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Concept Development Application Stage 1 Civil Works of 55 Coonara Ave, West Pennant Hills NSW

Construction Noise and Vibration Management Plan - Civil Works

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1 INTRODUCTION

This Construction Noise and Vibration Management Plan presents the results of potential noise and vibration effects associated with the civil works at 55 Coonara Avenue, West Pennant Hills.

Noise control strategies have been formulated within this report to ensure effects from site works are minimised. In particular, a detailed outline of the community consultation procedures proposed for the site which has been included which will form the basis of the noise control strategy.

1.1 SITE BACKGROUND

55 Coonara Ave West Pennant Hills is a 25.87 Ha site located in Sydney's north west and currently comprises a 34,000m^2 low rise commercial premises, associated carparks and ancillary structures.

The site received rezoning in June 2020 to facilitate development of up to 600 residential dwellings with a mixture of homes and apartments, associated infrastructure and public open space utilising the existing developed area. The remainder of the site is zoned for environmental conservation.

2 SITE DESCRIPTION

Onsite acoustic investigation has been carried out by this office in regard to the surrounding acoustic environment which has been detailed below:

- The proposed subject site is bounded by Coonara Avenue to the north western boundary, with residential housing across Coonara Avenue;
- Situated along the eastern boundary of the project site is the Cumberland state forest, the forest bounds the entirety of the eastern boundary of the proposed subject site;
- The southern boundary of the project site is bounded by Cumberland State Forest; and
- The western boundary of the project site is bounded by residential housing.

For a detailed description please see the detailed figure below.

3 RECEIVER LOCATIONS

The potentially most impacted sensitive receiver locations are presented below. In addition, these have been identified in figure 2-1 below.

Receiver 1 – Residential dwellings located along the northern boundary of the project site at 66 – 116 Coonara Avenue, West Pennant Hills located across Coonara Avenue along the northern boundary of the project site;

Receiver 2 – Residential dwellings located along the western boundary of the project site at 2 and 4 Eldon Green, 3,4,5,6,8 Malton Green, 7 – 20 Lynton Green, 12-24 The Glade and 10-12 Sutton Green.

For a detailed description please see the detailed figure below.

3.1 ENVIRONMENTAL CONSIDERATIONS

As detailed in the Biodiversity Assessment Report complete for the site by Keystone Ecological, potential nesting locations for the endangered Powerful Owl have been identified. With the known proximity of these potential habitat locations, control measures have been detailed in Section 10 to ensure minimal impact to the Powerful Owl habitat.

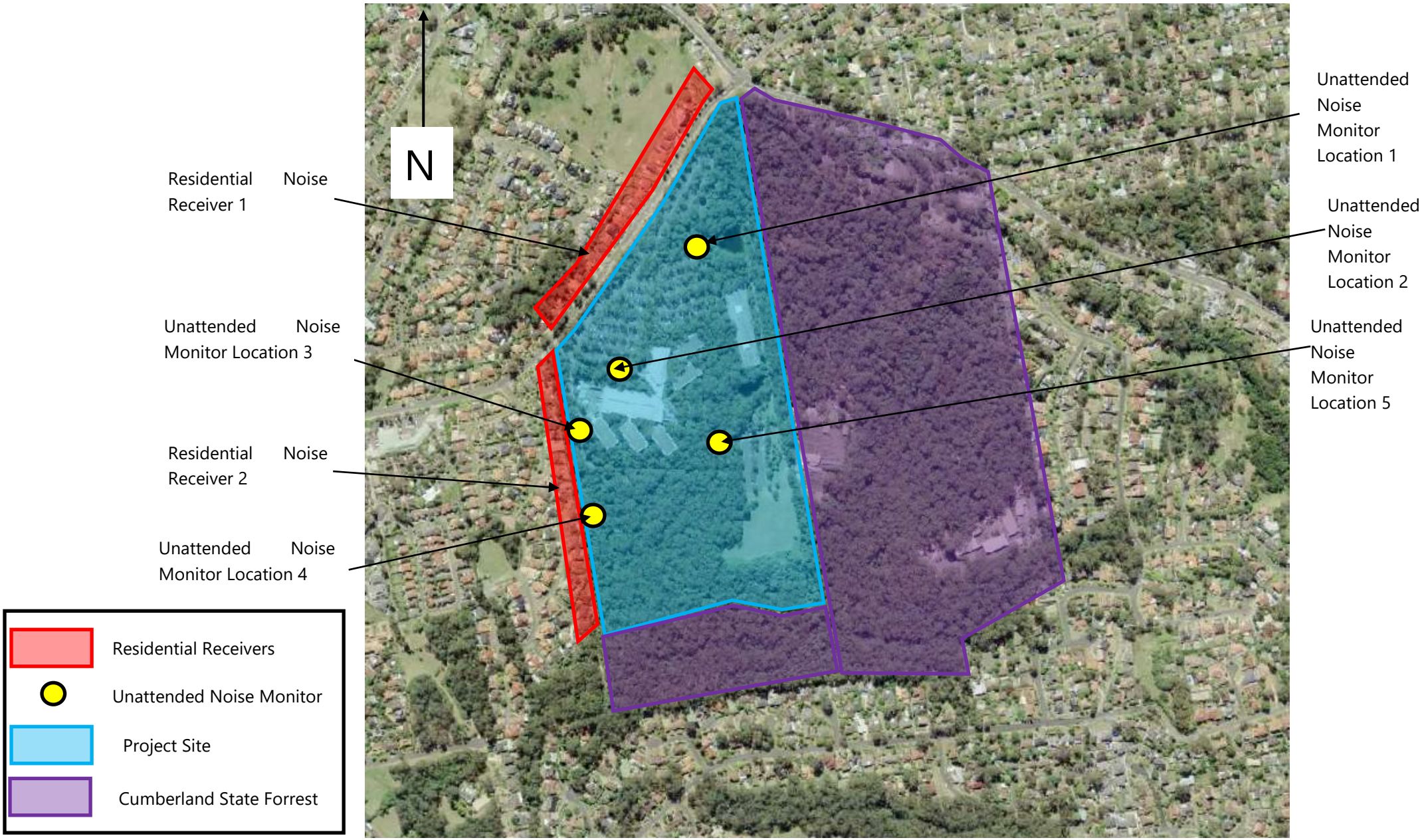

Figure 2-1 Site Map and Affected Receivers
Site map sourced SIX MapsNSW

4 PROPOSED CIVIL WORKS

The scope of works proposed to be carried out under this Development Application relates to Civil Works. These works generally consist of the following:

1. Bulk Earthworks, Piling Works, detailed excavation, drainage and services infrastructure and the construction of roads and retaining walls.
2. Infrastructure services lead in works and intersection works to Coonara Avenue.

Bulk Earthworks, Piling and Civil works are proposed to be completed within the area marked with a blue dotted line in Figure 4.1 below.

