



State Significant Development Application for a proposed
Warehouse and Logistics Development
20 Kelso Crescent
Moorebank

Noise and Vibration Impact Assessment



Client:

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1. Executive Summary

This report is in response to a request by Mapletree SP Australia Management Pty Ltd for an environmental noise assessment for the modified State Significant Development Application for a proposed warehouse and logistics development located at 20 Kelso Street, Moorebank. The purpose of the assessment is to determine if the proposed development layout is acoustically viable and what acoustic measures, if any, are necessary.

The environmental noise assessment was conducted in accordance with Liverpool City Council requirements and the NSW Department of Planning and Environment's Secretary's Environmental Assessment Requirements (SEARs) which requires the following matters to be addressed:

Noise and Vibration – including:

- *Provide a noise and vibration assessment prepared in accordance with the relevant EPA guidelines. The assessment must detail construction and operational noise and vibration impacts on impacts on nearby sensitive receivers and structures and outline the proposed management and mitigation measures that would be implemented.*

Table 1 provides a summary of the SEARs requirements and the locations within this report that they are addressed:

Table 1: SEARS requirements

Condition	Section References
Provide a noise and vibration assessment prepared in accordance with the relevant EPA guidelines.	Section 7 details the relevant state and local noise and vibration requirements.
The assessment must detail construction and operational noise and vibration impacts on impacts on nearby sensitive receivers and structures and outline the proposed management and mitigation measures that would be implemented.	Sections 8-10 details the operational and traffic noise generation, including a sleep disturbance assessment. Construction work noise is assessed in a separate report (ref: 1023065 R02B 20 Kelso Crescent Moorebank.docx dated 8/12/2023). Section 11 provides recommendations for the proposal.

The acoustic assessment considers the cumulative impact of all stages of the proposed development to sensitive receivers in the vicinity of site and concludes that the proposed masterplan for warehouses and logistic hub is satisfactory with the provided recommendations. The review indicates that the revised proposal is considered viable with recommendations provided in Section 11 for the 24-hour operation of the site. A 2.5m high acoustic barrier was recommended to be constructed to the height and extent shown in Figure 11 in order to achieve compliance with the criteria at receiver 2 location.

2. Introduction

This report is in response to a request by Mapletree SP Australia Management Pty Ltd for an environmental noise assessment for a State Significant Development Application for a proposed warehouse and logistics development to be located at 20 Kelso Crescent, Moorebank. The environmental noise assessment was conducted in accordance with Liverpool City Council requirements and the NSW Department of Planning, Industry and Environment's *Secretary's Environmental Assessment Requirements* (SEARs). To facilitate the assessment, unattended noise monitoring was conducted in the vicinity of nearby sensitive receivers to establish the criteria for onsite activities.

3. Site Description

3.1 Site Location

The site is described by the following:

20 Kelso Crescent, Moorebank
Lot 1 DP1296586

Refer to Figure 1 for site location.

Figure 1: Site Location (Not to Scale)



A comprehensive site survey was conducted on the 12th July 2023 which identified the following:

- A single storey commercial building and a decommissioned concrete factory currently occupy the site and will be demolished to make room for the proposed development.
- The site is located in a E4 – General Industrial zone, as defined in the Liverpool Local Environmental Plan 2008.
- Kelso Crescent bounds the site to the north separating the development from other general industrial and commercial land uses.

3.2 Proposal

The proposal is to construct a two storey ramp up logistics development including 2 warehouses with 8 tenancies as follows:

- Site Area of 35,190m².
- Site access via Kelso Crescent and Seton Road.
- Lower Ground Level: 56 Car parking spaces, truck and car exit onto Seton Road.
- Ground floor: 104 car parking spots, 4 tenancies with internal mezzanine offices, MSB room, COMM room, fire water tank.
- First floor: 4 tenancies with internal mezzanine offices.

Refer to the Appendices for development plans.

3.3 Acoustic Environment

The surrounding area is primarily affected by road traffic from Newbridge Road and potentially noise from existing nearby commercial/industrial activities. Mechanical plant and insect/frog noise was not audible at the noise monitoring locations.

4. Equipment

The following equipment was used to record noise levels:

- Two Rion NL42 Environmental Noise Monitors (SN#00322760 and 509258)
- Pulsar Model 105 Ltd Sound Calibrator (SN # 57417)

The Environmental Noise Monitors hold current NATA Laboratory Certification and were field calibrated before and after the monitoring period, with no significant drift from the reference signal recorded.

5. Receivers and Noise Monitoring Locations

5.1 Receiver Locations

The nearest sensitive receiver locations were identified as follows;

1. Residential dwellings are located northeast of the site on the western side of Whelan Avenue.
2. Residential dwellings are located east of the site on the eastern side of Jack O'Sullivan Road.
3. Residential dwellings are located west of the site on the western side of Heathcote Road.
4. Industrial premises are located adjacent the western site boundary at 2-8 Field Close.
5. An industrial premises is located adjacent the southern site boundary at 19 Seton Road.
6. Industrial premises are located adjacent the eastern site boundary at 18 Kelso Crescent and 9-11 Seton Road.
7. Industrial premises are located to the north at 3 Kelso Crescent.

These locations were chosen as being representative of the nearest sensitive receivers to the proposed development.

Refer to Figure 2 for these locations.

Figure 2: Receiver and noise monitoring locations



5.2 Unattended Noise Monitoring (Monitor A)

A Rion NL42 environmental noise monitor was placed at 37 Jack O'Sullivan Road to measure ambient noise levels. This location was selected as it was considered representative of Receivers 1 and 2 to the west of the site. The acoustic environment of Receiver 1 and 2 consisted primarily of road traffic noise from Newbridge Road. Noise monitor A was located approximately 500m away from Newbridge Road and Receiver 1 residents are between 50m to 220m away from Newbridge Road. Based on setback of the noise monitor from Newbridge Road, Noise Monitor A is considered as conservative representation of Receiver 1. The monitor was located in a free field position with the microphone approximately 1.4 metres above ground surface level. The noise monitor was set to record noise levels between the 19th and 28th June 2023.

The environmental noise monitor was set to record noise levels in "A" Weighting, Fast response using 15-minute statistical intervals. Ambient noise monitoring was conducted generally in accordance with Australian Standard AS1055:2018 *Acoustics – Description and measurement of environmental noise*.

Mechanical plant was inaudible at the noise monitoring location. Insects/frog noise were not detected in the measured results.

Refer to Figure 2 for the noise monitoring location.

5.3 Unattended Noise Monitoring (Monitor B)

A Rion NL42 environmental noise monitor was placed at 1A Swain Street to measure ambient noise levels. This location was selected as it was considered representative of Receiver 3 to the east of the site. The monitor was located in a free field position with the microphone approximately 1.4 metres above ground surface level. The noise monitor was set to record noise levels between the 19th and 28th June 2023.

The environmental noise monitor was set to record noise levels in "A" Weighting, Fast response using 15-minute statistical intervals. Ambient noise monitoring was conducted generally in accordance with Australian Standard AS1055:2018 *Acoustics – Description and measurement of environmental noise*.

Mechanical plant was inaudible at the noise monitoring location. Insects/frog noise were not detected in the measured results.

Refer to Figure 2 for the noise monitoring location.

6. Existing background noise levels

The following tables present the measured existing ambient noise levels from the unattended noise survey. Any periods of inclement weather or extraneous noise are omitted from the measured data prior to determining the overall results.

6.1 Meteorological conditions

Meteorological observations during the unattended noise monitoring survey were obtained from the Bureau of Meteorology website (<http://www.bom.gov.au/climate/data/>), shown in Table 2 below.

Table 2: Meteorological conditions – Holsworthy Aerodrome

Day	Date	Rainfall (mm)	Wind			
			9am		3pm	
			Speed (km/h)	Direction	Speed (km/h)	Direction
Monday	19/06/2023	0	7	W	15	NNW
Tuesday	20/06/2023	0	15	WSW	15	SW
Wednesday	21/06/2023	0	11	W	6	NE
Thursday	22/06/2023	0	6	WNW	Calm	Calm
Friday	23/06/2023	5.6	7	N	17	WNW
Saturday	24/06/2023	0	6	WNW	12	NW
Sunday	26/06/2023	0	7	W	24	WNW
Monday	27/06/2023	0	26	W	35	W

6.2 Ambient background noise level

The measured rating background noise levels (RBL) were determined in accordance with the NSW Noise Policy for Industry with levels for the different monitoring locations presented in Table 2.

Table 3: Measured L90 noise levels

Day	Date	Monitor 1			Monitor 2		
		Background L90 dB(A)			Background L90 dB(A)		
		Day	Evening	Night	Day	Evening	Night
Monday	19/06/2023	-	48.3	45.2	-	43.9	43.1
Tuesday	20/06/2023	48.8	51.1	46.9	51.1	45.0	44.3
Wednesday	21/06/2023	43.0	47.1	42.7	51.2	44.0	41.5
Thursday	22/06/2023	42.7	45.5	41.4	50.9	43.7	43.0
Friday	23/06/2023	49.0*	48.5*	44.7*	49.8	46.9*	45.9*
Saturday	24/06/2023	46.9	47.1	42.5	45.7	43.9	42.1
Sunday	25/06/2023	46.3	48.2	39.8	45.3	41.5	37.4
Monday	26/06/2023	52.0	49.9	44.9	49.6	43.4	41.5
Tuesday	27/06/2023	50.2	47.2	43.3	49.4	43.9	41.3
RBL		48	48	43	50	44	42

Rainfall recorded on the 23rd June 2023 was found have affected the measured results and were omitted from the measured data.

