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Athena Project - 33-39 Talavera Road, Macquarie Park

Construction Noise and Vibration Management Plan

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1 INTRODUCTION

Acoustic Logic (AL) has been engaged to prepare a construction noise and vibration management plan for the proposed commercial development "The Athena Project – Building B" to be located at 33-39 Talavera Road, Macquarie Park.

This report has been prepared to address the requirements of the M Park Building B – Main Works SSDA conditions detailed below (Ref: SSD-10467):

"B4. Construction Noise Management Plan

The applicant must prepare a Construction Noise Management Plan (CNMP) for the development to the satisfaction of the Planning Secretary. The plan must form part of a CEMP in accordance with Condition C2 and must:

a) Be prepared by a suitably qualified and experienced noise expert;
b) Be approved by the Planning Secretary prior to the commencement of construction;
c) Describe procedures for achieving the noise management levels in the EPA's Interim Construction Noise Guideline (Dec, 2009);
d) Describe the measures to be implemented to manage high noise generating works, such as piling;
e) Describe the community consultation which would be undertaken during the construction; and
f) Include a complaints management system that would be implemented for the duration of construction."

2 SITE DESCRIPTION

The site is located at the adjoining of Talavera and Khartoum Roads, Macquarie Park. The site is bound to the north-east by Talavera Road, to the north-west by Khartoum Road and by commercial buildings located at the south-east and south-west.

The closest affected sensitive receivers within the vicinity of the site are as follows:

- **R1:** Residential receivers located to the north-west of the proposed site, maintained on Cottonwood Crescent.
- **R2:** Residential dwellings maintained on Fontenoy Road, to the north-east of the project site.
- **R3:** Multi-Storey residential buildings maintained on Waterloo Road and Byfield Street, to the north-west of the project site.
- **M1:** 'WISE Specialist Emergency Clinic', a medical centre located adjacent to the north-western boundary of the project site, maintained on Khartoum Road.
- **C1:** 'Macquarie Park Data Centre Campus' maintained along Talavera Road, to the south-east of the project site.
- **C:** Various commercial buildings surrounding the project site.

See an aerial photo in Figure 1 below for a detailed location.

Figure 1 – Site Location with Nearest Sensitive Receivers (Sourced from Six Maps)

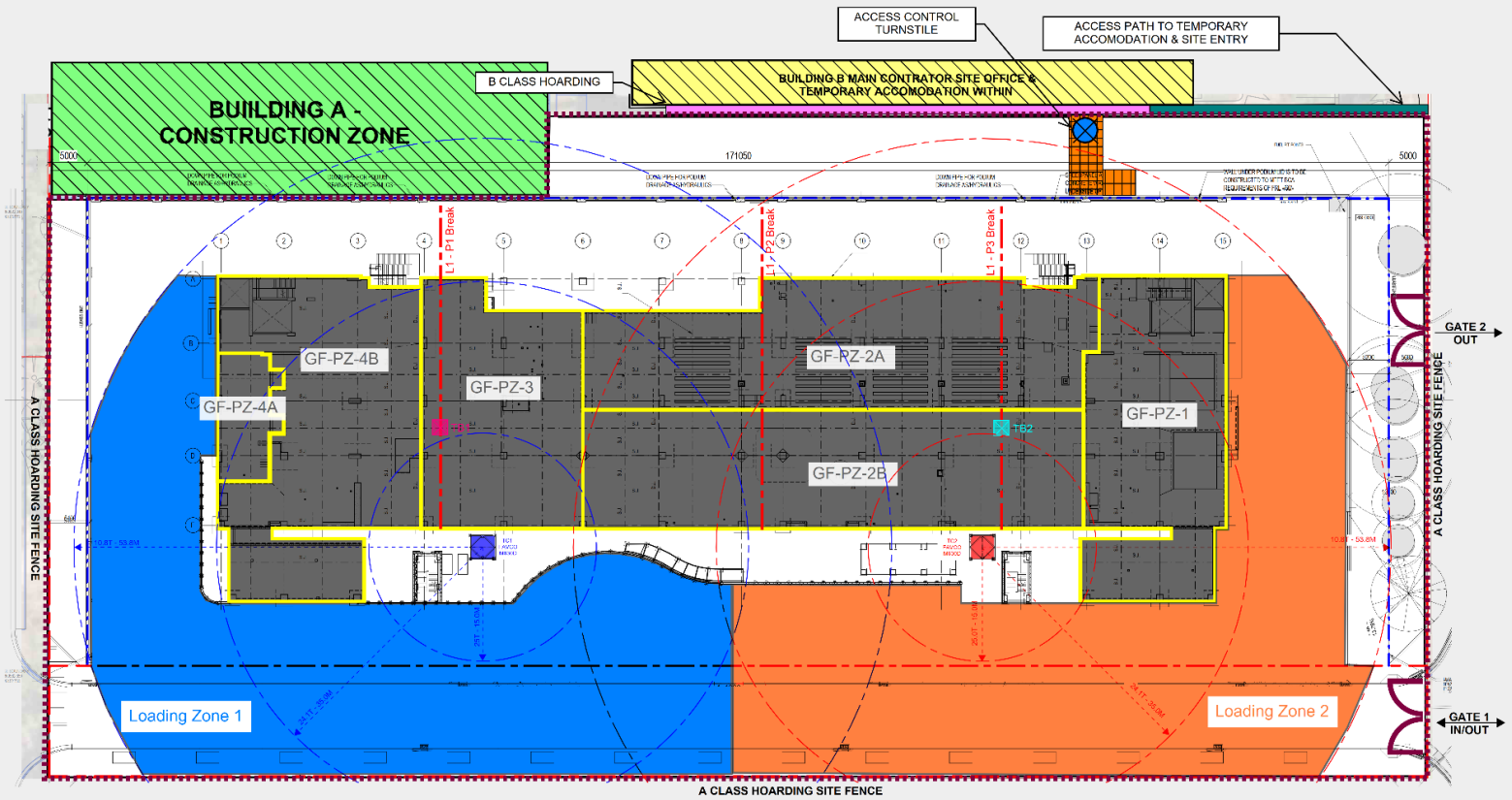
3 CONSTRUCTION ACTIVITIES

The information provided to this office of the primary noise producing activities associated with the site are as follows below:

- **Excavation and Piling Stage:**
    - Use of 2 Piling Rigs.
    - Trucks and articulated vehicles to move materials and components.
    - Use of Bobcats/excavators for material handling.
- **Construction Stage:**
    - Use of 2 Tower cranes for material handling and unloading, in conjunction with mobile cranes when required.
    - Trucks/concrete trucks and articulated vehicles to move materials and components.
    - Use of general hand tools (Angle Grinders, Jackhammers, Drills, etc.)

Vehicles will access the site and deliver goods via a laneway maintained within the site boundary and adjoining Talavera Road.

See Figure 2 below for an aerial view of the construction zone layout provided to this office.



HUTCHINSON BUILDERS
Established 1912

N

Project
MPark - Building B

Title
Construction Plan - GF Structure
Date - 29/06/21 Rev - 01

Figure 2 – Aerial Site Layout

4 HOURS OF WORK

SSDA conditions B1 and B2 outline the hours of work for construction activities, and these are presented in Figure 3 (Ref: SSD-10467).

The Applicant must comply with the hours detailed in Table 1.

Table 1 *Hours of Work*

Activity	Day	Time
Earthworks and construction	Monday – Friday Saturday	7:00 AM to 6:00 PM 8:00 AM to 1:00 PM
Operation (excluding back-up generator testing)	Monday – Sunday	24 hours
Back-up generator testing	Monday – Friday	7:00 AM to 6:00 PM

Works outside of the hours identified in Condition B1 may be undertaken in the following circumstances:
(a) works that are inaudible at the nearest sensitive receivers; or
(b) works agreed to in writing by the Planning Secretary; or
(c) for the delivery of materials or equipment required outside these hours by the NSW Police Force or other authorities for safety reasons; or
(d) where it is required in an emergency to avoid the loss of lives, property or to prevent environmental harm.

Figure 3: SSDA Conditions Construction Hours

5 UNATTENDED LONG TERM NOISE MONITORING

Long term unattended noise monitoring for the subject site has been conducted previously for the Athena Conformance Set – Acoustic Design Report, prepared by AECOM and dated 14/07/2021 (Ref: ATHENA-ACM-XX-XX-RP-A-9001). This data will be used to establish background noise levels for the sensitive receivers.

Table 1 – Rating Background Noise Levels (Ref: ATHENA-ACM-XX-XX-RP-A-9001)

Monitor Location	Receivers	Rating Background Noise Levels (dB(A) L_{90})
		Day (7am-6pm)
7 Booth Street, Marsfield	R1 and R3	45
37 Khartoum Road, Macquarie Park	R2	42

6 NOISE AND VIBRATION MANAGEMENT LEVELS

6.1 SSDA 10467 CONDITION B3 – CONSTRUCTION NOISE LIMITS

The SSDA condition B3 states the following with regards to Construction Noise Limits:

"The development must be constructed to achieve the construction noise management levels detained in the Interim Construction Noise Guideline (DECC, 2009) (as may be updated or replaced from time to time). All feasible and reasonable noise mitigation measures must be implemented and any activities that could exceed the construction noise management levels must be identified and managed in accordance with the management and mitigation measures in Appendix 2."