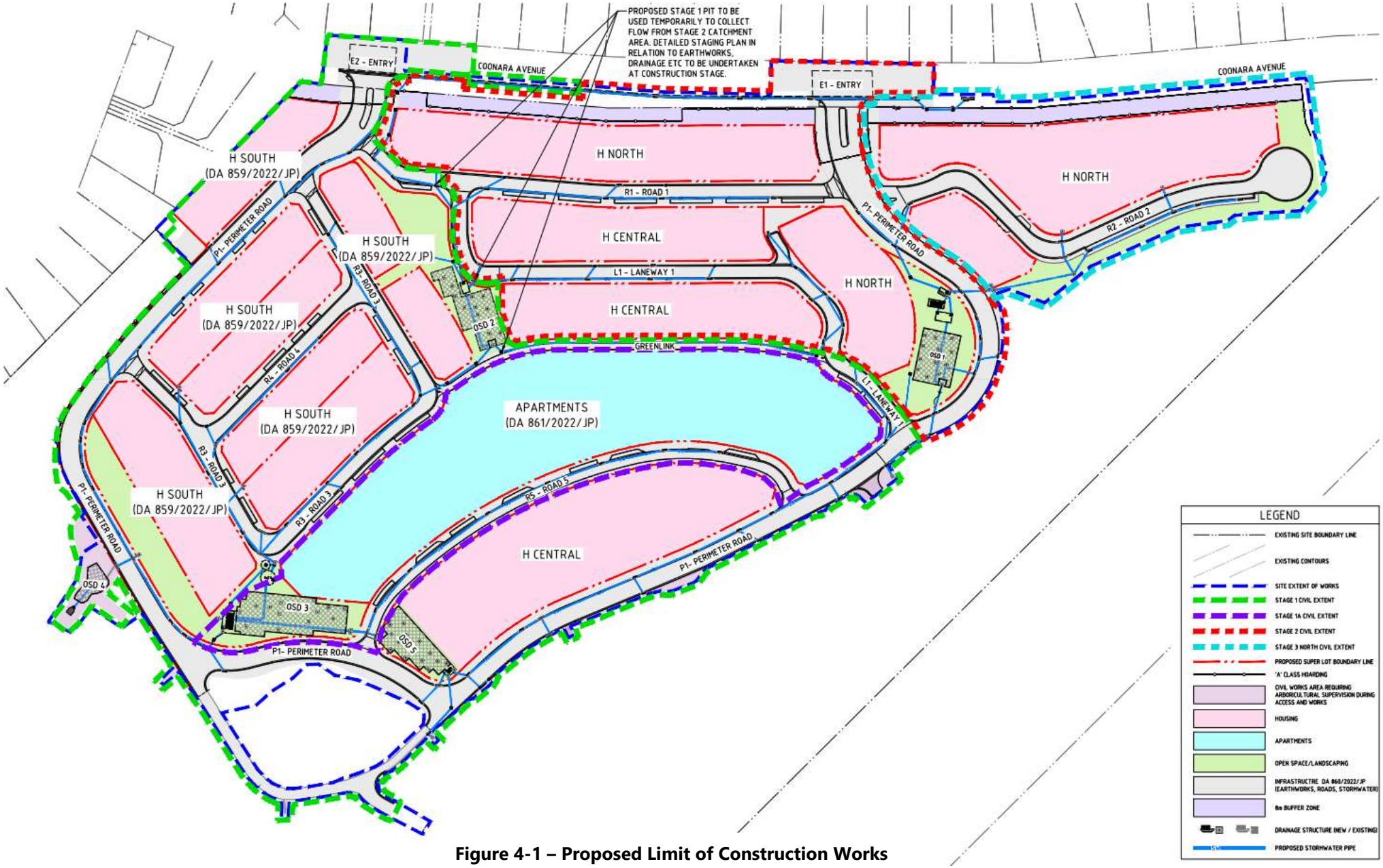

Figure 4-1 – Proposed Limit of Construction Works

The proposed works have been divided into a number of main work phases, along with the main noise producing equipment and activities likely to occur in each phase, please see below for outline of works:

Table 1 – Equipment Noise Data

Construction Activity	Equipment	Sound Power Level dB(A)L_{Aeq}
Civil Works	Excavator Mounted Hydraulic Hammer	118
	Excavator with Bucket	105
	CFA Piling Rig	103
	Concrete Pump	105
	Concrete Truck	105
	Wheel Trailer Scraper	118
	Grader	112
	Rock Saw	114

The Noise levels presented in the above table are derived from the following sources:

1. Table D2 of Australian Standard 2436-1981
2. Data held by this office from other similar studies.

5 CONSTRUCTION NOISE CODES AND GUIDELINES

The NSW EPA *Interim Construction Noise Guideline (ICNG) 2009* details specific construction noise and vibration management levels applicable to construction sites within NSW.

Where feasible and practical measures may be applied to the construction site is to endeavour to comply with the noise management levels outlined in the guideline. A summary of the code is detailed below.

5.1 NSW EPA INTERIM CONSTRUCTION NOISE GUIDELINE (ICNG) 2009

EPA guidelines adopt differing strategies for noise control depending on the predicted noise level at the nearest residences:

- "Noise affected" level. Where construction noise is predicted to exceed the "noise effected" level at a nearby residence, the proponent should take reasonable/feasible work practices to ensure compliance with the "noise effected level". For residential properties, the "noise effected" level occurs when construction noise exceeds ambient levels by more than:
    - 10dB(A)$L_{eq(15\ minutes)}$ for work during standard construction hours (7:00am-6:00pm Monday to Friday and 8am to 1pm on Saturdays); and
    - 5dB(A)$L_{eq(15\text{-}minutes)}$ for work outside standard construction hours (6:00pm-7:00pm Monday to Friday and 1:00pm to 4:00pm on Saturdays); and
- *"Highly noise affected level"*. Where noise emissions are such that nearby properties are "highly noise effected", noise controls such as respite periods should be considered. For residential properties, the "highly noise effected" level occurs when construction noise exceeds 75dB(A)Leq(15min) at nearby residences. Highly noise affected level only applies during standard construction hours.

A summary of noise management levels for standard hours of construction are presented below:

Table 2 – Construction Noise Management Level (Residents)

Receiver Type	"Noise Affected" Level dB(A) $L_{eq(15minutes)}$	"Highly Noise Affected" Level dB(A) $L_{eq(15Minutes)}$
Residential Receiver	Background + 10dB(A) (Standard Construction Hours)	75
	Background + 5dB(A) (Outside Standard Construction Hours)	N/A

5.2 AUSTRALIAN STANDARD AS 2436:2010 "GUIDE TO NOISE CONTROL ON CONSTRUCTION, MAINTENANCE AND DEMOLITION SITES"

Australian Standard AS 2436 provides guidance on noise and vibration control in respect to construction and demolition sites, the preparation of noise and vibration management plans, work method statements and impact studies.

The Standard states that:

- "Some construction and demolition activities are by their very nature noisy. The authorities responsible for setting noise level criteria for essential works will take note of the constraints imposed by such activities, especially when they are of short duration."
- Construction, demolition and maintenance works pose different problems of noise and vibration control when compared with most other types of industrial activity, since (a) they are mainly carried on in the open; (b) they are often temporary in nature although they may cause considerable disturbance whilst they last; (c) the noise and vibration arise from many different activities and kinds of plant, and their intensity and character may vary greatly during different phases of the work; and (d) the sites cannot be separated by planning controls, from areas that are sensitive to noise and vibration.

The standard provides advice and guidelines for the prediction of impacts and the methods available to manage impacts. The guideline promulgates feasible and reasonable mitigation strategies and controls, and stakeholder liaison, in the effort to reach a realistic compromise between site activities and impacts on neighbouring properties.

6 EXISTING BACKGROUND NOISE LEVELS

Five unattended noise monitors were installed on ground level around the project site (55 Coonara Avenue, West Pennant Hills) with detailed locations below:

- Location 1-North western corner along Coonara Ave.
- Location 2- Middle point of western boundary along Coonara Ave.
- Location 3- along western boundary of complex with microphone adjacent to the boundary fence
- Location 4- along turning point of Perimeter Rd with microphone located close to residential boundary.
- Location 5- along the proposed eastern facade of Building A2.

Existing rating background noise levels (RBL) have been measured by Acoustic Logic for this project. Rating background noise levels have been determined using unattended monitoring around the site. Unattended noise monitoring was conducted using five Acoustic Research Laboratories Pty Ltd noise loggers. The loggers were programmed to store 15-minute statistical noise levels throughout the monitoring period. The equipment was

calibrated at the beginning and the end of each measurement using a Rion NC-73 calibrator; no significant drift was detected. All measurements were taken on A-weighted fast response mode.

