

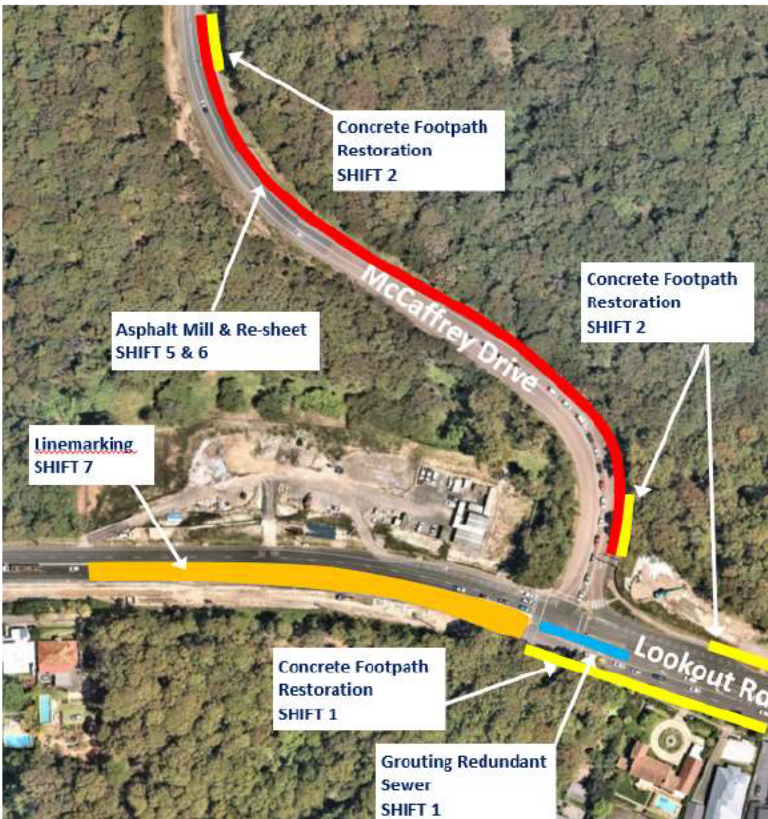
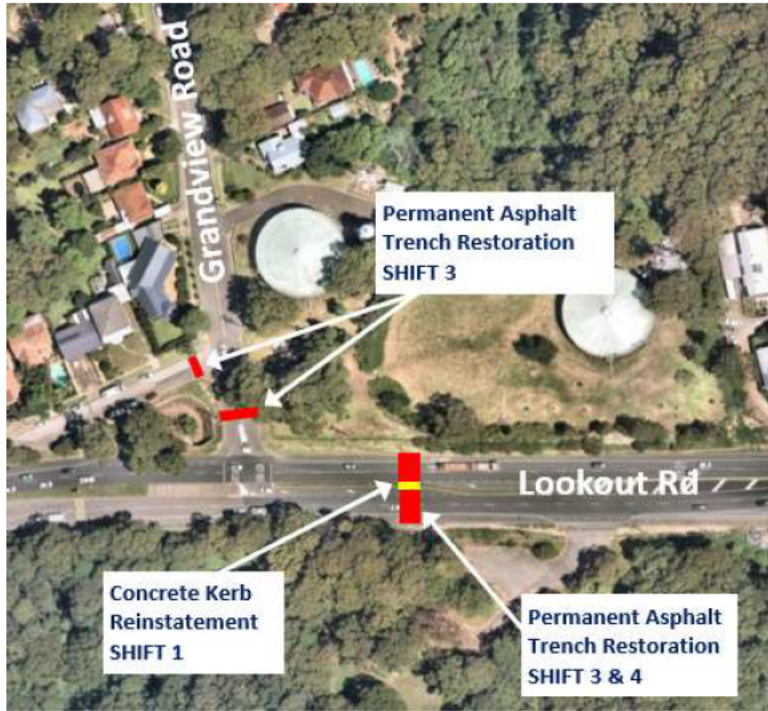
RP2J Project OOHW application form

Out of hours work approval request form			
No:	Notification date:	Approval date:	Project:
030	27/04/2022		RP2J – Southern Utilities
A. Contact details	Name	Mobile number	Email
Contractor Environmental Site Representative	██████████	██████████	████████████████████
Contractor Project Manager	██████████	██████████	████████████████████
Contractor Foreman	██████████	██████████	████████████████████
Contractor Project Engineer	██████████	██████████	████████████████████
B. Details of work: Include a map showing location of work extent and nearest sensitive receivers			

Out of hours work approval request form

Location / chainages:

Lookout Road, McCaffrey Drive and Grandview Road:



NCA/s:

NCA-13 – Lookout Rd Residents
NCA-10 – Rankin Park Residents

Out of hours work approval request form	
Description of works – also include a brief description of the sequence of activities:	Roadworks activities for permanent reinstatement of footpaths and roadways following completion of utilities relocation work. Work involves milling and re-sheeting asphalt pavements above utility trenches constructed through Lookout Road, Grandview Road and McCaffrey Drive. It also includes linemarking to realign southbound carriageway on Lookout Road and concreting of footpaths where they have been disturbed by utilities installation. Refer to Appendix A for more detailed summary of planned shifts, activities and plant.
Machinery/ plant to be used	Refer to Appendix A for detailed summary of machinery / plant that will be used and corresponding shifts.
Traffic control measures required:	McCaffrey Drive, Grandview Road and Lookout Road Lane Closures
Lighting required:	Lighting towers will be provided to highlight road works zone for motorists, and battery-operated task lighting will be provided at specific locations.
Proposed dates:	Proposed dates: 20/06/22 – 24/06/22 (4 Nights) 27/06/22 - 30/06/22 (3 Nights) Contingency dates: If wet weather prevents the work occurring as planned, the works will be re-scheduled to occur between 01/07/22 and 16/07/22 with impacted residents notified accordingly.
Proposed times:	Start 1900 – Finish 0500 on each shift
Justification – why does work need to occur outside of standard construction hours?: (attach support information as required)	Work needs to be carried out under lane closures on McCaffrey Drive, Grandview Road and Lookout Road for the safety of workers and public. This cannot happen during the day as TfNSW and City of Newcastle Council will not issue a Road Occupancy Licence (ROL) for daytime lane closures on McCaffrey Drive or concurrent lane closures on Lookout Road.
C. Risk assessment	
NML (refer Table 3-2 of OOHW protocol)	NCA13 - Evening: 54 dB(A). Night: 38 dB(A) NCA10 – Evening: 40 dB(A). Night: 31 dB(A)* <i>*A NML of 35 dB (A) has been adopted for NCA10 for noise assessment purposes, in accordance with EPA Guidelines</i>
Is the work highly noise intensive? (above 75dB(A) L_{Aeq} (15 minute))	No
Risk factor category (refer section 4.3 of OOHW protocol):	Low Risk. Maximum worst case cumulative predicted noise level (L_{Aeq} 15 min.) = 57dB(A). This is less than 25dB(A) above RBL (33dB(A)).
D. Details of noise or vibration assessment completed:	
Detailed noise assessments were completed using noise modelling program named <i>KNOWnoise: Minor Works</i> which is developed and owned by Hutchison Weller. This program is used on many large-scale infrastructure projects to determine and model likely noise impacts on sensitive receivers. As works are predicted to be carry over the Evening and Night OOHW Periods only the night period was considered to determine worst case predicted noise impacts for the works. The detailed noise assessment reports are attached	

Out of hours work approval request form

to this OOHW Application. There are separate reports corresponding to each location and each work shift. The report includes a map of predicted impacts on sensitive receivers and predicted noise levels at each receiver's address.

Where noise reductions such as noise blankets are applied to the noise assessments it is detailed in the table in **Appendix A** of the noise assessments. The reductions applied are in line with the following:

Reduction	
Some "rules of thumb" for possible noise reductions through shielding.	
3 dB	Noise barrier or other obstruction (like a dirt mound) just barely breaks the line-of-sight between the noise source and the receiver.
5 dB	Noise source is enclosed or shielded with heavy vinyl noise curtain material (e.g. Wavebar or similar).
5 dB to 8 dB	Noise source is completely shielded with a solid barrier close to the source - use 8 dB. Enclosure and/or barrier has some gaps in it - reduce to 5 dB.
10 dB	Noise source is completely enclosed with a solid barrier located close to the source.

All applicable data was added to the model, including but not limited to, specific information on the proposed activity, project adopted RBLs and NMLs, extent of works, plant and equipment to be used, proposed mitigation measures etc. Using this data, and data within the program, a detailed noise assessment report was produced giving accurate predicted noise impacts for the period assessed. Specific assessment methodology is described on Page 3 of each report.

Where multiple activities occur in sequence on a particular shift, then only the highest impact activity was included in the noise assessment.

Predicted impacts:

The predicted noise impacts for each shift during the night time period are summarised as follows:

Shift 1 – Footpath and Kerb Restoration, Grouting of Redundant Sewer

The predicted maximum worst case cumulative noise level (LAeq, 15 min) is 57dB(A).

There are 2 receivers for which the works will be Noticable (1- 5 dB(A) above NML).

There are 3 receivers for which the works will be Clearly Audible (6-15 dB(A) above NML).

There are 2 receivers for which the works will be Moderately Intrusive (15-25 dB(A) above NML)

Shift 2 – Footpath Restoration

The predicted maximum worst case cumulative noise level (LAeq, 15 min) is 52dB(A).

There are 3 receivers for which the works will be Noticable (1- 5 dB(A) above NML).

There are 5 receivers for which the works will be Clearly Audible (6-15 dB(A) above NML).

Shift 3 – Asphalt Trench Restoration Grandview Road and Lookout Road

The predicted maximum worst case cumulative noise level (LAeq, 15 min) is 56dB(A).

There are 54 receivers for which the works will be Noticable (1- 5 dB(A) above NML).

There are 17 receivers for which the works will be Clearly Audible (6-15 dB(A) above NML).

There is 1 receiver for which the works will be Moderately Intrusive (15-25 dB(A) above NML)

Shift 4 – Asphalt Trench Restoration Lookout Road

The predicted maximum worst case cumulative noise level (LAeq, 15 min) is 53dB(A).

There are 54 receivers for which the works will be Noticable (1- 5 dB(A) above NML).

There are 17 receivers for which the works will be Clearly Audible (6-15 dB(A) above NML).

Shift 5&6 – Asphalt Trench Restoration McCaffrey Drive

The predicted maximum worst case cumulative noise level (LAeq, 15 min) is 49dB(A).

There are 124 receivers for which the works will be Noticable (1- 5 dB(A) above NML).

There are 8 receivers for which the works will be Clearly Audible (6-15 dB(A) above NML).

Out of hours work approval request form

Shift 7 – Linemarking

The predicted maximum worst case cumulative noise level (LAeq, 15 min) is 43dB(A).

There are 7 receivers for which the works will be Noticable (1- 5 dB(A) above NML).

There is 1 receiver for which the works will be Clearly Audible (6-15 dB(A) above NML).

Refer to the detailed Noise Assessments in **Appendix B**:

Predicted Vibration Impacts:

No vibration impacts are predicted as a result of these works. A static roller only will be used for asphalt compaction at Grandview Road. The closest point of the asphalt will be 13m from the closest dwelling resulting in estimated vibration impacts of 0.3 – 0.6mm/s.

The activity is not considered to encroach into either “human comfort” (>1mm/s) or “structural damage” (>5mm/s) vibration criteria, based on distance, and equipment and methodology used.

E. Proposed mitigation measures, including respite

Out of hours work approval request form

Asphalt works at Grandview Rd and Lookout Rd have been combined to minimise the total number of nights of OOHW. Work for Shifts 1/2 are located at the opposite end of the project to shifts 3/4, to ensure the same receivers are not continually affected. Additionally, works have been planned to be carried out in 2 separate blocks with 3 days in between to provide respite to the residents. Sawcutting and/or demolition for the concrete footpath restoration will be carried out during daytime lane closures, to limit high impact works to be carried out at night.

The following mitigation measures were proposed based on those identified in the *OOHW Protocol – Section 5.1* and *Table 5-1: Hierarchy for application of additional mitigation for airborne noise*.

Standard Mitigation Measures (OOHW Protocol):

- Modifying behavioural practices on site
- Equipment selection / maintaining and monitoring plant
- Use and siting of plant and hoardings
- Site inductions
- Use of non-tonal reversing alarms
- Stakeholder notification
- Planning noisier work to be carried out earlier in the period.

NVMP Mitigation measures:

- Noise blankets to be utilised around static plant e.g. Daymakers
- Where practical, operating machines at low speed / power and switching them off when not in use rather than leaving them idling for prolonged periods;
- Minimising the reversing of machines;
- All employees, contractors and subcontractors are to receive an environmental induction.
- No swearing or unnecessary shouting or loud stereos/radios on site.
- Limit compression braking at night in residential areas.
- No dropping of materials from height, throwing of metal items and slamming of doors.

Additional Mitigation Measures (OOHW Protocol):

For Residents 5-15 dB(A) above NML

- Notification
- Verification
- Duration Respite

For Residents 15-25 dB(A) above NML

- Phone Call / Individual Briefing
- Verification
- Duration Respite

F. Community consultation

Outline consultation undertaken for the proposed OOHW:

The properties identified in **Appendix E** as having an impact classification as moderately intrusive, will be individually briefed on the OOH works and likely impacts via email and phone call.

The properties identified in **Appendix E** will be provided a written notification describing the upcoming OOH works and likely impacts. Refer to **Appendix D** for draft notification letters to be delivered no less than 5 days prior to undertaking the works.

Out of hours work approval request form

Has respite periods for OOHW been identified with the affected community on a monthly basis and a three-month schedule of likely OOHW provided (refer CoA E29)?

Yes, OOHW identified in a 3 monthly look-ahead notification which covers likely OOHW. May notification will be delivered to the community on 03/05/22. Refer to **Appendix B** for three month Lookahead.

Previous out of hours works is scheduled to be completed on 25/05/22 providing 18 days respite for the most impacted residents.

Has the outcome of community consultation, the identified respite periods and scheduling of likely OOHW been provided to the ER, EPA and Planning Secretary?

The outcomes of community consultation, the identified respite periods and likely schedule of OOHW is provided to the ER, EPA and the Planning Secretary on a monthly basis. Transport for NSW also provides this information to the ER and Planning Secretary through the OOHW application process when relevant to OOHW, and when approval is sought.

G. Respite framework

Outline any previous respite within the last month and the status of community agreements (where relevant)?

The previous block of out of hours work is scheduled to finish on 25/05/22 providing 18 nights respite for the most impacted residents (81 to 85 Lookout Road).

Have cumulative impacts from OOHW permitted by an EPL been considered during the development appropriate respite?

N/A

H. Details of non-residential receivers (if any) and corresponding NMLs

Comments:

Using the current noise assessment software it is noted that noise at the nearby sensitive receiver of John Hunter Hospital will not exceed the NML of 38db(A) during the planned works.

I. Are there any properties at risk of exceeding the screening criteria for cosmetic damage?

Comments:

No

I. Review/ Endorsements

Contractor Community Liaison Representative

Date: 27 April 2022

The affected sensitive receivers will be notified no later than 5 days prior to start of work via letter.

Have the works been reviewed and endorsed?

Yes

Name:

Signature:

Date:

██████████

██████████

27/02/22

Comments:

Out of hours work approval request form

Transport for NSW Environmental Manager (or delegate)	Agreed mitigation measures:		
	Have the works been reviewed and endorsed?		Yes / No
	Have the works been approved where neither low or high risk?		Yes / No
	Name:	Signature:	Date:
	██████████	██████████	28/04/2022
Comments:			
Transport for NSW Project Manager	Have the works been reviewed and endorsed?		Yes / No
	Have the works been approved where neither low or high risk?		Yes / No
	Name:	Signature:	Date:
	██████████	██████████	28/04/2022
	Comments:		
ER approval (low risk activities)	Are the works approved?		Yes / No
	Name:	Signature:	Date:
	██████████	██████████	20/05/2022
	Comments:		
Planning Secretary approval (high risk activities)	Are the works approved?		Yes / No
	Name:	Signature:	Date:
	Comments:		

Appendix A – Detailed Schedule of Activities

SHIFT NO.	PLANNED DATE	LOCATION	ACTIVITIES & SEQUENCE	PLANT USED	REF. NOISE ASSESSMENTS
1	Mon, 13 Jun 22	Lookout Rd - SB Carriageway CH7700 to 7800	1900 - 1930: Complete pre-start briefing with project team at compound 1930 - 1945: Set up traffic control and close southbound lanes 2015 - 2030: Mobilise equipment to the work area 2030 - 0100: Form and pour concrete footpath slabs 0100 - 0345: Grout fill redundant sewer line 0345 - 0415: Clean up and de-mobilise from roadway 0415 - 0500: Remove traffic control and reopen lanes to traffic 0100 - 0600: Footpath Concrete Curing 0600 - 0630: Re-open footpaths to pedestrians	Lighting Tower x 2 Light Vehicle Concrete Agitator Truck Concrete Vibrator	Shift 1.1 - NCA13
		Lookout Rd - NB & SB Carriageways CH7140 to 7160	1900 - 1930: Complete pre-start briefing with project team at compound 1930 - 1945: Set up traffic control and close northbound and southbound lanes 2015 - 2030: Mobilise equipment to the work area 2030 - 0030: Form and pour SF Kerb for median islands 0030 - 0100: Clean up and de-mobilise from the roadway 0100 - 0415: Concrete Curing 0415 - 0500: Remove traffic control and reopen lanes to traffic	Lighting Tower Light Vehicle Concrete Agitator Truck	Shift 1.2 - NCA13
2	Tue, 14 Jun 22	Lookout Rd - NB Carriageway CH7700 to CH7800 McCaffrey Drive - EB Shoulder	1900 - 1930: Complete pre-start briefing with project team at compound 1930 - 1945: Set up traffic control and close southbound lanes 2015 - 2030: Mobilise equipment to the work area 2030 - 2330: Form and pour concrete footpath slabs on Lookout Road NB 2330 - 0230: Form and pour concrete footpath slabs on McCaffrey Drive EB 0230 - 0315: Clean up and de-mobilise from roadway 0315 - 0400: Remove traffic control and reopen lanes to traffic 0230 - 0600: Concrete Curing 0600 - 0630: Re-open footpaths to pedestrians	Lighting Tower x 2 Light Vehicle Concrete Agitator Truck Concrete Vibrator Truck (10Tonne) 6T Excavator Plate Compactor	Shift 2 - NCA13 Shift2 - NCA10
3	Wed, 15 Jun 22	Lookout Rd - NB & SB Carriageways CH7140 to 7160	1900 - 1930: Complete pre-start briefing with project team at compound 1930 - 1945: Set up traffic control 2015 - 2030: Mobilise equipment to the work area 2030 - 2330: Mill out existing temporary asphalt pavement NB & SB Median Lanes 2330 - 0345: Place Asphalt Pavement Wearing course to NB & SB Median Lanes 0345 - 0415: Clean up and de-mobilise from roadway 0415 - 0500: Remove traffic control and reopen lanes to traffic	Lighting Towers x 2 Asphalt Paver Trucks Rollers (static)	Shift 3 and 4 - NCA13
		Grandview Road Verge and Lookout Rd Cul-de-sac	1900 - 1930: Complete pre-start briefing with project team at compound 1930 - 1945: Set up traffic control and close northbound and southbound lanes 2015 - 2030: Mobilise equipment to the work area 2030 - 1000: Sawcut and remove temporary asphalt 1000 - 0030: Install permanent asphalt trench reinstatements 0415 - 0500: Remove traffic control and reopen lanes to traffic	Lighting Tower Truck (10 Tonne) 6T Excavator 20T Roller (static)	Shift 3 - NCA13
4	Thu, 16 Jun 22	Lookout Rd - NB & SB Carriageways CH7140 to 7160	1900 - 1930: Complete pre-start briefing with project team at compound 1930 - 1945: Set up traffic control 2015 - 2030: Mobilise equipment to the work area 2030 - 2330: Mill out existing temporary asphalt pavement NB & SB Median Lanes 2330 - 0345: Place Asphalt Pavement Wearing course to NB & SB Median Lanes 0345 - 0415: Clean up and de-mobilise from roadway 0415 - 0500: Remove traffic control and reopen lanes to traffic	Lighting Towers x 2 Asphalt Paver Trucks Rollers (static)	Shift 3 and 4 - NCA13

SHIFT NO.	PLANNED DATE	LOCATION	ACTIVITIES & SEQUENCE	PLANT USED	REF. NOISE ASSESSMENTS
<i>RESPITE PERIOD</i>					
5	Mon, 20 Jun 22	McCaffrey Drive - EB Shoulder	1900 - 1930: Complete pre-start briefing with project team at compound 1930 - 1945: Set up traffic control 2015 - 2030: Mobilise equipment to the work area 2030 - 2330: Mill out existing asphalt shoulder pavement 2330 - 0030: Place emulsion primer seal 0030 - 0115: Clean up and de-mobilise from roadway 0415 - 0500: Remove traffic control and reopen lanes to traffic	Lighting Towers x 2 Small Multi Tyred Roller Bobcat & profiler Trucks	Shift 5 and 6 - NCA13 Shift 5 and 6 - NCA10
6	Tue, 21 Jun 22	McCaffrey Drive - EB Shoulder	1901 - 1930: Complete pre-start briefing with project team at compound 1930 - 1945: Set up traffic control 2015 - 2030: Mobilise equipment to the work area 2030 - 0130: Place asphalt wearing course to shoulder pavement 0130 - 0215: Clean up and de-mobilise from roadway 0215 - 0300: Remove traffic control and reopen lanes to traffic	Lighting Towers x 2 Small Multi Tyred Roller Bobcat & profiler Trucks	Shift 5 and 6 - NCA13 Shift 5 and 6 - NCA10
7	Wed, 22 Jun 22	Lookout Rd CH7220 to 7460	1900 - 1930: Complete pre-start briefing with project team at compound 1930 - 1945: Set up traffic control and close northbound and southbound lanes 2015 - 2030: Mobilise equipment to the work area 2030 - 0400: Complete Line Removal and Linemarking for SB Traffic Switch 0345 - 0415: Clean up, reinstate bollards and barrier boards and de-mobilise from median 0415 - 0500: Remove traffic control and reopen lanes to traffic	Lighting Towers x 2 Linemarking truck Linemarking removal Unit	Shift 7 - NCA 13

Appendix B - RP2J - Southern Utilities - Noise Impact Assessments

Construction noise impact assessment

June Nightwork			
Proposed works	Footpath Restoration		
Proponent	Quickway		
Assessment Date	22/04/2022		
Prepared by		Assessment Id	Shift1.1-NCA13

Introduction

This report has been prepared using the construction noise self-assessment platform KNOWnoise: *Minor Works* and presents an assessment of the likely noise impacts related to proposed works associated with the above project. Where possible, these works would be completed during standard construction hours; however, there may be a need to work outside these hours due to technical, community or access limitations. The location of the proposed works is illustrated in Appendix A.

Planned works

A description of the proposed works is as follows.

Form and Pour concrete footpath on Lookout Road Southbound

Proposed activities and equipment for the works are summarised in Appendix B.

Though subject to change, the works are expected to commence around 20/06/2022 and would be completed by 21/06/2022.

Assessment criteria and mitigation requirements

The Interim Construction Noise Guideline (ICNG) (DECC 2009) describes noise more than the background level as potentially having an adverse impact on sensitive receivers and increasing the likelihood of complaint. During standard construction hours, where construction noise is within 10 dB(A) of the RBL, impacts would be acceptable.

Where construction noise is more than 10 dB(A) above the RBL during standard construction hours, a residential receiver is considered noise affected and the proponent should undertake all reasonable and feasible steps necessary to manage the impact and consult with the affected community.

Above a LAeq, 15 minute noise level of 75 dB(A), a receiver is highly affected, requiring consideration of additional mitigation measures including alternative accommodation in the night period.

Outside standard construction hours, construction noise at a residential receiver more than 5 dB(A) above the RBL is taken to be noise affected.

In addition, annoying noise such as rock hammers, impact piling, or other impulsive noise sources usually result in greater annoyance than continuous construction noise. A 5 dB(A) penalty is applicable to such activities prior to comparison with the NMLs.

Other sensitive land uses, such as schools and offices, typically find noise from construction disruptive when the properties are being used (such as during work and school times). Table 2 presents NMLs from the ICNG for sensitive land uses based on the principle that the characteristic activities for each of these land uses should not be unduly disturbed.

Table 1 Non-residential sensitive land uses noise management levels

Land use	Noise assessment location	NML (L _{Aeq,15min})
Classrooms at schools and other educational institutions	Internal	45
Places of worship		
Active recreation areas (such as sporting activities and activities which generate their own noise or focus for participants)	External	65
Passive recreation areas (contemplative activities that generate little noise and where benefits are compromised by external noise intrusion, for example, reading, meditation)	External	60
Industrial premises	External	75
Office, retail outlets	External	70

As part of planning for out of hours works, standard mitigation measures, as described in the ICNG and CNVG, would be implemented where reasonable and feasible. However, after these measures have been applied, noise and vibration levels may continue to exceed the NMLs.

In this case, additional mitigation measures outlined in the CNVG, which largely focus on engagement with affected sensitive receivers, should be implemented where reasonable and feasible, unless other agreements are in place with the impacted receiver.

Triggers and additional mitigation measures for airborne noise are summarised in Table 2. Further details of specific additional mitigation measures are described in the CNVG.

Table 2 Triggers for additional mitigation measures – Airborne noise (Roads and Maritime 2016)

Predicted airborne LAeq(15min) noise level at receiver			
Perception	dB(A) above RBL	dB(A) above NML	Additional mitigation measures
All hours			
75 dB(A) or greater			N, V, PC, RO
Standard hours: Mon - Fri (7am – 6pm), Sat (8am – 1pm), Sun/Pub Hol (Nil)			
Noticeable	5 to 10	0	-
Clearly audible	10 to 20	< 10	-
Moderately intrusive	20 to 30	10 to 20	N, V
Highly intrusive	> 30	> 20	N, V
OOHW Period 1: Mon – Fri (6pm – 10pm), Sat (7am – 8am & 1pm – 10pm), Sun/Pub Hol (8am – 6pm)			
Noticeable	5 to 10	<5	-
Clearly audible	10 to 20	5 to 15	N, R1, DR
Moderately intrusive	20 to 30	15 to 25	V, N, R1, DR
Highly intrusive	> 30	>25	V, IB, N, R1, DR, PC, SN
OOHW Period 2: Mon – Fri (10pm – 7am), Sat (10pm – 8am), Sun/Pub Hol (6pm – 7am)			
Noticeable	5 to 10	<5	N
Clearly audible	10 to 20	5 to 15	V, N, R2, DR
Moderately intrusive	20 to 30	15 to 25	V, IB, N, PC, SN, R2, DR
Highly intrusive	> 30	>25	AA, V, IB, N, PC, SN, R2, DR

Notes:

PC = Phone calls
 V = verification
 IB = Individual briefings
 N= Notification
 AA = Alternative accommodation

SN = Specific notifications
 RO = Respite offer
 R1 = Respite period 1
 R2 = Respite period 2
 DR = Duration respite

Perception = relates to levels above RBL
 NML = Noise management level
 HA = Highly affected

Existing environment and noise management levels

The proposed works would be undertaken in a predominantly Urban, characterised as:

Areas with medium density transportation or some commerce or industry.

Typically traffic is moving from one area to another (light & heavy vehicles) with heavy peak hour traffic movement.

May be on or close to bus route/ light rail.

Background noise levels adopted for the project area and associated noise management levels (NMLs) are summarised in Table 3. NMLs have been established in line with the ICNG.

Table 3 Construction NMLs

Land use	Urban		Using custom background noise data?			Yes
	Day	Weekend Day	Evening	Night	Sleep	
RBL	56	56	49	33		
NML	61	61	54	38	38	

Sleep disturbance

The ICNG recommends where construction works are planned to extend over more than two consecutive nights, the maximum noise level should be considered for the purposes of establishing the likelihood of sleep disturbance. The Road Noise Policy suggests that maximum internal noise levels below 50-55 dB(A) are unlikely to awaken people from sleep and one or two noise events per night, with maximum internal noise levels of 65-70 dB(A) are not likely to affect health and wellbeing significantly.

Based on this, a sleep awakening criterion of 55 dB(A) (internal) is typically adopted for works. Given that noise attenuation of 10 dB(A) is typically provided by an open window, a sleep awakening criterion of L_{Amax} 65 dB(A) (external) has been applied to residential bedroom façades. This is consistent with the sleep disturbance threshold described in Appendix E of the CNVG.

Assessment methodology

Based on the nominated works area (illustrated in Appendix A), proposed equipment and the minimum distance from the works to each sensitive receiver, noise levels were calculated based on CONCAWE (1981) *Propagation of noise from petroleum and petrochemical complexes to neighboring communities*.

This method considers geometric spreading, atmospheric absorption, ground effects and is valid for meteorological conditions of a gentle breeze from source to receiver and stable atmosphere (temperature inversion).

KNOWnoise: Minor works is a 2-Dimensional assessment platform and does not consider terrain effects (e.g. hills, valleys) or the presence of solid structures such as homes or noise barriers. This will result in a conservative prediction, suitable for the project being assessed.

Considering the nature of the works and the type of surrounding land uses, sensitive receivers up to a radius of 600 metres from the works have been included in the assessment.

Sound power levels and predicted noise levels depend on the number of plant items operating at any one time and their precise location relative to a sensitive receiver. Equipment was assumed to be working at the worst-case location relative to each receiver and represents a worst-case assessment. Where the activity is further away from receivers or less equipment is used the predicted levels will decrease.

Sound power levels for plant and equipment expected to be used for each activity has been estimated based on guidance in the following standards and guidelines as well as typical measured noise levels for specific equipment.

- “ Australian Standard AS2436-2010: Guide to noise and vibration control on construction, demolition and maintenance sites
- “ Construction Noise and Vibration Strategy 7TP-ST-157/2.0 (CNVS), (TfNSW, 2018)
- “ Construction Noise and Vibration Guideline (CNVG) (Roads and Maritime Services, 2016)

- “ British Standard 5228-1:2009 Code of practice for noise and vibration control on construction and open sites
- “ United Kingdom Department for Environment, Food and Rural Affairs (DEFRA) Noise database for prediction of noise on construction and open sites

Construction noise sources and associated sound power levels are listed in Appendix B. The maximum predicted LAeq noise level within the work area was identified for each receiver.

Predicted noise levels

Detailed predicted noise levels for each potentially affected receiver are presented Appendix C.

A summary of predicted noise levels in comparison with ICNG assessment criteria for the Night period is presented in Table 4.

Table 4 Summary of predicted noise levels with comparison against ICNG criteria for the Night period.

Criterion	Predicted number of receivers
Maximum cumulative predicted L _{Aeq, 15 minute} noise level	57 dB(A)
Number of highly noise affected receivers (>75 dB)	0
1 – 10 dB above NML	3
10 – 20 dB above NML	3
20+ dB above NML	0

For works outside standard hours, up to 0 receivers are predicted to be classified as Highly Impacted during the Night period. A summary of the number of receivers in each class is presented in Table 5.

