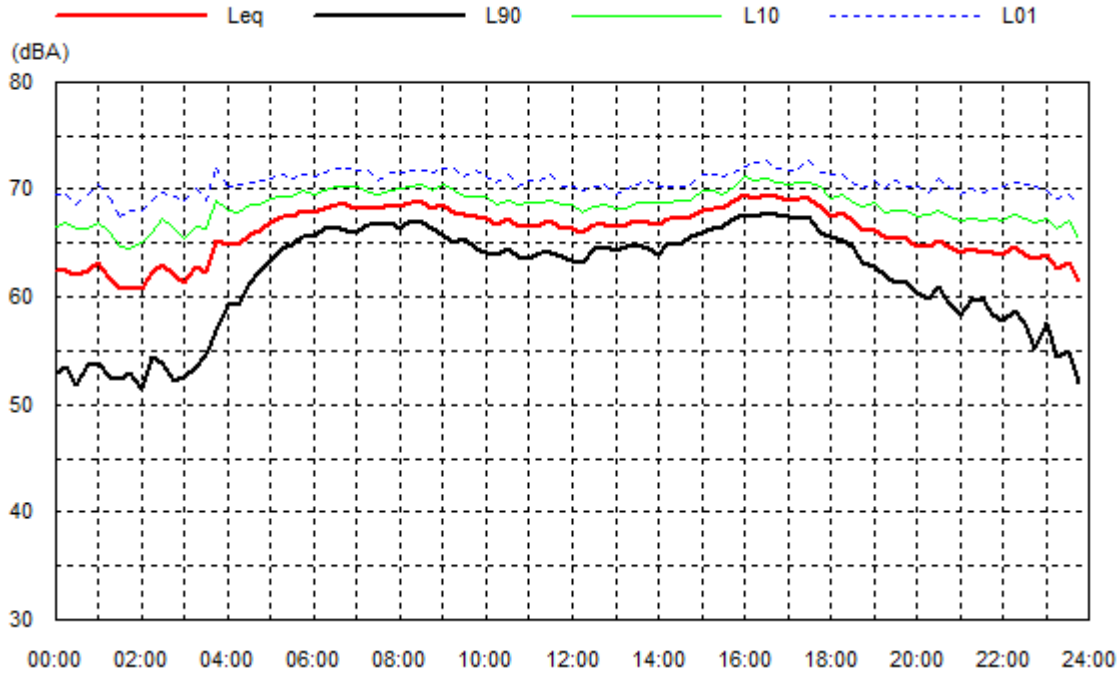


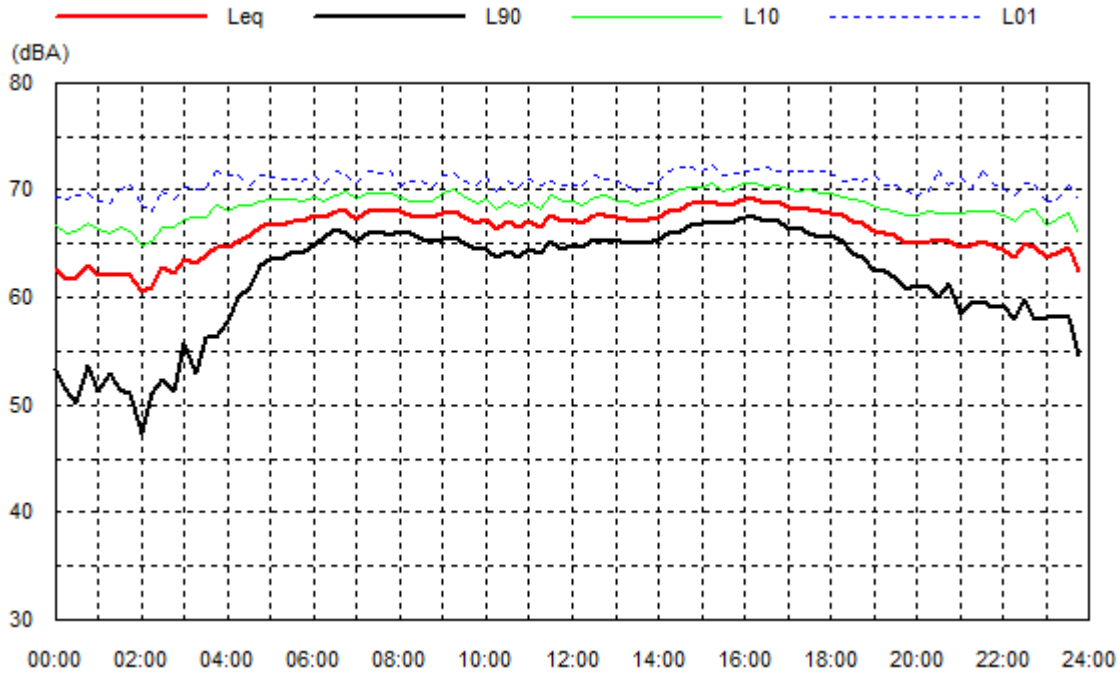
Location: 54 Hue Hue Road
Data shaded: Wind; Rain

Location: 54 Hue Hue Road
Data shaded: Wind; Rain

Tue 23 Jun 15

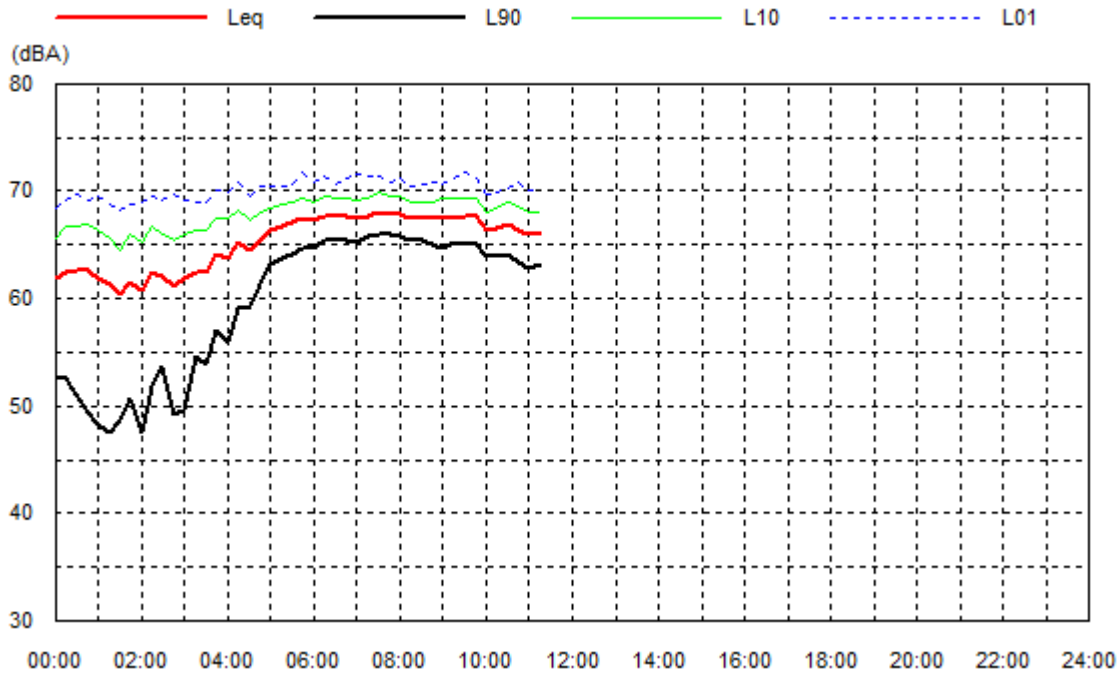

Leq
L90
L10
L01
(dBA)
80
70
60
50
40
30
00:00
02:00
04:00
06:00
08:00
10:00
12:00
14:00
16:00
18:00
20:00
22:00
24:00

Wed 24 Jun 15


Leq
L90
L10
L01
(dBA)
80
70
60
50
40
30
00:00
02:00
04:00
06:00
08:00
10:00
12:00
14:00
16:00
18:00
20:00
22:00
24:00

Location: 54 Hue Hue Road
Data shaded: Wind; Rain

Thu 25 Jun 15



APPENDIX B

COMPARISON OF EXCEEDANCES AT EA & DESIGN STAGES

<table>
<tr><td colspan="2">Explanation of Symbols</td><td rowspan="6">The following maps present the predicted noise impact at individual residences.

The larger symbol shows the impact predicted in the Project REF.

The smaller symbol, placed above the larger symbol shows the impact predicted in the Revised Design</td></tr>
<tr><td colspan="2">Project REF Design Impact</td></tr>
<tr><td>Complies</td><td>Complies with RNP – no mitigation required</td></tr>
<tr><td>Exceeds RNP
Acute
Exceeds RNP and increase more than 2dBA
Acute, increase more than 2BA</td><td>Consider Mitigation</td></tr>
<tr><td colspan="2">Revised Design Impact</td></tr>
<tr><td>Complies</td><td>Complies with RNP – no mitigation required</td></tr>
<tr><td>Exceeds RNP
Acute
Exceeds RNP and increase more than 2dBA
Acute, increase more than 2BA</td><td>Consider Mitigation</td></tr>
<tr><td colspan="2"> 
</td><td>For example:

Receiver N2-2 was predicted to comply at Project REF (larger symbol), and exceed the RNP criterion in the Revised Design (smaller symbol).

Receiver N2-1 was predicted to exceed the RNP criterion at Project REF (larger symbol), and be acute in the Revised Design (smaller symbol).</td></tr>
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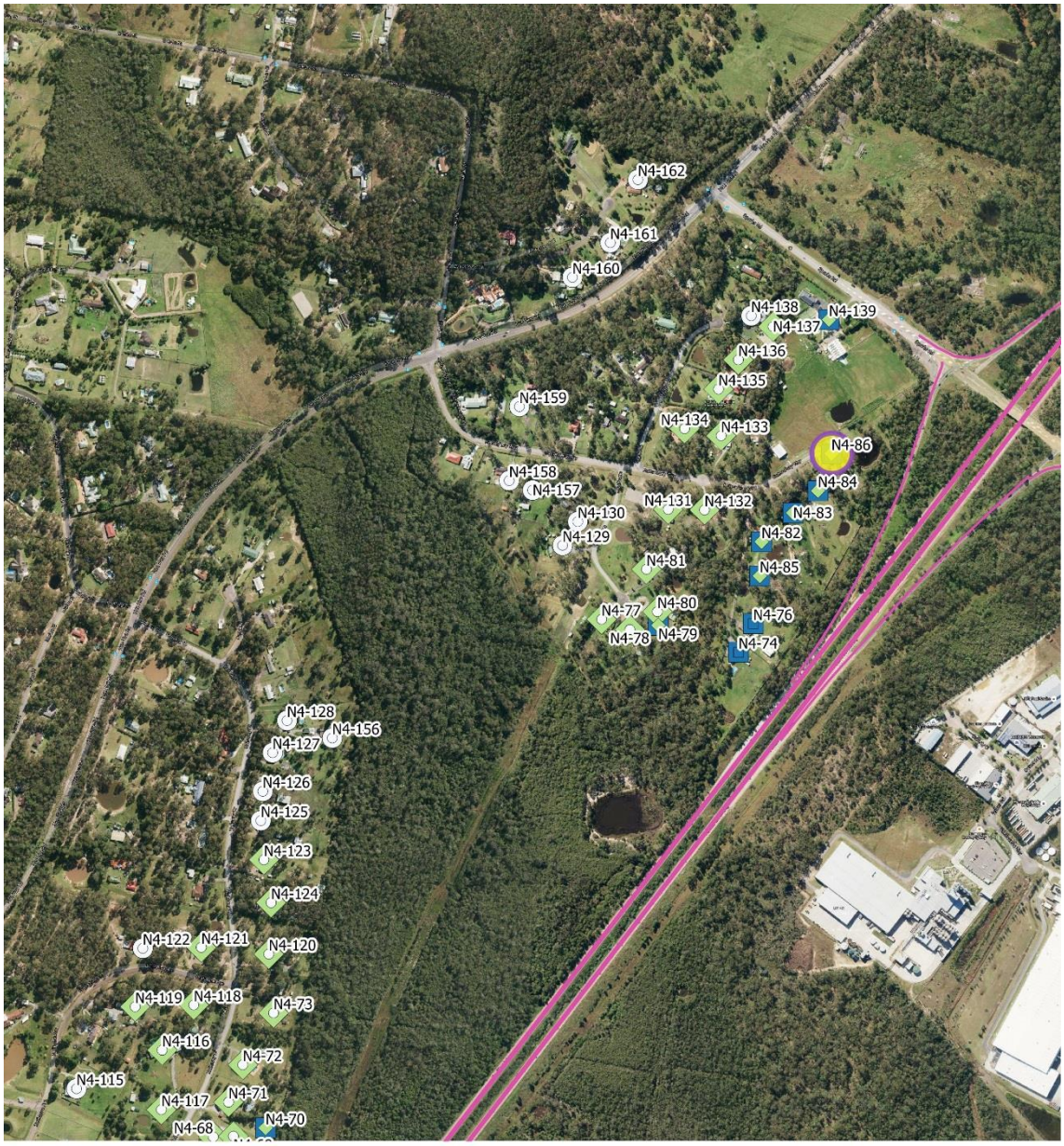

M1 Pacific Motorway- Comparison of Project REF Impacts to Revised Design Impacts (2029)

Double Storey

Non Residential

Road - OGAC for Project REF, SMA for Revised Design

Road - PCP for Project REF, SMA for Revised Design

0 100 200 300 400 m

N

Noise Impact - Outer symbol is Project REF, Inner symbol is Revised Design

Complies

Exceeds RNP

Acute

Exceeds RNP and increase more than 2dBA

Acute, increase more than 2BA

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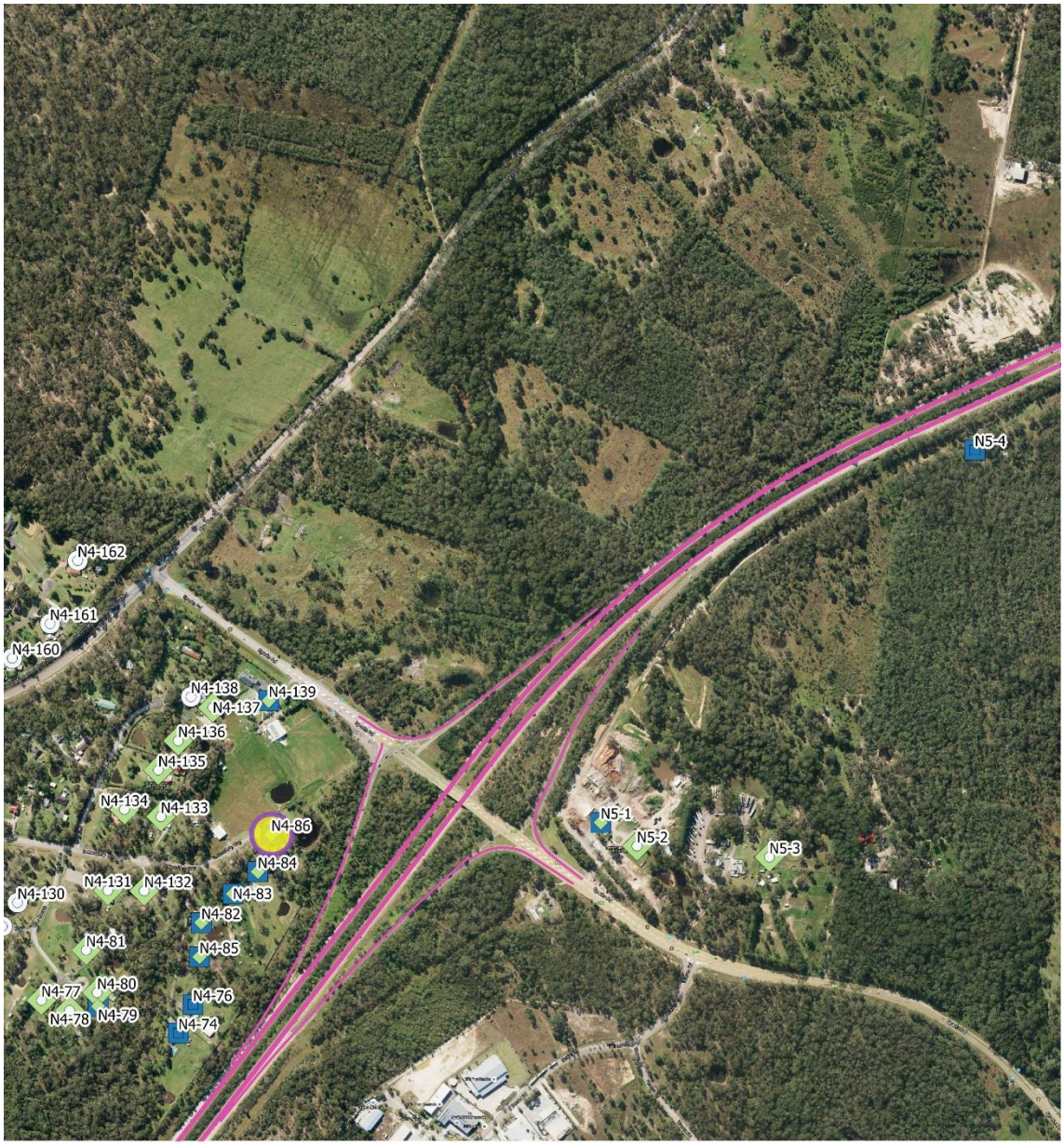

M1 Pacific Motorway- Comparison of Project REF Impacts to Revised Design Impacts (2029)

Double Storey

Non Residential

Road - OGAC for Project REF, SMA for Revised Design

Road - PCP for Project REF, SMA for Revised Design

0 100 200 300 400 m

N

Noise Impact - Outer symbol is Project REF, Inner symbol is Revised Design

Complies

Exceeds RNP

Acute

Exceeds RNP and increase more than 2dBA

Acute, increase more than 2BA

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M1 Pacific Motorway- Comparison of Project REF Impacts to Revised Design Impacts (2029)

Double Storey

Non Residential

Road - OGAC for Project REF, SMA for Revised Design

Road - PCP for Project REF, SMA for Revised Design

0 100 200 300 400 m

N

Noise Impact - Outer symbol is Project REF, Inner symbol is Revised Design

Complies

Exceeds RNP

Acute

Exceeds RNP and increase more than 2dBA

Acute, increase more than 2BA

M1 Pacific Motorway- Comparison of Project REF Impacts to Revised Design Impacts (2029)

Double Storey

Non Residential

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Road - PCP for Project REF, SMA for Revised Design

0 100 200 300 400 m

N

Noise Impact - Outer symbol is Project REF, Inner symbol is Revised Design

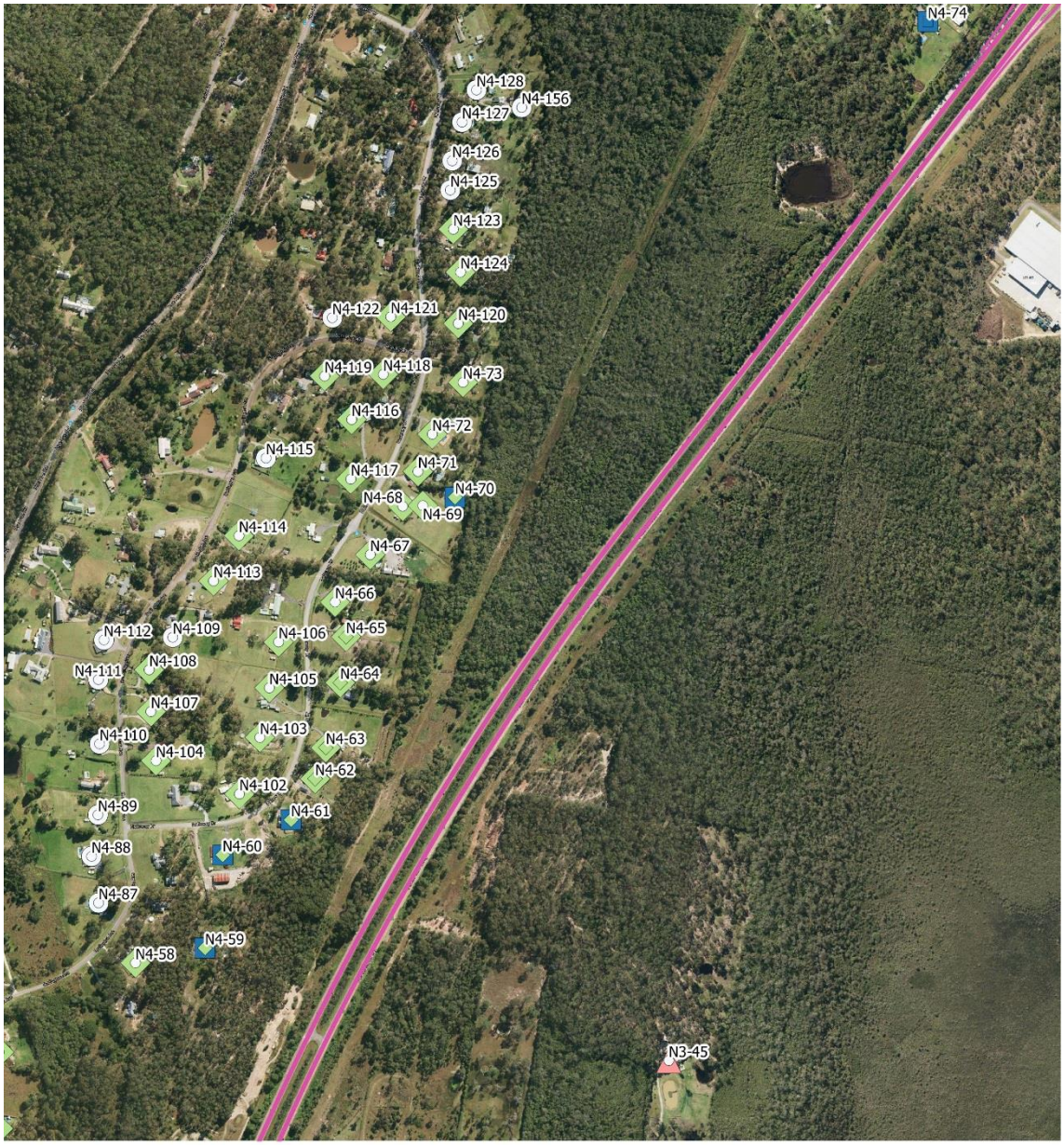
Complies

Exceeds RNP

Acute

Exceeds RNP and increase more than 2dBA

Acute, increase more than 2BA



M1 Pacific Motorway- Comparison of Project REF Impacts to Revised Design Impacts (2029)

Double Storey

Non Residential

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Road - PCP for Project REF, SMA for Revised Design

0 100 200 300 400 m

N

Noise Impact - Outer symbol is Project REF, Inner symbol is Revised Design

Complies

Exceeds RNP

Acute

Exceeds RNP and increase more than 2dBA

Acute, increase more than 2BA

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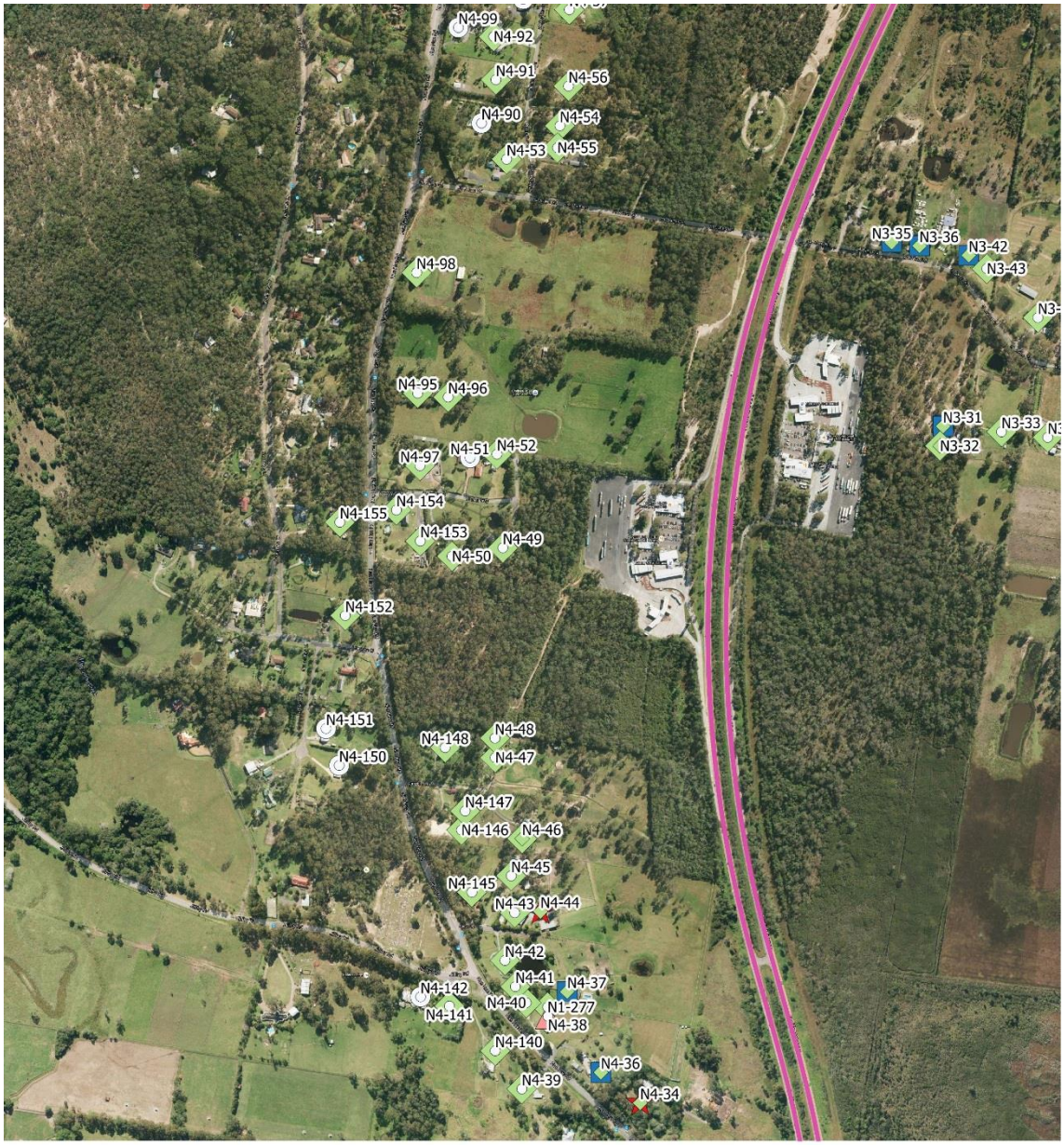

M1 Pacific Motorway- Comparison of Project REF Impacts to Revised Design Impacts (2029)

Double Storey

Non Residential

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0 100 200 300 400 m

N

Noise Impact - Outer symbol is Project REF, Inner symbol is Revised Design

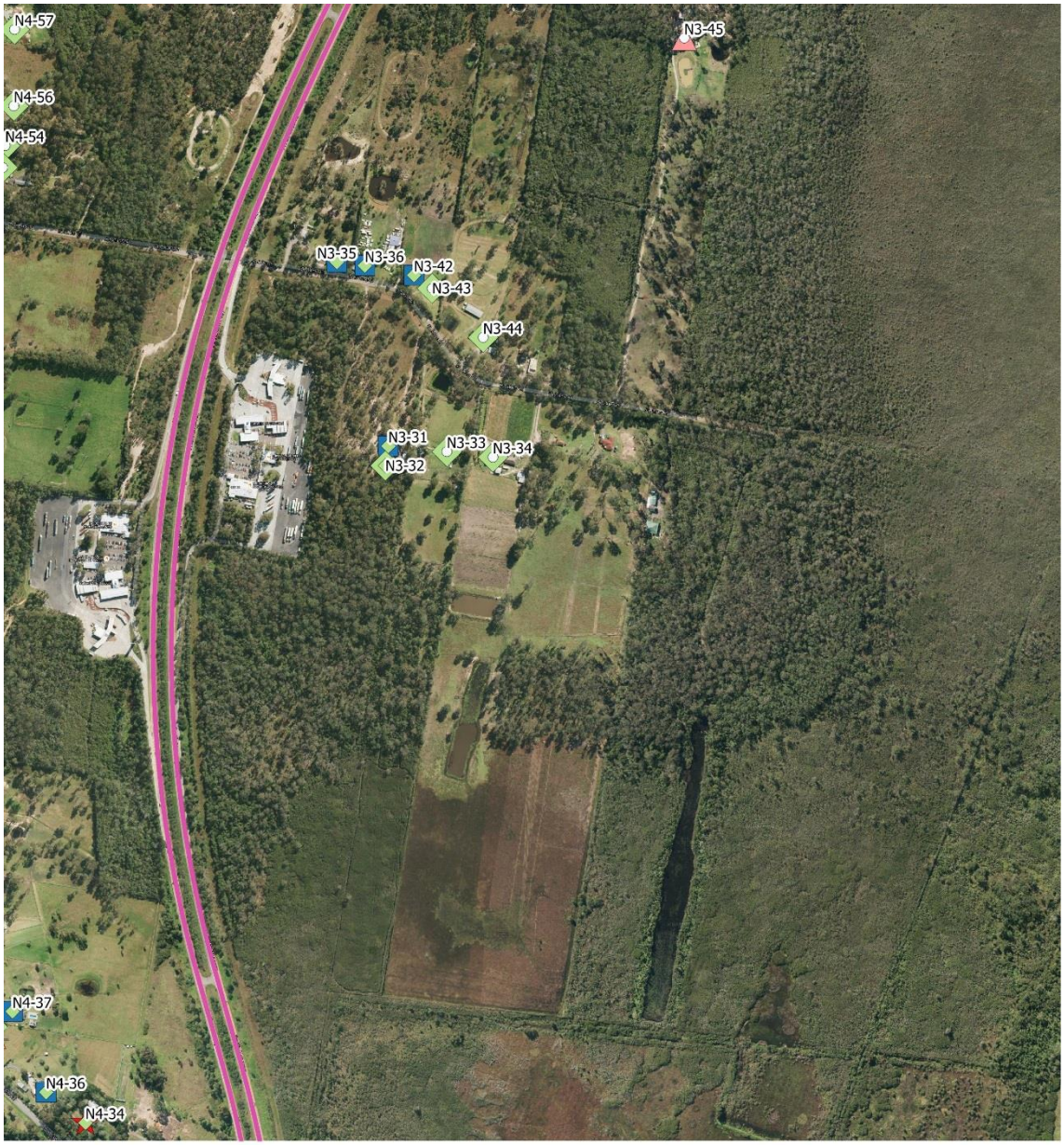
Complies

Exceeds RNP

Acute

Exceeds RNP and increase more than 2dBA

Acute, increase more than 2BA



M1 Pacific Motorway- Comparison of Project REF Impacts to Revised Design Impacts (2029)

Double Storey

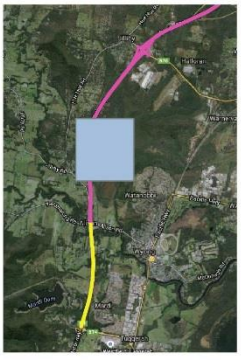
Non Residential

Road - OGAC for Project REF, SMA for Revised Design

Road - PCP for Project REF, SMA for Revised Design

0 100 200 300 400 m

N



Noise Impact - Outer symbol is Project REF, Inner symbol is Revised Design

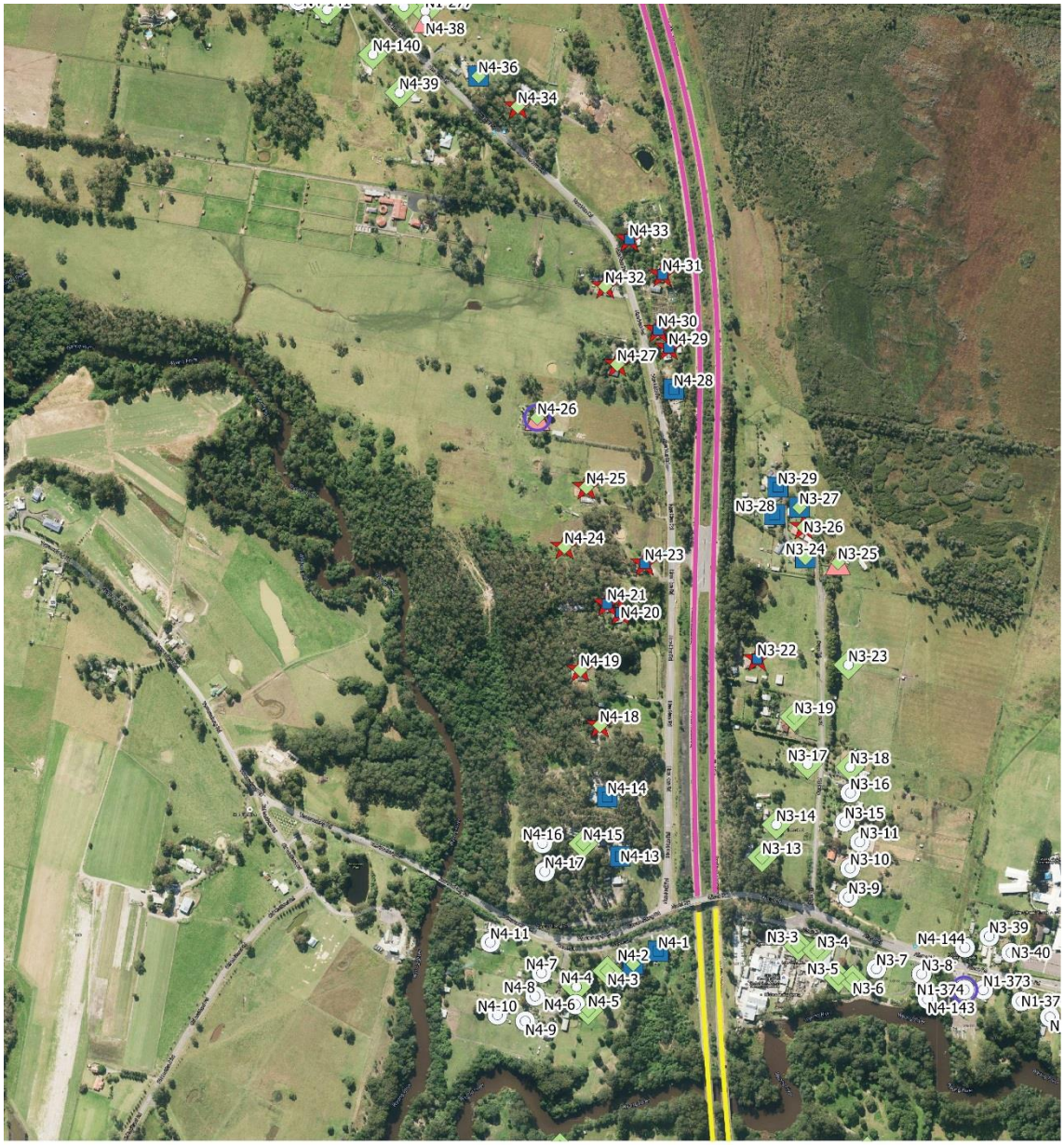
Complies

Exceeds RNP

Acute

Exceeds RNP and increase more than 2dBA

Acute, increase more than 2BA



M1 Pacific Motorway- Comparison of Project REF Impacts to Revised Design Impacts (2029)

Double Storey

Non Residential

Road - OGAC for Project REF, SMA for Revised Design

Road - PCP for Project REF, SMA for Revised Design

0 100 200 300 400 m

N

Noise Impact - Outer symbol is Project REF, Inner symbol is Revised Design

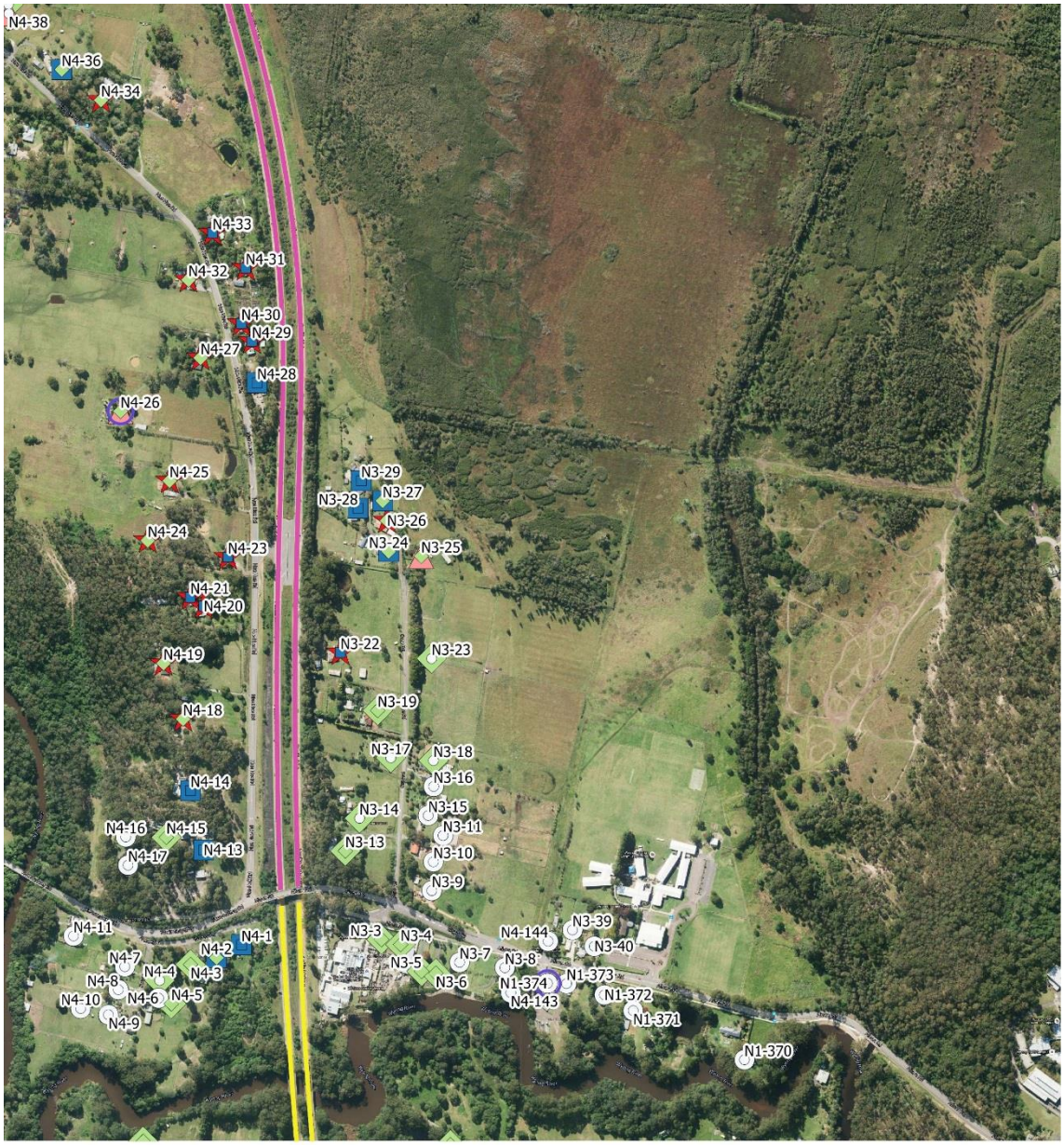
Complies

Exceeds RNP

Acute

Exceeds RNP and increase more than 2dBA

Acute, increase more than 2BA



M1 Pacific Motorway- Comparison of Project REF Impacts to Revised Design Impacts (2029)

Double Storey

Non Residential

Road - OGAC for Project REF, SMA for Revised Design

Road - PCP for Project REF, SMA for Revised Design

0 100 200 300 400 m

N

Noise Impact - Outer symbol is Project REF, Inner symbol is Revised Design

Complies

Exceeds RNP

Acute

Exceeds RNP and increase more than 2dBA

Acute, increase more than 2BA

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M1 Pacific Motorway- Comparison of Project REF Impacts to Revised Design Impacts (2029)

Double Storey

Non Residential

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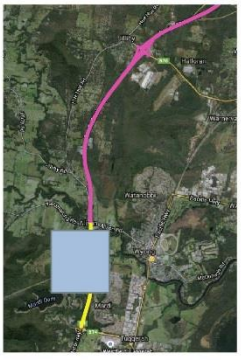
Road - PCP for Project REF, SMA for Revised Design

0 100 200 300 400 m

N



Noise Impact - Outer symbol is Project REF, Inner symbol is Revised Design

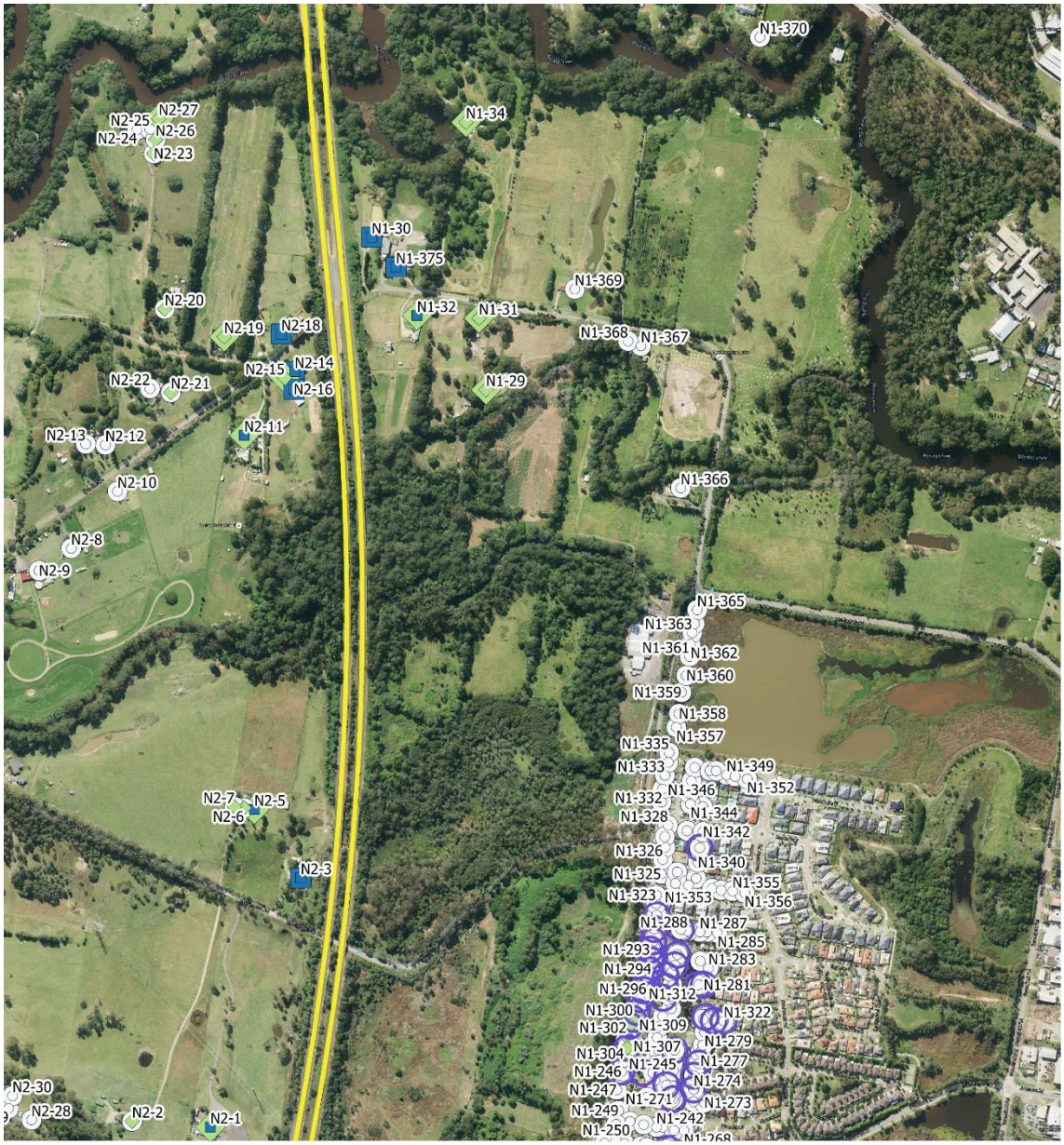
Complies

Exceeds RNP

Acute

Exceeds RNP and increase more than 2dBA

Acute, increase more than 2BA



M1 Pacific Motorway- Comparison of Project REF Impacts to Revised Design Impacts (2029)