The results of the monitoring are summarised in the following table.

Table 3 – Measured Rating Background Noise Level

Location	Time Period	Noise Level
Location 1	7:00am-6:00pm	50*
Location 2	7:00am-6:00pm	52
Location 3	7:00am-6:00pm	37**
Location 4	7:00am-6:00pm	45
Location 5	7:00am-6:00pm	37

Note: *Measured RBL is adopted for Receiver 1; **Measured RBL is adopted for Receiver 2

Please see figures below for photos of unattended noise monitors

Figure 6-1 Logger Location 1

Figure 6-2 Logger Location 2

Figure 6-3 Logger Location 3

Figure 6-4 Logger Location 4

Figure 6-5 Logger Location 5

7 CONSTRUCTION NOISE AND VIBRATION MANAGEMENT LEVELS

7.1 NOISE

Resultant Noise Management Levels (NMLs) have been summarised below, these have been determined based on the information in section 5 and rating background noise levels in section 6.

Table 4 – Resultant Noise Management Levels (NML's)

Hours of Work	Receivers	Noise Management Trigger Level dB(A)$L_{eq(15\text{-}minute)}$
Standard Construction Hours (7am-6pm Monday – Friday 7am-5pm Saturday)	R1	60dB(A)$L_{eq(15\text{-}minute)}$ (BG + 10dB(A)) (50dB(A)$L_{90(Period)}$ + 10dB(A)
	R2	47dB(A)$L_{eq(15\text{-}minute)}$ (BG + 10dB(A)) (37dB(A)$L_{90(Period)}$ + 10dB(A)

7.2 VIBRATION

Vibration caused by construction at any residence or structure outside the subject site must be limited to:

- For structural damage vibration, German Standard DIN 4150-3 Structural Vibration: Effects of Vibration on Structures; and
- For human exposure to vibration, British Standard BS 6472 – 'Guide to Evaluate Human Exposure to Vibration Buildings (1Hz to 80Hz.)

The criteria and the application of this standard are discussed in separate sections below.

7.2.1 Damage Criteria

German Standard DIN 4150-3 (1999-02) provides vibration velocity guideline levels for use in evaluating the effects of vibration on structures. The criteria presented in DIN 4150-3 (1999-02) are presented in Table 2.

It is noted that the peak velocity is the absolute value of the maximum of any of the three orthogonal component particle velocities as measured at the foundation, and the maximum levels measured in the x- and y-horizontal directions in the plane of the floor of the uppermost storey.

Table 5 – DIN 4150-3 (1999-02) Safe Limits for Building Vibration

Type of Structure		Peak Particle Velocity (mms^{-1})			
		At Foundation at a Frequency of			Plane of Floor of Uppermost Storey
		< 10Hz	10Hz to 50Hz	50Hz to 100Hz	All Frequencies
1	Buildings used in commercial purposes, industrial buildings and buildings of similar design	20	20 to 40	40 to 50	40
2	Dwellings and buildings of similar design and/or use	5	5 to 15	15 to 20	15
3	Structures that because of their particular sensitivity to vibration, do not correspond to those listed in Lines 1 or 2 and have intrinsic value (e.g. buildings that are under a preservation order)	3	3 to 8	8 to 10	8

7.2.2 Human Comfort and Amenity

The British Standard BS 6472 – 'Guide to Evaluate Human Exposure to Vibration Buildings (1Hz to 80Hz) will be used to assess construction vibration for human comfort.

This guideline provides procedures for assessing tactile vibration and regenerated noise within potentially affected buildings. The recommendations of this guideline should be adopted to assess and manage vibration from the site. Where vibration exceeds, or is likely to exceed, the recommended levels then an assessment of reasonable and feasible methods for the management of vibration should be undertaken.

Table 6 – BS 6472 Vibration Criteria

		RMS acceleration (m/s^2)		RMS velocity (mm/s)		Peak velocity (mm/s)	
Place	**Time**	**Preferred**	**Maximum**	**Preferred**	**Maximum**	**Preferred**	**Maximum**
Continuous Vibration							
Residences	Daytime	0.01	0.02	0.2	0.4	0.28	0.56
Offices		0.02	0.04	0.4	0.8	0.56	1.1
Workshops		0.04	0.08	0.8	1.6	1.1	2.2
Impulsive Vibration							
Residences	Daytime	0.3	0.6	6.0	12.0	8.6	17.0
Offices		0.64	1.28	13.0	26.0	18.0	36.0
Workshops		0.64	1.28	13.0	26.0	18.0	36.0

Note 1: Continuous vibration relates to vibration that continues uninterrupted for a defined period (usually throughout the daytime or night-time), e.g. continuous construction or maintenance activity. (DECC, 2006)

Note 2: Impulsive vibration relate to vibration that builds up rapidly to a peak followed by a damped decay and that may or may not involve several cycles of vibration (depending on frequency and damping), with up to three occurrences in an assessment period, e.g. occasional loading and unloading, or dropping of heavy equipment (DECC, 2006).

8 PREDICTED CONSTRUCTION NOISE LEVELS

Noise from the worst-case works for each phase of the development have been predicted to the nearest most affected sensitive receiver.

Noise emissions from the operation of the proposed substation have been predicted at the receiver locations using SoundPlan™ modelling software implementing the ISO 9613-2:1996 *"Acoustics – Attenuation of Sound During Propagation Outdoors – Part 2: General Method of Calculation"* noise propagation Standard. Substation noise data used in the SoundPlan™ modelling is based on data in Section 2 of this report. The following weather conditions are included in the modelling based on the requirements of ISO9613:

- Wind speed of between 1m/s and 5m/s.
- 10 Degrees with 70% relative humidity.

The predicted A-weighted noise levels at all nearby residential receivers and other sensitive receivers are presented below:

8.1 CIVIL WORKS

8.1.1 Stage 1

The following table presents the equipment included in the stage 1 noise assessment.

Table 7 – Stage 1 Civil Works Noise Emission Assessment

Activity	Number of Equipment	Sound Power Level	Predicted Cumulative Noise Level at Receiver dB(A)$L_{eq(15\text{-}minute)}$		Noise Management Trigger Level dB(A)$L_{eq,\ 15min}$	Findings
			Receiver 1 (North)	Receiver 2 (West)		
Excavator Mounted Hydraulic Hammer	3	118	60 – 66	63 – 75	Noise Affected Level to R1- 60 Noise Affected Level to R2- 47 High Affected Noise Level - 75	Noise exceed the "affected noise level" but not exceed "high affected noise level"
Excavator with bucket	4	105				
CFA Piling Rig	2	103				
Concrete Pump	4	105				
Concrete Truck	4	105				
Wheel Trailer Scraper	3	118				
Grader	5	112				

The following figures present the SoundPLAN modelling predicted noise levels at different receiver heights.