As such, the NSW EPA's Interim Construction Noise Guideline will be used to formulate noise management levels.

6.2 EPA INTERIM CONSTRUCTION NOISE GUIDELINE

Given the scale of the proposed works, the "quantitative" assessment procedure, as outlined in the Interim Construction Noise Guideline (ICNG) will be used.

The quantitative assessment method requires:

- Determination of noise generation management levels (based on ambient noise monitoring).
- Prediction of operational noise levels at nearby development.
- If necessary, recommendation of noise controls strategies in the event that compliance with noise emission management levels is not possible.

6.2.1 To Residential Receivers

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)$L_{eq(15min)}$.

- "*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)$L_{eq(15min)}$ at nearby residences.

6.2.2 To Commercial Receivers

"The external noise levels should be assessed at the most-affected occupied point of the premises:

- *Offices and retail outlets – External $L_{Aeq(15\ min)}$ = 70 dB(A)."*

6.2.3 Summary of Relevant Management Levels

A summary is presented below.

Table 2 – Noise Emission Management Levels

Receiver	"Noise Affected" Management Level - dB(A)$L_{eq(15min)}$	"Highly Noise Affected" Level - dB(A)$L_{eq(15min)}$
R1 and R3	BG + 10 = 55	75
R2	BG + 10 = 52	
Commercial	70	-

6.3 VIBRATION

Vibrations caused by any proposed activities on site, at the façade or incident on the structure of any surrounding sensitive receivers, will be assessed against the following provisions:

- For structural damage vibration, German Standard DIN 4150-3 *Structural Vibration: Effects of Vibration on Structures; and*
- For human exposure to vibration, the evaluation criteria presented in NSW Environmental Protection Authority (EPA) "*Assessing Vibration: A Technical Guideline*" guideline.

The criteria and the application of these guidelines are discussed in separate sections below.

6.3.1 Structure Borne Vibrations

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 3.

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 3 – 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

6.3.2 Assessing Amenity

The NSW Environment Protection Authority's (EPA) publication "Assessing Vibration: A Technical Guideline" (Feb 2006), outlines vibration criteria to assess the effects on human exposure to vibration from industry, transportation and machinery. This will ensure the amenity of tenants within surrounding residential properties is not adversely impacted.

This document classifies vibrations in buildings into continuous (with magnitudes varying or remaining constant with time), impulsive (such as shocks) or intermittent (with the magnitude of each event being either constant or varying with time). Criteria stipulated in this publication is based on the type of vibrations generated by the source.

Criteria relevant to the proposed excavation and construction activities on site are detailed below.

Table 4 – EPA Recommended Human Comfort 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

6.3.3 Recommended Vibration Limits

The table below presents the recommended vibration limit at the nearest vibration sensitive receivers.

Table 5 – Recommended Vibration Limit

Vibration Receiver	Recommended Vibration Limits
Residential Receivers	≤5mm/s PPV
Commercial Receivers	≤20mm/s PPV*

*Note: it is for building damage limit only

7 ACTIVITIES TO BE CONDUCTED AND THE ASSOCIATED NOISE SOURCES

Noise impacts will be determined from primary processes and equipment. The sound power levels of these activities are presented below.

Table 6 - Sound Power Levels of the Proposed Equipment

Stage	Equipment/Process	Sound Power Level dB(A)
Excavation/Piling	Piling Rig	118
	Semi-Trailer Truck Movement	105
	Truck Idle	99
	Bobcat	105
	Excavator with Bucket	105
Construction	Tower Crane	105
	Mobile Crane	105
	Semi-Trailer Truck Movement	105
	Truck Idle	99
	Angle Grinder	105
	Concrete Truck Movement	108
	Concrete Pump	108
	Drill/General Hand Tools	95
	Jackhammer	105

The noise levels presented in the above table are derived from the following sources, namely:

- Table A1 of Australian Standard 2436-2010.
- Data held by this office from other similar studies.

8 NOISE EMISSION ASSESSMENT

8.1 PREDICTED NOISE EMISSIONS

An assessment of the principal sources of noise emissions has been undertaken to identify the activities that may produce noise and/or vibration impacts so that appropriate ameliorative measures can be formulated. In addition, SoundPLAN noise modelling has been conducted based on information provided to this office of construction methodology and activities likely to be undertaken and presents the cumulative predicted external noise levels to the nearest surrounding receivers.

Noise levels from construction works have been predicted at the nearby development and assessed against EPA the "Noise Management Level", as identified in section 6.

With regard to the noise level generated at the nearest receivers, noise levels will vary depending where on the construction site the work in undertaken. To address this, a range of predicted noise levels is provided. Predicted noise levels are presented below.

The predicted noise levels are based on the assumption that the recommendations in section 9 have implemented/observed.

8.2 SOUNDPLAN MODELLING

Noise levels have been predicted at the receiver locations using SoundPlan™ 8.0 modelling software implementing the ISO 9613-2:1996 "Acoustics – Attenuation of Sound During Propagation Outdoors – Part 2: General Method of Calculation" noise propagation standard.

Noise enhancing meteorological effects have been adopted as recommended by the NPfI, noting that the ISO 9613 modelling approach assumes that all receivers are 'downwind' (i.e., that noise enhancing wind conditions are in effect at all times).

Ground absorption was conservatively calculated with a ground factor of 0 for all areas except for localised lawns and greenery with a ground factor of 0.6 as recommended in *Engineering Noise Control* (Bies & Hanson).

In line with Factsheet C of the NPfI, penalties for annoying noise characteristics should be applied at the receiver, where applicable. Based on the predicted noise levels, no penalty should be applied (either for tonality, intermittency, or otherwise).

Figure's 4 through 11 present the results of the SoundPlan Noise modelling, and they are summarised in Table 7 below.