Table 5 Summary of predicted noise levels with comparison against CNVG criteria

Impact class	Predicted noise level	Predicted number of receivers
Noticeable	1 – 5 dB above NML	2
Clearly audible	5 – 15 dB above NML	3
Moderately impacted	15 – 25 dB above NML	2
Highly Impacted	> 25 dB above NML	0

Predicted impact classes for the Night period are illustrated graphically in Appendix C. Each identified receiver in the study area has been coloured to highlight the predicted level of impact.

Sleep disturbance

In the event works are planned for more than two consecutive nights, up to 0 are expected to exceed the sleep awakening criteria. Where any exceedances if the awakening criteria are predicted, additional care should be taken and mitigation measures implemented in the with the CNVG.

Proposed noise mitigation measures

The safeguards and controls listed in Table 6 will be implemented where reasonable and feasible with the intention of achieving the project noise criteria and to maintain noise impacts at a practical minimum.

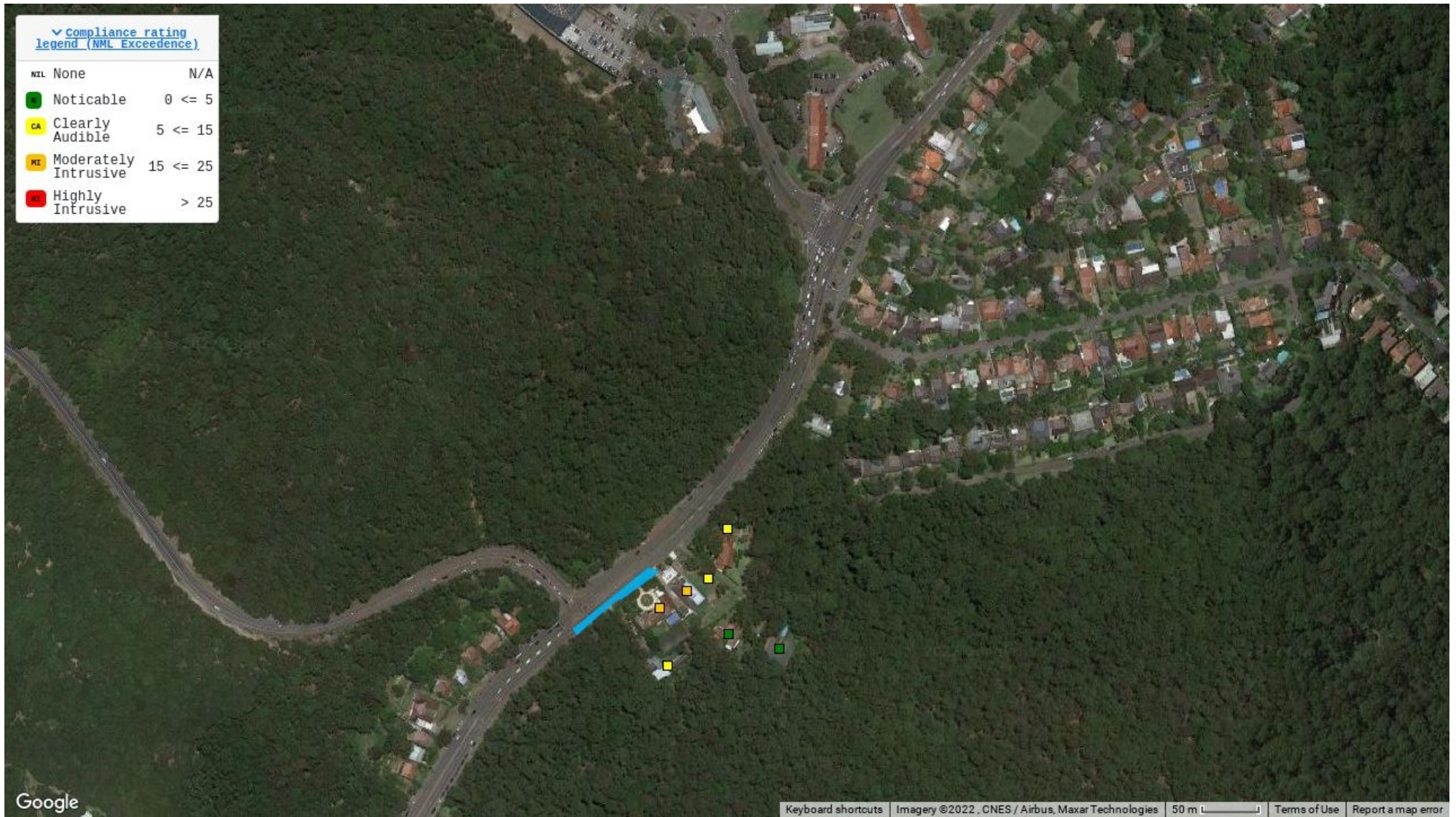
Table 6 Safeguards and controls

Action	Description
Community consultation or notification	<p>Notify the affected community.</p> <p>The notification will detail work activities, dates and hours, impacts and mitigation measures, indication of work schedule over the night time period, any operational noise benefits from the works (where applicable) and contact telephone number.</p> <p>Notification should be a minimum of 7 calendar days prior to the start of works. For projects other than maintenance works more advanced consultation or notification may be required.</p>
Site inductions	<p>All employees, contractors and subcontractors are to receive an environmental induction. The induction would at least include:</p> <ul style="list-style-type: none"> • all project specific and relevant standard noise and vibration mitigation measures • relevant licence and approval conditions • permissible hours of work • any limitations on high noise generating activities • location of nearest sensitive receivers • construction employee parking areas • designated loading/unloading areas and procedures <p>site opening/closing times (including deliveries) environmental incident procedures</p>
Behaviour	<p>No swearing or unnecessary shouting or loud stereos/radios on site.</p> <p>Limit compression braking at night in residential areas.</p> <p>No dropping of materials from height, throwing of metal items and slamming of doors.</p>
Verification	<p>Where indicated in Appendix C, a noise verification program would be undertaken for the duration of the works.</p>
Construction hours	<p>Where feasible and reasonable, construction should be carried out during the standard daytime working hours. Work generating high noise and/or vibration levels should be scheduled during less sensitive time periods.</p>
Respite for out-of-hours works	<p>Respite would be scheduled as indicated in Appendix C and described in the CNVG.</p>
Equipment selection	<p>Use quieter construction methods where feasible and reasonable.</p> <p>Ensure plant including the silencer is well maintained.</p> <p>Plant noise levels will have an operating noise emission level compliant with Appendix F of the CNVG</p>
Use and siting of plant	<p>The offset distance between noisy plant and adjacent sensitive receivers is to be maximised.</p> <p>Plant used intermittently to be throttled down or shut down.</p> <p>Noise-emitting plant to be directed away from sensitive receivers.</p>

Construction noise impact statement

Action	Description
Plan worksites and activities to minimise noise and vibration.	<p>Locate compounds away from sensitive receivers and discourage access from local roads.</p> <p>Plan traffic flow, parking and loading/unloading areas to minimise reversing movements within the site.</p> <p>Where additional activities or plant may only result in a marginal noise increase and speed up works, consider limiting duration of impact by concentrating noisy activities at one location and move to another as quickly as possible.</p> <p>Very noise activities should be scheduled for normal working hours. If the work can not be undertaken during the day, it should be completed before 11:00pm.</p> <p>Where practicable, work should be scheduled to avoid major student examination periods when students are studying for examinations such as before or during Higher School Certificate and at the end of higher education semesters.</p>
Non-tonal reverse alarms	Non-tonal reversing beepers (or an equivalent mechanism) must be fitted and used on all construction vehicles and mobile plant regularly used on site and for any out of hours work.
Shield stationary noise sources such as pumps, generators, and compressors	These should be enclosed or shielded where reasonable and feasible.
Implement any project specific mitigation measures	
1	None

Appendix A Project location and predicted level of impact



Appendix B Proposed activities and equipment

Concrete Placement & Finishing

Equipment	Quantity	Usage	Reduction	SWL
Concrete Truck / Agitator - discharging	1	10 %	3	86
Concrete Vibrator	1	10 %	3	87
Daymakers / Lighting plant	2	100 %	5	91
Light vehicle	1	20 %	3	75

Activity Sound Power Level: 93

Appendix C Detailed noise predicted for each receiver and activity

Assessment: Footpath Restoration				Night	Results summary		
NCA	ID	Address	Land use	NML	Cumulative Predicted LAeq, 15 minute noise level	Exceedance of NML, dB	Impact classification
NCA 13	696033	79 LOOKOUT ROAD NEW LAMBTON HEIGHTS	RES	38	45	7	Clearly Audible
NCA 13	696008	79A LOOKOUT ROAD NEW LAMBTON HEIGHTS	RES	38	43	5	Noticable
NCA 13	696007	79B LOOKOUT ROAD NEW LAMBTON HEIGHTS	RES	38	38	0	Noticable
NCA 13	696005	85 LOOKOUT ROAD NEW LAMBTON HEIGHTS	RES	38	44	6	Clearly Audible
NCA 13	695993	81 LOOKOUT ROAD NEW LAMBTON HEIGHTS	RES	38	56	18	Moderately Intrusive
NCA 13	695964	83 LOOKOUT ROAD NEW LAMBTON HEIGHTS	RES	38	57	19	Moderately Intrusive
NCA 13	695962	81A LOOKOUT ROAD NEW LAMBTON HEIGHTS	RES	38	51	13	Clearly Audible

Construction noise impact assessment

June Nightwork			
Proposed works	Median Kerb Restoration		
Proponent	Quickway		
Assessment Date	22/04/2022		
Prepared by	[REDACTED]	Assessment Id	Shift1.2-NCA13

Introduction

This report has been prepared using the construction noise self-assessment platform KNOWnoise: *Minor Works* and presents an assessment of the likely noise impacts related to proposed works associated with the above project. Where possible, these works would be completed during standard construction hours; however, there may be a need to work outside these hours due to technical, community or access limitations. The location of the proposed works is illustrated in Appendix A.

Planned works

A description of the proposed works is as follows.

Form and Pour Type SF Kerb for Lookout Road Median Island Restoration

Proposed activities and equipment for the works are summarised in Appendix B.

Though subject to change, the works are expected to commence around 20/06/2022 and would be completed by 21/06/2022.

Assessment criteria and mitigation requirements

The Interim Construction Noise Guideline (ICNG) (DECC 2009) describes noise more than the background level as potentially having an adverse impact on sensitive receivers and increasing the likelihood of complaint. During standard construction hours, where construction noise is within 10 dB(A) of the RBL, impacts would be acceptable.

Where construction noise is more than 10 dB(A) above the RBL during standard construction hours, a residential receiver is considered noise affected and the proponent should undertake all reasonable and feasible steps necessary to manage the impact and consult with the affected community.

Above a LAeq, 15 minute noise level of 75 dB(A), a receiver is highly affected, requiring consideration of additional mitigation measures including alternative accommodation in the night period.

Outside standard construction hours, construction noise at a residential receiver more than 5 dB(A) above the RBL is taken to be noise affected.

In addition, annoying noise such as rock hammers, impact piling, or other impulsive noise sources usually result in greater annoyance than continuous construction noise. A 5 dB(A) penalty is applicable to such activities prior to comparison with the NMLs.

Other sensitive land uses, such as schools and offices, typically find noise from construction disruptive when the properties are being used (such as during work and school times). Table 2 presents NMLs from the ICNG for sensitive land uses based on the principle that the characteristic activities for each of these land uses should not be unduly disturbed.

Table 1 Non-residential sensitive land uses noise management levels

Land use	Noise assessment location	NML (L _{Aeq,15min})
Classrooms at schools and other educational institutions	Internal	45
Places of worship		
Active recreation areas (such as sporting activities and activities which generate their own noise or focus for participants)	External	65
Passive recreation areas (contemplative activities that generate little noise and where benefits are compromised by external noise intrusion, for example, reading, meditation)	External	60
Industrial premises	External	75
Office, retail outlets	External	70

As part of planning for out of hours works, standard mitigation measures, as described in the ICNG and CNVG, would be implemented where reasonable and feasible. However, after these measures have been applied, noise and vibration levels may continue to exceed the NMLs.

In this case, additional mitigation measures outlined in the CNVG, which largely focus on engagement with affected sensitive receivers, should be implemented where reasonable and feasible, unless other agreements are in place with the impacted receiver.

Triggers and additional mitigation measures for airborne noise are summarised in Table 2. Further details of specific additional mitigation measures are described in the CNVG.

Table 2 Triggers for additional mitigation measures – Airborne noise (Roads and Maritime 2016)

Predicted airborne LAeq(15min) noise level at receiver			
Perception	dB(A) above RBL	dB(A) above NML	Additional mitigation measures
All hours			
75 dB(A) or greater			N, V, PC, RO
Standard hours: Mon - Fri (7am – 6pm), Sat (8am – 1pm), Sun/Pub Hol (Nil)			
Noticeable	5 to 10	0	-
Clearly audible	10 to 20	< 10	-
Moderately intrusive	20 to 30	10 to 20	N, V
Highly intrusive	> 30	> 20	N, V
OOHW Period 1: Mon – Fri (6pm – 10pm), Sat (7am – 8am & 1pm – 10pm), Sun/Pub Hol (8am – 6pm)			
Noticeable	5 to 10	<5	-
Clearly audible	10 to 20	5 to 15	N, R1, DR
Moderately intrusive	20 to 30	15 to 25	V, N, R1, DR
Highly intrusive	> 30	>25	V, IB, N, R1, DR, PC, SN
OOHW Period 2: Mon – Fri (10pm – 7am), Sat (10pm – 8am), Sun/Pub Hol (6pm – 7am)			
Noticeable	5 to 10	<5	N
Clearly audible	10 to 20	5 to 15	V, N, R2, DR
Moderately intrusive	20 to 30	15 to 25	V, IB, N, PC, SN, R2, DR
Highly intrusive	> 30	>25	AA, V, IB, N, PC, SN, R2, DR

Notes:

PC = Phone calls
 V = verification
 IB = Individual briefings
 N= Notification
 AA = Alternative accommodation

SN = Specific notifications
 RO = Respite offer
 R1 = Respite period 1
 R2 = Respite period 2
 DR = Duration respite

Perception = relates to levels above RBL
 NML = Noise management level
 HA = Highly affected

Existing environment and noise management levels

The proposed works would be undertaken in a predominantly Urban, characterised as:

Areas with medium density transportation or some commerce or industry.

Typically traffic is moving from one area to another (light & heavy vehicles) with heavy peak hour traffic movement.

May be on or close to bus route/ light rail.

Background noise levels adopted for the project area and associated noise management levels (NMLs) are summarised in Table 3. NMLs have been established in line with the ICNG.

Table 3 Construction NMLs

Land use	Urban		Using custom background noise data?			Yes
	Day	Weekend Day	Evening	Night	Sleep	
RBL	56	56	49	33		
NML	61	61	54	38	38	

Sleep disturbance

The ICNG recommends where construction works are planned to extend over more than two consecutive nights, the maximum noise level should be considered for the purposes of establishing the likelihood of sleep disturbance. The Road Noise Policy suggests that maximum internal noise levels below 50-55 dB(A) are unlikely to awaken people from sleep and one or two noise events per night, with maximum internal noise levels of 65-70 dB(A) are not likely to affect health and wellbeing significantly.

Based on this, a sleep awakening criterion of 55 dB(A) (internal) is typically adopted for works. Given that noise attenuation of 10 dB(A) is typically provided by an open window, a sleep awakening criterion of L_{Amax} 65 dB(A) (external) has been applied to residential bedroom façades. This is consistent with the sleep disturbance threshold described in Appendix E of the CNVG.

Assessment methodology

Based on the nominated works area (illustrated in Appendix A), proposed equipment and the minimum distance from the works to each sensitive receiver, noise levels were calculated based on CONCAWE (1981) *Propagation of noise from petroleum and petrochemical complexes to neighboring communities*.

This method considers geometric spreading, atmospheric absorption, ground effects and is valid for meteorological conditions of a gentle breeze from source to receiver and stable atmosphere (temperature inversion).

KNOWnoise: Minor works is a 2-Dimensional assessment platform and does not consider terrain effects (e.g. hills, valleys) or the presence of solid structures such as homes or noise barriers. This will result in a conservative prediction, suitable for the project being assessed.

Considering the nature of the works and the type of surrounding land uses, sensitive receivers up to a radius of 600 metres from the works have been included in the assessment.

Sound power levels and predicted noise levels depend on the number of plant items operating at any one time and their precise location relative to a sensitive receiver. Equipment was assumed to be working at the worst-case location relative to each receiver and represents a worst-case assessment. Where the activity is further away from receivers or less equipment is used the predicted levels will decrease.

Sound power levels for plant and equipment expected to be used for each activity has been estimated based on guidance in the following standards and guidelines as well as typical measured noise levels for specific equipment.

- “ Australian Standard AS2436-2010: Guide to noise and vibration control on construction, demolition and maintenance sites
- “ Construction Noise and Vibration Strategy 7TP-ST-157/2.0 (CNVS), (TfNSW, 2018)
- “ Construction Noise and Vibration Guideline (CNVG) (Roads and Maritime Services, 2016)

- “ British Standard 5228-1:2009 Code of practice for noise and vibration control on construction and open sites
- “ United Kingdom Department for Environment, Food and Rural Affairs (DEFRA) Noise database for prediction of noise on construction and open sites

Construction noise sources and associated sound power levels are listed in Appendix B. The maximum predicted LAeq noise level within the work area was identified for each receiver.

Predicted noise levels

Detailed predicted noise levels for each potentially affected receiver are presented Appendix C.

A summary of predicted noise levels in comparison with ICNG assessment criteria for the Night period is presented in Table 4.

Table 4 Summary of predicted noise levels with comparison against ICNG criteria for the Night period.

Criterion	Predicted number of receivers
Maximum cumulative predicted L _{Aeq, 15 minute} noise level	42 dB(A)
Number of highly noise affected receivers (>75 dB)	0
1 – 10 dB above NML	0
10 – 20 dB above NML	0
20+ dB above NML	0

For works outside standard hours, up to 0 receivers are predicted to be classified as Highly Impacted during the Night period. A summary of the number of receivers in each class is presented in Table 5.

Table 5 Summary of predicted noise levels with comparison against CNVG criteria

Impact class	Predicted noise level	Predicted number of receivers
Noticeable	1 – 5 dB above NML	0
Clearly audible	5 – 15 dB above NML	0
Moderately impacted	15 – 25 dB above NML	0
Highly Impacted	> 25 dB above NML	0

Predicted impact classes for the Night period are illustrated graphically in Appendix C. Each identified receiver in the study area has been coloured to highlight the predicted level of impact.

Sleep disturbance

In the event works are planned for more than two consecutive nights, up to 0 are expected to exceed the sleep awakening criteria. Where any exceedances if the awakening criteria are predicted, additional care should be taken and mitigation measures implemented in the with the CNVG.

Proposed noise mitigation measures

The safeguards and controls listed in Table 6 will be implemented where reasonable and feasible with the intention of achieving the project noise criteria and to maintain noise impacts at a practical minimum.

Table 6 Safeguards and controls

Action	Description
Community consultation or notification	<p>Notify the affected community.</p> <p>The notification will detail work activities, dates and hours, impacts and mitigation measures, indication of work schedule over the night time period, any operational noise benefits from the works (where applicable) and contact telephone number.</p> <p>Notification should be a minimum of 7 calendar days prior to the start of works. For projects other than maintenance works more advanced consultation or notification may be required.</p>
Site inductions	<p>All employees, contractors and subcontractors are to receive an environmental induction. The induction would at least include:</p> <ul style="list-style-type: none"> • all project specific and relevant standard noise and vibration mitigation measures • relevant licence and approval conditions • permissible hours of work • any limitations on high noise generating activities • location of nearest sensitive receivers • construction employee parking areas • designated loading/unloading areas and procedures <p>site opening/closing times (including deliveries) environmental incident procedures</p>
Behaviour	<p>No swearing or unnecessary shouting or loud stereos/radios on site.</p> <p>Limit compression braking at night in residential areas.</p> <p>No dropping of materials from height, throwing of metal items and slamming of doors.</p>
Verification	<p>Where indicated in Appendix C, a noise verification program would be undertaken for the duration of the works.</p>
Construction hours	<p>Where feasible and reasonable, construction should be carried out during the standard daytime working hours. Work generating high noise and/or vibration levels should be scheduled during less sensitive time periods.</p>
Respite for out-of-hours works	<p>Respite would be scheduled as indicated in Appendix C and described in the CNVG.</p>
Equipment selection	<p>Use quieter construction methods where feasible and reasonable.</p> <p>Ensure plant including the silencer is well maintained.</p> <p>Plant noise levels will have an operating noise emission level compliant with Appendix F of the CNVG</p>
Use and siting of plant	<p>The offset distance between noisy plant and adjacent sensitive receivers is to be maximised.</p> <p>Plant used intermittently to be throttled down or shut down.</p> <p>Noise-emitting plant to be directed away from sensitive receivers.</p>

Construction noise impact statement

Action	Description
Plan worksites and activities to minimise noise and vibration.	<p>Locate compounds away from sensitive receivers and discourage access from local roads.</p> <p>Plan traffic flow, parking and loading/unloading areas to minimise reversing movements within the site.</p> <p>Where additional activities or plant may only result in a marginal noise increase and speed up works, consider limiting duration of impact by concentrating noisy activities at one location and move to another as quickly as possible.</p> <p>Very noise activities should be scheduled for normal working hours. If the work can not be undertaken during the day, it should be completed before 11:00pm.</p> <p>Where practicable, work should be scheduled to avoid major student examination periods when students are studying for examinations such as before or during Higher School Certificate and at the end of higher education semesters.</p>
Non-tonal reverse alarms	Non-tonal reversing beepers (or an equivalent mechanism) must be fitted and used on all construction vehicles and mobile plant regularly used on site and for any out of hours work.
Shield stationary noise sources such as pumps, generators, and compressors	These should be enclosed or shielded where reasonable and feasible.
Implement any project specific mitigation measures	
1	None

Appendix A Project location and predicted level of impact



Appendix B Proposed activities and equipment

Concrete Placement & Finishing

Equipment	Quantity	Usage	Reduction	SWL
Concrete Truck / Agitator - discharging	1	10 %	3	86
Daymakers / Lighting plant	1	100 %	3	90
Light vehicle	1	10 %	3	72

Activity Sound Power Level: 92

Appendix C Detailed noise predicted for each receiver and activity

Assessment: Median Kerb Restoration				Night	Results summary		
NCA	ID	Address	Land use	NML	Cumulative Predicted LAeq, 15 minute noise level	Exceedance of NML, dB	Impact classification

Construction noise impact assessment

June Nightwork			
Proposed works	Footpath Restoration		
Proponent	Quickway		
Assessment Date	22/04/2022		
Prepared by		Assessment Id	Shift2-NCA13

Introduction

This report has been prepared using the construction noise self-assessment platform KNOWnoise: *Minor Works* and presents an assessment of the likely noise impacts related to proposed works associated with the above project. Where possible, these works would be completed during standard construction hours; however, there may be a need to work outside these hours due to technical, community or access limitations. The location of the proposed works is illustrated in Appendix A.

Planned works

A description of the proposed works is as follows.

Remove Existing Footpath Slabs, Prepare base, Form and Pour Concrete Footpath

Proposed activities and equipment for the works are summarised in Appendix B.

Though subject to change, the works are expected to commence around 21/06/2022 and would be completed by 22/06/2022.

Assessment criteria and mitigation requirements

The Interim Construction Noise Guideline (ICNG) (DECC 2009) describes noise more than the background level as potentially having an adverse impact on sensitive receivers and increasing the likelihood of complaint. During standard construction hours, where construction noise is within 10 dB(A) of the RBL, impacts would be acceptable.

Where construction noise is more than 10 dB(A) above the RBL during standard construction hours, a residential receiver is considered noise affected and the proponent should undertake all reasonable and feasible steps necessary to manage the impact and consult with the affected community.

Above a LAeq, 15 minute noise level of 75 dB(A), a receiver is highly affected, requiring consideration of additional mitigation measures including alternative accommodation in the night period.

Outside standard construction hours, construction noise at a residential receiver more than 5 dB(A) above the RBL is taken to be noise affected.

In addition, annoying noise such as rock hammers, impact piling, or other impulsive noise sources usually result in greater annoyance than continuous construction noise. A 5 dB(A) penalty is applicable to such activities prior to comparison with the NMLs.

Other sensitive land uses, such as schools and offices, typically find noise from construction disruptive when the properties are being used (such as during work and school times). Table 2 presents NMLs from the ICNG for sensitive land uses based on the principle that the characteristic activities for each of these land uses should not be unduly disturbed.

Table 1 Non-residential sensitive land uses noise management levels

Land use	Noise assessment location	NML (L _{Aeq,15min})
Classrooms at schools and other educational institutions	Internal	45
Places of worship		
Active recreation areas (such as sporting activities and activities which generate their own noise or focus for participants)	External	65
Passive recreation areas (contemplative activities that generate little noise and where benefits are compromised by external noise intrusion, for example, reading, meditation)	External	60
Industrial premises	External	75
Office, retail outlets	External	70

As part of planning for out of hours works, standard mitigation measures, as described in the ICNG and CNVG, would be implemented where reasonable and feasible. However, after these measures have been applied, noise and vibration levels may continue to exceed the NMLs.

In this case, additional mitigation measures outlined in the CNVG, which largely focus on engagement with affected sensitive receivers, should be implemented where reasonable and feasible, unless other agreements are in place with the impacted receiver.

Triggers and additional mitigation measures for airborne noise are summarised in Table 2. Further details of specific additional mitigation measures are described in the CNVG.

Table 2 Triggers for additional mitigation measures – Airborne noise (Roads and Maritime 2016)

Predicted airborne LAeq(15min) noise level at receiver			
Perception	dB(A) above RBL	dB(A) above NML	Additional mitigation measures
All hours			
75 dB(A) or greater			N, V, PC, RO
Standard hours: Mon - Fri (7am – 6pm), Sat (8am – 1pm), Sun/Pub Hol (Nil)			
Noticeable	5 to 10	0	-
Clearly audible	10 to 20	< 10	-
Moderately intrusive	20 to 30	10 to 20	N, V
Highly intrusive	> 30	> 20	N, V
OOHW Period 1: Mon – Fri (6pm – 10pm), Sat (7am – 8am & 1pm – 10pm), Sun/Pub Hol (8am – 6pm)			
Noticeable	5 to 10	<5	-
Clearly audible	10 to 20	5 to 15	N, R1, DR
Moderately intrusive	20 to 30	15 to 25	V, N, R1, DR
Highly intrusive	> 30	>25	V, IB, N, R1, DR, PC, SN
OOHW Period 2: Mon – Fri (10pm – 7am), Sat (10pm – 8am), Sun/Pub Hol (6pm – 7am)			
Noticeable	5 to 10	<5	N
Clearly audible	10 to 20	5 to 15	V, N, R2, DR
Moderately intrusive	20 to 30	15 to 25	V, IB, N, PC, SN, R2, DR
Highly intrusive	> 30	>25	AA, V, IB, N, PC, SN, R2, DR

Notes:

PC = Phone calls
 V = verification
 IB = Individual briefings
 N= Notification
 AA = Alternative accommodation

SN = Specific notifications
 RO = Respite offer
 R1 = Respite period 1
 R2 = Respite period 2
 DR = Duration respite

Perception = relates to levels above RBL
 NML = Noise management level
 HA = Highly affected

Existing environment and noise management levels

The proposed works would be undertaken in a predominantly Urban, characterised as:

Areas with medium density transportation or some commerce or industry.

Typically traffic is moving from one area to another (light & heavy vehicles) with heavy peak hour traffic movement.

May be on or close to bus route/ light rail.

Background noise levels adopted for the project area and associated noise management levels (NMLs) are summarised in Table 3. NMLs have been established in line with the ICNG.

Table 3 Construction NMLs

Land use	Urban		Using custom background noise data?			Yes
	Day	Weekend Day	Evening	Night	Sleep	
RBL	56	56	49	33		
NML	61	61	54	38	38	

Sleep disturbance

The ICNG recommends where construction works are planned to extend over more than two consecutive nights, the maximum noise level should be considered for the purposes of establishing the likelihood of sleep disturbance. The Road Noise Policy suggests that maximum internal noise levels below 50-55 dB(A) are unlikely to awaken people from sleep and one or two noise events per night, with maximum internal noise levels of 65-70 dB(A) are not likely to affect health and wellbeing significantly.

Based on this, a sleep awakening criterion of 55 dB(A) (internal) is typically adopted for works. Given that noise attenuation of 10 dB(A) is typically provided by an open window, a sleep awakening criterion of L_{Amax} 65 dB(A) (external) has been applied to residential bedroom façades. This is consistent with the sleep disturbance threshold described in Appendix E of the CNVG.

Assessment methodology

Based on the nominated works area (illustrated in Appendix A), proposed equipment and the minimum distance from the works to each sensitive receiver, noise levels were calculated based on CONCAWE (1981) *Propagation of noise from petroleum and petrochemical complexes to neighboring communities*.

This method considers geometric spreading, atmospheric absorption, ground effects and is valid for meteorological conditions of a gentle breeze from source to receiver and stable atmosphere (temperature inversion).

KNOWnoise: Minor works is a 2-Dimensional assessment platform and does not consider terrain effects (e.g. hills, valleys) or the presence of solid structures such as homes or noise barriers. This will result in a conservative prediction, suitable for the project being assessed.

Considering the nature of the works and the type of surrounding land uses, sensitive receivers up to a radius of 600 metres from the works have been included in the assessment.

Sound power levels and predicted noise levels depend on the number of plant items operating at any one time and their precise location relative to a sensitive receiver. Equipment was assumed to be working at the worst-case location relative to each receiver and represents a worst-case assessment. Where the activity is further away from receivers or less equipment is used the predicted levels will decrease.

Sound power levels for plant and equipment expected to be used for each activity has been estimated based on guidance in the following standards and guidelines as well as typical measured noise levels for specific equipment.

- “ Australian Standard AS2436-2010: Guide to noise and vibration control on construction, demolition and maintenance sites
- “ Construction Noise and Vibration Strategy 7TP-ST-157/2.0 (CNVS), (TfNSW, 2018)
- “ Construction Noise and Vibration Guideline (CNVG) (Roads and Maritime Services, 2016)

- “ British Standard 5228-1:2009 Code of practice for noise and vibration control on construction and open sites
- “ United Kingdom Department for Environment, Food and Rural Affairs (DEFRA) Noise database for prediction of noise on construction and open sites

Construction noise sources and associated sound power levels are listed in Appendix B. The maximum predicted LAeq noise level within the work area was identified for each receiver.

Predicted noise levels

Detailed predicted noise levels for each potentially affected receiver are presented Appendix C.

A summary of predicted noise levels in comparison with ICNG assessment criteria for the Night period is presented in Table 4.

Table 4 Summary of predicted noise levels with comparison against ICNG criteria for the Night period.