8.1.1.1 Ground Floor (1500mm above ground level):

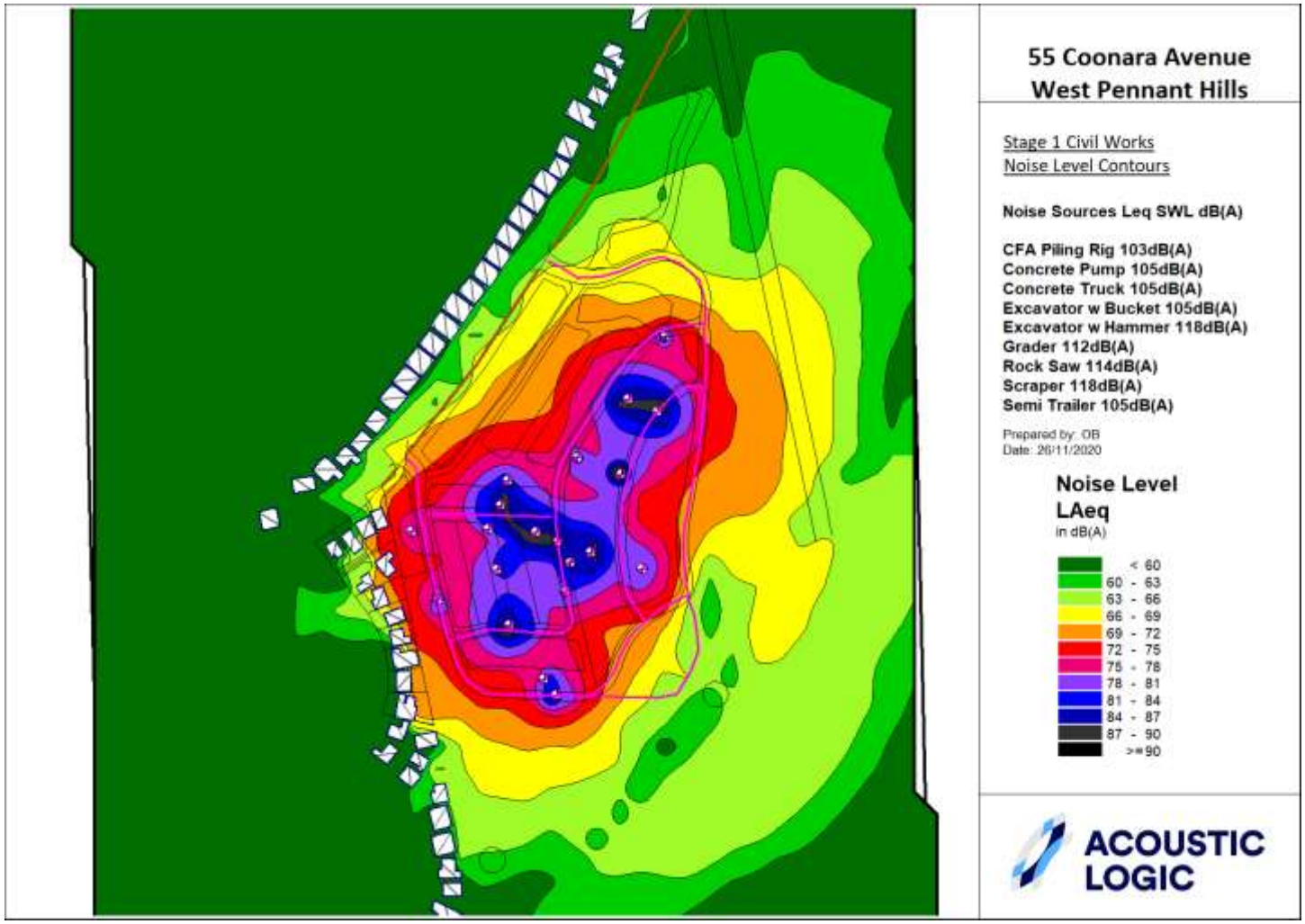

Figure 1 – SoundPLAN™ Stage 1 predicted noise impacts at Height 1500mm

◯ Owl Nest location

8.1.1.2 Level 1 (4500mm above ground level)

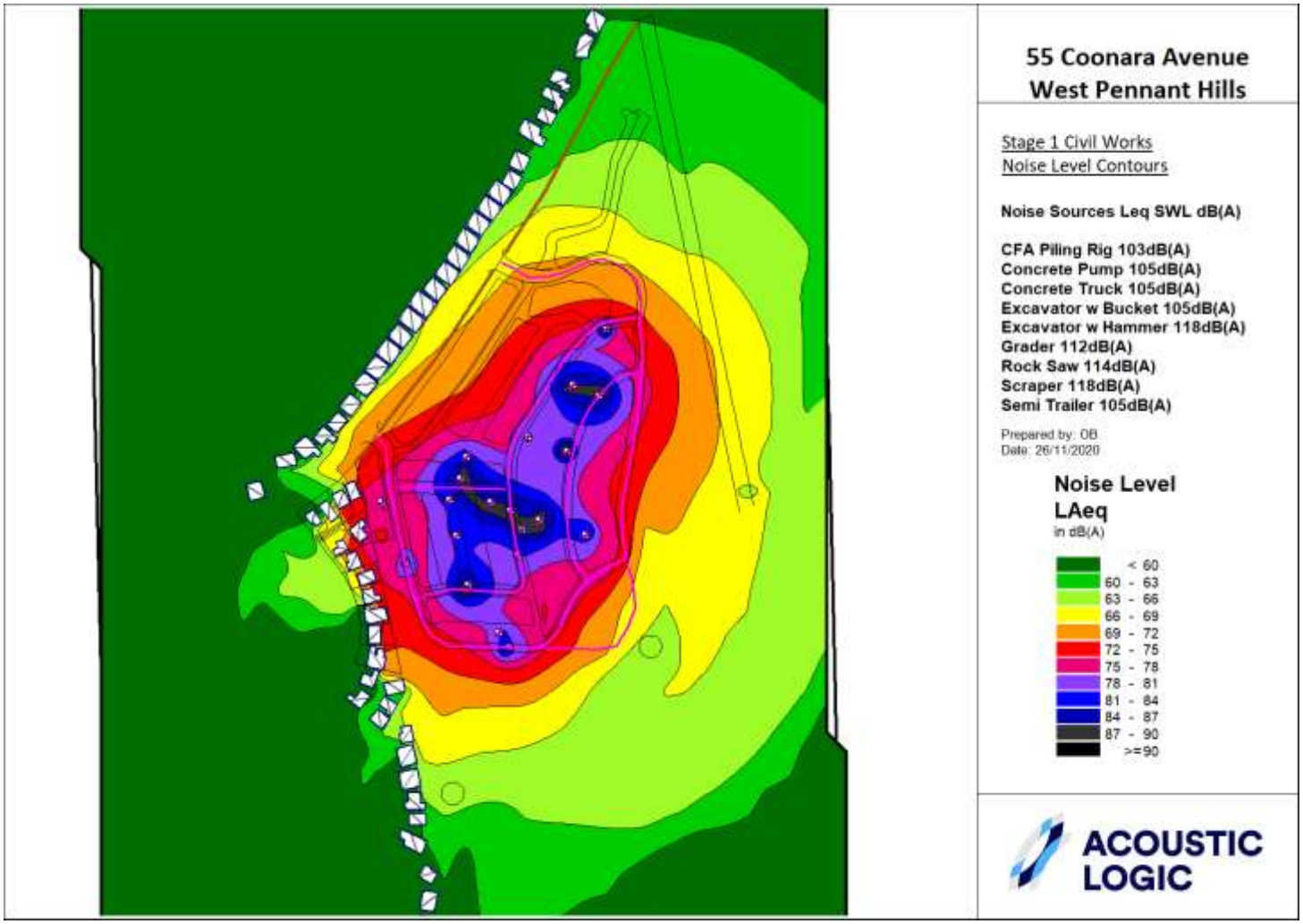

Figure 2 – SoundPLAN™ Stage 1 predicted noise impacts at Height 4500mm

◯ Owl Nest location

8.1.2 Stage 2 and Stage 3

The following table presents the equipment included in the stage 2 and stage 3 noise assessment.