Double Storey

Non Residential

Road - OGAC for Project REF, SMA for Revised Design

Road - PCP for Project REF, SMA for Revised Design

0 100 200 300 400 m

N

Noise Impact - Outer symbol is Project REF, Inner symbol is Revised Design

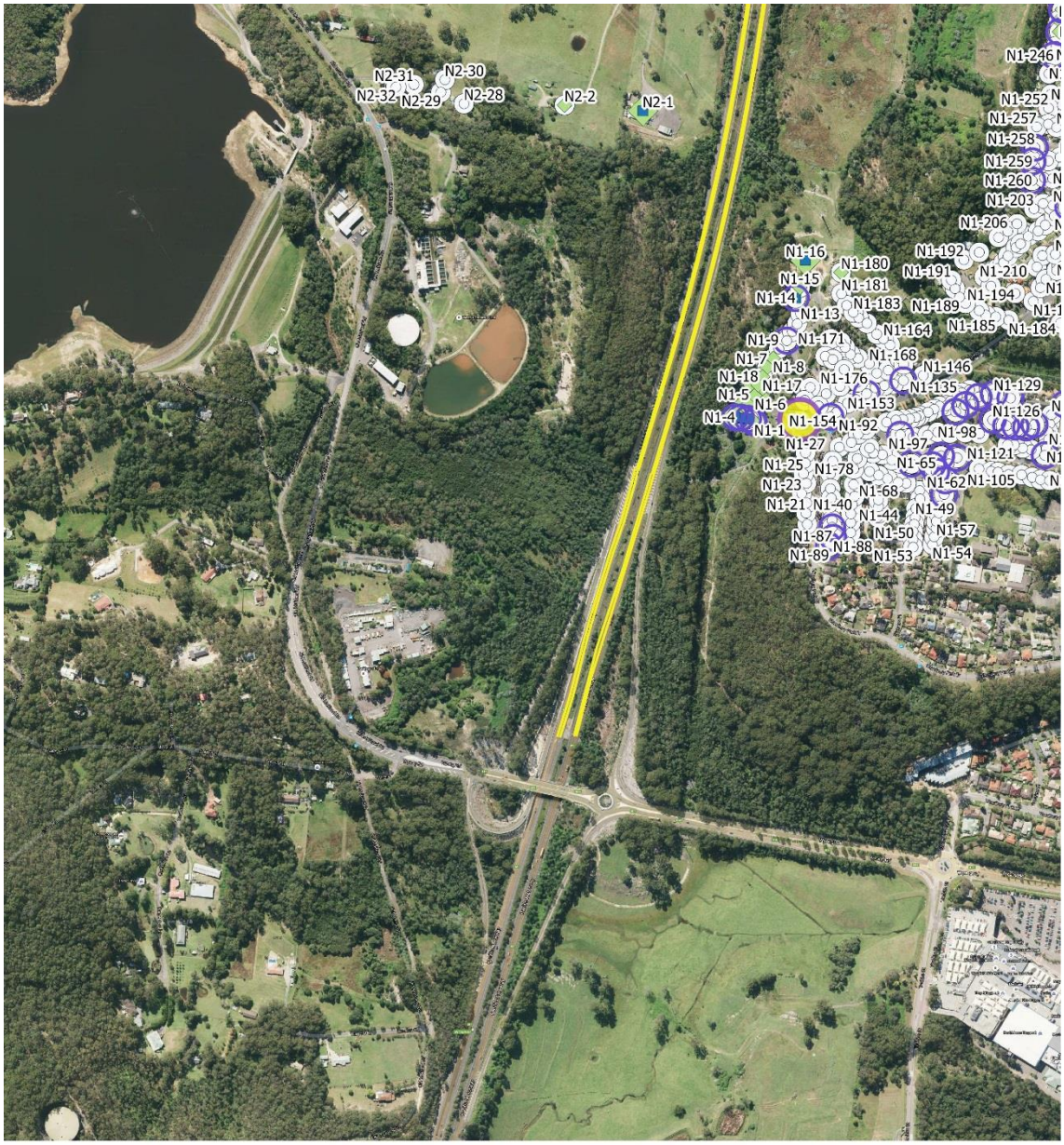
Complies

Exceeds RNP

Acute

Exceeds RNP and increase more than 2dBA

Acute, increase more than 2BA



M1 Pacific Motorway- Comparison of Project REF Impacts to Revised Design Impacts (2029)

Double Storey

Non Residential

Road - OGAC for Project REF, SMA for Revised Design

Road - PCP for Project REF, SMA for Revised Design

0 100 200 300 400 m

N

Noise Impact - Outer symbol is Project REF, Inner symbol is Revised Design

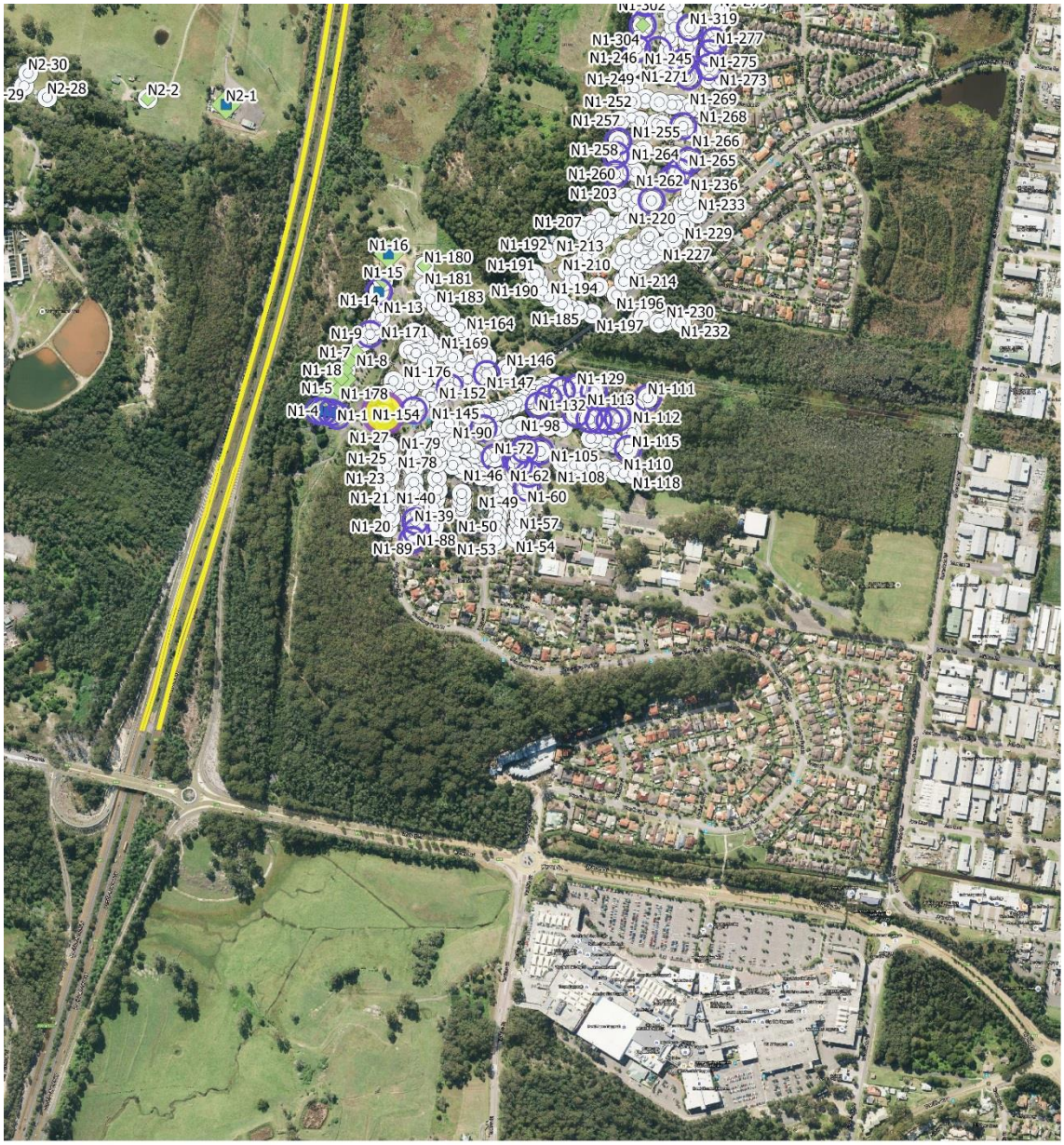
Complies

Exceeds RNP

Acute

Exceeds RNP and increase more than 2dBA

Acute, increase more than 2BA



M1 Pacific Motorway- Comparison of Project REF Impacts to Revised Design Impacts (2029)

Double Storey

Non Residential

Road - OGAC for Project REF, SMA for Revised Design

Road - PCP for Project REF, SMA for Revised Design

0 100 200 300 400 m

N

Noise Impact - Outer symbol is Project REF, Inner symbol is Revised Design

Complies

Exceeds RNP

Acute

Exceeds RNP and increase more than 2dBA

Acute, increase more than 2BA

APPENDIX C

PREDICTED NOISE LEVELS AT RECEIVERS, $L_{Aeq,period}$ dBA

Receiver No. [1]	Single Storey, Floor of Multi-Storey, or Non-Residential	*RNP* Criteria		2029 Project REF Noise Levels $L_{Aeq,period}$ dBA					2029 Revised Design Noise Levels $L_{Aeq,period}$ dBA								Address
				"No Build" [2]		"Build"			"No Build" [2]		"Build"		Increase				
		Day	Night	Day	Night	Day	Night	Consider Mitigation[3]	Day	Night	Day	Night	Day	Night	Consider Mitigation[3]	Change in Mitigation Outcome	
N1-1	First Floor	60	55	60	55	60	55	No	61	57	63	59	2.0	2.0	No	No	1/4 Woolmers Cres MARDI NSW 2259
N1-1	Ground Floor	60	55	60	55	60	55	No	60	57	62	58	2.0	1.8	No	No	1/4 Woolmers Cres MARDI NSW 2259
N1-2	First Floor	60	55	59	54	60	55	No	61	58	63	60	2.0	2.0	Yes - Acute	Yes	2/4 Woolmers Cres MARDI NSW 2259
N1-2	Ground Floor	60	55	59	54	60	55	No	60	57	62	59	1.9	1.8	No	No	2/4 Woolmers Cres MARDI NSW 2259
N1-3	First Floor	60	55	61	56	61	56	No	62	58	64	60	2.0	1.9	Yes - Acute	Yes	3/4 Woolmers Cres MARDI NSW 2259
N1-3	Ground Floor	60	55	61	56	61	56	No	61	58	63	59	2.0	1.8	No	No	3/4 Woolmers Cres MARDI NSW 2259
N1-4	First Floor	60	55	62	58	63	58	No	64	61	66	63	1.9	1.8	Yes - Acute	Yes	4/4 Woolmers Cres MARDI NSW 2259
N1-4	Ground Floor	60	55	62	58	63	58	No	63	60	65	62	2.0	1.8	Yes - Acute	Yes	4/4 Woolmers Cres MARDI NSW 2259
N1-5	Single	60	55	61	56	61	57	Yes	60	57	62	58	1.7	1.5	No	Yes	6 Woolmers Cres MARDI NSW 2259
N1-6	Single	60	55	61	56	61	56	Yes	60	57	62	59	1.7	1.5	No	Yes	8 Woolmers Cres MARDI NSW 2259
N1-7	Single	60	55	60	55	60	55	No	59	56	61	57	1.4	1.2	No	No	14 Woolmers Cres MARDI NSW 2259
N1-8	Single	60	55	59	54	59	55	No	59	55	60	57	1.6	1.5	No	No	16 Woolmers Cres MARDI NSW 2259
N1-9	Single	60	55	57	52	57	53	No	57	53	58	55	1.6	1.5	No	No	18 Woolmers Cres MARDI NSW 2259
N1-10	First Floor	60	55	53	48	54	49	No	57	54	58	55	0.8	0.7	No	No	20 Woolmers Cres MARDI NSW 2259
N1-10	Ground Floor	60	55	53	48	54	49	No	53	50	55	51	1.4	1.2	No	No	20 Woolmers Cres MARDI NSW 2259

[1] Road pavement for receivers starting with N1 and N2 was OGAC for the No Build and Project REF (Build) and SMA for the Project Design (Build).
Road pavement for receivers starting with N3, N4, N5 and N6 was PCP for the No Build and Project REF (Build) and SMA for the Project Design (Build).

[2] The change in "no build" levels between Project REF and Revised Design are due to model validation with additional noise measurement results and corrections to some building heights.

[3] At Project REF mitigation was considered for receivers above RNP. In Revised Design, after consideration of feasible and reasonable mitigations, architectural treatment may be offered to residences with acute levels, or levels above RNP and increase by >2dBA. Residences previously treated under NAP will not be eligible for further mitigation. Acute thresholds are 65dBA for daytime and 60dBA for night time.

Receiver No. [1]	Single Storey, Floor of Multi-Storey, or Non-Residential	*RNP* Criteria		2029 Project REF Noise Levels $L_{Aeq,period}$ dBA					2029 Revised Design Noise Levels $L_{Aeq,period}$ dBA								Address
				"No Build" [2]		"Build"		Consider Mitigation[3]	"No Build" [2]		"Build"		Increase		Consider Mitigation[3]	Change in Mitigation Outcome	
		Day	Night	Day	Night	Day	Night		Day	Night	Day	Night	Day	Night			
N1-11	Single	60	55	54	49	54	50	No	54	51	56	53	1.6	1.4	No	No	22 Woolmers Cres MARDI NSW 2259
N1-12	Single	60	55	53	48	53	49	No	54	50	55	52	1.4	1.3	No	No	24 Woolmers Cres MARDI NSW 2259
N1-13	Single	60	55	54	49	54	49	No	54	51	56	52	1.7	1.6	No	No	26 Woolmers Cres MARDI NSW 2259
N1-14	First Floor	60	55	58	53	57	53	No	63	60	64	60	0.6	0.5	Yes - Acute	Yes	1 Louis Close MARDI NSW 2259
N1-14	Ground Floor	60	55	58	53	57	53	No	58	55	59	56	1.2	1.1	No	No	1 Louis Close MARDI NSW 2259
N1-15	Single	60	55	61	56	59	55	No	61	57	61	58	0.4	0.4	No	No	2 Louis Close MARDI NSW 2259
N1-16	Single	60	55	64	59	62	57	Yes	63	60	63	60	0.0	0.0	Yes - Acute	No	3-4 Louis Close MARDI NSW 2259
N1-17	Single	60	55	60	55	60	55	No	60	57	62	58	1.8	1.6	No	No	12 Woolmers Cres MARDI NSW 2259
N1-18	Single	60	55	61	56	62	57	Yes	61	58	63	59	2.0	1.8	No	Yes	10 Woolmers Cres MARDI NSW 2259
N1-19	Single	60	55	53	48	53	49	No	53	50	55	52	1.7	1.6	No	No	159 Woodbury Park Dr MARDI NSW 2259
N1-20	Single	60	55	54	49	54	49	No	54	51	56	52	1.9	1.7	No	No	161 Woodbury Park Dr MARDI NSW 2259
N1-21	Single	60	55	54	49	54	50	No	54	51	56	53	1.9	1.7	No	No	163 Woodbury Park Dr MARDI NSW 2259
N1-22	Single	60	55	53	48	53	49	No	53	50	55	52	1.9	1.8	No	No	165 Woodbury Park Dr MARDI NSW 2259
N1-23	Single	60	55	54	49	54	50	No	54	51	56	53	1.9	1.7	No	No	167 Woodbury Park Dr MARDI NSW 2259
N1-24	Single	60	55	53	49	54	49	No	54	50	55	52	1.8	1.6	No	No	169 Woodbury Park Dr MARDI NSW 2259
N1-25	Single	60	55	56	51	56	51	No	56	53	57	54	1.7	1.5	No	No	171 Woodbury Park Dr MARDI NSW 2259
N1-26	Single	60	55	55	50	55	51	No	55	52	57	53	1.7	1.5	No	No	173 Woodbury Park Dr MARDI NSW 2259

[1] Road pavement for receivers starting with N1 and N2 was OGAC for the No Build and Project REF (Build) and SMA for the Project Design (Build).
Road pavement for receivers starting with N3, N4, N5 and N6 was PCP for the No Build and Project REF (Build) and SMA for the Project Design (Build).

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Receiver No. [1]	Single Storey, Floor of Multi-Storey, or Non-Residential	*RNP* Criteria		2029 Project REF Noise Levels $L_{Aeq,period}$ dBA					2029 Revised Design Noise Levels $L_{Aeq,period}$ dBA								Address
				"No Build" [2]		"Build"			"No Build" [2]		"Build"		Increase				
		Day	Night	Day	Night	Day	Night	Consider Mitigation[3]	Day	Night	Day	Night	Day	Night	Consider Mitigation[3]	Change in Mitigation Outcome	
N1-27	Single	60	55	55	50	55	51	No	55	52	57	54	1.7	1.5	No	No	2 Woolmers Cres MARDI NSW 2259
N1-28	Non-Res	60	55	55	51	56	51	No	56	53	58	54	1.8	1.7	No	No	Woodbury Park Community Centre 1 Woolmers Cres MARDI NSW 2259
N1-29	Single	60	55	63	58	61	56	Yes	62	58	62	59	0.4	0.4	No	Yes	40 Mardi Road MARDI NSW 2259
N1-30	Single	60	55	71	66	68	64	Yes - Acute	69	66	69	66	-0.1	-0.2	Yes - Acute	No	85 Mardi Road MARDI NSW 2259
N1-31	Single	60	55	63	58	61	56	Yes	62	58	62	58	0.1	0.2	No	Yes	50 Mardi Road MARDI NSW 2259
N1-32	Single	60	55	66	61	64	59	Yes	64	61	65	62	1.1	1.0	Yes - Acute	No	60 Mardi Road MARDI NSW 2259
N1-34	Single	60	55	64	59	63	58	Yes	63	59	62	58	-0.8	-0.7	No	Yes	65 Mardi Road MARDI NSW 2259
N1-36	Single	60	55	46	41	46	41	No	46	43	47	44	1.6	1.4	No	No	1/18 Wagners Place MARDI NSW 2259
N1-37	Single	60	55	46	41	46	41	No	46	42	47	44	1.6	1.4	No	No	1/20 Wagners Place MARDI NSW 2259
N1-38	Single	60	55	46	41	46	41	No	46	42	47	44	1.5	1.4	No	No	1/22-26 Hawthorn Place MARDI NSW 2259
N1-39	Single	60	55	46	41	46	41	No	46	42	47	44	1.5	1.4	No	No	2/22-26 Hawthorn Place MARDI NSW 2259
N1-40	Single	60	55	46	41	46	41	No	46	42	47	44	1.5	1.4	No	No	3/22-26 Hawthorn Place MARDI NSW 2259
N1-41	Single	60	55	46	41	46	41	No	46	42	47	44	1.6	1.4	No	No	4/22-26 Hawthorn Place MARDI NSW 2259
N1-42	Single	60	55	45	40	45	40	No	45	41	46	43	1.5	1.4	No	No	5/22-26 Hawthorn Place MARDI NSW 2259
N1-43	Single	60	55	45	40	45	40	No	45	42	46	43	1.5	1.4	No	No	6/22-26 Hawthorn Place MARDI NSW 2259
N1-44	Single	60	55	45	40	45	40	No	45	41	46	43	1.5	1.4	No	No	7/22-26 Hawthorn Place MARDI NSW 2259

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Receiver No. [1]	Single Storey, Floor of Multi-Storey, or Non-Residential	*RNP* Criteria		2029 Project REF Noise Levels $L_{Aeq,period}$ dBA					2029 Revised Design Noise Levels $L_{Aeq,period}$ dBA								Address
				"No Build" [2]		"Build"			"No Build" [2]		"Build"		Increase				
		Day	Night	Day	Night	Day	Night	Consider Mitigation[3]	Day	Night	Day	Night	Day	Night	Consider Mitigation[3]	Change in Mitigation Outcome	
N1-45	Single	60	55	45	40	45	40	No	45	41	46	43	1.5	1.4	No	No	8/22-26 Hawthorn Place MARDI NSW 2259
N1-46	Single	60	55	44	39	43	39	No	44	40	45	42	1.5	1.4	No	No	1/11 Wagners Place MARDI NSW 2259
N1-47	Single	60	55	44	39	43	39	No	44	40	45	42	1.5	1.4	No	No	2/11 Wagners Place MARDI NSW 2259
N1-48	Single	60	55	44	39	43	39	No	44	40	45	42	1.4	1.3	No	No	3/11 Wagners Place MARDI NSW 2259
N1-49	Single	60	55	44	39	43	39	No	44	40	45	42	1.4	1.2	No	No	4/11 Wagners Place MARDI NSW 2259
N1-50	Single	60	55	44	39	44	39	No	44	40	45	42	1.7	1.6	No	No	5/11 Wagners Place MARDI NSW 2259
N1-51	Single	60	55	44	39	44	39	No	44	41	45	42	1.4	1.2	No	No	6/11 Wagners Place MARDI NSW 2259
N1-52	Single	60	55	44	39	44	39	No	44	41	45	42	1.4	1.3	No	No	7/11 Wagners Place MARDI NSW 2259
N1-53	Single	60	55	44	39	44	39	No	44	41	45	42	1.4	1.3	No	No	8/11 Wagners Place MARDI NSW 2259
N1-54	Single	60	55	43	38	43	39	No	44	40	45	42	1.4	1.3	No	No	22 Keefers Glen MARDI NSW 2259
N1-55	Single	60	55	43	38	43	38	No	43	40	45	41	1.4	1.3	No	No	20 Keefers Glen MARDI NSW 2259
N1-56	Single	60	55	43	38	43	38	No	43	40	45	41	1.5	1.4	No	No	18 Keefers Glen MARDI NSW 2259
N1-57	Single	60	55	43	38	43	38	No	43	40	45	41	1.3	1.3	No	No	16 Keefers Glen MARDI NSW 2259
N1-58	Single	60	55	43	38	43	38	No	43	40	45	41	1.3	1.3	No	No	14 Keefers Glen MARDI NSW 2259
N1-59	Single	60	55	43	38	43	38	No	43	40	45	41	1.5	1.3	No	No	12 Keefers Glen MARDI NSW 2259
N1-60	First Floor	60	55	43	38	43	38	No	44	41	45	42	1.5	1.3	No	No	1/10 Keefers Glen MARDI NSW 2259
N1-60	Ground Floor	60	55	43	38	43	38	No	44	40	45	42	1.4	1.4	No	No	1/10 Keefers Glen MARDI NSW 2259
N1-61	First Floor	60	55	43	38	43	39	No	44	41	46	42	1.5	1.4	No	No	6A Keefers Glen MARDI NSW 2259
N1-61	Ground Floor	60	55	43	38	43	39	No	44	40	45	42	1.5	1.4	No	No	6A Keefers Glen MARDI NSW 2259
N1-62	Single	60	55	43	38	43	39	No	44	40	45	42	1.8	1.7	No	No	6 Keefers Glen MARDI NSW 2259

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Receiver No. [1]	Single Storey, Floor of Multi-Storey, or Non-Residential	*RNP* Criteria		2029 Project REF Noise Levels $L_{Aeq,period}$ dBA					2029 Revised Design Noise Levels $L_{Aeq,period}$ dBA								Address
				"No Build" [2]		"Build"		Consider Mitigation[3]	"No Build" [2]		"Build"		Increase		Consider Mitigation[3]	Change in Mitigation Outcome	
		Day	Night	Day	Night	Day	Night		Day	Night	Day	Night	Day	Night			
N1-63	Single	60	55	43	38	43	39	No	44	40	45	42	1.5	1.3	No	No	4 Keefers Glen MARDI NSW 2259
N1-64	Single	60	55	44	39	43	39	No	44	41	45	42	1.1	1.0	No	No	5A Hawthorn Place MARDI NSW 2259
N1-65	First Floor	60	55	44	39	43	39	No	44	41	46	42	1.7	1.5	No	No	5 Hawthorn Place MARDI NSW 2259
N1-65	Ground Floor	60	55	44	39	43	39	No	44	40	45	42	1.7	1.5	No	No	5 Hawthorn Place MARDI NSW 2259
N1-66	First Floor	60	55	44	39	44	39	No	45	41	46	43	1.4	1.4	No	No	3 Hawthorn Place MARDI NSW 2259
N1-66	Ground Floor	60	55	44	39	44	39	No	44	41	45	42	1.5	1.4	No	No	3 Hawthorn Place MARDI NSW 2259
N1-67	Single	60	55	44	39	44	39	No	44	41	45	42	1.3	1.2	No	No	1/4 Hawthorn Place MARDI NSW 2259
N1-68	Single	60	55	44	39	44	39	No	44	41	46	42	1.2	1.2	No	No	6 Hawthorn Place MARDI NSW 2259
N1-69	Single	60	55	45	40	44	40	No	45	41	46	43	1.4	1.2	No	No	1/8 Hawthorn Place MARDI NSW 2259
N1-70	Single	60	55	45	40	45	40	No	45	42	47	43	1.9	1.8	No	No	10 Hawthorn Place MARDI NSW 2259
N1-71	Single	60	55	45	40	45	41	No	45	42	47	43	1.5	1.5	No	No	1/12 Hawthorn Place MARDI NSW 2259
N1-72	First Floor	60	55	44	39	44	39	No	45	42	46	43	1.3	1.3	No	No	1/2 Hawthorn Place MARDI NSW 2259
N1-72	Ground Floor	60	55	44	39	44	39	No	45	41	46	42	1.3	1.2	No	No	1/2 Hawthorn Place MARDI NSW 2259
N1-73	Single	60	55	45	40	44	40	No	45	41	46	43	1.4	1.3	No	No	12 Brickendon Avenue MARDI NSW 2259
N1-74	Single	60	55	45	40	45	40	No	45	42	47	43	1.5	1.4	No	No	10 Brickendon Avenue MARDI NSW 2259
N1-75	Single	60	55	45	40	45	41	No	45	42	47	44	1.5	1.4	No	No	8 Brickendon Avenue MARDI NSW 2259
N1-76	Single	60	55	46	41	46	41	No	46	43	47	44	1.5	1.4	No	No	6 Brickendon Avenue MARDI NSW 2259
N1-77	Single	60	55	46	41	46	41	No	46	42	47	44	1.5	1.4	No	No	20 Hawthorn Place MARDI NSW 2259
N1-78	Single	60	55	46	41	46	41	No	46	42	47	44	1.6	1.5	No	No	16 Hawthorn Place MARDI NSW 2259
N1-79	Single	60	55	46	41	46	42	No	46	43	48	44	1.6	1.5	No	No	14 Hawthorn Place MARDI NSW 2259

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				"No Build" [2]		"Build"			"No Build" [2]		"Build"		Increase				
		Day	Night	Day	Night	Day	Night	Consider Mitigation[3]	Day	Night	Day	Night	Day	Night	Consider Mitigation[3]	Change in Mitigation Outcome	
N1-80	Single	60	55	48	43	48	43	No	48	44	49	46	1.8	1.7	No	No	178 Woodbury Park Dr MARDI NSW 2259
N1-81	Single	60	55	47	42	47	42	No	47	43	48	45	1.7	1.7	No	No	176 Woodbury Park Dr MARDI NSW 2259
N1-82	Single	60	55	46	41	46	41	No	46	43	48	44	1.7	1.5	No	No	174 Woodbury Park Dr MARDI NSW 2259
N1-83	Single	60	55	47	42	47	42	No	47	43	48	45	1.6	1.5	No	No	170 Woodbury Park Dr MARDI NSW 2259
N1-84	Single	60	55	46	41	46	42	No	47	43	48	45	1.6	1.6	No	No	168 Woodbury Park Dr MARDI NSW 2259
N1-85	Single	60	55	46	41	46	42	No	46	43	48	45	1.6	1.5	No	No	166 Woodbury Park Dr MARDI NSW 2259
N1-86	Single	60	55	46	41	46	42	No	46	43	48	45	1.6	1.6	No	No	164 Woodbury Park Dr MARDI NSW 2259
N1-87	First Floor	60	55	46	41	46	41	No	48	44	49	46	1.7	1.6	No	No	162 Woodbury Park Dr MARDI NSW 2259
N1-87	Ground Floor	60	55	46	41	46	41	No	46	43	48	44	1.7	1.5	No	No	162 Woodbury Park Dr MARDI NSW 2259
N1-88	First Floor	60	55	46	41	46	42	No	48	44	49	46	1.7	1.6	No	No	160 Woodbury Park Dr MARDI NSW 2259
N1-88	Ground Floor	60	55	46	41	46	42	No	46	43	48	45	1.6	1.5	No	No	160 Woodbury Park Dr MARDI NSW 2259
N1-89	First Floor	60	55	46	41	46	42	No	48	45	50	46	1.8	1.7	No	No	158 Woodbury Park Dr MARDI NSW 2259
N1-89	Ground Floor	60	55	46	41	46	42	No	47	43	48	45	1.7	1.6	No	No	158 Woodbury Park Dr MARDI NSW 2259
N1-90	Single	60	55	46	41	46	42	No	46	43	48	44	1.5	1.4	No	No	6 Brickendon Avenue MARDI NSW 2259

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				"No Build" [2]		"Build"			"No Build" [2]		"Build"		Increase				
		Day	Night	Day	Night	Day	Night	Consider Mitigation[3]	Day	Night	Day	Night	Day	Night	Consider Mitigation[3]	Change in Mitigation Outcome	
N1-91	Single	60	55	47	42	47	43	No	47	44	49	46	1.5	1.4	No	No	180 Woodbury Park Dr MARDI NSW 2259
N1-92	Single	60	55	47	42	47	42	No	47	44	49	45	1.6	1.5	No	No	182 Woodbury Park Dr MARDI NSW 2259
N1-93	Single	60	55	47	42	47	42	No	47	44	49	45	1.6	1.4	No	No	184 Woodbury Park Dr MARDI NSW 2259
N1-94	Single	60	55	46	41	46	42	No	46	43	48	45	1.8	1.7	No	No	1/186 Woodbury Park Dr MARDI NSW 2259
N1-95	First Floor	60	55	46	41	46	41	No	47	43	48	45	1.5	1.4	No	No	3 Brickendon Avenue MARDI NSW 2259
N1-95	Ground Floor	60	55	46	41	46	41	No	46	43	47	44	1.3	1.2	No	No	3 Brickendon Avenue MARDI NSW 2259
N1-96	Single	60	55	45	40	45	40	No	45	42	47	43	1.4	1.3	No	No	5 Brickendon Avenue MARDI NSW 2259
N1-97	Single	60	55	45	40	44	40	No	45	41	46	43	1.3	1.3	No	No	9 Brickendon Avenue MARDI NSW 2259
N1-98	Single	60	55	44	39	44	39	No	44	41	46	42	1.3	1.2	No	No	1/11 Brickendon Avenue MARDI NSW 2259
N1-99	Single	60	55	44	39	44	39	No	44	41	45	42	1.3	1.3	No	No	1/13 Brickendon Avenue MARDI NSW 2259
N1-100	Single	60	55	43	38	43	39	No	44	40	45	41	1.4	1.2	No	No	1/15 Brickendon Avenue MARDI NSW 2259
N1-101	Single	60	55	43	38	43	38	No	43	40	44	41	1.3	1.2	No	No	NULL
N1-102	First Floor	60	55	44	39	44	39	No	44	41	46	42	1.4	1.2	No	No	1/1 Hawthorn Place MARDI NSW 2259
N1-102	Ground Floor	60	55	44	39	44	39	No	44	41	45	42	1.5	1.4	No	No	1/1 Hawthorn Place MARDI NSW 2259
N1-103	First Floor	60	55	43	38	43	38	No	44	41	45	42	1.4	1.2	No	No	1/2 Keefers Glen MARDI NSW 2259
N1-103	Ground Floor	60	55	43	38	43	38	No	44	40	45	42	1.4	1.3	No	No	1/2 Keefers Glen MARDI NSW 2259
N1-104	Single	60	55	43	38	43	38	No	43	40	44	41	1.4	1.3	No	No	1/20 Brickendon Avenue MARDI NSW 2259

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				"No Build" [2]		"Build"		Consider Mitigation[3]	"No Build" [2]		"Build"		Increase		Consider Mitigation[3]	Change in Mitigation Outcome	
		Day	Night	Day	Night	Day	Night		Day	Night	Day	Night	Day	Night			
N1-105	Single	60	55	43	38	42	38	No	43	40	44	41	1.4	1.3	No	No	24 Brickendon Avenue MARDI NSW 2259
N1-106	Single	60	55	42	37	42	38	No	43	39	44	41	1.5	1.4	No	No	24 Brickendon Avenue MARDI NSW 2259
N1-107	Single	60	55	42	37	42	37	No	43	39	44	40	1.4	1.3	No	No	1/26 Brickendon Avenue MARDI NSW 2259
N1-108	Single	60	55	42	37	42	37	No	42	39	44	40	1.5	1.5	No	No	1/30 Brickendon Avenue MARDI NSW 2259
N1-109	Single	60	55	42	37	42	37	No	42	39	44	40	1.6	1.6	No	No	32 Brickendon Avenue MARDI NSW 2259
N1-110	Single	60	55	42	37	42	37	No	42	39	44	40	1.6	1.5	No	No	32 Brickendon Avenue MARDI NSW 2259
N1-111	First Floor	60	55	42	37	42	37	No	42	39	44	40	1.4	1.4	No	No	1/7 The Sheiling MARDI NSW 2259
N1-111	Ground Floor	60	55	42	37	42	37	No	42	38	43	40	1.5	1.4	No	No	1/7 The Sheiling MARDI NSW 2259
N1-112	Single	60	55	42	37	42	37	No	42	39	43	40	1.4	1.3	No	No	5 The Sheiling MARDI NSW 2259
N1-113	Single	60	55	42	37	42	37	No	42	39	43	40	1.4	1.3	No	No	6 The Sheiling MARDI NSW 2259
N1-114	Single	60	55	42	37	42	37	No	42	39	43	40	1.4	1.4	No	No	4 The Sheiling MARDI NSW 2259
N1-115	Single	60	55	42	37	42	37	No	42	39	43	40	1.4	1.3	No	No	3 The Sheiling MARDI NSW 2259
N1-116	Single	60	55	42	37	42	37	No	42	39	43	40	1.4	1.3	No	No	2 The Sheiling MARDI NSW 2259
N1-117	First Floor	60	55	42	37	42	37	No	42	39	44	40	1.4	1.3	No	No	1/31 Brickendon Avenue MARDI NSW 2259
N1-117	Ground Floor	60	55	42	37	42	37	No	42	39	43	40	1.5	1.4	No	No	1/31 Brickendon Avenue MARDI NSW 2259
N1-118	Single	60	55	42	37	42	37	No	42	38	43	40	1.5	1.5	No	No	1/34 Brickendon Avenue MARDI NSW 2259
N1-119	Single	60	55	42	37	42	37	No	42	39	44	40	1.4	1.3	No	No	29 Brickendon Avenue MARDI NSW 2259
N1-120	Single	60	55	42	37	42	37	No	42	39	44	40	1.3	1.2	No	No	27 Brickendon Avenue MARDI NSW 2259

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Receiver No. [1]	Single Storey, Floor of Multi-Storey, or Non-Residential	*RNP* Criteria		2029 Project REF Noise Levels $L_{Aeq,period}$ dBA					2029 Revised Design Noise Levels $L_{Aeq,period}$ dBA								Address
				"No Build" [2]		"Build"			"No Build" [2]		"Build"		Increase				
		Day	Night	Day	Night	Day	Night	Consider Mitigation[3]	Day	Night	Day	Night	Day	Night	Consider Mitigation[3]	Change in Mitigation Outcome	
N1-121	Single	60	55	42	37	42	38	No	42	39	44	40	1.4	1.3	No	No	25 Brickendon Avenue MARDI NSW 2259
N1-122	Single	60	55	42	37	42	38	No	43	39	44	41	1.5	1.3	No	No	23 Brickendon Avenue MARDI NSW 2259
N1-123	First Floor	60	55	42	37	42	37	No	43	39	44	41	1.4	1.3	No	No	1/5-7 Richmond Mews MARDI NSW 2259
N1-123	Ground Floor	60	55	42	37	42	37	No	42	39	44	40	1.3	1.3	No	No	1/5-7 Richmond Mews MARDI NSW 2259
N1-124	First Floor	60	55	42	37	42	37	No	43	39	44	41	1.3	1.2	No	No	4/5-7 Richmond Mews MARDI NSW 2259
N1-124	Ground Floor	60	55	42	37	42	37	No	42	39	44	40	1.4	1.3	No	No	4/5-7 Richmond Mews MARDI NSW 2259
N1-125	First Floor	60	55	42	37	42	38	No	43	40	44	41	1.3	1.2	No	No	1/8 Richmond Mews MARDI NSW 2259
N1-125	Ground Floor	60	55	42	37	42	38	No	43	39	44	41	1.4	1.3	No	No	1/8 Richmond Mews MARDI NSW 2259
N1-126	First Floor	60	55	43	38	43	38	No	44	40	45	41	1.2	1.1	No	No	1/10 Richmond Mews MARDI NSW 2259
N1-126	Ground Floor	60	55	43	38	43	38	No	43	40	44	41	1.4	1.2	No	No	1/10 Richmond Mews MARDI NSW 2259
N1-127	First Floor	60	55	43	38	42	38	No	43	40	44	41	1.3	1.2	No	No	1/9 Richmond Mews MARDI NSW 2259
N1-127	Ground Floor	60	55	43	38	42	38	No	43	39	44	41	1.4	1.2	No	No	1/9 Richmond Mews MARDI NSW 2259
N1-128	First Floor	60	55	43	38	42	38	No	43	40	45	41	1.5	1.3	No	No	1/3 Richmond Mews MARDI NSW 2259
N1-128	Ground Floor	60	55	43	38	42	38	No	43	39	44	41	1.5	1.4	No	No	1/3 Richmond Mews MARDI NSW 2259
N1-129	First Floor	60	55	43	38	43	38	No	44	41	45	42	1.6	1.5	No	No	4/3 Richmond Mews MARDI NSW 2259
N1-129	Ground Floor	60	55	43	38	43	38	No	43	40	45	42	1.7	1.5	No	No	4/3 Richmond Mews MARDI NSW 2259
N1-130	First Floor	60	55	44	39	44	39	No	44	41	46	42	1.6	1.5	No	No	1/2 Richmond Mews MARDI NSW 2259
N1-130	Ground Floor	60	55	44	39	44	39	No	44	40	45	42	1.6	1.5	No	No	1/2 Richmond Mews MARDI NSW 2259

[1] Road pavement for receivers starting with N1 and N2 was OGAC for the No Build and Project REF (Build) and SMA for the Project Design (Build).
Road pavement for receivers starting with N3, N4, N5 and N6 was PCP for the No Build and Project REF (Build) and SMA for the Project Design (Build).

[2] The change in "no build" levels between Project REF and Revised Design are due to model validation with additional noise measurement results and corrections to some building heights.