7. Noise Criteria

The relevant noise criteria have been determined in consultation with Liverpool City Council requirements, Secretary's Environmental Assessment Requirements and the NSW Noise Policy for Industry 2017.

7.1 Liverpool City Council

The site is located within Liverpool City Council local government area with the land classified as general industrial land zone. Liverpool City Council's Development Control Plan 2008 states the following in relation to noise;

"9. Amenity and Environmental Impact

Industrial and related developments have potential to cause a significant environmental impact in terms to odour, noise and discharges. Some of these impacts are addressed by the Protection of the Environment Operations Act 2008. However the design and operation of development in industrial areas can contribute to avoiding these issues. The impacts may be on more sensitive land uses in nearby residential areas or on other uses within the industrial areas. As the range of uses permitted in the industrial areas is quite significant it is necessary to consider these impacts on land uses within the industrial zone.

Noise

In order to comply with the Protection of the Environment Operations Act 2008 it may be necessary to construct external works. Mounding, planting and/or noise barriers may be permitted to reduce the impact of noise levels, provided that this does not compromise any other provision in the DCP.

Further reference was made to the Protection of the Environment Operations (POEO) Act 2008.

7.2 Protection of the Environment Operations Act

The proposal shall not emit "offensive noise" as defined in the *Protection of the Environmental Operations Act 1997* as follows;

Offensive noise means noise:

(a) that, by reason of its level, nature, character or quality, or the time at which it is made, or any other circumstances:

(i) is harmful to (or is likely to be harmful to) a person who is outside the premises from which it is emitted, or

(ii) interferes unreasonably with (or is likely to interfere unreasonably with) the comfort or repose of a person who is outside the premises from which it is emitted, or

(b) that is of a level, nature, character or quality prescribed by the regulations or that is made at a time prescribed by the regulations.

The definition of "offensive noise" does not specifically state the parameters required for the assessment of noise. Therefore, further reference was made to the *NSW EPA Noise Guide for Local Government*.

7.3 Secretary's Environmental Assessment Requirements (SEARs)

The Secretary's Environmental Assessment Requirements (SEARs) outline the requirements for the construction and operational use of the proposed development. The NSW Department of Planning and Environment's Secretary's Environmental Assessment Requirements (SEARs) requires the following matters to be addressed;

"Provide a noise and vibration assessment prepared in accordance with the relevant EPA guidelines. The assessment must detail construction and operational noise and vibration impacts on impacts on nearby sensitive receivers and structures and outline the proposed management and mitigation measures that would be implemented."

As a specific criterion is not specified, further reference was made to *Assessing Vibration: A Technical Guide 2006*, the *NSW Noise Policy for Industry*, *NSW Road Noise Policy* and the *NSW Interim Construction Guideline*.

7.4 Assessing Vibration: A Technical Guideline 2006

7.4.1 Types of vibration

There are three types of vibration as classified in the guide;

- Continuous - vibration continues uninterrupted for a defined period (usually throughout daytime and/or night-time). This type of vibration is assessed on the basis of weighted RMS (root mean squared) acceleration values.
- Impulsive - rapid build up to a peak followed by a damped decay that may or may not involve several cycles. The duration is short, typically less than 2 seconds. Impulsive vibration (no more than three occurrences in an assessment period) is assessed on the basis of acceleration values.
- Intermittent - interrupted periods of continuous (e.g. a drill) or repeated periods of impulsive vibration (e.g. a pile driver), or continuous vibration that varies significantly in magnitude. Assessed on the basis of vibration dose values.

7.4.2 Acceptable values for continuous and impulsive vibration (1-80Hz)

The relevant criteria for continuous and impulsive vibration are as follows;

Table 4: Preferred weighted RMS vibration acceleration values

Type	Location	Assessment period	Preferred values m/s ²		Maximum values m/s ²	
			z-axis	x- and y-axes	z-axis	x- and y-axes
Continuous vibration	Critical areas	Day or night time	0.005	0.0036	0.01	0.0072
	Residences	Day time	0.01	0.0071	0.02	0.014
		Night time	0.007	0.005	0.014	0.01
	Offices, schools, educational institutions and places of worship	Day or night time	0.02	0.014	0.04	0.028
	Workshops	Day or night time	0.04	0.029	0.08	0.058
Impulsive vibration	Critical areas	Day or night time	0.005	0.0036	0.01	0.0072
	Residences	Day time	0.3	0.21	0.6	0.42
		Night time	0.1	0.071	0.2	0.14
	Offices, schools, educational institutions and places of worship	Day or night time	0.64	0.46	1.28	0.92
	Workshops	Day or night time	0.64	0.46	1.28	0.92

7.4.3 Acceptable values for intermittent vibration

Intermittent vibration is assessed using the vibration dose value (VDV) root-mean-quad method. VDV accumulates the vibration energy received over the daytime and night-time periods. The vibration dose methodology is as per standard BS 6472–1992.

7.5 Noise Policy for Industry

Assessment of noise in accordance with NSW Noise Policy for Industry (2017) has two main components: intrusiveness and amenity criteria. These are compared to each other (after conversion of amenity noise level to LAeq,15min equivalent level) to determine the overall project noise trigger level.

7.5.1 Intrusiveness noise level

The intrusiveness noise level is based on the LAeq (15 min) associated with commercial activity being less than or equal to the measured LA90 Rating Background Level + 5dB as per section 2.3 of the policy. A modifying factor should also be added where appropriate to allow for tonality, impulsiveness, and intermittency or low frequency effects.

7.5.2 Amenity noise level

The amenity noise level is determined in accordance with Section 2.3 of the policy based on the land use and relevant noise criteria specified in Tables 2.3 and 2.2 respectively.

The Noise Policy for Industry sets out acceptable noise levels for various locations. Determination of which residential receiver category applies is described in Table 2.3 of the policy.

Table 5: Receiver category (Table 2.3 of the Noise Policy for Industry)

Receiver category	Typical planning zoning – standard instrument	Typical existing background noise levels	Description
Rural residential	RU1 – primary production RU2 – rural landscape RU4 – primary production small lots R5 – large lot residential E4 – environmental living	Daytime RBL <40 dB(A) Evening RBL <35 dB(A) Night RBL <30 dB(A)	Rural – an area with an acoustical environment that is dominated by natural sounds, having little or no road traffic noise and generally characterised by low background noise levels. Settlement patterns would be typically sparse. Note: Where background noise levels are higher than those presented in column 3 due to existing industry or intensive agricultural activities, the selection of a higher noise amenity area should be considered.
Suburban residential	RU5 – village RU6 – transition R2 – low density residential R3 – medium density residential E2 – environmental conservation E3 – environmental management	Daytime RBL <45 dB(A) Evening RBL <40 dB(A) Night RBL <35 dB(A)	Suburban – an area that has local traffic with characteristically intermittent traffic flows or with some limited commerce or industry. This area often has the following characteristic: evening ambient noise levels defined by the natural environment and human activity.
Urban residential	R1 – general residential R4 – high density residential B1 – neighbourhood centre (boarding houses and shop-top housing) B2 – local centre (boarding houses) B4 – mixed use	Daytime RBL > 45 dB(A) Evening RBL > 40 dB(A) Night RBL > 35 dB(A)	Urban – an area with an acoustical environment that: • is dominated by 'urban hum' or industrial source noise, where urban hum means the aggregate sound of many unidentifiable, mostly traffic and/or industrial related sound sources • has through-traffic with characteristically heavy and continuous traffic flows during peak periods • is near commercial districts or industrial districts • has any combination of the above.

To determine the appropriate receiver category, the following observations were made:

- The nearby residential receivers are zoned R2 Low Density Residential and R3 – Medium Density Residential which corresponds with typical planning zoning of the suburban category.
- The measured RBL values presented in Section 6 corresponds with the typical existing background noise levels of the urban category.
- The acoustic environment of the surrounding area is dominated by 'urban hum' and is located near industrial districts, which corresponds with the description of the urban category.

Therefore, the nearest residential receivers would be assessed against the suburban criteria.

7.5.3 Modifying factors

The NSW Noise Policy for Industry includes correction factors such as tonal noise, low-frequency noise, intermittent noise and duration. Where two or more modifying factors are present, the maximum adjustment to a noise source level is 10dBA (excluding duration correction).

7.5.4 Sleep Disturbance

The potential for sleep disturbance from maximum noise level events from premises during the night-time period needs to be considered. Sleep disturbance is considered to be both awakenings and disturbance to sleep stages.

Where the subject development/premises night-time noise levels at a residential location exceed:

- LAeq,15min 40 dB(A) or the prevailing RBL plus 5 dB, whichever is the greater, and/or
- LAFmax 52 dB(A) or the prevailing RBL plus 15 dB, whichever is the greater,

a detailed maximum noise level event assessment should be undertaken.

7.6 Project noise trigger level

To determine the project trigger noise level, the amenity noise level must first be standardised to and equivalent LAeq 15min in order to compare to the intrusiveness noise level. This is done in accordance with Section 2.2 of the policy as follows;

$$L_{Aeq,15min} = L_{Aeq, period} + 3dB$$

Therefore, based on the measured data presented in Section 6, the project specific noise limits are determined.