Table 8 – Stage 2 and Stage 3 Civil Works Noise Emission Assessment

Activity	Number of Equipment	Sound Power Level	Predicted Level at Receiver dB(A)$L_{eq(15min)}$		Noise Management Trigger Levels dB(A)$L_{eq,(15min)}$	Findings
			Receiver 1 (North)	Receiver 2 (West)		
Excavator Mounted Hydraulic Hammer	4	118	60 – 69	60-69	Noise Affected Level to R1- 60 Noise Affected Level to R2- 47 High Affected Noise Level - 75	Noise exceed the "affected noise level" but not exceed "high affected noise level
Excavator with bucket	2	105				
Concrete Pump	1	105				
Concrete Truck	1	105				
Wheel Trailer Scraper	1	118				
Grader	2	112				

The following figures present the SoundPLAN modelling predicted noise levels for the different construction activities.

8.1.2.1 Ground Floor (1500mm above ground level):

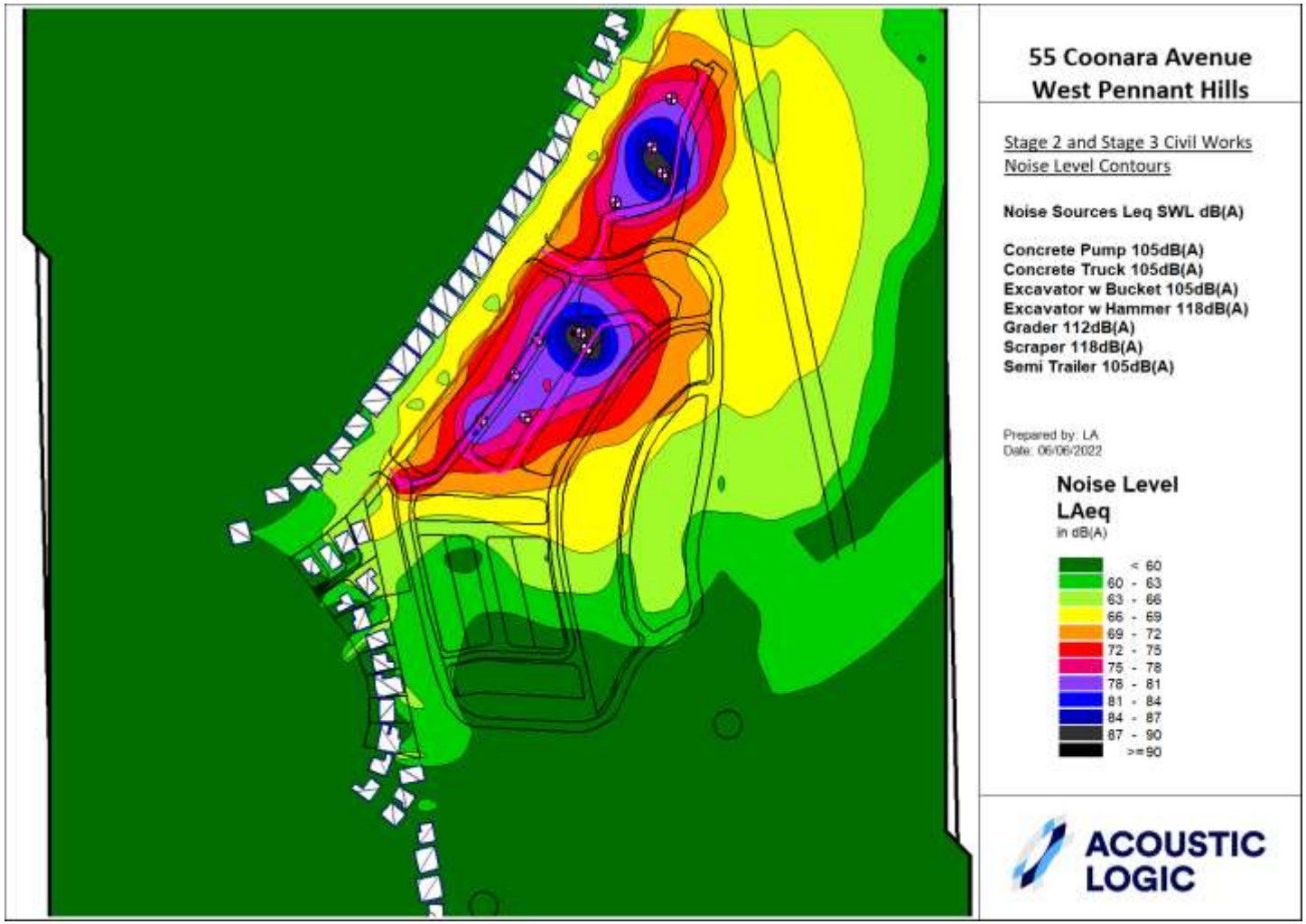

Figure 3 – SoundPLAN™ Stage 2 and Stage 3 predicted noise impacts at Height 1500mm

◯ Owl Nest location

8.1.2.2 Level 1 (4500mm above ground level)

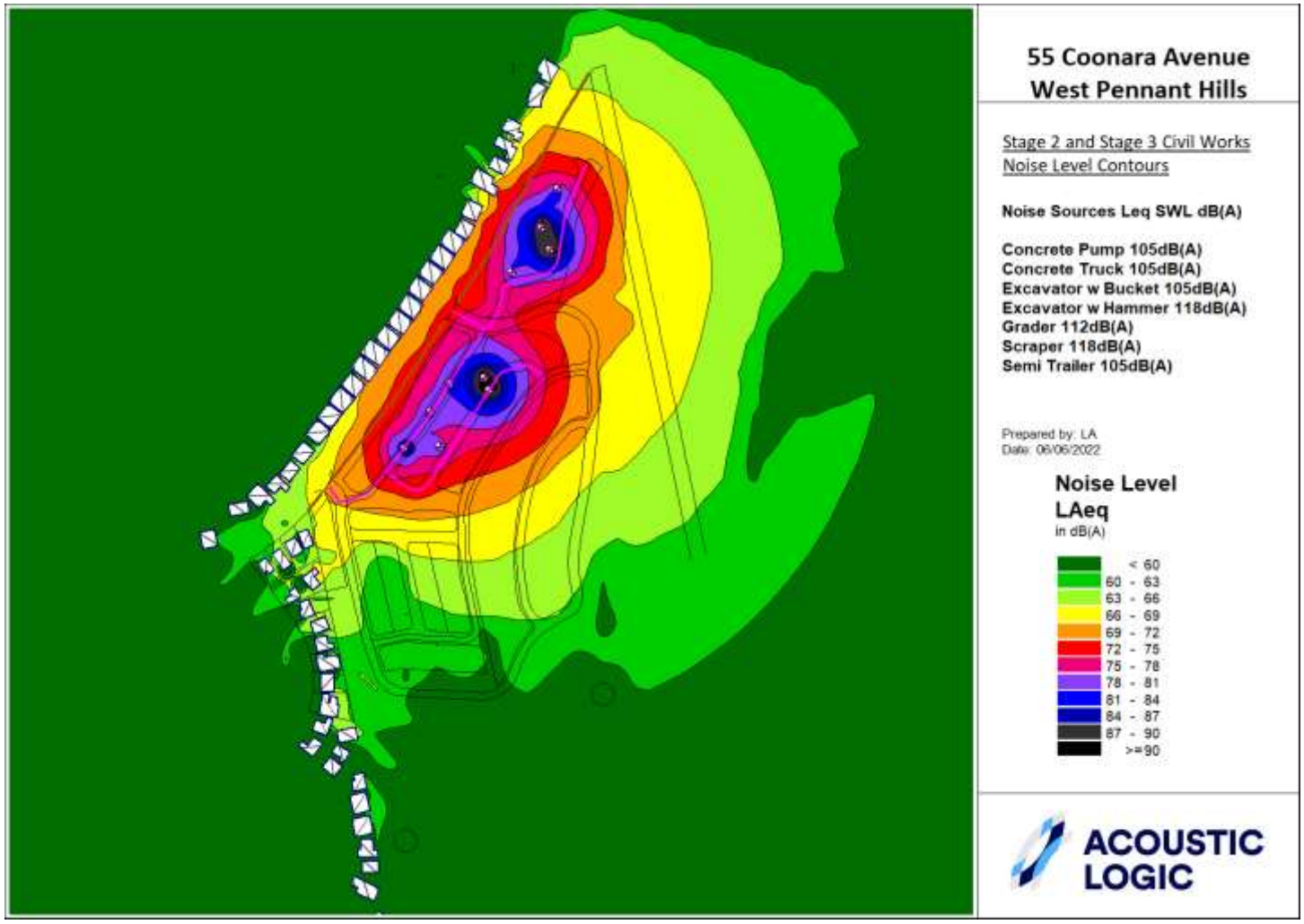

Figure 4 – SoundPLAN^{TM} Stage 2 and Stage 3 predicted noise impacts at Height 4500mm