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Receiver No. [1]	Single Storey, Floor of Multi-Storey, or Non-Residential	*RNP* Criteria		2029 Project REF Noise Levels $L_{Aeq,period}$ dBA					2029 Revised Design Noise Levels $L_{Aeq,period}$ dBA								Address
				"No Build" [2]		"Build"		Consider Mitigation[3]	"No Build" [2]		"Build"		Increase		Consider Mitigation[3]	Change in Mitigation Outcome	
		Day	Night	Day	Night	Day	Night		Day	Night	Day	Night	Day	Night			
N1-131	First Floor	60	55	44	39	44	39	No	45	41	46	43	1.4	1.3	No	No	4/2 Richmond Mews MARDI NSW 2259
N1-131	Ground Floor	60	55	44	39	44	39	No	44	41	46	42	1.5	1.5	No	No	4/2 Richmond Mews MARDI NSW 2259
N1-132	First Floor	60	55	44	39	44	39	No	45	42	46	43	1.4	1.3	No	No	4/2 Richmond Mews MARDI NSW 2259
N1-132	Ground Floor	60	55	44	39	44	39	No	44	41	46	42	1.4	1.4	No	No	4/2 Richmond Mews MARDI NSW 2259
N1-133	Single	60	55	44	39	44	39	No	44	41	46	42	1.5	1.5	No	No	212 Woodbury Park Dr MARDI NSW 2259
N1-134	Single	60	55	44	39	44	40	No	44	41	46	43	1.5	1.4	No	No	210 Woodbury Park Dr MARDI NSW 2259
N1-135	Single	60	55	44	39	44	40	No	45	41	46	43	1.5	1.4	No	No	208 Woodbury Park Dr MARDI NSW 2259
N1-136	Single	60	55	45	40	44	40	No	45	41	46	43	1.6	1.5	No	No	206 Woodbury Park Dr MARDI NSW 2259
N1-137	Single	60	55	45	40	44	40	No	45	41	46	43	1.6	1.5	No	No	204 Woodbury Park Dr MARDI NSW 2259
N1-138	Single	60	55	45	40	45	40	No	45	42	46	43	1.6	1.5	No	No	202 Woodbury Park Dr MARDI NSW 2259
N1-139	Single	60	55	45	40	45	40	No	45	42	47	43	1.6	1.4	No	No	202 Woodbury Park Dr MARDI NSW 2259
N1-140	Single	60	55	45	40	45	40	No	45	42	47	43	1.6	1.5	No	No	200 Woodbury Park Dr MARDI NSW 2259
N1-141	Single	60	55	45	40	45	41	No	45	42	47	44	1.7	1.5	No	No	196 Woodbury Park Dr MARDI NSW 2259
N1-142	Single	60	55	45	40	45	41	No	46	42	47	44	1.6	1.6	No	No	196 Woodbury Park Dr MARDI NSW 2259
N1-143	Single	60	55	46	41	45	41	No	46	42	47	44	1.7	1.6	No	No	194 Woodbury Park Dr MARDI NSW 2259

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Receiver No. [1]	Single Storey, Floor of Multi-Storey, or Non-Residential	*RNP* Criteria		2029 Project REF Noise Levels $L_{Aeq,period}$ dBA					2029 Revised Design Noise Levels $L_{Aeq,period}$ dBA								Address
				"No Build" [2]		"Build"			"No Build" [2]		"Build"		Increase				
		Day	Night	Day	Night	Day	Night	Consider Mitigation[3]	Day	Night	Day	Night	Day	Night	Consider Mitigation[3]	Change in Mitigation Outcome	
N1-144	Single	60	55	46	41	46	41	No	46	43	48	44	1.7	1.6	No	No	192 Woodbury Park Dr MARDI NSW 2259
N1-145	Single	60	55	46	41	46	41	No	46	43	48	44	1.7	1.6	No	No	188 Woodbury Park Dr MARDI NSW 2259
N1-146	Single	60	55	47	42	46	42	No	47	44	48	45	1.1	1.0	No	No	195-205 Woodbury Park Dr MARDI NSW 2259
N1-147	First Floor	60	55	47	42	47	42	No	48	45	49	46	1.1	1.0	No	No	50 Woolmers Cres MARDI NSW 2259
N1-147	Ground Floor	60	55	47	42	47	42	No	47	44	49	45	1.3	1.2	No	No	50 Woolmers Cres MARDI NSW 2259
N1-148	Single	60	55	47	42	47	43	No	48	44	49	45	1.2	1.1	No	No	21 Woolmers Cres MARDI NSW 2259
N1-149	Single	60	55	48	43	48	43	No	48	45	49	46	1.1	1.0	No	No	21 Woolmers Cres MARDI NSW 2259
N1-150	Single	60	55	48	43	48	43	No	48	45	49	46	1.2	1.1	No	No	189 Woodbury Park Dr MARDI NSW 2259
N1-151	First Floor	60	55	48	43	48	43	No	49	46	50	47	1.3	1.2	No	No	187 Woodbury Park Dr MARDI NSW 2259
N1-151	Ground Floor	60	55	48	43	48	43	No	48	45	49	46	1.3	1.2	No	No	187 Woodbury Park Dr MARDI NSW 2259
N1-152	Single	60	55	48	43	48	43	No	48	44	49	46	1.4	1.4	No	No	185 Woodbury Park Dr MARDI NSW 2259
N1-153	Single	60	55	48	43	48	43	No	48	44	49	46	1.5	1.4	No	No	183 Woodbury Park Dr MARDI NSW 2259
N1-154	Single	60	55	48	43	48	44	No	48	45	50	46	1.4	1.3	No	No	181 Woodbury Park Dr MARDI NSW 2259
N1-155	First Floor	60	55	49	44	49	44	No	50	47	52	49	1.6	1.5	No	No	179 Woodbury Park Dr MARDI NSW 2259
N1-155	Ground Floor	60	55	49	44	49	44	No	49	46	51	47	1.7	1.5	No	No	179 Woodbury Park Dr MARDI NSW 2259

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Receiver No. [1]	Single Storey, Floor of Multi-Storey, or Non-Residential	*RNP* Criteria		2029 Project REF Noise Levels $L_{Aeq,period}$ dBA					2029 Revised Design Noise Levels $L_{Aeq,period}$ dBA								Address
				"No Build" [2]		"Build"			"No Build" [2]		"Build"		Increase				
		Day	Night	Day	Night	Day	Night	Consider Mitigation[3]	Day	Night	Day	Night	Day	Night	Consider Mitigation[3]	Change in Mitigation Outcome	
N1-156	Single	60	55	49	44	49	45	No	49	46	51	48	1.8	1.7	No	No	7 Longford Place MARDI NSW 2259
N1-157	Single	60	55	49	44	49	44	No	49	46	51	47	1.8	1.7	No	No	6 Longford Place MARDI NSW 2259
N1-158	Single	60	55	48	43	48	44	No	49	45	51	47	1.9	1.8	No	No	187 Woodbury Park Dr MARDI NSW 2259
N1-159	Single	60	55	49	44	48	44	No	49	46	51	47	1.6	1.5	No	No	19 Woolmers Cres MARDI NSW 2259
N1-160	Single	60	55	48	43	48	44	No	49	45	50	47	1.7	1.8	No	No	46 Woolmers Cres MARDI NSW 2259
N1-161	Single	60	55	49	44	48	44	No	49	46	50	47	1.5	1.4	No	No	48 Woolmers Cres MARDI NSW 2259
N1-162	Single	60	55	48	43	48	43	No	48	45	50	47	1.9	1.8	No	No	48 Woolmers Cres MARDI NSW 2259
N1-163	Single	60	55	51	46	50	46	No	51	48	52	49	1.2	1.1	No	No	44 Woolmers Cres MARDI NSW 2259
N1-164	Single	60	55	52	47	51	47	No	52	49	53	50	0.9	0.8	No	No	42 Woolmers Cres MARDI NSW 2259
N1-165	Single	60	55	52	47	52	47	No	53	49	54	51	1.3	1.2	No	No	42 Woolmers Cres MARDI NSW 2259
N1-166	Single	60	55	53	48	53	48	No	53	50	55	51	1.5	1.5	No	No	38 Woolmers Cres MARDI NSW 2259
N1-167	Single	60	55	53	48	53	48	No	53	50	55	51	1.5	1.5	No	No	36 Woolmers Cres MARDI NSW 2259
N1-168	Single	60	55	50	45	50	45	No	50	47	52	48	1.4	1.2	No	No	17 Woolmers Cres MARDI NSW 2259
N1-169	Single	60	55	51	46	51	46	No	51	48	52	49	1.0	0.9	No	No	15 Woolmers Cres MARDI NSW 2259
N1-170	Single	60	55	51	46	51	46	No	52	48	53	49	1.3	1.2	No	No	13 Woolmers Cres MARDI NSW 2259
N1-171	Single	60	55	51	46	51	47	No	52	48	53	50	1.7	1.6	No	No	11 Woolmers Cres MARDI NSW 2259
N1-172	Single	60	55	51	46	52	47	No	51	48	54	50	2.3	2.2	No	No	11 Woolmers Cres MARDI NSW 2259
N1-173	Single	60	55	51	46	51	47	No	51	48	53	50	2.2	2.1	No	No	9 Woolmers Cres MARDI NSW 2259
N1-174	Single	60	55	50	45	51	46	No	50	47	53	50	2.6	2.5	No	No	3 Longford Place MARDI NSW 2259
N1-175	Single	60	55	50	46	51	46	No	51	48	53	49	1.9	1.7	No	No	3 Longford Place MARDI NSW 2259

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				"No Build" [2]		"Build"			"No Build" [2]		"Build"		Increase				
		Day	Night	Day	Night	Day	Night	Consider Mitigation[3]	Day	Night	Day	Night	Day	Night	Consider Mitigation[3]	Change in Mitigation Outcome	
N1-176	Single	60	55	50	45	50	45	No	50	47	52	48	1.4	1.3	No	No	4 Longford Place MARDI NSW 2259
N1-177	Single	60	55	51	46	52	47	No	52	49	54	50	1.8	1.6	No	No	7 Longford Place MARDI NSW 2259
N1-178	Single	60	55	53	48	53	48	No	53	50	55	52	2.0	1.8	No	No	9 Longford Place MARDI NSW 2259
N1-179	Single	60	55	48	43	49	44	No	49	46	51	47	1.7	1.6	No	No	179 Woodbury Park Dr MARDI NSW 2259
N1-180	Single	60	55	61	56	59	55	No	61	58	61	57	-0.1	-0.2	No	No	5 Louis Close MARDI NSW 2259
N1-181	Single	60	55	55	50	54	49	No	55	51	56	52	1.0	0.9	No	No	5 Louis Close MARDI NSW 2259
N1-182	Single	60	55	53	48	53	48	No	53	50	55	51	1.6	1.6	No	No	34 Woolmers Cres MARDI NSW 2259
N1-183	Single	60	55	53	48	53	48	No	53	50	55	51	1.6	1.4	No	No	36 Woolmers Cres MARDI NSW 2259
N1-184	Single	60	55	44	39	44	39	No	44	41	45	42	1.5	1.4	No	No	207-213 Woodbury Park Dr MARDI NSW 2259
N1-185	Single	60	55	44	39	44	40	No	45	41	46	43	1.7	1.6	No	No	2 Coachmans Place MARDI NSW 2259
N1-186	Single	60	55	45	40	45	40	No	45	42	47	43	1.8	1.7	No	No	3 Coachmans Place MARDI NSW 2259
N1-187	Single	60	55	45	40	45	40	No	45	42	47	44	1.7	1.6	No	No	3 Coachmans Place MARDI NSW 2259
N1-188	Single	60	55	47	42	46	41	No	47	43	48	45	1.3	1.2	No	No	5 Coachmans Place MARDI NSW 2259
N1-189	Single	60	55	47	42	47	42	No	47	44	48	45	1.1	1.0	No	No	6 Coachmans Place MARDI NSW 2259
N1-190	Single	60	55	47	42	47	43	No	48	44	49	46	1.6	1.5	No	No	7 Coachmans Place MARDI NSW 2259
N1-191	Single	60	55	48	43	48	43	No	48	45	50	46	1.3	1.2	No	No	8 Coachmans Place MARDI NSW 2259
N1-192	Single	60	55	47	42	47	43	No	47	44	49	46	1.6	1.5	No	No	9 Coachmans Place MARDI NSW 2259
N1-193	Single	60	55	45	40	45	41	No	46	42	47	43	1.2	1.1	No	No	11 Coachmans Place MARDI NSW 2259
N1-194	Single	60	55	45	40	45	40	No	45	42	46	43	1.2	1.1	No	No	12 Coachmans Place MARDI NSW 2259
N1-195	Single	60	55	44	39	44	39	No	44	40	46	42	1.8	1.7	No	No	36 Richard Avenue MARDI NSW 2259

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				"No Build" [2]		"Build"			"No Build" [2]		"Build"		Increase				
		Day	Night	Day	Night	Day	Night	Consider Mitigation[3]	Day	Night	Day	Night	Day	Night	Consider Mitigation[3]	Change in Mitigation Outcome	
N1-196	Single	60	55	43	38	43	38	No	43	40	45	41	1.6	1.6	No	No	NULL
N1-197	Single	60	55	42	37	42	37	No	42	39	43	40	1.0	0.9	No	No	2 Freemans Glen MARDI NSW 2259
N1-198	Single	60	55	43	38	43	38	No	43	40	45	41	1.6	1.5	No	No	221 Woodbury Park Dr MARDI NSW 2259
N1-199	Single	60	55	43	38	43	38	No	43	40	45	41	1.4	1.3	No	No	30 Richard Avenue MARDI NSW 2259
N1-200	Single	60	55	43	38	43	38	No	43	40	45	41	1.2	1.0	No	No	28 Richard Avenue MARDI NSW 2259
N1-201	Single	60	55	44	39	44	39	No	44	41	45	42	1.3	1.3	No	No	27 Richard Avenue MARDI NSW 2259
N1-202	Single	60	55	44	39	43	39	No	44	41	45	42	1.2	1.1	No	No	25 Richard Avenue MARDI NSW 2259
N1-203	Single	60	55	44	39	44	39	No	44	41	46	42	1.1	1.0	No	No	6 Clementine Place MARDI NSW 2259
N1-204	Single	60	55	44	39	44	39	No	44	41	45	42	1.1	1.0	No	No	4 Clementine Place MARDI NSW 2259
N1-205	Single	60	55	45	40	44	39	No	45	41	46	42	1.3	1.1	No	No	12 Clementine Place MARDI NSW 2259
N1-206	Single	60	55	45	40	45	40	No	45	42	46	43	1.3	1.2	No	No	14 Clementine Place MARDI NSW 2259
N1-207	Single	60	55	45	40	45	40	No	45	42	47	43	1.4	1.4	No	No	16 Clementine Place MARDI NSW 2259
N1-208	Single	60	55	46	41	46	41	No	46	43	48	44	1.6	1.4	No	No	20 Clementine Place MARDI NSW 2259
N1-209	Single	60	55	45	40	45	40	No	45	42	46	43	1.3	1.2	No	No	37 Richard Avenue MARDI NSW 2259
N1-210	Single	60	55	45	40	44	40	No	45	41	46	43	1.3	1.1	No	No	35 Richard Avenue MARDI NSW 2259
N1-211	Single	60	55	45	39	44	40	No	45	41	46	43	1.3	1.3	No	No	33 Richard Avenue MARDI NSW 2259
N1-212	Single	60	55	44	39	44	39	No	44	41	46	42	1.4	1.3	No	No	29 Richard Avenue MARDI NSW 2259
N1-213	Single	60	55	44	39	44	39	No	44	41	46	42	1.4	1.3	No	No	27 Richard Avenue MARDI NSW 2259
N1-214	Single	60	55	43	38	43	38	No	43	40	45	41	1.6	1.5	No	No	223 Woodbury Park Dr MARDI NSW 2259

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Receiver No. [1]	Single Storey, Floor of Multi-Storey, or Non-Residential	*RNP* Criteria		2029 Project REF Noise Levels $L_{Aeq,period}$ dBA					2029 Revised Design Noise Levels $L_{Aeq,period}$ dBA								Address
				"No Build" [2]		"Build"			"No Build" [2]		"Build"		Increase				
		Day	Night	Day	Night	Day	Night	Consider Mitigation[3]	Day	Night	Day	Night	Day	Night	Consider Mitigation[3]	Change in Mitigation Outcome	
N1-215	Single	60	55	43	38	42	38	No	43	39	44	41	1.5	1.5	No	No	227 Woodbury Park Dr MARDI NSW 2259
N1-216	Single	60	55	43	38	42	38	No	43	39	44	41	1.5	1.4	No	No	227 Woodbury Park Dr MARDI NSW 2259
N1-217	Single	60	55	43	38	42	38	No	43	39	44	41	1.5	1.3	No	No	229 Woodbury Park Dr MARDI NSW 2259
N1-218	Single	60	55	43	38	43	38	No	43	40	44	41	1.2	1.2	No	No	26 Richard Avenue MARDI NSW 2259
N1-219	Single	60	55	43	38	42	38	No	43	40	44	41	1.0	1.0	No	No	24 Richard Avenue MARDI NSW 2259
N1-220	Single	60	55	44	39	43	39	No	44	40	45	42	1.2	1.1	No	No	23 Richard Avenue MARDI NSW 2259
N1-221	Single	60	55	44	39	43	39	No	44	41	45	42	1.0	1.0	No	No	21 Richard Avenue MARDI NSW 2259
N1-222	Single	60	55	44	39	43	39	No	44	41	45	42	1.0	1.0	No	No	2 Clementine Place MARDI NSW 2259
N1-223	First Floor	60	55	44	39	43	38	No	45	41	46	42	1.0	0.9	No	No	2 Clementine Place MARDI NSW 2259
N1-223	Ground Floor	60	55	44	39	43	38	No	44	40	45	41	1.0	1.0	No	No	2 Clementine Place MARDI NSW 2259
N1-224	Single	60	55	43	38	42	38	No	43	40	44	41	0.7	0.7	No	No	18 Richard Avenue MARDI NSW 2259
N1-225	Single	60	55	43	38	42	38	No	43	40	44	41	1.0	0.9	No	No	20 Richard Avenue MARDI NSW 2259
N1-226	Single	60	55	43	38	42	38	No	43	40	44	41	1.1	1.0	No	No	22 Richard Avenue MARDI NSW 2259
N1-227	Single	60	55	43	38	42	38	No	43	39	44	41	1.4	1.2	No	No	231 Woodbury Park Dr MARDI NSW 2259
N1-228	Single	60	55	43	38	42	37	No	43	39	44	41	1.2	1.2	No	No	233 Woodbury Park Dr MARDI NSW 2259
N1-229	Single	60	55	43	38	42	37	No	43	39	44	40	1.2	1.2	No	No	237 Woodbury Park Dr MARDI NSW 2259
N1-230	Single	60	55	41	36	41	37	No	42	38	43	40	1.5	1.4	No	No	6 Freemans Glen MARDI NSW 2259
N1-231	Single	60	55	42	37	41	37	No	42	38	43	40	1.4	1.3	No	No	4 Freemans Glen MARDI NSW 2259

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Receiver No. [1]	Single Storey, Floor of Multi-Storey, or Non-Residential	*RNP* Criteria		2029 Project REF Noise Levels $L_{Aeq,period}$ dBA					2029 Revised Design Noise Levels $L_{Aeq,period}$ dBA								Address
				"No Build" [2]		"Build"			"No Build" [2]		"Build"		Increase				
		Day	Night	Day	Night	Day	Night	Consider Mitigation[3]	Day	Night	Day	Night	Day	Night	Consider Mitigation[3]	Change in Mitigation Outcome	
N1-232	Single	60	55	41	36	41	36	No	41	38	43	39	1.5	1.4	No	No	8 Freemans Glen MARDI NSW 2259
N1-233	Single	60	55	42	37	42	37	No	42	39	44	40	1.2	1.2	No	No	239 Woodbury Park Dr MARDI NSW 2259
N1-234	Single	60	55	43	38	42	37	No	43	40	44	40	0.6	0.6	No	No	14 Richard Avenue MARDI NSW 2259
N1-235	Single	60	55	43	38	42	37	No	43	40	44	40	0.7	0.5	No	No	14 Richard Avenue MARDI NSW 2259
N1-236	Single	60	55	43	38	42	37	No	43	40	44	40	0.6	0.6	No	No	12 Richard Avenue MARDI NSW 2259
N1-237	First Floor	60	55	44	39	43	38	No	45	41	46	42	1.0	0.9	No	No	15 Richard Avenue MARDI NSW 2259
N1-237	Ground Floor	60	55	44	39	43	38	No	44	41	45	41	1.0	0.9	No	No	15 Richard Avenue MARDI NSW 2259
N1-238	First Floor	60	55	44	39	43	38	No	44	41	45	42	1.0	0.9	No	No	15 Richard Avenue MARDI NSW 2259
N1-238	Ground Floor	60	55	44	39	43	38	No	44	40	45	41	1.0	1.0	No	No	15 Richard Avenue MARDI NSW 2259
N1-239	Single	60	55	44	39	43	39	No	44	41	45	42	0.9	0.9	No	No	2 Eliza Close MARDI NSW 2259
N1-240	Single	60	55	45	40	45	40	No	46	42	47	43	1.0	0.9	No	No	13 Eliza Close MARDI NSW 2259
N1-241	Single	60	55	41	36	40	35	No	41	38	42	38	0.6	0.7	No	No	26 Riveroak Dr MARDI NSW 2259
N1-242	Single	60	55	42	37	42	37	No	42	39	43	40	1.1	1.0	No	No	26 Riveroak Dr MARDI NSW 2259
N1-243	Single	60	55	46	41	46	41	No	48	44	50	46	2.0	1.9	No	No	21 Riveroak Dr MARDI NSW 2259
N1-244	Single	60	55	48	43	47	43	No	49	46	50	47	0.9	1.0	No	No	25 Riveroak Dr MARDI NSW 2259
N1-245	First Floor	60	55	50	45	49	44	No	52	49	52	49	0.2	0.3	No	No	27 Riveroak Dr MARDI NSW 2259
N1-245	Ground Floor	60	55	50	45	49	44	No	50	47	51	47	0.5	0.5	No	No	27 Riveroak Dr MARDI NSW 2259
N1-246	First Floor	60	55	53	48	51	46	No	57	54	57	54	-0.3	-0.3	No	No	42 Riveroak Dr MARDI NSW 2259
N1-246	Ground Floor	60	55	53	48	51	46	No	53	49	53	49	-0.2	-0.2	No	No	42 Riveroak Dr MARDI NSW 2259
N1-247	Single	60	55	52	47	50	45	No	52	48	52	48	0.2	0.2	No	No	40 Riveroak Dr MARDI NSW 2259

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Receiver No. [1]	Single Storey, Floor of Multi-Storey, or Non-Residential	*RNP* Criteria		2029 Project REF Noise Levels $L_{Aeq,period}$ dBA					2029 Revised Design Noise Levels $L_{Aeq,period}$ dBA								Address
				"No Build" [2]		"Build"			"No Build" [2]		"Build"		Increase				
		Day	Night	Day	Night	Day	Night	Consider Mitigation[3]	Day	Night	Day	Night	Day	Night	Consider Mitigation[3]	Change in Mitigation Outcome	
N1-248	Single	60	55	50	45	49	44	No	50	47	51	48	0.8	0.8	No	No	23 Riveroak Dr MARDI NSW 2259
N1-249	Single	60	55	51	46	50	45	No	51	47	51	48	0.8	0.9	No	No	36 Riveroak Dr MARDI NSW 2259
N1-250	Single	60	55	50	45	50	45	No	50	47	51	48	1.2	1.2	No	No	32 Riveroak Dr MARDI NSW 2259
N1-251	Single	60	55	47	42	46	42	No	47	44	48	45	1.0	1.0	No	No	28 Riveroak Dr MARDI NSW 2259
N1-252	Single	60	55	52	47	51	46	No	52	49	53	49	0.7	0.6	No	No	34 Riveroak Dr MARDI NSW 2259
N1-253	Single	60	55	50	45	49	44	No	50	47	51	48	0.9	0.8	No	No	9 Eliza Close MARDI NSW 2259
N1-254	Single	60	55	48	43	48	43	No	48	45	49	46	1.0	1.0	No	No	10 Eliza Close MARDI NSW 2259
N1-255	Single	60	55	47	42	46	42	No	47	44	48	45	1.0	1.0	No	No	12 Eliza Close MARDI NSW 2259
N1-256	Single	60	55	47	42	46	41	No	47	43	48	44	1.1	1.0	No	No	12 Eliza Close MARDI NSW 2259
N1-257	Single	60	55	52	47	50	46	No	52	49	52	49	0.3	0.3	No	No	8 Eliza Close MARDI NSW 2259
N1-258	First Floor	60	55	49	44	48	43	No	51	47	51	48	0.5	0.5	No	No	7 Eliza Close MARDI NSW 2259
N1-258	Ground Floor	60	55	49	44	48	43	No	49	45	50	46	0.7	0.7	No	No	7 Eliza Close MARDI NSW 2259
N1-259	First Floor	60	55	47	42	46	42	No	49	46	50	46	0.6	0.7	No	No	6 Eliza Close MARDI NSW 2259
N1-259	Ground Floor	60	55	47	42	46	42	No	48	44	48	45	0.7	0.7	No	No	6 Eliza Close MARDI NSW 2259
N1-260	First Floor	60	55	46	41	45	40	No	47	44	48	44	0.8	0.8	No	No	9 Clementine Place MARDI NSW 2259
N1-260	Ground Floor	60	55	46	41	45	40	No	46	42	47	43	0.9	0.8	No	No	9 Clementine Place MARDI NSW 2259
N1-261	Single	60	55	45	40	44	40	No	45	42	46	43	0.8	0.7	No	No	7 Clementine Place MARDI NSW 2259
N1-262	Single	60	55	45	40	44	39	No	45	42	46	42	0.8	0.7	No	No	5 Clementine Place MARDI NSW 2259
N1-263	Single	60	55	46	41	45	40	No	46	43	47	43	0.8	0.7	No	No	4 Eliza Close MARDI NSW 2259
N1-264	Single	60	55	46	41	45	41	No	46	43	47	44	0.8	0.8	No	No	5 Eliza Close MARDI NSW 2259
N1-265	First Floor	60	55	44	39	43	38	No	44	41	45	42	0.9	0.9	No	No	1 Eliza Close MARDI NSW 2259

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				"No Build" [2]		"Build"			"No Build" [2]		"Build"		Increase				
		Day	Night	Day	Night	Day	Night	Consider Mitigation[3]	Day	Night	Day	Night	Day	Night	Consider Mitigation[3]	Change in Mitigation Outcome	
N1-265	Ground Floor	60	55	44	39	43	38	No	44	40	45	41	1.0	0.9	No	No	1 Eliza Close MARDI NSW 2259
N1-266	Single	60	55	44	39	43	39	No	44	41	45	42	1.0	1.0	No	No	15 Eliza Close MARDI NSW 2259
N1-267	First Floor	60	55	45	40	44	39	No	46	42	47	43	1.0	1.0	No	No	14 Eliza Close MARDI NSW 2259
N1-267	Ground Floor	60	55	45	40	44	39	No	45	42	46	42	1.1	0.9	No	No	14 Eliza Close MARDI NSW 2259
N1-268	Single	60	55	42	36	41	36	No	42	38	43	39	1.2	1.2	No	No	22 Riveroak Dr MARDI NSW 2259
N1-269	Single	60	55	43	38	42	38	No	43	40	44	41	1.2	1.1	No	No	24 Riveroak Dr MARDI NSW 2259
N1-270	Single	60	55	36	31	35	30	No	36	33	37	34	0.7	0.8	No	No	17 Riveroak Dr MARDI NSW 2259
N1-271	First Floor	60	55	37	31	36	31	No	38	34	39	35	1.0	1.0	No	No	19 Riveroak Dr MARDI NSW 2259
N1-271	Ground Floor	60	55	37	31	36	31	No	37	33	38	34	1.0	0.9	No	No	19 Riveroak Dr MARDI NSW 2259
N1-272	Single	60	55	38	33	38	33	No	38	35	39	36	1.1	1.0	No	No	19 Riveroak Dr MARDI NSW 2259
N1-273	Single	60	55	37	32	36	31	No	37	33	38	34	1.0	1.0	No	No	15 Riveroak Dr MARDI NSW 2259
N1-274	First Floor	60	55	35	30	34	29	No	36	33	37	33	0.8	0.8	No	No	28 Silverbirch Avenue MARDI NSW 2259
N1-274	Ground Floor	60	55	35	30	34	29	No	35	32	36	32	0.8	0.8	No	No	28 Silverbirch Avenue MARDI NSW 2259
N1-275	First Floor	60	55	34	29	33	28	No	35	31	36	32	0.8	0.8	No	No	26 Silverbirch Avenue MARDI NSW 2259
N1-275	Ground Floor	60	55	34	29	33	28	No	34	30	35	31	0.7	0.7	No	No	26 Silverbirch Avenue MARDI NSW 2259
N1-276	Single	60	55	34	29	33	28	No	35	31	35	32	0.5	0.5	No	No	22 Silverbirch Avenue MARDI NSW 2259
N1-276	Ground Floor	60	55	34	29	33	28	No	34	30	34	31	0.4	0.4	No	No	22 Silverbirch Avenue MARDI NSW 2259
N1-277	Single	60	55	34	29	32	28	No	34	30	34	30	0.3	0.3	No	No	139 Hue Hue Road ALISON NSW 2259
N1-277	Single	60	55	60	55	62	57	Yes	61	58	57	54	-4.0	-3.9	No	Yes	139 Hue Hue Road ALISON NSW 2259
N1-278	Single	60	55	35	30	33	28	No	34	31	35	31	0.5	0.5	No	No	20 Silverbirch Avenue MARDI NSW 2259
N1-279	Single	60	55	38	33	38	33	No	38	35	38	34	-0.6	-0.6	No	No	14 Silverbirch Avenue MARDI NSW 2259

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				"No Build" [2]		"Build"			"No Build" [2]		"Build"		Increase				
		Day	Night	Day	Night	Day	Night	Consider Mitigation[3]	Day	Night	Day	Night	Day	Night	Consider Mitigation[3]	Change in Mitigation Outcome	
N1-280	First Floor	60	55	42	37	40	36	No	43	39	42	39	-0.1	0.0	No	No	16 Silverbirch Avenue MARDI NSW 2259
N1-280	Ground Floor	60	55	42	37	40	36	No	41	37	41	37	0.0	0.0	No	No	16 Silverbirch Avenue MARDI NSW 2259
N1-281	First Floor	60	55	45	40	43	38	No	46	42	45	42	-0.4	-0.3	No	No	15 Silverbirch Avenue MARDI NSW 2259
N1-281	Ground Floor	60	55	45	40	43	38	No	45	41	44	41	-0.4	-0.4	No	No	15 Silverbirch Avenue MARDI NSW 2259
N1-282	First Floor	60	55	46	41	44	40	No	47	44	47	44	-0.2	-0.2	No	No	15 Silverbirch Avenue MARDI NSW 2259
N1-282	Ground Floor	60	55	46	41	44	40	No	46	42	46	42	-0.2	-0.2	No	No	15 Silverbirch Avenue MARDI NSW 2259
N1-283	Single	60	55	46	41	43	39	No	45	42	45	41	-0.7	-0.6	No	No	14 Honeygum Way MARDI NSW 2259
N1-284	Single	60	55	47	42	44	40	No	47	43	46	42	-0.7	-0.7	No	No	16 Honeygum Way MARDI NSW 2259
N1-285	Single	60	55	52	47	51	46	No	52	48	51	47	-0.6	-0.6	No	No	9 Honeygum Way MARDI NSW 2259
N1-286	Single	60	55	50	45	48	43	No	49	46	49	45	-0.7	-0.7	No	No	13 Honeygum Way MARDI NSW 2259
N1-287	Single	60	55	50	45	48	44	No	50	46	49	46	-0.8	-0.7	No	No	13 Honeygum Way MARDI NSW 2259
N1-288	Single	60	55	49	44	47	42	No	49	46	49	45	-0.5	-0.5	No	No	17 Honeygum Way MARDI NSW 2259
N1-289	First Floor	60	55	50	45	48	43	No	52	49	52	48	-0.5	-0.5	No	No	17 Honeygum Way MARDI NSW 2259
N1-289	Ground Floor	60	55	50	45	48	43	No	50	46	49	46	-0.6	-0.4	No	No	17 Honeygum Way MARDI NSW 2259
N1-290	First Floor	60	55	57	52	56	51	No	59	55	58	55	-0.4	-0.4	No	No	72 Riveroak Dr MARDI NSW 2259
N1-290	Ground Floor	60	55	57	52	56	51	No	57	53	57	54	0.4	0.5	No	No	72 Riveroak Dr MARDI NSW 2259
N1-291	First Floor	60	55	51	46	49	44	No	53	50	53	49	-0.5	-0.4	No	No	70 Riveroak Dr MARDI NSW 2259
N1-291	Ground Floor	60	55	51	46	49	44	No	51	47	50	47	-0.3	-0.3	No	No	70 Riveroak Dr MARDI NSW 2259
N1-292	First Floor	60	55	51	46	49	44	No	53	50	53	49	-0.1	-0.1	No	No	68 Riveroak Dr MARDI NSW 2259
N1-292	Ground Floor	60	55	51	46	49	44	No	51	47	50	47	-0.1	-0.1	No	No	68 Riveroak Dr MARDI NSW 2259
N1-293	First Floor	60	55	51	46	49	44	No	53	50	53	50	-0.1	-0.1	No	No	66 Riveroak Dr MARDI NSW 2259

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				"No Build" [2]		"Build"		Consider Mitigation[3]	"No Build" [2]		"Build"		Increase		Consider Mitigation[3]	Change in Mitigation Outcome	
		Day	Night	Day	Night	Day	Night		Day	Night	Day	Night	Day	Night			
N1-293	Ground Floor	60	55	51	46	49	44	No	51	47	50	47	-0.2	-0.2	No	No	66 Riveroak Dr MARDI NSW 2259
N1-294	First Floor	60	55	51	46	49	44	No	53	50	53	49	-0.5	-0.4	No	No	64 Riveroak Dr MARDI NSW 2259
N1-294	Ground Floor	60	55	51	46	49	44	No	51	47	50	47	-0.5	-0.3	No	No	64 Riveroak Dr MARDI NSW 2259
N1-295	First Floor	60	55	51	45	49	44	No	53	49	52	49	-0.5	-0.4	No	No	62 Riveroak Dr MARDI NSW 2259
N1-295	Ground Floor	60	55	51	45	49	44	No	50	47	50	46	-0.5	-0.5	No	No	62 Riveroak Dr MARDI NSW 2259
N1-296	First Floor	60	55	56	51	54	50	No	57	54	57	53	-0.5	-0.5	No	No	60 Riveroak Dr MARDI NSW 2259
N1-296	Ground Floor	60	55	56	51	54	50	No	56	52	55	52	-0.4	-0.4	No	No	60 Riveroak Dr MARDI NSW 2259
N1-297	First Floor	60	55	58	53	55	51	No	58	54	57	54	-0.6	-0.6	No	No	58 Riveroak Dr MARDI NSW 2259
N1-297	Ground Floor	60	55	58	53	55	51	No	57	54	56	53	-0.6	-0.6	No	No	58 Riveroak Dr MARDI NSW 2259
N1-298	First Floor	60	55	58	53	56	51	No	59	55	58	55	-0.6	-0.6	No	No	56 Riveroak Dr MARDI NSW 2259
N1-298	Ground Floor	60	55	58	53	56	51	No	57	54	57	53	-0.5	-0.4	No	No	56 Riveroak Dr MARDI NSW 2259
N1-299	First Floor	60	55	60	55	58	53	No	60	57	60	56	-0.5	-0.5	No	No	52 Riveroak Dr MARDI NSW 2259
N1-299	Ground Floor	60	55	60	55	58	53	No	60	56	59	56	-0.6	-0.4	No	No	52 Riveroak Dr MARDI NSW 2259
N1-300	First Floor	60	55	60	55	58	53	No	60	57	60	56	-0.5	-0.5	No	No	52 Riveroak Dr MARDI NSW 2259
N1-300	Ground Floor	60	55	60	55	58	53	No	60	56	59	56	-0.5	-0.5	No	No	52 Riveroak Dr MARDI NSW 2259
N1-301	First Floor	60	55	60	55	58	53	No	60	57	60	56	-0.4	-0.4	No	No	50A Riveroak Dr MARDI NSW 2259
N1-301	Ground Floor	60	55	60	55	58	53	No	60	56	60	56	-0.5	-0.4	No	No	50A Riveroak Dr MARDI NSW 2259
N1-302	Single	60	55	60	55	58	53	No	60	57	60	56	-0.5	-0.4	No	No	48 Riveroak Dr MARDI NSW 2259
N1-303	First Floor	60	55	59	54	57	53	No	60	57	60	56	-0.4	-0.4	No	No	46 Riveroak Dr MARDI NSW 2259
N1-303	Ground Floor	60	55	59	54	57	53	No	59	56	59	55	-0.3	-0.3	No	No	46 Riveroak Dr MARDI NSW 2259
N1-304	Single	60	55	56	51	54	49	No	56	52	56	52	0.0	0.0	No	No	44 Riveroak Dr MARDI NSW 2259

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[2] The change in "no build" levels between Project REF and Revised Design are due to model validation with additional noise measurement results and corrections to some building heights.

[3] At Project REF mitigation was considered for receivers above RNP. After consideration of feasible and reasonable mitigations, architectural treatment may be offered to residences with acute levels, or levels above RNP and increase by >2dBA. Residences previously treated under NAP will not be eligible for further mitigation. Acute thresholds are 65dBA for daytime and 60dBA for night time.

Receiver No. [1]	Single Storey, Floor of Multi-Storey, or Non-Residential	*RNP* Criteria		2029 Project REF Noise Levels $L_{Aeq,period}$ dBA					2029 Revised Design Noise Levels $L_{Aeq,period}$ dBA								Address
				"No Build" [2]		"Build"			"No Build" [2]		"Build"		Increase				
		Day	Night	Day	Night	Day	Night	Consider Mitigation[3]	Day	Night	Day	Night	Day	Night	Consider Mitigation[3]	Change in Mitigation Outcome	
N1-305	Single	60	55	52	47	51	46	No	53	50	53	50	0.2	0.2	No	No	29 Riveroak Dr MARDI NSW 2259
N1-306	Single	60	55	57	52	55	50	No	56	53	56	53	0.0	0.0	No	No	31 Riveroak Dr MARDI NSW 2259
N1-307	Single	60	55	57	52	56	51	No	57	53	57	54	0.0	0.1	No	No	33 Riveroak Dr MARDI NSW 2259
N1-308	Single	60	55	57	52	55	51	No	57	54	57	53	-0.2	-0.2	No	No	35 Riveroak Dr MARDI NSW 2259
N1-309	Single	60	55	57	52	55	50	No	58	54	57	54	-0.4	-0.4	No	No	37 Riveroak Dr MARDI NSW 2259
N1-310	Single	60	55	55	50	54	49	No	57	54	57	53	-0.5	-0.4	No	No	39 Riveroak Dr MARDI NSW 2259
N1-311	First Floor	60	55	55	50	53	48	No	55	52	55	51	-0.3	-0.3	No	No	41 Riveroak Dr MARDI NSW 2259
N1-311	Ground Floor	60	55	55	50	53	48	No	54	51	54	50	-0.1	-0.1	No	No	41 Riveroak Dr MARDI NSW 2259
N1-312	First Floor	60	55	58	53	55	50	No	56	53	55	52	-1.0	-1.0	No	No	43 Riveroak Dr MARDI NSW 2259
N1-312	Ground Floor	60	55	58	53	55	50	No	56	52	54	51	-1.3	-1.3	No	No	43 Riveroak Dr MARDI NSW 2259
N1-313	First Floor	60	55	50	44	47	42	No	51	48	51	48	-0.3	-0.3	No	No	45 Riveroak Dr MARDI NSW 2259
N1-313	Ground Floor	60	55	50	44	47	42	No	49	46	49	46	-0.3	-0.3	No	No	45 Riveroak Dr MARDI NSW 2259
N1-314	First Floor	60	55	49	44	47	42	No	51	47	50	47	-0.4	-0.4	No	No	47 Riveroak Dr MARDI NSW 2259
N1-314	Ground Floor	60	55	49	44	47	42	No	49	45	49	45	-0.5	-0.4	No	No	47 Riveroak Dr MARDI NSW 2259
N1-315	First Floor	60	55	49	44	47	42	No	51	47	50	46	-0.6	-0.5	No	No	49 Riveroak Dr MARDI NSW 2259
N1-315	Ground Floor	60	55	49	44	47	42	No	49	45	48	45	-0.6	-0.5	No	No	49 Riveroak Dr MARDI NSW 2259
N1-316	First Floor	60	55	47	42	47	42	No	49	45	50	46	1.0	1.0	No	No	27 Silverbirch Avenue MARDI NSW 2259
N1-316	Ground Floor	60	55	47	42	47	42	No	47	44	48	45	1.1	1.2	No	No	27 Silverbirch Avenue MARDI NSW 2259
N1-317	Single	60	55	36	30	35	30	No	35	32	36	33	0.7	0.7	No	No	23 Silverbirch Avenue MARDI NSW 2259
N1-318	Single	60	55	40	34	37	33	No	39	36	39	36	-0.4	-0.4	No	No	23 Silverbirch Avenue MARDI NSW 2259
N1-319	First Floor	60	55	40	35	39	34	No	43	39	43	40	0.5	0.5	No	No	21 Silverbirch Avenue MARDI NSW 2259

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[3] At Project REF mitigation was considered for receivers above RNP. After consideration of feasible and reasonable mitigations, architectural treatment may be offered to residences with acute levels, or levels above RNP and increase by >2dBA. Residences previously treated under NAP will not be eligible for further mitigation. Acute thresholds are 65dBA for daytime and 60dBA for night time.

Receiver No. [1]	Single Storey, Floor of Multi-Storey, or Non-Residential	*RNP* Criteria		2029 Project REF Noise Levels $L_{Aeq,period}$ dBA					2029 Revised Design Noise Levels $L_{Aeq,period}$ dBA								Address
				"No Build" [2]		"Build"		Consider Mitigation[3]	"No Build" [2]		"Build"		Increase		Consider Mitigation[3]	Change in Mitigation Outcome	
		Day	Night	Day	Night	Day	Night		Day	Night	Day	Night	Day	Night			
N1-319	Ground Floor	60	55	40	35	39	34	No	40	36	40	37	0.3	0.3	No	No	21 Silverbirch Avenue MARDI NSW 2259
N1-320	Single	60	55	41	36	40	35	No	40	37	40	36	-0.4	-0.3	No	No	16 Silverbirch Avenue MARDI NSW 2259
N1-321	First Floor	60	55	42	37	40	35	No	42	38	42	39	0.1	0.1	No	No	14 Silverbirch Avenue MARDI NSW 2259
N1-321	Ground Floor	60	55	42	37	40	35	No	41	37	41	37	0.1	0.1	No	No	14 Silverbirch Avenue MARDI NSW 2259
N1-322	First Floor	60	55	42	37	40	36	No	42	39	42	39	0.0	0.0	No	No	10 Silverbirch Avenue MARDI NSW 2259
N1-322	Ground Floor	60	55	42	37	40	36	No	41	38	41	38	0.1	0.1	No	No	10 Silverbirch Avenue MARDI NSW 2259
N1-323	Single	60	55	58	53	56	52	No	58	54	57	54	-0.4	-0.4	No	No	15 Fairlight Circuit MARDI NSW 2259
N1-324	Single	60	55	58	53	56	51	No	57	53	56	53	-0.4	-0.4	No	No	15 Fairlight Circuit MARDI NSW 2259
N1-325	Single	60	55	58	53	56	51	No	57	53	57	53	-0.4	-0.4	No	No	20 Fairlight Circuit MARDI NSW 2259
N1-326	Single	60	55	58	52	56	51	No	57	53	56	53	-0.4	-0.4	No	No	16 Fairlight Circuit MARDI NSW 2259
N1-327	Single	60	55	58	53	56	51	No	57	53	57	53	-0.4	-0.4	No	No	14 Fairlight Circuit MARDI NSW 2259
N1-328	Single	60	55	58	53	56	51	No	57	54	57	53	-0.5	-0.4	No	No	12 Fairlight Circuit MARDI NSW 2259
N1-329	Single	60	55	57	52	55	50	No	56	52	56	52	-0.4	-0.3	No	No	10 Fairlight Circuit MARDI NSW 2259
N1-330	Single	60	55	58	53	56	51	No	57	54	57	53	-0.4	-0.4	No	No	14 Fairlight Circuit MARDI NSW 2259
N1-331	Single	60	55	58	53	56	51	No	57	54	57	53	-0.5	-0.5	No	No	47 Freshwater Road MARDI NSW 2259
N1-332	Single	60	55	58	53	56	51	No	58	54	57	54	-0.5	-0.5	No	No	43 Freshwater Road MARDI NSW 2259
N1-333	Single	60	55	58	53	56	51	No	57	54	57	53	-0.6	-0.5	No	No	41 Freshwater Road MARDI NSW 2259
N1-334	Single	60	55	58	53	56	51	No	57	54	57	53	-0.5	-0.4	No	No	37 Freshwater Road MARDI NSW 2259
N1-335	Single	60	55	58	53	56	51	No	57	54	57	53	-0.4	-0.4	No	No	26 Queenscliff Place MARDI NSW 2259
N1-336	Single	60	55	57	52	55	50	No	56	53	56	52	-0.3	-0.3	No	No	22 Fairlight Circuit MARDI NSW 2259
N1-337	Single	60	55	56	51	55	50	No	56	52	55	52	-0.3	-0.2	No	No	24 Fairlight Circuit MARDI NSW 2259

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Receiver No. [1]	Single Storey, Floor of Multi-Storey, or Non-Residential	*RNP* Criteria		2029 Project REF Noise Levels $L_{Aeq,period}$ dBA					2029 Revised Design Noise Levels $L_{Aeq,period}$ dBA								Address
				"No Build" [2]		"Build"		Consider Mitigation[3]	"No Build" [2]		"Build"		Increase		Consider Mitigation[3]	Change in Mitigation Outcome	
		Day	Night	Day	Night	Day	Night		Day	Night	Day	Night	Day	Night			
N1-338	Single	60	55	56	50	54	49	No	55	51	55	51	-0.1	-0.1	No	No	22 Fairlight Circuit MARDI NSW 2259
N1-339	Single	60	55	55	50	53	49	No	54	51	54	51	-0.3	-0.2	No	No	NULL
N1-340	Single	60	55	56	51	54	49	No	55	51	55	51	-0.3	-0.2	No	No	NULL
N1-341	First Floor	60	55	56	51	54	49	No	56	52	56	52	-0.4	-0.3	No	No	NULL
N1-341	Ground Floor	60	55	56	51	54	49	No	55	52	55	51	-0.4	-0.4	No	No	NULL
N1-342	Single	60	55	56	51	54	49	No	55	51	55	51	-0.4	-0.3	No	No	NULL
N1-343	Single	60	55	56	51	54	50	No	56	52	55	52	-0.5	-0.4	No	No	11 Fairlight Circuit MARDI NSW 2259
N1-344	Single	60	55	57	52	55	50	No	56	53	56	52	-0.5	-0.4	No	No	13 Fairlight Circuit MARDI NSW 2259
N1-345	Single	60	55	57	52	55	50	No	56	53	56	52	-0.5	-0.5	No	No	36 Freshwater Road MARDI NSW 2259
N1-346	Single	60	55	57	52	55	50	No	56	53	56	52	-0.4	-0.5	No	No	34 Freshwater Road MARDI NSW 2259
N1-347	Single	60	55	57	52	55	50	No	56	53	56	52	-0.5	-0.5	No	No	34 Freshwater Road MARDI NSW 2259
N1-348	Single	60	55	56	51	54	50	No	56	52	55	52	-0.5	-0.4	No	No	32 Freshwater Road MARDI NSW 2259
N1-349	Single	60	55	56	51	54	49	No	55	52	55	51	-0.5	-0.4	No	No	28 Freshwater Road MARDI NSW 2259
N1-350	Single	60	55	56	51	54	49	No	56	52	55	52	-0.5	-0.4	No	No	30 Freshwater Road MARDI NSW 2259
N1-351	Single	60	55	55	50	54	49	No	55	51	54	51	-0.4	-0.4	No	No	26 Freshwater Road MARDI NSW 2259
N1-352	Single	60	55	55	50	53	49	No	54	51	54	51	-0.4	-0.4	No	No	24 Freshwater Road MARDI NSW 2259
N1-353	Single	60	55	54	49	52	47	No	53	49	53	49	-0.2	-0.2	No	No	7 Newport Terrace MARDI NSW 2259
N1-354	Single	60	55	53	48	52	47	No	52	49	52	48	-0.3	-0.3	No	No	5 Newport Terrace MARDI NSW 2259
N1-355	Single	60	55	53	48	51	47	No	52	48	52	48	-0.2	-0.2	No	No	3 Newport Terrace MARDI NSW 2259
N1-356	Single	60	55	52	47	51	46	No	51	48	51	48	-0.3	-0.2	No	No	1 Newport Terrace MARDI NSW 2259
N1-357	Single	60	55	57	52	55	51	No	57	53	56	53	-0.6	-0.5	No	No	204 Gavenlock Road MARDI NSW 2259