Criterion	Predicted number of receivers
Maximum cumulative predicted L _{Aeq, 15 minute} noise level	52 dB(A)
Number of highly noise affected receivers (>75 dB)	0
1 – 10 dB above NML	3
10 – 20 dB above NML	4
20+ dB above NML	0

For works outside standard hours, up to 0 receivers are predicted to be classified as Highly Impacted during the Night period. A summary of the number of receivers in each class is presented in Table 5.

Table 5 Summary of predicted noise levels with comparison against CNVG criteria

Impact class	Predicted noise level	Predicted number of receivers
Noticeable	1 – 5 dB above NML	3
Clearly audible	5 – 15 dB above NML	5
Moderately impacted	15 – 25 dB above NML	0
Highly Impacted	> 25 dB above NML	0

Predicted impact classes for the Night period are illustrated graphically in Appendix C. Each identified receiver in the study area has been coloured to highlight the predicted level of impact.

Sleep disturbance

In the event works are planned for more than two consecutive nights, up to 0 are expected to exceed the sleep awakening criteria. Where any exceedances if the awakening criteria are predicted, additional care should be taken and mitigation measures implemented in the with the CNVG.

Proposed noise mitigation measures

The safeguards and controls listed in Table 6 will be implemented where reasonable and feasible with the intention of achieving the project noise criteria and to maintain noise impacts at a practical minimum.

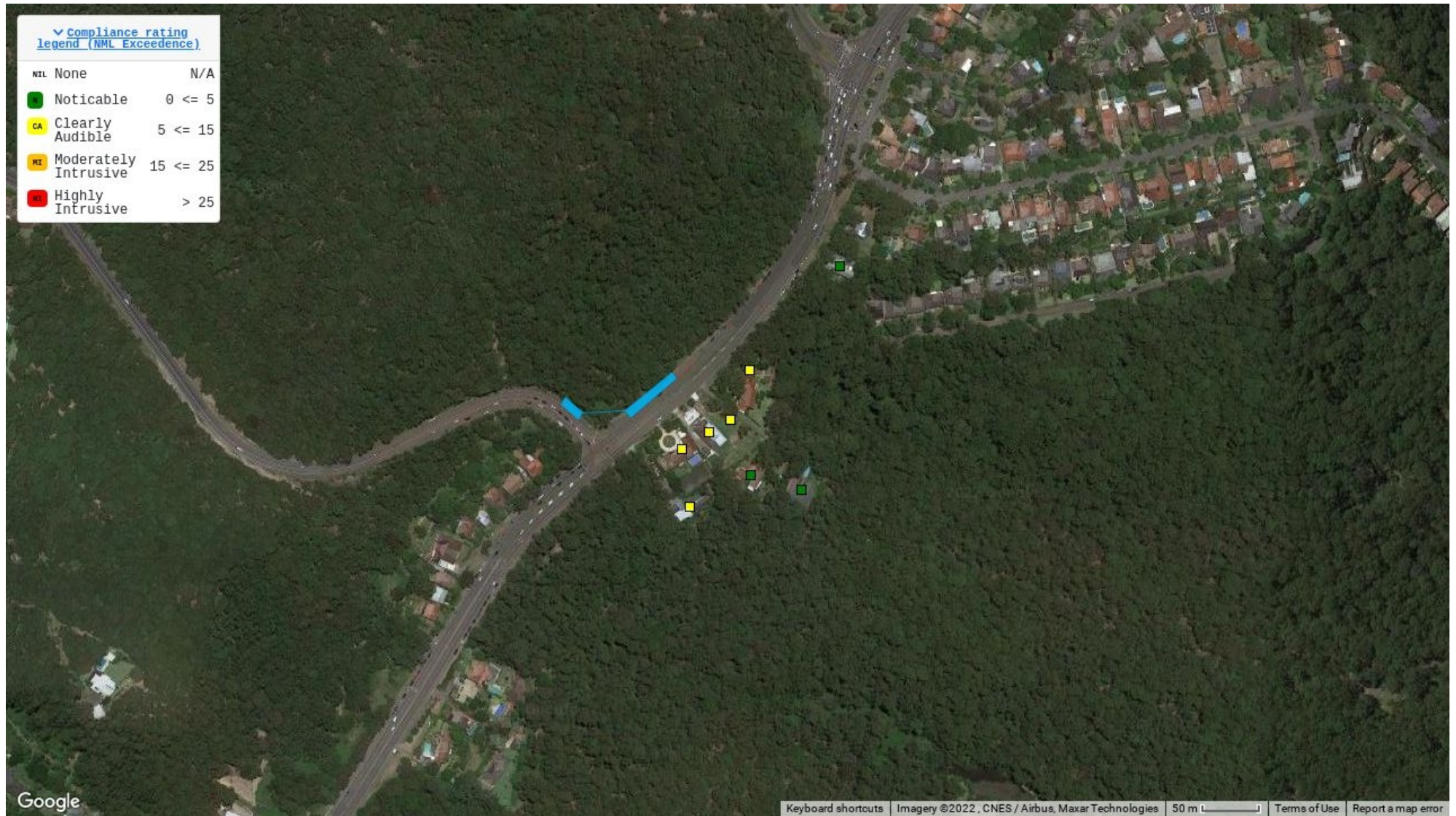
Table 6 Safeguards and controls

Action	Description
Community consultation or notification	<p>Notify the affected community.</p> <p>The notification will detail work activities, dates and hours, impacts and mitigation measures, indication of work schedule over the night time period, any operational noise benefits from the works (where applicable) and contact telephone number.</p> <p>Notification should be a minimum of 7 calendar days prior to the start of works. For projects other than maintenance works more advanced consultation or notification may be required.</p>
Site inductions	<p>All employees, contractors and subcontractors are to receive an environmental induction. The induction would at least include:</p> <ul style="list-style-type: none"> • all project specific and relevant standard noise and vibration mitigation measures • relevant licence and approval conditions • permissible hours of work • any limitations on high noise generating activities • location of nearest sensitive receivers • construction employee parking areas • designated loading/unloading areas and procedures <p>site opening/closing times (including deliveries) environmental incident procedures</p>
Behaviour	<p>No swearing or unnecessary shouting or loud stereos/radios on site.</p> <p>Limit compression braking at night in residential areas.</p> <p>No dropping of materials from height, throwing of metal items and slamming of doors.</p>
Verification	<p>Where indicated in Appendix C, a noise verification program would be undertaken for the duration of the works.</p>
Construction hours	<p>Where feasible and reasonable, construction should be carried out during the standard daytime working hours. Work generating high noise and/or vibration levels should be scheduled during less sensitive time periods.</p>
Respite for out-of-hours works	<p>Respite would be scheduled as indicated in Appendix C and described in the CNVG.</p>
Equipment selection	<p>Use quieter construction methods where feasible and reasonable.</p> <p>Ensure plant including the silencer is well maintained.</p> <p>Plant noise levels will have an operating noise emission level compliant with Appendix F of the CNVG</p>
Use and siting of plant	<p>The offset distance between noisy plant and adjacent sensitive receivers is to be maximised.</p> <p>Plant used intermittently to be throttled down or shut down.</p> <p>Noise-emitting plant to be directed away from sensitive receivers.</p>

Construction noise impact statement

Action	Description
Plan worksites and activities to minimise noise and vibration.	<p>Locate compounds away from sensitive receivers and discourage access from local roads.</p> <p>Plan traffic flow, parking and loading/unloading areas to minimise reversing movements within the site.</p> <p>Where additional activities or plant may only result in a marginal noise increase and speed up works, consider limiting duration of impact by concentrating noisy activities at one location and move to another as quickly as possible.</p> <p>Very noise activities should be scheduled for normal working hours. If the work can not be undertaken during the day, it should be completed before 11:00pm.</p> <p>Where practicable, work should be scheduled to avoid major student examination periods when students are studying for examinations such as before or during Higher School Certificate and at the end of higher education semesters.</p>
Non-tonal reverse alarms	Non-tonal reversing beepers (or an equivalent mechanism) must be fitted and used on all construction vehicles and mobile plant regularly used on site and for any out of hours work.
Shield stationary noise sources such as pumps, generators, and compressors	These should be enclosed or shielded where reasonable and feasible.
Implement any project specific mitigation measures	
1	None

Appendix A Project location and predicted level of impact



Appendix B Proposed activities and equipment

Concrete Placement & Finishing

Equipment	Quantity	Usage	Reduction	SWL
Concrete Truck / Agitator - discharging	1	20 %	3	89
Concrete Vibrator	1	10 %	3	87
Daymakers / Lighting plant	2	100 %	5	91
Excavator (06 tonne)	1	20 %	3	84
Light vehicle	1	10 %	3	72
Plate compactor (small e.g. 60kg)	1	10 %	3	91
Truck (10 tonne)	1	10 %	3	87

Activity Sound Power Level: 97

Appendix C Detailed noise predicted for each receiver and activity

Assessment: Footpath Restoration				Night	Results summary		
NCA	ID	Address	Land use	NML	Cumulative Predicted LAeq, 15 minute noise level	Exceedance of NML, dB	Impact classification
NCA 13	696419	79 LOOKOUT ROAD NEW LAMBTON HEIGHTS	RES	38	49	11	Clearly Audible
NCA 13	696394	79A LOOKOUT ROAD NEW LAMBTON HEIGHTS	RES	38	43	5	Noticable
NCA 13	696393	79B LOOKOUT ROAD NEW LAMBTON HEIGHTS	RES	38	40	2	Noticable
NCA 13	696391	85 LOOKOUT ROAD NEW LAMBTON HEIGHTS	RES	38	44	6	Clearly Audible
NCA 13	696379	81 LOOKOUT ROAD NEW LAMBTON HEIGHTS	RES	38	51	13	Clearly Audible
NCA 13	696367	71 LOOKOUT ROAD NEW LAMBTON HEIGHTS	RES	38	38	0	Noticable
NCA 13	696348	83 LOOKOUT ROAD NEW LAMBTON HEIGHTS	RES	38	52	14	Clearly Audible
NCA 13	696346	81A LOOKOUT ROAD NEW LAMBTON HEIGHTS	RES	38	50	12	Clearly Audible

Construction noise impact assessment

June Nightwork			
Proposed works	Footpath Restoration		
Proponent	Quickway		
Assessment Date	22/04/2022		
Prepared by		Assessment Id	Shift2-NCA10

Introduction

This report has been prepared using the construction noise self-assessment platform KNOWnoise: *Minor Works* and presents an assessment of the likely noise impacts related to proposed works associated with the above project. Where possible, these works would be completed during standard construction hours; however, there may be a need to work outside these hours due to technical, community or access limitations. The location of the proposed works is illustrated in Appendix A.

Planned works

A description of the proposed works is as follows.

Remove Existing Footpath Slabs, Prepare base, Form and Pour Concrete Footpath

Proposed activities and equipment for the works are summarised in Appendix B.

Though subject to change, the works are expected to commence around 21/06/2022 and would be completed by 22/06/2022.

Assessment criteria and mitigation requirements

The Interim Construction Noise Guideline (ICNG) (DECC 2009) describes noise more than the background level as potentially having an adverse impact on sensitive receivers and increasing the likelihood of complaint. During standard construction hours, where construction noise is within 10 dB(A) of the RBL, impacts would be acceptable.

Where construction noise is more than 10 dB(A) above the RBL during standard construction hours, a residential receiver is considered noise affected and the proponent should undertake all reasonable and feasible steps necessary to manage the impact and consult with the affected community.

Above a LAeq, 15 minute noise level of 75 dB(A), a receiver is highly affected, requiring consideration of additional mitigation measures including alternative accommodation in the night period.

Outside standard construction hours, construction noise at a residential receiver more than 5 dB(A) above the RBL is taken to be noise affected.

In addition, annoying noise such as rock hammers, impact piling, or other impulsive noise sources usually result in greater annoyance than continuous construction noise. A 5 dB(A) penalty is applicable to such activities prior to comparison with the NMLs.

Other sensitive land uses, such as schools and offices, typically find noise from construction disruptive when the properties are being used (such as during work and school times). Table 2 presents NMLs from the ICNG for sensitive land uses based on the principle that the characteristic activities for each of these land uses should not be unduly disturbed.

Table 1 Non-residential sensitive land uses noise management levels

Land use	Noise assessment location	NML (L _{Aeq,15min})
Classrooms at schools and other educational institutions	Internal	45
Places of worship		
Active recreation areas (such as sporting activities and activities which generate their own noise or focus for participants)	External	65
Passive recreation areas (contemplative activities that generate little noise and where benefits are compromised by external noise intrusion, for example, reading, meditation)	External	60
Industrial premises	External	75
Office, retail outlets	External	70

As part of planning for out of hours works, standard mitigation measures, as described in the ICNG and CNVG, would be implemented where reasonable and feasible. However, after these measures have been applied, noise and vibration levels may continue to exceed the NMLs.

In this case, additional mitigation measures outlined in the CNVG, which largely focus on engagement with affected sensitive receivers, should be implemented where reasonable and feasible, unless other agreements are in place with the impacted receiver.

Triggers and additional mitigation measures for airborne noise are summarised in Table 2. Further details of specific additional mitigation measures are described in the CNVG.

Table 2 Triggers for additional mitigation measures – Airborne noise (Roads and Maritime 2016)

Predicted airborne LAeq(15min) noise level at receiver			
Perception	dB(A) above RBL	dB(A) above NML	Additional mitigation measures
All hours			
75 dB(A) or greater			N, V, PC, RO
Standard hours: Mon - Fri (7am – 6pm), Sat (8am – 1pm), Sun/Pub Hol (Nil)			
Noticeable	5 to 10	0	-
Clearly audible	10 to 20	< 10	-
Moderately intrusive	20 to 30	10 to 20	N, V
Highly intrusive	> 30	> 20	N, V
OOHW Period 1: Mon – Fri (6pm – 10pm), Sat (7am – 8am & 1pm – 10pm), Sun/Pub Hol (8am – 6pm)			
Noticeable	5 to 10	<5	-
Clearly audible	10 to 20	5 to 15	N, R1, DR
Moderately intrusive	20 to 30	15 to 25	V, N, R1, DR
Highly intrusive	> 30	>25	V, IB, N, R1, DR, PC, SN
OOHW Period 2: Mon – Fri (10pm – 7am), Sat (10pm – 8am), Sun/Pub Hol (6pm – 7am)			
Noticeable	5 to 10	<5	N
Clearly audible	10 to 20	5 to 15	V, N, R2, DR
Moderately intrusive	20 to 30	15 to 25	V, IB, N, PC, SN, R2, DR
Highly intrusive	> 30	>25	AA, V, IB, N, PC, SN, R2, DR

Notes:

PC = Phone calls
 V = verification
 IB = Individual briefings
 N= Notification
 AA = Alternative accommodation

SN = Specific notifications
 RO = Respite offer
 R1 = Respite period 1
 R2 = Respite period 2
 DR = Duration respite

Perception = relates to levels above RBL
 NML = Noise management level
 HA = Highly affected

Existing environment and noise management levels

The proposed works would be undertaken in a predominantly Suburban/ Urban, characterised as:

Areas with low density transportation.

Typically local traffic, light vehicles, intermittent traffic flow

Background noise levels adopted for the project area and associated noise management levels (NMLs) are summarised in Table 3. NMLs have been established in line with the ICNG.

Table 3 Construction NMLs

Land use	Suburban/ Urban		Using custom background noise data?		Yes
	Day	Weekend Day	Evening	Night	Sleep
RBL	38	38	35	30	
NML	43	43	35	35	35

Sleep disturbance

The ICNG recommends where construction works are planned to extend over more than two consecutive nights, the maximum noise level should be considered for the purposes of establishing the likelihood of sleep disturbance. The Road Noise Policy suggests that maximum internal noise levels below 50-55 dB(A) are unlikely to awaken people from sleep and one or two noise events per night, with maximum internal noise levels of 65-70 dB(A) are not likely to affect health and wellbeing significantly.

Based on this, a sleep awakening criterion of 55 dB(A) (internal) is typically adopted for works. Given that noise attenuation of 10 dB(A) is typically provided by an open window, a sleep awakening criterion of L_{Amax} 65 dB(A) (external) has been applied to residential bedroom façades. This is consistent with the sleep disturbance threshold described in Appendix E of the CNVG.

Assessment methodology

Based on the nominated works area (illustrated in Appendix A), proposed equipment and the minimum distance from the works to each sensitive receiver, noise levels were calculated based on CONCAWE (1981) *Propagation of noise from petroleum and petrochemical complexes to neighboring communities*.

This method considers geometric spreading, atmospheric absorption, ground effects and is valid for meteorological conditions of a gentle breeze from source to receiver and stable atmosphere (temperature inversion).

KNOWnoise: Minor works is a 2-Dimensional assessment platform and does not consider terrain effects (e.g. hills, valleys) or the presence of solid structures such as homes or noise barriers. This will result in a conservative prediction, suitable for the project being assessed.

Considering the nature of the works and the type of surrounding land uses, sensitive receivers up to a radius of 600 metres from the works have been included in the assessment.

Sound power levels and predicted noise levels depend on the number of plant items operating at any one time and their precise location relative to a sensitive receiver. Equipment was assumed to be working at the worst-case location relative to each receiver and represents a worst-case assessment. Where the activity is further away from receivers or less equipment is used the predicted levels will decrease.

Sound power levels for plant and equipment expected to be used for each activity has been estimated based on guidance in the following standards and guidelines as well as typical measured noise levels for specific equipment.

- “ Australian Standard AS2436-2010: Guide to noise and vibration control on construction, demolition and maintenance sites
- “ Construction Noise and Vibration Strategy 7TP-ST-157/2.0 (CNVS), (TfNSW, 2018)
- “ Construction Noise and Vibration Guideline (CNVG) (Roads and Maritime Services, 2016)
- “ British Standard 5228-1:2009 Code of practice for noise and vibration control on construction and open sites

“ United Kingdom Department for Environment, Food and Rural Affairs (DEFRA) Noise database for prediction of noise on construction and open sites

Construction noise sources and associated sound power levels are listed in Appendix B. The maximum predicted LAeq noise level within the work area was identified for each receiver.

Predicted noise levels

Detailed predicted noise levels for each potentially affected receiver are presented Appendix C.

A summary of predicted noise levels in comparison with ICNG assessment criteria for the Night period is presented in Table 4.

Table 4 Summary of predicted noise levels with comparison against ICNG criteria for the Night period.

Criterion	Predicted number of receivers
Maximum cumulative predicted L _{Aeq, 15 minute} noise level	30 dB(A)
Number of highly noise affected receivers (>75 dB)	0
1 – 10 dB above NML	0
10 – 20 dB above NML	0
20+ dB above NML	0

For works outside standard hours, up to 0 receivers are predicted to be classified as Highly Impacted during the Night period. A summary of the number of receivers in each class is presented in Table 5.

Table 5 Summary of predicted noise levels with comparison against CNVG criteria

Impact class	Predicted noise level	Predicted number of receivers
Noticeable	1 – 5 dB above NML	0
Clearly audible	5 – 15 dB above NML	0
Moderately impacted	15 – 25 dB above NML	0
Highly Impacted	> 25 dB above NML	0

Predicted impact classes for the Night period are illustrated graphically in Appendix C. Each identified receiver in the study area has been coloured to highlight the predicted level of impact.

Sleep disturbance

In the event works are planned for more than two consecutive nights, up to 0 are expected to exceed the sleep awakening criteria. Where any exceedances if the awakening criteria are predicted, additional care should be taken and mitigation measures implemented in the with the CNVG.

Proposed noise mitigation measures

The safeguards and controls listed in Table 6 will be implemented where reasonable and feasible with the intention of achieving the project noise criteria and to maintain noise impacts at a practical minimum.

Table 6 Safeguards and controls

Action	Description
Community consultation or notification	<p>Notify the affected community.</p> <p>The notification will detail work activities, dates and hours, impacts and mitigation measures, indication of work schedule over the night time period, any operational noise benefits from the works (where applicable) and contact telephone number.</p> <p>Notification should be a minimum of 7 calendar days prior to the start of works. For projects other than maintenance works more advanced consultation or notification may be required.</p>
Site inductions	<p>All employees, contractors and subcontractors are to receive an environmental induction. The induction would at least include:</p> <ul style="list-style-type: none"> • all project specific and relevant standard noise and vibration mitigation measures • relevant licence and approval conditions • permissible hours of work • any limitations on high noise generating activities • location of nearest sensitive receivers • construction employee parking areas • designated loading/unloading areas and procedures <p>site opening/closing times (including deliveries) environmental incident procedures</p>
Behaviour	<p>No swearing or unnecessary shouting or loud stereos/radios on site.</p> <p>Limit compression braking at night in residential areas.</p> <p>No dropping of materials from height, throwing of metal items and slamming of doors.</p>
Verification	<p>Where indicated in Appendix C, a noise verification program would be undertaken for the duration of the works.</p>
Construction hours	<p>Where feasible and reasonable, construction should be carried out during the standard daytime working hours. Work generating high noise and/or vibration levels should be scheduled during less sensitive time periods.</p>
Respite for out-of-hours works	<p>Respite would be scheduled as indicated in Appendix C and described in the CNVG.</p>
Equipment selection	<p>Use quieter construction methods where feasible and reasonable.</p> <p>Ensure plant including the silencer is well maintained.</p> <p>Plant noise levels will have an operating noise emission level compliant with Appendix F of the CNVG</p>
Use and siting of plant	<p>The offset distance between noisy plant and adjacent sensitive receivers is to be maximised.</p> <p>Plant used intermittently to be throttled down or shut down.</p> <p>Noise-emitting plant to be directed away from sensitive receivers.</p>

Construction noise impact statement

Action	Description
Plan worksites and activities to minimise noise and vibration.	<p>Locate compounds away from sensitive receivers and discourage access from local roads.</p> <p>Plan traffic flow, parking and loading/unloading areas to minimise reversing movements within the site.</p> <p>Where additional activities or plant may only result in a marginal noise increase and speed up works, consider limiting duration of impact by concentrating noisy activities at one location and move to another as quickly as possible.</p> <p>Very noise activities should be scheduled for normal working hours. If the work can not be undertaken during the day, it should be completed before 11:00pm.</p> <p>Where practicable, work should be scheduled to avoid major student examination periods when students are studying for examinations such as before or during Higher School Certificate and at the end of higher education semesters.</p>
Non-tonal reverse alarms	Non-tonal reversing beepers (or an equivalent mechanism) must be fitted and used on all construction vehicles and mobile plant regularly used on site and for any out of hours work.
Shield stationary noise sources such as pumps, generators, and compressors	These should be enclosed or shielded where reasonable and feasible.
Implement any project specific mitigation measures	
1	None

Appendix A Project location and predicted level of impact



Appendix B Proposed activities and equipment

Concrete Placement & Finishing

Equipment	Quantity	Usage	Reduction	SWL
Concrete Truck / Agitator - discharging	1	10 %	3	86
Concrete Vibrator	1	10 %	3	87
Light vehicle	1	10 %	3	72

Activity Sound Power Level: 90

Appendix C Detailed noise predicted for each receiver and activity

Assessment: Footpath Restoration				Night	Results summary		
NCA	ID	Address	Land use	NML	Cumulative Predicted LAeq, 15 minute noise level	Exceedance of NML, dB	Impact classification

Construction noise impact assessment

June Nightwork			
Proposed works	Asphalt Trench Restoration		
Proponent	Quickway		
Assessment Date	25/04/2022		
Prepared by		Assessment Id	Shift3-NCA13

Introduction

This report has been prepared using the construction noise self-assessment platform KNOWnoise: *Minor Works* and presents an assessment of the likely noise impacts related to proposed works associated with the above project. Where possible, these works would be completed during standard construction hours; however, there may be a need to work outside these hours due to technical, community or access limitations. The location of the proposed works is illustrated in Appendix A.

Planned works

A description of the proposed works is as follows.

Permanent Asphalt Trench Restoration - Grandview

Proposed activities and equipment for the works are summarised in Appendix B.

Though subject to change, the works are expected to commence around 21/06/2022 and would be completed by 22/06/2022.

Assessment criteria and mitigation requirements

The Interim Construction Noise Guideline (ICNG) (DECC 2009) describes noise more than the background level as potentially having an adverse impact on sensitive receivers and increasing the likelihood of complaint. During standard construction hours, where construction noise is within 10 dB(A) of the RBL, impacts would be acceptable.

Where construction noise is more than 10 dB(A) above the RBL during standard construction hours, a residential receiver is considered noise affected and the proponent should undertake all reasonable and feasible steps necessary to manage the impact and consult with the affected community.

Above a LAeq, 15 minute noise level of 75 dB(A), a receiver is highly affected, requiring consideration of additional mitigation measures including alternative accommodation in the night period.

Outside standard construction hours, construction noise at a residential receiver more than 5 dB(A) above the RBL is taken to be noise affected.

In addition, annoying noise such as rock hammers, impact piling, or other impulsive noise sources usually result in greater annoyance than continuous construction noise. A 5 dB(A) penalty is applicable to such activities prior to comparison with the NMLs.

Other sensitive land uses, such as schools and offices, typically find noise from construction disruptive when the properties are being used (such as during work and school times). Table 2 presents NMLs from the ICNG for sensitive land uses based on the principle that the characteristic activities for each of these land uses should not be unduly disturbed.

Table 1 Non-residential sensitive land uses noise management levels

Land use	Noise assessment location	NML (L _{Aeq,15min})
Classrooms at schools and other educational institutions	Internal	45
Places of worship		
Active recreation areas (such as sporting activities and activities which generate their own noise or focus for participants)	External	65
Passive recreation areas (contemplative activities that generate little noise and where benefits are compromised by external noise intrusion, for example, reading, meditation)	External	60
Industrial premises	External	75
Office, retail outlets	External	70

As part of planning for out of hours works, standard mitigation measures, as described in the ICNG and CNVG, would be implemented where reasonable and feasible. However, after these measures have been applied, noise and vibration levels may continue to exceed the NMLs.

In this case, additional mitigation measures outlined in the CNVG, which largely focus on engagement with affected sensitive receivers, should be implemented where reasonable and feasible, unless other agreements are in place with the impacted receiver.

Triggers and additional mitigation measures for airborne noise are summarised in Table 2. Further details of specific additional mitigation measures are described in the CNVG.

Table 2 Triggers for additional mitigation measures – Airborne noise (Roads and Maritime 2016)

Predicted airborne LAeq(15min) noise level at receiver			
Perception	dB(A) above RBL	dB(A) above NML	Additional mitigation measures
All hours			
75 dB(A) or greater			N, V, PC, RO
Standard hours: Mon - Fri (7am – 6pm), Sat (8am – 1pm), Sun/Pub Hol (Nil)			
Noticeable	5 to 10	0	-
Clearly audible	10 to 20	< 10	-
Moderately intrusive	20 to 30	10 to 20	N, V
Highly intrusive	> 30	> 20	N, V
OOHW Period 1: Mon – Fri (6pm – 10pm), Sat (7am – 8am & 1pm – 10pm), Sun/Pub Hol (8am – 6pm)			
Noticeable	5 to 10	<5	-
Clearly audible	10 to 20	5 to 15	N, R1, DR
Moderately intrusive	20 to 30	15 to 25	V, N, R1, DR
Highly intrusive	> 30	>25	V, IB, N, R1, DR, PC, SN
OOHW Period 2: Mon – Fri (10pm – 7am), Sat (10pm – 8am), Sun/Pub Hol (6pm – 7am)			
Noticeable	5 to 10	<5	N
Clearly audible	10 to 20	5 to 15	V, N, R2, DR
Moderately intrusive	20 to 30	15 to 25	V, IB, N, PC, SN, R2, DR
Highly intrusive	> 30	>25	AA, V, IB, N, PC, SN, R2, DR

Notes:

PC = Phone calls
 V = verification
 IB = Individual briefings
 N= Notification
 AA = Alternative accommodation

SN = Specific notifications
 RO = Respite offer
 R1 = Respite period 1
 R2 = Respite period 2
 DR = Duration respite

Perception = relates to levels above RBL
 NML = Noise management level
 HA = Highly affected

Existing environment and noise management levels

The proposed works would be undertaken in a predominantly Suburban/ Urban, characterised as:

Areas with low density transportation.

Typically local traffic, light vehicles, intermittent traffic flow

Background noise levels adopted for the project area and associated noise management levels (NMLs) are summarised in Table 3. NMLs have been established in line with the ICNG.

Table 3 Construction NMLs

Land use	Suburban/ Urban		Using custom background noise data?		Yes
	Day	Weekend Day	Evening	Night	Sleep
RBL	56	56	49	33	
NML	61	61	54	38	38

Sleep disturbance

The ICNG recommends where construction works are planned to extend over more than two consecutive nights, the maximum noise level should be considered for the purposes of establishing the likelihood of sleep disturbance. The Road Noise Policy suggests that maximum internal noise levels below 50-55 dB(A) are unlikely to awaken people from sleep and one or two noise events per night, with maximum internal noise levels of 65-70 dB(A) are not likely to affect health and wellbeing significantly.

Based on this, a sleep awakening criterion of 55 dB(A) (internal) is typically adopted for works. Given that noise attenuation of 10 dB(A) is typically provided by an open window, a sleep awakening criterion of L_{Amax} 65 dB(A) (external) has been applied to residential bedroom façades. This is consistent with the sleep disturbance threshold described in Appendix E of the CNVG.

Assessment methodology

Based on the nominated works area (illustrated in Appendix A), proposed equipment and the minimum distance from the works to each sensitive receiver, noise levels were calculated based on CONCAWE (1981) *Propagation of noise from petroleum and petrochemical complexes to neighboring communities*.

This method considers geometric spreading, atmospheric absorption, ground effects and is valid for meteorological conditions of a gentle breeze from source to receiver and stable atmosphere (temperature inversion).

KNOWnoise: Minor works is a 2-Dimensional assessment platform and does not consider terrain effects (e.g. hills, valleys) or the presence of solid structures such as homes or noise barriers. This will result in a conservative prediction, suitable for the project being assessed.

Considering the nature of the works and the type of surrounding land uses, sensitive receivers up to a radius of 600 metres from the works have been included in the assessment.

Sound power levels and predicted noise levels depend on the number of plant items operating at any one time and their precise location relative to a sensitive receiver. Equipment was assumed to be working at the worst-case location relative to each receiver and represents a worst-case assessment. Where the activity is further away from receivers or less equipment is used the predicted levels will decrease.

Sound power levels for plant and equipment expected to be used for each activity has been estimated based on guidance in the following standards and guidelines as well as typical measured noise levels for specific equipment.

- “ Australian Standard AS2436-2010: Guide to noise and vibration control on construction, demolition and maintenance sites
- “ Construction Noise and Vibration Strategy 7TP-ST-157/2.0 (CNVS), (TfNSW, 2018)
- “ Construction Noise and Vibration Guideline (CNVG) (Roads and Maritime Services, 2016)
- “ British Standard 5228-1:2009 Code of practice for noise and vibration control on construction and open sites

“ United Kingdom Department for Environment, Food and Rural Affairs (DEFRA) Noise database for prediction of noise on construction and open sites

Construction noise sources and associated sound power levels are listed in Appendix B. The maximum predicted LAeq noise level within the work area was identified for each receiver.