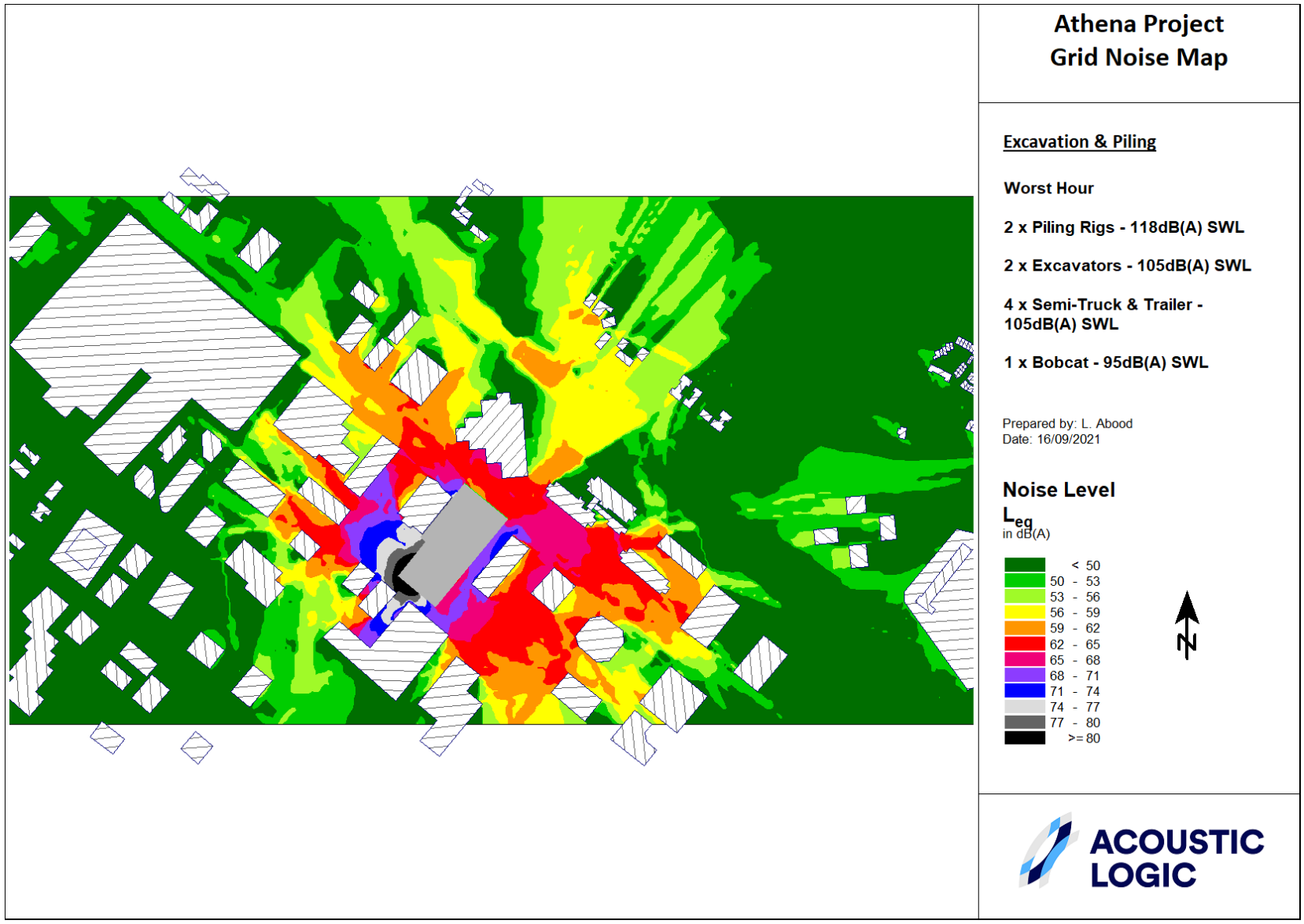


Figure 4 – Excavation and Piling Grid Noise Map

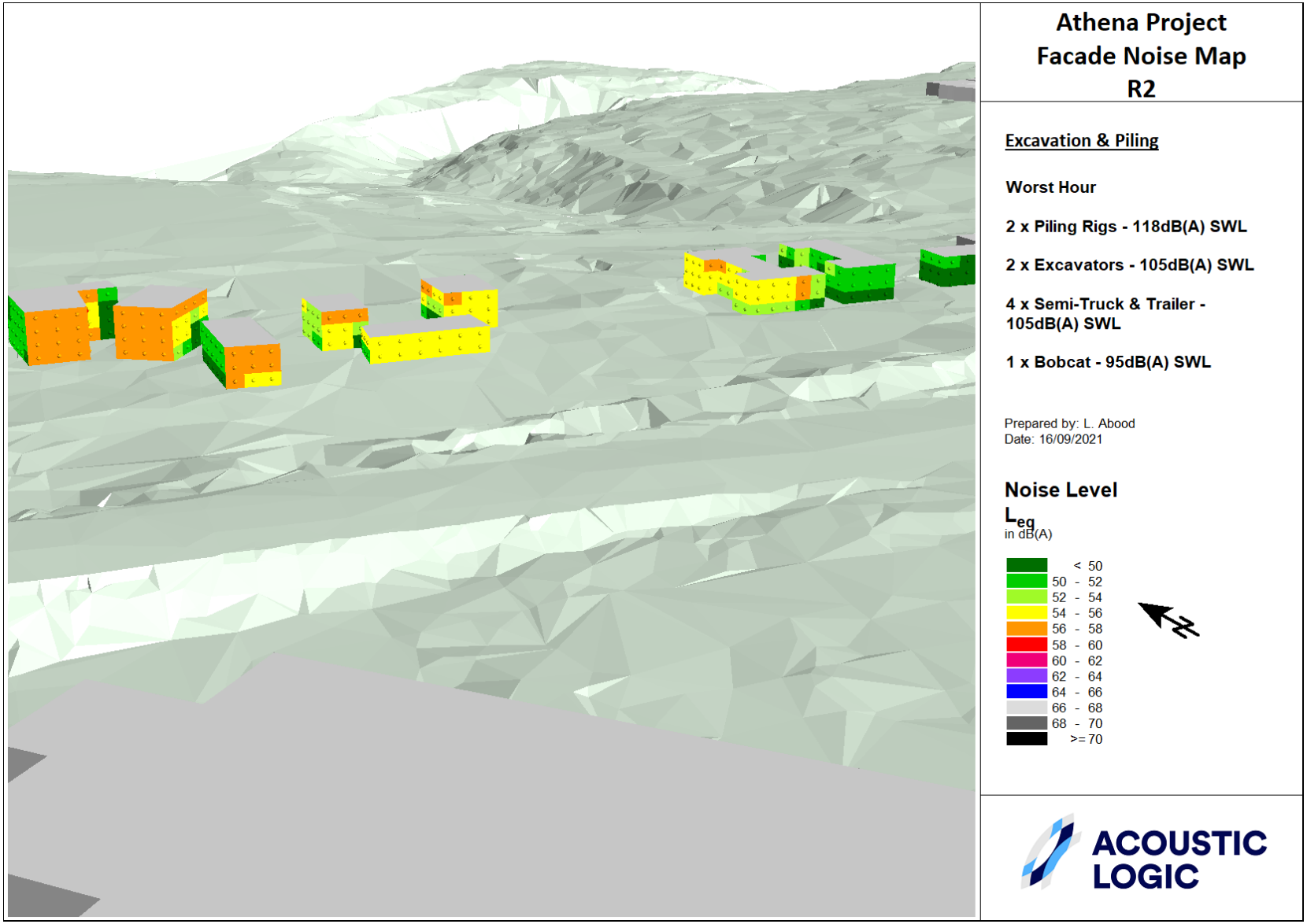


Figure 5 – Excavation and Piling Façade Noise Map (R2)

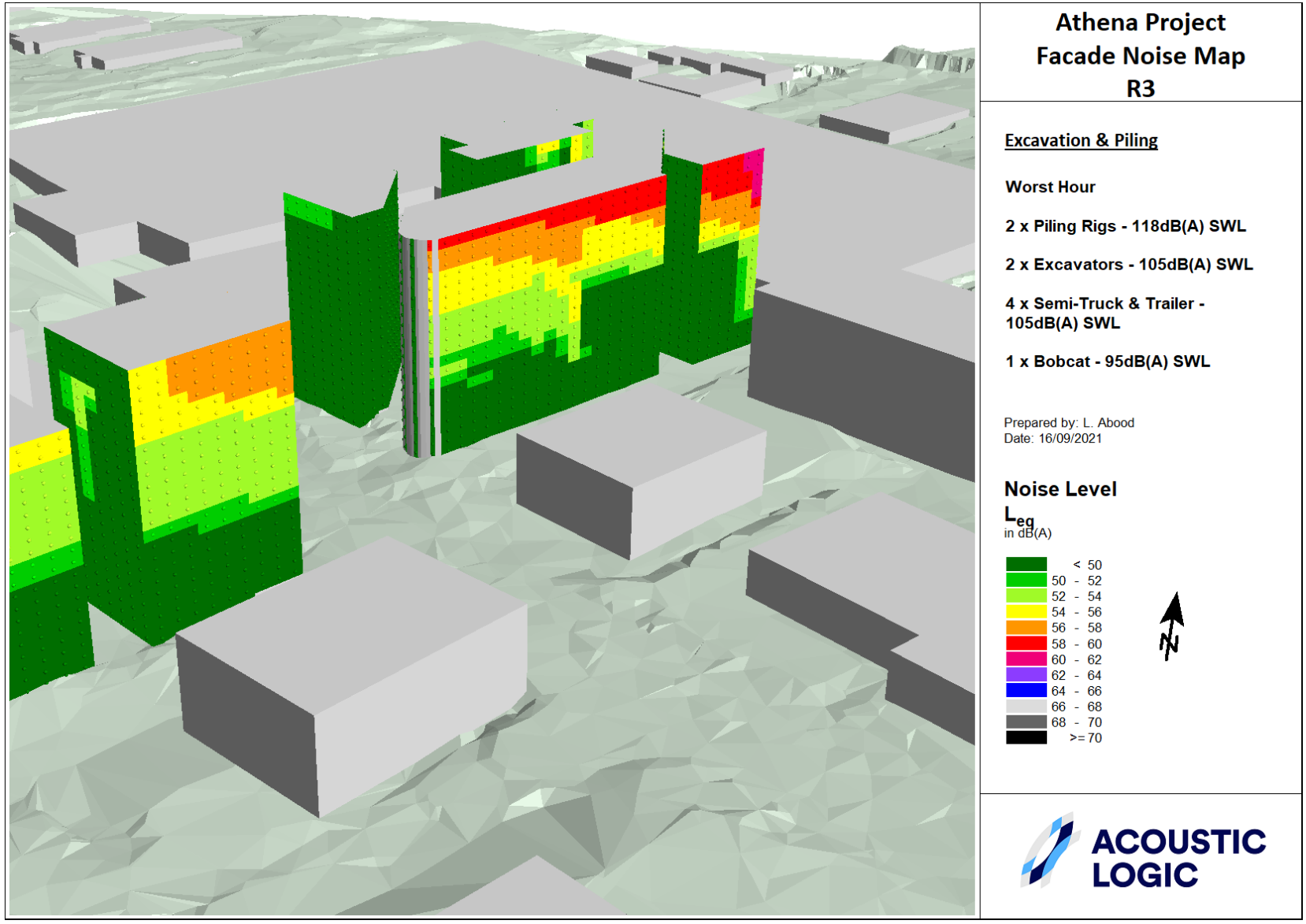


Figure 6 – Excavation and Piling Façade Noise Map (R3)