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Receiver No. [1]	Single Storey, Floor of Multi-Storey, or Non-Residential	*RNP* Criteria		2029 Project REF Noise Levels $L_{Aeq,period}$ dBA					2029 Revised Design Noise Levels $L_{Aeq,period}$ dBA								Address
				"No Build" [2]		"Build"			"No Build" [2]		"Build"		Increase				
		Day	Night	Day	Night	Day	Night	Consider Mitigation[3]	Day	Night	Day	Night	Day	Night	Consider Mitigation[3]	Change in Mitigation Outcome	
N1-358	Single	60	55	57	52	55	51	No	57	53	56	53	-0.5	-0.5	No	No	204 Gavenlock Road MARDI NSW 2259
N1-359	Single	60	55	57	52	55	51	No	57	53	56	53	-0.5	-0.5	No	No	204 Gavenlock Road MARDI NSW 2259
N1-360	Single	60	55	57	52	55	51	No	57	53	56	53	-0.5	-0.4	No	No	204 Gavenlock Road MARDI NSW 2259
N1-361	Single	60	55	57	52	55	51	No	57	53	56	53	-0.5	-0.4	No	No	204 Gavenlock Road MARDI NSW 2259
N1-362	Single	60	55	57	52	55	51	No	57	53	56	53	-0.5	-0.4	No	No	204 Gavenlock Road MARDI NSW 2259
N1-363	Single	60	55	57	52	55	51	No	57	53	56	53	-0.5	-0.4	No	No	204 Gavenlock Road MARDI NSW 2259
N1-364	Single	60	55	57	52	55	51	No	57	53	56	53	-0.4	-0.4	No	No	204 Gavenlock Road MARDI NSW 2259
N1-365	Single	60	55	57	52	55	51	No	57	53	56	53	-0.4	-0.4	No	No	204 Gavenlock Road MARDI NSW 2259
N1-366	Single	60	55	58	53	56	51	No	57	53	57	53	-0.3	-0.3	No	No	10 Mardi Road MARDI NSW 2259
N1-367	Single	60	55	58	53	57	52	No	57	54	57	54	-0.3	-0.3	No	No	30 Mardi Road MARDI NSW 2259
N1-368	Single	60	55	59	54	57	53	No	58	54	57	54	-0.3	-0.3	No	No	30 Mardi Road MARDI NSW 2259
N1-369	Single	60	55	60	55	58	54	No	59	55	58	55	-0.3	-0.2	No	No	55 Mardi Road MARDI NSW 2259
N1-370	Single	60	55	56	52	57	52	No	56	53	55	51	-1.9	-1.8	No	No	93 Alison Road WYONG NSW 2259
N1-371	Single	60	55	58	53	58	54	No	58	55	56	53	-2.0	-1.9	No	No	97 Alison Road WYONG NSW 2259
N1-372	Single	60	55	58	53	59	54	No	58	55	56	53	-2.0	-2.0	No	No	101-103 Alison Road WYONG NSW 2259
N1-373	Single	60	55	58	53	58	54	No	58	55	57	53	-1.5	-1.5	No	No	109-111 Alison Road WYONG NSW 2259
N1-374	First Floor	60	55	59	54	59	54	No	60	56	58	55	-1.7	-1.7	No	No	109-111 Alison Road WYONG NSW 2259
N1-374	Ground Floor	60	55	59	54	59	54	No	59	55	57	54	-1.7	-1.6	No	No	109-111 Alison Road WYONG NSW 2259
N1-375	Single	60	55	67	62	65	60	Yes - Acute	65	62	66	63	1.0	0.9	Yes - Acute	No	75 Mardi Road MARDI NSW 2259
N2-1	Single	60	55	64	59	62	57	Yes	64	61	64	60	-0.6	-0.6	Yes - Acute	No	110 McPherson Road MARDI NSW 2259
N2-2	Single	60	55	60	55	58	53	No	60	56	59	56	-0.5	-0.5	No	No	120 McPherson Road MARDI NSW 2259

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				"No Build" [2]		"Build"			"No Build" [2]		"Build"		Increase				
		Day	Night	Day	Night	Day	Night	Consider Mitigation[3]	Day	Night	Day	Night	Day	Night	Consider Mitigation[3]	Change in Mitigation Outcome	
N2-3	Single	60	55	67	62	65	61	Yes - Acute	67	64	67	63	0.0	-0.1	Yes - Acute	No	185 McPherson Road MARDI NSW 2259
N2-5	Single	60	55	65	60	63	58	Yes	65	62	65	61	-0.4	-0.4	Yes - Acute	No	195 McPherson Road MARDI NSW 2259
N2-6	Single	60	55	62	57	60	55	No	62	58	61	58	-0.3	-0.3	No	No	195 McPherson Road MARDI NSW 2259
N2-7	Single	60	55	61	56	59	54	No	60	57	60	57	0.0	-0.1	No	No	195 McPherson Road MARDI NSW 2259
N2-8	Single	60	55	58	53	56	52	No	57	54	58	54	0.2	0.2	No	No	30 Collies Lane MARDI NSW 2259
N2-9	Single	60	55	57	52	55	50	No	56	53	56	53	-0.1	-0.1	No	No	30 Collies Lane MARDI NSW 2259
N2-10	Single	60	55	59	54	57	52	No	58	54	58	55	0.4	0.4	No	No	30 Collies Lane MARDI NSW 2259
N2-11	Single	60	55	64	59	62	57	Yes	62	59	64	60	1.1	1.0	Yes - Acute	No	40 Collies Lane MARDI NSW 2259
N2-12	Single	60	55	59	54	57	52	No	58	54	58	54	0.2	0.2	No	No	35 Collies Lane MARDI NSW 2259
N2-13	Single	60	55	56	51	55	50	No	55	52	55	52	-0.3	-0.2	No	No	35 Collies Lane MARDI NSW 2259
N2-14	Single	60	55	68	63	67	62	Yes - Acute	67	64	68	65	1.0	0.9	Yes - Acute	No	50 Collies Lane MARDI NSW 2259
N2-15	Single	60	55	63	58	61	56	Yes	61	58	62	59	1.1	1.0	No	Yes	50 Collies Lane MARDI NSW 2259
N2-16	Single	60	55	67	62	65	61	Yes - Acute	65	62	67	64	1.4	1.3	Yes - Acute	No	50 Collies Lane MARDI NSW 2259
N2-18	Single	60	55	68	63	66	62	Yes - Acute	66	63	67	64	0.9	0.8	Yes - Acute	No	60 Collies Lane MARDI NSW 2259
N2-19	Single	60	55	63	58	61	57	Yes	62	58	62	59	0.8	0.7	No	Yes	70 Collies Lane MARDI NSW 2259
N2-20	Single	60	55	61	56	59	55	No	60	56	60	57	0.4	0.4	No	No	80 Collies Lane MARDI NSW 2259
N2-21	Single	60	55	60	55	58	53	No	58	55	59	56	1.0	0.9	No	No	45 Collies Lane MARDI NSW 2259
N2-22	Single	60	55	59	54	57	52	No	57	54	58	54	0.7	0.7	No	No	45 Collies Lane MARDI NSW 2259
N2-23	Single	60	55	61	56	60	55	No	60	56	60	56	-0.1	0.0	No	No	90 Collies Lane MARDI NSW 2259
N2-24	Single	60	55	55	50	56	51	No	56	52	54	50	-1.8	-1.7	No	No	90 Collies Lane MARDI NSW 2259
N2-25	Single	60	55	60	55	59	54	No	58	55	59	55	0.1	0.1	No	No	90 Collies Lane MARDI NSW 2259

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Receiver No. [1]	Single Storey, Floor of Multi-Storey, or Non-Residential	*RNP* Criteria		2029 Project REF Noise Levels $L_{Aeq,period}$ dBA					2029 Revised Design Noise Levels $L_{Aeq,period}$ dBA								Address
				"No Build" [2]		"Build"			"No Build" [2]		"Build"		Increase				
		Day	Night	Day	Night	Day	Night	Consider Mitigation[3]	Day	Night	Day	Night	Day	Night	Consider Mitigation[3]	Change in Mitigation Outcome	
N2-26	Single	60	55	61	56	60	55	No	60	57	60	56	-0.1	-0.1	No	No	90 Collies Lane MARDI NSW 2259
N2-27	Single	60	55	61	56	60	56	Yes	60	57	60	57	-0.2	-0.2	No	Yes	90 Collies Lane MARDI NSW 2259
N2-28	Single	60	55	58	53	56	51	No	58	54	57	54	-0.5	-0.5	No	No	333 Old Maitland Road MARDI NSW 2259
N2-29	Single	60	55	58	52	55	51	No	57	54	57	53	-0.5	-0.4	No	No	333 Old Maitland Road MARDI NSW 2259
N2-30	Single	60	55	58	53	55	51	No	57	54	57	53	-0.4	-0.4	No	No	333 Old Maitland Road MARDI NSW 2259
N2-31	Single	60	55	57	52	55	50	No	57	53	56	53	-0.4	-0.4	No	No	333 Old Maitland Road MARDI NSW 2259
N2-32	Single	60	55	57	52	55	50	No	56	53	56	53	-0.4	-0.3	No	No	Wyong Milk Factory 141-155 Alison Road WYONG NSW 2259
N3-3	Single	60	55	62	57	62	57	Yes	62	58	60	57	-1.8	-1.7	No	Yes	137-139 Alison Road WYONG NSW 2259
N3-4	Single	60	55	62	57	62	58	Yes	62	59	60	57	-2.1	-1.9	No	Yes	133 Alison Road WYONG NSW 2259
N3-5	Single	60	55	63	58	63	58	Yes	63	59	61	57	-1.9	-1.9	No	Yes	125-129 Alison Road WYONG NSW 2259
N3-6	Single	60	55	62	57	62	57	Yes	62	58	60	57	-1.8	-1.7	No	Yes	125-129 Alison Road WYONG NSW 2259
N3-7	Single	60	55	60	55	59	54	No	59	56	58	55	-0.8	-0.8	No	No	119 Alison Road WYONG NSW 2259
N3-8	Single	60	55	60	55	60	55	No	60	57	58	55	-1.8	-1.7	No	No	112 Alison Road WYONG NSW 2259
N3-9	Single	60	55	56	51	58	53	No	57	54	54	50	-3.7	-3.5	No	No	8 Cape Road WYONG NSW 2259
N3-10	Single	60	55	57	52	58	54	No	58	54	55	51	-3.2	-3.0	No	No	12 Cape Road WYONG NSW 2259
N3-11	Single	60	55	56	52	58	53	No	57	54	54	51	-3.4	-3.1	No	No	Alison Homestead 1 Cape Road WYONG NSW 2259
N3-13	Single	60	55	61	56	61	57	Yes	61	58	59	56	-2.0	-1.8	No	Yes	Alison Homestead 1 Cape Road WYONG NSW 2259

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Receiver No. [1]	Single Storey, Floor of Multi-Storey, or Non-Residential	*RNP* Criteria		2029 Project REF Noise Levels $L_{Aeq,period}$ dBA					2029 Revised Design Noise Levels $L_{Aeq,period}$ dBA								Address
				"No Build" [2]		"Build"			"No Build" [2]		"Build"		Increase				
		Day	Night	Day	Night	Day	Night	Consider Mitigation[3]	Day	Night	Day	Night	Day	Night	Consider Mitigation[3]	Change in Mitigation Outcome	
N3-14	Single	60	55	61	56	63	58	Yes	62	59	58	55	-3.7	-3.5	No	Yes	12 Cape Road WYONG NSW 2259
N3-15	Single	60	55	57	52	59	54	No	58	55	55	52	-3.6	-3.4	No	No	18 Cape Road WYONG NSW 2259
N3-16	Single	60	55	57	53	59	54	No	59	55	55	52	-3.7	-3.5	No	No	21 Cape Road WYONG NSW 2259
N3-17	Single	60	55	59	54	61	56	Yes	60	57	57	54	-3.5	-3.4	No	Yes	20 Cape Road WYONG NSW 2259
N3-18	Single	60	55	59	54	60	56	Yes	60	56	56	53	-3.8	-3.7	No	Yes	25 Cape Road WYONG NSW 2259
N3-19	Single	60	55	62	57	64	59	Yes	64	60	60	56	-4.1	-4.0	No	Yes	25 Cape Road WYONG NSW 2259
N3-22	Single	60	55	68	63	70	66	Yes - Increase >2, Acute	70	66	66	63	-3.8	-3.7	Yes - Acute	No	40 Cape Road WYONG NSW 2259
N3-23	Single	60	55	60	55	62	58	Yes	61	58	58	54	-3.9	-3.9	No	Yes	61 Cape Road WYONG NSW 2259
N3-24	Single	60	55	65	60	67	62	Yes - Increase >2, Acute	66	63	62	58	-4.3	-4.2	No	Yes	52 Cape Road WYONG NSW 2259
N3-25	Single	60	55	62	57	64	59	Yes-Increase>2dBA	63	60	59	56	-4.0	-4.0	No	Yes	58 Cape Road WYONG NSW 2259
N3-26	Single	60	55	63	58	65	61	Yes - Increase >2, Acute	65	62	61	58	-4.3	-4.2	No	Yes	58 Cape Road WYONG NSW 2259
N3-27	Single	60	55	63	58	65	60	Yes - Increase >2, Acute	64	61	60	57	-4.2	-4.1	No	Yes	65 Cape Road WYONG NSW 2259
N3-28	Single	60	55	68	63	70	65	Yes - Acute	69	66	64	61	-4.7	-4.5	Yes - Acute	No	67 Cape Road WYONG NSW 2259
N3-29	Single	60	55	67	63	69	65	Yes - Acute	69	66	64	61	-5.2	-5.0	Yes - Acute	No	65 Cape Road WYONG NSW 2259
N3-31	Single	60	55	64	59	65	60	Yes - Acute	65	61	60	57	-4.5	-4.3	No	Yes	37 St Johns Road WARNERVALE NSW 2259
N3-32	Single	60	55	63	58	64	59	Yes	64	60	59	56	-4.5	-4.3	No	Yes	333 Old Maitland Road MARDI NSW 2259
N3-33	Single	60	55	62	57	63	58	Yes	63	59	58	55	-4.5	-4.4	No	Yes	39 St Johns Road WARNERVALE NSW 2259

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Receiver No. [1]	Single Storey, Floor of Multi-Storey, or Non-Residential	*RNP* Criteria		2029 Project REF Noise Levels $L_{Aeq,period}$ dBA					2029 Revised Design Noise Levels $L_{Aeq,period}$ dBA								Address
				"No Build" [2]		"Build"			"No Build" [2]		"Build"		Increase				
		Day	Night	Day	Night	Day	Night	Consider Mitigation[3]	Day	Night	Day	Night	Day	Night	Consider Mitigation[3]	Change in Mitigation Outcome	
N3-34	Single	60	55	60	55	61	56	Yes	61	57	56	53	-4.5	-4.2	No	Yes	41 St Johns Road WARNERVALE NSW 2259
N3-35	Single	60	55	67	62	68	63	Yes - Acute	68	64	63	59	-4.8	-4.5	No	Yes	50 St Johns Road WARNERVALE NSW 2259
N3-36	Single	60	55	66	61	66	62	Yes - Acute	66	62	61	58	-4.8	-4.5	No	Yes	52 St Johns Road WARNERVALE NSW 2259
N3-39	Single	60	55	58	53	58	54	No	58	54	56	52	-2.2	-2.1	No	No	106 Alison Road WYONG NSW 2259
N3-40	Single	60	55	58	53	59	54	No	58	55	56	53	-2.2	-2.2	No	No	102 Alison Road WYONG NSW 2259
N3-42	Single	60	55	64	59	64	60	Yes - Acute	64	61	59	56	-4.7	-4.5	No	Yes	54 St Johns Road WARNERVALE NSW 2259
N3-43	Single	60	55	63	58	64	59	Yes	63	60	59	55	-4.7	-4.5	No	Yes	54 St Johns Road WARNERVALE NSW 2259
N3-44	Single	60	55	61	56	61	57	Yes	61	58	57	53	-4.6	-4.4	No	Yes	56 St Johns Road WARNERVALE NSW 2259
N3-45	Single	60	55	58	53	60	56	Yes - Increase >2	60	56	55	52	-4.6	-4.4	No	Yes	62 St Johns Road WARNERVALE NSW 2259
N4-1	Single	60	55	69	64	69	65	Yes - Acute	69	66	66	63	-3.6	-3.4	Yes - Acute	No	15 Frames Lane ALISON NSW 2259
N4-2	Single	60	55	64	59	64	60	Yes - Acute	65	61	61	57	-4.0	-3.8	No	Yes	11 Frames Lane ALISON NSW 2259
N4-3	Single	60	55	62	57	62	57	Yes	62	59	59	56	-2.6	-2.5	No	Yes	5 Frames Lane ALISON NSW 2259
N4-4	Single	60	55	60	56	60	56	Yes	60	57	59	55	-1.7	-1.6	No	Yes	1 Frames Lane ALISON NSW 2259
N4-5	Single	60	55	61	56	60	56	Yes	60	57	59	56	-1.0	-1.0	No	Yes	5 Frames Lane ALISON NSW 2259
N4-6	Single	60	55	59	54	59	54	No	59	55	58	55	-0.7	-0.8	No	No	1 Frames Lane ALISON NSW 2259
N4-7	Single	60	55	60	55	59	55	No	59	56	58	55	-1.1	-1.0	No	No	1 Rossmore Close ALISON NSW 2259
N4-8	Single	60	55	59	54	58	54	No	58	55	58	54	-0.6	-0.6	No	No	5 Rossmore Close ALISON NSW 2259

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Receiver No. [1]	Single Storey, Floor of Multi-Storey, or Non-Residential	*RNP* Criteria		2029 Project REF Noise Levels $L_{Aeq,period}$ dBA					2029 Revised Design Noise Levels $L_{Aeq,period}$ dBA								Address
				"No Build" [2]		"Build"			"No Build" [2]		"Build"		Increase				
		Day	Night	Day	Night	Day	Night	Consider Mitigation[3]	Day	Night	Day	Night	Day	Night	Consider Mitigation[3]	Change in Mitigation Outcome	
N4-9	Single	60	55	59	54	58	53	No	58	55	58	54	-0.4	-0.4	No	No	7 Rossmore Close ALISON NSW 2259
N4-10	Single	60	55	57	52	56	51	No	56	53	56	52	-0.1	-0.2	No	No	7 Rossmore Close ALISON NSW 2259
N4-11	Single	60	55	55	50	55	50	No	55	51	54	50	-1.0	-0.9	No	No	28 Yarramalong Road ALISON NSW 2259
N4-13	Single	60	55	66	61	67	62	Yes - Acute	67	63	64	60	-3.0	-2.8	Yes - Acute	No	5 Yarramalong Road ALISON NSW 2259
N4-14	Single	60	55	66	61	67	63	Yes - Acute	67	64	64	61	-3.2	-3.0	Yes - Acute	No	22 Hue Hue Road ALISON NSW 2259
N4-15	Single	60	55	61	56	61	56	Yes	61	57	59	56	-1.7	-1.6	No	Yes	7 Yarramalong Road ALISON NSW 2259
N4-16	Single	60	55	58	53	58	53	No	58	54	57	53	-1.1	-1.0	No	No	9 Yarramalong Road ALISON NSW 2259
N4-17	Single	60	55	59	54	59	54	No	59	56	58	54	-1.5	-1.4	No	No	9 Yarramalong Road ALISON NSW 2259
N4-18	Single	60	55	64	60	67	62	Yes - Increase >2, Acute	66	62	62	59	-3.5	-3.4	No	Yes	24 Hue Hue Road ALISON NSW 2259
N4-19	Single	60	55	65	60	67	62	Yes - Increase >2, Acute	66	63	63	59	-3.5	-3.5	No	Yes	34 Hue Hue Road ALISON NSW 2259
N4-20	Single	60	55	67	63	70	65	Yes - Increase >2, Acute	70	66	66	63	-3.4	-3.4	Yes - Acute	No	54 Hue Hue Road ALISON NSW 2259
N4-21	Single	60	55	66	61	68	63	Yes - Increase >2, Acute	67	64	63	60	-3.6	-3.7	Yes - Acute	No	54 Hue Hue Road ALISON NSW 2259
N4-23	Single	60	55	69	65	72	67	Yes - Increase >2, Acute	71	67	67	64	-3.4	-3.5	Yes - Acute	No	56 Hue Hue Road ALISON NSW 2259
N4-24	Single	60	55	63	59	65	61	Yes - Increase >2, Acute	65	61	61	58	-3.7	-3.7	No	Yes	64 Hue Hue Road ALISON NSW 2259
N4-25	Single	60	55	65	60	67	63	Yes - Increase >2, Acute	66	63	63	59	-3.6	-3.6	No	Yes	64 Hue Hue Road ALISON NSW 2259
N4-26	First Floor	60	55	60	56	63	58	Yes - Increase >2	63	60	60	56	-3.7	-3.6	No	Yes	84 Hue Hue Road ALISON NSW 2259

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Receiver No. [1]	Single Storey, Floor of Multi-Storey, or Non-Residential	*RNP* Criteria		2029 Project REF Noise Levels $L_{Aeq,period}$ dBA					2029 Revised Design Noise Levels $L_{Aeq,period}$ dBA								Address
				"No Build" [2]		"Build"			"No Build" [2]		"Build"		Increase				
		Day	Night	Day	Night	Day	Night	Consider Mitigation[3]	Day	Night	Day	Night	Day	Night	Consider Mitigation[3]	Change in Mitigation Outcome	
N4-26	Ground Floor	60	55	60	56	63	58	Yes-Increase>2dBA	62	58	58	55	-3.6	-3.6	No	Yes	84 Hue Hue Road ALISON NSW 2259
N4-27	Single	60	55	65	61	67	63	Yes - Increase >2, Acute	66	63	63	59	-3.6	-3.6	No	Yes	92 Hue Hue Road ALISON NSW 2259
N4-28	Single	60	55	73	69	75	71	Yes - Increase >2, Acute	74	71	70	67	-3.6	-3.8	Yes - Acute	No	81 Hue Hue Road ALISON NSW 2259
N4-29	Single	60	55	72	67	74	70	Yes - Increase >2, Acute	73	70	70	66	-3.2	-3.4	Yes - Acute	No	93 Hue Hue Road ALISON NSW 2259
N4-30	Single	60	55	69	64	71	67	Yes - Increase >2, Acute	70	67	67	64	-3.1	-3.1	Yes - Acute	No	105 Hue Hue Road ALISON NSW 2259
N4-31	Single	60	55	71	67	74	69	Yes - Increase >2, Acute	72	69	69	66	-2.9	-3.0	Yes - Acute	No	105 Hue Hue Road ALISON NSW 2259
N4-32	Single	60	55	63	59	66	61	Yes - Increase >2, Acute	65	61	61	58	-3.4	-3.4	No	Yes	100 Hue Hue Road ALISON NSW 2259
N4-33	Single	60	55	67	63	69	65	Yes - Increase >2, Acute	68	65	65	62	-3.7	-3.6	Yes - Acute	No	115 Hue Hue Road ALISON NSW 2259
N4-34	Single	60	55	62	58	65	60	Yes - Increase >2, Acute	64	60	60	57	-3.8	-3.7	No	Yes	135 Hue Hue Road ALISON NSW 2259
N4-36	Single	60	55	63	58	65	60	Yes - Acute	64	61	60	57	-4.2	-4.0	No	Yes	137 Hue Hue Road ALISON NSW 2259
N4-37	Single	60	55	63	58	65	60	Yes - Increase >2, Acute	64	61	60	57	-4.1	-3.8	No	Yes	11 Kiera Lane ALISON NSW 2259
N4-38	Single	60	55	59	54	61	57	Yes-Increase>2dBA	60	57	56	53	-3.9	-3.7	No	Yes	139 Hue Hue Road ALISON NSW 2259
N4-39	Single	60	55	60	55	62	57	Yes	61	58	57	54	-4.1	-3.9	No	Yes	150 Hue Hue Road ALISON NSW 2259
N4-40	Single	60	55	61	56	62	58	Yes	62	58	58	54	-4.0	-3.7	No	Yes	139 Hue Hue Road ALISON NSW 2259
N4-41	Single	60	55	61	56	63	58	Yes	62	59	58	55	-4.0	-3.8	No	Yes	7 Kiera Lane ALISON NSW 2259

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Receiver No. [1]	Single Storey, Floor of Multi-Storey, or Non-Residential	*RNP* Criteria		2029 Project REF Noise Levels $L_{Aeq,period}$ dBA					2029 Revised Design Noise Levels $L_{Aeq,period}$ dBA								Address
				"No Build" [2]		"Build"			"No Build" [2]		"Build"		Increase				
		Day	Night	Day	Night	Day	Night	Consider Mitigation[3]	Day	Night	Day	Night	Day	Night	Consider Mitigation[3]	Change in Mitigation Outcome	
N4-42	Single	60	55	61	56	63	58	Yes	62	59	58	55	-4.2	-3.9	No	Yes	7 Kiera Lane ALISON NSW 2259
N4-43	Single	60	55	60	55	62	57	Yes	61	58	57	54	-4.1	-3.9	No	Yes	6 Kiera Lane ALISON NSW 2259
N4-44	Single	60	55	62	57	64	60	Yes - Increase >2, Acute	64	60	59	56	-4.1	-3.8	No	Yes	6 Kiera Lane ALISON NSW 2259
N4-45	Single	60	55	61	56	63	58	Yes	62	59	58	55	-4.1	-3.9	No	Yes	4 Kiera Lane ALISON NSW 2259
N4-46	Single	60	55	62	57	64	59	Yes	63	60	59	56	-4.0	-3.8	No	Yes	15 Song Bird Lane JILLIBY NSW 2259
N4-47	Single	60	55	61	57	63	58	Yes	62	59	58	55	-4.1	-3.9	No	Yes	12 Song Bird Lane JILLIBY NSW 2259
N4-48	Single	60	55	62	57	63	59	Yes	63	59	58	55	-4.2	-3.9	No	Yes	12 Song Bird Lane JILLIBY NSW 2259
N4-49	Single	60	55	62	57	63	58	Yes	63	59	58	55	-4.3	-4.0	No	Yes	1 Peacock Avenue JILLIBY NSW 2259
N4-50	Single	60	55	61	56	62	57	Yes	62	58	58	54	-4.2	-4.0	No	Yes	4 Brolga Way JILLIBY NSW 2259
N4-51	Single	60	55	59	54	60	55	No	60	56	55	52	-4.5	-4.2	No	No	3 Brolga Way JILLIBY NSW 2259
N4-52	Single	60	55	61	56	62	58	Yes	62	59	58	54	-4.3	-4.1	No	Yes	3 Brolga Way JILLIBY NSW 2259
N4-53	Single	60	55	60	55	61	56	Yes	61	57	56	53	-4.5	-4.3	No	Yes	62 Burlington Avenue JILLIBY NSW 2259
N4-54	Single	60	55	62	57	62	58	Yes	62	59	58	54	-4.7	-4.5	No	Yes	37 Burlington Avenue JILLIBY NSW 2259
N4-55	Single	60	55	62	57	62	58	Yes	62	59	58	54	-4.7	-4.5	No	Yes	39 Burlington Avenue JILLIBY NSW 2259
N4-56	Single	60	55	61	57	62	57	Yes	62	58	57	54	-4.7	-4.5	No	Yes	35 Burlington Avenue JILLIBY NSW 2259
N4-57	Single	60	55	60	55	61	56	Yes	61	57	56	53	-4.7	-4.4	No	Yes	31 Burlington Avenue JILLIBY NSW 2259
N4-58	Single	60	55	62	57	63	58	Yes	63	59	58	55	-4.6	-4.4	No	Yes	27 Burlington Avenue JILLIBY NSW 2259
N4-59	Single	60	55	67	62	67	62	Yes - Acute	67	63	62	59	-4.5	-4.4	No	Yes	48 St Johns Road JILLIBY NSW 2259
N4-60	Single	60	55	65	60	66	61	Yes - Acute	65	62	61	57	-4.5	-4.3	No	Yes	44 Holloway Dr JILLIBY NSW 2259
N4-61	Single	60	55	66	61	66	62	Yes - Acute	66	62	62	58	-4.5	-4.3	No	Yes	40 Holloway Dr JILLIBY NSW 2259

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Receiver No. [1]	Single Storey, Floor of Multi-Storey, or Non-Residential	*RNP* Criteria		2029 Project REF Noise Levels $L_{Aeq,period}$ dBA					2029 Revised Design Noise Levels $L_{Aeq,period}$ dBA								Address
				"No Build" [2]		"Build"			"No Build" [2]		"Build"		Increase				
		Day	Night	Day	Night	Day	Night	Consider Mitigation[3]	Day	Night	Day	Night	Day	Night	Consider Mitigation[3]	Change in Mitigation Outcome	
N4-62	Single	60	55	64	59	64	59	Yes	64	60	59	56	-4.4	-4.1	No	Yes	38 Holloway Dr JILLIBY NSW 2259
N4-63	Single	60	55	63	59	64	59	Yes	64	60	59	56	-4.3	-4.2	No	Yes	36 Holloway Dr JILLIBY NSW 2259
N4-64	Single	60	55	63	59	64	59	Yes	64	60	59	56	-4.5	-4.3	No	Yes	34 Holloway Dr JILLIBY NSW 2259
N4-65	Single	60	55	63	59	64	59	Yes	63	60	59	56	-4.6	-4.4	No	Yes	32 Holloway Dr JILLIBY NSW 2259
N4-66	Single	60	55	63	58	63	59	Yes	63	59	58	55	-4.6	-4.3	No	Yes	30 Holloway Dr JILLIBY NSW 2259
N4-67	Single	60	55	63	58	63	58	Yes	63	59	58	55	-4.6	-4.3	No	Yes	28 Holloway Dr JILLIBY NSW 2259
N4-68	Single	60	55	62	57	62	58	Yes	62	59	58	54	-4.6	-4.3	No	Yes	26 Holloway Dr JILLIBY NSW 2259
N4-69	Single	60	55	63	59	63	59	Yes	63	60	59	55	-4.6	-4.4	No	Yes	26 Holloway Dr JILLIBY NSW 2259
N4-70	Single	60	55	65	60	65	60	Yes - Acute	65	61	60	57	-4.6	-4.4	No	Yes	24 Holloway Dr JILLIBY NSW 2259
N4-71	Single	60	55	63	58	63	58	Yes	63	59	58	55	-4.7	-4.4	No	Yes	24 Holloway Dr JILLIBY NSW 2259
N4-72	Single	60	55	63	59	64	59	Yes	63	60	59	55	-4.7	-4.5	No	Yes	22 Holloway Dr JILLIBY NSW 2259
N4-73	Single	60	55	63	59	63	59	Yes	63	60	59	55	-4.8	-4.5	No	Yes	20 Holloway Dr JILLIBY NSW 2259
N4-74	Single	60	55	70	66	70	66	Yes - Acute	70	67	65	61	-5.6	-5.4	Yes - Acute	No	13 Buttonderry Way JILLIBY NSW 2259
N4-76	Single	60	55	69	64	68	64	Yes - Acute	69	65	63	60	-5.3	-5.2	Yes - Acute	No	15 Buttonderry Way JILLIBY NSW 2259
N4-77	Single	60	55	62	57	62	57	Yes	62	58	57	53	-4.9	-4.8	No	Yes	5 The Downs JILLIBY NSW 2259
N4-78	Single	60	55	63	59	63	59	Yes	63	60	58	55	-5.0	-4.8	No	Yes	7 The Downs JILLIBY NSW 2259
N4-79	Single	60	55	64	59	64	60	Yes - Acute	64	61	59	56	-4.9	-4.8	No	Yes	6 The Downs JILLIBY NSW 2259
N4-80	Single	60	55	62	58	62	58	Yes	62	59	57	54	-4.9	-4.7	No	Yes	6 The Downs JILLIBY NSW 2259
N4-81	Single	60	55	61	57	61	57	Yes	61	58	56	53	-4.8	-4.6	No	Yes	4 The Downs JILLIBY NSW 2259
N4-82	Single	60	55	66	61	66	61	Yes - Acute	66	62	61	58	-4.8	-4.6	No	Yes	17 Buttonderry Way JILLIBY NSW 2259
N4-83	Single	60	55	66	62	67	62	Yes - Acute	66	63	62	58	-4.3	-4.1	No	Yes	19 Buttonderry Way JILLIBY NSW 2259

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Receiver No. [1]	Single Storey, Floor of Multi-Storey, or Non-Residential	*RNP* Criteria		2029 Project REF Noise Levels $L_{Aeq,period}$ dBA					2029 Revised Design Noise Levels $L_{Aeq,period}$ dBA								Address
				"No Build" [2]		"Build"			"No Build" [2]		"Build"		Increase				
		Day	Night	Day	Night	Day	Night	Consider Mitigation[3]	Day	Night	Day	Night	Day	Night	Consider Mitigation[3]	Change in Mitigation Outcome	
N4-84	Single	60	55	67	63	67	63	Yes - Acute	67	63	63	59	-4.3	-4.3	No	Yes	21 Buttonderry Way JILLIBY NSW 2259
N4-85	Single	60	55	69	64	69	65	Yes - Acute	66	63	61	58	-5.2	-4.9	No	Yes	23 Buttonderry Way JILLIBY NSW 2259
N4-86	Non residential	60	55	66	61	66	62	Yes - Acute	66	62	61	58	-4.2	-4.1	No	Yes	23 Buttonderry Way JILLIBY NSW 2259
N4-87	Single	60	55	58	53	58	54	No	58	55	54	50	-4.6	-4.4	No	No	42 Burlington Avenue JILLIBY NSW 2259
N4-88	Single	60	55	56	52	57	52	No	57	53	52	49	-4.6	-4.4	No	No	40 Burlington Avenue JILLIBY NSW 2259
N4-89	Single	60	55	57	52	58	53	No	58	54	53	50	-4.5	-4.3	No	No	38 Burlington Avenue JILLIBY NSW 2259
N4-90	Single	60	55	59	55	60	55	No	60	56	55	52	-4.4	-4.2	No	No	60 Burlington Avenue JILLIBY NSW 2259
N4-91	Single	60	55	60	55	60	56	Yes	60	57	56	52	-4.5	-4.3	No	Yes	58 Burlington Avenue JILLIBY NSW 2259
N4-92	Single	60	55	60	55	61	56	Yes	61	57	56	53	-4.4	-4.2	No	Yes	56 Burlington Avenue JILLIBY NSW 2259
N4-93	Single	60	55	60	55	60	55	No	60	56	55	52	-4.6	-4.4	No	No	54 Burlington Avenue JILLIBY NSW 2259
N4-94	Single	60	55	59	54	60	55	No	60	56	55	52	-4.6	-4.4	No	No	52 Burlington Avenue JILLIBY NSW 2259
N4-95	Single	60	55	59	54	60	56	Yes	60	56	56	52	-4.3	-4.2	No	Yes	275 Hue Hue Road JILLIBY NSW 2259
N4-96	Single	60	55	60	55	61	57	Yes	61	57	57	53	-4.4	-4.1	No	Yes	275 Hue Hue Road JILLIBY NSW 2259
N4-97	Single	60	55	59	54	60	56	Yes	60	57	56	52	-4.3	-4.1	No	Yes	1 Brolga Way JILLIBY NSW 2259
N4-98	Single	60	55	60	55	61	56	Yes	61	57	56	53	-4.4	-4.2	No	Yes	293 Hue Hue Road JILLIBY NSW 2259
N4-99	Single	60	55	58	53	59	54	No	58	55	54	51	-4.4	-4.2	No	No	56 Burlington Avenue JILLIBY NSW 2259
N4-100	Single	60	55	56	52	57	52	No	57	53	52	49	-4.6	-4.4	No	No	46 Burlington Avenue JILLIBY NSW 2259
N4-101	Single	60	55	56	51	56	51	No	56	52	51	48	-4.6	-4.4	No	No	44 Burlington Avenue JILLIBY NSW 2259
N4-102	Single	60	55	61	57	62	57	Yes	61	58	57	53	-4.5	-4.3	No	Yes	33 Holloway Dr JILLIBY NSW 2259
N4-103	Single	60	55	61	56	61	57	Yes	61	58	57	53	-4.5	-4.4	No	Yes	31 Holloway Dr JILLIBY NSW 2259

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Receiver No. [1]	Single Storey, Floor of Multi-Storey, or Non-Residential	*RNP* Criteria		2029 Project REF Noise Levels $L_{Aeq,period}$ dBA					2029 Revised Design Noise Levels $L_{Aeq,period}$ dBA								Address
				"No Build" [2]		"Build"			"No Build" [2]		"Build"		Increase				
		Day	Night	Day	Night	Day	Night	Consider Mitigation[3]	Day	Night	Day	Night	Day	Night	Consider Mitigation[3]	Change in Mitigation Outcome	
N4-104	Single	60	55	61	56	61	56	Yes	61	57	56	53	-4.7	-4.5	No	Yes	19 Burlington Avenue JILLIBY NSW 2259
N4-105	Single	60	55	61	56	61	56	Yes	61	57	56	53	-4.4	-4.2	No	Yes	29 Holloway Dr JILLIBY NSW 2259
N4-106	Single	60	55	62	57	62	57	Yes	62	58	57	54	-4.6	-4.3	No	Yes	27 Holloway Dr JILLIBY NSW 2259
N4-107	Single	60	55	60	55	60	56	Yes	60	57	56	52	-4.4	-4.2	No	Yes	17 Burlington Avenue JILLIBY NSW 2259
N4-108	Single	60	55	60	55	60	56	Yes	60	56	55	52	-4.5	-4.3	No	Yes	15 Burlington Avenue JILLIBY NSW 2259
N4-109	Single	60	55	60	55	60	55	No	60	56	55	52	-4.5	-4.3	No	No	13 Burlington Avenue JILLIBY NSW 2259
N4-110	Single	60	55	57	53	58	53	No	58	54	53	50	-4.5	-4.3	No	No	34 Burlington Avenue JILLIBY NSW 2259
N4-111	Single	60	55	57	52	57	52	No	57	53	52	49	-4.5	-4.3	No	No	32 Burlington Avenue JILLIBY NSW 2259
N4-112	Single	60	55	59	55	60	55	No	60	56	55	52	-4.4	-4.2	No	No	26 Burlington Avenue JILLIBY NSW 2259
N4-113	Single	60	55	61	56	61	56	Yes	61	57	56	53	-4.6	-4.3	No	Yes	11 Burlington Avenue JILLIBY NSW 2259
N4-114	Single	60	55	61	56	61	56	Yes	61	57	56	53	-4.6	-4.3	No	Yes	9 Burlington Avenue JILLIBY NSW 2259
N4-115	Single	60	55	59	54	59	55	No	59	56	55	51	-4.5	-4.3	No	No	7 Burlington Avenue JILLIBY NSW 2259
N4-116	Single	60	55	61	56	61	57	Yes	61	57	56	53	-4.6	-4.4	No	Yes	19 Holloway Dr JILLIBY NSW 2259
N4-117	Single	60	55	61	56	61	56	Yes	61	57	56	53	-4.6	-4.4	No	Yes	21 Holloway Dr JILLIBY NSW 2259
N4-118	Single	60	55	62	57	62	58	Yes	62	58	57	54	-4.7	-4.4	No	Yes	1 Burlington Avenue JILLIBY NSW 2259
N4-119	Single	60	55	61	56	61	56	Yes	61	57	56	53	-4.7	-4.4	No	Yes	3 Burlington Avenue JILLIBY NSW 2259
N4-120	Single	60	55	62	57	62	57	Yes	62	58	57	54	-4.7	-4.6	No	Yes	18 Holloway Dr JILLIBY NSW 2259
N4-121	Single	60	55	61	56	61	56	Yes	61	57	56	53	-4.6	-4.5	No	Yes	2 Burlington Avenue JILLIBY NSW 2259
N4-122	Single	60	55	60	55	60	55	No	60	56	55	52	-4.5	-4.4	No	No	4 Burlington Avenue JILLIBY NSW 2259
N4-123	Single	60	55	60	56	60	56	Yes	60	57	56	52	-4.7	-4.5	No	Yes	14 Holloway Dr JILLIBY NSW 2259

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Receiver No. [1]	Single Storey, Floor of Multi-Storey, or Non-Residential	*RNP* Criteria		2029 Project REF Noise Levels $L_{Aeq,period}$ dBA					2029 Revised Design Noise Levels $L_{Aeq,period}$ dBA								Address
				"No Build" [2]		"Build"			"No Build" [2]		"Build"		Increase				
		Day	Night	Day	Night	Day	Night	Consider Mitigation[3]	Day	Night	Day	Night	Day	Night	Consider Mitigation[3]	Change in Mitigation Outcome	
N4-124	Single	60	55	61	56	61	57	Yes	61	58	56	53	-4.7	-4.6	No	Yes	16 Holloway Dr JILLIBY NSW 2259
N4-125	Single	60	55	59	55	60	55	No	60	56	55	51	-4.7	-4.6	No	No	12 Holloway Dr JILLIBY NSW 2259
N4-126	Single	60	55	59	55	59	55	No	59	56	55	51	-4.7	-4.5	No	No	10 Holloway Dr JILLIBY NSW 2259
N4-127	Single	60	55	59	54	59	54	No	59	56	54	51	-4.7	-4.6	No	No	8 Holloway Dr JILLIBY NSW 2259
N4-128	Single	60	55	59	54	59	54	No	59	55	54	51	-4.8	-4.5	No	No	6 Holloway Dr JILLIBY NSW 2259
N4-129	Single	60	55	59	55	59	55	No	59	56	55	51	-4.9	-4.7	No	No	3 The Downs JILLIBY NSW 2259
N4-130	Single	60	55	60	55	60	55	No	60	56	55	52	-4.8	-4.6	No	No	1 The Downs JILLIBY NSW 2259
N4-131	Single	60	55	61	56	61	56	Yes	61	57	56	53	-4.9	-4.7	No	Yes	9 Buttonderry Way JILLIBY NSW 2259
N4-132	Single	60	55	63	58	63	58	Yes	63	59	58	55	-4.8	-4.6	No	Yes	11 Buttonderry Way JILLIBY NSW 2259
N4-133	Single	60	55	62	58	63	58	Yes	62	59	58	55	-4.6	-4.4	No	Yes	12 Buttonderry Way JILLIBY NSW 2259
N4-134	Single	60	55	61	56	61	57	Yes	61	57	56	53	-4.7	-4.5	No	Yes	1 The Knoll JILLIBY NSW 2259
N4-135	Single	60	55	64	59	64	59	Yes	64	60	59	55	-5.0	-4.9	No	Yes	3 The Knoll JILLIBY NSW 2259
N4-136	Single	60	55	63	58	63	58	Yes	63	59	58	54	-4.9	-4.8	No	Yes	5 The Knoll JILLIBY NSW 2259
N4-137	Single	60	55	63	58	62	58	Yes	62	59	57	54	-4.9	-4.8	No	Yes	7 The Knoll JILLIBY NSW 2259
N4-138	Single	60	55	59	55	60	55	No	59	56	55	51	-4.4	-4.3	No	No	7 The Knoll JILLIBY NSW 2259
N4-139	Single	60	55	65	61	64	60	Yes - Acute	65	61	59	56	-5.1	-5.0	No	Yes	220 Sparks Road JILLIBY NSW 2259
N4-140	Single	60	55	59	54	61	56	Yes	60	57	56	53	-3.9	-3.6	No	Yes	2 Jilliby Road ALISON NSW 2259
N4-141	Single	60	55	58	54	60	56	Yes	60	56	56	52	-3.9	-3.8	No	Yes	4 Jilliby Road ALISON NSW 2259
N4-142	Single	60	55	58	53	60	55	No	59	56	55	52	-4.1	-3.9	No	No	6 Jilliby Road ALISON NSW 2259
N4-143	Single	60	55	60	55	60	55	No	60	57	58	55	-1.8	-1.8	No	No	117 Alison Road WYONG NSW 2259
N4-144	Single	60	55	58	53	59	54	No	58	55	56	53	-2.2	-2.2	No	No	110 Alison Road WYONG NSW 2259

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Receiver No. [1]	Single Storey, Floor of Multi-Storey, or Non-Residential	*RNP* Criteria		2029 Project REF Noise Levels $L_{Aeq,period}$ dBA					2029 Revised Design Noise Levels $L_{Aeq,period}$ dBA								Address
				"No Build" [2]		"Build"			"No Build" [2]		"Build"		Increase				
		Day	Night	Day	Night	Day	Night	Consider Mitigation[3]	Day	Night	Day	Night	Day	Night	Consider Mitigation[3]	Change in Mitigation Outcome	
N4-145	Single	60	55	60	55	61	57	Yes	61	57	57	53	-4.1	-3.8	No	Yes	2 Kiera Lane ALISON NSW 2259
N4-146	Single	60	55	60	55	62	57	Yes	61	58	57	54	-4.1	-3.9	No	Yes	5 Song Bird Lane JILLIBY NSW 2259
N4-147	Single	60	55	60	55	62	57	Yes	61	58	57	54	-4.2	-3.9	No	Yes	5 Song Bird Lane JILLIBY NSW 2259
N4-148	Single	60	55	59	54	61	56	Yes	60	57	56	53	-4.1	-3.9	No	Yes	4 Song Bird Lane JILLIBY NSW 2259
N4-150	Single	60	55	60	55	59	54	No	59	55	55	51	-4.1	-4.0	No	No	15 Grasslands Close JILLIBY NSW 2259
N4-151	Single	60	55	57	52	58	54	No	58	54	54	50	-4.2	-4.0	No	No	10 Grasslands Close JILLIBY NSW 2259
N4-152	Single	60	55	59	54	60	56	Yes	60	56	56	52	-4.2	-4.0	No	Yes	7 Jascaren Close JILLIBY NSW 2259
N4-153	Single	60	55	60	55	61	56	Yes	61	57	56	53	-4.2	-4.0	No	Yes	2 Brolga Way JILLIBY NSW 2259
N4-154	Single	60	55	60	55	61	56	Yes	61	57	56	53	-4.3	-4.1	No	Yes	2 Brolga Way JILLIBY NSW 2259
N4-155	Single	60	55	60	55	61	56	Yes	60	57	56	53	-4.3	-4.2	No	Yes	5 Treelands Dr JILLIBY NSW 2259
N4-156	Single	60	55	60	55	60	55	No	60	56	55	52	-4.7	-4.5	No	No	6 Holloway Dr JILLIBY NSW 2259
N4-157	Single	60	55	58	53	58	54	No	58	54	53	50	-4.7	-4.5	No	No	5 Buttonderry Way JILLIBY NSW 2259
N4-158	Single	60	55	58	53	58	53	No	58	54	53	50	-4.7	-4.6	No	No	3 Buttonderry Way JILLIBY NSW 2259
N4-159	Single	60	55	56	52	57	52	No	56	53	52	48	-4.8	-4.6	No	No	4 Buttonderry Way JILLIBY NSW 2259
N4-160	Single	60	55	58	53	58	54	No	58	54	53	50	-4.6	-4.4	No	No	6 Amberwood Close JILLIBY NSW 2259
N4-161	Single	60	55	60	55	60	55	No	60	56	55	52	-4.6	-4.5	No	No	5 Amberwood Close JILLIBY NSW 2259
N4-162	Single	60	55	57	53	58	53	No	57	54	53	49	-4.6	-4.4	No	No	4 Amberwood Close JILLIBY NSW 2259
N5-1	Single	60	55	65	61	66	62	Yes - Acute	66	62	61	58	-4.2	-4.0	No	Yes	221 Sparks Road HALLORAN NSW 2259
N5-2	Single	60	55	62	58	63	59	Yes	63	59	58	55	-4.7	-4.5	No	Yes	221 Sparks Road HALLORAN NSW 2259
N5-3	Single	60	55	60	56	61	56	Yes	61	57	56	52	-4.8	-4.6	No	Yes	201 Sparks Road HALLORAN NSW 2259
N5-4	Single	60	55	72	68	71	67	Yes - Acute	72	69	66	63	-5.9	-5.7	Yes - Acute	No	189 Sparks Road HALLORAN NSW 2259

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[2] The change in "no build" levels between Project REF and Revised Design are due to model validation with additional noise measurement results and corrections to some building heights.