7.6.1 Intrusiveness noise criteria

The intrusiveness noise levels are as follows;

Table 6: Intrusiveness noise levels

Time period	Receivers 1 to 2	Receiver 3	Receivers 4 to 7
	Criteria L _{eq} (15min) dB(A)	Criteria L _{eq} (15min) dB(A)	Criteria L _{eq} (15min) dB(A)
Day (7am-6pm Mon-Sat; 8am-6pm Sun)	53	55	N/A
Evening (6pm-10pm)	53	49	N/A
Night (10pm-7am Sun-Fri, 10pm-8am Sat)	48	47	N/A

*N/A: Intrusive noise criteria does not apply for industrial receivers.

7.6.2 Amenity criteria

Based on Section 2.4 of the policy, the amenity noise levels are as follows;

Table 7: Amenity noise levels

Time period	Receivers 1 to 2	Receiver 3	Receivers 4 to 7
	Criteria L _{eq} (15min) dB(A)	Criteria L _{eq} (15min) dB(A)	Criteria L _{eq} (15min) dB(A)
Day	53	53	70
Evening	43	43	70
Night	38	38	70

7.6.3 Project specific noise criteria

The project noise trigger level is the lower (that is, the most stringent) value of the intrusiveness and amenity noise levels. Therefore the project noise trigger levels are as follows:

Table 8: Project criteria

Time period	Receivers 1 to 2	Receiver 3	Receivers 4 to 7
	Criteria $L_{eq(15min)}$ dB(A)	Criteria $L_{eq(15min)}$ dB(A)	Criteria $L_{eq(15min)}$ dB(A)
Day	53	53	70
Evening	43	43	70
Night	38	38	70

7.6.4 Sleep disturbance

The sleep disturbance noise levels are as follows;

Table 9: Sleep disturbance criteria

Time period	Receivers 1 to 2		Receiver 3	
	Criteria $L_{eq(15min)}$ dBA	Criteria L_{AFmax} dBA	Criteria $L_{eq(15min)}$ dBA	Criteria L_{AFmax} dBA
Night	43	58	42	57

7.7 NSW Road Noise Policy 2011

The NSW Road Noise Policy outlines the criteria for any increase in the total traffic noise level at the location due to a proposed project or traffic generating development. As Newbridge Road is an arterial road the following criteria applies:

Table 10: Relative increase criteria for residential land uses

Road Category	Type of project/development	Total traffic noise level increase – dB(A)	
		Day (7am to 10pm)	Night (10pm to 7am)
Freeway/arterial/sub-arterial roads and transitways	New road corridor/redevelopment of existing road/land use development with the potential to generate additional traffic on existing road	Existing traffic $L_{Aeq(15hr)} + 12dB$ (external)	Existing traffic $L_{Aeq(9hr)} + 12dB$ (external)

When the existing traffic noise levels already exceeds the L_{Aeq} 15hour and L_{Aeq} 9hr noise limits, the development should not increase the existing traffic noise levels by more than 2dB(A) as stated in Section 3.4 of the NSW Road Noise Policy 2011.

8. Environmental Assessment

Noise associated with the development has been assessed using 3D SoundPLAN modelling generated in accordance with ISO 9613-2:1996 *Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation*, showing the predicted worst-case 15 minute noise impacts associated with typical warehouse activities such as trucks, forklifts, reverse alarms, mechanical plant and carpark activities. Barrier screening, topographical screening, air absorption and ground absorption were calculated in accordance with ISO 9613-2. Predictions also include corrections for the prevailing meteorological conditions in accordance with ISO 9613-2: 1996 and Fact Sheet D of the Noise Policy for Industry.

ISO 9613-2: 1996 *Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation* is the selected sound propagation standard used in the model as it's a referenced standard nominated in the Noise Policy for Industry 2017 which sets the requirements for this project. Furthermore, based on the separation distances of residential receivers, utilising ISO 9613-2:1996 may be considered conservative based on a comparison of five general noise propagation models (Lane Jenkin, Jeffrey Peng and Jeffrey Parnell, 2021, November. *Comparison of five general noise predictions models and their performance in estimating low frequency noise propagation*. Proceedings of Acoustics 2021: 21-23 February 2022, Wollongong, NSW, Australia). It should be noted that experimental comparison was based on soft surfaces whereas the noise model for this assessment primarily consists of hard (totally reflective) surfaces between the source and receiver.

8.1 Modelling Assumptions and Itemised Noise Sources

Noise levels from each warehouse has been modelled based on the following assumptions:

- Warehouse constructed using standard sheet metal.
- All Warehouse roller doors being open.
- Acoustic barriers as per Section 11.1.2.
- Onsite heavy truck movements on the hard stands from the access road boundaries to or from the respective loading bays according to the predicted peak 15-minute traffic volumes, as detailed in Table 13.
- Forklifts operating continuously in each warehouse, both indoors and outdoors including reverse alarms.
- Source locations as nominated in Section 13.3.
- Roof mounted AC plant (above office locations). This was assessed based on the equipment source noise levels detailed in Table 14.
- Typical worst-case noise source levels as presented in Table 14.
- Ground absorption was modelled based on the assumptions outlined in Table 11 for the proposed development and any proposed or existing developments for surrounding area.

Table 11: Ground absorption assumptions

Ground Type	Category	Assumed absorption coefficient
Ground where an industrial development is proposed (irrespective of specific landscape plans)	Totally reflective	0
Surface of a body of water (e.g. dams, rivers)	Totally reflective	0
Existing paved road or hardstand	Totally reflective	0
Existing unsealed road	Totally reflective	0
Landscaped grass (e.g. lawns)	More absorptive	0.7

To determine the number of noise events taking place, reference was made to the Traffic Impact Assessment prepared by Genesis Traffic (ref: GT23016, dated 17th September 2025), which made the following predictions for peak hour traffic volumes onsite:

Table 12: Predicted Peak Hour Traffic Volumes

Source Description	Hourly Traffic Volumes (veh/h)		
	All Vehicles	Heavy Vehicles (30%)	Light Vehicles (70%)
AM Peak (7am-8am)	57	17	40
PM Peak (5pm-6pm)	71	21	50
Average Peak	64	19	45

- Based on the predicted peak hour traffic volumes, Table 13 presents the estimated worst case 15 minute heavy vehicle movements in each day period.

Table 13: Predicted Peak 15-minute traffic volumes per lot

Heavy Vehicles per 15 minutes (Day)	Heavy Vehicles per 15 minutes (Evening)	Heavy Vehicles per 15 minutes (Night)
24	16	12

The volumes for light vehicles were assumed to be the number of events for car-related activities, with the heavy vehicle volumes assumed to be the number of events for truck-related activities. Forklifts were assumed to be operating continuously, with the number of forklifts on each lot the same as the number of truck events.

Noise levels were based on previous measurements of similar activities. Car park activities were calculated in accordance with the ISO-9613-2:1996 (Parkplatzlärmstudie 2007) methodology. Predictions include corrections for the prevailing meteorological conditions in accordance with the ISO-9613-2:1996.

Table 14: Itemised Noise Sources

Source Description	Source type	Source height above finished floor level (m)	Sound Power Level	Reverberant Sound Pressure Level
Semi-Trailer Truck Accelerated Passby	Line	3	60.1dBA/m	-
Semi-Trailer Truck Acceleration/Deceleration on ramp	Line	3	66dBA/m	-
** Semi-Trailer Reverse Alarm	Line	1.5	61.0dBA/m	-
Semi-Trailer Engine Starting	Point	1.5	100.0dBA	-
Semi-Trailer Engine Idling	Point	1.5	98.0dBA	-
Semi-Trailer Truck Venting Airbrake	Point	1.5	110dBA	-
Semi-Trailer Truck Door Closure	Point	1.5	99dBA	-
Mechanical Plant Deck	Point	2	79dBA	-
**Forklift (Average Work over 240 seconds)	Point	1.5	90dBA	-
*Indoor Industrial Activities	Area	-	-	78dB(A)
Car starting	Point	0.5	84dBA	
Car door closure	Point	0.5	83dBA	
Car driving on asphalt <30km/h	Line	0.5	47dBA/m	

*Note this level of noise at the internal façades accounts for typical worst-case source emission of industrial warehousing and manufacturing activities. Examples of significant equipment accounted for in the assumed reverberant noise source data are as follows:

- *Workshop equipment:* for example electric hand tools such as drill, grinder, drop saw; air powered equipment such as rattle gun, linisher, sandblaster and spray painting equipment.
- *Manufacturing equipment:* for example injection moulding machinery, CNC machinery and production line automation.
- *Warehouse and logistics:* for example gas or diesel powered lifting equipment such as forklift and telescopic boom movements, loading and unloading manoeuvres and reversing with alarm.

It is noted that the assumed building internal reverberant sound pressure levels represent noise levels below the WHS hearing protection threshold.

**Note that the noise level includes a +5dB(A) correction for tonality in accordance with the Noise Policy for Industry 2017.

8.2 Noise Impact Assessment (Nearest Receivers)

The following assessment of noise impacts to sensitive receivers is based on the criteria established using the cumulative criteria specified in Section 2.4.2 of the Noise Policy for Industry, which takes into account the potential impacts from multiple sources within the site and surrounding area. The noise source levels at the receiver locations are shown in Table 15. LAeq results are not shown where the calculated total is less than 0dBA. All receivers were assumed to be two storeys, with the maximum noise impact between the two levels presented in Table 15.