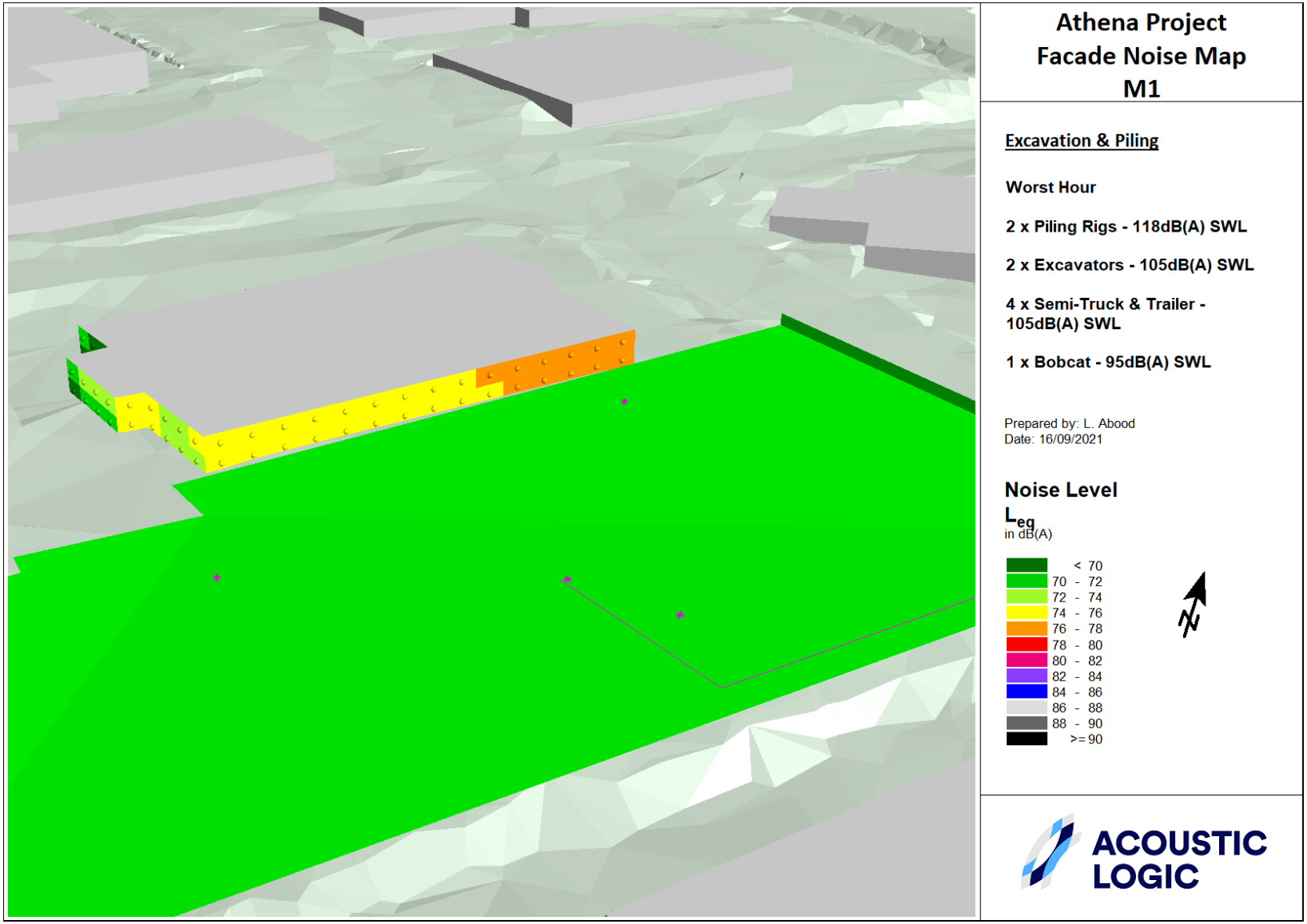


Figure 7 – Excavation and Piling Façade Noise Map (M1)