◯ Owl Nest location

8.2 NOISE IMPACT ON POWERFUL OWL NEST TREES

8.2.1 Location of Powerful Owl Nest Trees

Unattended noise monitoring was conducted to determine background noise conditions within the construction site. The figure below demonstrates the potential owl nest locations known to be in the site area but which are not located with the development footprint.

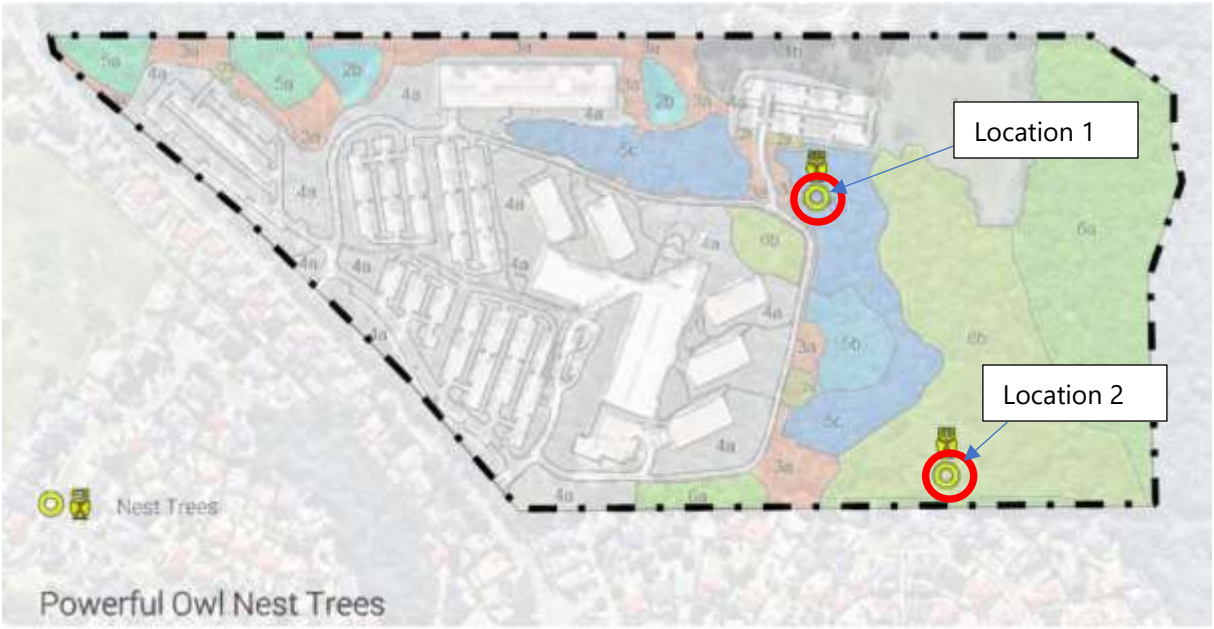

Figure 5 – Noise Monitoring Locations in Relation to the Powerful Owl Nest Trees

8.2.2 Measured Existing Noise Levels and Predicted Noise Level from Construction Activities

The measured ambient noise levels and predicted noise impacts at the tree locations marked up in Figure 5 are shown in the following table.

Table 9 – Measured Ambient Noise Levels and Predicted Noise Impacts

Location	Measured Highest Ambient Noise Levels LAeq Day	Predicted Noise Impacts	
		Stage 1	Stage 2 & Stage 3
1	58 dB(A)	63-66 dB(A)	57-58 dB(A)
2	54dB(A)	63-65 dB(A)	55-58dB(A)

Findings:

- The predicted noise levels at Tree location 1 are 5-8dB higher for Stage 1 than the current highest measured ambient noise levels in the location. However, Stage 2 and Stage 3 predicted noise levels are not higher than the measured highest ambient noise levels.

- Tree location 2 will have Stage 1 predicted noise levels 9-11dB higher than the highest ambient noise levels. However, Stage 2 and Stage 3 predicted noise levels will only be marginally higher at 1-4dB above the highest existing ambient noise levels.

9 VIBRATION LIMIT

9.1 VIBRATION PRODUCING ACTIVITIES

Proposed activities that have the potential to produce significant ground vibration include:

- Excavator mounted hydraulic hammer;
- Excavator mounted saw;
- Excavator with bucket.

9.2 RECOMMENDED VIBRATION CRITERIA

It is recommended to adopt maximum 5mm/s PPV criteria to protect residential buildings adjacent to the project site based on requirements of DIN 4150.

- Alarm Level – 3mm/s PPV at vibration at receiver location, SMS alarm message will be sent to operator, project manager and acoustic engineer if magnitude of vibration events exceed this level. Project manager shall respond immediately by taking courteous work methodology.
- Stop work level -5mm/s PPV at vibration at receiver location, SMS alarm message will be sent to operator, project manager and acoustic engineer if magnitude of vibration events exceed this level. Project manager shall stop the work at amenity of geophone immediately.

9.3 SAFEGUARDS TO PROTECT SENSITIVE STRUCTURES

Vibration monitoring is recommended with geophone located along the nearest boundary. The monitor sends a notification to the site management team if a vibration alarm level is triggered.

10 RECOMMENDED NOISE AND VIBRATION CONTROLS

10.1 ECOLOGICAL CONTROL MEASURES

Powerful Owl

To minimise impact to owl nesting areas mapped in Figure 5, the following control measures are proposed to be implemented during civil works if the owl is identified as nesting:

- Hours of work will be restricted when within 100m during the breeding season (March – September) to commence 1 hour after sunrise (8:00am) and finish before 4:00pm; and
- Noise monitoring is to be established during the breeding period in these areas.

10.2 EXCAVATOR MOUNTED HAMMER AND ROCK SAWING

If complaints arise, it is advised that the respite periods be reviewed such that these activities occur further away from sensitive hours or days and continuous works be shortened.

10.3 COMMUNITY CONSULTATION/NOTIFICATION:

For any noise management programme to work effectively, continuous communication is required between all parties, which include sensitive receivers that may be potentially impacted upon, the builder and the regulatory authority. This establishes a dynamic response process which allows for the adjustment of control methods and management levels for the benefit of all parties.

The objective in undertaking a consultation process is to:

- Inform and educate the groups about the project and the noise controls being implemented;
- Increase understanding of all acoustic issues related to the project and options available;
- Identify group concerns generated by the project, so that they can be addressed;
- Notification (leaflet or similar) of nearby residents is recommended, detailing the description of works, duration on the day, and expected completion date;
- Ensure that concerned individuals or groups are aware of and have access to a Complaints Register which will be used to address any construction noise related problems should they arise. Community consultation would be undertaken prior to works commencing including the receivers identified in Section 3.