[3] At Project REF mitigation was considered for receivers above RNP. After consideration of feasible and reasonable mitigations, architectural treatment may be offered to residences with acute levels, or levels above RNP and increase by >2dBA. Residences previously treated under NAP will not be eligible for further mitigation. Acute thresholds are 65dBA for daytime and 60dBA for night time.

Receiver No. [1]	Single Storey, Floor of Multi-Storey, or Non-Residential	*RNP* Criteria		2029 Project REF Noise Levels $L_{Aeq,period}$ dBA					2029 Revised Design Noise Levels $L_{Aeq,period}$ dBA								Address
				"No Build" [2]		"Build"			"No Build" [2]		"Build"		Increase				
		Day	Night	Day	Night	Day	Night	Consider Mitigation[3]	Day	Night	Day	Night	Day	Night	Consider Mitigation[3]	Change in Mitigation Outcome	
N5-6	Single	60	55	62	57	61	56	Yes	62	58	56	52	-5.7	-5.8	No	Yes	188 Mountain Road, Halloran
N5-7	Single	60	55	62	57	60	56	Yes	62	58	56	52	-5.7	-6.0	No	Yes	188 Mountain Road, Halloran

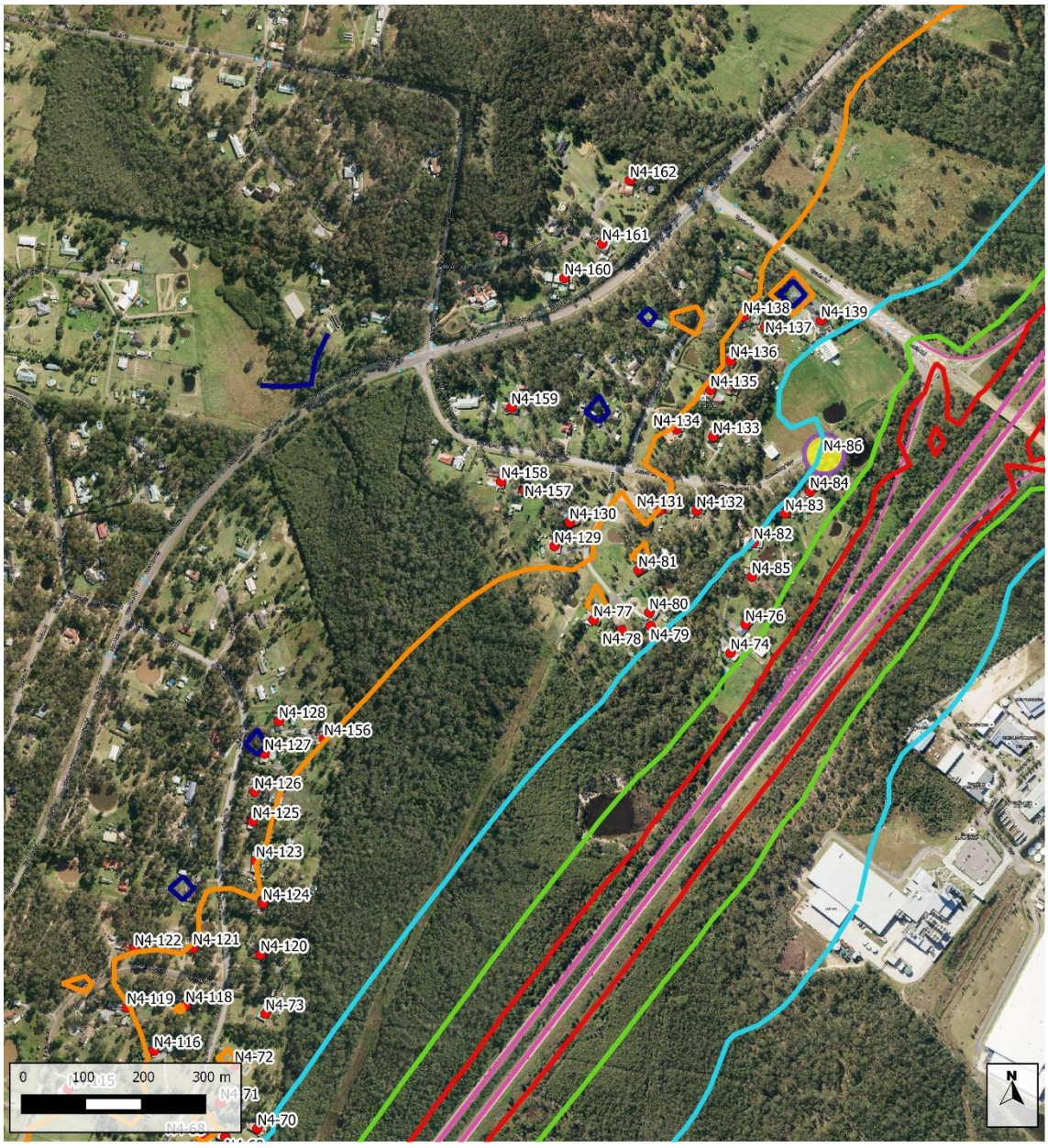
[1] Road pavement for receivers starting with N1 and N2 was OGAC for the No Build and Project REF (Build) and SMA for the Project Design (Build).
Road pavement for receivers starting with N3, N4, N5 and N6 was PCP for the No Build and Project REF (Build) and SMA for the Project Design (Build).

[2] The change in "no build" levels between Project REF and Revised Design are due to model validation with additional noise measurement results and corrections to some building heights.

[3] At Project REF mitigation was considered for receivers above RNP. After consideration of feasible and reasonable mitigations, architectural treatment may be offered to residences with acute levels, or levels above RNP and increase by >2dBA. Residences previously treated under NAP will not be eligible for further mitigation. Acute thresholds are 65dBA for daytime and 60dBA for night time.

APPENDIX D

DAYTIME NOISE CONTOUR MAPS (Revised Design 2029)

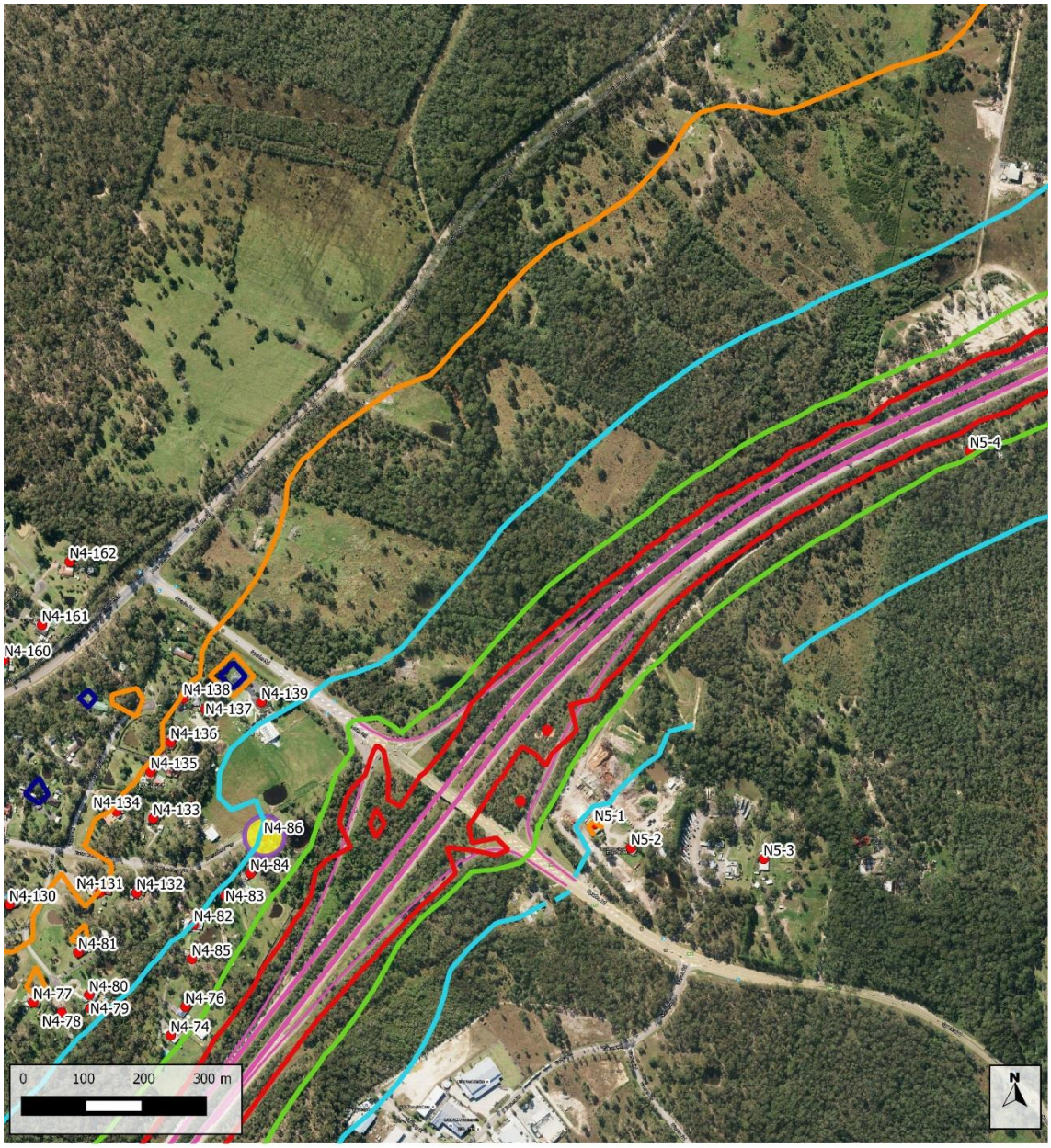


M1 Pacific Motorway
Predicted Daytime Levels, 2029

$L_{Aeq,15hr}$ dBA
50
55
60
65
70

Road - OGAC for Project REF, SMA for Revised Design
Road - PCP for Project REF, SMA for Revised Design

Receivers
Double Storey
Non Residential

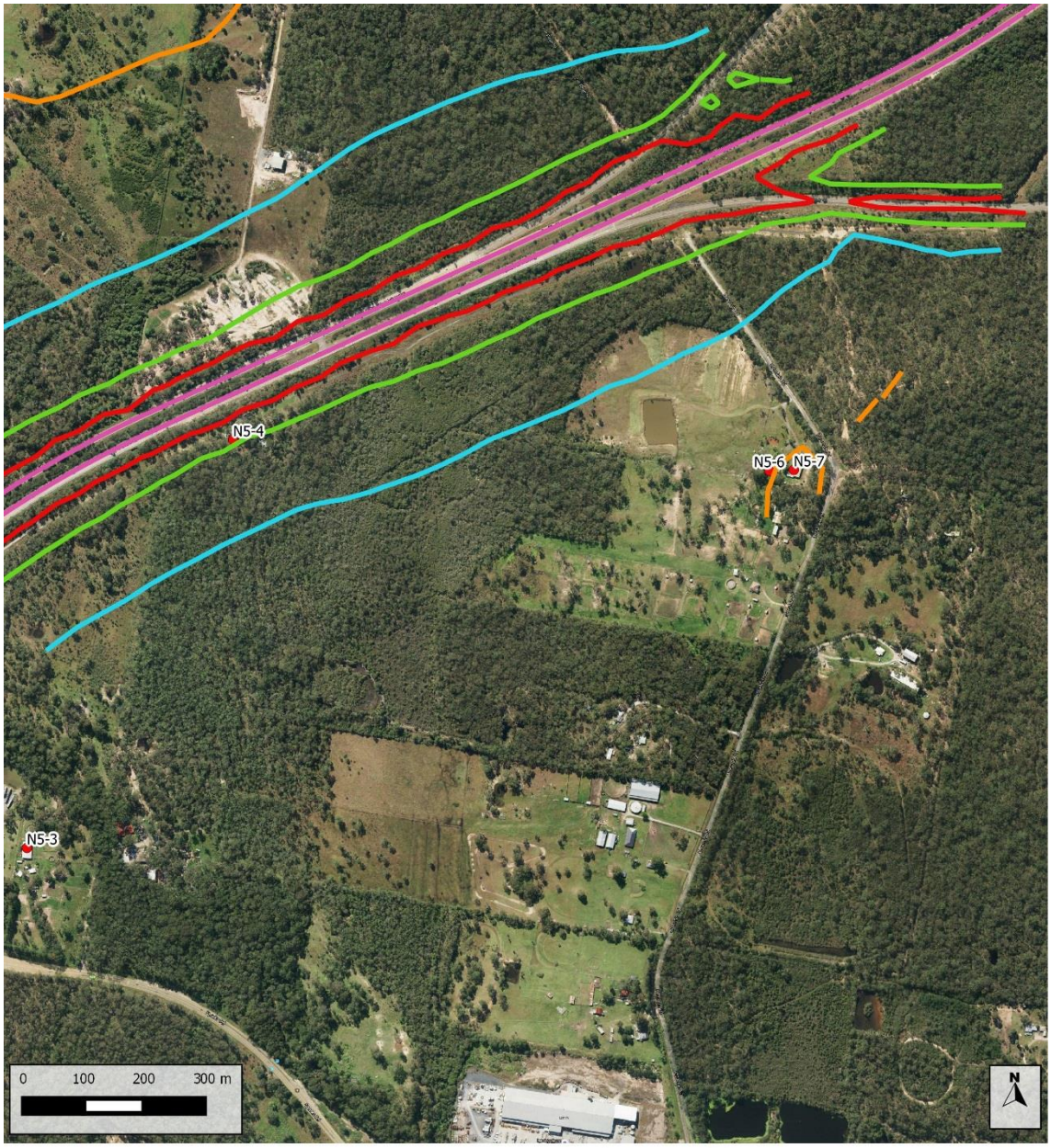


M1 Pacific Motorway
Predicted Daytime Levels, 2029

$L_{Aeq,15hr}$ dBA
- 50
- 55
- 60
- 65
- 70

Road - OGAC for Project REF, SMA for Revised Design
Road - PCP for Project REF, SMA for Revised Design

Receivers
- Double Storey
- Non Residential

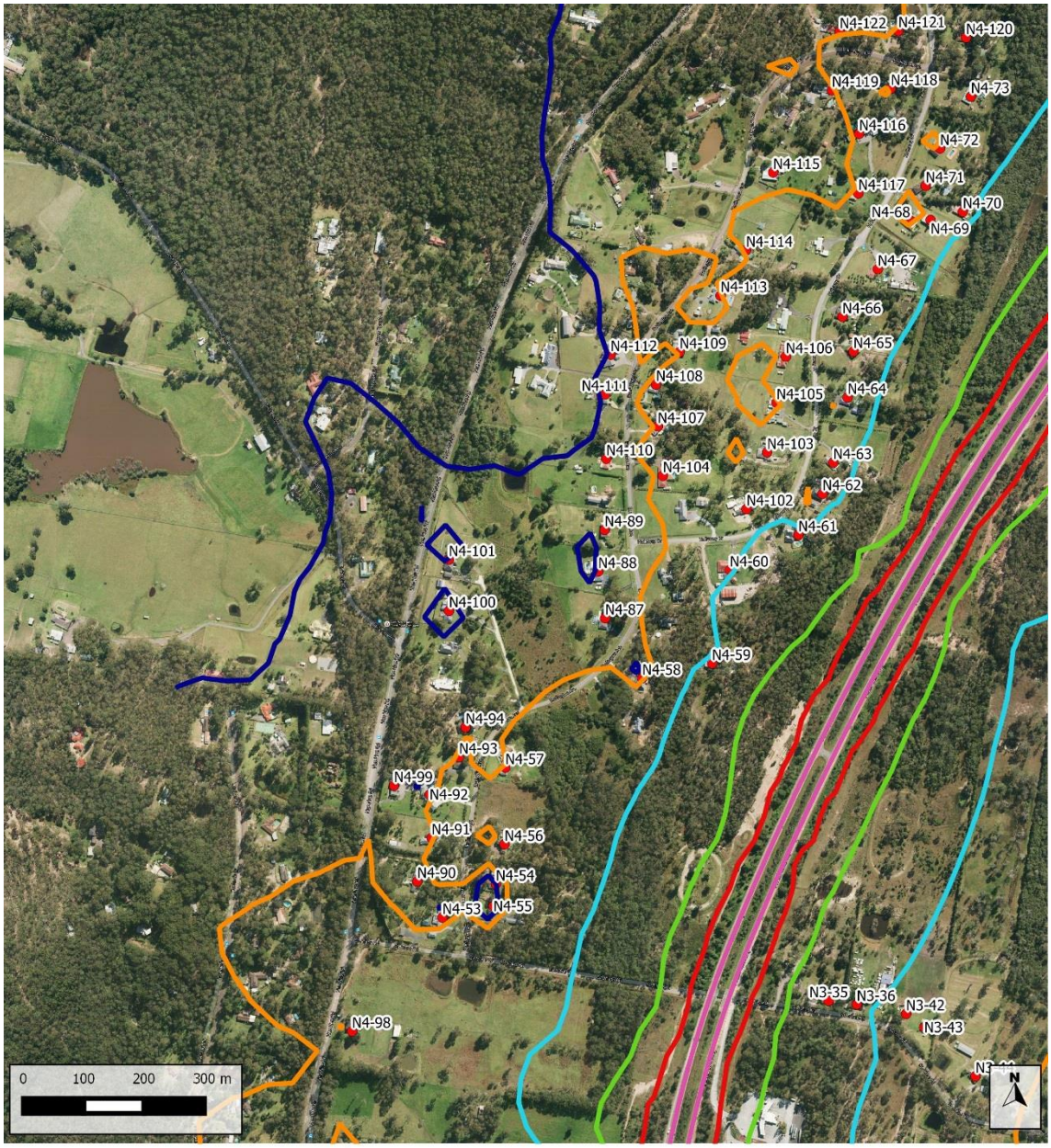


M1 Pacific Motorway
Predicted Daytime Levels, 2029

$L_{Aeq,15hr}$ dBA
50
55
60
65
70

Road - OGAC for Project REF, SMA for Revised Design
Road - PCP for Project REF, SMA for Revised Design

Receivers
Double Storey
Non Residential

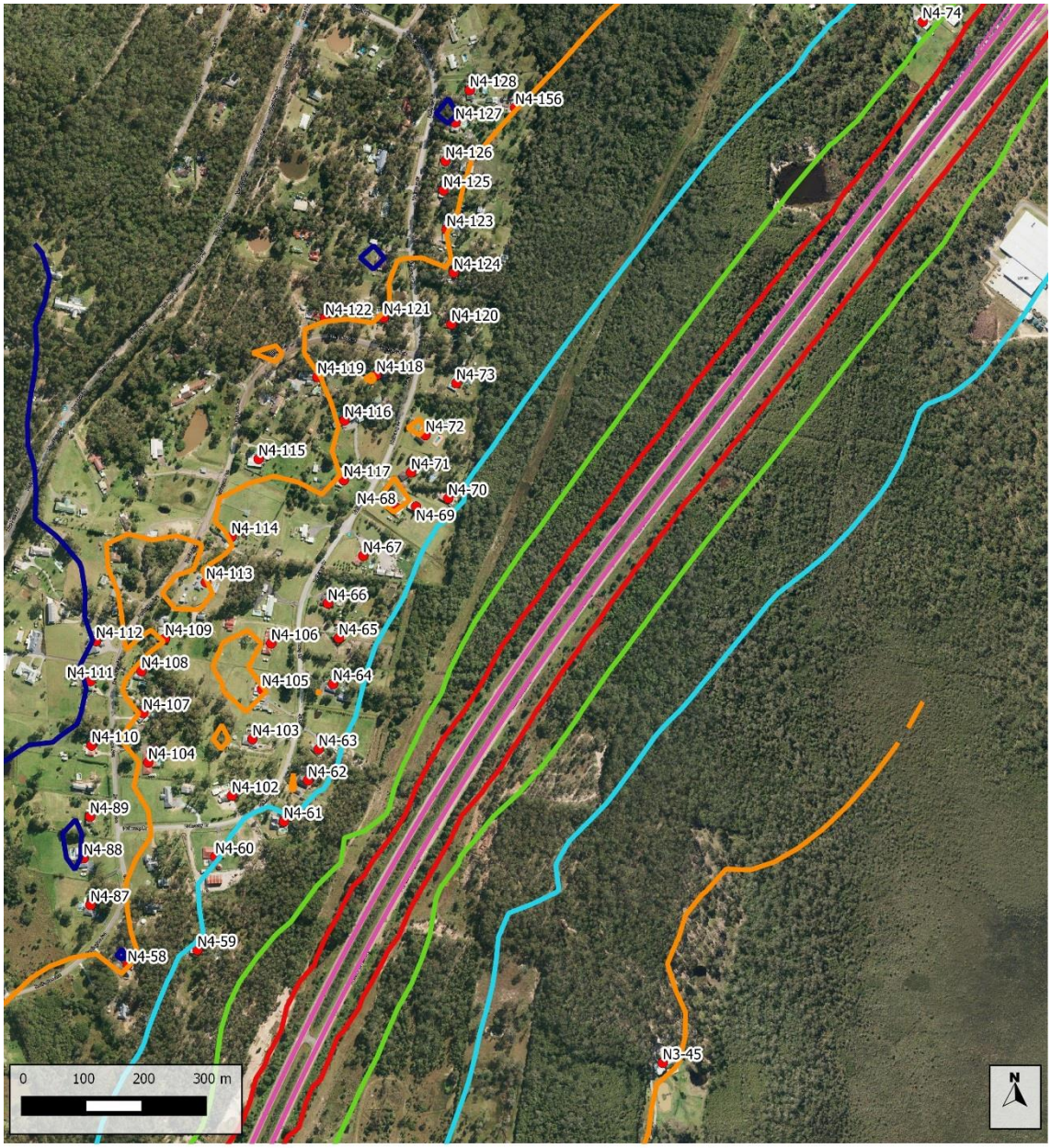


$L_{Aeq,15hr}$ dBA
50
55
60
65
70

M1 Pacific Motorway
Predicted Daytime Levels, 2029

Road - OGAC for Project REF, SMA for Revised Design
Road - PCP for Project REF, SMA for Revised Design

Receivers
Double Storey
Non Residential

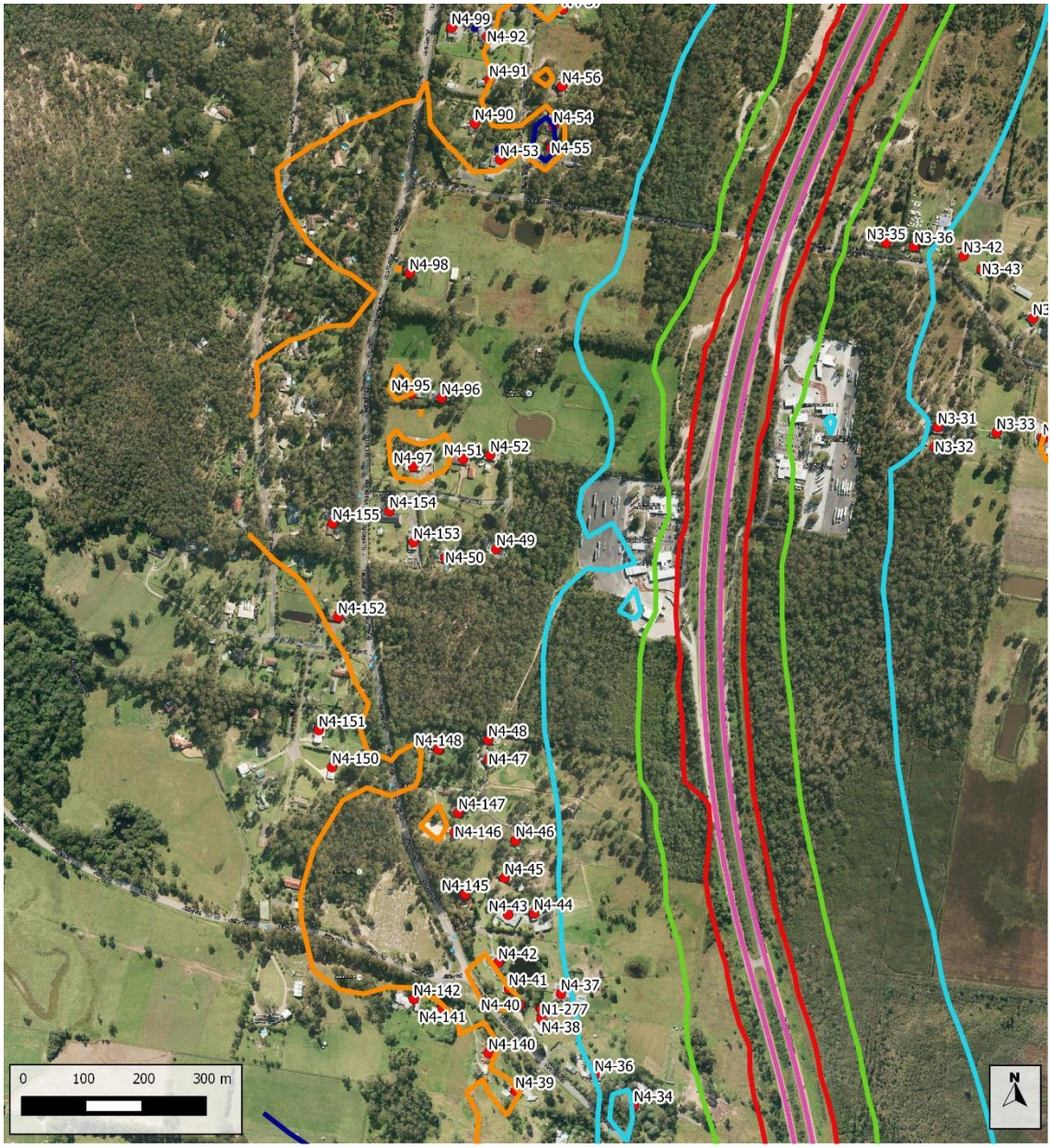


M1 Pacific Motorway
Predicted Daytime Levels, 2029

$L_{Aeq,15hr}$ dBA
- 50
- 55
- 60
- 65
- 70

Road - OGAC for Project REF, SMA for Revised Design
Road - PCP for Project REF, SMA for Revised Design

Receivers
- Double Storey
- Non Residential

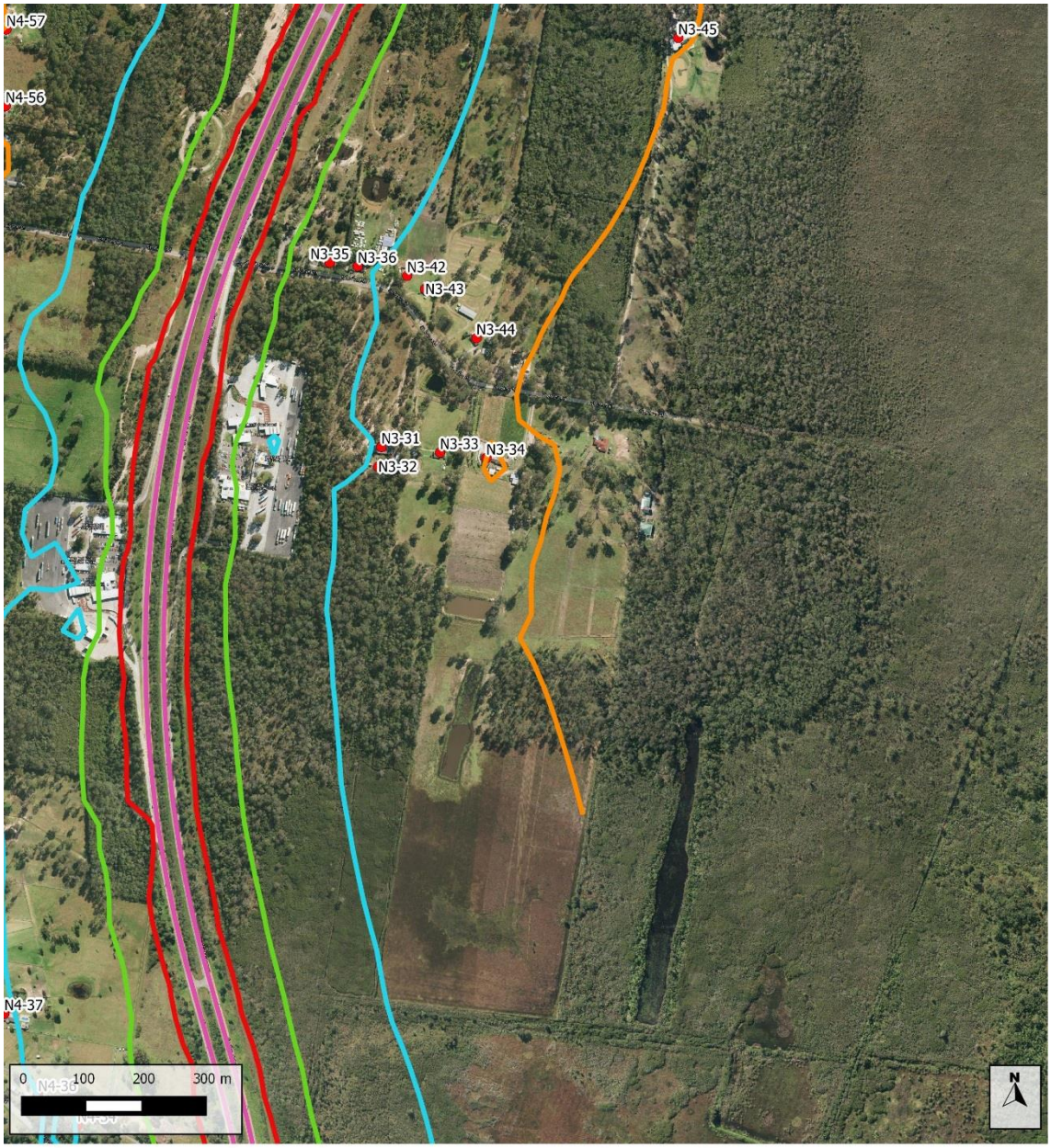


M1 Pacific Motorway
Predicted Daytime Levels, 2029

$L_{Aeq,15hr}$ dBA
- 50
- 55
- 60
- 65
- 70

Road - OGAC for Project REF, SMA for Revised Design
Road - PCP for Project REF, SMA for Revised Design

Receivers
- Double Storey
- Non Residential

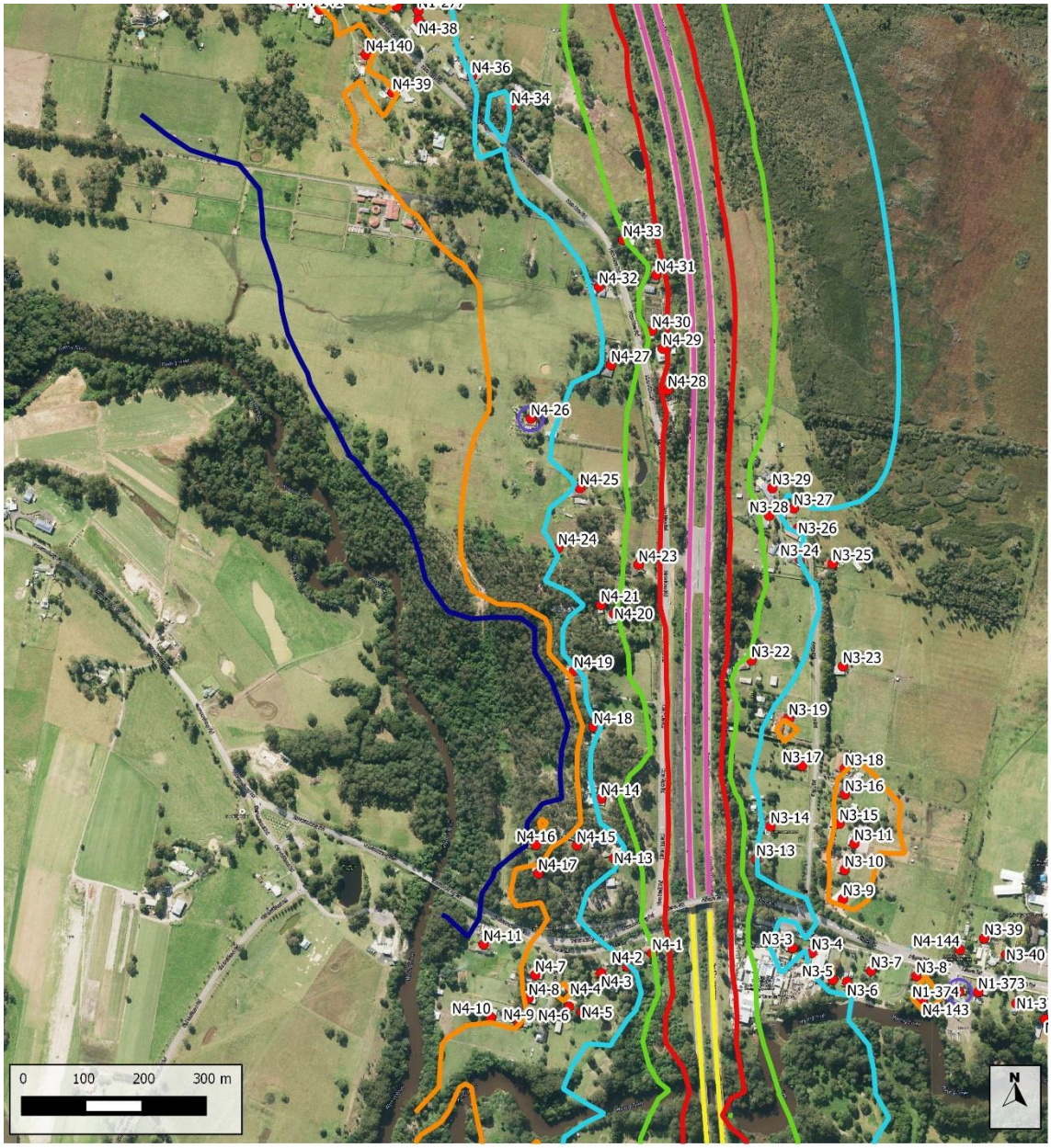


M1 Pacific Motorway
Predicted Daytime Levels, 2029

$L_{Aeq,15hr}$ dBA
- 50
- 55
- 60
- 65
- 70

Road - OGAC for Project REF, SMA for Revised Design
Road - PCP for Project REF, SMA for Revised Design

Receivers
- Double Storey
- Non Residential

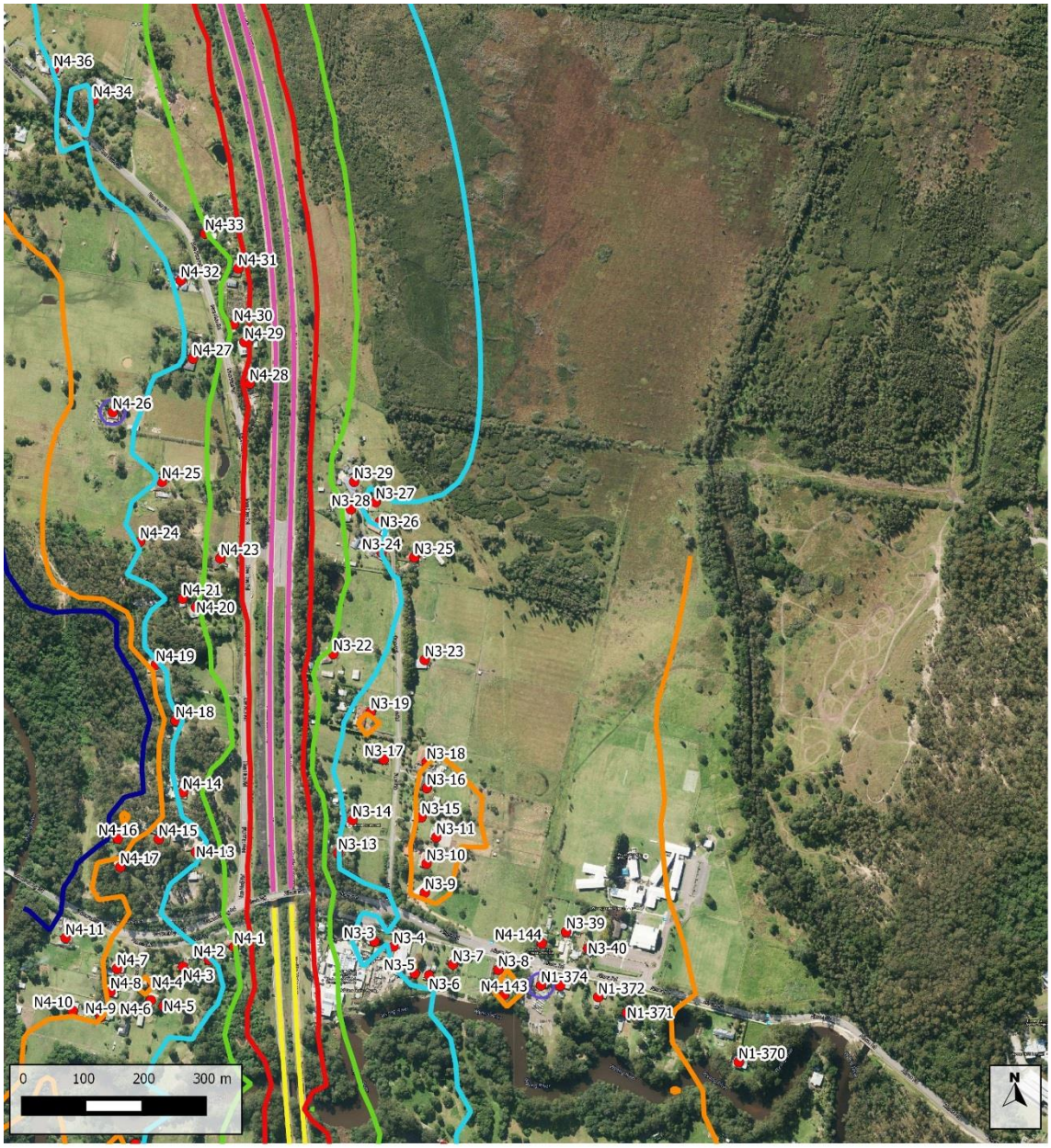


M1 Pacific Motorway
Predicted Daytime Levels, 2029

$L_{Aeq,15hr}$ dBA
- 50
- 55
- 60
- 65
- 70

Road - OGAC for Project REF, SMA for Revised Design
Road - PCP for Project REF, SMA for Revised Design

Receivers
- Double Storey
- Non Residential

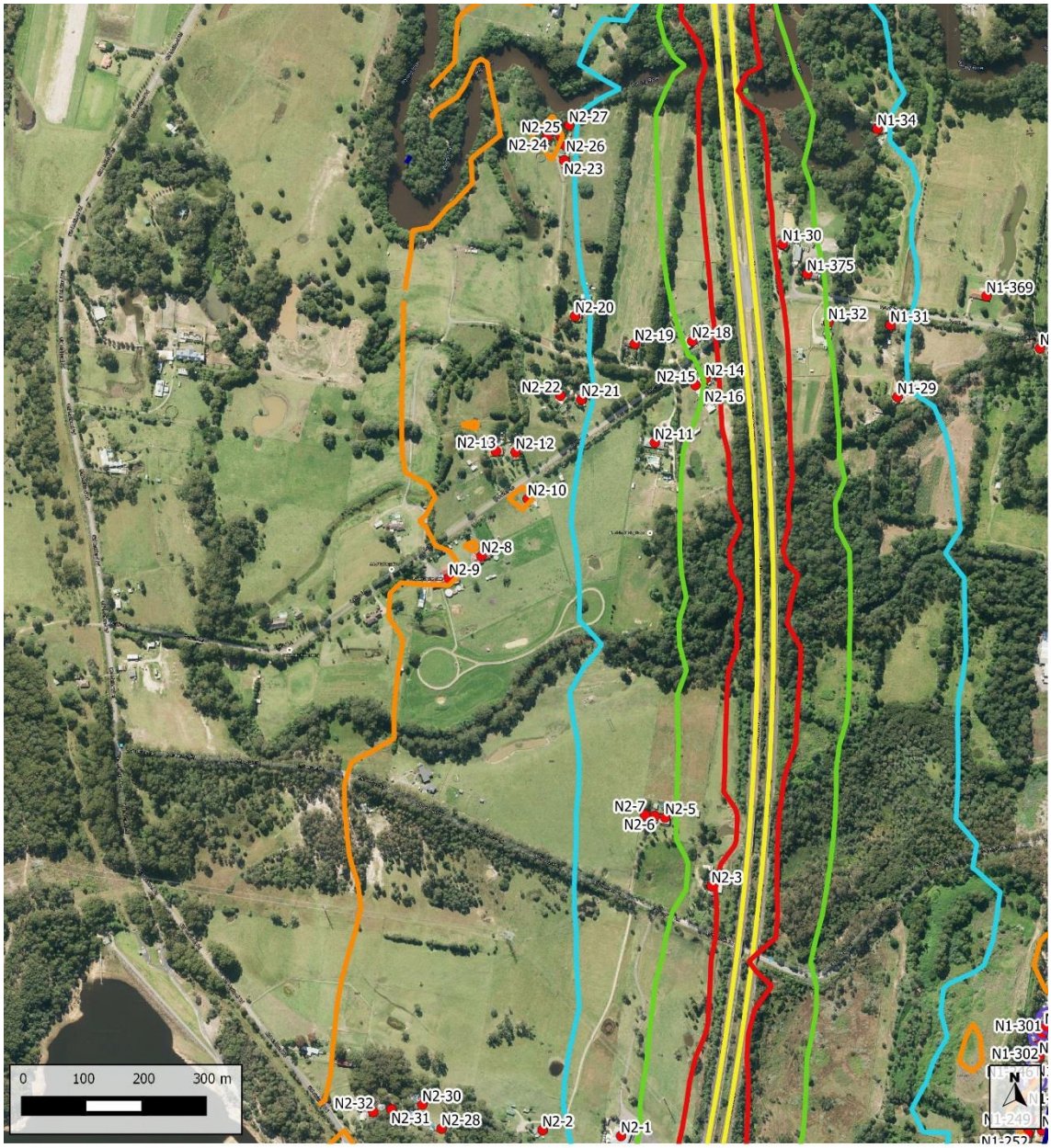


M1 Pacific Motorway
Predicted Daytime Levels, 2029

$L_{Aeq,15hr}$ dBA
- 50
- 55
- 60
- 65
- 70

Road - OGAC for Project REF, SMA for Revised Design
Road - PCP for Project REF, SMA for Revised Design