Predicted noise levels

Detailed predicted noise levels for each potentially affected receiver are presented Appendix C.

A summary of predicted noise levels in comparison with ICNG assessment criteria for the Night period is presented in Table 4.

Table 4 Summary of predicted noise levels with comparison against ICNG criteria for the Night period.

Criterion	Predicted number of receivers
Maximum cumulative predicted L _{Aeq, 15 minute} noise level	56 dB(A)
Number of highly noise affected receivers (>75 dB)	0
1 – 10 dB above NML	15
10 – 20 dB above NML	3
20+ dB above NML	0

For works outside standard hours, up to 0 receivers are predicted to be classified as Highly Impacted during the Night period. A summary of the number of receivers in each class is presented in Table 5.

Table 5 Summary of predicted noise levels with comparison against CNVG criteria

Impact class	Predicted noise level	Predicted number of receivers
Noticeable	1 – 5 dB above NML	12
Clearly audible	5 – 15 dB above NML	7
Moderately impacted	15 – 25 dB above NML	1
Highly Impacted	> 25 dB above NML	0

Predicted impact classes for the Night period are illustrated graphically in Appendix C. Each identified receiver in the study area has been coloured to highlight the predicted level of impact.

Sleep disturbance

In the event works are planned for more than two consecutive nights, up to 0 are expected to exceed the sleep awakening criteria. Where any exceedances if the awakening criteria are predicted, additional care should be taken and mitigation measures implemented in the with the CNVG.

Proposed noise mitigation measures

The safeguards and controls listed in Table 6 will be implemented where reasonable and feasible with the intention of achieving the project noise criteria and to maintain noise impacts at a practical minimum.

Table 6 Safeguards and controls

Action	Description
Community consultation or notification	<p>Notify the affected community.</p> <p>The notification will detail work activities, dates and hours, impacts and mitigation measures, indication of work schedule over the night time period, any operational noise benefits from the works (where applicable) and contact telephone number.</p> <p>Notification should be a minimum of 7 calendar days prior to the start of works. For projects other than maintenance works more advanced consultation or notification may be required.</p>
Site inductions	<p>All employees, contractors and subcontractors are to receive an environmental induction. The induction would at least include:</p> <ul style="list-style-type: none"> • all project specific and relevant standard noise and vibration mitigation measures • relevant licence and approval conditions • permissible hours of work • any limitations on high noise generating activities • location of nearest sensitive receivers • construction employee parking areas • designated loading/unloading areas and procedures <p>site opening/closing times (including deliveries) environmental incident procedures</p>
Behaviour	<p>No swearing or unnecessary shouting or loud stereos/radios on site.</p> <p>Limit compression braking at night in residential areas.</p> <p>No dropping of materials from height, throwing of metal items and slamming of doors.</p>
Verification	<p>Where indicated in Appendix C, a noise verification program would be undertaken for the duration of the works.</p>
Construction hours	<p>Where feasible and reasonable, construction should be carried out during the standard daytime working hours. Work generating high noise and/or vibration levels should be scheduled during less sensitive time periods.</p>
Respite for out-of-hours works	<p>Respite would be scheduled as indicated in Appendix C and described in the CNVG.</p>
Equipment selection	<p>Use quieter construction methods where feasible and reasonable.</p> <p>Ensure plant including the silencer is well maintained.</p> <p>Plant noise levels will have an operating noise emission level compliant with Appendix F of the CNVG</p>
Use and siting of plant	<p>The offset distance between noisy plant and adjacent sensitive receivers is to be maximised.</p> <p>Plant used intermittently to be throttled down or shut down.</p> <p>Noise-emitting plant to be directed away from sensitive receivers.</p>

Construction noise impact statement

Action	Description
Plan worksites and activities to minimise noise and vibration.	<p>Locate compounds away from sensitive receivers and discourage access from local roads.</p> <p>Plan traffic flow, parking and loading/unloading areas to minimise reversing movements within the site.</p> <p>Where additional activities or plant may only result in a marginal noise increase and speed up works, consider limiting duration of impact by concentrating noisy activities at one location and move to another as quickly as possible.</p> <p>Very noise activities should be scheduled for normal working hours. If the work can not be undertaken during the day, it should be completed before 11:00pm.</p> <p>Where practicable, work should be scheduled to avoid major student examination periods when students are studying for examinations such as before or during Higher School Certificate and at the end of higher education semesters.</p>
Non-tonal reverse alarms	Non-tonal reversing beepers (or an equivalent mechanism) must be fitted and used on all construction vehicles and mobile plant regularly used on site and for any out of hours work.
Shield stationary noise sources such as pumps, generators, and compressors	These should be enclosed or shielded where reasonable and feasible.
Implement any project specific mitigation measures	
1	None

Appendix A Project location and predicted level of impact



Appendix B Proposed activities and equipment

Asphalting

Equipment	Quantity	Usage	Reduction	SWL
Daymakers / Lighting plant	1	100 %	5	88
Truck (10 tonne)	1	20 %	3	90
Excavator (06 tonne)	1	20 %	3	84
Vibratory roller 20 t (static)	1	10 %	3	91

Activity Sound Power Level: 95

Appendix C Detailed noise predicted for each receiver and activity

Assessment: Asphalt Trench Restoration				Night	Results summary		
NCA	ID	Address	Land use	NML	Cumulative Predicted LAeq, 15 minute noise level	Exceedance of NML, dB	Impact classification
NCA 13	697257	7 GRANDVIEW ROAD NEW LAMBTON HEIGHTS	RES	38	44	6	Clearly Audible
NCA 13	697248	174 LOOKOUT ROAD NEW LAMBTON HEIGHTS	RES	38	41	3	Noticable
NCA 13	697245	10 GRANDVIEW ROAD NEW LAMBTON HEIGHTS	RES	38	47	9	Clearly Audible
NCA 13	697228	9A MARSHALL STREET NEW LAMBTON HEIGHTS	RES	38	39	1	Noticable
NCA 13	697200	172 LOOKOUT ROAD NEW LAMBTON HEIGHTS	RES	38	43	5	Noticable
NCA 13	697191	11 GRANDVIEW ROAD NEW LAMBTON HEIGHTS	RES	38	41	3	Noticable
NCA 13	697157	14 GRANDVIEW ROAD NEW LAMBTON HEIGHTS	RES	38	42	4	Noticable
NCA 13	697151	164 LOOKOUT ROAD NEW LAMBTON HEIGHTS	RES	38	56	18	Moderately Intrusive
NCA 13	697150	5 GRANDVIEW ROAD NEW LAMBTON HEIGHTS	RES	38	47	9	Clearly Audible
NCA 13	697144	18 GRANDVIEW ROAD NEW LAMBTON HEIGHTS	RES	38	38	0	Noticable
NCA 13	697118	168 LOOKOUT ROAD NEW LAMBTON HEIGHTS	RES	38	47	9	Clearly Audible
NCA 13	697070	9 GRANDVIEW ROAD NEW LAMBTON HEIGHTS	RES	38	42	4	Noticable
NCA 13	697063	174A LOOKOUT ROAD NEW LAMBTON HEIGHTS	RES	38	39	1	Noticable
NCA 13	697057	174 LOOKOUT ROAD NEW LAMBTON HEIGHTS	RES	38	40	2	Noticable
NCA 13	697035	15 GRANDVIEW ROAD NEW LAMBTON HEIGHTS	RES	38	39	1	Noticable
NCA 13	697032	12 GRANDVIEW ROAD NEW LAMBTON HEIGHTS	RES	38	43	5	Noticable
NCA 13	697017	166 LOOKOUT ROAD NEW LAMBTON HEIGHTS	RES	38	50	12	Clearly Audible
NCA 13	697014	170 LOOKOUT ROAD NEW LAMBTON HEIGHTS	RES	38	45	7	Clearly Audible
NCA 13	697004	3 GRANDVIEW ROAD NEW LAMBTON HEIGHTS	RES	38	50	12	Clearly Audible
NCA 13	696994	16 GRANDVIEW ROAD NEW LAMBTON HEIGHTS	RES	38	40	2	Noticable

Construction noise impact assessment

June Nightwork			
Proposed works	Asphalt Trench Restoration		
Proponent	Quickway		
Assessment Date	25/04/2022		
Prepared by		Assessment Id	Shift3and4-NCA13

Introduction

This report has been prepared using the construction noise self-assessment platform KNOWnoise: *Minor Works* and presents an assessment of the likely noise impacts related to proposed works associated with the above project. Where possible, these works would be completed during standard construction hours; however, there may be a need to work outside these hours due to technical, community or access limitations. The location of the proposed works is illustrated in Appendix A.

Planned works

A description of the proposed works is as follows.

Placement of permanent asphalt wearing course.

Proposed activities and equipment for the works are summarised in Appendix B.

Though subject to change, the works are expected to commence around 22/06/2022 and would be completed by 24/06/2022.

Assessment criteria and mitigation requirements

The Interim Construction Noise Guideline (ICNG) (DECC 2009) describes noise more than the background level as potentially having an adverse impact on sensitive receivers and increasing the likelihood of complaint. During standard construction hours, where construction noise is within 10 dB(A) of the RBL, impacts would be acceptable.

Where construction noise is more than 10 dB(A) above the RBL during standard construction hours, a residential receiver is considered noise affected and the proponent should undertake all reasonable and feasible steps necessary to manage the impact and consult with the affected community.

Above a LAeq, 15 minute noise level of 75 dB(A), a receiver is highly affected, requiring consideration of additional mitigation measures including alternative accommodation in the night period.

Outside standard construction hours, construction noise at a residential receiver more than 5 dB(A) above the RBL is taken to be noise affected.

In addition, annoying noise such as rock hammers, impact piling, or other impulsive noise sources usually result in greater annoyance than continuous construction noise. A 5 dB(A) penalty is applicable to such activities prior to comparison with the NMLs.

Other sensitive land uses, such as schools and offices, typically find noise from construction disruptive when the properties are being used (such as during work and school times). Table 2 presents NMLs from the ICNG for sensitive land uses based on the principle that the characteristic activities for each of these land uses should not be unduly disturbed.

Table 1 Non-residential sensitive land uses noise management levels

Land use	Noise assessment location	NML (L _{Aeq,15min})
Classrooms at schools and other educational institutions	Internal	45
Places of worship		
Active recreation areas (such as sporting activities and activities which generate their own noise or focus for participants)	External	65
Passive recreation areas (contemplative activities that generate little noise and where benefits are compromised by external noise intrusion, for example, reading, meditation)	External	60
Industrial premises	External	75
Office, retail outlets	External	70

As part of planning for out of hours works, standard mitigation measures, as described in the ICNG and CNVG, would be implemented where reasonable and feasible. However, after these measures have been applied, noise and vibration levels may continue to exceed the NMLs.

In this case, additional mitigation measures outlined in the CNVG, which largely focus on engagement with affected sensitive receivers, should be implemented where reasonable and feasible, unless other agreements are in place with the impacted receiver.

Triggers and additional mitigation measures for airborne noise are summarised in Table 2. Further details of specific additional mitigation measures are described in the CNVG.

Table 2 Triggers for additional mitigation measures – Airborne noise (Roads and Maritime 2016)

Predicted airborne LAeq(15min) noise level at receiver			
Perception	dB(A) above RBL	dB(A) above NML	Additional mitigation measures
All hours			
75 dB(A) or greater			N, V, PC, RO
Standard hours: Mon - Fri (7am – 6pm), Sat (8am – 1pm), Sun/Pub Hol (Nil)			
Noticeable	5 to 10	0	-
Clearly audible	10 to 20	< 10	-
Moderately intrusive	20 to 30	10 to 20	N, V
Highly intrusive	> 30	> 20	N, V
OOHW Period 1: Mon – Fri (6pm – 10pm), Sat (7am – 8am & 1pm – 10pm), Sun/Pub Hol (8am – 6pm)			
Noticeable	5 to 10	<5	-
Clearly audible	10 to 20	5 to 15	N, R1, DR
Moderately intrusive	20 to 30	15 to 25	V, N, R1, DR
Highly intrusive	> 30	>25	V, IB, N, R1, DR, PC, SN
OOHW Period 2: Mon – Fri (10pm – 7am), Sat (10pm – 8am), Sun/Pub Hol (6pm – 7am)			
Noticeable	5 to 10	<5	N
Clearly audible	10 to 20	5 to 15	V, N, R2, DR
Moderately intrusive	20 to 30	15 to 25	V, IB, N, PC, SN, R2, DR
Highly intrusive	> 30	>25	AA, V, IB, N, PC, SN, R2, DR

Notes:

PC = Phone calls
 V = verification
 IB = Individual briefings
 N= Notification
 AA = Alternative accommodation

SN = Specific notifications
 RO = Respite offer
 R1 = Respite period 1
 R2 = Respite period 2
 DR = Duration respite

Perception = relates to levels above RBL
 NML = Noise management level
 HA = Highly affected

Existing environment and noise management levels

The proposed works would be undertaken in a predominantly Urban, characterised as:

Areas with medium density transportation or some commerce or industry.

Typically traffic is moving from one area to another (light & heavy vehicles) with heavy peak hour traffic movement.

May be on or close to bus route/ light rail.

Background noise levels adopted for the project area and associated noise management levels (NMLs) are summarised in Table 3. NMLs have been established in line with the ICNG.

Table 3 Construction NMLs

Land use	Urban		Using custom background noise data?			Yes
	Day	Weekend Day	Evening	Night	Sleep	
RBL	56	56	49	33		
NML	61	61	54	38	38	

Sleep disturbance

The ICNG recommends where construction works are planned to extend over more than two consecutive nights, the maximum noise level should be considered for the purposes of establishing the likelihood of sleep disturbance. The Road Noise Policy suggests that maximum internal noise levels below 50-55 dB(A) are unlikely to awaken people from sleep and one or two noise events per night, with maximum internal noise levels of 65-70 dB(A) are not likely to affect health and wellbeing significantly.

Based on this, a sleep awakening criterion of 55 dB(A) (internal) is typically adopted for works. Given that noise attenuation of 10 dB(A) is typically provided by an open window, a sleep awakening criterion of L_{Amax} 65 dB(A) (external) has been applied to residential bedroom façades. This is consistent with the sleep disturbance threshold described in Appendix E of the CNVG.

Assessment methodology

Based on the nominated works area (illustrated in Appendix A), proposed equipment and the minimum distance from the works to each sensitive receiver, noise levels were calculated based on CONCAWE (1981) *Propagation of noise from petroleum and petrochemical complexes to neighboring communities*.

This method considers geometric spreading, atmospheric absorption, ground effects and is valid for meteorological conditions of a gentle breeze from source to receiver and stable atmosphere (temperature inversion).

KNOWnoise: Minor works is a 2-Dimensional assessment platform and does not consider terrain effects (e.g. hills, valleys) or the presence of solid structures such as homes or noise barriers. This will result in a conservative prediction, suitable for the project being assessed.

Considering the nature of the works and the type of surrounding land uses, sensitive receivers up to a radius of 600 metres from the works have been included in the assessment.

Sound power levels and predicted noise levels depend on the number of plant items operating at any one time and their precise location relative to a sensitive receiver. Equipment was assumed to be working at the worst-case location relative to each receiver and represents a worst-case assessment. Where the activity is further away from receivers or less equipment is used the predicted levels will decrease.

Sound power levels for plant and equipment expected to be used for each activity has been estimated based on guidance in the following standards and guidelines as well as typical measured noise levels for specific equipment.

- “ Australian Standard AS2436-2010: Guide to noise and vibration control on construction, demolition and maintenance sites
- “ Construction Noise and Vibration Strategy 7TP-ST-157/2.0 (CNVS), (TfNSW, 2018)
- “ Construction Noise and Vibration Guideline (CNVG) (Roads and Maritime Services, 2016)

- “ British Standard 5228-1:2009 Code of practice for noise and vibration control on construction and open sites
- “ United Kingdom Department for Environment, Food and Rural Affairs (DEFRA) Noise database for prediction of noise on construction and open sites

Construction noise sources and associated sound power levels are listed in Appendix B. The maximum predicted LAeq noise level within the work area was identified for each receiver.

Predicted noise levels

Detailed predicted noise levels for each potentially affected receiver are presented Appendix C.

A summary of predicted noise levels in comparison with ICNG assessment criteria for the Night period is presented in Table 4.

Table 4 Summary of predicted noise levels with comparison against ICNG criteria for the Night period.

Criterion	Predicted number of receivers
Maximum cumulative predicted L _{Aeq, 15 minute} noise level	53 dB(A)
Number of highly noise affected receivers (>75 dB)	0
1 – 10 dB above NML	52
10 – 20 dB above NML	1
20+ dB above NML	0

For works outside standard hours, up to 0 receivers are predicted to be classified as Highly Impacted during the Night period. A summary of the number of receivers in each class is presented in Table 5.

Table 5 Summary of predicted noise levels with comparison against CNVG criteria

Impact class	Predicted noise level	Predicted number of receivers
Noticeable	1 – 5 dB above NML	54
Clearly audible	5 – 15 dB above NML	17
Moderately impacted	15 – 25 dB above NML	0
Highly Impacted	> 25 dB above NML	0

Predicted impact classes for the Night period are illustrated graphically in Appendix C. Each identified receiver in the study area has been coloured to highlight the predicted level of impact.

Sleep disturbance

In the event works are planned for more than two consecutive nights, up to 0 are expected to exceed the sleep awakening criteria. Where any exceedances if the awakening criteria are predicted, additional care should be taken and mitigation measures implemented in the with the CNVG.

Proposed noise mitigation measures

The safeguards and controls listed in Table 6 will be implemented where reasonable and feasible with the intention of achieving the project noise criteria and to maintain noise impacts at a practical minimum.

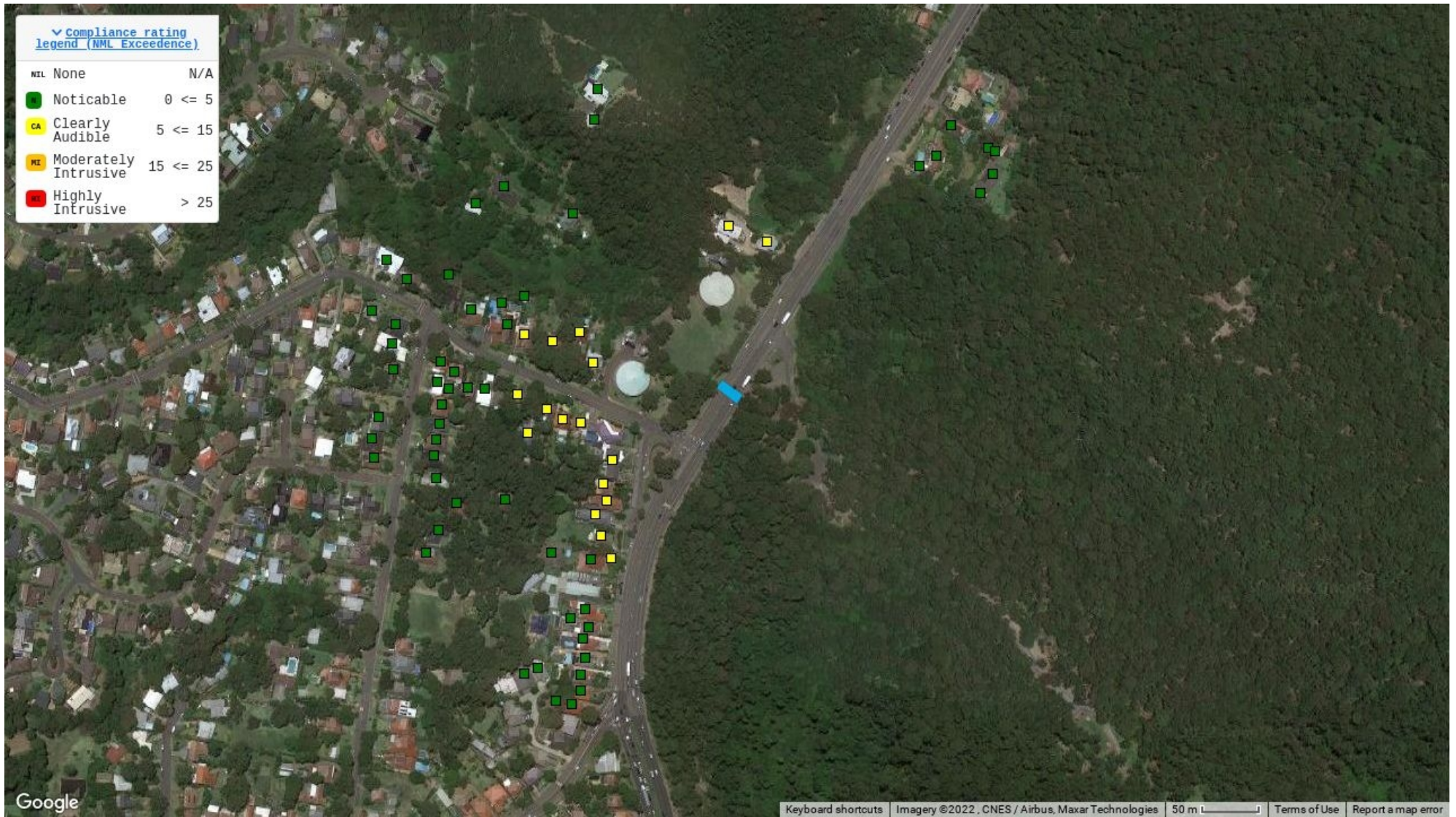
Table 6 Safeguards and controls

Action	Description
Community consultation or notification	<p>Notify the affected community.</p> <p>The notification will detail work activities, dates and hours, impacts and mitigation measures, indication of work schedule over the night time period, any operational noise benefits from the works (where applicable) and contact telephone number.</p> <p>Notification should be a minimum of 7 calendar days prior to the start of works. For projects other than maintenance works more advanced consultation or notification may be required.</p>
Site inductions	<p>All employees, contractors and subcontractors are to receive an environmental induction. The induction would at least include:</p> <ul style="list-style-type: none"> • all project specific and relevant standard noise and vibration mitigation measures • relevant licence and approval conditions • permissible hours of work • any limitations on high noise generating activities • location of nearest sensitive receivers • construction employee parking areas • designated loading/unloading areas and procedures <p>site opening/closing times (including deliveries) environmental incident procedures</p>
Behaviour	<p>No swearing or unnecessary shouting or loud stereos/radios on site.</p> <p>Limit compression braking at night in residential areas.</p> <p>No dropping of materials from height, throwing of metal items and slamming of doors.</p>
Verification	<p>Where indicated in Appendix C, a noise verification program would be undertaken for the duration of the works.</p>
Construction hours	<p>Where feasible and reasonable, construction should be carried out during the standard daytime working hours. Work generating high noise and/or vibration levels should be scheduled during less sensitive time periods.</p>
Respite for out-of-hours works	<p>Respite would be scheduled as indicated in Appendix C and described in the CNVG.</p>
Equipment selection	<p>Use quieter construction methods where feasible and reasonable.</p> <p>Ensure plant including the silencer is well maintained.</p> <p>Plant noise levels will have an operating noise emission level compliant with Appendix F of the CNVG</p>
Use and siting of plant	<p>The offset distance between noisy plant and adjacent sensitive receivers is to be maximised.</p> <p>Plant used intermittently to be throttled down or shut down.</p> <p>Noise-emitting plant to be directed away from sensitive receivers.</p>

Construction noise impact statement

Action	Description
Plan worksites and activities to minimise noise and vibration.	<p>Locate compounds away from sensitive receivers and discourage access from local roads.</p> <p>Plan traffic flow, parking and loading/unloading areas to minimise reversing movements within the site.</p> <p>Where additional activities or plant may only result in a marginal noise increase and speed up works, consider limiting duration of impact by concentrating noisy activities at one location and move to another as quickly as possible.</p> <p>Very noise activities should be scheduled for normal working hours. If the work can not be undertaken during the day, it should be completed before 11:00pm.</p> <p>Where practicable, work should be scheduled to avoid major student examination periods when students are studying for examinations such as before or during Higher School Certificate and at the end of higher education semesters.</p>
Non-tonal reverse alarms	Non-tonal reversing beepers (or an equivalent mechanism) must be fitted and used on all construction vehicles and mobile plant regularly used on site and for any out of hours work.
Shield stationary noise sources such as pumps, generators, and compressors	These should be enclosed or shielded where reasonable and feasible.
Implement any project specific mitigation measures	
1	None

Appendix A Project location and predicted level of impact



Appendix B Proposed activities and equipment

Asphalting

Equipment	Quantity	Usage	Reduction	SWL
Daymakers / Lighting plant	2	100 %	5	91
Multi Tyred Roller	1	10 %	3	98
Paving Machine	1	10 %	3	99
Truck (10 tonne)	1	10 %	3	87

Activity Sound Power Level: 102

Appendix C Detailed noise predicted for each receiver and activity

Assessment: Asphalt Trench Restoration				Night	Results summary		
NCA	ID	Address	Land use	NML	Cumulative Predicted LAeq, 15 minute noise level	Exceedance of NML, dB	Impact classification
NCA 13	697579	121A LOOKOUT ROAD NEW LAMBTON HEIGHTS	RES	38	38	0	Noticable
NCA 13	697578	121C LOOKOUT ROAD NEW LAMBTON HEIGHTS	RES	38	40	2	Noticable
NCA 13	697575	121C LOOKOUT ROAD NEW LAMBTON HEIGHTS	RES	38	40	2	Noticable
NCA 13	697571	121B LOOKOUT ROAD NEW LAMBTON HEIGHTS	RES	38	38	0	Noticable
NCA 13	697570	136 LOOKOUT ROAD NEW LAMBTON HEIGHTS	RES	38	47	9	Clearly Audible
NCA 13	697569	138 LOOKOUT ROAD NEW LAMBTON HEIGHTS	RES	38	46	8	Clearly Audible
NCA 13	697568	121A LOOKOUT ROAD NEW LAMBTON HEIGHTS	RES	38	39	1	Noticable
NCA 13	697566	121B LOOKOUT ROAD NEW LAMBTON HEIGHTS	RES	38	39	1	Noticable
NCA 13	697564	121A LOOKOUT ROAD NEW LAMBTON HEIGHTS	RES	38	39	1	Noticable
NCA 13	697563	18 GRANDVIEW ROAD NEW LAMBTON HEIGHTS	RES	38	43	5	Noticable
NCA 13	697561	19 GRANDVIEW ROAD NEW LAMBTON HEIGHTS	RES	38	41	3	Noticable
NCA 13	697549	24 GRANDVIEW ROAD NEW LAMBTON HEIGHTS	RES	38	40	2	Noticable
NCA 13	697542	20 GRANDVIEW ROAD NEW LAMBTON HEIGHTS	RES	38	42	4	Noticable
NCA 13	697540	11 MARSHALL STREET NEW LAMBTON HEIGHTS	RES	38	40	2	Noticable
NCA 13	697529	7 GRANDVIEW ROAD NEW LAMBTON HEIGHTS	RES	38	45	7	Clearly Audible
NCA 13	697524	2 CARDIFF ROAD NEW LAMBTON HEIGHTS	RES	38	38	0	Noticable
NCA 13	697521	174 LOOKOUT ROAD NEW LAMBTON HEIGHTS	RES	38	43	5	Clearly Audible
NCA 13	697518	10 GRANDVIEW ROAD NEW LAMBTON HEIGHTS	RES	38	48	10	Clearly Audible
NCA 13	697510	3 MARSHALL STREET NEW LAMBTON HEIGHTS	RES	38	40	2	Noticable
NCA 13	697505	9A MARSHALL STREET NEW LAMBTON HEIGHTS	RES	38	42	4	Noticable
NCA 13	697494	2 CARDIFF ROAD NEW LAMBTON HEIGHTS	RES	38	38	0	Noticable
NCA 13	697489	10 MARSHALL STREET NEW LAMBTON HEIGHTS	RES	38	38	0	Noticable
NCA 13	697482	172 LOOKOUT ROAD NEW LAMBTON HEIGHTS	RES	38	44	6	Clearly Audible
NCA 13	697477	180 LOOKOUT ROAD NEW LAMBTON HEIGHTS	RES	38	40	2	Noticable
NCA 13	697474	11 GRANDVIEW ROAD NEW LAMBTON HEIGHTS	RES	38	43	5	Clearly Audible
NCA 13	697468	UNIT 7/ 6 CARDIFF ROAD NEW LAMBTON HEIGHTS	RES	38	39	1	Noticable
NCA 13	697467	21 GRANDVIEW ROAD NEW LAMBTON HEIGHTS	RES	38	40	2	Noticable
NCA 13	697464	17 GRANDVIEW ROAD NEW LAMBTON HEIGHTS	RES	38	41	3	Noticable
NCA 13	697460	1B MARSHALL STREET NEW LAMBTON HEIGHTS	RES	38	40	2	Noticable
NCA 13	697459	188 LOOKOUT ROAD NEW LAMBTON HEIGHTS	RES	38	39	1	Noticable
NCA 13	697458	UNIT 6/ 6 CARDIFF ROAD NEW LAMBTON HEIGHTS	RES	38	38	0	Noticable
NCA 13	697456	9 MARSHALL STREET NEW LAMBTON HEIGHTS	RES	38	40	2	Noticable
NCA 13	697455	3A MARSHALL STREET NEW LAMBTON HEIGHTS	RES	38	39	1	Noticable
NCA 13	697454	180 LOOKOUT ROAD NEW LAMBTON HEIGHTS	RES	38	41	3	Noticable
NCA 13	697448	186 LOOKOUT ROAD NEW LAMBTON HEIGHTS	RES	38	39	1	Noticable
NCA 13	697447	14 GRANDVIEW ROAD NEW LAMBTON HEIGHTS	RES	38	45	7	Clearly Audible
NCA 13	697445	8 MARSHALL STREET NEW LAMBTON HEIGHTS	RES	38	38	0	Noticable
NCA 13	697444	164 LOOKOUT ROAD NEW LAMBTON HEIGHTS	RES	38	48	10	Clearly Audible

Appendix C Detailed noise predicted for each receiver and activity

Assessment: Asphalt Trench Restoration				Night	Results summary		
NCA	ID	Address	Land use	NML	Cumulative Predicted LAeq, 15 minute noise level	Exceedance of NML, dB	Impact classification
NCA 13	697443	5 GRANDVIEW ROAD NEW LAMBTON HEIGHTS	RES	38	46	8	Clearly Audible
NCA 13	697440	25 GRANDVIEW ROAD NEW LAMBTON HEIGHTS	RES	38	38	0	Noticable
NCA 13	697439	18 GRANDVIEW ROAD NEW LAMBTON HEIGHTS	RES	38	43	5	Noticable
NCA 13	697420	3A MARSHALL STREET NEW LAMBTON HEIGHTS	RES	38	40	2	Noticable
NCA 13	697418	168 LOOKOUT ROAD NEW LAMBTON HEIGHTS	RES	38	46	8	Clearly Audible
NCA 13	697417	2 MARSHALL STREET NEW LAMBTON HEIGHTS	RES	38	39	1	Noticable
NCA 13	697412	6 MARSHALL STREET NEW LAMBTON HEIGHTS	RES	38	39	1	Noticable
NCA 13	697410	19 GRANDVIEW ROAD NEW LAMBTON HEIGHTS	RES	38	41	3	Noticable
NCA 13	697402	2B MARSHALL STREET NEW LAMBTON HEIGHTS	RES	38	39	1	Noticable
NCA 13	697385	7 MARSHALL STREET NEW LAMBTON HEIGHTS	RES	38	40	2	Noticable
NCA 13	697384	9 GRANDVIEW ROAD NEW LAMBTON HEIGHTS	RES	38	44	6	Clearly Audible
NCA 13	697382	15 MARSHALL STREET NEW LAMBTON HEIGHTS	RES	38	39	1	Noticable
NCA 13	697380	182 LOOKOUT ROAD NEW LAMBTON HEIGHTS	RES	38	40	2	Noticable
NCA 13	697379	26 GRANDVIEW ROAD NEW LAMBTON HEIGHTS	RES	38	39	1	Noticable
NCA 13	697378	174A LOOKOUT ROAD NEW LAMBTON HEIGHTS	RES	38	42	4	Noticable
NCA 13	697375	5A MARSHALL STREET NEW LAMBTON HEIGHTS	RES	38	40	2	Noticable
NCA 13	697374	174 LOOKOUT ROAD NEW LAMBTON HEIGHTS	RES	38	43	5	Noticable
NCA 13	697371	184 LOOKOUT ROAD NEW LAMBTON HEIGHTS	RES	38	40	2	Noticable
NCA 13	697368	17 MARSHALL STREET NEW LAMBTON HEIGHTS	RES	38	39	1	Noticable
NCA 13	697360	15 GRANDVIEW ROAD NEW LAMBTON HEIGHTS	RES	38	42	4	Noticable
NCA 13	697359	23 GRANDVIEW ROAD NEW LAMBTON HEIGHTS	RES	38	39	1	Noticable
NCA 13	697358	5A MARSHALL STREET NEW LAMBTON HEIGHTS	RES	38	40	2	Noticable
NCA 13	697357	12 GRANDVIEW ROAD NEW LAMBTON HEIGHTS	RES	38	47	9	Clearly Audible
NCA 13	697356	5 MARSHALL STREET NEW LAMBTON HEIGHTS	RES	38	40	2	Noticable
NCA 13	697353	1 MARSHALL STREET NEW LAMBTON HEIGHTS	RES	38	40	2	Noticable
NCA 13	697352	5A MARSHALL STREET NEW LAMBTON HEIGHTS	RES	38	43	5	Noticable
NCA 13	697347	166 LOOKOUT ROAD NEW LAMBTON HEIGHTS	RES	38	46	8	Clearly Audible
NCA 13	697344	170 LOOKOUT ROAD NEW LAMBTON HEIGHTS	RES	38	45	7	Clearly Audible
NCA 13	697338	28 GRANDVIEW ROAD NEW LAMBTON HEIGHTS	RES	38	38	0	Noticable
NCA 13	697336	3 GRANDVIEW ROAD NEW LAMBTON HEIGHTS	RES	38	47	9	Clearly Audible
NCA 13	697334	22 GRANDVIEW ROAD NEW LAMBTON HEIGHTS	RES	38	41	3	Noticable
NCA 13	697329	178 LOOKOUT ROAD NEW LAMBTON HEIGHTS	RES	38	41	3	Noticable
NCA 13	697328	16 GRANDVIEW ROAD NEW LAMBTON HEIGHTS	RES	38	44	6	Clearly Audible

Construction noise impact assessment

June Nightwork

Proposed works	Asphalt Pavement Restoration		
Proponent	Quickway		
Assessment Date	25/04/2022		
Prepared by	[REDACTED]	Assessment Id	Shift5and6-NCA13

Introduction

This report has been prepared using the construction noise self-assessment platform KNOWnoise: *Minor Works* and presents an assessment of the likely noise impacts related to proposed works associated with the above project. Where possible, these works would be completed during standard construction hours; however, there may be a need to work outside these hours due to technical, community or access limitations. The location of the proposed works is illustrated in Appendix A.