10.4 MATERIALS HANDLING/VEHICLES:

- Trucks and bobcats to use a non-tonal reversing beacon (subject to OH&S requirements) to minimise potential disturbance of neighbours.
- Avoid careless dropping of construction materials into empty trucks.
- Trucks, trailers and concrete trucks should turn off their engines during idling to reduce noise impacts (unless truck ignition needs to remain on during concrete pumping).
- Construction vehicles accessing the site should not queue in residential streets and should only use the designated construction vehicle routes. Loading of these vehicles should occur as far as possible from any sensitive receiver.

10.5 COMPLAINTS HANDLING:

In the event of complaint, the procedures outlined in Section 11 should be adopted.

10.6 ACOUSTIC BARRIER:

Barriers or screens can be an effective means of reducing noise. Barriers can be located either at the source or receiver. The placement of barriers at the source is generally only effective for static plant (tower cranes). Equipment which is on the move or working in rough or undulating terrain cannot be effectively attenuated by placing barriers at the source.

Barriers can also be placed between the source and the receiver. The degree of noise reduction provided by barriers is dependent on the amount by which line of sight can be blocked by the barrier. If the receiver is totally shielded from the noise source reductions of up to 15 dB(A) can be achieved. Where only partial obstruction of line of sight occurs, noise reductions of 5 to 8 dB(A) may be achieved. Where no line of sight is obstructed by the barrier, generally no noise reduction will occur.

As barriers are used to provide shielding and do not act as an enclosure, the material they are constructed from should have a noise reduction performance which is approximately 10dB(A) greater than the maximum reduction provided by the barrier. In this case the use of a material such as 10 or 15mm plywood would be acceptable for the barriers.

10.7 EXCAVATOR NOISE

Excavators are expected to be used for most of the civil works period.

Where prolonged excavator use is necessary, excavators could be moved to another part of the site to offer the receiver closest to the excavator some respite. Where practical and feasible, by moving the excavator from working on one part of the site to the opposite side of the site can provide up to a 10dB(A) reduction in noise levels impacting residential receiver locations. Management processes include;

All surrounding receivers should be notified of the duration and extent of the works proposed commencement during the excavation stage via letterbox drops, with a detailed engagement plan and contact information for all relevant personnel on site.

10.8 VEHICLE NOISE AND CONCRETE PUMPS

Trucks must turn off their engines when on site to reduce impacts on adjacent land use (unless truck ignition needs to remain on during concrete pumping).

Where feasible locate concrete pumping plant away from site boundaries.

10.9 VIBRATION MONITORING

It is recommended that attended monitoring be carried out at the commencement of civil work if rock excavation using hydraulic hammers is undertaken to confirm vibration levels at sensitive receivers. If this assessment indicates that vibration levels may be exceeded, then either modify work practices or install continuous monitors with alarms so that works can cease if the trigger levels are exceeded.

It is recommended that the monitors (if required) are fitted with GSM modem for vibration exceedance. In addition, the vibration loggers will be downloaded remotely using the GSM modem and reports to be issued fortnightly.

The following alarm levels and stop work levels are recommended if vibration monitors are installed:

Recommended Vibration Criteria

- Alarm Level – 3mm/s PPV for residential receivers. SMS alarm message will be sent to site foreman/engineer, project manager and acoustic engineer if magnitude of vibration events reach or exceed this level. Project manager shall respond and investigate works at amenity of geophone immediately.
- Stop work level – 5mm/s PPV for residential receivers. SMS alarm message will be sent to site foreman/engineer, project manager and acoustic engineer if magnitude of vibration events reach or exceed this level. Project manager shall stop the work at amenity of geophone immediately.

Detailed monitor locations will be determined based on the locations of civil work machines.

10.9.1 Downloading of Vibration Logger

Downloading of the vibration logger will be conducted on a regular basis. In the event exceedance of vibration criteria via a SMS alert system occurs, downloading of logger should be conducted more frequently. Results obtained from the vibration monitor will be presented in a graph formant and will be forwarded to Mirvac for review. It is proposed that reports are provided fortnightly with any exceedance in the vibration criteria reported as detailed in this report.

10.9.2 Presentation of Vibration Logger Results

A fortnightly report will be submitted Mirvac via email summarising the vibration events. The vibration exceedance of limit is recorded the report shall be submitted within 24 hours. Complete results of the continuous vibration logging will be presented in fortnight reports including graphs of collected data.

10.9.3 Persons to Receive Alarms

The following personnel will receive GSM alarms:

- Acoustic consultant/advisor (1 person)
- Civil Works Principal Contractor (Site Manager)
- Excavation site foreman

10.9.4 Other Activities

- In the event of non-compliances, noise management techniques identified in this report should be employed to minimise the level of noise impact. This may include community consultation and scheduling of loud construction processes.
- Notwithstanding above, general management techniques and acoustic treatments are included below which may be implemented on a case-by-case basis to reduce noise emissions to surrounding receivers.

11 CONTROL OF CONSTRUCTION NOISE AND VIBRATION

The execution of this work will facilitate the formulation of noise control strategies for this project.

The flow chart presented in Figure 2 illustrates the process that will be followed in assessing construction activities.