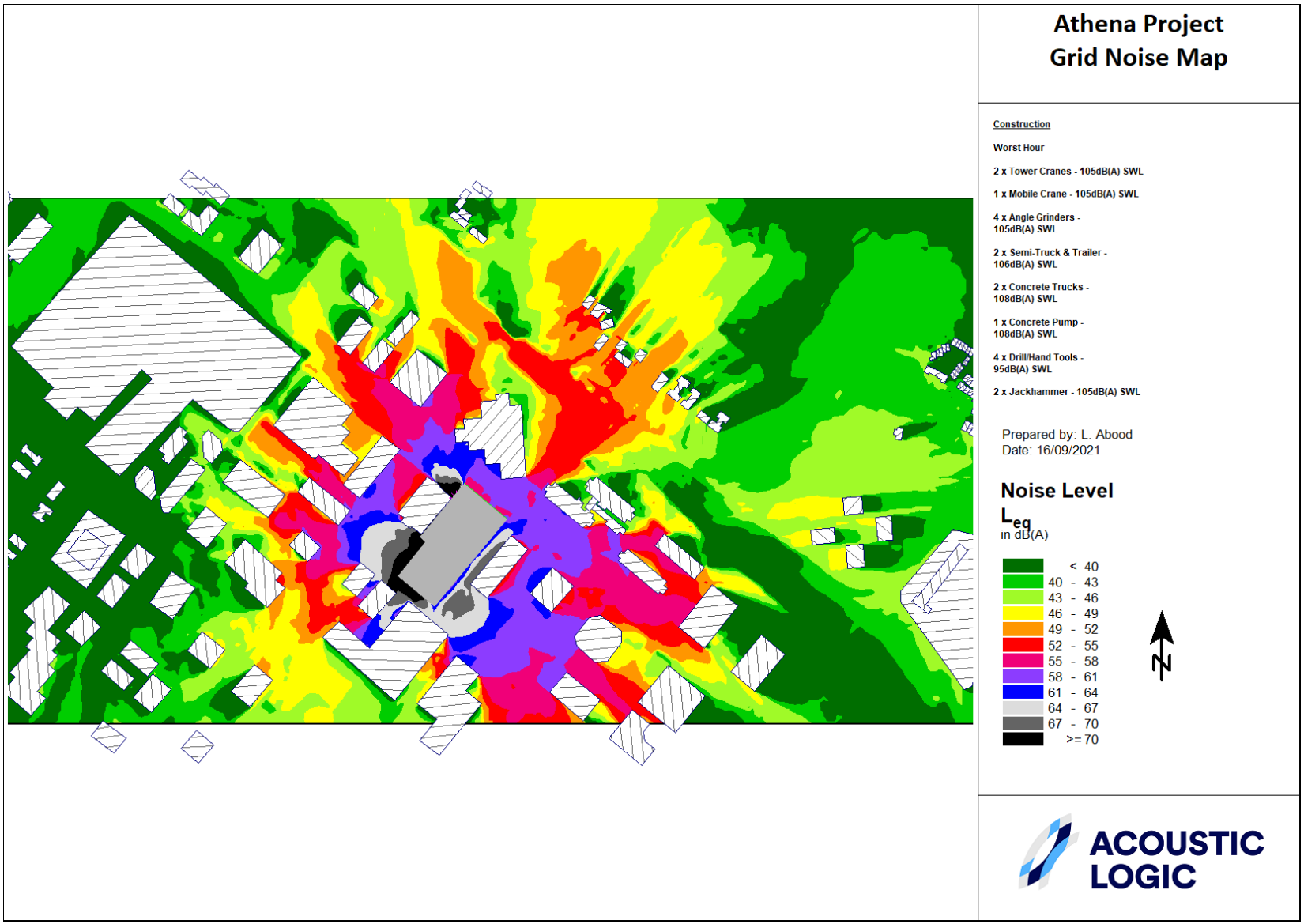


Figure 8 – Construction Stage Grid Noise Map

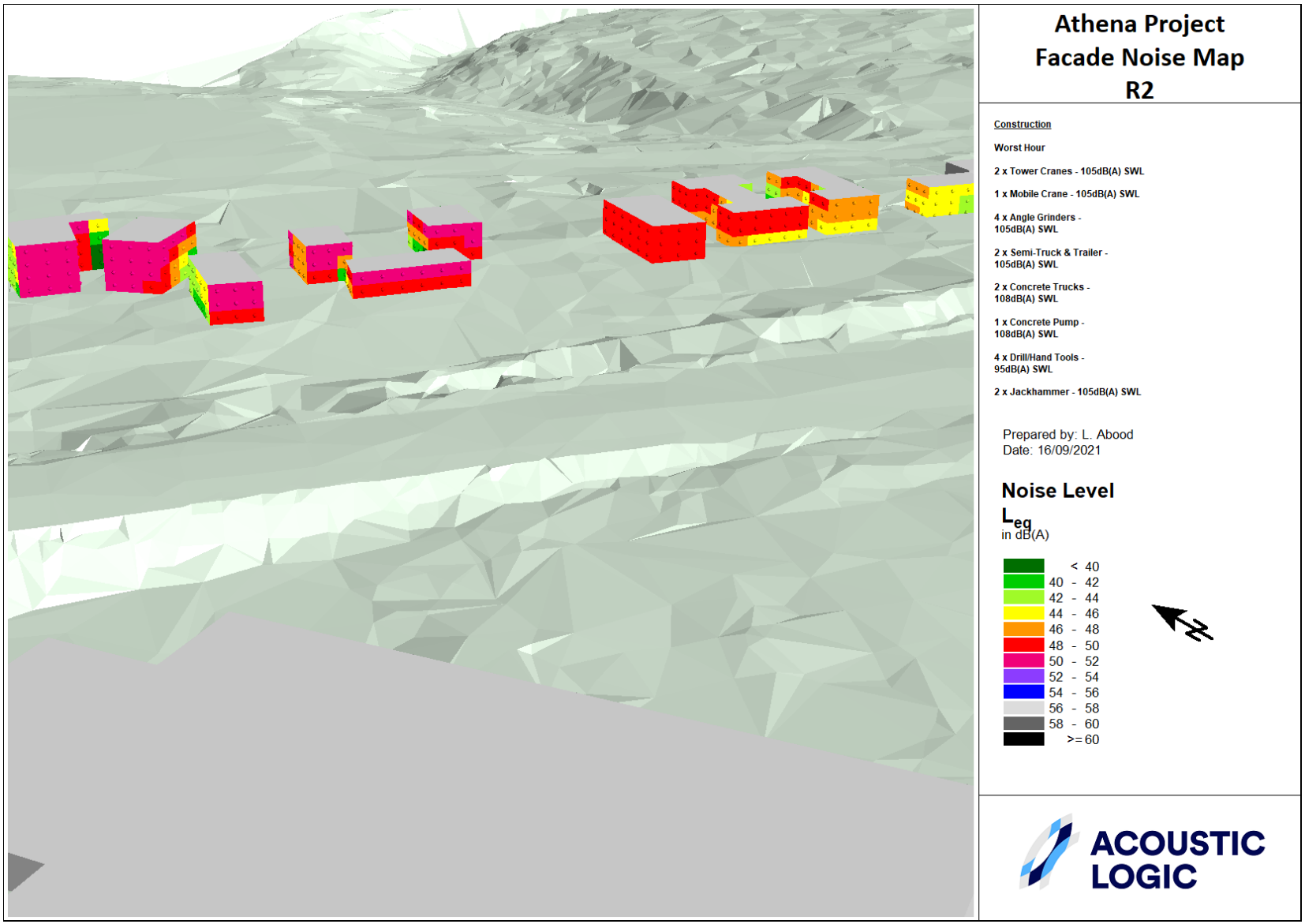


Figure 9 – Construction Stage Façade Noise Map (R2)

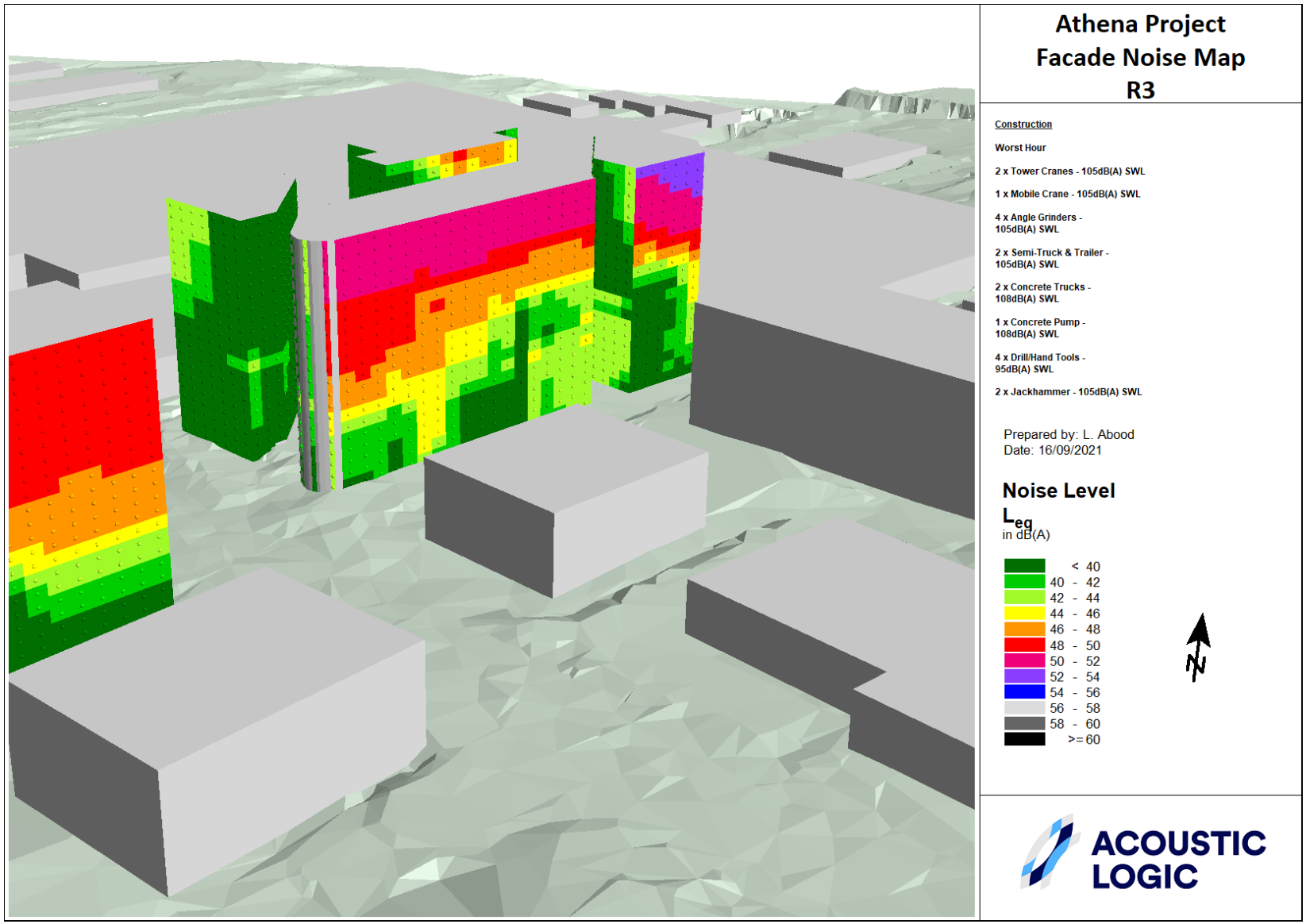


Figure 10 – Construction Stage Façade Noise Map (R3)