Table 15: Project specific noise levels (Nearest receivers)

Receiver	Project Specific Criteria L _{eq,15min} dBA			Predicted Noise Impacts L _{eq,15min} dBA			Complies (Yes/No)		
	Day	Evening	Night	Day	Evening	Night	Day	Evening	Night
1	53	43	38	37	36	35	Yes	Yes	Yes
2	53	43	38	40	39	38	Yes	Yes	Yes
3	53	43	38	38	37	36	Yes	Yes	Yes
4	70	70	70	65	64	63	Yes	Yes	Yes
5	70	70	70	59	58	56	Yes	Yes	Yes
6	70	70	70	51	50	48	Yes	Yes	Yes
7	70	70	70	55	54	53	Yes	Yes	Yes

Compliance with the cumulative impact criteria is predicted for all onsite activities at the receiver locations during the proposed operating hours on the condition the recommendations in Section 11.1 are implemented. Figures 6 to 8 present a graphical representation of the predicted noise levels.

Figure 3: LAeq,15min noise contours (Day) – Ground Floor

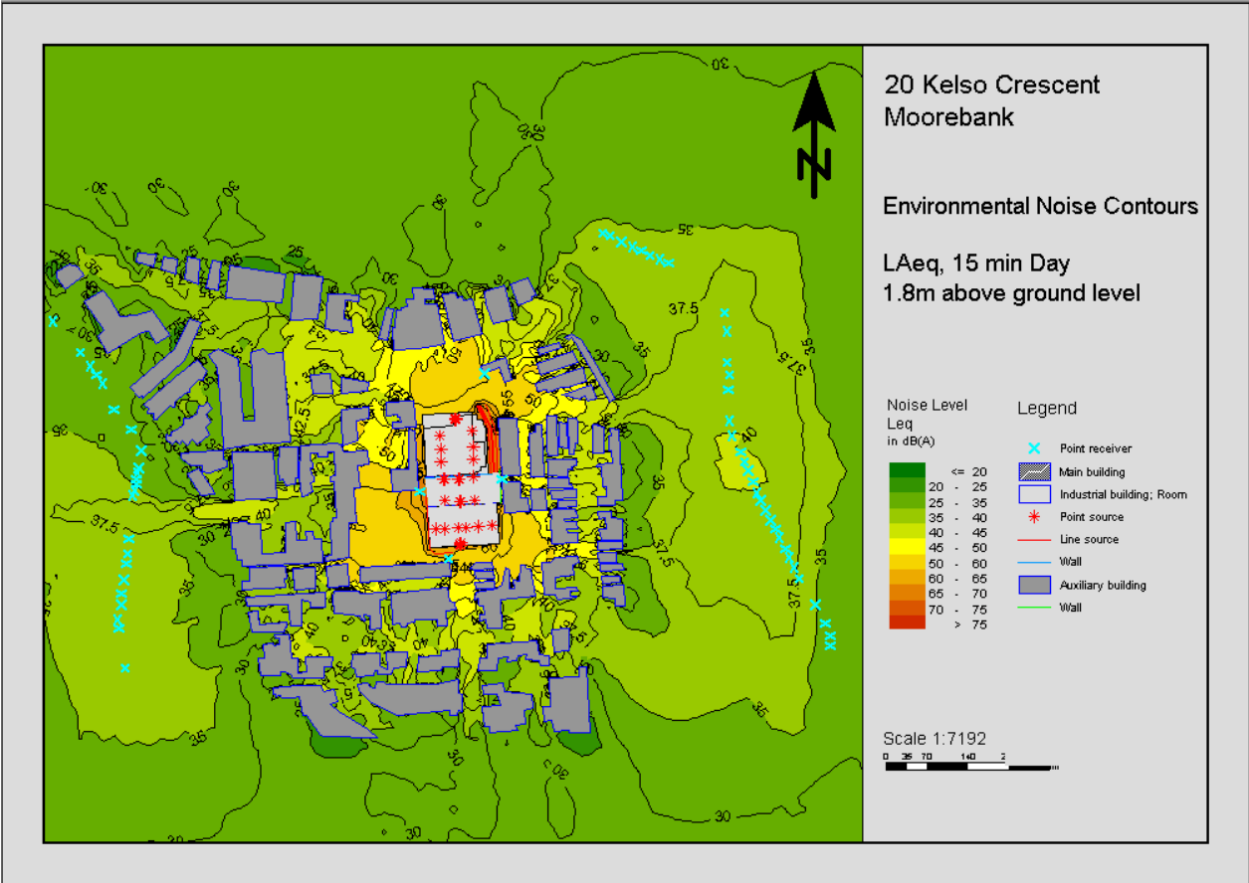


Figure 4: LAeq,15min noise contours (Evening) – Ground Floor

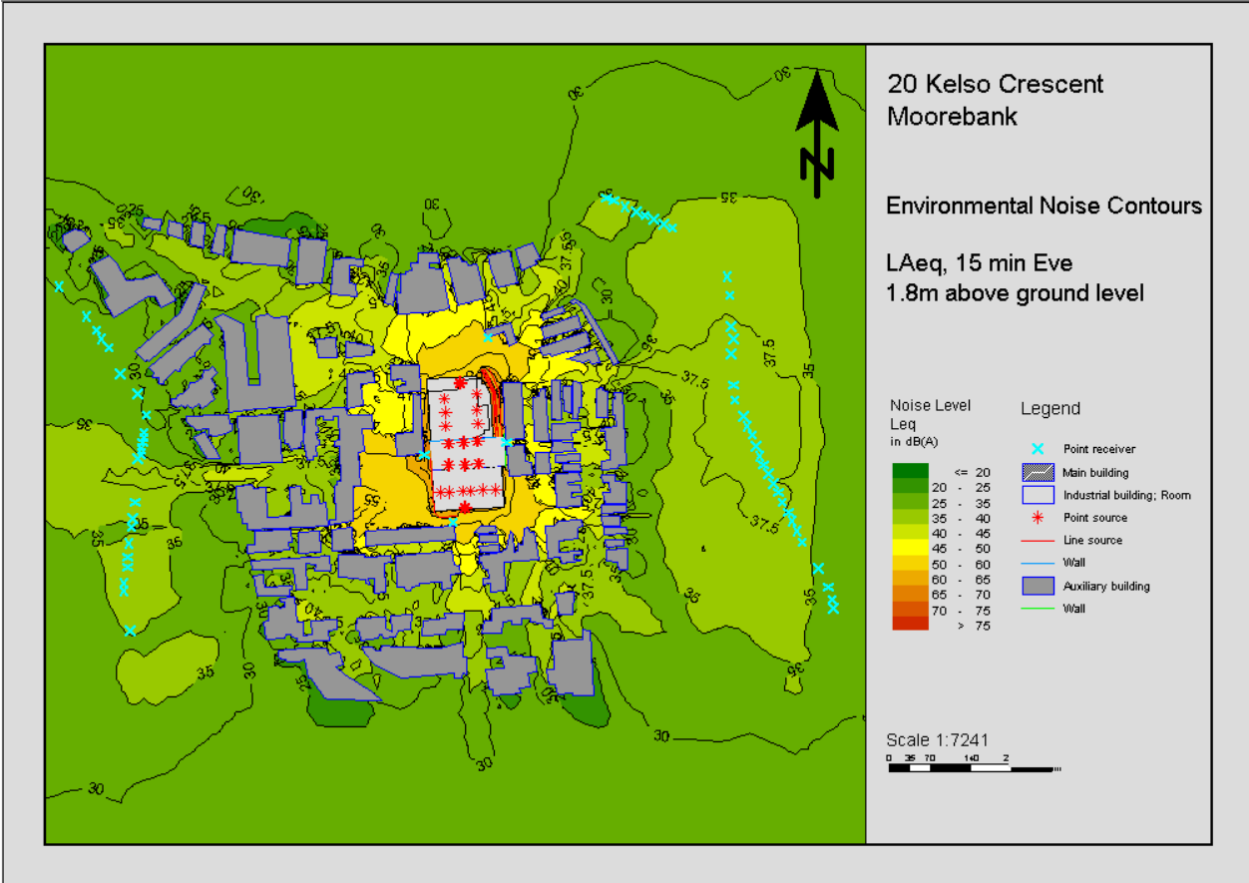


Figure 5: LAeq,15min noise contours (Night) – Ground Floor