Planned works

A description of the proposed works is as follows.

Mill and Re-sheet Asphalt Pavement in McCaffrey Drive Shoulder

Proposed activities and equipment for the works are summarised in Appendix B.

Though subject to change, the works are expected to commence around 26/06/2022 and would be completed by 28/06/2022.

Assessment criteria and mitigation requirements

The Interim Construction Noise Guideline (ICNG) (DECC 2009) describes noise more than the background level as potentially having an adverse impact on sensitive receivers and increasing the likelihood of complaint. During standard construction hours, where construction noise is within 10 dB(A) of the RBL, impacts would be acceptable.

Where construction noise is more than 10 dB(A) above the RBL during standard construction hours, a residential receiver is considered noise affected and the proponent should undertake all reasonable and feasible steps necessary to manage the impact and consult with the affected community.

Above a LAeq, 15 minute noise level of 75 dB(A), a receiver is highly affected, requiring consideration of additional mitigation measures including alternative accommodation in the night period.

Outside standard construction hours, construction noise at a residential receiver more than 5 dB(A) above the RBL is taken to be noise affected.

In addition, annoying noise such as rock hammers, impact piling, or other impulsive noise sources usually result in greater annoyance than continuous construction noise. A 5 dB(A) penalty is applicable to such activities prior to comparison with the NMLs.

Other sensitive land uses, such as schools and offices, typically find noise from construction disruptive when the properties are being used (such as during work and school times). Table 2 presents NMLs from the ICNG for sensitive land uses based on the principle that the characteristic activities for each of these land uses should not be unduly disturbed.

Table 1 Non-residential sensitive land uses noise management levels

Land use	Noise assessment location	NML (L _{Aeq,15min})
Classrooms at schools and other educational institutions	Internal	45
Places of worship		
Active recreation areas (such as sporting activities and activities which generate their own noise or focus for participants)	External	65
Passive recreation areas (contemplative activities that generate little noise and where benefits are compromised by external noise intrusion, for example, reading, meditation)	External	60
Industrial premises	External	75
Office, retail outlets	External	70

As part of planning for out of hours works, standard mitigation measures, as described in the ICNG and CNVG, would be implemented where reasonable and feasible. However, after these measures have been applied, noise and vibration levels may continue to exceed the NMLs.

In this case, additional mitigation measures outlined in the CNVG, which largely focus on engagement with affected sensitive receivers, should be implemented where reasonable and feasible, unless other agreements are in place with the impacted receiver.

Triggers and additional mitigation measures for airborne noise are summarised in Table 2. Further details of specific additional mitigation measures are described in the CNVG.

Table 2 Triggers for additional mitigation measures – Airborne noise (Roads and Maritime 2016)

Predicted airborne LAeq(15min) noise level at receiver			
Perception	dB(A) above RBL	dB(A) above NML	Additional mitigation measures
All hours			
75 dB(A) or greater			N, V, PC, RO
Standard hours: Mon - Fri (7am – 6pm), Sat (8am – 1pm), Sun/Pub Hol (Nil)			
Noticeable	5 to 10	0	-
Clearly audible	10 to 20	< 10	-
Moderately intrusive	20 to 30	10 to 20	N, V
Highly intrusive	> 30	> 20	N, V
OOHW Period 1: Mon – Fri (6pm – 10pm), Sat (7am – 8am & 1pm – 10pm), Sun/Pub Hol (8am – 6pm)			
Noticeable	5 to 10	<5	-
Clearly audible	10 to 20	5 to 15	N, R1, DR
Moderately intrusive	20 to 30	15 to 25	V, N, R1, DR
Highly intrusive	> 30	>25	V, IB, N, R1, DR, PC, SN
OOHW Period 2: Mon – Fri (10pm – 7am), Sat (10pm – 8am), Sun/Pub Hol (6pm – 7am)			
Noticeable	5 to 10	<5	N
Clearly audible	10 to 20	5 to 15	V, N, R2, DR
Moderately intrusive	20 to 30	15 to 25	V, IB, N, PC, SN, R2, DR
Highly intrusive	> 30	>25	AA, V, IB, N, PC, SN, R2, DR

Notes:

PC = Phone calls
 V = verification
 IB = Individual briefings
 N= Notification
 AA = Alternative accommodation

SN = Specific notifications
 RO = Respite offer
 R1 = Respite period 1
 R2 = Respite period 2
 DR = Duration respite

Perception = relates to levels above RBL
 NML = Noise management level
 HA = Highly affected

Existing environment and noise management levels

The proposed works would be undertaken in a predominantly Suburban/ Urban, characterised as:

Areas with low density transportation.

Typically local traffic, light vehicles, intermittent traffic flow

Background noise levels adopted for the project area and associated noise management levels (NMLs) are summarised in Table 3. NMLs have been established in line with the ICNG.

Table 3 Construction NMLs

Land use	Suburban/ Urban		Using custom background noise data?		Yes
	Day	Weekend Day	Evening	Night	Sleep
RBL	56	56	49	33	
NML	61	61	54	38	38

Sleep disturbance

The ICNG recommends where construction works are planned to extend over more than two consecutive nights, the maximum noise level should be considered for the purposes of establishing the likelihood of sleep disturbance. The Road Noise Policy suggests that maximum internal noise levels below 50-55 dB(A) are unlikely to awaken people from sleep and one or two noise events per night, with maximum internal noise levels of 65-70 dB(A) are not likely to affect health and wellbeing significantly.

Based on this, a sleep awakening criterion of 55 dB(A) (internal) is typically adopted for works. Given that noise attenuation of 10 dB(A) is typically provided by an open window, a sleep awakening criterion of L_{Amax} 65 dB(A) (external) has been applied to residential bedroom façades. This is consistent with the sleep disturbance threshold described in Appendix E of the CNVG.

Assessment methodology

Based on the nominated works area (illustrated in Appendix A), proposed equipment and the minimum distance from the works to each sensitive receiver, noise levels were calculated based on CONCAWE (1981) *Propagation of noise from petroleum and petrochemical complexes to neighboring communities*.

This method considers geometric spreading, atmospheric absorption, ground effects and is valid for meteorological conditions of a gentle breeze from source to receiver and stable atmosphere (temperature inversion).

KNOWnoise: Minor works is a 2-Dimensional assessment platform and does not consider terrain effects (e.g. hills, valleys) or the presence of solid structures such as homes or noise barriers. This will result in a conservative prediction, suitable for the project being assessed.

Considering the nature of the works and the type of surrounding land uses, sensitive receivers up to a radius of 600 metres from the works have been included in the assessment.

Sound power levels and predicted noise levels depend on the number of plant items operating at any one time and their precise location relative to a sensitive receiver. Equipment was assumed to be working at the worst-case location relative to each receiver and represents a worst-case assessment. Where the activity is further away from receivers or less equipment is used the predicted levels will decrease.

Sound power levels for plant and equipment expected to be used for each activity has been estimated based on guidance in the following standards and guidelines as well as typical measured noise levels for specific equipment.

- “ Australian Standard AS2436-2010: Guide to noise and vibration control on construction, demolition and maintenance sites
- “ Construction Noise and Vibration Strategy 7TP-ST-157/2.0 (CNVS), (TfNSW, 2018)
- “ Construction Noise and Vibration Guideline (CNVG) (Roads and Maritime Services, 2016)
- “ British Standard 5228-1:2009 Code of practice for noise and vibration control on construction and open sites

“ United Kingdom Department for Environment, Food and Rural Affairs (DEFRA) Noise database for prediction of noise on construction and open sites

Construction noise sources and associated sound power levels are listed in Appendix B. The maximum predicted LAeq noise level within the work area was identified for each receiver.

Predicted noise levels

Detailed predicted noise levels for each potentially affected receiver are presented Appendix C.

A summary of predicted noise levels in comparison with ICNG assessment criteria for the Night period is presented in Table 4.

Table 4 Summary of predicted noise levels with comparison against ICNG criteria for the Night period.

Criterion	Predicted number of receivers
Maximum cumulative predicted L _{Aeq, 15 minute} noise level	49 dB(A)
Number of highly noise affected receivers (>75 dB)	0
1 – 10 dB above NML	57
10 – 20 dB above NML	1
20+ dB above NML	0

For works outside standard hours, up to 0 receivers are predicted to be classified as Highly Impacted during the Night period. A summary of the number of receivers in each class is presented in Table 5.

Table 5 Summary of predicted noise levels with comparison against CNVG criteria

Impact class	Predicted noise level	Predicted number of receivers
Noticeable	1 – 5 dB above NML	77
Clearly audible	5 – 15 dB above NML	8
Moderately impacted	15 – 25 dB above NML	0
Highly Impacted	> 25 dB above NML	0

Predicted impact classes for the Night period are illustrated graphically in Appendix C. Each identified receiver in the study area has been coloured to highlight the predicted level of impact.

Sleep disturbance

In the event works are planned for more than two consecutive nights, up to 0 are expected to exceed the sleep awakening criteria. Where any exceedances if the awakening criteria are predicted, additional care should be taken and mitigation measures implemented in the with the CNVG.

Proposed noise mitigation measures

The safeguards and controls listed in Table 6 will be implemented where reasonable and feasible with the intention of achieving the project noise criteria and to maintain noise impacts at a practical minimum.

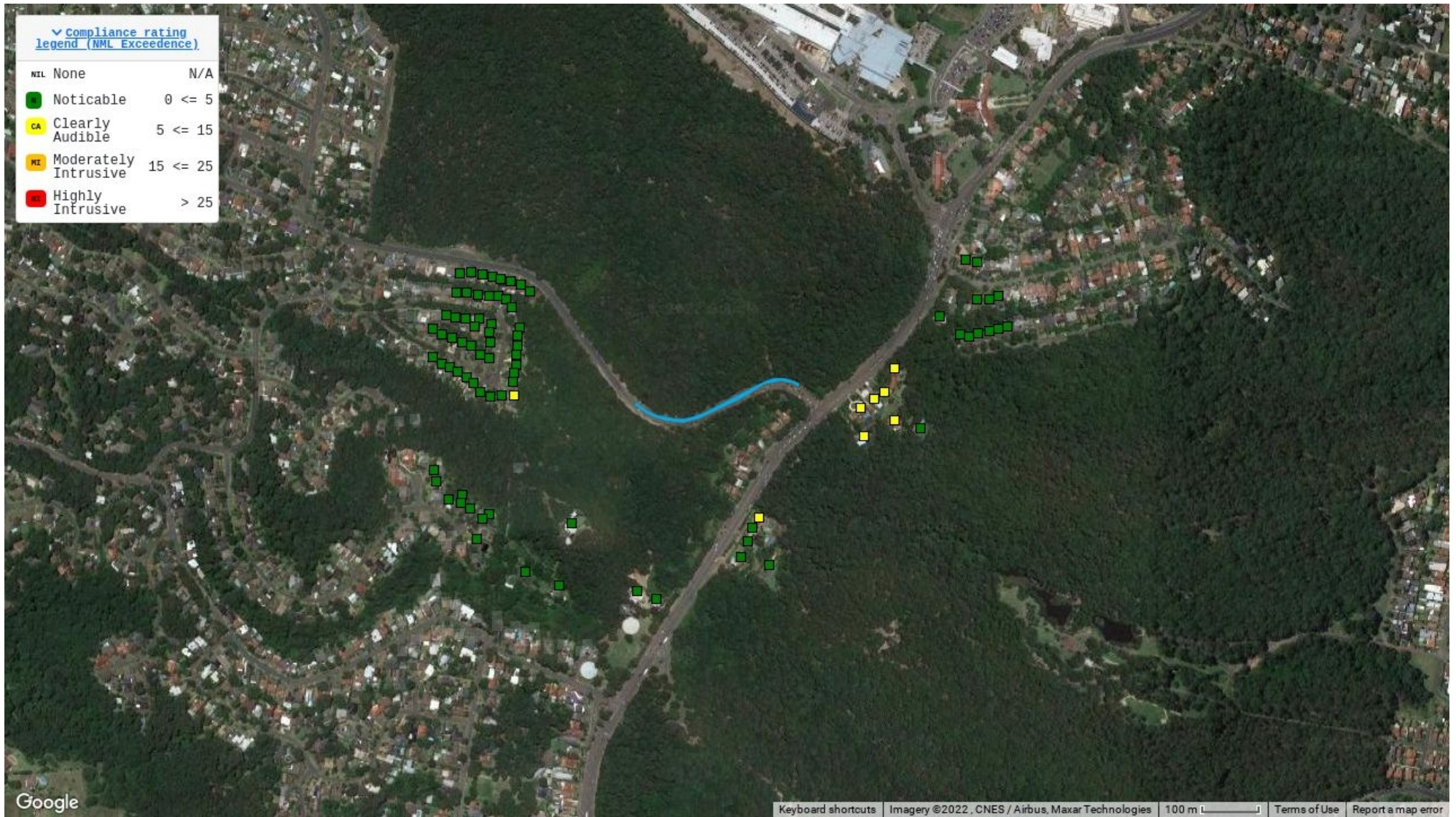
Table 6 Safeguards and controls

Action	Description
Community consultation or notification	<p>Notify the affected community.</p> <p>The notification will detail work activities, dates and hours, impacts and mitigation measures, indication of work schedule over the night time period, any operational noise benefits from the works (where applicable) and contact telephone number.</p> <p>Notification should be a minimum of 7 calendar days prior to the start of works. For projects other than maintenance works more advanced consultation or notification may be required.</p>
Site inductions	<p>All employees, contractors and subcontractors are to receive an environmental induction. The induction would at least include:</p> <ul style="list-style-type: none"> • all project specific and relevant standard noise and vibration mitigation measures • relevant licence and approval conditions • permissible hours of work • any limitations on high noise generating activities • location of nearest sensitive receivers • construction employee parking areas • designated loading/unloading areas and procedures <p>site opening/closing times (including deliveries) environmental incident procedures</p>
Behaviour	<p>No swearing or unnecessary shouting or loud stereos/radios on site.</p> <p>Limit compression braking at night in residential areas.</p> <p>No dropping of materials from height, throwing of metal items and slamming of doors.</p>
Verification	<p>Where indicated in Appendix C, a noise verification program would be undertaken for the duration of the works.</p>
Construction hours	<p>Where feasible and reasonable, construction should be carried out during the standard daytime working hours. Work generating high noise and/or vibration levels should be scheduled during less sensitive time periods.</p>
Respite for out-of-hours works	<p>Respite would be scheduled as indicated in Appendix C and described in the CNVG.</p>
Equipment selection	<p>Use quieter construction methods where feasible and reasonable.</p> <p>Ensure plant including the silencer is well maintained.</p> <p>Plant noise levels will have an operating noise emission level compliant with Appendix F of the CNVG</p>
Use and siting of plant	<p>The offset distance between noisy plant and adjacent sensitive receivers is to be maximised.</p> <p>Plant used intermittently to be throttled down or shut down.</p> <p>Noise-emitting plant to be directed away from sensitive receivers.</p>

Construction noise impact statement

Action	Description
Plan worksites and activities to minimise noise and vibration.	<p>Locate compounds away from sensitive receivers and discourage access from local roads.</p> <p>Plan traffic flow, parking and loading/unloading areas to minimise reversing movements within the site.</p> <p>Where additional activities or plant may only result in a marginal noise increase and speed up works, consider limiting duration of impact by concentrating noisy activities at one location and move to another as quickly as possible.</p> <p>Very noise activities should be scheduled for normal working hours. If the work can not be undertaken during the day, it should be completed before 11:00pm.</p> <p>Where practicable, work should be scheduled to avoid major student examination periods when students are studying for examinations such as before or during Higher School Certificate and at the end of higher education semesters.</p>
Non-tonal reverse alarms	Non-tonal reversing beepers (or an equivalent mechanism) must be fitted and used on all construction vehicles and mobile plant regularly used on site and for any out of hours work.
Shield stationary noise sources such as pumps, generators, and compressors	These should be enclosed or shielded where reasonable and feasible.
Implement any project specific mitigation measures	
1	None

Appendix A Project location and predicted level of impact



Appendix B Proposed activities and equipment

Asphalting

Equipment	Quantity	Usage	Reduction	SWL
Daymakers / Lighting plant	2	100 %	5	91
Multi Tyred Roller	1	20 %	3	101
Truck (10 tonne)	1	20 %	3	90
Bobcat / skidsteer large	1	20 %	3	99

Activity Sound Power Level: 104

Appendix C Detailed noise predicted for each receiver and activity

Assessment: Asphalt Pavement Restoration				Night	Results summary		
NCA	ID	Address	Land use	NML	Cumulative Predicted LAeq, 15 minute noise level	Exceedance of NML, dB	Impact classification
NCA 13	697818	117 LOOKOUT ROAD NEW LAMBTON HEIGHTS	RES	38	43	5	Clearly Audible
NCA 13	697817	121C LOOKOUT ROAD NEW LAMBTON HEIGHTS	RES	38	41	3	Noticable
NCA 13	697812	136 LOOKOUT ROAD NEW LAMBTON HEIGHTS	RES	38	39	1	Noticable
NCA 13	697811	138 LOOKOUT ROAD NEW LAMBTON HEIGHTS	RES	38	40	2	Noticable
NCA 13	697810	121A LOOKOUT ROAD NEW LAMBTON HEIGHTS	RES	38	40	2	Noticable
NCA 13	697808	121B LOOKOUT ROAD NEW LAMBTON HEIGHTS	RES	38	42	4	Noticable
NCA 13	697807	119 LOOKOUT ROAD NEW LAMBTON HEIGHTS	RES	38	43	5	Noticable
NCA 13	697787	53 ATHERTON CLOSE RANKIN PARK	RES	38	39	1	Noticable
NCA 13	697781	57 ATHERTON CLOSE RANKIN PARK	RES	38	39	1	Noticable
NCA 13	697779	53 ATHERTON CLOSE RANKIN PARK	RES	38	39	1	Noticable
NCA 13	697773	3A MARSHALL STREET NEW LAMBTON HEIGHTS	RES	38	42	4	Noticable
NCA 13	697770	51 ATHERTON CLOSE RANKIN PARK	RES	38	38	0	Noticable
NCA 13	697758	4 BOND CLOSE RANKIN PARK	RES	38	38	0	Noticable
NCA 13	697757	57 ATHERTON CLOSE RANKIN PARK	RES	38	39	1	Noticable
NCA 13	697749	5A MARSHALL STREET NEW LAMBTON HEIGHTS	RES	38	39	1	Noticable
NCA 13	697743	5A MARSHALL STREET NEW LAMBTON HEIGHTS	RES	38	39	1	Noticable
NCA 13	697740	55 ATHERTON CLOSE RANKIN PARK	RES	38	39	1	Noticable
NCA 13	697735	61 ATHERTON CLOSE RANKIN PARK	RES	38	38	0	Noticable
NCA 13	697716	38 FLORALIA CLOSE NEW LAMBTON HEIGHTS	RES	38	40	2	Noticable
NCA 13	697715	34 FLORALIA CLOSE NEW LAMBTON HEIGHTS	RES	38	39	1	Noticable
NCA 13	697710	79 LOOKOUT ROAD NEW LAMBTON HEIGHTS	RES	38	46	8	Clearly Audible
NCA 13	697706	30 FLORALIA CLOSE NEW LAMBTON HEIGHTS	RES	38	39	1	Noticable
NCA 13	697698	32 FLORALIA CLOSE NEW LAMBTON HEIGHTS	RES	38	39	1	Noticable
NCA 13	697697	4 RIDGEWAY ROAD NEW LAMBTON HEIGHTS	RES	38	38	0	Noticable
NCA 13	697694	79A LOOKOUT ROAD NEW LAMBTON HEIGHTS	RES	38	45	7	Clearly Audible
NCA 13	697693	79B LOOKOUT ROAD NEW LAMBTON HEIGHTS	RES	38	43	5	Noticable
NCA 13	697692	85 LOOKOUT ROAD NEW LAMBTON HEIGHTS	RES	38	47	9	Clearly Audible
NCA 13	697685	3 RIDGEWAY ROAD NEW LAMBTON HEIGHTS	RES	38	38	0	Noticable
NCA 13	697684	36 FLORALIA CLOSE NEW LAMBTON HEIGHTS	RES	38	40	2	Noticable
NCA 13	697683	81 LOOKOUT ROAD NEW LAMBTON HEIGHTS	RES	38	48	10	Clearly Audible
NCA 13	697682	2 RIDGEWAY ROAD NEW LAMBTON HEIGHTS	RES	38	39	1	Noticable
NCA 13	697681	1 RIDGEWAY ROAD NEW LAMBTON HEIGHTS	RES	38	39	1	Noticable
NCA 13	697674	71 LOOKOUT ROAD NEW LAMBTON HEIGHTS	RES	38	41	3	Noticable
NCA 13	697665	28 FLORALIA CLOSE NEW LAMBTON HEIGHTS	RES	38	38	0	Noticable
NCA 13	697663	1A RIDGEWAY ROAD NEW LAMBTON HEIGHTS	RES	38	38	0	Noticable
NCA 13	697661	83 LOOKOUT ROAD NEW LAMBTON HEIGHTS	RES	38	49	11	Clearly Audible
NCA 13	697659	81A LOOKOUT ROAD NEW LAMBTON HEIGHTS	RES	38	47	9	Clearly Audible
NCA 10	697655	14 KINGSWAY AVENUE RANKIN PARK	RES	38	40	2	Noticable

Appendix C Detailed noise predicted for each receiver and activity

Assessment: Asphalt Pavement Restoration				Night	Results summary		
NCA	ID	Address	Land use	NML	Cumulative Predicted LAeq, 15 minute noise level	Exceedance of NML, dB	Impact classification
NCA 10	697654	43 KINGSWAY AVENUE RANKIN PARK	RES	38	43	5	Noticable
NCA 10	697653	329 MCCAFFREY DRIVE RANKIN PARK	RES	38	40	2	Noticable
NCA 10	697652	57 KINGSWAY AVENUE RANKIN PARK	RES	38	41	3	Noticable
NCA 10	697651	47 KINGSWAY AVENUE RANKIN PARK	RES	38	43	5	Noticable
NCA 10	697649	23 KINGSWAY AVENUE RANKIN PARK	RES	38	39	1	Noticable
NCA 10	697648	37 KINGSWAY AVENUE RANKIN PARK	RES	38	42	4	Noticable
NCA 10	697647	10 KINGSWAY AVENUE RANKIN PARK	RES	38	39	1	Noticable
NCA 10	697646	33 KINGSWAY AVENUE RANKIN PARK	RES	38	41	3	Noticable
NCA 10	697645	49 KINGSWAY AVENUE RANKIN PARK	RES	38	43	5	Noticable
NCA 10	697643	61 KINGSWAY AVENUE RANKIN PARK	RES	38	40	2	Noticable
NCA 10	697642	32 KINGSWAY AVENUE RANKIN PARK	RES	38	39	1	Noticable
NCA 10	697641	30 KINGSWAY AVENUE RANKIN PARK	RES	38	39	1	Noticable
NCA 10	697639	24 KINGSWAY AVENUE RANKIN PARK	RES	38	41	3	Noticable
NCA 10	697638	28 KINGSWAY AVENUE RANKIN PARK	RES	38	40	2	Noticable
NCA 10	697637	321 MCCAFFREY DRIVE RANKIN PARK	RES	38	38	0	Noticable
NCA 10	697633	59 KINGSWAY AVENUE RANKIN PARK	RES	38	41	3	Noticable
NCA 10	697632	12 KINGSWAY AVENUE RANKIN PARK	RES	38	39	1	Noticable
NCA 10	697631	41 KINGSWAY AVENUE RANKIN PARK	RES	38	43	5	Noticable
NCA 10	697630	34 KINGSWAY AVENUE RANKIN PARK	RES	38	38	0	Noticable
NCA 10	697629	27 KINGSWAY AVENUE RANKIN PARK	RES	38	40	2	Noticable
NCA 10	697628	39 KINGSWAY AVENUE RANKIN PARK	RES	38	42	4	Noticable
NCA 10	697626	331 MCCAFFREY DRIVE RANKIN PARK	RES	38	40	2	Noticable
NCA 10	697625	22 KINGSWAY AVENUE RANKIN PARK	RES	38	41	3	Noticable
NCA 10	697624	327 MCCAFFREY DRIVE RANKIN PARK	RES	38	39	1	Noticable
NCA 10	697623	51 KINGSWAY AVENUE RANKIN PARK	RES	38	43	5	Clearly Audible
NCA 10	697622	45 KINGSWAY AVENUE RANKIN PARK	RES	38	43	5	Noticable
NCA 10	697621	323 MCCAFFREY DRIVE RANKIN PARK	RES	38	38	0	Noticable
NCA 10	697620	29 KINGSWAY AVENUE RANKIN PARK	RES	38	40	2	Noticable
NCA 10	697619	21 KINGSWAY AVENUE RANKIN PARK	RES	38	38	0	Noticable
NCA 10	697612	325 MCCAFFREY DRIVE RANKIN PARK	RES	38	39	1	Noticable
NCA 10	697610	8 KINGSWAY AVENUE RANKIN PARK	RES	38	38	0	Noticable
NCA 10	697606	335 MCCAFFREY DRIVE RANKIN PARK	RES	38	41	3	Noticable
NCA 10	697605	69 KINGSWAY AVENUE RANKIN PARK	RES	38	38	0	Noticable
NCA 10	697603	26 KINGSWAY AVENUE RANKIN PARK	RES	38	40	2	Noticable
NCA 10	697600	25 KINGSWAY AVENUE RANKIN PARK	RES	38	39	1	Noticable
NCA 10	697599	31 KINGSWAY AVENUE RANKIN PARK	RES	38	41	3	Noticable
NCA 10	697597	20 KINGSWAY AVENUE RANKIN PARK	RES	38	41	3	Noticable
NCA 10	697596	333 MCCAFFREY DRIVE RANKIN PARK	RES	38	41	3	Noticable
NCA 10	697595	16 KINGSWAY AVENUE RANKIN PARK	RES	38	41	3	Noticable
NCA 10	697594	55 KINGSWAY AVENUE RANKIN PARK	RES	38	42	4	Noticable

Appendix C Detailed noise predicted for each receiver and activity

Assessment: Asphalt Pavement Restoration				Night	Results summary		
NCA	ID	Address	Land use	NML	Cumulative Predicted LAeq, 15 minute noise level	Exceedance of NML, dB	Impact classification
NCA 10	697593	6 BOND CLOSE RANKIN PARK	RES	38	38	0	Noticable
NCA 10	697591	65 KINGSWAY AVENUE RANKIN PARK	RES	38	39	1	Noticable
NCA 10	697589	63 KINGSWAY AVENUE RANKIN PARK	RES	38	40	2	Noticable
NCA 10	697588	67 KINGSWAY AVENUE RANKIN PARK	RES	38	39	1	Noticable
NCA 10	697587	18 KINGSWAY AVENUE RANKIN PARK	RES	38	41	3	Noticable
NCA 10	697584	14 KINGSWAY AVENUE RANKIN PARK	RES	38	40	2	Noticable
NCA 10	697583	53 KINGSWAY AVENUE RANKIN PARK	RES	38	42	4	Noticable

Construction noise and vibration impact assessment

June Nightwork			
Proposed works	Asphalt Pavement Restoration		
Proponent	Quickway		
Assessment Date	26/04/2022		
Prepared by		Assessment Id	Shift5and6-NCA10

Introduction

This report has been prepared using the construction noise self-assessment platform KNOWnoise: *Minor Works* and presents an assessment of the likely noise impacts related to proposed works associated with the above project. Where possible, these works would be completed during standard construction hours; however, there may be a need to work outside these hours due to technical, community or access limitations. The location of the proposed works is illustrated in Appendix A.