Receivers
- Double Storey
- Non Residential

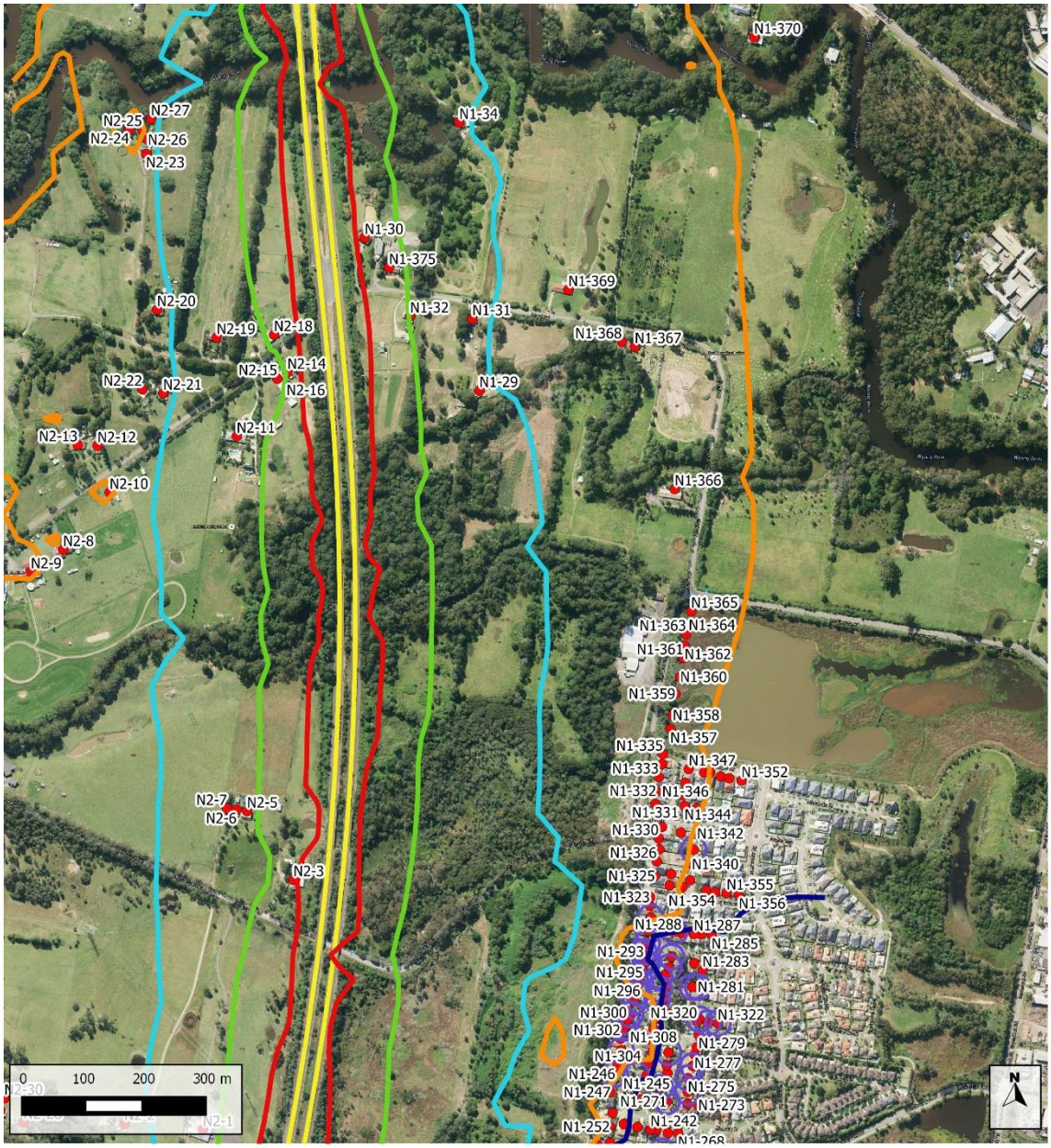


M1 Pacific Motorway
Predicted Daytime Levels, 2029

Road - OGAC for Project REF, SMA for Revised Design
Road - PCP for Project REF, SMA for Revised Design

$L_{Aeq,15hr}$ dBA
50
55
60
65
70

Receivers
Double Storey
Non Residential

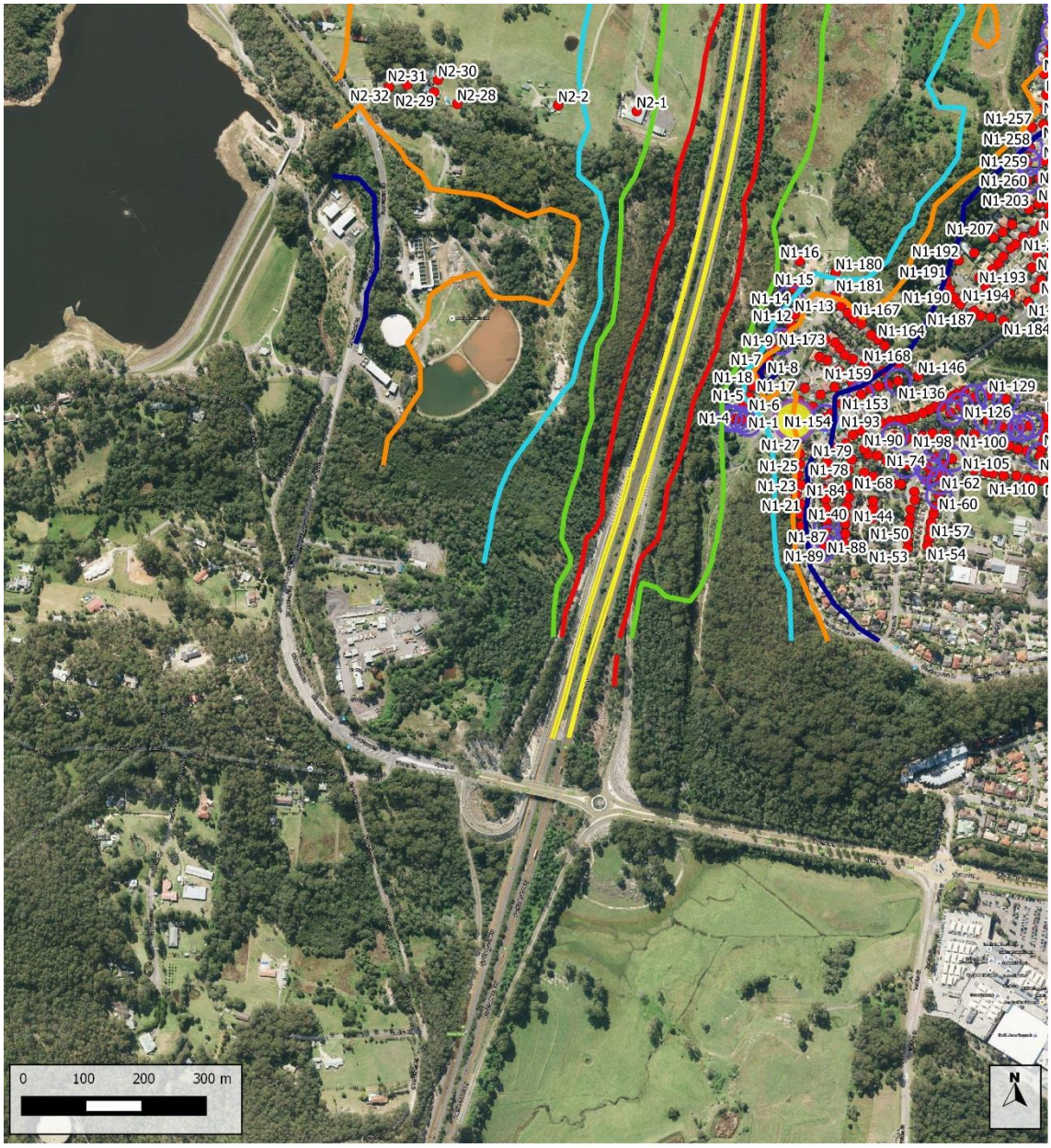


M1 Pacific Motorway
Predicted Daytime Levels, 2029

$L_{Aeq,15hr}$ dBA
- 50
- 55
- 60
- 65
- 70

Road - OGAC for Project REF, SMA for Revised Design
Road - PCP for Project REF, SMA for Revised Design

Receivers
- Double Storey
- Non Residential

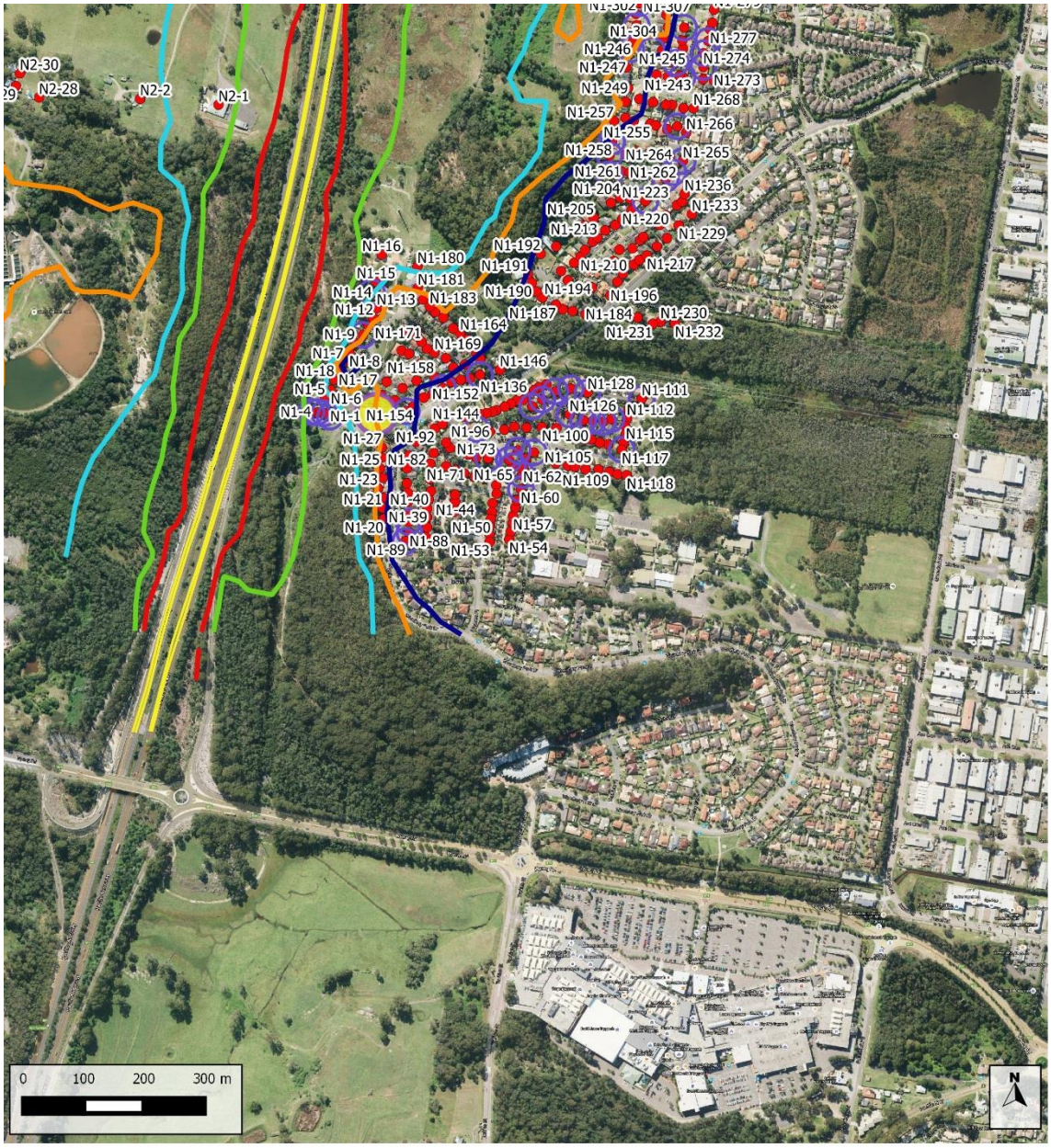


M1 Pacific Motorway
Predicted Daytime Levels, 2029

Road - OGAC for Project REF, SMA for Revised Design
Road - PCP for Project REF, SMA for Revised Design

$L_{Aeq,15hr}$ dBA
50
55
60
65
70

Receivers
Double Storey
Non Residential



$L_{Aeq,15hr}$ dBA
- 50
- 55
- 60
- 65
- 70

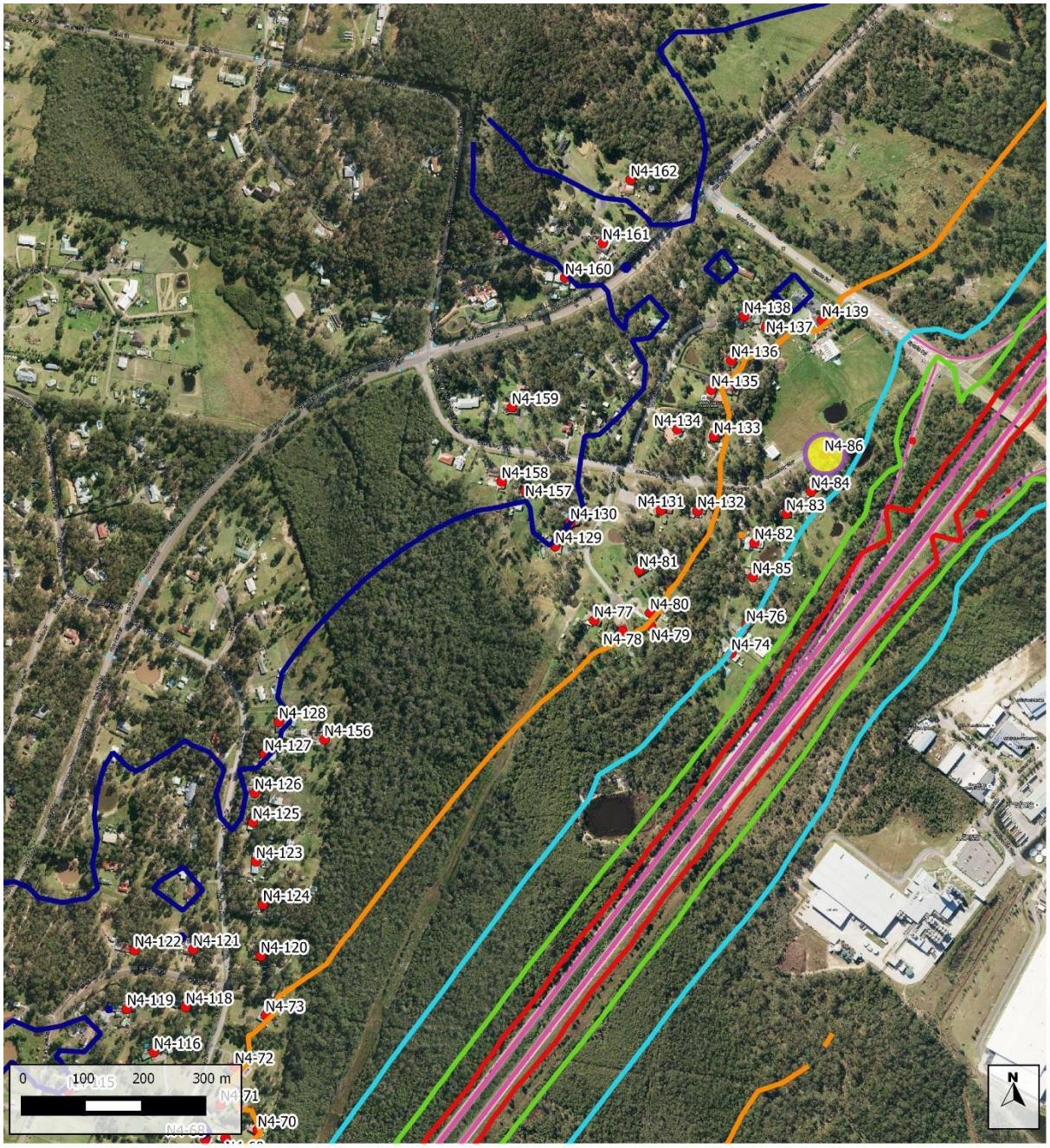
M1 Pacific Motorway
Predicted Daytime Levels, 2029

Road - OGAC for Project REF, SMA for Revised Design
Road - PCP for Project REF, SMA for Revised Design

Receivers
- Double Storey
- Non Residential

APPENDIX E

NIGHT TIME NOISE CONTOUR MAPS (Revised Design 2029)

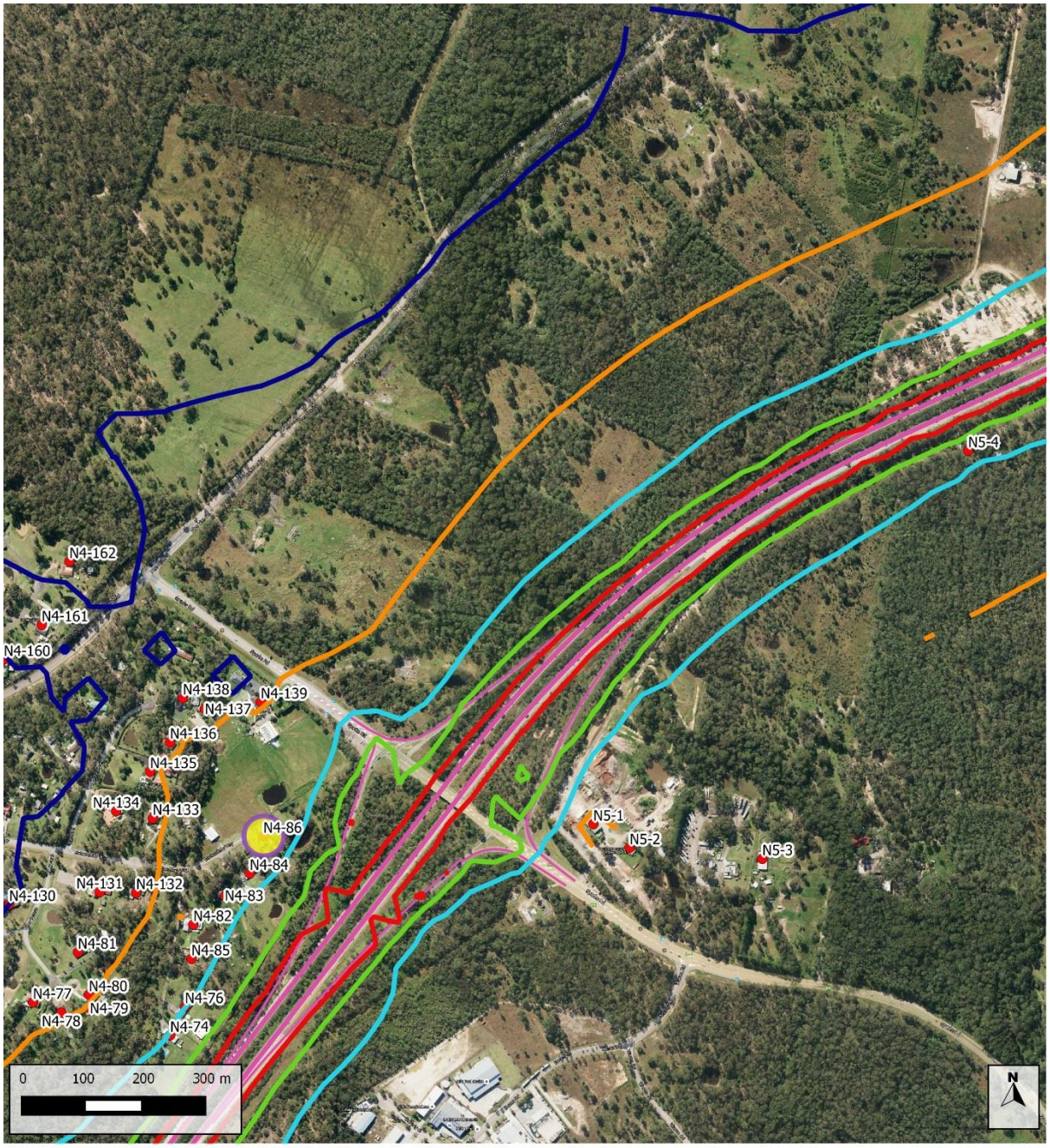


M1 Pacific Motorway
Predicted Night Time Levels, 2029

$L_{Aeq,9hr}$ dBA
- 50
- 55
- 60
- 65
- 70

Road - OGAC for Project REF, SMA for Revised Design
Road - PCP for Project REF, SMA for Revised Design

Receivers
- Double Storey
- Non Residential

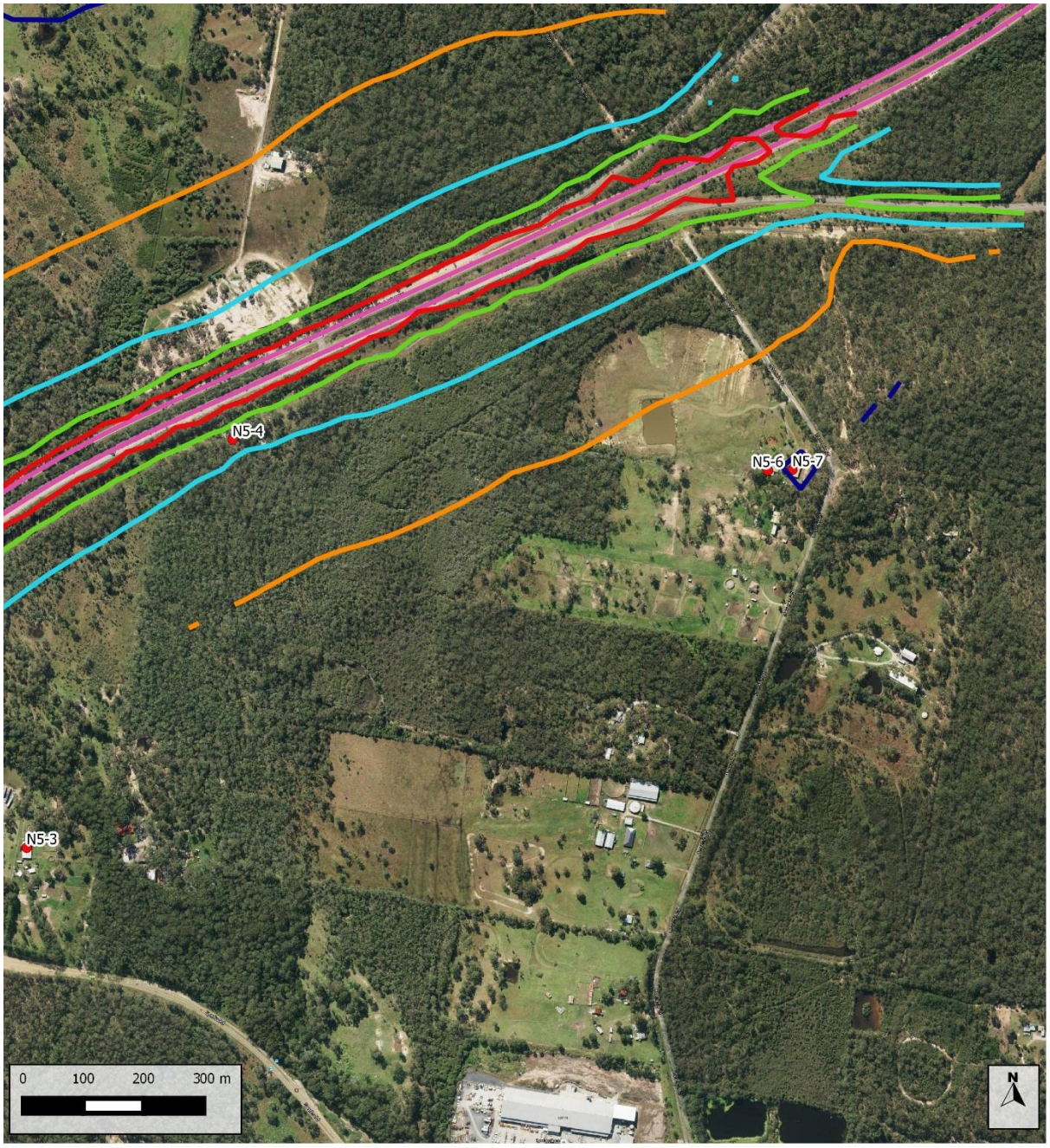


M1 Pacific Motorway
Predicted Night Time Levels, 2029

$L_{Aeq,9hr}$ dBA
- 50
- 55
- 60
- 65
- 70

Road - OGAC for Project REF, SMA for Revised Design
Road - PCP for Project REF, SMA for Revised Design

Receivers
- Double Storey
- Non Residential

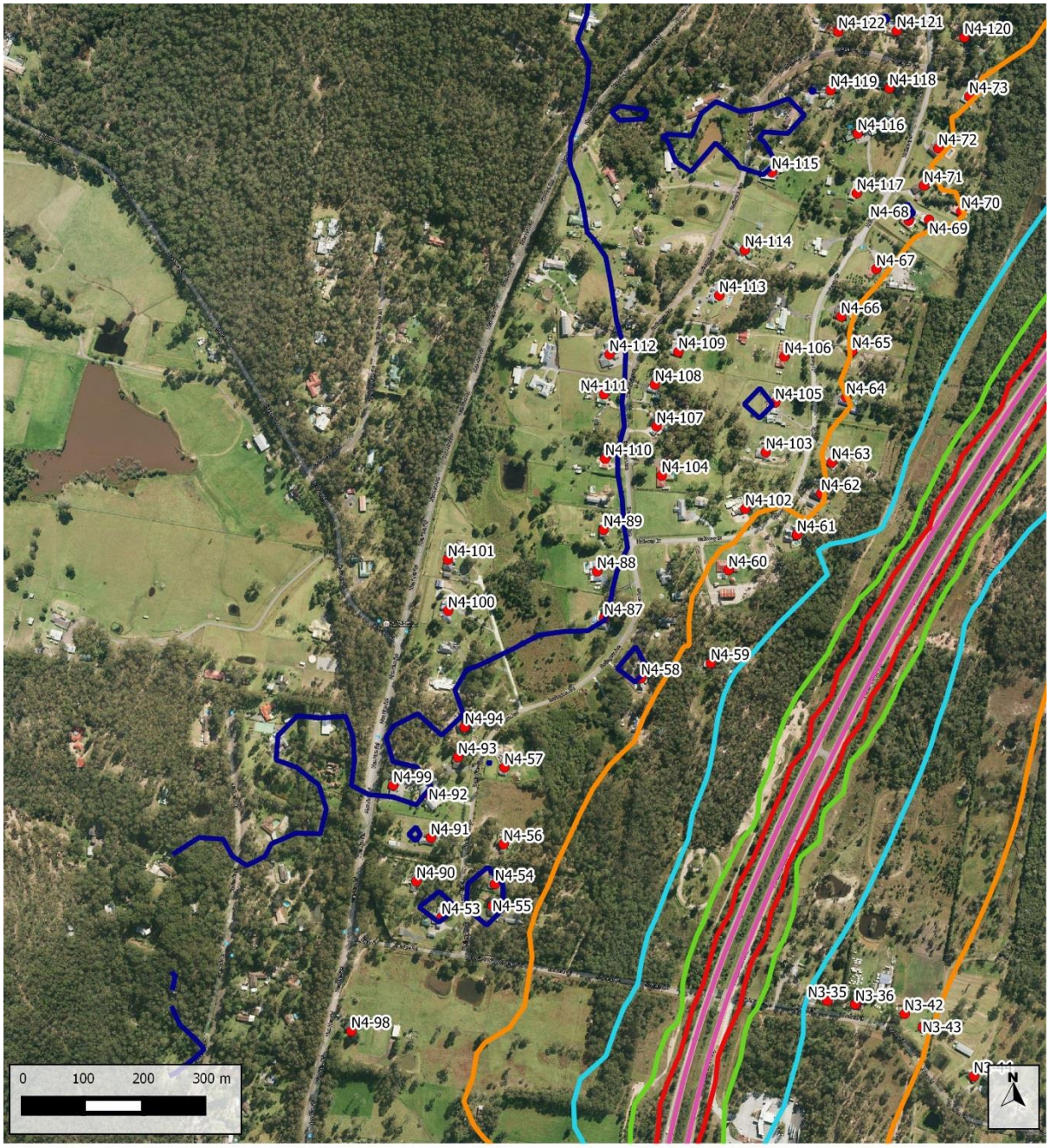


M1 Pacific Motorway
Predicted Night Time Levels, 2029

$L_{Aeq,9hr}$ dBA
- 50
- 55
- 60
- 65
- 70

Road - OGAC for Project REF, SMA for Revised Design
Road - PCP for Project REF, SMA for Revised Design

Receivers
- Double Storey
- Non Residential

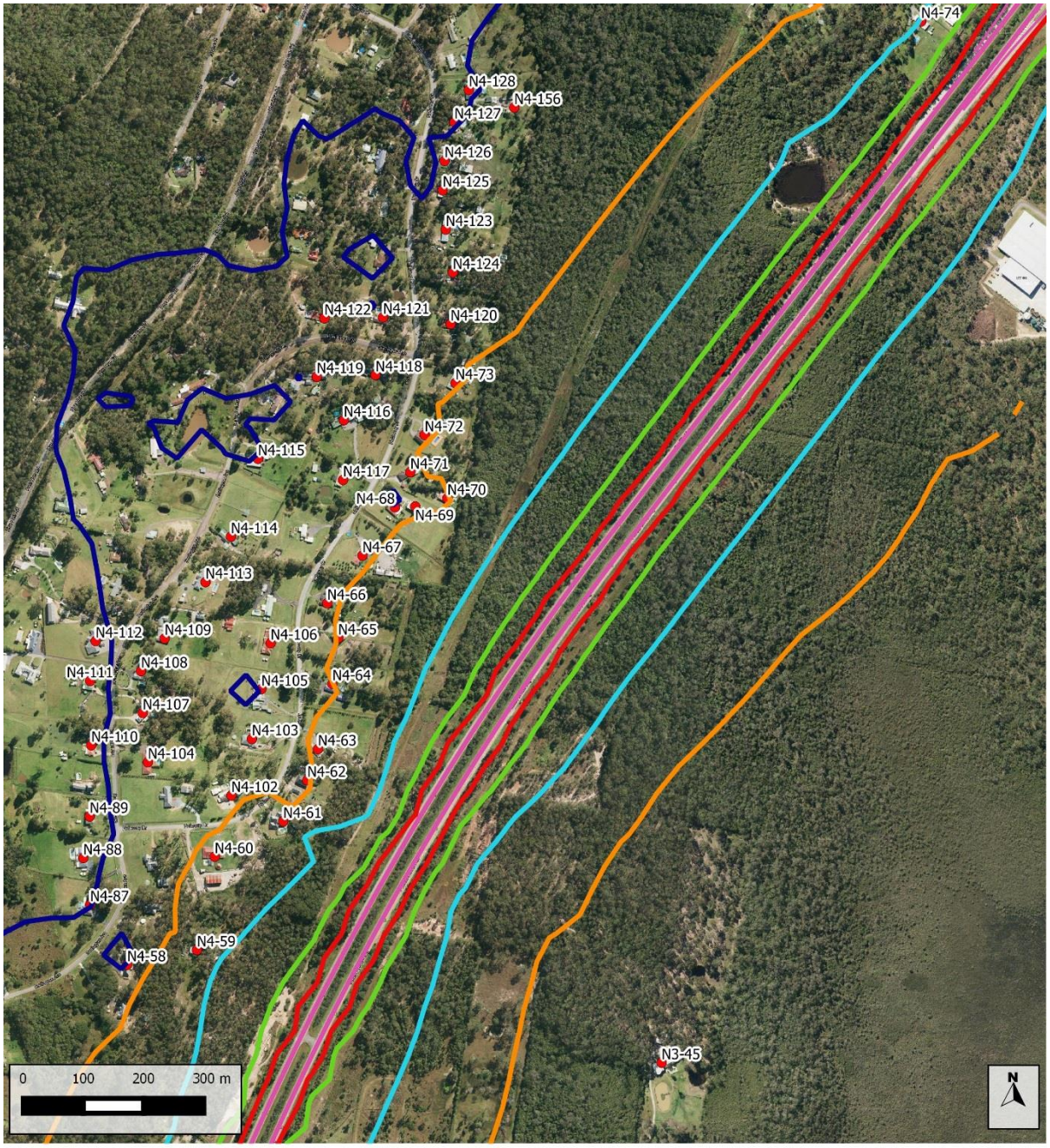


M1 Pacific Motorway
Predicted Night Time Levels, 2029

$L_{Aeq,9hr}$ dBA
- 50
- 55
- 60
- 65
- 70

Road - OGAC for Project REF, SMA for Revised Design
Road - PCP for Project REF, SMA for Revised Design

Receivers
- Double Storey
- Non Residential

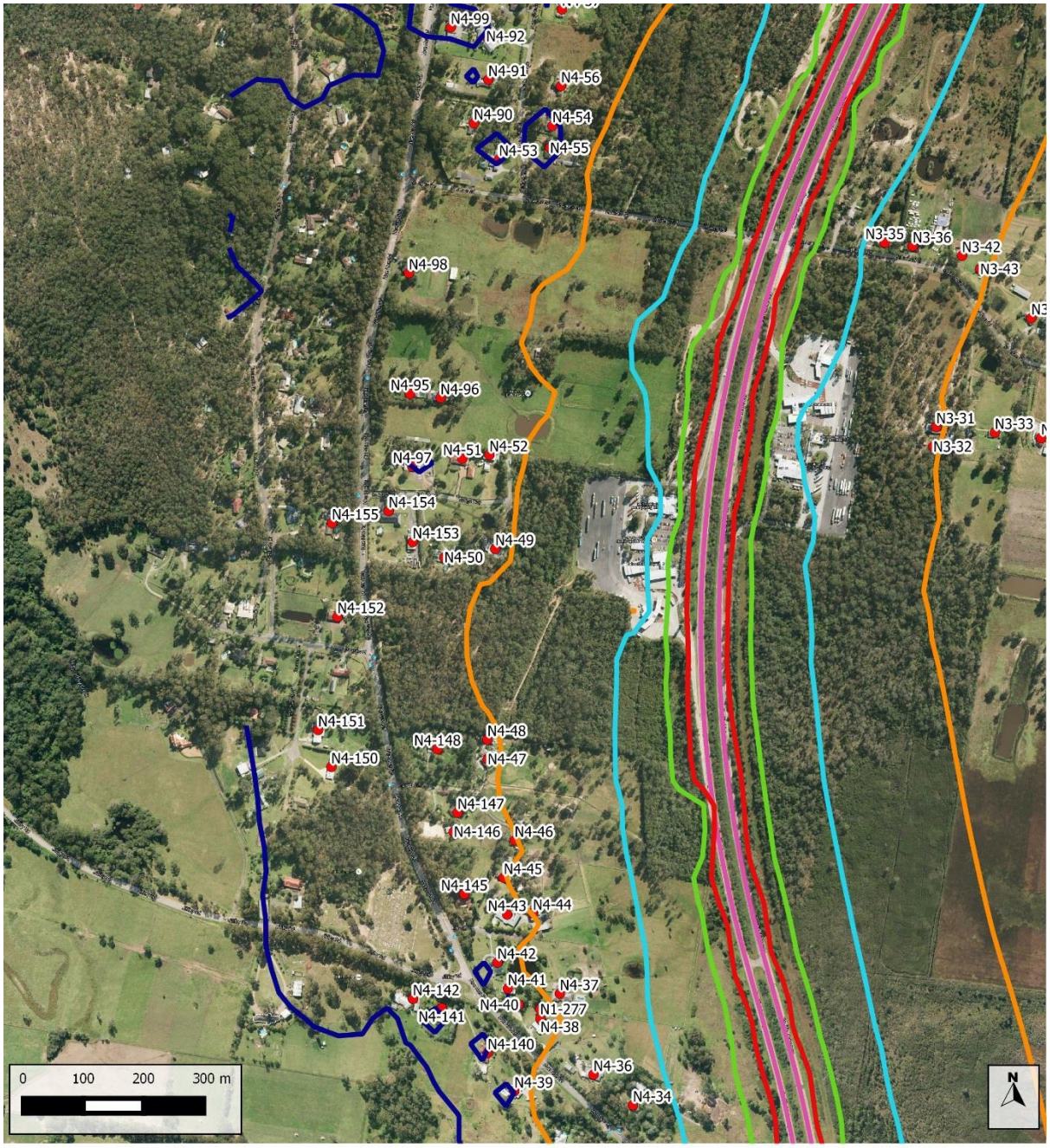


M1 Pacific Motorway
Predicted Night Time Levels, 2029

$L_{Aeq,9hr}$ dBA
- 50
- 55
- 60
- 65
- 70

Road - OGAC for Project REF, SMA for Revised Design
Road - PCP for Project REF, SMA for Revised Design

Receivers
- Double Storey
- Non Residential

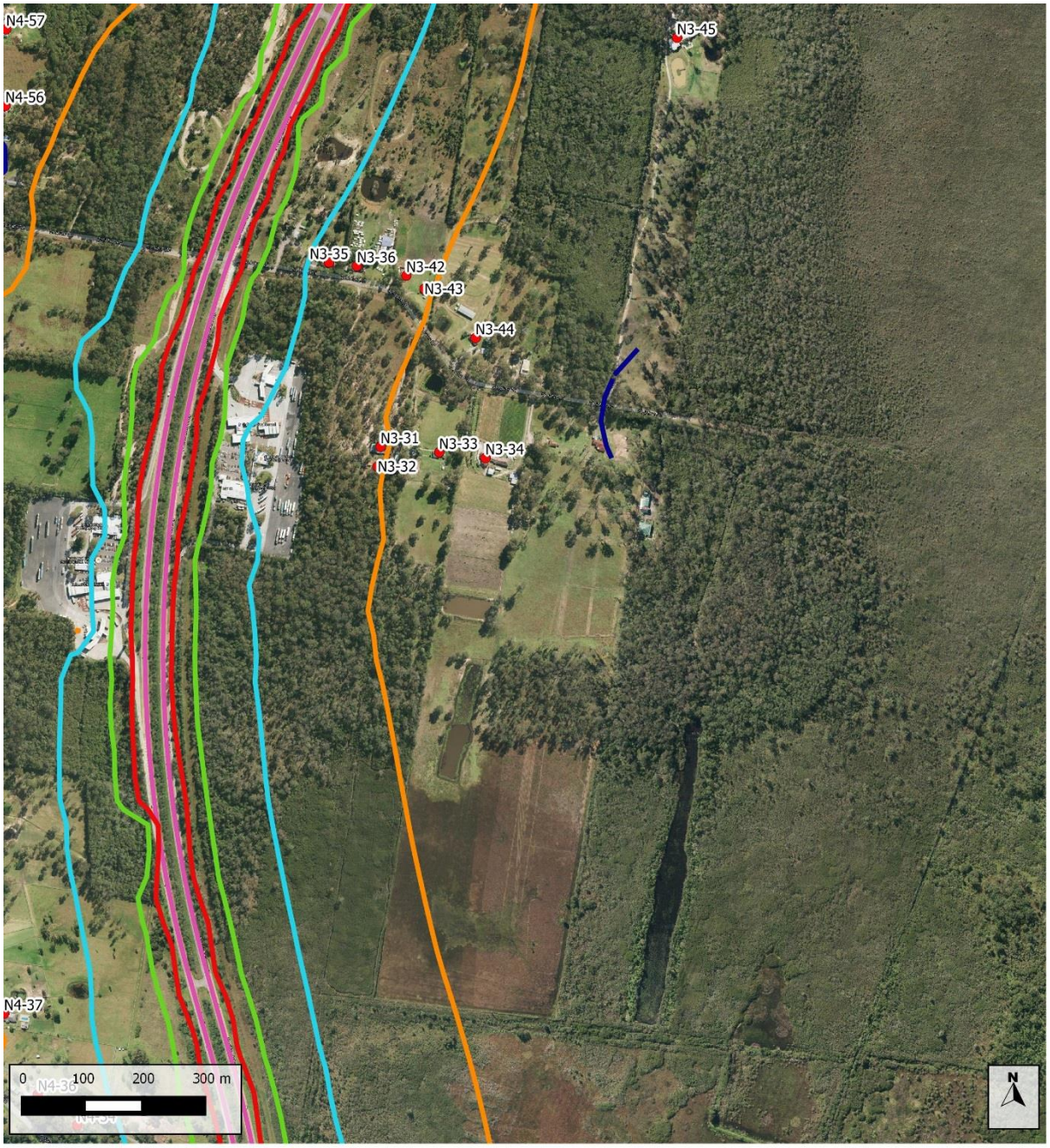


M1 Pacific Motorway
Predicted Night Time Levels, 2029

$L_{Aeq,9hr}$ dBA
- 50
- 55
- 60
- 65
- 70

Road - OGAC for Project REF, SMA for Revised Design
Road - PCP for Project REF, SMA for Revised Design

Receivers
- Double Storey
- Non Residential

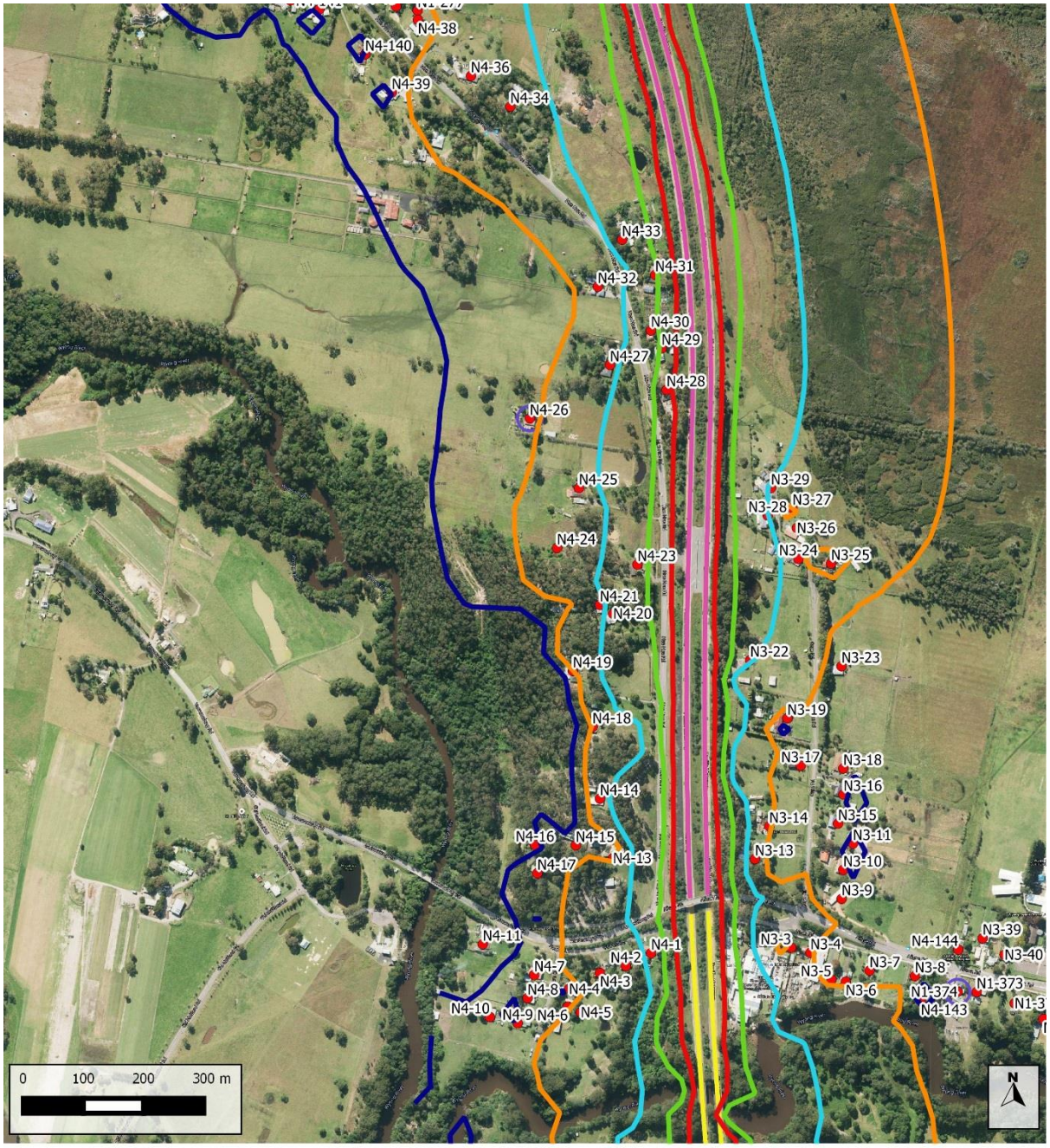


M1 Pacific Motorway
Predicted Night Time Levels, 2029

$L_{Aeq,9hr}$ dBA
- 50
- 55
- 60
- 65
- 70

Road - OGAC for Project REF, SMA for Revised Design
Road - PCP for Project REF, SMA for Revised Design