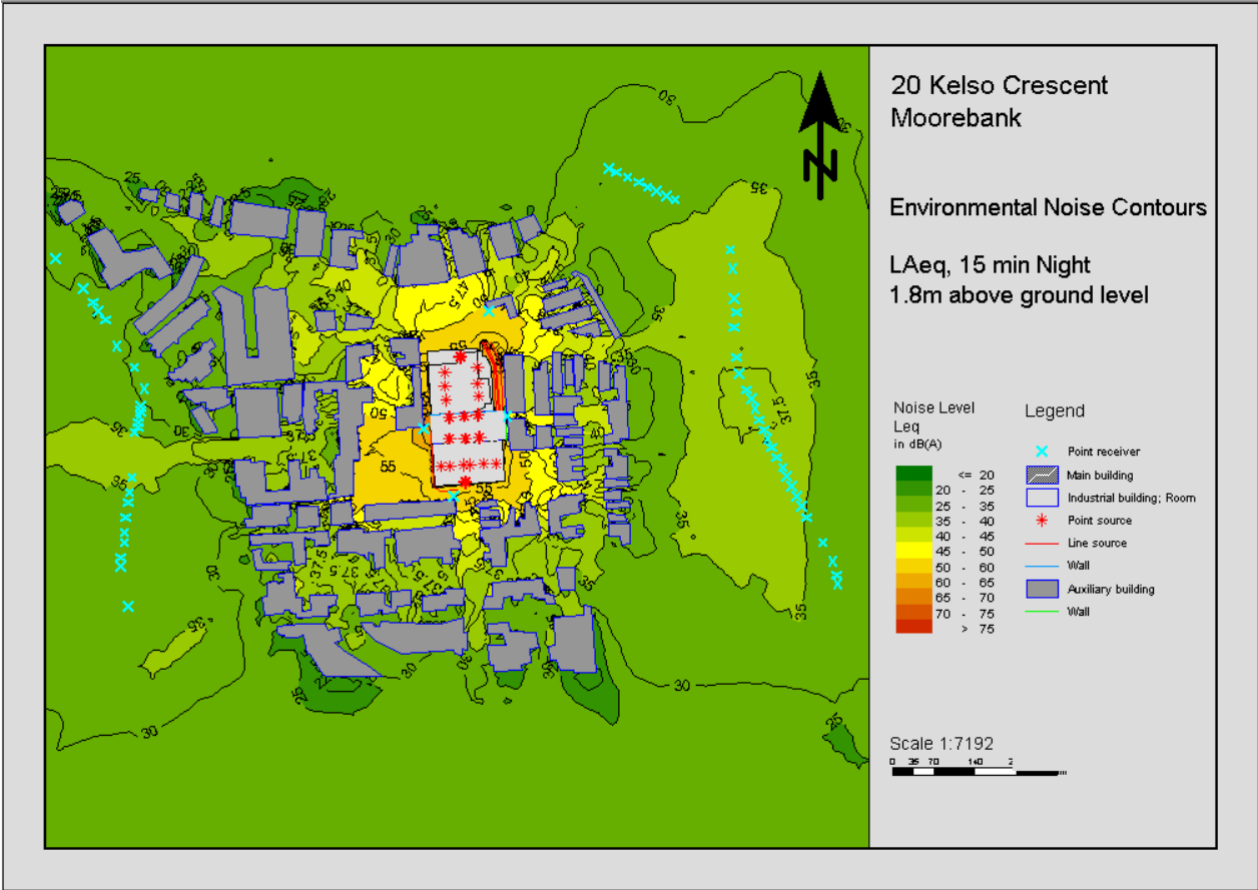


Figure 6: LAeq,15min noise contours (Day) – First Floor

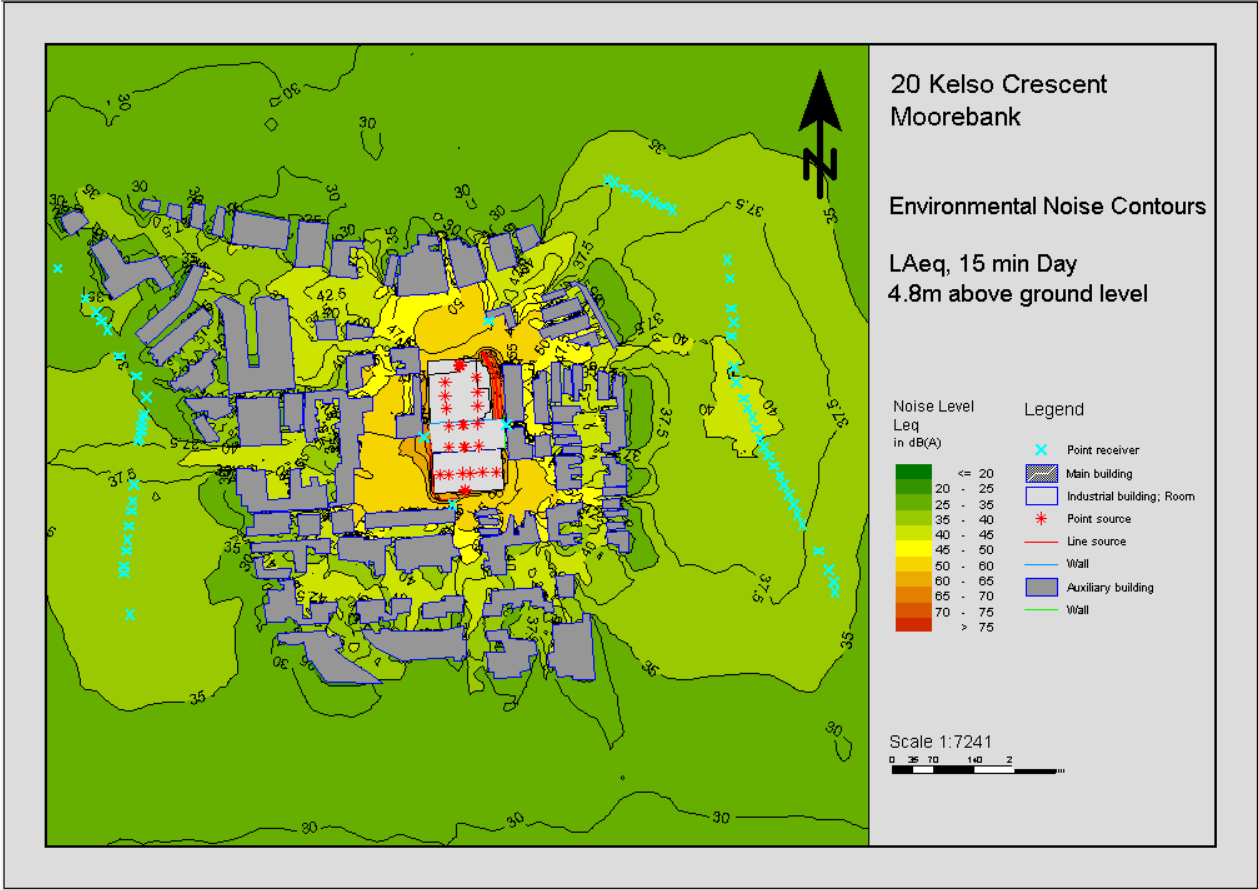


Figure 7: LAeq,15min noise contours (Evening) – First Floor

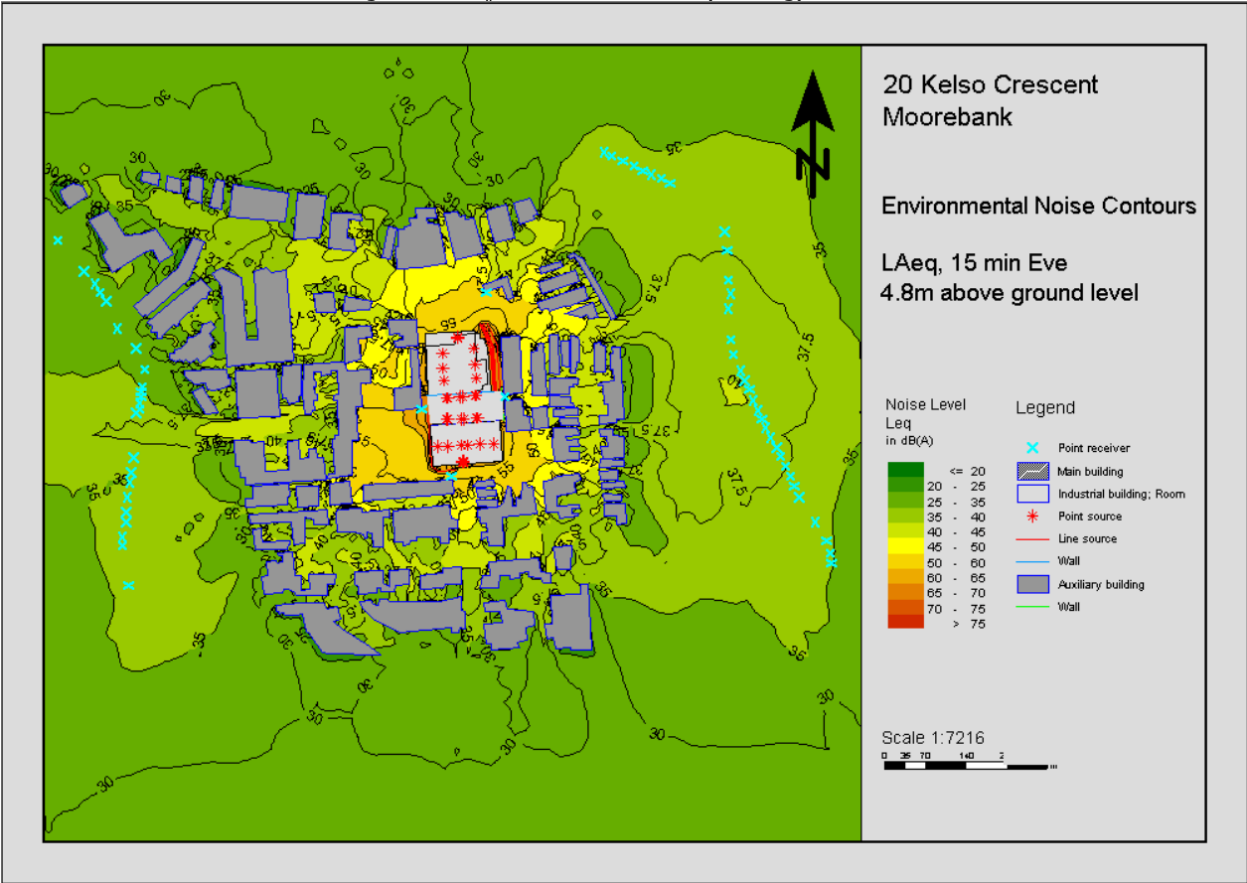
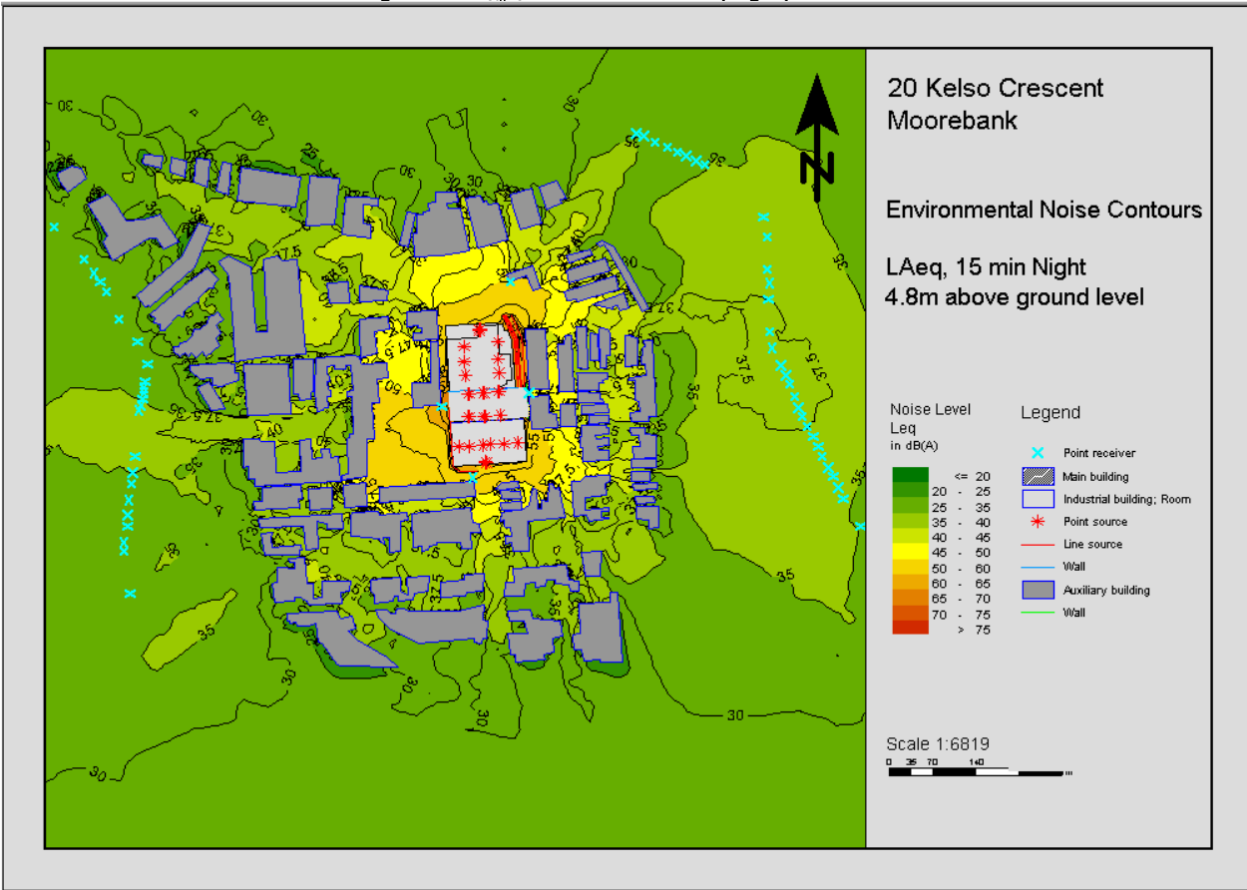


Figure 8: LAeq,15min noise contours (Night) – First Floor



8.3 Sleep Disturbance Assessment

The noise source levels and predicted levels of noise at the receiver locations are shown in Table 16. The calculations were undertaken to determine if noise impacts are predicted to comply with the sleep disturbance criteria for 24/7 operation. All receivers were assumed to be two storeys, with the maximum noise impact between the two levels presented in Table 16.

Table 16: Sleep disturbance – predicted L_{Amax} noise levels (nearest residential receivers)

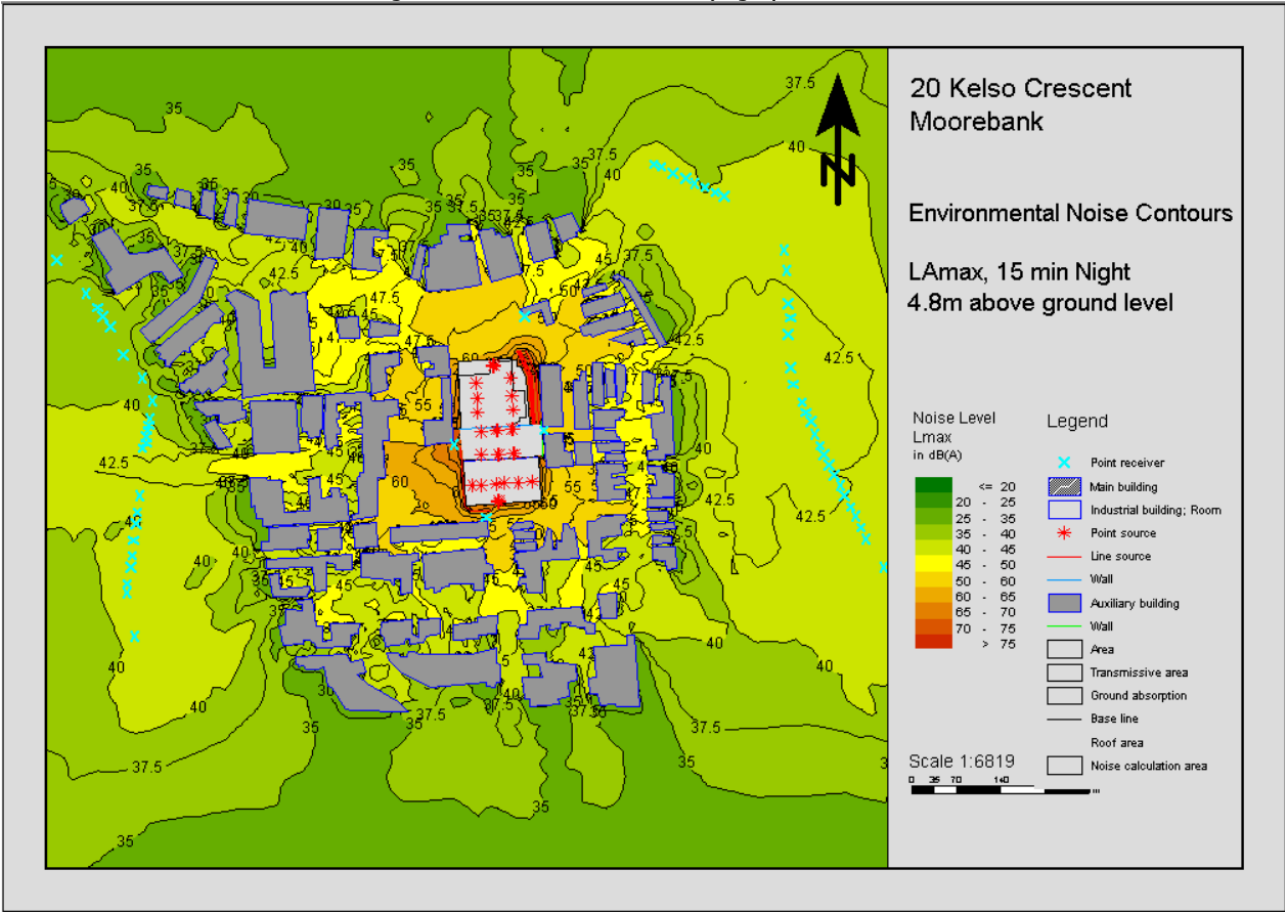
Receiver	Sleep Disturbance Criteria L _{Amax} dBA	Predicted Noise Impacts L _{Amax} dBA	Complies (Yes/No)
1	58	42	Yes
2	58	44	Yes
3	57	42	Yes

Compliance is predicted for all onsite activities at the receiver locations during the proposed operating hours on the condition the recommendations detailed in Section 11 are implemented.

Figure 9: L_{Amax} noise contours (Night) – Ground Floor



Figure 10: L_{Amax} noise contours (Night) – First Floor



9. Vibration Predictions

Potential vibration and acceleration impacts were assessed to determine typical levels within a set distance of the activity to the receiver with a maximum combined Peak Particle Velocity of level less than 1mm/s predicted based on the equipment in operation. The level of impact may change depending on the ground composition, example stone/rock or concrete will allow higher levels of ground vibration than soft soil. It is recommended a strict management plan is implemented to allow a proactive approach to addressing complaints including vibration monitoring of activities if complaints are received.