Planned works

A description of the proposed works is as follows.

Mill and Re-sheet Asphalt Pavement in McCaffrey Drive Shoulder

Proposed activities and equipment for the works are summarised in Appendix B.

Though subject to change, the works are expected to commence around 26/06/2022 and would be completed by 28/06/2022.

Assessment criteria and mitigation requirements

Noise

The Interim Construction Noise Guideline (ICNG) (DECC 2009) describes noise more than the background level as potentially having an adverse impact on sensitive receivers and increasing the likelihood of complaint. During standard construction hours, where construction noise is within 10 dB(A) of the RBL, impacts would be acceptable.

Where construction noise is more than 10 dB(A) above the RBL during standard construction hours, a residential receiver is considered noise affected and the proponent should undertake all reasonable and feasible steps necessary to manage the impact and consult with the affected community.

Above a LAeq, 15 minute noise level of 75 dB(A), a receiver is highly affected, requiring consideration of additional mitigation measures including alternative accommodation in the night period.

Outside standard construction hours, construction noise at a residential receiver more than 5 dB(A) above the RBL is taken to be noise affected.

In addition, annoying noise such as rock hammers, impact piling, or other impulsive noise sources usually result in greater annoyance than continuous construction noise. A 5 dB(A) penalty is applicable to such activities prior to comparison with the NMLs.

Other sensitive land uses, such as schools and offices, typically find noise from construction disruptive when the properties are being used (such as during work and school times). Table 2 presents NMLs from the ICNG for sensitive land uses based on the principle that the characteristic activities for each of these land uses should not be unduly disturbed.

The difference between an internal noise level and the external noise level is about 10 dB(A), which provides a conservative assumption that windows are open for ventilation. Buildings where windows are fixed or cannot otherwise be opened may achieve a greater noise level performance.

Table 1 Non-residential sensitive land uses noise management levels

Land use	Noise assessment location	NML (L _{Aeq,15min})
Classrooms at schools and other educational institutions	Internal	45
Places of worship		
Active recreation areas (such as sporting activities and activities which generate their own noise or focus for participants)	External	65
Passive recreation areas (contemplative activities that generate little noise and where benefits are compromised by external noise intrusion, for example, reading, meditation)	External	60
Industrial premises	External	75
Office, retail outlets	External	70

Standard mitigation measures, as described in the ICNG and Construction Noise and Vibration Strategy (CNVS), would be implemented where reasonable and feasible. However, after these measures have been applied, noise and vibration levels may continue to exceed the NMLs.

In this case, additional mitigation measures outlined in the CNVS, which largely focus on engagement with affected sensitive receivers, should be implemented where reasonable and feasible, unless other agreements are in place with the impacted receiver.

Triggers and additional mitigation measures for airborne noise are summarised in Table 2. Further details of specific additional mitigation measures are described in the CNVG.

Table 2 Triggers for additional mitigation measures – Airborne noise (CNVS)

Construction hours	dB above NML	Additional management measures
Approved hours Monday – Friday: 7am – 6pm Saturday: 8am to 6pm	0 to 10	-
	10 to 20	LB
	20 to 30	LB, M, SN
	>30	LB, M, SN
Evening Monday – Friday: 6pm – 10pm Saturday: 7am – 8am, 6pm – 10pm Sunday / PH: 8am – 6pm	0 to 10	LB
	10 to 20	LB, M
	20 to 30	LB, M, SN, RO
	> 30	LB, M, SN, IB, PC, RO
Night Monday – Saturday: 10am – 7am Saturday: 10pm – 8am) Sunday / PH: 6pm – 7am	0 to 10	LB
	10 to 20	LB, M, SN, RO
	20 to 30	LB, M, SN, IB, PC, RO, AA
	> 30	LB, M, SN, IB, PC, RO, AA

Notes: PC = Phone calls and emails SN = Specific notification
M = monitoring LB = Letterbox drops
IB = Individual briefings DR = Duration reduction
AA = Alternative accommodation RO = Project specific respite offer

Sleep disturbance

The CNVS requires maximum noise levels to be analysed in terms of the extent and number of times the maximum noise exceeds specific noise trigger levels, in general accordance with the Noise Policy for Industry (NPfI) (EPA 2017). These triggers are:

- LAeq, 15 minute 40 dBA or the prevailing RBL plus 5 dB, whichever is greater, and the
- L_{Amax} 52 dBA or the prevailing RBL plus 15 dB, whichever is greater.

The NPfI also recommends review of the DECCW (2011) Road Noise Policy (RNP) for further risk assessment. The RNP recommends maximum internal noise levels below 50–55 dB(A) are unlikely to awaken people from sleep and one or two noise events per night, with maximum internal noise levels of 65–70 dB(A), are not likely to affect health and wellbeing significantly.

Vibration

Effects of vibration from construction may be segregated into:

- Human exposure – disturbance to building occupants: vibration in which the occupants or users of the building are inconvenienced or possibly disturbed.
- Effects on building contents – vibration where the building contents may be affected.
- Effects on building structures – vibration in which the integrity of the building or structure itself may be prejudiced.

Vibration criteria relating to human comfort applicable to this project are taken from the DEC (2006) document *Assessing Vibration – A Technical Guideline for intermittent vibration* – such as from drilling, compacting or activities that would result in continuous vibration if operated continuously. Intermittent vibration is assessed as a vibration dose value (VDV) and relates to the level of vibration over time (cumulative over the night or day period). VDV's that may result in adverse comment from receivers are summarised in Table 3.

Table 3 Summary of vibration dose values which might result in adverse comment

Time	Low probability of adverse comment (m/s ^{1.75})	Adverse comment possible (m/s ^{1.75})	Adverse comment probable (m/s ^{1.75})
Day (6am to 10pm)	0.2 to 0.4	0.4 to 0.8	0.8 to 1.6
Night (10pm to 6am)	0.1 to 0.2	0.2 to 0.4	0.4 to 0.8

Guidance for the consideration of potential building damage from construction vibration is in line with BS 7385-1 *Evaluation and measurement for vibration in buildings - Guide for measurement of vibration and evaluation of their effects on buildings*. These guideline values are presented in Table 4.

Table 4 Building damage vibration guidelines (BS 7385-1)

Type of building	Guideline values for vibration (PPV mm/s)		
	4Hz to 15Hz	15Hz to 40Hz	40Hz and above
Reinforced or framed structures / Industrial and heavy commercial buildings	50		
Un-reinforced or light framed structures / Residential or light commercial type buildings	15 - 20	20 - 50	50

For heritage structures, criteria are in line with the German Standard *DIN 4150-3: Structural Vibration- effects of vibration on structures*, as summarised in Table 5.

Table 5 Guideline values for vibration velocity to be used when evaluating the effects of short-term vibration on heritage structures (DIN 4150-3).

Type of building	Guideline values for vibration (PPV mm/s)			
	1 Hz to 10 Hz	10 Hz to 50 Hz	50 Hz to 100 Hz	Vibration at horizontal plane of highest floor at all frequencies
Structures that, because of their sensitivity to vibration, cannot be classified under lines 1 and 2 and are of great intrinsic value (e.g. listed buildings under preservation order)	3	3 to 8	8 to 10	8

The safe working distances presented in Table 6 are indicative and will vary depending on the item of plant and local geotechnical conditions. The cosmetic damage thresholds apply to typical buildings under typical geotechnical conditions and vibration monitoring is recommended at specific sites. Where structures are more sensitive, such as heritage items, more stringent conditions are applicable and should be considered individually.

In relation to human response, the safe working distances relate to continuous vibration. For most construction activities, vibration emissions are intermittent and higher vibration levels over shorter periods are acceptable. Additional assessment should be undertaken where the human response criteria are exceeded.

Table 6 Safe working distances for vibration intensive plant

Plant item	Rating/description	Safe working distance	
		Cosmetic damage (BS 7385-1)	Human response (DECCW)
Vibratory roller	<50 kN (typically 1-2 t)	5 m	15 m to 20 m
	<100 kN (typically 2-4 t)	6 m	20 m
	<200 kN (typically 4-6 t)	12 m	40 m
	<300 kN (typically 7-13 t)	15 m	100 m
	>300 kN (typically 13-18 t)	20 m	100 m
	>300 kN (> 18 t)	25 m	100 m
Small hydraulic hammer	300 kg – 5 to 12 t excavator	2 m	7 m
Medium hydraulic hammer	900 kg – 12 to 18t excavator	7 m	23 m
Large hydraulic hammer	1600 kg – 18 to 34 t excavator	22 m	73 m
Vibratory pile driver	Sheet piles	2 m to 20 m	20 m
Pile boring	≤800 mm	2 m	n/a
Jackhammer	Hand held	1 m	Avoid contact with structure

Existing environment and noise management levels

The proposed works would be undertaken in a predominantly Suburban/ Urban, characterised as:

Areas with low density transportation.

Typically local traffic, light vehicles, intermittent traffic flow

Background noise levels adopted for the project area and associated noise management levels (NMLs) are summarised in Table 7. NMLs have been established in line with the ICNG.

Table 7 Construction NMLs

Land use	Suburban/ Urban		Using custom background noise data?			Yes
	Day	Weekend Day	Evening	Night	Sleep	
RBL	38	35	30	30		
NML	43	43	35	35	35	

Assessment methodology

Based on the nominated works area (illustrated in Appendix A), proposed equipment and the minimum distance from the works to each sensitive receiver, noise levels were calculated based on CONCAWE (1981) *Propagation of noise from petroleum and petrochemical complexes to neighboring communities*.

This method considers geometric spreading, atmospheric absorption, ground effects and is valid for meteorological conditions of a gentle breeze from source to receiver and stable atmosphere (temperature inversion).

KNOWnoise: Minor works is a 2-Dimensional assessment platform and does not consider terrain effects (e.g. hills, valleys) or the presence of solid structures such as homes or noise barriers. This will result in a conservative prediction, suitable for the project being assessed.

Considering the nature of the works and the type of surrounding land uses, sensitive receivers up to a radius of 600 metres from the works have been included in the assessment.

Sound power levels and predicted noise levels depend on the number of plant items operating at any one time and their precise location relative to a sensitive receiver. Equipment was assumed to be working at the worst-case location relative to each receiver and represents a worst-case assessment. Where the activity is further away from receivers or less equipment is used the predicted levels will decrease.

Sound power levels for plant and equipment expected to be used for each activity has been estimated based on guidance in the following standards and guidelines as well as typical measured noise levels for specific equipment.

- “ Australian Standard AS2436-2010: Guide to noise and vibration control on construction, demolition and maintenance sites
- “ Construction Noise and Vibration Strategy (CNVS) (TfNSW, 2019)
- “ British Standard 5228-1:2009 Code of practice for noise and vibration control on construction and open sites
- “ United Kingdom Department for Environment, Food and Rural Affairs (DEFRA) Noise database for prediction of noise on construction and open sites

Construction noise sources and associated sound power levels are listed in Appendix B. The maximum predicted LAeq noise level within the work area was identified for each receiver.

Predicted noise levels

Detailed predicted noise levels for each potentially affected receiver are presented Appendix C.

Predictions indicate 0 receivers are predicted to be classified as Highly Impacted during the Night period. A summary of predicted exceedances of the NML for the Night period is presented in Table 8.

Table 8 Summary of predicted noise levels with comparison against CNVS criteria

Criterion	Predicted number of receivers	
Maximum cumulative predicted L _{Aeq, 15 minute} noise level	43 dB(A)	
Number of highly noise affected receivers (>75 dB)	0	
Impact class	Predicted noise level	Predicted number of receivers
Noticable	0 <= 10 dB above NML	105
Clearly Audible	10 <= 20 dB above NML	0
Moderately Intrusive	20 <= 30 dB above NML	0
Highly Intrusive	> 30 dB above NML	0

Predicted impact classes for the Night period are illustrated graphically in Appendix C. Each identified receiver in the study area has been coloured to highlight the predicted level of impact.

Sleep disturbance

In the event works are planned for more than two consecutive nights, sleep disturbance is considered. Table 9 summarises the number of residents predicted to exceed the sleep disturbance screening criterion. Further analysis is also provided to indicate the number of receivers expected to be woken, at L_{Amax} noise levels greater than 65 dBA.

Where exceedances of the awakening criteria are predicted, additional care should be taken and mitigation measures implemented in the with the CNVG.

Table 9 Summary of predicted exceedances of sleep disturbance screening criterion and awakening criterion.

Criterion	Predicted number of receivers
Potentially Sleep Disturbed (exceed RBL + 15 screening criterion)	105
Sleep Disturbed (exceed 65 dBA awakening criterion)	0

Predicted vibration impacts

The level of vibration impact on sensitive receivers (buildings and human comfort) will largely depend on the type of machinery in use and the distance from source to receiver.

Based on the proposed work locations and selected equipment, the following level of vibration impact is expected. A summary of vibration impacts is provided for each sensitive receiver in Appendix C.

Impact classification	Number of potentially affected receivers
Human comfort	0
Cosmetic damage	0
Heritage structure	0

Proposed noise mitigation measures

The safeguards and controls listed in Table 6 will be implemented where reasonable and feasible with the intention of achieving the project noise criteria and to maintain noise impacts at a practical minimum.

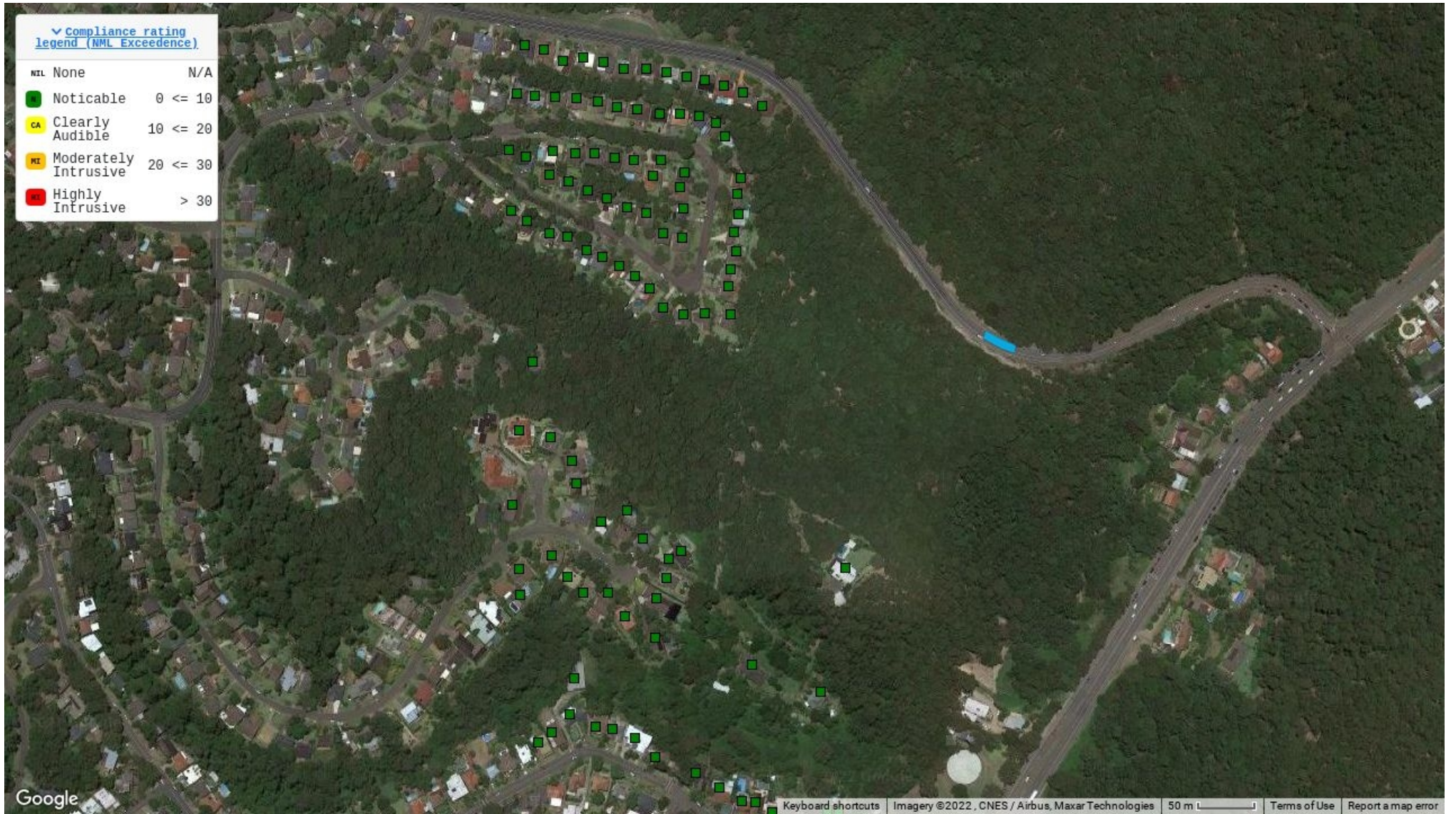
Table 10 Safeguards and controls

Action	Description
Community consultation or notification	<p>Notify the affected community.</p> <p>The notification will detail work activities, dates and hours, impacts and mitigation measures, indication of work schedule over the night time period, any operational noise benefits from the works (where applicable) and contact telephone number.</p> <p>Notification should be a minimum of 7 calendar days prior to the start of works. For projects other than maintenance works more advanced consultation or notification may be required.</p>
Site inductions	<p>All employees, contractors and subcontractors are to receive an environmental induction. The induction would at least include:</p> <ul style="list-style-type: none"> • all project specific and relevant standard noise and vibration mitigation measures • relevant licence and approval conditions • permissible hours of work • any limitations on high noise generating activities • location of nearest sensitive receivers • construction employee parking areas • designated loading/unloading areas and procedures <p>site opening/closing times (including deliveries) environmental incident procedures</p>
Behaviour	<p>No swearing or unnecessary shouting or loud stereos/radios on site.</p> <p>Limit compression braking at night in residential areas.</p> <p>No dropping of materials from height, throwing of metal items and slamming of doors.</p>
Verification	<p>Where indicated in Appendix C, a noise verification program would be undertaken for the duration of the works.</p>
Construction hours	<p>Where feasible and reasonable, construction should be carried out during the standard daytime working hours. Work generating high noise and/or vibration levels should be scheduled during less sensitive time periods.</p>
Respite for out-of-hours works	<p>Respite would be scheduled as indicated in Appendix C and described in the CNVG.</p>
Equipment selection	<p>Use quieter construction methods where feasible and reasonable.</p> <p>Ensure plant including the silencer is well maintained.</p> <p>Plant noise levels will have an operating noise emission level compliant with Appendix F of the CNVG</p>
Use and siting of plant	<p>The offset distance between noisy plant and adjacent sensitive receivers is to be maximised.</p> <p>Plant used intermittently to be throttled down or shut down.</p> <p>Noise-emitting plant to be directed away from sensitive receivers.</p>

Construction noise and vibration impact statement

Action	Description
Plan worksites and activities to minimise noise and vibration.	<p>Locate compounds away from sensitive receivers and discourage access from local roads.</p> <p>Plan traffic flow, parking and loading/unloading areas to minimise reversing movements within the site.</p> <p>Where additional activities or plant may only result in a marginal noise increase and speed up works, consider limiting duration of impact by concentrating noisy activities at one location and move to another as quickly as possible.</p> <p>Very noise activities should be scheduled for normal working hours. If the work can not be undertaken during the day, it should be completed before 11:00pm.</p> <p>Where practicable, work should be scheduled to avoid major student examination periods when students are studying for examinations such as before or during Higher School Certificate and at the end of higher education semesters.</p>
Non-tonal reverse alarms	Non-tonal reversing beepers (or an equivalent mechanism) must be fitted and used on all construction vehicles and mobile plant regularly used on site and for any out of hours work.
Shield stationary noise sources such as pumps, generators, and compressors	These should be enclosed or shielded where reasonable and feasible.
Implement any project specific mitigation measures	
1	None

Appendix A Project location and predicted level of impact



Appendix B Proposed activities and equipment

Asphalting

Equipment	Quantity	Usage	Reduction	SWL
Bobcat / skidsteer large	1	20 %	3	99
Daymakers / Lighting plant	2	100 %	5	91
Multi Tyred Roller	1	20 %	3	101
Truck (10 tonne)	1	20 %	3	90

Activity Sound Power Level: 104

Appendix C Detailed noise predicted for each receiver

Noise

Assessment: Asphalt Pavement Restoration				NML, LAeq, 15 minute				Sleep, LAmax		Predicted noise level, dBA		Exceedance summary										
NCA	Rec	Address	Land use	Day	O/day	Eve	Night	Screen	Awake	Cumulative LAeq, 15 minute	LMax	Highly Affected?	Exceed NML by (dB):				Exceed sleep disturbance by (dB):		Impact classification			
													Day	O/day	Eve	Night	Screen	Awake	Day	O/day	Eve	Night
NCA 13	6979 71	10 GRANDVIEW ROAD NEW LAMBTON HEIGHTS	RES	43			35	Y		37	47		0	-	-	2	-	2	None			Noticable
NCA 13	6979 62	20 GRANDVIEW ROAD NEW LAMBTON HEIGHTS	RES	43			35	Y		36	47		0	-	-	1	-	1	None			Noticable
NCA 10	6979 61	64 ATHERTON CLOSE RANKIN PARK	RES	43			35	Y		36	47		0	-	-	1	-	1	None			Noticable
NCA 10	6979 59	74 ATHERTON CLOSE RANKIN PARK	RES	43			35	Y		38	48		0	-	-	3	-	3	None			Noticable
NCA 10	6979 57	30 GRANDVIEW ROAD NEW LAMBTON HEIGHTS	RES	43			35	Y		36	46		0	-	-	1	-	1	None			Noticable
NCA 10	6979 55	72 ATHERTON CLOSE RANKIN PARK	RES	43			35	Y		37	48		0	-	-	2	-	2	None			Noticable
NCA 10	6979 54	57 ATHERTON CLOSE RANKIN PARK	RES	43			35	Y		39	49		0	-	-	4	-	4	None			Noticable
NCA 10	6979 52	53 ATHERTON CLOSE RANKIN PARK	RES	43			35	Y		39	49		0	-	-	4	-	4	None			Noticable
NCA 10	6979 51	32 GRANDVIEW ROAD NEW LAMBTON HEIGHTS	RES	43			35	Y		36	46		0	-	-	1	-	1	None			Noticable
NCA 10	6979 47	3A MARSHALL STREET NEW LAMBTON HEIGHTS	RES	43			35	Y		42	52		0	-	-	7	-	7	None			Noticable
NCA 10	6979 46	70 ATHERTON CLOSE RANKIN PARK	RES	43			35	Y		37	47		0	-	-	2	-	2	None			Noticable
NCA 10	6979 45	14 GRANDVIEW ROAD NEW LAMBTON HEIGHTS	RES	43			35	Y		36	47		0	-	-	1	-	1	None			Noticable
NCA 10	6979 44	51 ATHERTON CLOSE RANKIN PARK	RES	43			35	Y		38	49		0	-	-	3	-	3	None			Noticable
NCA 10	6979 42	18 GRANDVIEW ROAD NEW LAMBTON HEIGHTS	RES	43			35	Y		36	47		0	-	-	1	-	1	None			Noticable
NCA 10	6979 40	68 ATHERTON CLOSE RANKIN PARK	RES	43			35	Y		37	47		0	-	-	2	-	2	None			Noticable
NCA 10	6979 39	38 GRANDVIEW ROAD NEW LAMBTON HEIGHTS	RES	43			35	Y		35	46		0	-	-	0	-	0	None			Noticable
NCA 10	6979 38	59 ATHERTON CLOSE RANKIN PARK	RES	43			35	Y		39	49		0	-	-	4	-	4	None			Noticable
NCA 10	6979 36	24 GRANDVIEW ROAD NEW LAMBTON HEIGHTS	RES	43			35	Y		36	47		0	-	-	1	-	1	None			Noticable
NCA 10	6979 34	76 ATHERTON CLOSE RANKIN PARK	RES	43			35	Y		38	48		0	-	-	3	-	3	None			Noticable
NCA 10	6979 33	4 BOND CLOSE RANKIN PARK	RES	43			35	Y		38	48		0	-	-	3	-	3	None			Noticable
NCA 10	6979 32	57 ATHERTON CLOSE RANKIN PARK	RES	43			35	Y		39	50		0	-	-	4	-	4	None			Noticable
NCA 10	6979 30	36A GRANDVIEW ROAD NEW LAMBTON HEIGHTS	RES	43			35	Y		36	47		0	-	-	1	-	1	None			Noticable
NCA 10	6979 28	66 ATHERTON CLOSE RANKIN PARK	RES	43			35	Y		36	47		0	-	-	1	-	1	None			Noticable
NCA 10	6979 26	26 GRANDVIEW ROAD NEW LAMBTON HEIGHTS	RES	43			35	Y		36	47		0	-	-	1	-	1	None			Noticable
NCA 10	6979 25	5A MARSHALL STREET NEW LAMBTON HEIGHTS	RES	43			35	Y		39	49		0	-	-	4	-	4	None			Noticable
NCA 10	6979 24	34 GRANDVIEW ROAD NEW LAMBTON HEIGHTS	RES	43			35	Y		36	46		0	-	-	1	-	1	None			Noticable
NCA 10	6979 21	12 GRANDVIEW ROAD NEW LAMBTON HEIGHTS	RES	43			35	Y		37	47		0	-	-	2	-	2	None			Noticable
NCA 10	6979 20	5A MARSHALL STREET NEW LAMBTON HEIGHTS	RES	43			35	Y		39	49		0	-	-	4	-	4	None			Noticable
NCA 10	6979 19	78 ATHERTON CLOSE RANKIN PARK	RES	43			35	Y		38	48		0	-	-	3	-	3	None			Noticable
NCA 10	6979 18	36 GRANDVIEW ROAD NEW LAMBTON HEIGHTS	RES	43			35	Y		35	46		0	-	-	0	-	0	None			Noticable
NCA 10	6979 17	55 ATHERTON CLOSE RANKIN PARK	RES	43			35	Y		39	49		0	-	-	4	-	4	None			Noticable
NCA 10	6979 15	28 GRANDVIEW ROAD NEW LAMBTON HEIGHTS	RES	43			35	Y		36	47		0	-	-	1	-	1	None			Noticable

NCA 10	6979 14	22 GRANDVIEW ROAD NEW LAMBTON HEIGHTS	RES	43		35	Y		36	47		0	-	-	1	-	1	None		Noticable
NCA 10	6979 13	1 BOND CLOSE RANKIN PARK	RES	43		35	Y		37	47		0	-	-	2	-	2	None		Noticable
NCA 10	6979 12	61 ATHERTON CLOSE RANKIN PARK	RES	43		35	Y		38	49		0	-	-	3	-	3	None		Noticable
NCA 10	6979 11	16 GRANDVIEW ROAD NEW LAMBTON HEIGHTS	RES	43		35	Y		36	47		0	-	-	1	-	1	None		Noticable
NCA 10	6978 93	14 KINGSWAY AVENUE RANKIN PARK	RES	43		35	Y		39	50		0	-	-	4	-	4	None		Noticable
NCA 10	6978 92	43 KINGSWAY AVENUE RANKIN PARK	RES	43		35	Y		42	53		0	-	-	7	-	7	None		Noticable
NCA 10	6978 91	329 MCCAFFREY DRIVE RANKIN PARK	RES	43		35	Y		39	50		0	-	-	4	-	4	None		Noticable
NCA 10	6978 90	57 KINGSWAY AVENUE RANKIN PARK	RES	43		35	Y		41	51		0	-	-	6	-	6	None		Noticable
NCA 10	6978 89	47 KINGSWAY AVENUE RANKIN PARK	RES	43		35	Y		42	53		0	-	-	7	-	7	None		Noticable
NCA 10	6978 88	18 SLADE CLOSE RANKIN PARK	RES	43		35	Y		38	48		0	-	-	3	-	3	None		Noticable
NCA 10	6978 87	23 KINGSWAY AVENUE RANKIN PARK	RES	43		35	Y		38	49		0	-	-	3	-	3	None		Noticable
NCA 10	6978 86	37 KINGSWAY AVENUE RANKIN PARK	RES	43		35	Y		42	52		0	-	-	7	-	7	None		Noticable
NCA 10	6978 85	10 KINGSWAY AVENUE RANKIN PARK	RES	43		35	Y		38	49		0	-	-	3	-	3	None		Noticable
NCA 10	6978 84	33 KINGSWAY AVENUE RANKIN PARK	RES	43		35	Y		41	51		0	-	-	6	-	6	None		Noticable
NCA 10	6978 83	49 KINGSWAY AVENUE RANKIN PARK	RES	43		35	Y		43	53		0	-	-	8	-	8	None		Noticable
NCA 10	6978 81	61 KINGSWAY AVENUE RANKIN PARK	RES	43		35	Y		40	50		0	-	-	5	-	5	None		Noticable
NCA 10	6978 80	32 KINGSWAY AVENUE RANKIN PARK	RES	43		35	Y		38	49		0	-	-	3	-	3	None		Noticable
NCA 10	6978 79	30 KINGSWAY AVENUE RANKIN PARK	RES	43		35	Y		39	49		0	-	-	4	-	4	None		Noticable
NCA 10	6978 78	19 KINGSWAY AVENUE RANKIN PARK	RES	43		35	Y		38	48		0	-	-	3	-	3	None		Noticable
NCA 10	6978 77	24 KINGSWAY AVENUE RANKIN PARK	RES	43		35	Y		40	51		0	-	-	5	-	5	None		Noticable
NCA 10	6978 76	28 KINGSWAY AVENUE RANKIN PARK	RES	43		35	Y		39	50		0	-	-	4	-	4	None		Noticable
NCA 10	6978 75	321 MCCAFFREY DRIVE RANKIN PARK	RES	43		35	Y		38	48		0	-	-	3	-	3	None		Noticable
NCA 10	6978 74	313 MCCAFFREY DRIVE RANKIN PARK	RES	43		35	Y		36	47		0	-	-	1	-	1	None		Noticable
NCA 10	6978 73	15 KINGSWAY AVENUE RANKIN PARK	RES	43		35	Y		37	47		0	-	-	2	-	2	None		Noticable
NCA 10	6978 72	59 KINGSWAY AVENUE RANKIN PARK	RES	43		35	Y		40	51		0	-	-	5	-	5	None		Noticable
NCA 10	6978 71	12 KINGSWAY AVENUE RANKIN PARK	RES	43		35	Y		39	49		0	-	-	4	-	4	None		Noticable
NCA 10	6978 70	41 KINGSWAY AVENUE RANKIN PARK	RES	43		35	Y		42	53		0	-	-	7	-	7	None		Noticable
NCA 10	6978 69	34 KINGSWAY AVENUE RANKIN PARK	RES	43		35	Y		38	48		0	-	-	3	-	3	None		Noticable
NCA 10	6978 68	27 KINGSWAY AVENUE RANKIN PARK	RES	43		35	Y		39	50		0	-	-	4	-	4	None		Noticable
NCA 10	6978 67	39 KINGSWAY AVENUE RANKIN PARK	RES	43		35	Y		42	52		0	-	-	7	-	7	None		Noticable
NCA 10	6978 66	75 KINGSWAY AVENUE RANKIN PARK	RES	43		35	Y		37	47		0	-	-	2	-	2	None		Noticable
NCA 10	6978 65	331 MCCAFFREY DRIVE RANKIN PARK	RES	43		35	Y		40	50		0	-	-	5	-	5	None		Noticable
NCA 10	6978 64	22 KINGSWAY AVENUE RANKIN PARK	RES	43		35	Y		41	51		0	-	-	6	-	6	None		Noticable
NCA 10	6978 63	327 MCCAFFREY DRIVE RANKIN PARK	RES	43		35	Y		39	49		0	-	-	4	-	4	None		Noticable
NCA 10	6978 62	51 KINGSWAY AVENUE RANKIN PARK	RES	43		35	Y		43	53		0	-	-	8	-	8	None		Noticable
NCA 10	6978 61	45 KINGSWAY AVENUE RANKIN PARK	RES	43		35	Y		42	53		0	-	-	7	-	7	None		Noticable
NCA 10	6978 60	323 MCCAFFREY DRIVE RANKIN PARK	RES	43		35	Y		38	49		0	-	-	3	-	3	None		Noticable