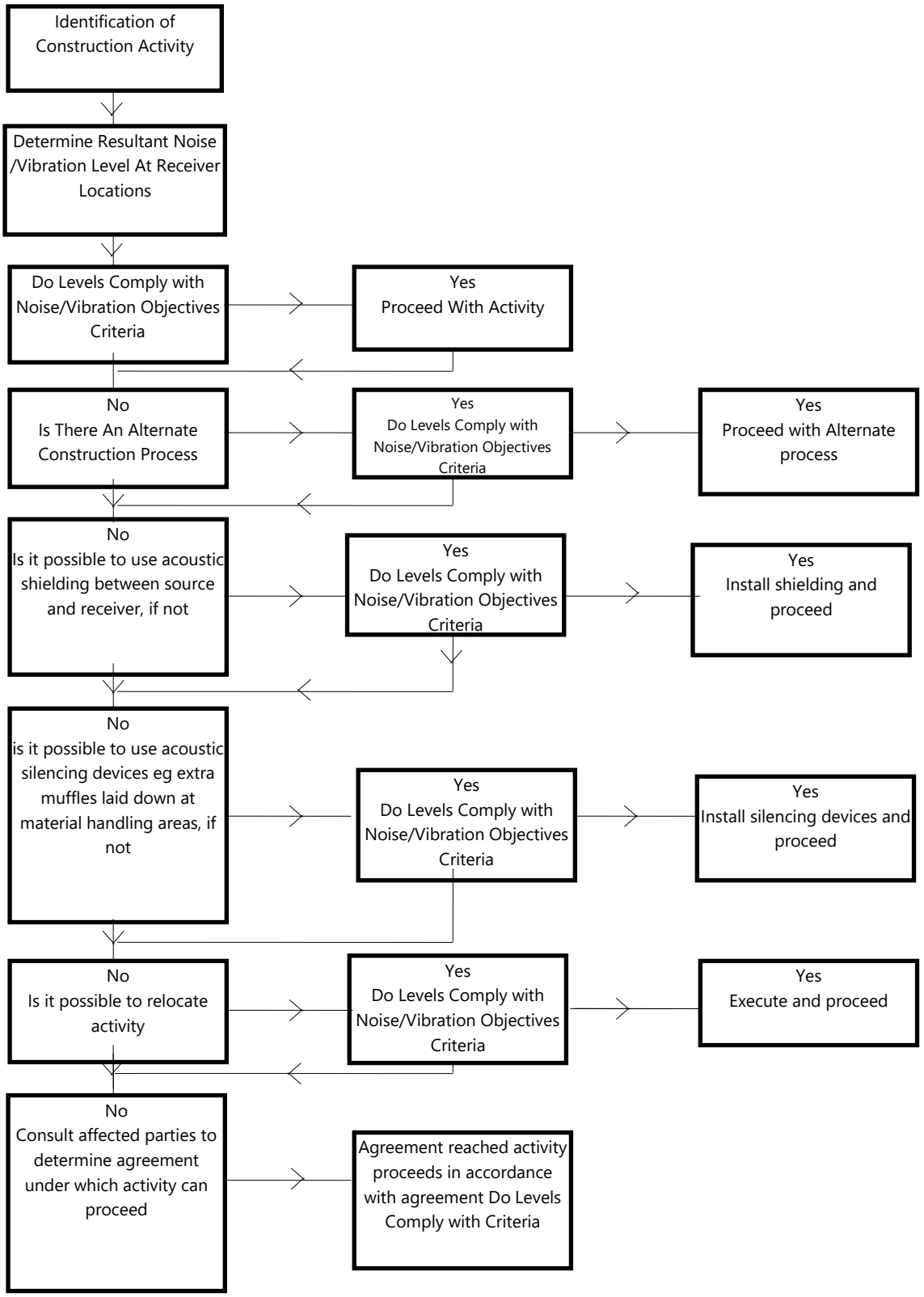

Figure 2 – Process Flowchart

12 TYPICAL NOISE AND VIBRATION CONTROL METHODS

The determination of appropriate noise control measures will be dependent on the particular activities and construction appliances. This section provides an outline of available methods.

12.1 SELECTION OF ALTERNATE APPLIANCE OR PROCESS

Where a particular activity or construction appliance is found to generate excessive noise levels, it may be possible to select an alternative approach or appliance. For example; the use of a hydraulic hammer on certain areas of the site may potentially generate high levels of noise. By carrying this activity by use of pneumatic hammers, bulldozers ripping and/or milling machines lower levels of noise will result.

12.2 SILENCING DEVICES

Where construction process or appliances are noisy, the use of noise reducing devices may be possible. These may take the form of engine shrouding, or special industrial noise reducers fitted to exhausts.

12.3 MATERIAL HANDLING

The installation of rubber matting over material handling areas can reduce the sound of impacts due to material being dropped by up to 20dB(A).

12.4 TREATMENT OF SPECIFIC EQUIPMENT

In certain cases, it may be possible to specially treat a piece of equipment to dramatically reduce the sound levels emitted.

12.5 ESTABLISHMENT OF SITE PRACTICES

This involves the formulation of work practices to reduce noise generation. It is recommended that all available and reasonable treatments and mitigation strategies presented in this report be adopted to minimise noise emissions from the excavation and construction activities on site.

12.6 COMBINATION OF METHODS

In some cases, it may be necessary that two or more control measures be implemented to minimise noise.

12.7 MAINTENANCE OF PLANT, EQUIPMENT AND MACHINERY

All plant, equipment and machinery should be regularly serviced and maintained at optimum operating conditions, to ensure excessive noise emissions are not generated from faulty, overused or unmaintained machinery.

12.8 STAFF TRAINING AND REPORTING MECHANISM

All construction staff (including subcontractors) on site, as part of the site induction process, will be informed of the surrounding sensitive receivers on site and the site-specific recommendations to reduce noise and vibration impacts to these receivers.

13 COMMUNITY INTERACTION AND COMPLAINTS HANDLING

13.1 ESTABLISHMENT OF DIRECT COMMUNICATION WITH AFFECTED PARTIES

In order for any construction noise management programme to work effectively, continuous communication is required between all parties, which may be potentially impacted upon, the builder and the regulatory authority. This establishes a dynamic response process which allows for the adjustment of control methods and criteria for the benefit of all parties.

The objective in undertaking a consultation process is to:

- Inform and educate the groups about the project and the noise controls being implemented;
- Increase understanding of all acoustic issues related to the project and options available;
- Identify group concerns generated by the project, so that they can be addressed; and
- Ensure that concerned individuals or groups are aware of and have access to a Constructions Complaints Register which will be used to address any construction noise related problems should they arise.

Community consultation should be conducted prior to any works commencing on site, with letterbox notifications to all identified however not limited to surrounding sensitive receivers (refer section 3).

13.2 DEALING WITH COMPLAINTS

Should ongoing complaints of excessive noise or vibration criteria occur immediate measures shall be undertaken to investigate the complaint, the cause of the exceedances and identify the required changes to work practices. In the case of exceedances of the vibration limits all work potentially producing vibration shall cease until the exceedance is investigated.

The effectiveness of any changes shall be verified before continuing. Documentation and training of site staff shall occur to ensure the practices that produced the exceedances are not repeated.

If a noise complaint is received the complaint should be recorded on a Noise Complaint Form. The complaint form should list:

- The name and address of the complainant (if provided);
- The time and date the complaint was received;
- The nature of the complaint and the time and date the noise was heard;
- The name of the employee who received the complaint;
- Actions taken to investigate the complaint, and a summary of the results of the investigation;
- Required remedial action, if required;
- Validation of the remedial action; and
- Summary of feedback to the complainant.

A permanent register of complaints should be held. All complaints received should be fully investigated and reported to management. The complainant should also be notified of the results and actions arising from the investigation.

The investigation of a complaint shall involve where applicable;

- Noise measurements at the affected receiver;
- An investigation of the activities occurring at the time of the incident;
- Inspection of the activity to determine whether any undue noise is being emitted by equipment; and
- Whether work practices were being carried out either within established guidelines or outside these guidelines.

Where an item of plant is found to be emitting excessive noise, the cause is to be rectified as soon as possible. Where work practices within established guidelines are found to result in excessive noise being generated then the guidelines should be modified so as to reduce noise emissions to acceptable levels. Where guidelines are not being followed, the additional training and counselling of employees should be carried out.

Measurement or other methods shall validate the results of any corrective actions arising from a complaint where applicable.

13.3 REPORTING REQUIREMENTS

The following shall be kept on site:

1. A register of complaints received/communication with the local community shall be maintained and kept on site with information as detailed in section 14.2.
2. Where noise/vibration complaints require noise/vibration monitoring, results from monitoring shall be retained on site at all times.
3. Any noise exceedances occurring including, the actions taken and results of follow up monitoring.

13.4 CONTINGENCY PLANS

Where non-compliances or noise complaints are raised the following methodology will be implemented.

1. Determine the offending plant/equipment/process
2. Locate the plant/equipment/process further away from the affected receiver(s) if possible.
3. Implement additional acoustic treatment in the form of localised barriers, silencers etc where practical and reasonable.
4. Selecting alternative equipment/processes where practical

14 CONCLUSION

A Noise and Vibration Management Plan has been produced to assess the noise and vibration effects associated with civil works included as part of the Stage 1 Concept Plan Application for 55 Coonara Ave, West Pennant Hills NSW.

Based on our assessment, predicted external noise levels at surrounding receivers may potentially exceed the noise management trigger level, especially for activities such as concrete breaking/sawing and piling, but will have varying degrees of impact depending on the location of the activity. This can be expected due to the close proximity of receivers and because they are 1-2 storey, there will still be direct line of sight to the project site, even with the proposed hoarding along Coonara Avenue. In addition, ecological constraints have been considered and control measures proposed to mitigate impact to ecologically sensitive environments in proximity of the site.

Recommendations have been provided to minimise and monitor the noise impacts on surrounding receivers whilst monitoring has also been elected at selected locations to work within the site parameters.

We trust this information is satisfactory. Please contact us should you have any further queries.

Yours faithfully,

Acoustic Logic Pty Ltd
Lachlan Abood