After review of the proposal in relation to vibration impacts, we provide the following recommendations:

- The nearest residential receivers are located over 375m away from the site and are separated by roads and other industry. The human exposures and Peak Particle levels are predicted to be below the criteria nominated in Section 7.4 with no further treatments required.
- The surrounding industrial lots are predicted to comply with the criteria based on the proposed activities, with nearby industrial sites predicted to generate more vibration than the proposal.
- If complaints are received for onsite activities from any of the sensitive receiver we recommend that compliance monitoring is undertaken as detailed in Section 12.3.

10. Road Traffic Noise

10.1 Newbridge Road Traffic

The existing annual average daily traffic volume for Newbridge Road is estimated to be approximately 71,710 vehicles per day based on peak hour traffic counts provided by Genesis Traffic. Additional vehicle movements to and from the proposed development are expected along Newbridge Road.

Section 3.4.1 of the Road Noise Policy states the following in regards to noise generation:

"For existing residences and other sensitive land uses affected by additional traffic on existing roads generated by land use developments, any increase in the total traffic noise level should be limited to 2 dB above that of the corresponding 'no build option'".

An increase of 2dB would be approximately equal to a 60% increase in traffic along Newbridge Road, or 114,736 vehicles. The proposed development is predicted to generate 715 vehicles per day in accordance with Genesis Traffic report for the site (ref: GT23016, dated 17/09/25). As the site is not predicted to generate over 43,026 vehicles per day, compliance is predicted with the Road Noise Policy criterion of +2dB(A) as outlined in Section 7.7.

10.2 Moorebank Avenue Traffic

The existing annual average daily traffic volume for Moorebank Avenue is approximately 30,182 vehicles per day (with approximately 7% Heavy Vehicles) based on peak hour traffic counts provided by Genesis Traffic. Additional vehicle movements to and from the proposed development are expected along Moorebank Avenue.

Section 3.4.1 of the Road Noise Policy states the following in regards to noise generation:

"For existing residences and other sensitive land uses affected by additional traffic on existing roads generated by land use developments, any increase in the total traffic noise level should be limited to 2 dB above that of the corresponding 'no build option'".

An increase of 2dB would be approximately equal to a 60% increase in traffic along Moorebank Avenue, or 48,291 vehicles. The proposed development is predicted to generate 715 vehicles per day (noting that not all vehicles will use Moorebank Avenue) in accordance with Genesis Traffic report for the site (ref: GT23016, dated 17/09/25). As the site is not predicted to generate over 18,109 vehicles per day, compliance is predicted with the Road Noise Policy criterion of +2dB(A) as outlined in Section 7.7.

11. Recommendations

11.1 Operational Noise

The noise assessment indicates that 24 hour operation of the site is predicted to comply with the assessment criteria on the condition the acoustic barrier shown in Figure 11 is implemented.

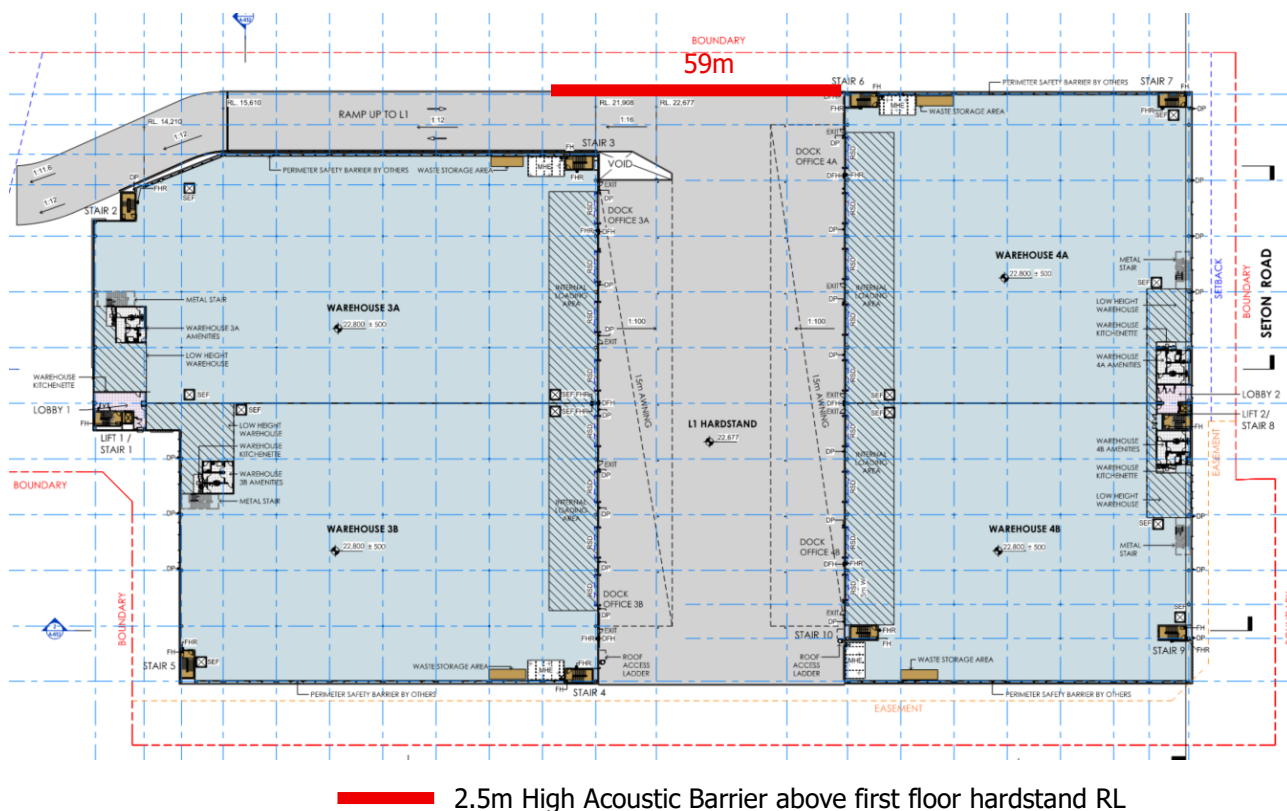
11.1.1 NSW Road Noise Policy – Traffic Generation

The traffic generation from the proposed development is not predicted to exceed 43,026 vehicles per day. Based on the existing traffic volumes on Newbridge Road, this increase in traffic volume is not predicted to exceed the criteria nominated in Section 7.7.

11.1.2 Acoustic Barriers

Acoustic barriers are recommended to be constructed to the height and extent shown in Figure 11. The acoustic barriers shall be constructed using materials that achieve a minimum surface density of at least 12.5kg/m². Suitable materials may include lapped 16mm lapped and capped timber with 40% overlap, 9mm fibre cement sheet, masonry, 6.38mm laminate glass or other materials which satisfy the minimum surface density requirement. The barriers shall be free of gaps and holes.

Figure 11: Recommended Acoustic Barriers



11.1.3 Onsite Mechanical Plant

No information regarding mechanical services was available at the time of the assessment, but a preliminary assessment based on measurements of similar developments predicted that similar plant would comply on the condition the recommendations of this report are implemented. Any new mechanical plant shall be designed to comply with the criteria nominated in Section 7.6.3 of this report.

Acoustic Works recommends that once mechanical plant selection is finalised, an assessment by qualified acoustic consultant be conducted prior to installation to determine any requirements for acoustic treatments.

11.2 Vibration

Vibration associated with truck activity and onsite activities is predicted to comply with the relevant NSW guidelines at the nearest sensitive receivers. We recommend that any vibrating equipment used onsite is adequately isolated to prevent vibration issues to nearby receivers and is reviewed by a qualified acoustic consultant. If complaints are received for vibration, we recommend the management controls nominated in Section 12.3 are implemented.

11.2.1 Compliance Vibration Monitoring Procedure

To ensure the vibration monitoring is effective, we recommend the following:

- All vibration monitors will be set to a maximum measurement interval of 5 minutes and record over the period commencing over the entire day and be located onsite and at the sensitive receiver location.
- The client shall provide a list of relevant management staff (including mobile phone numbers) working on the project to be notified of exceedance of the nominated vibration levels.
- All vibration monitors will be fitted with an internal SMS warning system (allow the unit to send SMS notification of vibration levels when the nominated level is exceeded). The SMS warning from the vibration monitors will go out to all staff who have provided their mobile numbers for use for notifications from the vibration monitor.
- The vibration monitor will be set to provide vibration impact warnings at 2/3 of the criteria for human exposure and peak particle velocity, this will allow staff to be notified of vibration levels and take a proactive approach before the criteria is exceeded. The Acoustic consultant will also have a minimum of 2 staff nominated on the warning system.
- The vibration monitors will be installed with additional battery packs to extend the operation of the monitor to a minimum of 6 weeks without recharge.
- Attended vibrations measurement will be undertake for the affected site to determine existing levels of specific equipment to help identify. Regardless of warning or notification, the vibration monitor will be downloaded on a monthly basis with a monthly report provided to the client, the report will be suitable for submission to council.