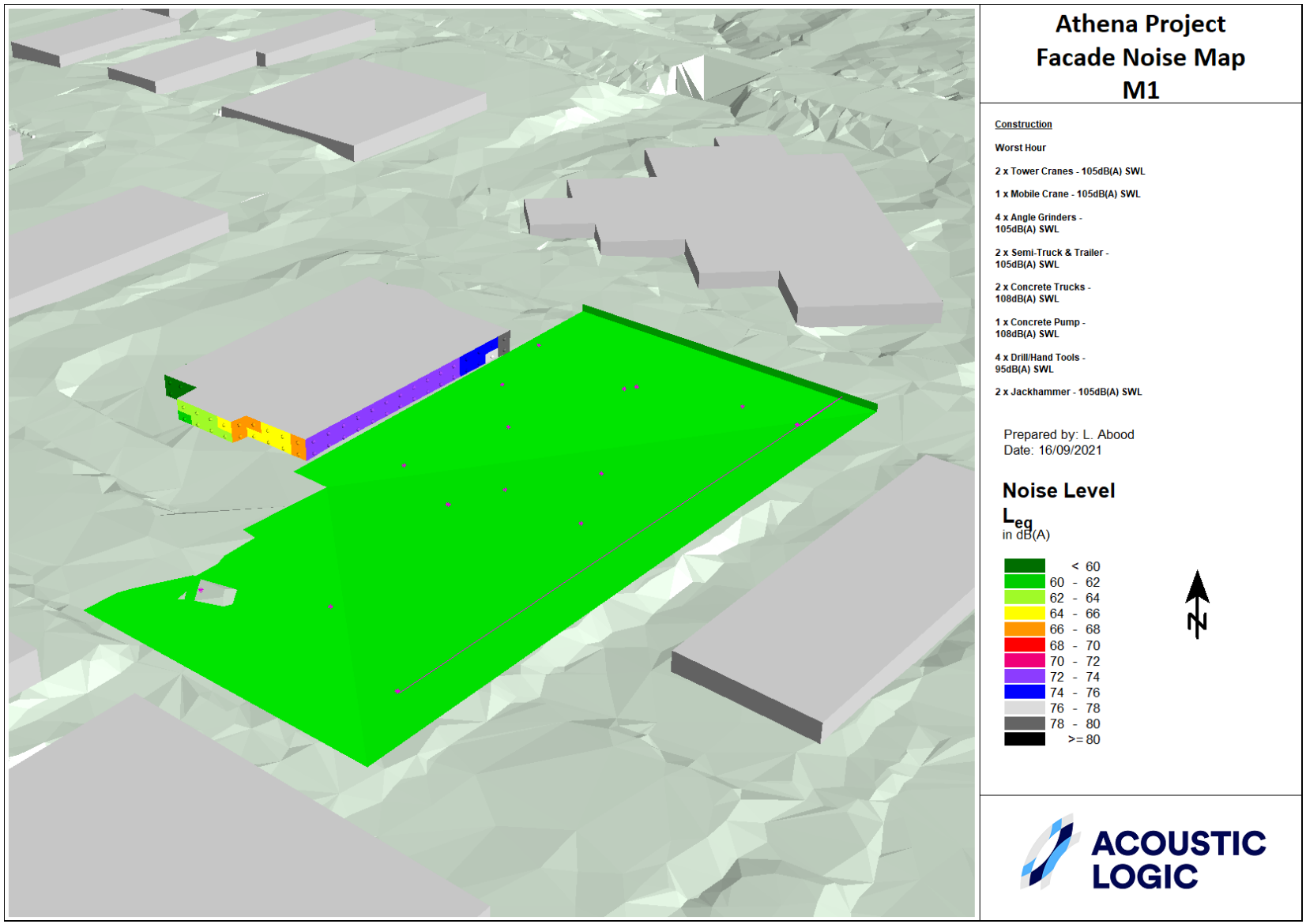


Figure 11 – Construction Stage Façade Noise Map (M1)

8.3 PREDICTED NOISE LEVELS AT SENSITIVE RECEIVERS

The predicted external noise levels at nearest sensitive receivers are presented in the table below.

Table 7 –Predicted External Noise Levels at Nearest Sensitive Receivers

Receiver	Excavation & Piling Stage Predicted External Noise Level dB(A) $L_{eq(15\ min)}$	Construction Stage Predicted External Noise Level dB(A) $L_{eq(15\ min)}$	Affected Noise Management Level	Highly Affected Noise Level	Recommendations
R1	< 50	< 40	55	75	Meets external noise management levels
R2	56-58	50-52	52		Construction stage meets external noise requirements, excavation meets highly affected noise level
R3	62-64	52-54	55		
M1	76-78	78-80	70	n.a.	See Section 9 for recommendations

9 AMELIORATIVE MEASURES

The following recommendations are made with reference to 'Management and Mitigation Measures' maintained in Appendix 2 of the SSDA Development Consent, with particular reference to the Noise and Vibration measures, ID numbers NV1 through NV19 (Ref: SSD-10467). These conditions are presented in Appendix 1 of this report.

9.1 SITE SPECIFIC RECOMMENDATIONS

- Notification - Prior to commencement of each month, neighbouring residential receivers should be notified of the anticipated works for that month and the potential noise and vibration generation from the anticipated construction activity.
- The barrier (imperforate site boundary) already installed along the north-eastern boundary of the project site is to remain as is during the course of all works.
- Excavation and Piling:
    - It is recommended to use CFA/Drill piling.
    - Wherever feasible, hydraulic hammering should be minimised in favour for the use of excavators with a bucket.
- High Noise Generating Works:
    - Where high noise generating works are proposed to be undertaken, respite hours should be implemented to reduce the impact on surrounding receivers. Limit the use of any required hydraulic hammers and grinding activities to between 10:00am – 1:00pm and 2:00pm - 5:00pm Monday to Friday and between 10:00am - 1:00pm on Saturdays. This equates to a maximum of three-hour blocks of high generating noise activity, separated by a minimum 1 hour respite period.
- Vehicle Noise - Trucks must turn off their engines during idling to reduce impacts on nearby receivers (unless truck ignition needs to remain on during concrete pumping). Minimise truck reversing. Plant and equipment should be off when not in use.
- Deliveries should use straps in place of chains for handling materials wherever possible. Deliveries should be scheduled during less sensitive time periods (After 9am) wherever practical.
- When selecting construction equipment to be used on the project, the noise levels of plant and equipment should be considered, whereby equipment selected has an equivalent or lower sound power level than the predictive sound power levels of equipment maintained within this report.
- A conscientious effort should be made to avoid works near the nearest sensitive receivers (M1) wherever feasible. Compounding various high generating activities simultaneously near receivers should be avoided where possible.
- All employees, contractors and sub-contractors are to undergo an environmental induction which outlines noise management techniques.
- Unnecessary shouting should be avoided on site, and appropriate signage should be installed to remind workers of their responsibility to reduce noise impacts where feasible. Loud music from radios and stereos is not permitted.
- Materials should be placed gently and not thrown to avoid making crashing noises.
- During the construction stage and where practical and safe to do so, handheld construction equipment should be used within the building shell to minimise noise impacts on adjacent receivers.
- Non-tonal reversing beepers should be implemented on all construction equipment and mobile plant used regularly on site.
- Maximum delivery vehicle speed of 10km/h through service road.

- In the event of a complaint, noise management procedure identified in section 10 of this report are to be followed. 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.

9.2 GENERAL RECOMMENDATIONS

Other noise management practices which may be adopted are discussed below. In addition, notification, reporting and complaints handling procedures should be adopted as recommended in section in this report.

9.2.1 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 affected. 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.

9.2.2 Silencing Devices

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

9.2.3 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).

9.2.4 Treatment of Specific Equipment

In certain cases, it may be possible to specially treat a piece of equipment to reduce the sound levels emitted. These may take the form of engine shrouding, or special industrial silencers fitted to exhausts.

9.2.5 Establishment of Site Practices

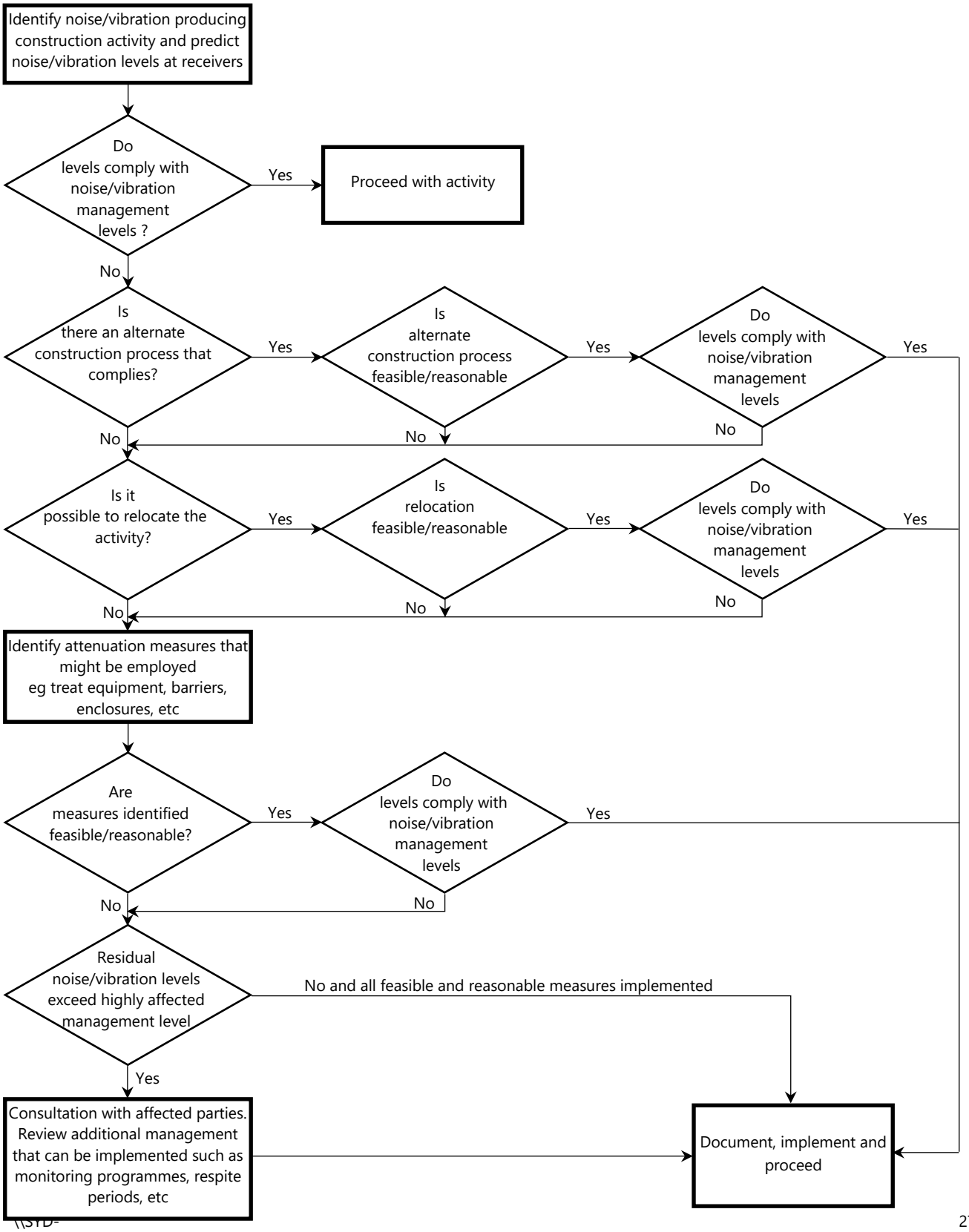
This involves the formulation of work practices to reduce noise generation. This includes locating fixed plant items as far as possible from residents as well as rotating plant and equipment to provide respite to receivers.