NCA 10	6978 59	29 KINGSWAY AVENUE RANKIN PARK	RES	43			35	Y		40	50		0	-	-	5	-	5	None		Noticable
NCA 10	6978 58	21 KINGSWAY AVENUE RANKIN PARK	RES	43			35	Y		38	48		0	-	-	3	-	3	None		Noticable
NCA 10	6978 57	73 KINGSWAY AVENUE RANKIN PARK	RES	43			35	Y		37	48		0	-	-	2	-	2	None		Noticable
NCA 10	6978 56	17 KINGSWAY AVENUE RANKIN PARK	RES	43			35	Y		37	48		0	-	-	2	-	2	None		Noticable
NCA 10	6978 55	7 BOND CLOSE RANKIN PARK	RES	43			35	Y		37	48		0	-	-	2	-	2	None		Noticable
NCA 10	6978 54	4 KINGSWAY AVENUE RANKIN PARK	RES	43			35	Y		37	48		0	-	-	2	-	2	None		Noticable
NCA 10	6978 53	317 MCCAFFREY DRIVE RANKIN PARK	RES	43			35	Y		37	47		0	-	-	2	-	2	None		Noticable
NCA 10	6978 52	38 KINGSWAY AVENUE RANKIN PARK	RES	43			35	Y		37	47		0	-	-	2	-	2	None		Noticable
NCA 10	6978 51	325 MCCAFFREY DRIVE RANKIN PARK	RES	43			35	Y		39	49		0	-	-	4	-	4	None		Noticable
NCA 10	6978 50	13 KINGSWAY AVENUE RANKIN PARK	RES	43			35	Y		37	47		0	-	-	2	-	2	None		Noticable
NCA 10	6978 49	8 KINGSWAY AVENUE RANKIN PARK	RES	43			35	Y		38	49		0	-	-	3	-	3	None		Noticable
NCA 10	6978 48	36 KINGSWAY AVENUE RANKIN PARK	RES	43			35	Y		37	48		0	-	-	2	-	2	None		Noticable
NCA 10	6978 47	335 MCCAFFREY DRIVE RANKIN PARK	RES	43			35	Y		41	51		0	-	-	6	-	6	None		Noticable
NCA 10	6978 46	69 KINGSWAY AVENUE RANKIN PARK	RES	43			35	Y		38	49		0	-	-	3	-	3	None		Noticable
NCA 10	6978 45	319 MCCAFFREY DRIVE RANKIN PARK	RES	43			35	Y		37	48		0	-	-	2	-	2	None		Noticable
NCA 10	6978 44	26 KINGSWAY AVENUE RANKIN PARK	RES	43			35	Y		40	50		0	-	-	5	-	5	None		Noticable
NCA 10	6978 43	8 BOND CLOSE RANKIN PARK	RES	43			35	Y		38	48		0	-	-	3	-	3	None		Noticable
NCA 10	6978 42	2 KINGSWAY AVENUE RANKIN PARK	RES	43			35	Y		37	47		0	-	-	2	-	2	None		Noticable
NCA 10	6978 41	25 KINGSWAY AVENUE RANKIN PARK	RES	43			35	Y		39	49		0	-	-	4	-	4	None		Noticable
NCA 10	6978 40	31 KINGSWAY AVENUE RANKIN PARK	RES	43			35	Y		40	51		0	-	-	5	-	5	None		Noticable
NCA 10	6978 39	315 MCCAFFREY DRIVE RANKIN PARK	RES	43			35	Y		37	47		0	-	-	2	-	2	None		Noticable
NCA 10	6978 38	20 KINGSWAY AVENUE RANKIN PARK	RES	43			35	Y		40	51		0	-	-	5	-	5	None		Noticable
NCA 10	6978 37	333 MCCAFFREY DRIVE RANKIN PARK	RES	43			35	Y		40	51		0	-	-	5	-	5	None		Noticable
NCA 10	6978 36	16 KINGSWAY AVENUE RANKIN PARK	RES	43			35	Y		40	51		0	-	-	5	-	5	None		Noticable
NCA 10	6978 35	55 KINGSWAY AVENUE RANKIN PARK	RES	43			35	Y		41	52		0	-	-	6	-	6	None		Noticable
NCA 10	6978 34	6 BOND CLOSE RANKIN PARK	RES	43			35	Y		38	48		0	-	-	3	-	3	None		Noticable
NCA 10	6978 33	65 KINGSWAY AVENUE RANKIN PARK	RES	43			35	Y		39	49		0	-	-	4	-	4	None		Noticable
NCA 10	6978 32	6 KINGSWAY AVENUE RANKIN PARK	RES	43			35	Y		38	48		0	-	-	3	-	3	None		Noticable
NCA 10	6978 31	63 KINGSWAY AVENUE RANKIN PARK	RES	43			35	Y		39	50		0	-	-	4	-	4	None		Noticable
NCA 10	6978 30	67 KINGSWAY AVENUE RANKIN PARK	RES	43			35	Y		39	49		0	-	-	4	-	4	None		Noticable
NCA 10	6978 29	18 KINGSWAY AVENUE RANKIN PARK	RES	43			35	Y		40	51		0	-	-	5	-	5	None		Noticable
NCA 10	6978 28	311 MCCAFFREY DRIVE RANKIN PARK	RES	43			35	Y		36	47		0	-	-	1	-	1	None		Noticable
NCA 10	6978 27	11 KINGSWAY AVENUE RANKIN PARK	RES	43			35	Y		36	47		0	-	-	1	-	1	None		Noticable
NCA 10	6978 26	14 KINGSWAY AVENUE RANKIN PARK	RES	43			35	Y		39	50		0	-	-	4	-	4	None		Noticable
NCA 10	6978 25	53 KINGSWAY AVENUE RANKIN PARK	RES	43			35	Y		42	52		0	-	-	7	-	7	None		Noticable
NCA 10	6978 24	71 KINGSWAY AVENUE RANKIN PARK	RES	43			35	Y		38	48		0	-	-	3	-	3	None		Noticable

Vibration

NCA	Receiver	Address	Vibration Impact
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Construction noise impact assessment

June Nightwork			
Proposed works	Linemarking		
Proponent	Quickway		
Assessment Date	26/04/2022		
Prepared by		Assessment Id	Shift7-NCA13

Introduction

This report has been prepared using the construction noise self-assessment platform KNOWnoise: *Minor Works* and presents an assessment of the likely noise impacts related to proposed works associated with the above project. Where possible, these works would be completed during standard construction hours; however, there may be a need to work outside these hours due to technical, community or access limitations. The location of the proposed works is illustrated in Appendix A.

Planned works

A description of the proposed works is as follows.

Linemarking removal and linemarking for traffic switch

Proposed activities and equipment for the works are summarised in Appendix B.

Though subject to change, the works are expected to commence around 29/06/2022 and would be completed by 30/06/2022.

Assessment criteria and mitigation requirements

The Interim Construction Noise Guideline (ICNG) (DECC 2009) describes noise more than the background level as potentially having an adverse impact on sensitive receivers and increasing the likelihood of complaint. During standard construction hours, where construction noise is within 10 dB(A) of the RBL, impacts would be acceptable.

Where construction noise is more than 10 dB(A) above the RBL during standard construction hours, a residential receiver is considered noise affected and the proponent should undertake all reasonable and feasible steps necessary to manage the impact and consult with the affected community.

Above a LAeq, 15 minute noise level of 75 dB(A), a receiver is highly affected, requiring consideration of additional mitigation measures including alternative accommodation in the night period.

Outside standard construction hours, construction noise at a residential receiver more than 5 dB(A) above the RBL is taken to be noise affected.

In addition, annoying noise such as rock hammers, impact piling, or other impulsive noise sources usually result in greater annoyance than continuous construction noise. A 5 dB(A) penalty is applicable to such activities prior to comparison with the NMLs.

Other sensitive land uses, such as schools and offices, typically find noise from construction disruptive when the properties are being used (such as during work and school times). Table 2 presents NMLs from the ICNG for sensitive land uses based on the principle that the characteristic activities for each of these land uses should not be unduly disturbed.

Table 1 Non-residential sensitive land uses noise management levels

Land use	Noise assessment location	NML (L _{Aeq,15min})
Classrooms at schools and other educational institutions	Internal	45
Places of worship		
Active recreation areas (such as sporting activities and activities which generate their own noise or focus for participants)	External	65
Passive recreation areas (contemplative activities that generate little noise and where benefits are compromised by external noise intrusion, for example, reading, meditation)	External	60
Industrial premises	External	75
Office, retail outlets	External	70

As part of planning for out of hours works, standard mitigation measures, as described in the ICNG and CNVG, would be implemented where reasonable and feasible. However, after these measures have been applied, noise and vibration levels may continue to exceed the NMLs.

In this case, additional mitigation measures outlined in the CNVG, which largely focus on engagement with affected sensitive receivers, should be implemented where reasonable and feasible, unless other agreements are in place with the impacted receiver.

Triggers and additional mitigation measures for airborne noise are summarised in Table 2. Further details of specific additional mitigation measures are described in the CNVG.

Table 2 Triggers for additional mitigation measures – Airborne noise (Roads and Maritime 2016)

Predicted airborne LAeq(15min) noise level at receiver			
Perception	dB(A) above RBL	dB(A) above NML	Additional mitigation measures
All hours			
75 dB(A) or greater			N, V, PC, RO
Standard hours: Mon - Fri (7am – 6pm), Sat (8am – 1pm), Sun/Pub Hol (Nil)			
Noticeable	5 to 10	0	-
Clearly audible	10 to 20	< 10	-
Moderately intrusive	20 to 30	10 to 20	N, V
Highly intrusive	> 30	> 20	N, V
OOHW Period 1: Mon – Fri (6pm – 10pm), Sat (7am – 8am & 1pm – 10pm), Sun/Pub Hol (8am – 6pm)			
Noticeable	5 to 10	<5	-
Clearly audible	10 to 20	5 to 15	N, R1, DR
Moderately intrusive	20 to 30	15 to 25	V, N, R1, DR
Highly intrusive	> 30	>25	V, IB, N, R1, DR, PC, SN
OOHW Period 2: Mon – Fri (10pm – 7am), Sat (10pm – 8am), Sun/Pub Hol (6pm – 7am)			
Noticeable	5 to 10	<5	N
Clearly audible	10 to 20	5 to 15	V, N, R2, DR
Moderately intrusive	20 to 30	15 to 25	V, IB, N, PC, SN, R2, DR
Highly intrusive	> 30	>25	AA, V, IB, N, PC, SN, R2, DR

Notes:

PC = Phone calls
 V = verification
 IB = Individual briefings
 N= Notification
 AA = Alternative accommodation

SN = Specific notifications
 RO = Respite offer
 R1 = Respite period 1
 R2 = Respite period 2
 DR = Duration respite

Perception = relates to levels above RBL
 NML = Noise management level
 HA = Highly affected

Existing environment and noise management levels

The proposed works would be undertaken in a predominantly Urban, characterised as:

Areas with medium density transportation or some commerce or industry.

Typically traffic is moving from one area to another (light & heavy vehicles) with heavy peak hour traffic movement.

May be on or close to bus route/ light rail.

Background noise levels adopted for the project area and associated noise management levels (NMLs) are summarised in Table 3. NMLs have been established in line with the ICNG.

Table 3 Construction NMLs

Land use	Urban		Using custom background noise data?			Yes
	Day	Weekend Day	Evening	Night	Sleep	
RBL	56	56	49	33		
NML	61	61	54	38	38	

Sleep disturbance

The ICNG recommends where construction works are planned to extend over more than two consecutive nights, the maximum noise level should be considered for the purposes of establishing the likelihood of sleep disturbance. The Road Noise Policy suggests that maximum internal noise levels below 50-55 dB(A) are unlikely to awaken people from sleep and one or two noise events per night, with maximum internal noise levels of 65-70 dB(A) are not likely to affect health and wellbeing significantly.

Based on this, a sleep awakening criterion of 55 dB(A) (internal) is typically adopted for works. Given that noise attenuation of 10 dB(A) is typically provided by an open window, a sleep awakening criterion of L_{Amax} 65 dB(A) (external) has been applied to residential bedroom façades. This is consistent with the sleep disturbance threshold described in Appendix E of the CNVG.

Assessment methodology

Based on the nominated works area (illustrated in Appendix A), proposed equipment and the minimum distance from the works to each sensitive receiver, noise levels were calculated based on CONCAWE (1981) *Propagation of noise from petroleum and petrochemical complexes to neighboring communities*.

This method considers geometric spreading, atmospheric absorption, ground effects and is valid for meteorological conditions of a gentle breeze from source to receiver and stable atmosphere (temperature inversion).

KNOWnoise: Minor works is a 2-Dimensional assessment platform and does not consider terrain effects (e.g. hills, valleys) or the presence of solid structures such as homes or noise barriers. This will result in a conservative prediction, suitable for the project being assessed.

Considering the nature of the works and the type of surrounding land uses, sensitive receivers up to a radius of 600 metres from the works have been included in the assessment.

Sound power levels and predicted noise levels depend on the number of plant items operating at any one time and their precise location relative to a sensitive receiver. Equipment was assumed to be working at the worst-case location relative to each receiver and represents a worst-case assessment. Where the activity is further away from receivers or less equipment is used the predicted levels will decrease.

Sound power levels for plant and equipment expected to be used for each activity has been estimated based on guidance in the following standards and guidelines as well as typical measured noise levels for specific equipment.

- “ Australian Standard AS2436-2010: Guide to noise and vibration control on construction, demolition and maintenance sites
- “ Construction Noise and Vibration Strategy 7TP-ST-157/2.0 (CNVS), (TfNSW, 2018)
- “ Construction Noise and Vibration Guideline (CNVG) (Roads and Maritime Services, 2016)

- “ British Standard 5228-1:2009 Code of practice for noise and vibration control on construction and open sites
- “ United Kingdom Department for Environment, Food and Rural Affairs (DEFRA) Noise database for prediction of noise on construction and open sites

Construction noise sources and associated sound power levels are listed in Appendix B. The maximum predicted LAeq noise level within the work area was identified for each receiver.

Predicted noise levels

Detailed predicted noise levels for each potentially affected receiver are presented Appendix C.

A summary of predicted noise levels in comparison with ICNG assessment criteria for the Night period is presented in Table 4.

Table 4 Summary of predicted noise levels with comparison against ICNG criteria for the Night period.

Criterion	Predicted number of receivers
Maximum cumulative predicted L _{Aeq, 15 minute} noise level	43 dB(A)
Number of highly noise affected receivers (>75 dB)	0
1 – 10 dB above NML	6
10 – 20 dB above NML	0
20+ dB above NML	0

For works outside standard hours, up to 0 receivers are predicted to be classified as Highly Impacted during the Night period. A summary of the number of receivers in each class is presented in Table 5.

Table 5 Summary of predicted noise levels with comparison against CNVG criteria

Impact class	Predicted noise level	Predicted number of receivers
Noticeable	1 – 5 dB above NML	7
Clearly audible	5 – 15 dB above NML	1
Moderately impacted	15 – 25 dB above NML	0
Highly Impacted	> 25 dB above NML	0

Predicted impact classes for the Night period are illustrated graphically in Appendix C. Each identified receiver in the study area has been coloured to highlight the predicted level of impact.

Sleep disturbance

In the event works are planned for more than two consecutive nights, up to 0 are expected to exceed the sleep awakening criteria. Where any exceedances if the awakening criteria are predicted, additional care should be taken and mitigation measures implemented in the with the CNVG.

Proposed noise mitigation measures

The safeguards and controls listed in Table 6 will be implemented where reasonable and feasible with the intention of achieving the project noise criteria and to maintain noise impacts at a practical minimum.

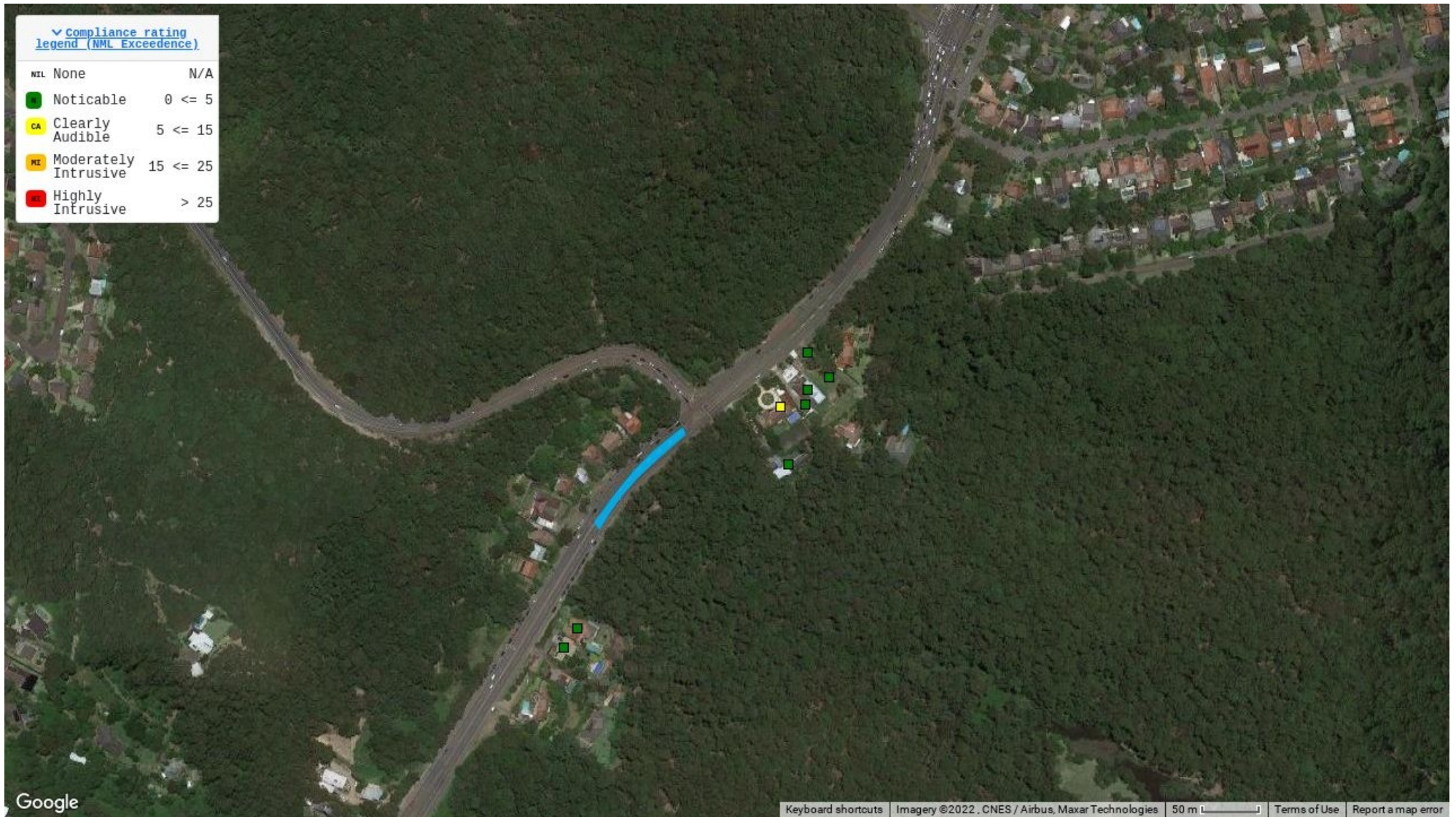
Table 6 Safeguards and controls

Action	Description
Community consultation or notification	<p>Notify the affected community.</p> <p>The notification will detail work activities, dates and hours, impacts and mitigation measures, indication of work schedule over the night time period, any operational noise benefits from the works (where applicable) and contact telephone number.</p> <p>Notification should be a minimum of 7 calendar days prior to the start of works. For projects other than maintenance works more advanced consultation or notification may be required.</p>
Site inductions	<p>All employees, contractors and subcontractors are to receive an environmental induction. The induction would at least include:</p> <ul style="list-style-type: none"> • all project specific and relevant standard noise and vibration mitigation measures • relevant licence and approval conditions • permissible hours of work • any limitations on high noise generating activities • location of nearest sensitive receivers • construction employee parking areas • designated loading/unloading areas and procedures <p>site opening/closing times (including deliveries) environmental incident procedures</p>
Behaviour	<p>No swearing or unnecessary shouting or loud stereos/radios on site.</p> <p>Limit compression braking at night in residential areas.</p> <p>No dropping of materials from height, throwing of metal items and slamming of doors.</p>
Verification	<p>Where indicated in Appendix C, a noise verification program would be undertaken for the duration of the works.</p>
Construction hours	<p>Where feasible and reasonable, construction should be carried out during the standard daytime working hours. Work generating high noise and/or vibration levels should be scheduled during less sensitive time periods.</p>
Respite for out-of-hours works	<p>Respite would be scheduled as indicated in Appendix C and described in the CNVG.</p>
Equipment selection	<p>Use quieter construction methods where feasible and reasonable.</p> <p>Ensure plant including the silencer is well maintained.</p> <p>Plant noise levels will have an operating noise emission level compliant with Appendix F of the CNVG</p>
Use and siting of plant	<p>The offset distance between noisy plant and adjacent sensitive receivers is to be maximised.</p> <p>Plant used intermittently to be throttled down or shut down.</p> <p>Noise-emitting plant to be directed away from sensitive receivers.</p>

Construction noise impact statement

Action	Description
Plan worksites and activities to minimise noise and vibration.	<p>Locate compounds away from sensitive receivers and discourage access from local roads.</p> <p>Plan traffic flow, parking and loading/unloading areas to minimise reversing movements within the site.</p> <p>Where additional activities or plant may only result in a marginal noise increase and speed up works, consider limiting duration of impact by concentrating noisy activities at one location and move to another as quickly as possible.</p> <p>Very noise activities should be scheduled for normal working hours. If the work can not be undertaken during the day, it should be completed before 11:00pm.</p> <p>Where practicable, work should be scheduled to avoid major student examination periods when students are studying for examinations such as before or during Higher School Certificate and at the end of higher education semesters.</p>
Non-tonal reverse alarms	Non-tonal reversing beepers (or an equivalent mechanism) must be fitted and used on all construction vehicles and mobile plant regularly used on site and for any out of hours work.
Shield stationary noise sources such as pumps, generators, and compressors	These should be enclosed or shielded where reasonable and feasible.
Implement any project specific mitigation measures	
1	None

Appendix A Project location and predicted level of impact



Appendix B Proposed activities and equipment

Linemarking

Equipment	Quantity	Usage	Reduction	SWL
Daymakers / Lighting plant	2	100 %	5	91
Line Marking Plant	1	20 %	3	83
Line Marking Removal Plant	1	20 %	3	90

Activity Sound Power Level: 94

Appendix C Detailed noise predicted for each receiver and activity

Assessment: Linemarking				Night	Results summary		
NCA	ID	Address	Land use	NML	Cumulative Predicted LAeq, 15 minute noise level	Exceedance of NML, dB	Impact classification
NCA 13	698107	117 LOOKOUT ROAD NEW LAMBTON HEIGHTS	RES	38	42	4	Noticable
NCA 13	698096	119 LOOKOUT ROAD NEW LAMBTON HEIGHTS	RES	38	40	2	Noticable
NCA 13	698056	81 LOOKOUT ROAD NEW LAMBTON HEIGHTS	RES	38	41	3	Noticable
NCA 13	698048	81A LOOKOUT ROAD NEW LAMBTON HEIGHTS	RES	38	39	1	Noticable
NCA 13	698030	85 LOOKOUT ROAD NEW LAMBTON HEIGHTS	RES	38	42	4	Noticable
NCA 13	698020	81 LOOKOUT ROAD NEW LAMBTON HEIGHTS	RES	38	40	2	Noticable
NCA 13	697999	83 LOOKOUT ROAD NEW LAMBTON HEIGHTS	RES	38	43	5	Clearly Audible
NCA 13	697997	81A LOOKOUT ROAD NEW LAMBTON HEIGHTS	RES	38	38	0	Noticable

Appendix C – 3 Month Look Ahead Notification Letter

Out of hours early work at New Lambton Heights from May to July 2022

The NSW Government is funding early work for the Newcastle Inner City Bypass between Rankin Park and Jesmond.

Early work to relocate major utilities at the southern end of the Rankin Park to Jesmond project will be continuing from May 2022 to July 2022. We will be carrying out essential night work on Lookout Road, McCaffrey Drive and surrounding areas.

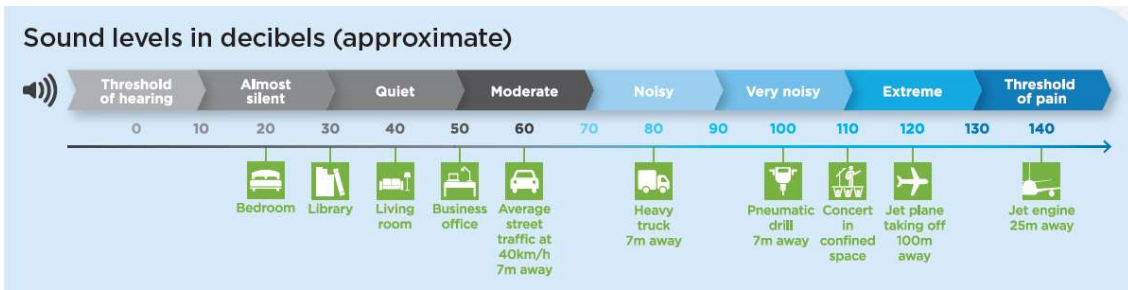
Work is required outside normal project hours for the safety of workers and road users, and to minimise traffic delays. Work hours will be between **7pm and 6am, Monday to Friday**, weather permitting. High impact noisy work will be done **before 11pm**.

Date	Work Activity	Equipment
Mid May	Water main work on McCaffrey Drive Expected duration – seven shifts over nine nights	Traffic control, excavators, trucks, lighting towers, compaction rollers, road saw
June	linemarking, and barrier work on Lookout Road Expected duration – One shift	Traffic control, excavators, trucks, lighting towers, compaction rollers, road saw, asphalt profiler, asphalt paver, mobile crane
June	Asphalting work on Lookout Road and McCaffrey Drive Expected duration – four consecutive shifts	Traffic control, excavators, trucks, lighting towers, compaction rollers, road saw, asphalt profiler, asphalt paver, mobile crane
June	Concrete footpath restoration works on McCaffrey Drive Expected duration – two consecutive shifts	Traffic control, excavators, trucks, lighting towers, concrete agitator trucks

How will the work affect you?

The work will involve the use of machinery which generates noise, light and vibration. We will make every effort to minimise these impacts with our equipment selection, positioning of machines and noise blankets, turning off vehicles when not in use and using non-tonal reversing alarms. Appropriate respite periods for the night work will be provided in consultation with the community at each affected location.

Noise levels will vary between moderate to noisy, the diagram below provides a guide to the noise you can expect. Directly affected residents will be contacted and advised of the likely impact and what we are doing to minimise disruption during the work.



Traffic changes

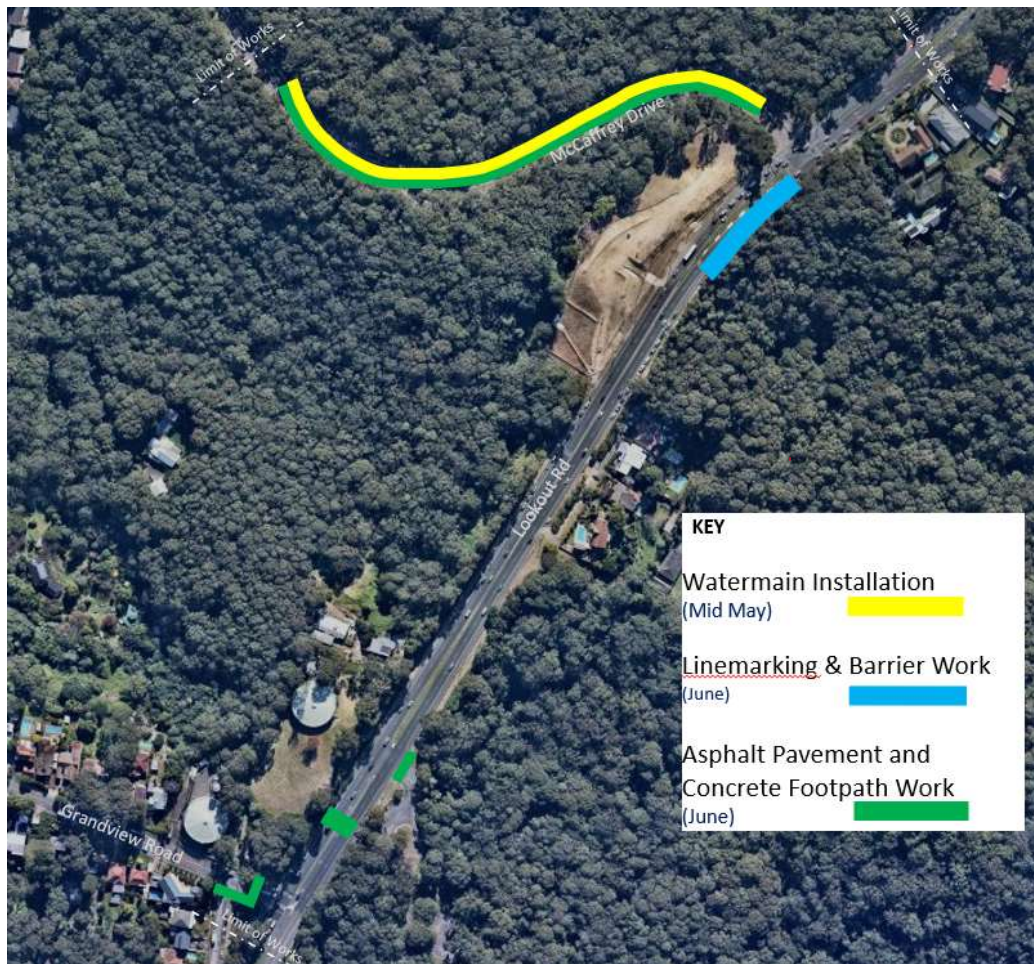
There will be temporary traffic changes to ensure the work zone is safe including lane closures on Lookout Road and McCaffrey Drive. A 40km/h speed limit will apply during the temporary lane closures. Travel times will be affected.