Receivers
- Double Storey
- Non Residential

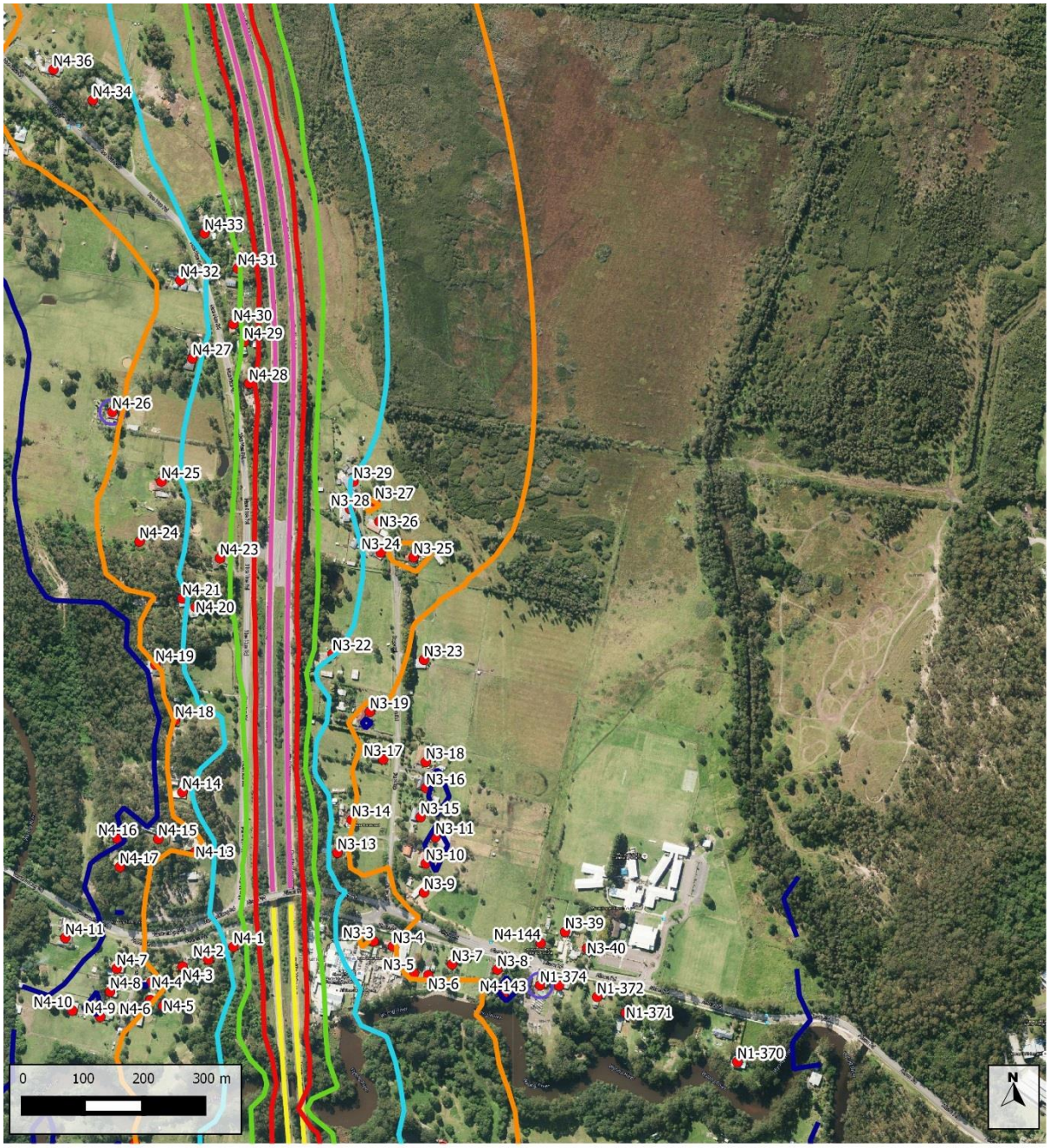


M1 Pacific Motorway
Predicted Night Time Levels, 2029

$L_{Aeq,9hr}$ dBA
- 50
- 55
- 60
- 65
- 70

Road - OGAC for Project REF, SMA for Revised Design
Road - PCP for Project REF, SMA for Revised Design

Receivers
- Double Storey
- Non Residential

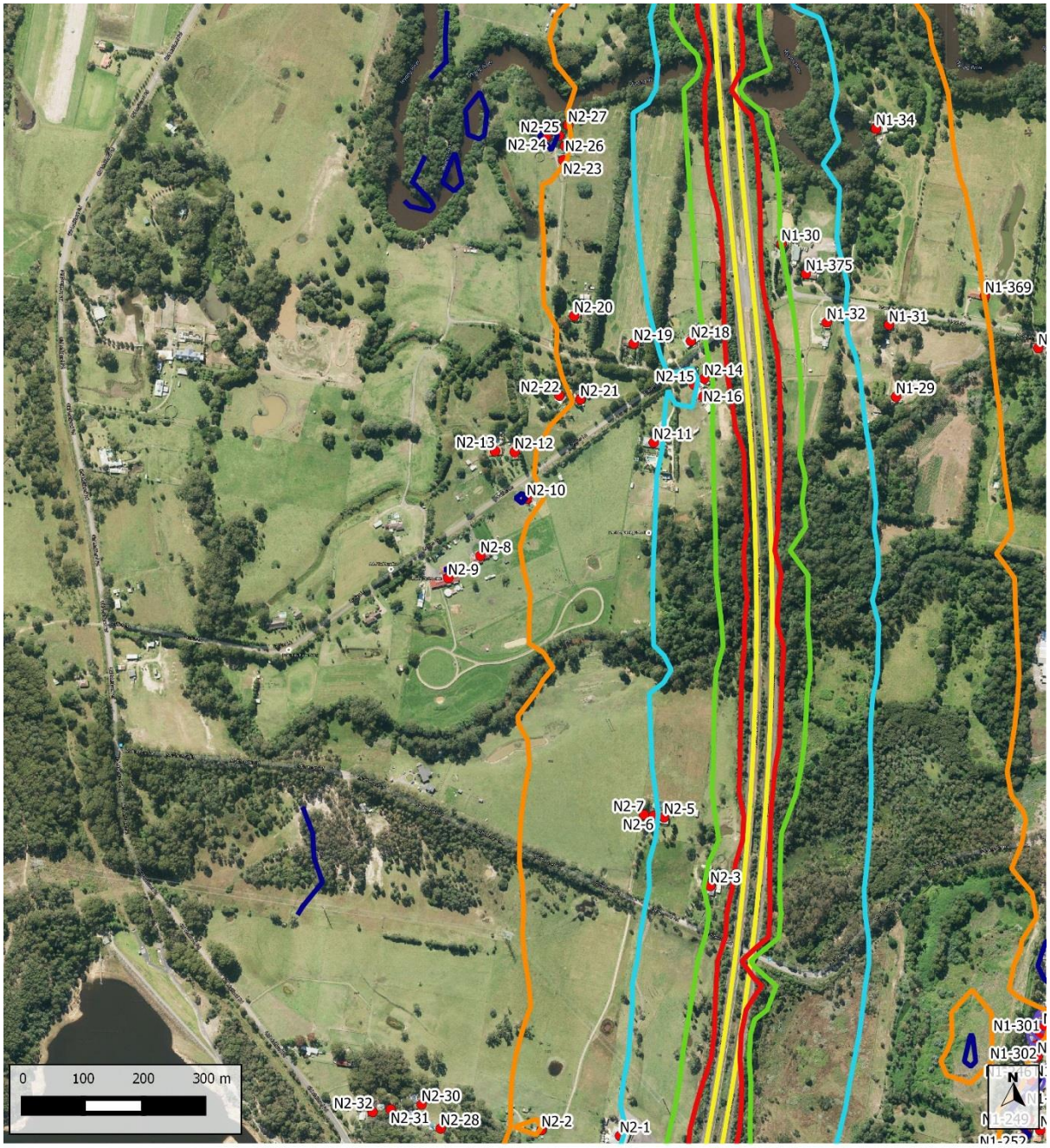


M1 Pacific Motorway
Predicted Night Time Levels, 2029

$L_{Aeq,9hr}$ dBA
- 50
- 55
- 60
- 65
- 70

Road - OGAC for Project REF, SMA for Revised Design
Road - PCP for Project REF, SMA for Revised Design

Receivers
- Double Storey
- Non Residential

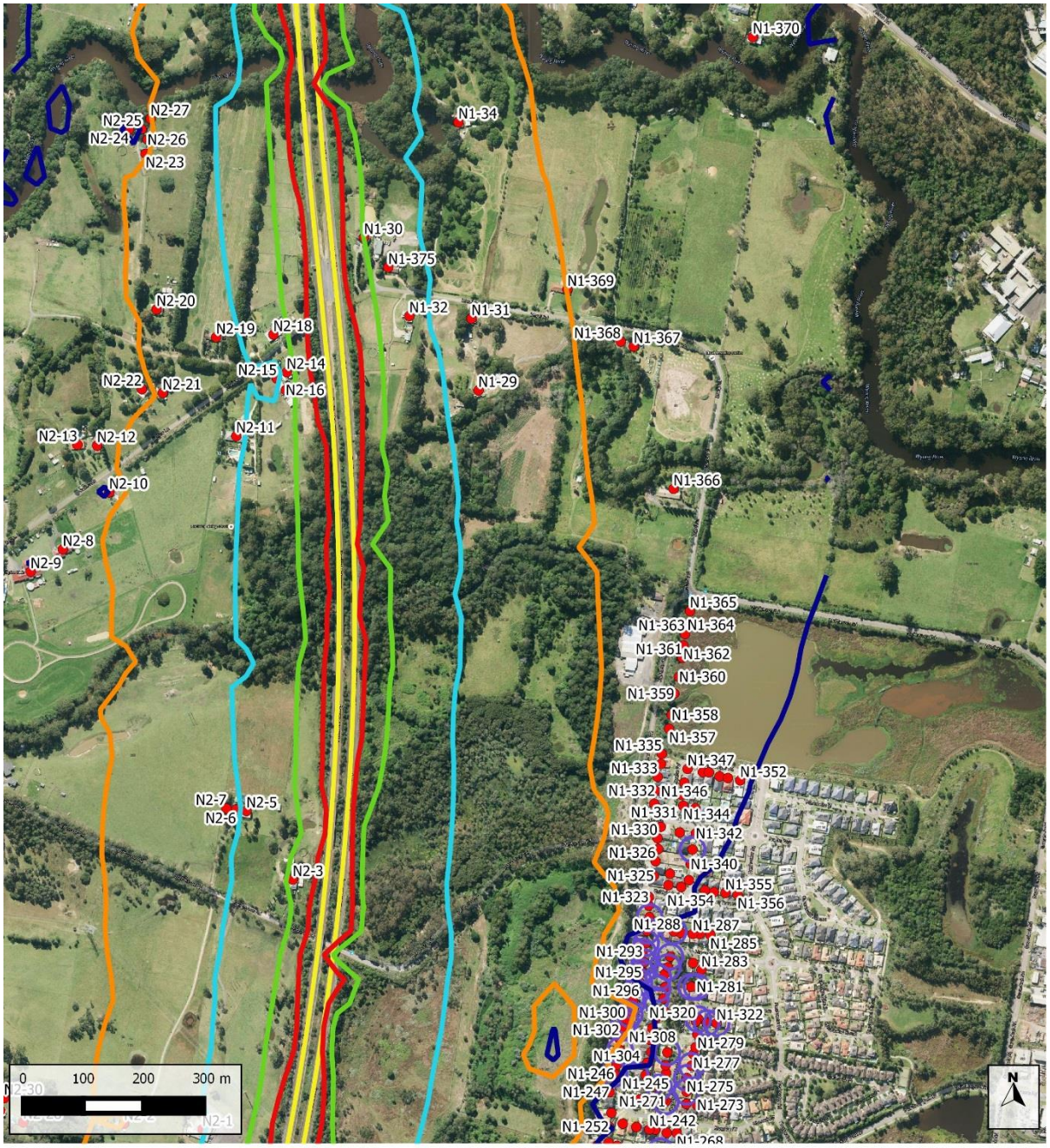


M1 Pacific Motorway
Predicted Night Time Levels, 2029

$L_{Aeq,9hr}$ dBA
- 50
- 55
- 60
- 65
- 70

Road - OGAC for Project REF, SMA for Revised Design
Road - PCP for Project REF, SMA for Revised Design

Receivers
- Double Storey
- Non Residential

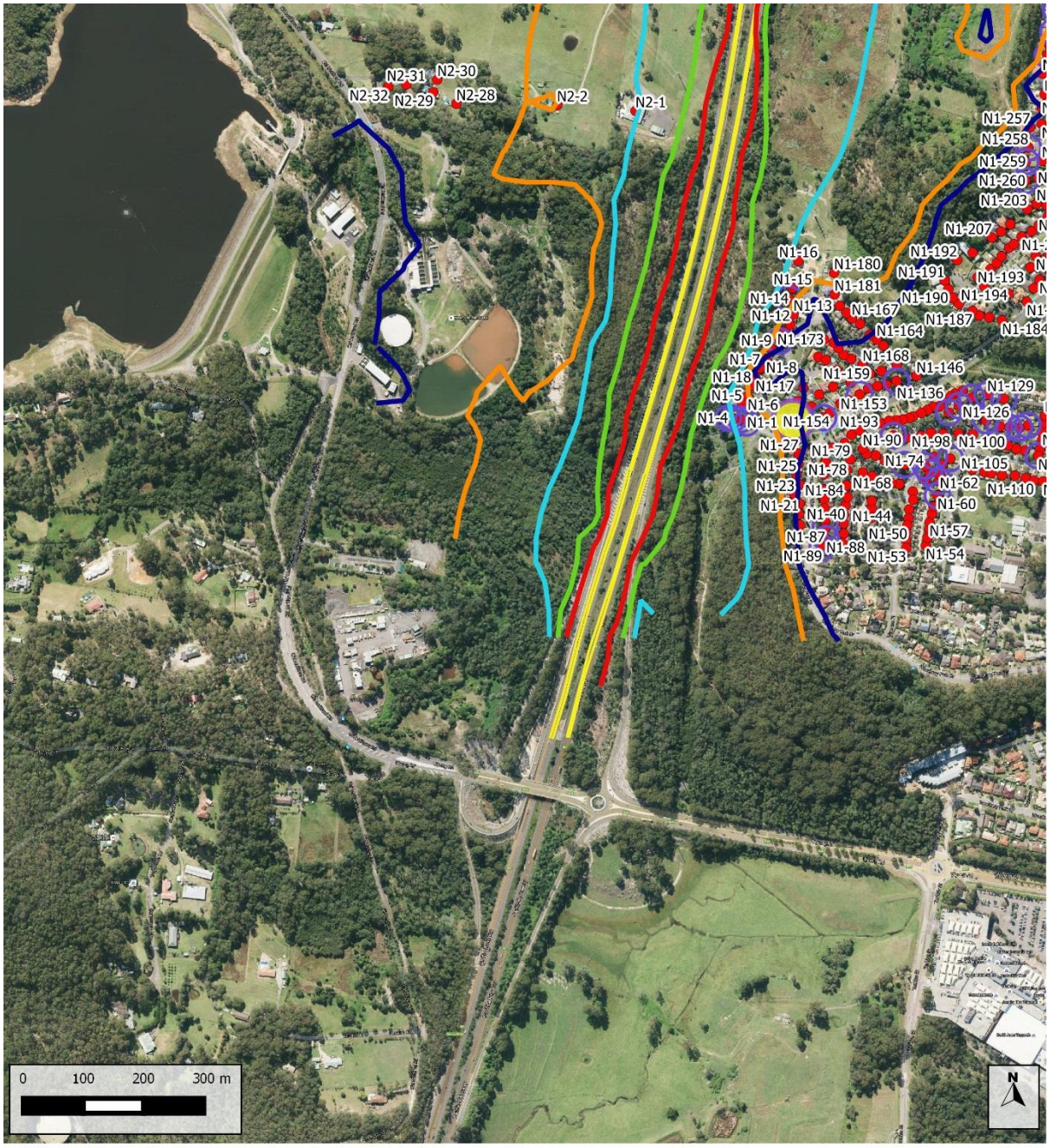


M1 Pacific Motorway
Predicted Night Time Levels, 2029

$L_{Aeq,9hr}$ dBA
- 50
- 55
- 60
- 65
- 70

Road - OGAC for Project REF, SMA for Revised Design
Road - PCP for Project REF, SMA for Revised Design

Receivers
- Double Storey
- Non Residential

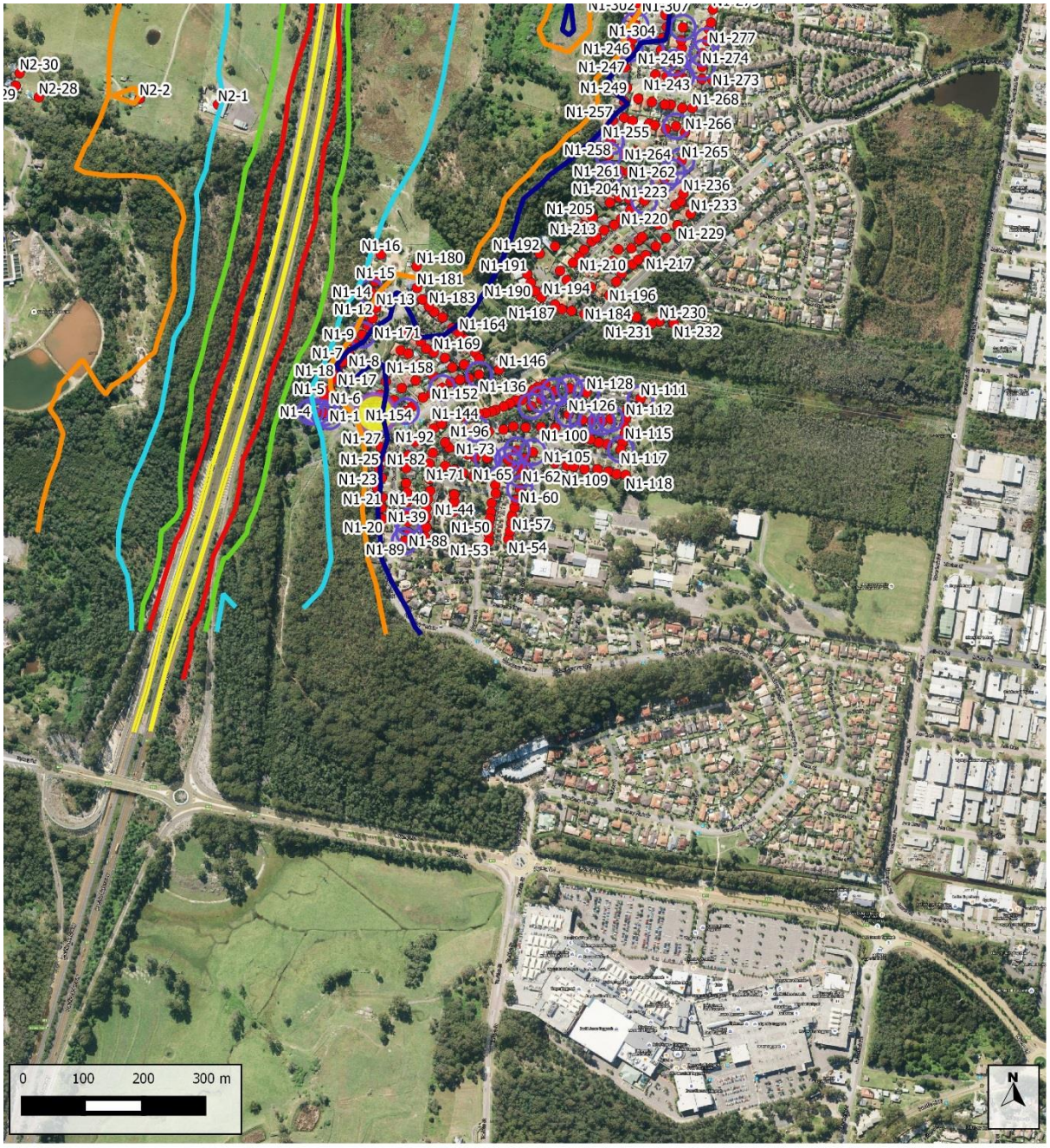


$L_{Aeq,9hr}$ dBA
- 50
- 55
- 60
- 65
- 70

M1 Pacific Motorway
Predicted Night Time Levels, 2029

Road - OGAC for Project REF, SMA for Revised Design
Road - PCP for Project REF, SMA for Revised Design

Receivers
- Double Storey
- Non Residential



M1 Pacific Motorway
Predicted Night Time Levels, 2029

$L_{Aeq,9hr}$ dBA
- 50
- 55
- 60
- 65
- 70

Road - OGAC for Project REF, SMA for Revised Design
Road - PCP for Project REF, SMA for Revised Design

Receivers
- Double Storey
- Non Residential

APPENDIX F

PREDICTED NOISE LEVELS AT RECEIVERS FOR OPENING YEAR, $L_{Aeq,period}$ dBA

Receiver No. [1]	Single Storey, Floor of Multi-Storey, or Non-Residential	*RNP* Criteria		2019 Project REF Noise Levels $L_{Aeq,period}$ dBA				2019 Revised Design Noise Levels $L_{Aeq,period}$ dBA					
				"No Build" [2]		"Build"		"No Build" [2]		"Build"		Increase	
		Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
N1-1	First Floor	60	55	59	54	59	54	60	57	62	59	2.0	2.0
N1-1	Ground Floor	60	55	59	54	59	54	59	56	61	58	2.0	1.8
N1-2	First Floor	60	55	59	54	59	54	61	57	63	59	2.0	2.0
N1-2	Ground Floor	60	55	59	54	59	54	60	56	62	58	1.9	1.8
N1-3	First Floor	60	55	60	55	60	56	61	58	63	60	2.0	1.9
N1-3	Ground Floor	60	55	60	55	60	56	60	57	62	59	2.0	1.8
N1-4	First Floor	60	55	62	57	62	58	64	61	66	62	1.9	1.8
N1-4	Ground Floor	60	55	62	57	62	58	62	59	64	61	2.0	1.8
N1-5	Single	60	55	60	56	61	56	59	56	61	58	1.7	1.5
N1-6	Single	60	55	60	55	60	56	60	57	62	58	1.7	1.5
N1-7	Single	60	55	59	54	59	55	59	56	60	57	1.4	1.2
N1-8	Single	60	55	58	54	59	54	58	55	60	56	1.6	1.5
N1-9	Single	60	55	56	51	57	52	56	53	58	54	1.6	1.5
N1-10	First Floor	60	55	53	48	53	48	57	53	58	54	0.8	0.7
N1-10	Ground Floor	60	55	53	48	53	48	53	50	54	51	1.4	1.2
N1-11	Single	60	55	54	49	54	49	54	51	55	52	1.6	1.4
N1-12	Single	60	55	53	48	53	48	53	50	54	51	1.4	1.3
N1-13	Single	60	55	53	48	53	49	53	50	55	52	1.7	1.6
N1-14	First Floor	60	55	58	53	57	52	63	59	63	60	0.6	0.5
N1-14	Ground Floor	60	55	58	53	57	52	58	54	59	55	1.2	1.1
N1-15	Single	60	55	60	55	59	54	60	57	61	57	0.4	0.4
N1-16	Single	60	55	63	58	61	56	63	59	63	59	0.0	0.0

[1] Road pavement for receivers starting with N1 and N2 was OGAC for the No Build and Project REF (Build) and SMA for the Project Design (Build).
Road pavement for receivers starting with N3, N4, N5 and N6 was PCP for the No Build and Project REF (Build) and SMA for the Project Design (Build).

[2] The change in "no build" levels between Project REF and Revised Design are due to model validation with additional noise measurement results and corrections to some building heights.

Receiver No. [1]	Single Storey, Floor of Multi-Storey, or Non-Residential	*RNP* Criteria		2019 Project REF Noise Levels $L_{Aeq,period}$ dBA				2019 Revised Design Noise Levels $L_{Aeq,period}$ dBA					
				"No Build" [2]		"Build"		"No Build" [2]		"Build"		Increase	
		Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
N1-17	Single	60	55	59	54	59	55	59	56	61	58	1.8	1.6
N1-18	Single	60	55	60	56	61	56	60	57	62	59	2.0	1.8
N1-19	Single	60	55	53	48	53	48	53	50	54	51	1.7	1.6
N1-20	Single	60	55	53	48	53	49	53	50	55	52	1.9	1.7
N1-21	Single	60	55	53	48	54	49	53	50	55	52	1.9	1.7
N1-22	Single	60	55	52	47	53	48	52	49	54	51	1.9	1.8
N1-23	Single	60	55	53	48	54	49	54	50	55	52	1.9	1.7
N1-24	Single	60	55	53	48	53	48	53	50	55	51	1.8	1.6
N1-25	Single	60	55	55	50	55	50	55	52	57	53	1.7	1.5
N1-26	Single	60	55	54	49	54	50	55	51	56	53	1.7	1.5
N1-27	Single	60	55	55	50	55	50	55	52	57	53	1.7	1.5
N1-28	Non-Res	60	55	55	50	55	50	55	52	57	54	1.8	1.7
N1-29	Single	60	55	63	58	60	56	61	58	61	58	0.4	0.4
N1-30	Single	60	55	70	66	67	63	69	66	69	65	-0.1	-0.2
N1-31	Single	60	55	62	57	60	56	61	58	61	58	0.1	0.2
N1-32	Single	60	55	66	61	63	59	63	60	65	61	1.1	1.0
N1-34	Single	60	55	63	58	62	57	62	59	61	58	-0.8	-0.7
N1-36	Single	60	55	45	40	45	40	45	42	47	43	1.6	1.4
N1-37	Single	60	55	45	40	45	40	45	42	47	43	1.6	1.4
N1-38	Single	60	55	45	40	45	40	45	42	47	43	1.5	1.4
N1-39	Single	60	55	45	40	45	40	45	42	47	43	1.5	1.4
N1-40	Single	60	55	45	40	45	40	45	42	47	43	1.5	1.4
N1-41	Single	60	55	45	40	45	40	45	42	47	43	1.6	1.4
N1-42	Single	60	55	44	39	44	39	44	41	46	42	1.5	1.4
N1-43	Single	60	55	44	39	44	39	44	41	46	42	1.5	1.4

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Receiver No. [1]	Single Storey, Floor of Multi-Storey, or Non-Residential	*RNP* Criteria		2019 Project REF Noise Levels $L_{Aeq,period}$ dBA				2019 Revised Design Noise Levels $L_{Aeq,period}$ dBA					
				"No Build" [2]		"Build"		"No Build" [2]		"Build"		Increase	
		Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
N1-44	Single	60	55	44	39	44	39	44	41	46	42	1.5	1.4
N1-45	Single	60	55	44	39	44	39	44	41	46	42	1.5	1.4
N1-46	Single	60	55	43	38	43	38	43	40	45	41	1.5	1.4
N1-47	Single	60	55	43	38	43	38	43	40	44	41	1.5	1.4
N1-48	Single	60	55	43	38	43	38	43	40	45	41	1.4	1.3
N1-49	Single	60	55	43	38	43	38	43	40	45	41	1.4	1.2
N1-50	Single	60	55	43	38	43	38	43	40	45	41	1.7	1.6
N1-51	Single	60	55	43	38	43	38	43	40	45	41	1.4	1.2
N1-52	Single	60	55	43	38	43	38	43	40	45	41	1.4	1.3
N1-53	Single	60	55	43	38	43	38	43	40	45	41	1.4	1.3
N1-54	Single	60	55	43	38	43	38	43	40	44	41	1.4	1.3
N1-55	Single	60	55	43	38	42	38	43	40	44	41	1.4	1.3
N1-56	Single	60	55	43	38	42	38	43	39	44	41	1.5	1.4
N1-57	Single	60	55	43	38	42	38	43	39	44	41	1.3	1.3
N1-58	Single	60	55	43	38	42	38	43	39	44	41	1.3	1.3
N1-59	Single	60	55	43	38	42	38	43	39	44	41	1.5	1.3
N1-60	First Floor	60	55	43	38	42	38	43	40	45	41	1.5	1.3
N1-60	Ground Floor	60	55	43	38	42	38	43	40	44	41	1.4	1.4
N1-61	First Floor	60	55	43	38	43	38	43	40	45	42	1.5	1.4
N1-61	Ground Floor	60	55	43	38	43	38	43	40	45	41	1.5	1.4
N1-62	Single	60	55	43	38	43	38	43	40	45	41	1.8	1.7
N1-63	Single	60	55	43	38	43	38	43	40	44	41	1.5	1.3
N1-64	Single	60	55	43	38	43	38	43	40	44	41	1.1	1.0
N1-65	First Floor	60	55	43	38	43	38	44	40	45	42	1.7	1.5
N1-65	Ground Floor	60	55	43	38	43	38	43	40	45	41	1.7	1.5

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Receiver No. [1]	Single Storey, Floor of Multi-Storey, or Non-Residential	*RNP* Criteria		2019 Project REF Noise Levels $L_{Aeq,period}$ dBA				2019 Revised Design Noise Levels $L_{Aeq,period}$ dBA					
				"No Build" [2]		"Build"		"No Build" [2]		"Build"		Increase	
		Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
N1-66	First Floor	60	55	43	38	43	38	44	41	45	42	1.4	1.4
N1-66	Ground Floor	60	55	43	38	43	38	43	40	45	41	1.5	1.4
N1-67	Single	60	55	43	38	43	38	44	40	45	41	1.3	1.2
N1-68	Single	60	55	44	39	43	39	44	40	45	42	1.2	1.2
N1-69	Single	60	55	44	39	44	39	44	41	45	42	1.4	1.2
N1-70	Single	60	55	44	39	44	39	44	41	46	43	1.9	1.8
N1-71	Single	60	55	45	40	45	40	45	41	46	43	1.5	1.5
N1-72	First Floor	60	55	44	39	43	39	45	41	46	42	1.3	1.3
N1-72	Ground Floor	60	55	44	39	43	39	44	41	45	42	1.3	1.2
N1-73	Single	60	55	44	39	44	39	44	41	46	42	1.4	1.3
N1-74	Single	60	55	44	39	44	39	44	41	46	43	1.5	1.4
N1-75	Single	60	55	45	40	45	40	45	42	46	43	1.5	1.4
N1-76	Single	60	55	45	40	45	40	45	42	47	43	1.5	1.4
N1-77	Single	60	55	45	40	45	40	45	42	47	43	1.5	1.4
N1-78	Single	60	55	45	40	45	40	45	42	47	43	1.6	1.5
N1-79	Single	60	55	46	41	46	41	46	42	47	44	1.6	1.5
N1-80	Single	60	55	47	42	47	42	47	44	49	45	1.8	1.7
N1-81	Single	60	55	46	41	46	41	46	43	48	44	1.7	1.7
N1-82	Single	60	55	45	40	45	41	46	42	47	44	1.7	1.5
N1-83	Single	60	55	46	41	46	41	46	43	48	44	1.6	1.5
N1-84	Single	60	55	46	41	46	41	46	43	48	44	1.6	1.6
N1-85	Single	60	55	46	41	46	41	46	42	47	44	1.6	1.5
N1-86	Single	60	55	46	41	46	41	46	42	47	44	1.6	1.6
N1-87	First Floor	60	55	46	41	45	41	47	44	49	45	1.7	1.6
N1-87	Ground Floor	60	55	46	41	45	41	46	42	47	44	1.7	1.5

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Receiver No. [1]	Single Storey, Floor of Multi-Storey, or Non-Residential	*RNP* Criteria		2019 Project REF Noise Levels $L_{Aeq,period}$ dBA				2019 Revised Design Noise Levels $L_{Aeq,period}$ dBA					
				"No Build" [2]		"Build"		"No Build" [2]		"Build"		Increase	
		Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
N1-88	First Floor	60	55	46	41	46	41	47	44	49	45	1.7	1.6
N1-88	Ground Floor	60	55	46	41	46	41	46	43	47	44	1.6	1.5
N1-89	First Floor	60	55	46	41	46	41	47	44	49	46	1.8	1.7
N1-89	Ground Floor	60	55	46	41	46	41	46	43	48	44	1.7	1.6
N1-90	Single	60	55	45	40	46	41	46	42	47	44	1.5	1.4
N1-91	Single	60	55	46	41	47	42	47	44	48	45	1.5	1.4
N1-92	Single	60	55	46	41	46	42	47	43	48	45	1.6	1.5
N1-93	Single	60	55	46	41	46	41	46	43	48	44	1.6	1.4
N1-94	Single	60	55	45	41	45	41	46	42	47	44	1.8	1.7
N1-95	First Floor	60	55	45	40	45	40	46	43	47	44	1.5	1.4
N1-95	Ground Floor	60	55	45	40	45	40	45	42	47	43	1.3	1.2
N1-96	Single	60	55	44	39	44	40	45	41	46	43	1.4	1.3
N1-97	Single	60	55	44	39	44	39	44	41	46	42	1.3	1.3
N1-98	Single	60	55	44	39	43	39	44	41	45	42	1.3	1.2
N1-99	Single	60	55	43	38	43	38	43	40	45	41	1.3	1.3
N1-100	Single	60	55	43	38	43	38	43	40	44	41	1.4	1.2
N1-101	Single	60	55	42	37	42	38	43	39	44	40	1.3	1.2
N1-102	First Floor	60	55	43	38	43	38	44	41	45	42	1.4	1.2
N1-102	Ground Floor	60	55	43	38	43	38	43	40	45	41	1.5	1.4
N1-103	First Floor	60	55	43	38	42	38	43	40	45	41	1.4	1.2
N1-103	Ground Floor	60	55	43	38	42	38	43	40	44	41	1.4	1.3
N1-104	Single	60	55	42	37	42	37	42	39	44	40	1.4	1.3
N1-105	Single	60	55	42	37	42	37	42	39	44	40	1.4	1.3
N1-106	Single	60	55	42	37	42	37	42	39	44	40	1.5	1.4
N1-107	Single	60	55	42	37	41	37	42	39	43	40	1.4	1.3

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Receiver No. [1]	Single Storey, Floor of Multi-Storey, or Non-Residential	*RNP* Criteria		2019 Project REF Noise Levels $L_{Aeq,period}$ dBA				2019 Revised Design Noise Levels $L_{Aeq,period}$ dBA					
				"No Build" [2]		"Build"		"No Build" [2]		"Build"		Increase	
		Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
N1-108	Single	60	55	41	36	41	36	42	38	43	40	1.5	1.5
N1-109	Single	60	55	41	36	41	36	41	38	43	40	1.6	1.6
N1-110	Single	60	55	41	36	41	36	41	38	43	40	1.6	1.5
N1-111	First Floor	60	55	41	36	41	36	42	38	43	40	1.4	1.4
N1-111	Ground Floor	60	55	41	36	41	36	41	38	43	39	1.5	1.4
N1-112	Single	60	55	41	36	41	36	41	38	43	39	1.4	1.3
N1-113	Single	60	55	41	36	41	36	41	38	43	39	1.4	1.3
N1-114	Single	60	55	41	36	41	36	41	38	43	39	1.4	1.4
N1-115	Single	60	55	41	36	41	36	41	38	43	39	1.4	1.3
N1-116	Single	60	55	41	36	41	36	41	38	43	39	1.4	1.3
N1-117	First Floor	60	55	41	36	41	36	42	38	43	40	1.4	1.3
N1-117	Ground Floor	60	55	41	36	41	36	41	38	43	39	1.5	1.4
N1-118	Single	60	55	41	36	41	36	41	38	43	39	1.5	1.5
N1-119	Single	60	55	41	36	41	37	42	38	43	40	1.4	1.3
N1-120	Single	60	55	42	37	41	37	42	38	43	40	1.3	1.2
N1-121	Single	60	55	42	37	42	37	42	39	43	40	1.4	1.3
N1-122	Single	60	55	42	37	42	37	42	39	43	40	1.5	1.3
N1-123	First Floor	60	55	41	36	41	37	42	39	43	40	1.4	1.3
N1-123	Ground Floor	60	55	41	36	41	37	42	38	43	40	1.3	1.3
N1-124	First Floor	60	55	42	37	41	37	42	39	43	40	1.3	1.2
N1-124	Ground Floor	60	55	42	37	41	37	42	38	43	40	1.4	1.3
N1-125	First Floor	60	55	42	37	42	37	42	39	44	40	1.3	1.2
N1-125	Ground Floor	60	55	42	37	42	37	42	39	43	40	1.4	1.3
N1-126	First Floor	60	55	42	37	42	37	43	40	44	41	1.2	1.1
N1-126	Ground Floor	60	55	42	37	42	37	42	39	44	40	1.4	1.2

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				"No Build" [2]		"Build"		"No Build" [2]		"Build"		Increase	
		Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
N1-127	First Floor	60	55	42	37	42	37	43	39	44	40	1.3	1.2
N1-127	Ground Floor	60	55	42	37	42	37	42	39	44	40	1.4	1.2
N1-128	First Floor	60	55	42	37	42	37	43	39	44	41	1.5	1.3
N1-128	Ground Floor	60	55	42	37	42	37	42	39	44	40	1.5	1.4
N1-129	First Floor	60	55	43	38	42	38	43	40	45	41	1.6	1.5
N1-129	Ground Floor	60	55	43	38	42	38	43	39	44	41	1.7	1.5
N1-130	First Floor	60	55	43	38	43	38	44	40	45	42	1.6	1.5
N1-130	Ground Floor	60	55	43	38	43	38	43	40	45	41	1.6	1.5
N1-131	First Floor	60	55	43	38	43	38	44	41	45	42	1.4	1.3
N1-131	Ground Floor	60	55	43	38	43	38	44	40	45	42	1.5	1.5
N1-132	First Floor	60	55	44	39	43	39	44	41	46	42	1.4	1.3
N1-132	Ground Floor	60	55	44	39	43	39	44	40	45	42	1.4	1.4
N1-133	Single	60	55	44	39	43	39	44	40	45	42	1.5	1.5
N1-134	Single	60	55	44	39	43	39	44	41	45	42	1.5	1.4
N1-135	Single	60	55	44	39	44	39	44	41	46	42	1.5	1.4
N1-136	Single	60	55	44	39	44	39	44	41	46	42	1.6	1.5
N1-137	Single	60	55	44	39	44	39	44	41	46	42	1.6	1.5
N1-138	Single	60	55	44	39	44	39	44	41	46	42	1.6	1.5
N1-139	Single	60	55	44	39	44	40	44	41	46	43	1.6	1.4
N1-140	Single	60	55	44	39	44	40	45	41	46	43	1.6	1.5
N1-141	Single	60	55	45	40	44	40	45	42	47	43	1.7	1.5
N1-142	Single	60	55	45	40	45	40	45	42	47	43	1.6	1.6
N1-143	Single	60	55	45	40	45	40	45	42	47	43	1.7	1.6
N1-144	Single	60	55	45	40	45	40	45	42	47	44	1.7	1.6
N1-145	Single	60	55	45	40	45	41	46	42	47	44	1.7	1.6

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				"No Build" [2]		"Build"		"No Build" [2]		"Build"		Increase	
		Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
N1-146	Single	60	55	46	41	46	41	46	43	47	44	1.1	1.0
N1-147	First Floor	60	55	47	42	46	42	48	44	49	45	1.1	1.0
N1-147	Ground Floor	60	55	47	42	46	42	47	44	48	45	1.3	1.2
N1-148	Single	60	55	47	42	47	42	47	44	48	45	1.2	1.1
N1-149	Single	60	55	47	42	47	42	47	44	49	45	1.1	1.0
N1-150	Single	60	55	47	42	47	42	48	44	49	45	1.2	1.1
N1-151	First Floor	60	55	47	42	47	42	48	45	50	46	1.3	1.2
N1-151	Ground Floor	60	55	47	42	47	42	47	44	49	45	1.3	1.2
N1-152	Single	60	55	47	42	47	42	47	44	49	45	1.4	1.4
N1-153	Single	60	55	47	42	47	42	47	44	49	45	1.5	1.4
N1-154	Single	60	55	48	43	48	43	48	44	49	46	1.4	1.3
N1-155	First Floor	60	55	48	43	48	43	50	47	51	48	1.6	1.5
N1-155	Ground Floor	60	55	48	43	48	43	48	45	50	47	1.7	1.5
N1-156	Single	60	55	49	44	49	44	49	45	51	47	1.8	1.7
N1-157	Single	60	55	48	43	48	43	48	45	50	47	1.8	1.7
N1-158	Single	60	55	48	43	48	43	48	45	50	47	1.9	1.8
N1-159	Single	60	55	48	43	48	43	48	45	50	47	1.6	1.5
N1-160	Single	60	55	48	43	48	43	48	45	50	47	1.7	1.8
N1-161	Single	60	55	48	43	48	43	48	45	50	46	1.5	1.4
N1-162	Single	60	55	47	42	47	42	47	44	49	46	1.9	1.8
N1-163	Single	60	55	50	45	50	45	50	47	51	48	1.2	1.1
N1-164	Single	60	55	51	46	51	46	52	48	52	49	0.9	0.8
N1-165	Single	60	55	52	47	51	47	52	49	53	50	1.3	1.2
N1-166	Single	60	55	52	47	52	47	53	49	54	51	1.5	1.5
N1-167	Single	60	55	52	47	52	47	52	49	54	51	1.5	1.5

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				"No Build" [2]		"Build"		"No Build" [2]		"Build"		Increase	
		Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
N1-168	Single	60	55	50	45	49	45	50	47	51	48	1.4	1.2
N1-169	Single	60	55	50	45	50	45	51	47	52	48	1.0	0.9
N1-170	Single	60	55	51	46	50	46	51	48	52	49	1.3	1.2
N1-171	Single	60	55	51	45	51	46	51	48	53	49	1.7	1.6
N1-172	Single	60	55	51	46	51	46	51	48	53	50	2.3	2.2
N1-173	Single	60	55	50	45	51	46	51	47	53	49	2.2	2.1
N1-174	Single	60	55	50	45	50	46	50	47	52	49	2.6	2.5
N1-175	Single	60	55	50	45	50	46	50	47	52	49	1.9	1.7
N1-176	Single	60	55	49	44	49	44	50	46	51	48	1.4	1.3
N1-177	Single	60	55	51	46	51	46	51	48	53	50	1.8	1.6
N1-178	Single	60	55	52	47	52	48	52	49	54	51	2.0	1.8
N1-179	Single	60	55	48	43	48	43	48	45	50	47	1.7	1.6
N1-180	Single	60	55	61	56	59	54	60	57	60	57	-0.1	-0.2
N1-181	Single	60	55	54	49	53	49	54	51	55	52	1.0	0.9
N1-182	Single	60	55	52	47	52	47	52	49	54	51	1.6	1.6
N1-183	Single	60	55	52	47	52	47	52	49	54	50	1.6	1.4
N1-184	Single	60	55	43	38	43	38	43	40	45	41	1.5	1.4
N1-185	Single	60	55	44	39	44	39	44	41	46	42	1.7	1.6
N1-186	Single	60	55	44	39	44	39	44	41	46	43	1.8	1.7
N1-187	Single	60	55	45	40	44	40	45	42	47	43	1.7	1.6
N1-188	Single	60	55	46	41	45	41	46	43	47	44	1.3	1.2
N1-189	Single	60	55	46	41	46	41	47	43	48	44	1.1	1.0
N1-190	Single	60	55	47	42	47	42	47	44	49	45	1.6	1.5
N1-191	Single	60	55	48	43	47	43	48	44	49	46	1.3	1.2
N1-192	Single	60	55	47	42	47	42	47	44	48	45	1.6	1.5

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[2] The change in "no build" levels between Project REF and Revised Design are due to model validation with additional noise measurement results and corrections to some building heights.