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 ASSESSMENT METHODOLOGY AND MITIGATION METHODS

The flow chart that follows illustrates the process to be followed to minimise the impact associated with these activities.

Noise sources with the potential to exceed the criteria set out in section 6 have been identified and discussed in section 8.



11 ASSESSMENT OF VIBRATION

11.1 VIBRATION PRODUCING ACTIVITIES

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

- Excavation Work.
- Piling.

11.2 SAFEGUARDS TO PROTECT SENSITIVE STRUCTURES

It is impossible to predict the vibrations induced by the excavation operations on site at potentially affected receivers. This is because vibration levels are principally proportional to the energy impact which is unknown, the nature of the terrain in the area (type of soil), drop weight, height etc.

11.3 VIBRATION MONITORING

AL recommends that at minimum, 2 vibration monitors are installed at two different site boundaries during the excavation and piling stage, one at the north-west boundary to monitor vibration impacts on the 'WISE Medical Centre', and another located at the south-east boundary to monitor vibrations to the 'Macquarie Park Data Centre Campus.' These receivers are particularly sensitive to vibration impacts, and therefore are to be constantly monitored. Any vibration monitor is to have SMS notification capability to enable contractor to be immediately informed when vibration limits are reached.

11.3.1 Downloading of Vibration Monitor Data

Downloading of the vibration monitor data will be conducted on a regular basis. In the event of exceedance of the vibration criteria, downloading of the vibration monitor data will be conducted more frequently. Results obtained from the vibration monitor will be presented in a graph format and will be forwarded to the client for review. It is proposed that reports are provided fortnightly with any exceedances in the vibration criteria reported as detailed in this report.

11.3.2 Presentation of Vibration Monitor Results

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

12 COMMUNITY INTERACTION AND COMPLAINTS HANDLING

12.1 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.
- Ensure that concerned individuals or groups are aware of and have access to the Site Complaints Register which will be used to address any construction noise related problems should they arise.

To ensure that this process is effective, regular scheduled meetings may be required for a finite period, until all issues have been addressed and the evidence of successful implementation is embraced by all parties.

An additional step in this process is to produce a newsletter informing nearby residents of upcoming activities that are likely to generate higher noise/vibration levels.

12.2 DEALING WITH COMPLAINTS

Should ongoing complaints of excessive noise, vibration or dust 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 and dust limits, all work potentially producing vibration or dust 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.
- If necessary, setup vibration monitoring at the location representing the nearest affected vibration receiver, with alarm device which can inform the project manager on site if the vibration exceedance happened.
- 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 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.
4. Selecting alternative equipment/processes where practical
5. If necessary, setup noise and vibration monitoring devices at locations representing the nearest noise/vibration and dust affected receivers and provide data for each complain time period. Analysis is required to determine suitable mitigation measures.

Complaints associated with noise and vibration generated by site activities shall be recorded on a Complaint Form. The person(s) responsible for complaint handling and contact details for receiving of complaints shall be established on site prior to construction works commencing. A sign shall be displayed at the site indicating the Site Manager to the general public and their contact telephone number.

14 CONCLUSION

This report presents a construction noise and vibration management plan for the associated construction activities proposed to be conducted for the 'Athena Project – Building B' to be located 33-39 Talavera Road, Macquarie Park.

Provided that the practices and recommendations in this report are implemented, the noise and vibration impacts during the excavation and construction stages will be minimised.

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

Yours faithfully,

Acoustic Logic Pty Ltd
Lachlan Abood

APPENDIX 1 – SSDA NOISE AND VIBRATION MANAGEMENT AND MITIGATION MEASURES (REF: SSD-10467)

Noise and vibration		
NV1	A Construction Noise and Vibration Management Plan (CNVMP) is to be prepared for each stage of the Proposal's construction. The CNVMP should include: • Identification of nearby residences and other sensitive land uses • Description of approved hours of work • Description and identification of all construction activities, including work areas, equipment and duration • Description of what work practices (generic and specific) would be applied to minimise noise and vibration • A complaint handling process • Noise and vibration monitoring procedures, and • Overview of community consultation required for identified high impact works.	Prior to and during construction
NV2	Periodic notification (monthly letterbox drop or equivalent), website, Proposal Infoline, Construction Response Line, email distribution list and community and stakeholder meetings	Prior to construction
NV3	All employees, contractors and subcontractors are to receive an environmental induction	Prior to and during construction
ID	**Mitigation measure**	**Timing**
NV4	No swearing or unnecessary shouting or loud stereos/radios on site. No dropping of materials from height, throwing of metal items and slamming of doors.	During construction
NV5	Attended vibration measurements are recommended at the commencement of vibration generating activities to determine site specific minimum working distances. Vibration intensive work should not proceed within the minimum working distances unless a permanent vibration monitoring system is installed approximately a metre from the building footprint, to warn operators (via flashing light, audible alarm, SMS etc.) when vibration levels are approaching the peak particle velocity objective	During construction
NV6	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. Consideration should be given to avoiding examination periods	During construction
NV7	High noise and vibration generating activities (e.g. rock breaking) may only be carried out in continuous blocks, not exceeding three hours each, with a minimum respite period of one hour between each block	During construction
NV8	Use quieter and less vibration emitting construction methods where feasible and reasonable. Equipment would be regularly inspected and maintained to ensure it is in good working order	During construction
NV9	The noise levels of plant and equipment must have operating sound power or sound pressure levels that would meet the predicted noise levels Noise emissions should be considered as part of the selection process	During construction

NV10	• Avoid simultaneous operation of noisy plant within discernible range of a sensitive receiver. • the offset distance between noisy plant and adjacent sensitive receivers is to be maximised. • Plant used intermittently to be throttled down or shut down. • Plant and vehicles to be turned off when not in use. • Noise-emitting plant to be directed away from sensitive receivers.	During construction
NV11	Plan traffic flow, parking and loading/unloading areas to minimise reversing movements within the site	During construction
NV12	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	During construction
NV13	• Loading and unloading of materials/deliveries is to occur as far as possible from sensitive receivers. • Select site access points and roads as far as possible away from sensitive receivers. • Dedicated loading/unloading areas to be shielded if close to sensitive receivers. • Delivery vehicles to be fitted with straps rather than chains for unloading, wherever possible.	During construction
NV14	• Schedule and route vehicle movements away from sensitive receivers and during less sensitive times.	During construction

ID	Mitigation measure	Timing
	• Limit the speed of vehicles and avoid the use of engine compression brakes. • Maximise on-site storage capacity to reduce the need for truck movements during sensitive times.	
NV151	Where possible reduce noise from mobile plant through additional fittings including: • Residential grade mufflers • Damped hammers such as "City" Model Rammer Hammers • Air parking brake engagement is silenced	During construction
NV16	The use of less vibration-intensive methods of construction or equipment is preferred where practical to reduce the potential for cosmetic damage. All equipment should be maintained and operated in an efficient manner, in accordance with manufacturer's specifications, to reduce the potential for adverse vibration impacts	During construction
NV17	Attended vibration measurements are undertaken when work commences, to determine site-specific minimum working distances. Vibration intensive work should not proceed within the minimum working distances unless a permanent vibration monitoring system is installed around one metre from the building footprint, to warn operators (e.g. via flashing light, audible alarm, SMS) when vibration levels are approaching the peak particle velocity objective	During construction
NV18	Stationary noise sources should be enclosed or shielded whilst ensuring that the occupational health and safety of workers is maintained.	During construction
NV19	Use structures to shield residential receivers from noise such as site shed placement; earth bunds; fencing; erection of operational stage noise barriers (where practicable) and consideration of site topography when situating plant.	During construction

APPENDIX 2A – GEORGE WEI CURRICULUM VITAE

CIRICULUM VITAE – GEORGE WEI (ASSOCIATE DIRECTOR)

Qualifications

Master Degree of Mechanical Engineering (UNSW)
Bachelor Degree of Mechanical Engineer
Diploma of HVAC Engineering
Member of Australian Acoustical Society

Outline of Experience

George Wei has been employed by Acoustic Logic Consultancy since January 2004 and has experienced projects in Middle East, Australia, New Zealand, Singapore and United Kingdom. George Wei has built variety experience in the areas of building acoustics, mechanical noise control, environmental noise, traffic noise control, train vibration isolation, hearing protection and real time noise/ vibration monitoring.

Whilst employed with Acoustic Logic Consultancy, George has been responsible for projects of residential, retail, education, cinema, concert, aged care, sports facility, music function, gymnasium, childcare, etc.

Special Areas- Noise and Vibration

George has gained more than 16 years' experience of acoustic consultancy.