Please keep to speed limits and follow the direction of traffic controllers and signs. For the latest traffic updates, you can call 132 701, visit livetraffic.com or download the Live Traffic NSW App.

Contact

If you would like to provide feedback, or have any questions about this work, please contact our project team on 1800 818 433 (24 hours – select option 2) or email southern.utilities.RP2J@quickway.com.au. For more information about the Newcastle Inner City Bypass between Rankin Park and Jesmond, visit nswroads.work/rp2j. Thank you for your patience during this important work.

Location of work



Appendix D - Draft Notification Letter for Residents

Out of hours early work at New Lambton Heights from 13th June 2022

The NSW Government is funding early work for the Newcastle Inner City Bypass between Rankin Park and Jesmond.

Transport for NSW has awarded a contract to Quickway to relocate major utilities at the southern end of the Rankin Park to Jesmond project to help prepare for the main construction of the bypass. This early work will be continuing in June.

We will be carrying out essential night work on McCaffrey Drive, Grandview Road and Lookout Road. Work will include:

- Asphalt Pavement work in Grandview Road, Lookout Road and McCaffrey Drive.
- Footpath concrete work on Lookout Road and McCaffrey Drive
- New line marking on Lookout Road

Work is required outside normal project hours for the safety of workers and road users, and to minimise traffic delays.

We will be completing works over seven nights from **7pm to 5am** between **Monday 13 June** and **Thursday 23 June** weather permitting. High impact noisy work will be done before **11pm**. If wet weather prevents the work occurring as planned, it will be rescheduled on, and you will be notified.

How will the work affect you?

The work will involve the use of machinery which generates noise and light. We will make every effort to minimise these impacts with our equipment selection, positioning of machines and noise blankets, turning off vehicles when not in use and using non-tonal reversing alarms.

Traffic changes

There will be some temporary traffic changes to ensure the work zone is safe including closure of Grandview Road and lane closures of Lookout Road and McCaffrey Drive. A detour will be in place during closure of Grandview Road and local access will be permitted to residents at the corner of Grandview and Marshall Street. A 40km/h speed limit will apply during temporary lane closures on Lookout Road. Travel times will be affected. Please keep to speed limits and follow the direction of traffic controllers and signs. For the latest traffic updates, you can call 132 701, visit livetraffic.com or download the Live Traffic NSW App.

Contact

If you would like to provide feedback, have any questions about this work or would like to provide your contact details for future notices, please contact or Community Relations Manager on 1800 818 433 (24 hours – select option 2) or email southern.utilities.RP2J@quickway.com.au.

For more information about the Newcastle Inner City Bypass between Rankin Park and Jesmond, visit nswroads.work/rp2j. Thank you for your patience during this important work.

Appendix E – Consultation Record

Address	NCA	Land Use	NML (RBL +5 dB(A))	Predicted Noise Level at receiver	Exceedance of NML	Exceedance of RBL	OOH Protocol Risk Rating (high/low)	Impact Classification	Mitigation Measures (PC, V, IB, N, AA, SN, RO, R1, R2, DR)	Date Notification completed / sent	Notification type (SMS / Email / Phone Call / Notification Letter / Door knock)	Written Agreement to all OoHW
83 LOOKOUT ROAD NEW LAMBTON HEIGHTS	13	Residential	38	57	19	24	Low	Moderately Intrusive	V, IB, N	TBA	Email and phone call	
81 LOOKOUT ROAD NEW LAMBTON HEIGHTS	13	Residential	38	56	18	23	Low	Moderately Intrusive	V, IB, N	TBA	Email and phone call	
164 LOOKOUT ROAD NEW LAMBTON HEIGHTS	13	Residential	38	56	18	23	Low	Moderately Intrusive	V, IB, N	TBA	Email and phone call	
81A LOOKOUT ROAD NEW LAMBTON HEIGHTS	13	Residential	38	51	13	18	Low	Clearly Audible	N, V	TBC	Notification Letter	
3 GRANDVIEW ROAD NEW LAMBTON HEIGHTS	13	Residential	38	50	12	17	Low	Clearly Audible	N, V	TBC	Notification Letter	
166 LOOKOUT ROAD NEW LAMBTON HEIGHTS	13	Residential	38	50	12	17	Low	Clearly Audible	N, V	TBC	Notification Letter	
79 LOOKOUT ROAD NEW LAMBTON HEIGHTS	13	Residential	38	49	11	16	Low	Clearly Audible	N, V	TBC	Notification Letter	
10 GRANDVIEW ROAD NEW LAMBTON HEIGHTS	13	Residential	38	48	10	15	Low	Clearly Audible	N, V	TBC	Notification Letter	
168 LOOKOUT ROAD NEW LAMBTON HEIGHTS	13	Residential	38	47	9	14	Low	Clearly Audible	N, V	TBC	Notification Letter	
136 LOOKOUT ROAD NEW LAMBTON HEIGHTS	13	Residential	38	47	9	14	Low	Clearly Audible	N, V	TBC	Notification Letter	
85 LOOKOUT ROAD NEW LAMBTON HEIGHTS	13	Residential	38	47	9	14	Low	Clearly Audible	N, V	TBC	Notification Letter	
5 GRANDVIEW ROAD NEW LAMBTON HEIGHTS	13	Residential	38	47	9	14	Low	Clearly Audible	N, V	TBC	Notification Letter	
12 GRANDVIEW ROAD NEW LAMBTON HEIGHTS	13	Residential	38	47	9	14	Low	Clearly Audible	N, V	TBC	Notification Letter	
138 LOOKOUT ROAD NEW LAMBTON HEIGHTS	13	Residential	38	46	8	13	Low	Clearly Audible	N, V	TBC	Notification Letter	
14 GRANDVIEW ROAD NEW LAMBTON HEIGHTS	13	Residential	38	45	7	12	Low	Clearly Audible	N, V	TBC	Notification Letter	
7 GRANDVIEW ROAD NEW LAMBTON HEIGHTS	13	Residential	38	45	7	12	Low	Clearly Audible	N, V	TBC	Notification Letter	
170 LOOKOUT ROAD NEW LAMBTON HEIGHTS	13	Residential	38	45	7	12	Low	Clearly Audible	N, V	TBC	Notification Letter	
79A LOOKOUT ROAD NEW LAMBTON HEIGHTS	13	Residential	38	45	7	12	Low	Clearly Audible	N, V	TBC	Notification Letter	
172 LOOKOUT ROAD NEW LAMBTON HEIGHTS	13	Residential	38	44	6	11	Low	Clearly Audible	N, V	TBC	Notification Letter	
9 GRANDVIEW ROAD NEW LAMBTON HEIGHTS	13	Residential	38	44	6	11	Low	Clearly Audible	N, V	TBC	Notification Letter	
16 GRANDVIEW ROAD NEW LAMBTON HEIGHTS	13	Residential	38	44	6	11	Low	Clearly Audible	N, V	TBC	Notification Letter	
11 GRANDVIEW ROAD NEW LAMBTON HEIGHTS	13	Residential	38	43	5	10	Low	Clearly Audible	N, V	TBC	Notification Letter	

Address	NCA	Land Use	NML (RBL +5 dB(A))	Predicted Noise Level at receiver	Exceedance of NML	Exceedance of RBL	OOH Protocol Risk Rating (high/low)	Impact Classification	Mitigation Measures (PC, V, IB, N, AA, SN, RO, R1, R2, DR)	Date Notification completed / sent	Notification type (SMS / Email / Phone Call / Notification Letter / Door knock)	Written Agreement to all OoHW
117 LOOKOUT ROAD NEW LAMBTON HEIGHTS	13	Residential	38	43	5	10	Low	Clearly Audible	N, V	TBC	Notification Letter	
174 LOOKOUT ROAD NEW LAMBTON HEIGHTS	13	Residential	38	43	5	10	Low	Clearly Audible	N, V	TBC	Notification Letter	
18 GRANDVIEW ROAD NEW LAMBTON HEIGHTS	13	Residential	38	43	5	10	Low	Noticable	N	TBC	Notification Letter	
119 LOOKOUT ROAD NEW LAMBTON HEIGHTS	13	Residential	38	43	5	10	Low	Noticable	N	TBC	Notification Letter	
79B LOOKOUT ROAD NEW LAMBTON HEIGHTS	13	Residential	38	43	5	10	Low	Noticable	N	TBC	Notification Letter	
20 GRANDVIEW ROAD NEW LAMBTON HEIGHTS	13	Residential	38	42	4	9	Low	Noticable	N	TBC	Notification Letter	
121B LOOKOUT ROAD NEW LAMBTON HEIGHTS	13	Residential	38	42	4	9	Low	Noticable	N	TBC	Notification Letter	
15 GRANDVIEW ROAD NEW LAMBTON HEIGHTS	13	Residential	38	42	4	9	Low	Noticable	N	TBC	Notification Letter	
174A LOOKOUT ROAD NEW LAMBTON HEIGHTS	13	Residential	38	42	4	9	Low	Noticable	N	TBC	Notification Letter	
9A MARSHALL STREET NEW LAMBTON HEIGHTS	13	Residential	38	42	4	9	Low	Noticable	N	TBC	Notification Letter	
17 GRANDVIEW ROAD NEW LAMBTON HEIGHTS	13	Residential	38	41	3	8	Low	Noticable	N	TBC	Notification Letter	
121C LOOKOUT ROAD NEW LAMBTON HEIGHTS	13	Residential	38	41	3	8	Low	Noticable	N	TBC	Notification Letter	
22 GRANDVIEW ROAD NEW LAMBTON HEIGHTS	13	Residential	38	41	3	8	Low	Noticable	N	TBC	Notification Letter	
71 LOOKOUT ROAD NEW LAMBTON HEIGHTS	13	Residential	38	41	3	8	Low	Noticable	N	TBC	Notification Letter	
178 LOOKOUT ROAD NEW LAMBTON HEIGHTS	13	Residential	38	41	3	8	Low	Noticable	N	TBC	Notification Letter	
19 GRANDVIEW ROAD NEW LAMBTON HEIGHTS	13	Residential	38	41	3	8	Low	Noticable	N	TBC	Notification Letter	
180 LOOKOUT ROAD NEW LAMBTON HEIGHTS	13	Residential	38	41	3	8	Low	Noticable	N	TBC	Notification Letter	
1 MARSHALL STREET NEW LAMBTON HEIGHTS	13	Residential	38	40	2	7	Low	Noticable	N	TBC	Notification Letter	
21 GRANDVIEW ROAD NEW LAMBTON HEIGHTS	13	Residential	38	40	2	7	Low	Noticable	N	TBC	Notification Letter	
38 FLORALIA CLOSE NEW LAMBTON HEIGHTS	13	Residential	38	40	2	7	Low	Noticable	N	TBC	Notification Letter	
1B MARSHALL STREET NEW LAMBTON HEIGHTS	13	Residential	38	40	2	7	Low	Noticable	N	TBC	Notification Letter	
121A LOOKOUT ROAD NEW LAMBTON HEIGHTS	13	Residential	38	40	2	7	Low	Noticable	N	TBC	Notification Letter	

Address	NCA	Land Use	NML (RBL +5 dB(A))	Predicted Noise Level at receiver	Exceedance of NML	Exceedance of RBL	OOH Protocol Risk Rating (high/low)	Impact Classification	Mitigation Measures (PC, V, IB, N, AA, SN, RO, R1, R2, DR)	Date Notification completed / sent	Notification type (SMS / Email / Phone Call / Notification Letter / Door knock)	Written Agreement to all OoHW
3 MARSHALL STREET NEW LAMBTON HEIGHTS	13	Residential	38	40	2	7	Low	Noticable	N	TBC	Notification Letter	
182 LOOKOUT ROAD NEW LAMBTON HEIGHTS	13	Residential	38	40	2	7	Low	Noticable	N	TBC	Notification Letter	
5 MARSHALL STREET NEW LAMBTON HEIGHTS	13	Residential	38	40	2	7	Low	Noticable	N	TBC	Notification Letter	
11 MARSHALL STREET NEW LAMBTON HEIGHTS	13	Residential	38	40	2	7	Low	Noticable	N	TBC	Notification Letter	
24 GRANDVIEW ROAD NEW LAMBTON HEIGHTS	13	Residential	38	40	2	7	Low	Noticable	N	TBC	Notification Letter	
7 MARSHALL STREET NEW LAMBTON HEIGHTS	13	Residential	38	40	2	7	Low	Noticable	N	TBC	Notification Letter	
36 FLORALIA CLOSE NEW LAMBTON HEIGHTS	13	Residential	38	40	2	7	Low	Noticable	N	TBC	Notification Letter	
9 MARSHALL STREET NEW LAMBTON HEIGHTS	13	Residential	38	40	2	7	Low	Noticable	N	TBC	Notification Letter	
184 LOOKOUT ROAD NEW LAMBTON HEIGHTS	13	Residential	38	40	2	7	Low	Noticable	N	TBC	Notification Letter	
34 FLORALIA CLOSE NEW LAMBTON HEIGHTS	13	Residential	38	39	1	6	Low	Noticable	N	TBC	Notification Letter	
15 MARSHALL STREET NEW LAMBTON HEIGHTS	13	Residential	38	39	1	6	Low	Noticable	N	TBC	Notification Letter	
186 LOOKOUT ROAD NEW LAMBTON HEIGHTS	13	Residential	38	39	1	6	Low	Noticable	N	TBC	Notification Letter	
1 RIDGEWAY ROAD NEW LAMBTON HEIGHTS	13	Residential	38	39	1	6	Low	Noticable	N	TBC	Notification Letter	
2 MARSHALL STREET NEW LAMBTON HEIGHTS	13	Residential	38	39	1	6	Low	Noticable	N	TBC	Notification Letter	
32 FLORALIA CLOSE NEW LAMBTON HEIGHTS	13	Residential	38	39	1	6	Low	Noticable	N	TBC	Notification Letter	
26 GRANDVIEW ROAD NEW LAMBTON HEIGHTS	13	Residential	38	39	1	6	Low	Noticable	N	TBC	Notification Letter	
2B MARSHALL STREET NEW LAMBTON HEIGHTS	13	Residential	38	39	1	6	Low	Noticable	N	TBC	Notification Letter	
23 GRANDVIEW ROAD NEW LAMBTON HEIGHTS	13	Residential	38	39	1	6	Low	Noticable	N	TBC	Notification Letter	
188 LOOKOUT ROAD NEW LAMBTON HEIGHTS	13	Residential	38	39	1	6	Low	Noticable	N	TBC	Notification Letter	
10 KINGSWAY AVENUE RANKIN PARK	13	Residential	38	39	1	6	Low	Noticable	N	TBC	Notification Letter	
UNIT 7/ 6 CARDIFF ROAD NEW LAMBTON HEIGHTS	13	Residential	38	39	1	6	Low	Noticable	N	TBC	Notification Letter	
17 MARSHALL STREET NEW LAMBTON HEIGHTS	13	Residential	38	39	1	6	Low	Noticable	N	TBC	Notification Letter	

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6 MARSHALL STREET NEW LAMBTON HEIGHTS	13	Residential	38	39	1	6	Low	Noticable	N	TBC	Notification Letter	
2 RIDGEWAY ROAD NEW LAMBTON HEIGHTS	13	Residential	38	39	1	6	Low	Noticable	N	TBC	Notification Letter	
30 FLORALIA CLOSE NEW LAMBTON HEIGHTS	13	Residential	38	39	1	6	Low	Noticable	N	TBC	Notification Letter	
1A RIDGEWAY ROAD NEW LAMBTON HEIGHTS	13	Residential	38	38	0	5	Low	Noticable	N	TBC	Notification Letter	
2 CARDIFF ROAD NEW LAMBTON HEIGHTS	13	Residential	38	38	0	5	Low	Noticable	N	TBC	Notification Letter	
UNIT 6/ 6 CARDIFF ROAD NEW LAMBTON HEIGHTS	13	Residential	38	38	0	5	Low	Noticable	N	TBC	Notification Letter	
8 MARSHALL STREET NEW LAMBTON HEIGHTS	13	Residential	38	38	0	5	Low	Noticable	N	TBC	Notification Letter	
10 MARSHALL STREET NEW LAMBTON HEIGHTS	13	Residential	38	38	0	5	Low	Noticable	N	TBC	Notification Letter	
28 GRANDVIEW ROAD NEW LAMBTON HEIGHTS	13	Residential	38	38	0	5	Low	Noticable	N	TBC	Notification Letter	
25 GRANDVIEW ROAD NEW LAMBTON HEIGHTS	13	Residential	38	38	0	5	Low	Noticable	N	TBC	Notification Letter	
4 RIDGEWAY ROAD NEW LAMBTON HEIGHTS	13	Residential	38	38	0	5	Low	Noticable	N	TBC	Notification Letter	
28 FLORALIA CLOSE NEW LAMBTON HEIGHTS	13	Residential	38	38	0	5	Low	Noticable	N	TBC	Notification Letter	
3 RIDGEWAY ROAD NEW LAMBTON HEIGHTS	13	Residential	38	38	0	5	Low	Noticable	N	TBC	Notification Letter	
51 KINGSWAY AVENUE RANKIN PARK	10	Residential	35	43	8	13	Low	Noticable	N	TBC	Notification Letter	
49 KINGSWAY AVENUE RANKIN PARK	10	Residential	35	43	8	13	Low	Noticable	N	TBC	Notification Letter	
47 KINGSWAY AVENUE RANKIN PARK	10	Residential	35	42	7	12	Low	Noticable	N	TBC	Notification Letter	
45 KINGSWAY AVENUE RANKIN PARK	10	Residential	35	42	7	12	Low	Noticable	N	TBC	Notification Letter	
43 KINGSWAY AVENUE RANKIN PARK	10	Residential	35	42	7	12	Low	Noticable	N	TBC	Notification Letter	
41 KINGSWAY AVENUE RANKIN PARK	10	Residential	35	42	7	12	Low	Noticable	N	TBC	Notification Letter	
3A MARSHALL STREET NEW LAMBTON HEIGHTS	10	Residential	35	42	7	12	Low	Noticable	N	TBC	Notification Letter	
53 KINGSWAY AVENUE RANKIN PARK	10	Residential	35	42	7	12	Low	Noticable	N	TBC	Notification Letter	
39 KINGSWAY AVENUE RANKIN PARK	10	Residential	35	42	7	12	Low	Noticable	N	TBC	Notification Letter	

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37 KINGSWAY AVENUE RANKIN PARK	10	Residential	35	42	7	12	Low	Noticable	N	TBC	Notification Letter	
55 KINGSWAY AVENUE RANKIN PARK	10	Residential	35	41	6	11	Low	Noticable	N	TBC	Notification Letter	
335 MCCAFFREY DRIVE RANKIN PARK	10	Residential	35	41	6	11	Low	Noticable	N	TBC	Notification Letter	
22 KINGSWAY AVENUE RANKIN PARK	10	Residential	35	41	6	11	Low	Noticable	N	TBC	Notification Letter	
33 KINGSWAY AVENUE RANKIN PARK	10	Residential	35	41	6	11	Low	Noticable	N	TBC	Notification Letter	
57 KINGSWAY AVENUE RANKIN PARK	10	Residential	35	41	6	11	Low	Noticable	N	TBC	Notification Letter	
20 KINGSWAY AVENUE RANKIN PARK	10	Residential	35	40	5	10	Low	Noticable	N	TBC	Notification Letter	
24 KINGSWAY AVENUE RANKIN PARK	10	Residential	35	40	5	10	Low	Noticable	N	TBC	Notification Letter	
18 KINGSWAY AVENUE RANKIN PARK	10	Residential	35	40	5	10	Low	Noticable	N	TBC	Notification Letter	
333 MCCAFFREY DRIVE RANKIN PARK	10	Residential	35	40	5	10	Low	Noticable	N	TBC	Notification Letter	
59 KINGSWAY AVENUE RANKIN PARK	10	Residential	35	40	5	10	Low	Noticable	N	TBC	Notification Letter	
16 KINGSWAY AVENUE RANKIN PARK	10	Residential	35	40	5	10	Low	Noticable	N	TBC	Notification Letter	
31 KINGSWAY AVENUE RANKIN PARK	10	Residential	35	40	5	10	Low	Noticable	N	TBC	Notification Letter	
61 KINGSWAY AVENUE RANKIN PARK	10	Residential	35	40	5	10	Low	Noticable	N	TBC	Notification Letter	
331 MCCAFFREY DRIVE RANKIN PARK	10	Residential	35	40	5	10	Low	Noticable	N	TBC	Notification Letter	
29 KINGSWAY AVENUE RANKIN PARK	10	Residential	35	40	5	10	Low	Noticable	N	TBC	Notification Letter	
26 KINGSWAY AVENUE RANKIN PARK	10	Residential	35	40	5	10	Low	Noticable	N	TBC	Notification Letter	
14 KINGSWAY AVENUE RANKIN PARK	10	Residential	35	39	4	9	Low	Noticable	N	TBC	Notification Letter	
63 KINGSWAY AVENUE RANKIN PARK	10	Residential	35	39	4	9	Low	Noticable	N	TBC	Notification Letter	
27 KINGSWAY AVENUE RANKIN PARK	10	Residential	35	39	4	9	Low	Noticable	N	TBC	Notification Letter	
57 ATHERTON CLOSE RANKIN PARK	10	Residential	35	39	4	9	Low	Noticable	N	TBC	Notification Letter	
329 MCCAFFREY DRIVE RANKIN PARK	10	Residential	35	39	4	9	Low	Noticable	N	TBC	Notification Letter	

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28 KINGSWAY AVENUE RANKIN PARK	10	Residential	35	39	4	9	Low	Noticable	N	TBC	Notification Letter	
57 ATHERTON CLOSE RANKIN PARK	10	Residential	35	39	4	9	Low	Noticable	N	TBC	Notification Letter	
65 KINGSWAY AVENUE RANKIN PARK	10	Residential	35	39	4	9	Low	Noticable	N	TBC	Notification Letter	
327 MCCAFFREY DRIVE RANKIN PARK	10	Residential	35	39	4	9	Low	Noticable	N	TBC	Notification Letter	
25 KINGSWAY AVENUE RANKIN PARK	10	Residential	35	39	4	9	Low	Noticable	N	TBC	Notification Letter	
12 KINGSWAY AVENUE RANKIN PARK	10	Residential	35	39	4	9	Low	Noticable	N	TBC	Notification Letter	
5A MARSHALL STREET NEW LAMBTON HEIGHTS	10	Residential	35	39	4	9	Low	Noticable	N	TBC	Notification Letter	
55 ATHERTON CLOSE RANKIN PARK	10	Residential	35	39	4	9	Low	Noticable	N	TBC	Notification Letter	
53 ATHERTON CLOSE RANKIN PARK	10	Residential	35	39	4	9	Low	Noticable	N	TBC	Notification Letter	
30 KINGSWAY AVENUE RANKIN PARK	10	Residential	35	39	4	9	Low	Noticable	N	TBC	Notification Letter	
59 ATHERTON CLOSE RANKIN PARK	10	Residential	35	39	4	9	Low	Noticable	N	TBC	Notification Letter	
67 KINGSWAY AVENUE RANKIN PARK	10	Residential	35	39	4	9	Low	Noticable	N	TBC	Notification Letter	
325 MCCAFFREY DRIVE RANKIN PARK	10	Residential	35	39	4	9	Low	Noticable	N	TBC	Notification Letter	
23 KINGSWAY AVENUE RANKIN PARK	10	Residential	35	38	3	8	Low	Noticable	N	TBC	Notification Letter	
32 KINGSWAY AVENUE RANKIN PARK	10	Residential	35	38	3	8	Low	Noticable	N	TBC	Notification Letter	
61 ATHERTON CLOSE RANKIN PARK	10	Residential	35	38	3	8	Low	Noticable	N	TBC	Notification Letter	
323 MCCAFFREY DRIVE RANKIN PARK	10	Residential	35	38	3	8	Low	Noticable	N	TBC	Notification Letter	
51 ATHERTON CLOSE RANKIN PARK	10	Residential	35	38	3	8	Low	Noticable	N	TBC	Notification Letter	
69 KINGSWAY AVENUE RANKIN PARK	10	Residential	35	38	3	8	Low	Noticable	N	TBC	Notification Letter	
8 KINGSWAY AVENUE RANKIN PARK	10	Residential	35	38	3	8	Low	Noticable	N	TBC	Notification Letter	
21 KINGSWAY AVENUE RANKIN PARK	10	Residential	35	38	3	8	Low	Noticable	N	TBC	Notification Letter	
6 BOND CLOSE RANKIN PARK	10	Residential	35	38	3	8	Low	Noticable	N	TBC	Notification Letter	

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4 BOND CLOSE RANKIN PARK	10	Residential	35	38	3	8	Low	Noticable	N	TBC	Notification Letter	
34 KINGSWAY AVENUE RANKIN PARK	10	Residential	35	38	3	8	Low	Noticable	N	TBC	Notification Letter	
321 MCCAFFREY DRIVE RANKIN PARK	10	Residential	35	38	3	8	Low	Noticable	N	TBC	Notification Letter	
71 KINGSWAY AVENUE RANKIN PARK	10	Residential	35	38	3	8	Low	Noticable	N	TBC	Notification Letter	
8 BOND CLOSE RANKIN PARK	10	Residential	35	38	3	8	Low	Noticable	N	TBC	Notification Letter	
6 KINGSWAY AVENUE RANKIN PARK	10	Residential	35	38	3	8	Low	Noticable	N	TBC	Notification Letter	
78 ATHERTON CLOSE RANKIN PARK	10	Residential	35	38	3	8	Low	Noticable	N	TBC	Notification Letter	
19 KINGSWAY AVENUE RANKIN PARK	10	Residential	35	38	3	8	Low	Noticable	N	TBC	Notification Letter	
18 SLADE CLOSE RANKIN PARK	10	Residential	35	38	3	8	Low	Noticable	N	TBC	Notification Letter	
74 ATHERTON CLOSE RANKIN PARK	10	Residential	35	38	3	8	Low	Noticable	N	TBC	Notification Letter	
76 ATHERTON CLOSE RANKIN PARK	10	Residential	35	38	3	8	Low	Noticable	N	TBC	Notification Letter	
36 KINGSWAY AVENUE RANKIN PARK	10	Residential	35	37	2	7	Low	Noticable	N	TBC	Notification Letter	
319 MCCAFFREY DRIVE RANKIN PARK	10	Residential	35	37	2	7	Low	Noticable	N	TBC	Notification Letter	
4 KINGSWAY AVENUE RANKIN PARK	10	Residential	35	37	2	7	Low	Noticable	N	TBC	Notification Letter	
17 KINGSWAY AVENUE RANKIN PARK	10	Residential	35	37	2	7	Low	Noticable	N	TBC	Notification Letter	
73 KINGSWAY AVENUE RANKIN PARK	10	Residential	35	37	2	7	Low	Noticable	N	TBC	Notification Letter	
7 BOND CLOSE RANKIN PARK	10	Residential	35	37	2	7	Low	Noticable	N	TBC	Notification Letter	
72 ATHERTON CLOSE RANKIN PARK	10	Residential	35	37	2	7	Low	Noticable	N	TBC	Notification Letter	
70 ATHERTON CLOSE RANKIN PARK	10	Residential	35	37	2	7	Low	Noticable	N	TBC	Notification Letter	
317 MCCAFFREY DRIVE RANKIN PARK	10	Residential	35	37	2	7	Low	Noticable	N	TBC	Notification Letter	
68 ATHERTON CLOSE RANKIN PARK	10	Residential	35	37	2	7	Low	Noticable	N	TBC	Notification Letter	
75 KINGSWAY AVENUE RANKIN PARK	10	Residential	35	37	2	7	Low	Noticable	N	TBC	Notification Letter	

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15 KINGSWAY AVENUE RANKIN PARK	10	Residential	35	37	2	7	Low	Noticable	N	TBC	Notification Letter	
38 KINGSWAY AVENUE RANKIN PARK	10	Residential	35	37	2	7	Low	Noticable	N	TBC	Notification Letter	
315 MCCAFFREY DRIVE RANKIN PARK	10	Residential	35	37	2	7	Low	Noticable	N	TBC	Notification Letter	
1 BOND CLOSE RANKIN PARK	10	Residential	35	37	2	7	Low	Noticable	N	TBC	Notification Letter	
13 KINGSWAY AVENUE RANKIN PARK	10	Residential	35	37	2	7	Low	Noticable	N	TBC	Notification Letter	
2 KINGSWAY AVENUE RANKIN PARK	10	Residential	35	37	2	7	Low	Noticable	N	TBC	Notification Letter	
66 ATHERTON CLOSE RANKIN PARK	10	Residential	35	36	1	6	Low	Noticable	N	TBC	Notification Letter	
313 MCCAFFREY DRIVE RANKIN PARK	10	Residential	35	36	1	6	Low	Noticable	N	TBC	Notification Letter	
11 KINGSWAY AVENUE RANKIN PARK	10	Residential	35	36	1	6	Low	Noticable	N	TBC	Notification Letter	
64 ATHERTON CLOSE RANKIN PARK	10	Residential	35	36	1	6	Low	Noticable	N	TBC	Notification Letter	
36A GRANDVIEW ROAD NEW LAMBTON HEIGHTS	10	Residential	35	36	1	6	Low	Noticable	N	TBC	Notification Letter	
311 MCCAFFREY DRIVE RANKIN PARK	10	Residential	35	36	1	6	Low	Noticable	N	TBC	Notification Letter	
30 GRANDVIEW ROAD NEW LAMBTON HEIGHTS	10	Residential	35	36	1	6	Low	Noticable	N	TBC	Notification Letter	
32 GRANDVIEW ROAD NEW LAMBTON HEIGHTS	10	Residential	35	36	1	6	Low	Noticable	N	TBC	Notification Letter	
34 GRANDVIEW ROAD NEW LAMBTON HEIGHTS	10	Residential	35	36	1	6	Low	Noticable	N	TBC	Notification Letter	
36 GRANDVIEW ROAD NEW LAMBTON HEIGHTS	10	Residential	35	35	0	5	Low	Noticable	N	TBC	Notification Letter	
38 GRANDVIEW ROAD NEW LAMBTON HEIGHTS	10	Residential	35	35	0	5	Low	Noticable	N	TBC	Notification Letter	