Receiver No. [1]	Single Storey, Floor of Multi-Storey, or Non-Residential	*RNP* Criteria		2019 Project REF Noise Levels $L_{Aeq,period}$ dBA				2019 Revised Design Noise Levels $L_{Aeq,period}$ dBA					
				"No Build" [2]		"Build"		"No Build" [2]		"Build"		Increase	
		Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
N1-193	Single	60	55	45	40	45	40	45	42	46	43	1.2	1.1
N1-194	Single	60	55	44	39	44	39	45	41	46	42	1.2	1.1
N1-195	Single	60	55	43	38	43	38	43	40	45	42	1.8	1.7
N1-196	Single	60	55	42	37	42	37	43	39	44	41	1.6	1.6
N1-197	Single	60	55	42	37	41	36	42	39	43	39	1.0	0.9
N1-198	Single	60	55	42	37	42	37	42	39	44	41	1.6	1.5
N1-199	Single	60	55	43	38	42	38	43	40	44	41	1.4	1.3
N1-200	Single	60	55	43	38	42	38	43	40	44	41	1.2	1.0
N1-201	Single	60	55	43	38	43	38	44	40	45	41	1.3	1.3
N1-202	Single	60	55	43	38	43	38	43	40	44	41	1.2	1.1
N1-203	Single	60	55	44	39	43	38	44	40	45	41	1.1	1.0
N1-204	Single	60	55	44	39	43	38	44	40	45	41	1.1	1.0
N1-205	Single	60	55	44	39	43	39	44	41	45	42	1.3	1.1
N1-206	Single	60	55	44	39	44	39	44	41	46	42	1.3	1.2
N1-207	Single	60	55	45	40	44	40	45	41	46	43	1.4	1.4
N1-208	Single	60	55	46	41	45	41	46	42	47	44	1.6	1.4
N1-209	Single	60	55	44	39	44	39	44	41	46	42	1.3	1.2
N1-210	Single	60	55	44	39	44	39	44	41	45	42	1.3	1.1
N1-211	Single	60	55	44	39	44	39	44	41	45	42	1.3	1.3
N1-212	Single	60	55	44	39	43	39	44	40	45	42	1.4	1.3
N1-213	Single	60	55	44	39	43	38	44	40	45	42	1.4	1.3
N1-214	Single	60	55	42	37	42	37	42	39	44	41	1.6	1.5
N1-215	Single	60	55	42	37	42	37	42	39	44	40	1.5	1.5
N1-216	Single	60	55	42	37	42	37	42	39	44	40	1.5	1.4
N1-217	Single	60	55	42	37	42	37	42	39	44	40	1.5	1.3

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Receiver No. [1]	Single Storey, Floor of Multi-Storey, or Non-Residential	*RNP* Criteria		2019 Project REF Noise Levels $L_{Aeq,period}$ dBA				2019 Revised Design Noise Levels $L_{Aeq,period}$ dBA					
				"No Build" [2]		"Build"		"No Build" [2]		"Build"		Increase	
		Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
N1-218	Single	60	55	43	38	42	37	43	39	44	40	1.2	1.2
N1-219	Single	60	55	42	37	42	37	43	39	44	40	1.0	1.0
N1-220	Single	60	55	43	38	43	38	43	40	44	41	1.2	1.1
N1-221	Single	60	55	43	38	43	38	43	40	44	41	1.0	1.0
N1-222	Single	60	55	44	38	43	38	44	40	45	41	1.0	1.0
N1-223	First Floor	60	55	43	38	42	38	44	41	45	41	1.0	0.9
N1-223	Ground Floor	60	55	43	38	42	38	43	40	44	41	1.0	1.0
N1-224	Single	60	55	42	37	42	37	43	39	43	40	0.7	0.7
N1-225	Single	60	55	42	37	42	37	42	39	43	40	1.0	0.9
N1-226	Single	60	55	42	37	42	37	43	39	44	40	1.1	1.0
N1-227	Single	60	55	42	37	41	37	42	39	44	40	1.4	1.2
N1-228	Single	60	55	42	37	41	37	42	39	43	40	1.2	1.2
N1-229	Single	60	55	42	37	41	37	42	39	43	40	1.2	1.2
N1-230	Single	60	55	41	36	40	36	41	38	42	39	1.5	1.4
N1-231	Single	60	55	41	36	41	36	41	38	43	39	1.4	1.3
N1-232	Single	60	55	41	36	40	36	41	37	42	39	1.5	1.4
N1-233	Single	60	55	42	37	41	36	42	38	43	40	1.2	1.2
N1-234	Single	60	55	42	37	41	37	43	39	43	40	0.6	0.6
N1-235	Single	60	55	42	37	41	37	42	39	43	40	0.7	0.5
N1-236	Single	60	55	42	37	41	37	43	39	43	40	0.6	0.6
N1-237	First Floor	60	55	43	38	42	38	44	41	45	41	1.0	0.9
N1-237	Ground Floor	60	55	43	38	42	38	43	40	44	41	1.0	0.9
N1-238	First Floor	60	55	43	38	42	37	44	40	45	41	1.0	0.9
N1-238	Ground Floor	60	55	43	38	42	37	43	40	44	41	1.0	1.0
N1-239	Single	60	55	44	39	43	38	44	40	45	41	0.9	0.9

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Receiver No. [1]	Single Storey, Floor of Multi-Storey, or Non-Residential	*RNP* Criteria		2019 Project REF Noise Levels $L_{Aeq,period}$ dBA				2019 Revised Design Noise Levels $L_{Aeq,period}$ dBA					
				"No Build" [2]		"Build"		"No Build" [2]		"Build"		Increase	
		Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
N1-240	Single	60	55	45	40	44	39	45	42	46	43	1.0	0.9
N1-241	Single	60	55	41	35	39	35	41	37	41	38	0.6	0.7
N1-242	Single	60	55	42	37	41	36	42	38	43	39	1.1	1.0
N1-243	Single	60	55	45	40	45	40	47	44	49	46	2.0	1.9
N1-244	Single	60	55	48	43	47	42	49	45	50	46	0.9	1.0
N1-245	First Floor	60	55	50	45	48	44	52	48	52	48	0.2	0.3
N1-245	Ground Floor	60	55	50	45	48	44	49	46	50	46	0.5	0.5
N1-246	First Floor	60	55	52	47	50	46	57	53	57	53	-0.3	-0.3
N1-246	Ground Floor	60	55	52	47	50	46	52	49	52	49	-0.2	-0.2
N1-247	Single	60	55	51	46	49	45	51	47	51	48	0.2	0.2
N1-248	Single	60	55	50	45	48	44	50	46	50	47	0.8	0.8
N1-249	Single	60	55	50	45	49	44	50	46	51	47	0.8	0.9
N1-250	Single	60	55	50	45	49	44	50	46	51	47	1.2	1.2
N1-251	Single	60	55	46	41	46	41	46	43	47	44	1.0	1.0
N1-252	Single	60	55	52	47	50	46	52	48	52	49	0.7	0.6
N1-253	Single	60	55	49	44	48	44	50	46	50	47	0.9	0.8
N1-254	Single	60	55	48	43	47	42	48	44	49	45	1.0	1.0
N1-255	Single	60	55	47	42	46	41	47	43	48	44	1.0	1.0
N1-256	Single	60	55	46	41	45	41	46	43	47	44	1.1	1.0
N1-257	Single	60	55	51	46	50	45	51	48	52	48	0.3	0.3
N1-258	First Floor	60	55	48	43	47	42	50	47	51	47	0.5	0.5
N1-258	Ground Floor	60	55	48	43	47	42	48	45	49	46	0.7	0.7
N1-259	First Floor	60	55	47	42	46	41	48	45	49	46	0.6	0.7
N1-259	Ground Floor	60	55	47	42	46	41	47	43	48	44	0.7	0.7
N1-260	First Floor	60	55	45	40	44	39	46	43	47	44	0.8	0.8

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				"No Build" [2]		"Build"		"No Build" [2]		"Build"		Increase	
		Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
N1-260	Ground Floor	60	55	45	40	44	39	45	42	46	43	0.9	0.8
N1-261	Single	60	55	45	40	44	39	45	41	46	42	0.8	0.7
N1-262	Single	60	55	44	39	43	39	45	41	45	42	0.8	0.7
N1-263	Single	60	55	45	40	44	40	45	42	46	43	0.8	0.7
N1-264	Single	60	55	46	41	45	40	46	42	47	43	0.8	0.8
N1-265	First Floor	60	55	43	38	42	37	44	40	45	41	0.9	0.9
N1-265	Ground Floor	60	55	43	38	42	37	43	40	44	41	1.0	0.9
N1-266	Single	60	55	43	38	43	38	44	40	45	41	1.0	1.0
N1-267	First Floor	60	55	44	39	43	39	45	42	46	43	1.0	1.0
N1-267	Ground Floor	60	55	44	39	43	39	44	41	45	42	1.1	0.9
N1-268	Single	60	55	41	36	40	36	41	38	42	39	1.2	1.2
N1-269	Single	60	55	42	37	42	37	42	39	44	40	1.2	1.1
N1-270	Single	60	55	36	31	35	30	36	32	36	33	0.7	0.8
N1-271	First Floor	60	55	36	31	35	30	37	34	38	35	1.0	1.0
N1-271	Ground Floor	60	55	36	31	35	30	36	33	37	33	1.0	0.9
N1-272	Single	60	55	38	33	37	32	38	34	39	35	1.1	1.0
N1-273	Single	60	55	36	31	35	31	36	33	37	34	1.0	1.0
N1-274	First Floor	60	55	35	29	33	29	35	32	36	33	0.8	0.8
N1-274	Ground Floor	60	55	35	29	33	29	35	31	35	32	0.8	0.8
N1-275	First Floor	60	55	33	28	32	28	34	31	35	32	0.8	0.8
N1-275	Ground Floor	60	55	33	28	32	28	33	30	34	31	0.7	0.7
N1-276	Single	60	55	34	28	32	27	34	31	35	31	0.5	0.5
N1-276	Ground Floor	60	55	34	28	32	27	33	30	34	30	0.4	0.4
N1-277	Single	60	55	34	28	32	27	33	30	33	30	0.3	0.3
N1-277	Single	60	55	60	55	61	57	61	57	57	53	-4.0	-3.9

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				"No Build" [2]		"Build"		"No Build" [2]		"Build"		Increase	
		Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
N1-278	Single	60	55	34	29	32	28	34	30	34	31	0.5	0.5
N1-279	Single	60	55	38	32	37	32	38	34	37	33	-0.6	-0.6
N1-280	First Floor	60	55	41	36	40	35	42	38	42	38	-0.1	0.0
N1-280	Ground Floor	60	55	41	36	40	35	40	37	40	37	0.0	0.0
N1-281	First Floor	60	55	44	39	42	37	45	42	45	41	-0.4	-0.3
N1-281	Ground Floor	60	55	44	39	42	37	44	40	44	40	-0.4	-0.4
N1-282	First Floor	60	55	46	41	44	39	47	43	46	43	-0.2	-0.2
N1-282	Ground Floor	60	55	46	41	44	39	45	42	45	42	-0.2	-0.2
N1-283	Single	60	55	45	40	43	38	45	41	44	41	-0.7	-0.6
N1-284	Single	60	55	46	41	44	39	46	43	45	42	-0.7	-0.7
N1-285	Single	60	55	52	46	50	45	51	47	50	47	-0.6	-0.6
N1-286	Single	60	55	49	44	47	43	49	45	48	45	-0.7	-0.7
N1-287	Single	60	55	50	44	48	43	49	46	48	45	-0.8	-0.7
N1-288	Single	60	55	49	44	46	42	48	45	48	44	-0.5	-0.5
N1-289	First Floor	60	55	50	44	47	42	51	48	51	47	-0.5	-0.5
N1-289	Ground Floor	60	55	50	44	47	42	49	46	49	45	-0.6	-0.4
N1-290	First Floor	60	55	57	51	55	51	58	55	58	54	-0.4	-0.4
N1-290	Ground Floor	60	55	57	51	55	51	56	53	57	53	0.4	0.5
N1-291	First Floor	60	55	50	45	48	43	53	49	52	49	-0.5	-0.4
N1-291	Ground Floor	60	55	50	45	48	43	50	47	50	46	-0.3	-0.3
N1-292	First Floor	60	55	50	45	48	43	52	49	52	49	-0.1	-0.1
N1-292	Ground Floor	60	55	50	45	48	43	50	46	50	46	-0.1	-0.1
N1-293	First Floor	60	55	50	45	48	44	53	49	53	49	-0.1	-0.1
N1-293	Ground Floor	60	55	50	45	48	44	50	47	50	46	-0.2	-0.2
N1-294	First Floor	60	55	50	45	48	43	53	49	52	49	-0.5	-0.4

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				"No Build" [2]		"Build"		"No Build" [2]		"Build"		Increase	
		Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
N1-294	Ground Floor	60	55	50	45	48	43	50	46	49	46	-0.5	-0.3
N1-295	First Floor	60	55	50	45	48	43	52	49	52	48	-0.5	-0.4
N1-295	Ground Floor	60	55	50	45	48	43	50	46	49	46	-0.5	-0.5
N1-296	First Floor	60	55	56	51	54	49	57	53	56	53	-0.5	-0.5
N1-296	Ground Floor	60	55	56	51	54	49	55	52	55	51	-0.4	-0.4
N1-297	First Floor	60	55	57	52	55	50	57	54	57	53	-0.6	-0.6
N1-297	Ground Floor	60	55	57	52	55	50	56	53	56	52	-0.6	-0.6
N1-298	First Floor	60	55	57	52	55	50	58	55	58	54	-0.6	-0.6
N1-298	Ground Floor	60	55	57	52	55	50	57	53	56	53	-0.5	-0.4
N1-299	First Floor	60	55	60	55	57	53	59	56	59	55	-0.5	-0.5
N1-299	Ground Floor	60	55	60	55	57	53	59	56	59	55	-0.6	-0.4
N1-300	First Floor	60	55	60	55	57	53	60	56	59	56	-0.5	-0.5
N1-300	Ground Floor	60	55	60	55	57	53	59	56	59	55	-0.5	-0.5
N1-301	First Floor	60	55	60	55	57	53	60	56	59	56	-0.4	-0.4
N1-301	Ground Floor	60	55	60	55	57	53	59	56	59	55	-0.5	-0.4
N1-302	Single	60	55	60	55	57	53	59	56	59	56	-0.5	-0.4
N1-303	First Floor	60	55	59	54	57	52	60	56	59	56	-0.4	-0.4
N1-303	Ground Floor	60	55	59	54	57	52	58	55	58	55	-0.3	-0.3
N1-304	Single	60	55	55	50	53	48	55	51	55	51	0.0	0.0
N1-305	Single	60	55	52	47	50	45	52	49	53	49	0.2	0.2
N1-306	Single	60	55	56	51	54	50	55	52	55	52	0.0	0.0
N1-307	Single	60	55	57	52	55	50	56	53	56	53	0.0	0.1
N1-308	Single	60	55	57	52	55	50	56	53	56	53	-0.2	-0.2
N1-309	Single	60	55	56	51	54	50	57	54	57	53	-0.4	-0.4
N1-310	Single	60	55	54	49	53	48	57	53	56	53	-0.5	-0.4

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				"No Build" [2]		"Build"		"No Build" [2]		"Build"		Increase	
		Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
N1-311	First Floor	60	55	54	49	52	47	55	51	54	51	-0.3	-0.3
N1-311	Ground Floor	60	55	54	49	52	47	53	50	53	50	-0.1	-0.1
N1-312	First Floor	60	55	57	52	54	50	56	52	55	51	-1.0	-1.0
N1-312	Ground Floor	60	55	57	52	54	50	55	52	54	50	-1.3	-1.3
N1-313	First Floor	60	55	49	44	46	42	51	47	50	47	-0.3	-0.3
N1-313	Ground Floor	60	55	49	44	46	42	49	45	48	45	-0.3	-0.3
N1-314	First Floor	60	55	49	44	46	42	50	47	50	46	-0.4	-0.4
N1-314	Ground Floor	60	55	49	44	46	42	48	45	48	44	-0.5	-0.4
N1-315	First Floor	60	55	49	43	46	41	50	46	49	46	-0.6	-0.5
N1-315	Ground Floor	60	55	49	43	46	41	48	45	48	44	-0.6	-0.5
N1-316	First Floor	60	55	47	42	46	41	48	45	49	46	1.0	1.0
N1-316	Ground Floor	60	55	47	42	46	41	47	43	48	44	1.1	1.2
N1-317	Single	60	55	35	30	34	29	35	31	36	32	0.7	0.7
N1-318	Single	60	55	39	34	37	32	39	35	38	35	-0.4	-0.4
N1-319	First Floor	60	55	39	34	38	33	42	39	43	39	0.5	0.5
N1-319	Ground Floor	60	55	39	34	38	33	39	36	39	36	0.3	0.3
N1-320	Single	60	55	40	35	39	34	40	36	39	36	-0.4	-0.3
N1-321	First Floor	60	55	41	36	39	35	41	38	41	38	0.1	0.1
N1-321	Ground Floor	60	55	41	36	39	35	40	37	40	37	0.1	0.1
N1-322	First Floor	60	55	42	37	40	35	42	38	42	38	0.0	0.0
N1-322	Ground Floor	60	55	42	37	40	35	41	37	41	37	0.1	0.1
N1-323	Single	60	55	58	53	56	51	57	54	57	53	-0.4	-0.4
N1-324	Single	60	55	57	52	55	51	56	53	56	52	-0.4	-0.4
N1-325	Single	60	55	57	52	55	50	56	53	56	52	-0.4	-0.4
N1-326	Single	60	55	57	52	55	50	56	53	56	52	-0.4	-0.4

[1] Road pavement for receivers starting with N1 and N2 was OGAC for the No Build and Project REF (Build) and SMA for the Project Design (Build).
Road pavement for receivers starting with N3, N4, N5 and N6 was PCP for the No Build and Project REF (Build) and SMA for the Project Design (Build).

[2] The change in "no build" levels between Project REF and Revised Design are due to model validation with additional noise measurement results and corrections to some building heights.

Receiver No. [1]	Single Storey, Floor of Multi-Storey, or Non-Residential	*RNP* Criteria		2019 Project REF Noise Levels $L_{Aeq,period}$ dBA				2019 Revised Design Noise Levels $L_{Aeq,period}$ dBA					
				"No Build" [2]		"Build"		"No Build" [2]		"Build"		Increase	
		Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
N1-327	Single	60	55	57	52	55	50	56	53	56	52	-0.4	-0.4
N1-328	Single	60	55	57	52	55	50	56	53	56	53	-0.5	-0.4
N1-329	Single	60	55	56	51	54	49	55	52	55	52	-0.4	-0.3
N1-330	Single	60	55	57	52	55	50	56	53	56	53	-0.4	-0.4
N1-331	Single	60	55	57	52	55	50	57	53	56	53	-0.5	-0.5
N1-332	Single	60	55	57	52	55	50	57	54	57	53	-0.5	-0.5
N1-333	Single	60	55	57	52	55	50	57	53	56	53	-0.6	-0.5
N1-334	Single	60	55	57	52	55	50	57	53	56	53	-0.5	-0.4
N1-335	Single	60	55	57	52	55	50	56	53	56	53	-0.4	-0.4
N1-336	Single	60	55	56	51	54	49	55	52	55	52	-0.3	-0.3
N1-337	Single	60	55	56	51	54	49	55	52	55	51	-0.3	-0.2
N1-338	Single	60	55	55	50	53	48	54	51	54	50	-0.1	-0.1
N1-339	Single	60	55	55	49	53	48	54	50	53	50	-0.3	-0.2
N1-340	Single	60	55	55	50	53	49	54	51	54	51	-0.3	-0.2
N1-341	First Floor	60	55	55	50	53	49	55	52	55	52	-0.4	-0.3
N1-341	Ground Floor	60	55	55	50	53	49	55	51	54	51	-0.4	-0.4
N1-342	Single	60	55	55	50	53	49	54	51	54	51	-0.4	-0.3
N1-343	Single	60	55	56	51	54	49	55	52	55	51	-0.5	-0.4
N1-344	Single	60	55	56	51	54	49	56	52	55	52	-0.5	-0.4
N1-345	Single	60	55	56	51	54	50	56	52	55	52	-0.5	-0.5
N1-346	Single	60	55	56	51	54	50	56	52	55	52	-0.4	-0.5
N1-347	Single	60	55	56	51	54	49	56	52	55	52	-0.5	-0.5
N1-348	Single	60	55	56	51	54	49	55	52	55	51	-0.5	-0.4
N1-349	Single	60	55	55	50	53	48	55	51	54	51	-0.5	-0.4
N1-350	Single	60	55	56	50	53	49	55	51	54	51	-0.5	-0.4

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				"No Build" [2]		"Build"		"No Build" [2]		"Build"		Increase	
		Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
N1-351	Single	60	55	55	50	53	48	54	51	54	50	-0.4	-0.4
N1-352	Single	60	55	54	49	52	48	54	50	53	50	-0.4	-0.4
N1-353	Single	60	55	53	48	51	47	52	49	52	48	-0.2	-0.2
N1-354	Single	60	55	52	47	51	46	52	48	51	48	-0.3	-0.3
N1-355	Single	60	55	52	47	51	46	51	48	51	48	-0.2	-0.2
N1-356	Single	60	55	52	47	50	46	51	47	51	47	-0.3	-0.2
N1-357	Single	60	55	57	52	55	50	56	53	56	52	-0.6	-0.5
N1-358	Single	60	55	57	52	55	50	56	53	56	52	-0.5	-0.5
N1-359	Single	60	55	57	52	55	50	56	53	56	52	-0.5	-0.5
N1-360	Single	60	55	57	52	55	50	56	53	56	52	-0.5	-0.4
N1-361	Single	60	55	57	52	55	50	56	53	56	52	-0.5	-0.4
N1-362	Single	60	55	57	52	55	50	56	53	56	52	-0.5	-0.4
N1-363	Single	60	55	57	52	55	50	56	53	56	52	-0.5	-0.4
N1-364	Single	60	55	57	52	55	50	56	53	56	52	-0.4	-0.4
N1-365	Single	60	55	57	52	55	50	56	53	56	52	-0.4	-0.4
N1-366	Single	60	55	57	52	55	51	56	53	56	53	-0.3	-0.3
N1-367	Single	60	55	58	53	56	52	57	53	57	53	-0.3	-0.3
N1-368	Single	60	55	58	53	56	52	57	54	57	53	-0.3	-0.3
N1-369	Single	60	55	59	54	58	53	58	55	58	54	-0.3	-0.2
N1-370	Single	60	55	56	51	56	51	56	52	54	51	-1.9	-1.8
N1-371	Single	60	55	57	52	57	53	57	54	55	52	-2.0	-1.9
N1-372	Single	60	55	58	53	58	53	58	54	56	52	-2.0	-2.0
N1-373	Single	60	55	58	53	58	53	58	54	56	53	-1.5	-1.5
N1-374	First Floor	60	55	58	53	58	54	59	56	58	54	-1.7	-1.7
N1-374	Ground Floor	60	55	58	53	58	54	58	55	57	53	-1.7	-1.6

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Receiver No. [1]	Single Storey, Floor of Multi-Storey, or Non-Residential	*RNP* Criteria		2019 Project REF Noise Levels $L_{Aeq,period}$ dBA				2019 Revised Design Noise Levels $L_{Aeq,period}$ dBA					
				"No Build" [2]		"Build"		"No Build" [2]		"Build"		Increase	
		Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
N1-375	Single	60	55	67	62	64	60	65	61	66	62	1.0	0.9
N2-1	Single	60	55	64	59	61	57	64	60	63	60	-0.6	-0.6
N2-2	Single	60	55	59	54	57	52	59	56	59	55	-0.5	-0.5
N2-3	Single	60	55	66	61	64	60	66	63	66	63	0.0	-0.1
N2-5	Single	60	55	65	60	62	58	64	61	64	61	-0.4	-0.4
N2-6	Single	60	55	61	56	59	55	61	58	61	57	-0.3	-0.3
N2-7	Single	60	55	60	55	58	53	60	57	60	56	0.0	-0.1
N2-8	Single	60	55	58	53	56	51	57	53	57	54	0.2	0.2
N2-9	Single	60	55	57	52	54	50	56	52	56	52	-0.1	-0.1
N2-10	Single	60	55	58	53	56	52	57	54	57	54	0.4	0.4
N2-11	Single	60	55	64	59	61	57	62	59	63	60	1.1	1.0
N2-12	Single	60	55	58	53	56	52	57	54	57	54	0.2	0.2
N2-13	Single	60	55	55	50	54	49	55	51	55	51	-0.3	-0.2
N2-14	Single	60	55	68	63	66	62	66	63	67	64	1.0	0.9
N2-15	Single	60	55	62	57	60	55	61	57	62	58	1.1	1.0
N2-16	Single	60	55	67	62	65	60	65	62	66	63	1.4	1.3
N2-18	Single	60	55	67	62	66	61	66	62	67	63	0.9	0.8
N2-19	Single	60	55	63	58	61	56	61	58	62	58	0.8	0.7
N2-20	Single	60	55	60	55	59	54	59	56	59	56	0.4	0.4
N2-21	Single	60	55	60	55	57	52	58	55	59	55	1.0	0.9
N2-22	Single	60	55	58	53	56	51	57	53	57	54	0.7	0.7
N2-23	Single	60	55	60	55	59	55	59	56	59	56	-0.1	0.0
N2-24	Single	60	55	54	49	55	51	55	52	53	50	-1.8	-1.7
N2-25	Single	60	55	59	54	58	54	58	54	58	55	0.1	0.1
N2-26	Single	60	55	60	55	59	55	59	56	59	56	-0.1	-0.1

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				"No Build" [2]		"Build"		"No Build" [2]		"Build"		Increase	
		Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
N2-27	Single	60	55	60	55	60	55	59	56	59	56	-0.2	-0.2
N2-28	Single	60	55	57	52	55	50	57	54	57	53	-0.5	-0.5
N2-29	Single	60	55	57	52	55	50	57	53	56	53	-0.5	-0.4
N2-30	Single	60	55	57	52	55	50	57	53	56	53	-0.4	-0.4
N2-31	Single	60	55	57	51	54	49	56	53	56	52	-0.4	-0.4
N2-32	Single	60	55	56	51	54	49	56	52	55	52	-0.4	-0.3
N3-3	Single	60	55	62	57	61	56	61	58	59	56	-1.8	-1.7
N3-4	Single	60	55	62	57	62	57	62	58	60	56	-2.1	-1.9
N3-5	Single	60	55	62	57	62	57	62	59	60	57	-1.9	-1.9
N3-6	Single	60	55	62	57	61	57	61	58	60	56	-1.8	-1.7
N3-7	Single	60	55	59	54	58	54	58	55	58	54	-0.8	-0.8
N3-8	Single	60	55	60	55	59	55	59	56	58	54	-1.8	-1.7
N3-9	Single	60	55	56	51	57	52	57	53	53	50	-3.7	-3.5
N3-10	Single	60	55	56	52	57	53	57	54	54	51	-3.2	-3.0
N3-11	Single	60	55	56	51	57	52	57	53	53	50	-3.4	-3.1
N3-13	Single	60	55	60	55	61	56	61	57	59	55	-2.0	-1.8
N3-14	Single	60	55	61	56	62	57	62	58	58	55	-3.7	-3.5
N3-15	Single	60	55	57	52	58	54	58	54	54	51	-3.6	-3.4
N3-16	Single	60	55	57	52	58	54	58	55	54	51	-3.7	-3.5
N3-17	Single	60	55	58	54	60	55	60	56	56	53	-3.5	-3.4
N3-18	Single	60	55	58	53	60	55	59	56	55	52	-3.8	-3.7
N3-19	Single	60	55	61	57	63	59	63	60	59	56	-4.1	-4.0
N3-22	Single	60	55	67	63	69	65	69	66	65	62	-3.8	-3.7
N3-23	Single	60	55	60	55	61	57	61	58	57	54	-3.9	-3.9
N3-24	Single	60	55	64	59	66	61	65	62	61	58	-4.3	-4.2

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				"No Build" [2]		"Build"		"No Build" [2]		"Build"		Increase	
		Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
N3-25	Single	60	55	61	57	63	59	63	60	59	56	-4.0	-4.0
N3-26	Single	60	55	62	58	65	60	65	61	60	57	-4.3	-4.2
N3-27	Single	60	55	62	57	64	59	64	60	59	56	-4.2	-4.1
N3-28	Single	60	55	67	62	69	64	69	65	64	61	-4.7	-4.5
N3-29	Single	60	55	67	62	68	64	69	65	63	60	-5.2	-5.0
N3-31	Single	60	55	63	58	64	60	64	61	60	56	-4.5	-4.3
N3-32	Single	60	55	62	57	63	59	63	60	59	55	-4.5	-4.3
N3-33	Single	60	55	61	56	62	57	62	58	57	54	-4.5	-4.4
N3-34	Single	60	55	60	55	60	56	60	57	56	52	-4.5	-4.2
N3-35	Single	60	55	66	62	67	63	67	63	62	59	-4.8	-4.5
N3-36	Single	60	55	65	60	66	61	65	62	61	57	-4.8	-4.5
N3-39	Single	60	55	57	52	57	53	57	54	55	52	-2.2	-2.1
N3-40	Single	60	55	57	53	58	53	58	54	55	52	-2.2	-2.2
N3-42	Single	60	55	63	58	64	59	64	60	59	55	-4.7	-4.5
N3-43	Single	60	55	62	58	63	58	63	59	58	55	-4.7	-4.5
N3-44	Single	60	55	60	56	61	56	61	57	56	53	-4.6	-4.4
N3-45	Single	60	55	57	52	60	55	59	56	55	51	-4.6	-4.4
N4-1	Single	60	55	68	63	68	64	69	65	65	62	-3.6	-3.4
N4-2	Single	60	55	63	59	64	59	64	61	60	57	-4.0	-3.8
N4-3	Single	60	55	61	56	61	57	61	58	59	56	-2.6	-2.5
N4-4	Single	60	55	60	55	59	55	60	56	58	55	-1.7	-1.6
N4-5	Single	60	55	60	55	59	55	60	56	59	55	-1.0	-1.0
N4-6	Single	60	55	59	54	58	53	58	55	57	54	-0.7	-0.8
N4-7	Single	60	55	59	54	58	54	59	55	58	54	-1.1	-1.0
N4-8	Single	60	55	59	54	58	53	58	54	57	54	-0.6	-0.6

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				"No Build" [2]		"Build"		"No Build" [2]		"Build"		Increase	
		Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
N4-9	Single	60	55	58	53	57	53	57	54	57	54	-0.4	-0.4
N4-10	Single	60	55	56	51	55	50	55	52	55	52	-0.1	-0.2
N4-11	Single	60	55	55	50	54	49	54	51	53	50	-1.0	-0.9
N4-13	Single	60	55	65	61	66	61	66	63	63	60	-3.0	-2.8
N4-14	Single	60	55	65	61	67	62	66	63	63	60	-3.2	-3.0
N4-15	Single	60	55	60	55	60	55	60	57	58	55	-1.7	-1.6
N4-16	Single	60	55	58	53	57	52	57	54	56	53	-1.1	-1.0
N4-17	Single	60	55	59	54	58	54	59	55	57	54	-1.5	-1.4
N4-18	Single	60	55	64	59	66	61	65	62	62	58	-3.5	-3.4
N4-19	Single	60	55	64	60	66	62	65	62	62	59	-3.5	-3.5
N4-20	Single	60	55	67	62	69	64	69	66	66	62	-3.4	-3.4
N4-21	Single	60	55	65	60	67	62	66	63	63	59	-3.6	-3.7
N4-23	Single	60	55	69	64	71	66	70	67	67	63	-3.4	-3.5
N4-24	Single	60	55	63	58	65	60	64	61	60	57	-3.7	-3.7
N4-25	Single	60	55	64	60	67	62	66	62	62	59	-3.6	-3.6
N4-26	First Floor	60	55	60	55	62	57	63	59	59	56	-3.7	-3.6
N4-26	Ground Floor	60	55	60	55	62	57	61	58	58	54	-3.6	-3.6
N4-27	Single	60	55	64	60	67	62	66	62	62	59	-3.6	-3.6
N4-28	Single	60	55	72	68	74	70	73	70	70	66	-3.6	-3.8
N4-29	Single	60	55	71	67	74	69	72	69	69	66	-3.2	-3.4
N4-30	Single	60	55	68	64	71	66	69	66	66	63	-3.1	-3.1
N4-31	Single	60	55	70	66	73	69	72	68	69	65	-2.9	-3.0
N4-32	Single	60	55	63	58	65	60	64	61	61	57	-3.4	-3.4
N4-33	Single	60	55	67	62	69	64	68	65	64	61	-3.7	-3.6
N4-34	Single	60	55	62	57	64	59	63	60	59	56	-3.8	-3.7

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Receiver No. [1]	Single Storey, Floor of Multi-Storey, or Non-Residential	*RNP* Criteria		2019 Project REF Noise Levels $L_{Aeq,period}$ dBA				2019 Revised Design Noise Levels $L_{Aeq,period}$ dBA					
				"No Build" [2]		"Build"		"No Build" [2]		"Build"		Increase	
		Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
N4-36	Single	60	55	63	58	64	59	64	60	59	56	-4.2	-4.0
N4-37	Single	60	55	63	58	64	60	64	60	60	56	-4.1	-3.8
N4-38	Single	60	55	59	54	60	56	60	56	56	52	-3.9	-3.7
N4-39	Single	60	55	60	55	61	57	61	57	57	53	-4.1	-3.9
N4-40	Single	60	55	60	55	62	57	61	58	57	54	-4.0	-3.7
N4-41	Single	60	55	60	56	62	57	62	58	58	54	-4.0	-3.8
N4-42	Single	60	55	61	56	62	58	62	58	57	54	-4.2	-3.9
N4-43	Single	60	55	60	55	61	57	61	57	57	53	-4.1	-3.9
N4-44	Single	60	55	62	57	64	59	63	59	59	56	-4.1	-3.8
N4-45	Single	60	55	61	56	62	58	62	58	58	54	-4.1	-3.9
N4-46	Single	60	55	61	56	63	58	62	59	58	55	-4.0	-3.8
N4-47	Single	60	55	61	56	62	58	62	58	58	54	-4.1	-3.9
N4-48	Single	60	55	61	56	62	58	62	58	58	55	-4.2	-3.9
N4-49	Single	60	55	61	56	62	58	62	59	58	55	-4.3	-4.0
N4-50	Single	60	55	60	55	61	57	61	58	57	54	-4.2	-4.0
N4-51	Single	60	55	58	53	59	54	59	55	55	51	-4.5	-4.2
N4-52	Single	60	55	61	56	62	57	61	58	57	54	-4.3	-4.1
N4-53	Single	60	55	59	54	60	55	60	56	55	52	-4.5	-4.3
N4-54	Single	60	55	61	56	62	57	62	58	57	54	-4.7	-4.5
N4-55	Single	60	55	61	56	62	57	62	58	57	54	-4.7	-4.5
N4-56	Single	60	55	61	56	61	57	61	58	57	53	-4.7	-4.5
N4-57	Single	60	55	60	55	60	55	60	56	55	52	-4.7	-4.4
N4-58	Single	60	55	62	57	62	57	62	58	57	54	-4.6	-4.4
N4-59	Single	60	55	66	61	66	62	66	63	62	58	-4.5	-4.4
N4-60	Single	60	55	64	60	65	60	65	61	60	57	-4.5	-4.3

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Receiver No. [1]		*RNP* Criteria		2019 Project REF Noise Levels $L_{Aeq,period}$ dBA				2019 Revised Design Noise Levels $L_{Aeq,period}$ dBA					
				"No Build" [2]		"Build"		"No Build" [2]		"Build"		Increase	
		Day											
N4-61	Single	60	55	65	61	65	61	65	62	61	58	-4.5	-4.3
N4-62	Single	60	55	63	58	63	59	63	59	59	55	-4.4	-4.1
N4-63	Single	60	55	63	58	63	59	63	59	59	55	-4.3	-4.2
N4-64	Single	60	55	63	58	63	59	63	59	58	55	-4.5	-4.3
N4-65	Single	60	55	63	58	63	58	63	59	58	55	-4.6	-4.4
N4-66	Single	60	55	62	58	63	58	62	59	58	55	-4.6	-4.3
N4-67	Single	60	55	62	58	62	58	62	59	58	54	-4.6	-4.3
N4-68	Single	60	55	61	57	62	57	62	58	57	54	-4.6	-4.3
N4-69	Single	60	55	63	58	63	58	63	59	58	55	-4.6	-4.4
N4-70	Single	60	55	64	59	64	60	64	61	60	56	-4.6	-4.4
N4-71	Single	60	55	62	58	62	58	62	59	58	54	-4.7	-4.4
N4-72	Single	60	55	63	58	63	58	63	59	58	55	-4.7	-4.5
N4-73	Single	60	55	63	58	63	58	63	59	58	55	-4.8	-4.5
N4-74	Single	60	55	70	65	70	65	70	66	64	61	-5.6	-5.4
N4-76	Single	60	55	68	64	68	63	68	65	63	59	-5.3	-5.2
N4-77	Single	60	55	61	56	61	56	61	58	56	53	-4.9	-4.8
N4-78	Single	60	55	63	58	63	58	63	59	58	55	-5.0	-4.8
N4-79	Single	60	55	63	59	63	59	64	60	59	55	-4.9	-4.8
N4-80	Single	60	55	62	57	61	57	62	58	57	53	-4.9	-4.7
N4-81	Single	60	55	61	56	61	56	61	57	56	53	-4.8	-4.6
N4-82	Single	60	55	65	61	65	61	65	62	60	57	-4.8	-4.6
N4-83	Single	60	55	66	61	66	61	65	62	61	58	-4.3	-4.1
N4-84	Single	60	55	66	62	67	62	66	63	62	59	-4.3	-4.3
N4-85	Single	60	55	68	64	69	64	66	62	61	57	-5.2	-4.9
N4-86	Non residential	60	55	65	61	66	61	65	61	61	57	-4.2	-4.1

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Receiver No. [1]	Single Storey, Floor of Multi-Storey, or Non-Residential	*RNP* Criteria		2019 Project REF Noise Levels $L_{Aeq,period}$ dBA				2019 Revised Design Noise Levels $L_{Aeq,period}$ dBA					
				"No Build" [2]		"Build"		"No Build" [2]		"Build"		Increase	
		Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
N4-87	Single	60	55	57	52	58	53	58	54	53	50	-4.6	-4.4
N4-88	Single	60	55	56	51	56	51	56	52	52	48	-4.6	-4.4
N4-89	Single	60	55	57	52	57	52	57	54	53	49	-4.5	-4.3
N4-90	Single	60	55	59	54	59	55	59	56	55	51	-4.4	-4.2
N4-91	Single	60	55	59	54	60	55	60	56	55	52	-4.5	-4.3
N4-92	Single	60	55	59	55	60	55	60	56	56	52	-4.4	-4.2
N4-93	Single	60	55	59	54	59	55	59	56	55	51	-4.6	-4.4
N4-94	Single	60	55	59	54	59	54	59	55	54	51	-4.6	-4.4
N4-95	Single	60	55	59	54	60	55	59	56	55	52	-4.3	-4.2
N4-96	Single	60	55	60	55	61	56	60	57	56	53	-4.4	-4.1
N4-97	Single	60	55	59	54	60	55	59	56	55	52	-4.3	-4.1
N4-98	Single	60	55	60	55	60	56	60	57	56	52	-4.4	-4.2
N4-99	Single	60	55	57	52	58	53	58	54	53	50	-4.4	-4.2
N4-100	Single	60	55	56	51	56	52	56	53	52	48	-4.6	-4.4
N4-101	Single	60	55	55	50	55	51	55	52	51	47	-4.6	-4.4
N4-102	Single	60	55	61	56	61	56	61	57	56	53	-4.5	-4.3
N4-103	Single	60	55	61	56	61	56	61	57	56	53	-4.5	-4.4
N4-104	Single	60	55	60	55	60	56	60	57	56	52	-4.7	-4.5
N4-105	Single	60	55	60	55	60	56	60	57	56	52	-4.4	-4.2
N4-106	Single	60	55	61	56	61	57	61	57	56	53	-4.6	-4.3
N4-107	Single	60	55	59	55	60	55	60	56	55	52	-4.4	-4.2
N4-108	Single	60	55	59	55	60	55	59	56	55	51	-4.5	-4.3
N4-109	Single	60	55	59	55	59	55	59	56	55	51	-4.5	-4.3
N4-110	Single	60	55	57	52	57	53	57	54	53	49	-4.5	-4.3
N4-111	Single	60	55	56	51	56	52	56	53	52	48	-4.5	-4.3

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				"No Build" [2]		"Build"		"No Build" [2]		"Build"		Increase	
		Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
N4-112	Single	60	55	59	54	59	54	59	55	55	51	-4.4	-4.2
N4-113	Single	60	55	60	55	60	56	60	56	55	52	-4.6	-4.3
N4-114	Single	60	55	60	55	60	56	60	56	55	52	-4.6	-4.3
N4-115	Single	60	55	59	54	59	54	59	55	54	51	-4.5	-4.3
N4-116	Single	60	55	60	56	60	56	60	57	56	52	-4.6	-4.4
N4-117	Single	60	55	60	55	60	56	60	57	56	52	-4.6	-4.4
N4-118	Single	60	55	61	57	62	57	61	58	57	53	-4.7	-4.4
N4-119	Single	60	55	60	55	60	55	60	56	55	52	-4.7	-4.4
N4-120	Single	60	55	61	57	61	57	61	58	57	53	-4.7	-4.6
N4-121	Single	60	55	60	55	60	55	60	57	55	52	-4.6	-4.5
N4-122	Single	60	55	59	55	59	55	59	56	55	51	-4.5	-4.4
N4-123	Single	60	55	60	55	60	55	60	56	55	52	-4.7	-4.5
N4-124	Single	60	55	60	56	60	56	61	57	56	52	-4.7	-4.6
N4-125	Single	60	55	59	54	59	54	59	55	54	51	-4.7	-4.6
N4-126	Single	60	55	59	54	59	54	59	55	54	51	-4.7	-4.5
N4-127	Single	60	55	58	54	58	54	58	55	54	50	-4.7	-4.6
N4-128	Single	60	55	58	53	58	53	58	54	53	50	-4.8	-4.5
N4-129	Single	60	55	59	54	59	54	59	55	54	51	-4.9	-4.7
N4-130	Single	60	55	59	55	59	55	59	56	54	51	-4.8	-4.6
N4-131	Single	60	55	60	56	60	56	60	57	56	52	-4.9	-4.7
N4-132	Single	60	55	62	58	62	58	62	59	57	54	-4.8	-4.6
N4-133	Single	60	55	62	57	62	57	62	58	57	54	-4.6	-4.4
N4-134	Single	60	55	60	56	61	56	60	57	56	52	-4.7	-4.5
N4-135	Single	60	55	63	59	63	58	63	60	58	55	-5.0	-4.9
N4-136	Single	60	55	62	58	62	57	62	59	57	54	-4.9	-4.8

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				"No Build" [2]		"Build"		"No Build" [2]		"Build"		Increase	
		Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
N4-137	Single	60	55	62	57	62	57	62	58	57	53	-4.9	-4.8
N4-138	Single	60	55	59	54	59	54	59	55	54	51	-4.4	-4.3
N4-139	Single	60	55	64	60	63	59	64	60	59	55	-5.1	-5.0
N4-140	Single	60	55	59	54	60	56	60	56	56	52	-3.9	-3.6
N4-141	Single	60	55	58	53	59	55	59	55	55	52	-3.9	-3.8
N4-142	Single	60	55	57	53	59	54	59	55	54	51	-4.1	-3.9
N4-143	Single	60	55	60	55	59	55	59	56	58	54	-1.8	-1.8
N4-144	Single	60	55	58	53	58	53	58	54	56	52	-2.2	-2.2
N4-145	Single	60	55	59	54	61	56	60	57	56	53	-4.1	-3.8
N4-146	Single	60	55	60	55	61	57	61	57	57	53	-4.1	-3.9
N4-147	Single	60	55	60	55	61	56	61	57	56	53	-4.2	-3.9
N4-148	Single	60	55	59	54	60	55	60	56	56	52	-4.1	-3.9
N4-150	Single	60	55	59	55	58	54	58	55	54	51	-4.1	-4.0
N4-151	Single	60	55	56	51	58	53	57	54	53	50	-4.2	-4.0
N4-152	Single	60	55	58	53	60	55	59	56	55	52	-4.2	-4.0
N4-153	Single	60	55	59	54	60	56	60	56	56	52	-4.2	-4.0
N4-154	Single	60	55	59	54	60	56	60	56	56	52	-4.3	-4.1
N4-155	Single	60	55	59	54	60	55	60	56	56	52	-4.3	-4.2
N4-156	Single	60	55	59	54	59	54	59	56	54	51	-4.7	-4.5
N4-157	Single	60	55	57	53	57	53	57	54	53	49	-4.7	-4.5
N4-158	Single	60	55	57	53	57	53	57	54	53	49	-4.7	-4.6
N4-159	Single	60	55	56	51	56	51	56	52	51	48	-4.8	-4.6
N4-160	Single	60	55	57	53	58	53	57	54	53	49	-4.6	-4.4
N4-161	Single	60	55	59	54	59	55	59	55	54	51	-4.6	-4.5
N4-162	Single	60	55	57	52	57	52	57	53	52	49	-4.6	-4.4

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				"No Build" [2]		"Build"		"No Build" [2]		"Build"		Increase	
		Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
N5-1	Single	60	55	65	60	66	61	65	62	61	58	-4.2	-4.0
N5-2	Single	60	55	62	57	62	58	62	59	57	54	-4.7	-4.5
N5-3	Single	60	55	60	55	60	55	60	56	55	52	-4.8	-4.6
N5-4	Single	60	55	71	67	70	66	71	68	65	62	-5.9	-5.7
N5-6	Single	60	55	61	57	60	55	61	58	56	52	-5.7	-5.8
N5-7	Single	60	55	61	57	60	55	61	58	56	52	-5.7	-6.0

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