Employment History:

Jan 2004 – March 2009	*Project Engineer Acoustic Logic Consultancy.*
March 2009-August 2017	*Senior Acoustic Engineer Acoustic Logic Consultancy.*
August 2017- Current	*Associate Director Acoustic Logic Consultancy.*

Areas of Expertise and Relevant Experience:

- *Building acoustics*
- *MEP noise control*
- *Environmental noise modelling and assessment*
- *Train noise and vibration control*
- *Traffic noise prediction*
- *Concert / Cinema noise isolation.*
- *Helicopter & aircraft noise*
- *Construction noise and vibration*
- *Vibration Isolation*
- *Transmission Loss Testing*
- *Structural Dynamics*

Project Experience

Residential / Commercial / Mixed Use

- *Loftus Lane*
- *275 George St, Sydney*
- *Balvidia North Sydney*
- *South Bank, Wooli Creek*
- *7D1-7D6, Breakfast Point*
- *710 George St, Sydney.*
- *V- Crown Parramatta*
- *Meriton Group Projects (Victoria Park, Mascot Central, Gordon, Pymble, Epping, Arncliffe, Brisbane, Gold Coast, Parramatta, Pagewood, Olympic Park, etc)*
- *Regents Place, Town Hall*
- *Discovery Point, Wooli Creek*
- *Hyde Park Gardens*
- *Balmain Shores*
- *Bennelong Apartments*
- *Ikon*
- *BP513 & 5F Breakfast Point*
- *Newbury and York Apartments, Breakfast Point*
- *Pinnacle Rhodes*
- *Waterside Rhodes*
- *Kiewa Project, Rhodes*
- *Top Ryde City*
- *Belvedere, North Sydney*
- *Pinnacle Rhodes*
- *Portside Building, Brisbane*

Hospital and Healthcare Projects

- *Randwick Hospital Redevelopment*
- *Liverpool Hospital*
- *Westmead Hospital*
- *Manning Hospital*
- *St George's Hospital*
- *Royal North Shore*
- *Muswell brook Hospital*

Hotel/Serviced Apartments

- *Holiday Inn*
- *Star City*
- *Medina – Kent Street/King Street Wharf*
- *Mercure Hotels - Railway Sq.*
- *Grande Mecure - Darling Harbour*
- *Quest Apartments - Mascot, Cronulla, Rosehill*

GEORGE WEI
Associate Director

Commercial Projects

- *Wynyard Place*
- *275 George St*
- *46-51 Waterloo Rd, Macquarie Park*
- *60 Martin Place*
- *Penrith Panthers Club*
- *APRA 1 Martin Place*
- *UWS Projects (Bankstown, Penrith, etc)*
- *Manly Wharf*
- *Ibis Hotel*
- *Menzies Hotel*
- *Hydro Majestic Hotel*
- *T2 Piers, Sydney Airport*
- *Justice Precinct*
- *Liverpool Hospital*
- *Auburn Hospital*
- *Westmead Hospital*
- *Norwest precinct*
- *World Square, Sydney*
- *Stockland Merrylands*
- *Sydney Water, Parramatta*
- *Sydney Water, Potts Hill*
- *Atlas, Norwest*

Aged Care Projects

- *ARV Forestville*
- *Woolooware Shores ARV*
- *ARV Glenhaven*
- *ARV Lober Square, Castle Hill*
- *Malabar Aged Care Centre*
- *BUPA Princess Highway Sutherland*
- *St Josephs Coffs Harbour*
- *Pittwater ACF at 14-16 John St, Avalon*
- *Aged Care Centre at 75-77 Alexandria Parade, Wahroonga*
- *Mt Wilga Aged Care*
- *Acacia St Kirrawee Village*

Child Care Projects

- *CCC at 203 Darley Road, Randwick*
- *Kids Korner Greenway Supacenta*
- *5 South Ave, Double Nay Childcare Nursery*
- *1-5 Mullane Ave, Baulkham Hills.*
- *88 Newcastle St, Rose Bay.*
- *Childcare centre at 77 King St, Sydney.*
- *20 Gadigal Ave, Zetland, Childcare Centre.*

- *28 Ramsay Rd, Pennant Hills.*
- *262 Hawthorne St, Haberfield*
- *12-14 Pine St, Five Dock.*
- *614 Polding St, Bossley Park.*
- *7 Donnelly Rd, Narrembern*
- *6-8 Waterloo St, Balmain.*
- *Montessori Academy*

Heritage Buildings

- *110 Homebuh Rd, Strathfield. Childcare Centre for Montessori Academy.*
- *14 Garthowen Cre, Castle Hill. Childcare Centre for Revelop Projects.*
- *Cityview Baptist Church, Penrith*
- *St Basils Randwick.*
- *AIN Enabling Projects at Sydney Uni*

Higher Education Projects

- *AIN Enabling Projects at Sydney Uni*
- *Abercrombie Demolition, Sydney Uni.*
- *Function Centre, UTS.*
- *UWS College Teaching Facility, Kingswood campus.*
- *UWS Nirimba*
- *New Teaching Facility at UWS College Bankstown campus*

Gym/ Fitness Projects

- *George Wei has experienced more than 50 Gym projects in recent a few years.*
- *Fitness First Australia: Manly; Bondi Junction, Maroubra, Sydney, etc.*
- *Snap Fitness: Double Bay, Maroubra, Waterloo, Pyrmont, etc.*

University Projects

- *Regiment Redevelopment- Sydney University*
- *Lees Project – Sydney University*
- *Union Court redevelopment - ANU*
- *University of Sydney - Fo7 LEES 1 Building*
- *University of New South Wales – Gate 2 Student Accommodation*
- *University of Sydney - Creative Arts Rozelle – Mechanical Services*
- *Dover Heights High School – New Buildings*
- *Trinity Grammar – Internal acoustics and plant noise for auditorium*
- *Fort Street High School – New Music and Drama workshops and Admin building*
- *UTS Graduate School of Health*
- *University of Sydney – Conservatorium of Music (Refurb)*
- *UWS College Teaching Facility – Kingswood Campus*

School Projects

- *Inner Sydney High School*
- *Knox Grammar*
- *Kent Road Public School*
- *Arthur Phillip High School*
- *Kellyville South Public School*
- *Marsden Park Public School*
- *Central Coast Schools*
- *St Ives North Public School*

APPENDIX 2B – LACHLAN ABOOD CURRICULUM VITAE

Qualifications

Bachelor of Engineering (Hons) Major in Aerospace (2021).

2021 - current: Project Engineer, Acoustic Logic.

Outline of Experience

Whilst at Acoustic Logic, Lachlan has been trained in measurement and analysis of noise and vibration. Lachlan has worked in detailed assessment of acoustic impacts and has been involved in the design of noise/vibration attenuation systems to meet relevant statutory codes (BCA/NCC, EPA guidelines and Australian Standards).

His work involves the investigation, design and construction supervision of noise control measures associated with mechanical services and building works.

Whilst being employed with Acoustic Logic, Lachlan has been responsible for noise and vibration engineering for residential, hospital, commercial and special projects including:

- Building acoustics and building services noise control.
- Environmental noise modelling and assessment.
- Traffic, train and aircraft noise prediction.
- Industrial Noise Control.
- Construction Noise and Vibration.
- Gymnasium Noise and Vibration.
- NSW Office of Liquor and Gaming acoustic assessment.
- Testing and assessment of walls/floors/glazing/building services.

Project Experience

A sample of projects Lachlan has been or is currently involved with as an Engineer include the following:

Aged Care Projects

- St. Ives House – Residential Aged Care Facility.

Residential Projects

- Ivanhoe Estate, Macquarie Park.
- The Langston, 12-22 Langston Place, Epping.
- Granville Place, 38 Cowper Street, Granville.
- 1-27 Walter Street and 452-460 Willoughby Road, Willoughby.
- Lotus 16IJ, Pelican Road, Schofields.
- 6 Gillespie Street/311 Hume Highway, Liverpool.
- 20-22 Hume Highway, Warwick Farm.
- Wavelength, 49-57 Gerrale Street, Cronulla

Commercial Projects

- Woolworths, Kiama – 143 Terralong Street, Kiama.
- Meriton Suites Zetland – Epsom Road, Zetland
- Woolworths, Leppington – Ingleburn Road, Leppington.
- Retail Tenancies – The Langston, 12-22 Langston Place, Epping.
- Athena Project, 33-39 Talavera Road, Macquarie Park.
- 29 Rowe Street, Eastwood.
- Meriton Suites Liverpool – 167 Northumberland Street, Liverpool.
- IGA Supermarket – 2 Figtree Drive, Sydney Olympic Park.
- Meriton Suites Lidcombe – Carter Street, Lidcombe

Hospital Buildings

- Concord Hospital Redevelopment.

Green Star Acoustic Testing

- Concord Hospital Redevelopment.

Gym Noise and Vibration

- F45 Gym, 1 Ramsay Street, Five Dock.
- Locofit Gym – Stocklands Merrylands.