11.2.2 Procedure for measuring Vibration

11.2.2.1 Where to measure vibration for complaints

Vibration is required to be measured at complainants location and onsite simultaneously with the geophone located at the nearest point to the dwelling for the sensitive receiver and onsite where the source of the complaint originated. The geophone can be fixed to the ground using mounting spikes in line with the nearest point of the site or fixed directly to building elements, note that relocation of the geophone may be required to be representative of the nearest location of works being conducted onsite. Note multiple vibration monitors (two) are recommended to avoid the need for relocating the geophone multiple times.

11.2.2.2 Information to be reported

Any reporting should be concise. The minimum requirements to be included in a report are;

- Date and duration of measurements.
- Time of measurements or measurement period.
- Person(s) performing measurements or placing equipment used for long term monitoring.
- Equipment used for measurements.
- Location of measurements including photos.
- Measured values including graphed PPV for the period of monitoring.
- Corrected values (where applicable).
- Notes regarding vibrating sources.
- Notes regarding any extraneous sources that may have influenced measurements.
- Detail of instrumentation and calibration.
- Meteorological conditions.
- Explanation of any high levels below the criteria including exceedances
- Action taken for any exceedance including changes to site operations

11.3 Noise Management Plan

If noise complaints are received from nearby receivers, noise monitoring with audio shall be conducted for a period of 7 weeks, with a monitor placed onsite and at the receiver from which the complaint was received. The monitors shall record simultaneously, with attended measurements also conducted onsite and at the complaining receiver. The monitoring data and audio shall be examined by a suitably qualified person to verify that the offending noise originated at the site.

If noise generated by the site has resulted in complaints, we recommend an acoustic assessment is conducted to determine suitable mitigation strategies and/or acoustic treatments.

12. Conclusion

A noise assessment was conducted for a State Significant Development Application for a proposed warehouse and logistics development to be located at 20 Kelso Crescent, Moorebank. Based on the results of the investigation, the application for the masterplan is predicted to satisfy the criteria for 24 hour operation of the site on the condition the acoustic barrier in Figure 11 is implemented.

If you should have any queries please do not hesitate to contact us.

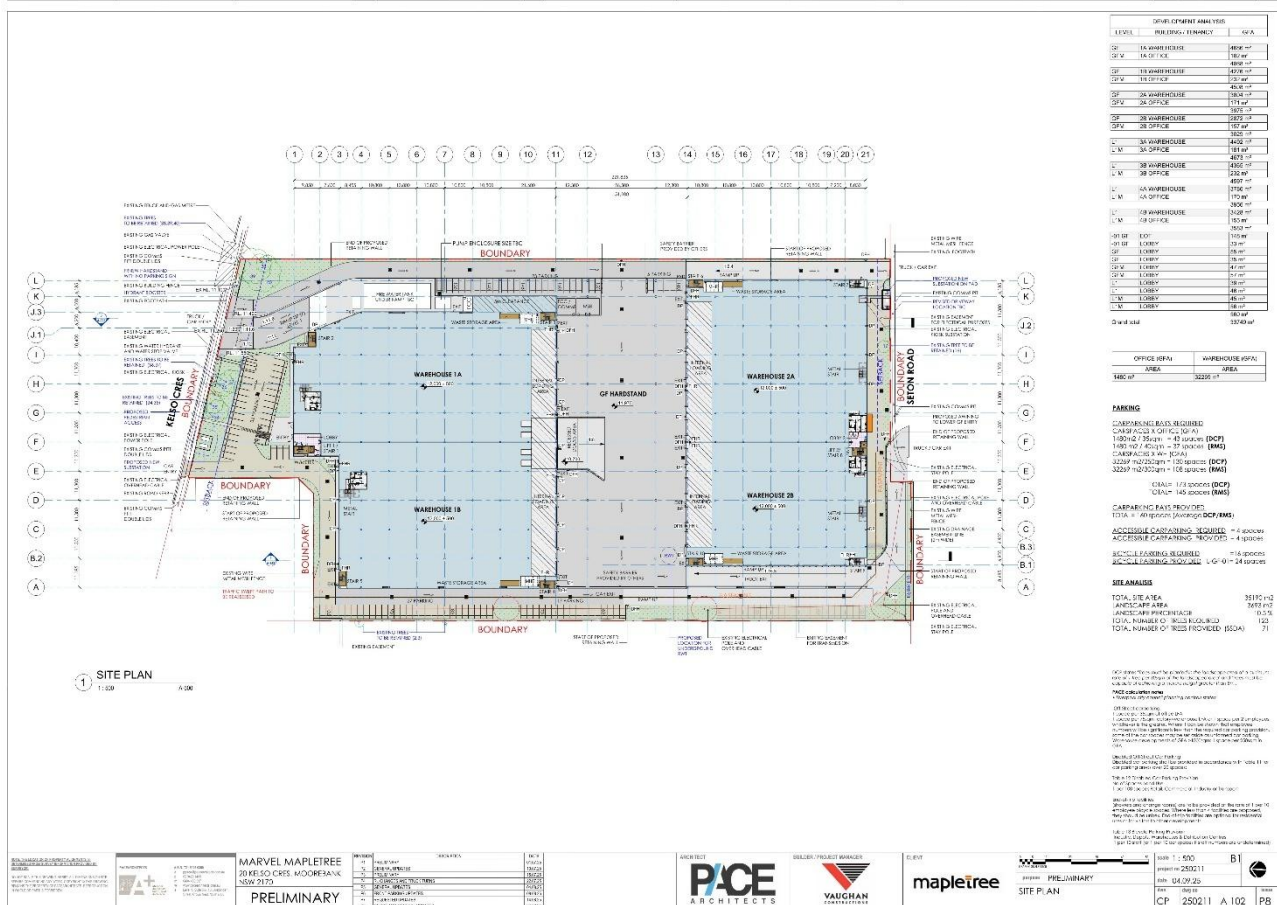
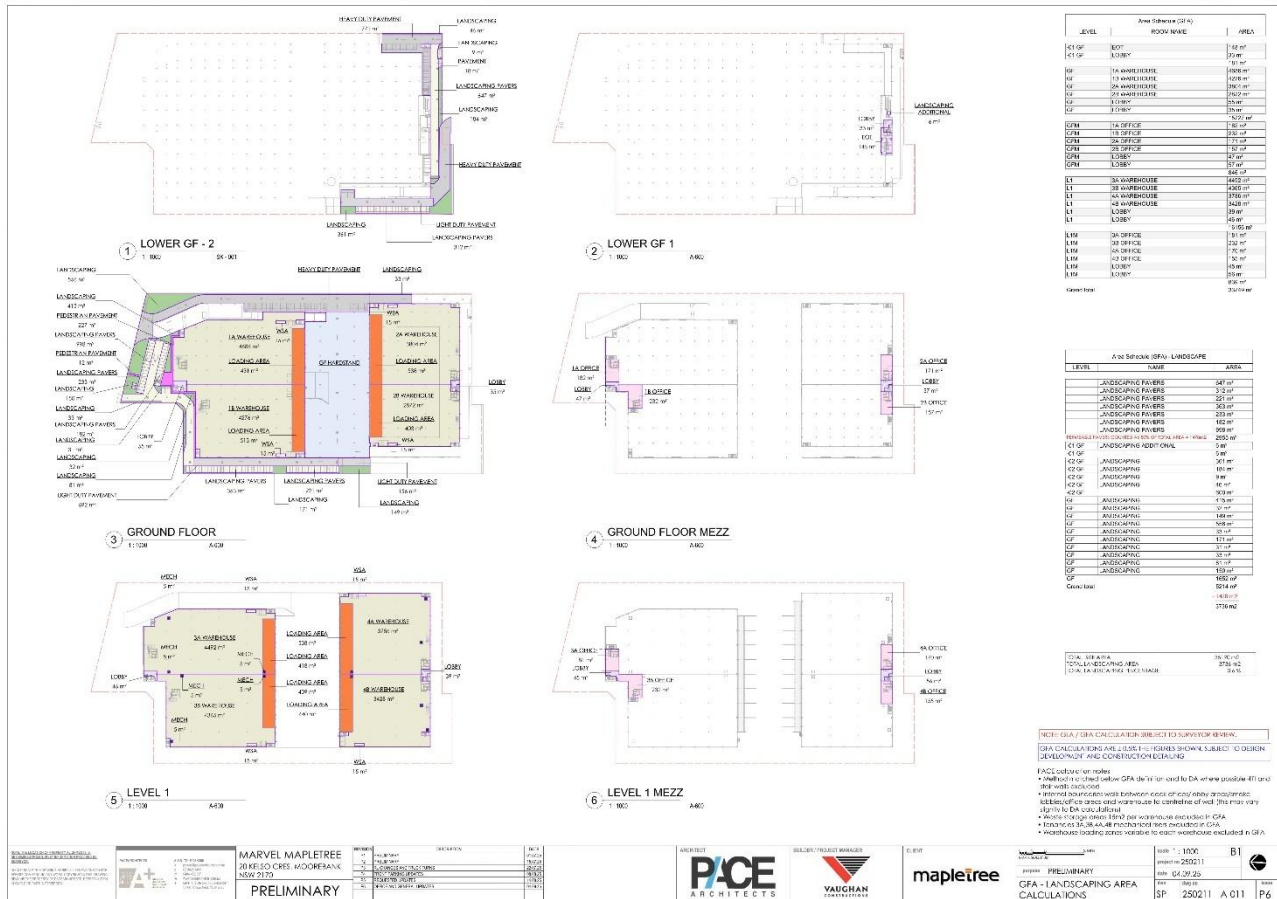
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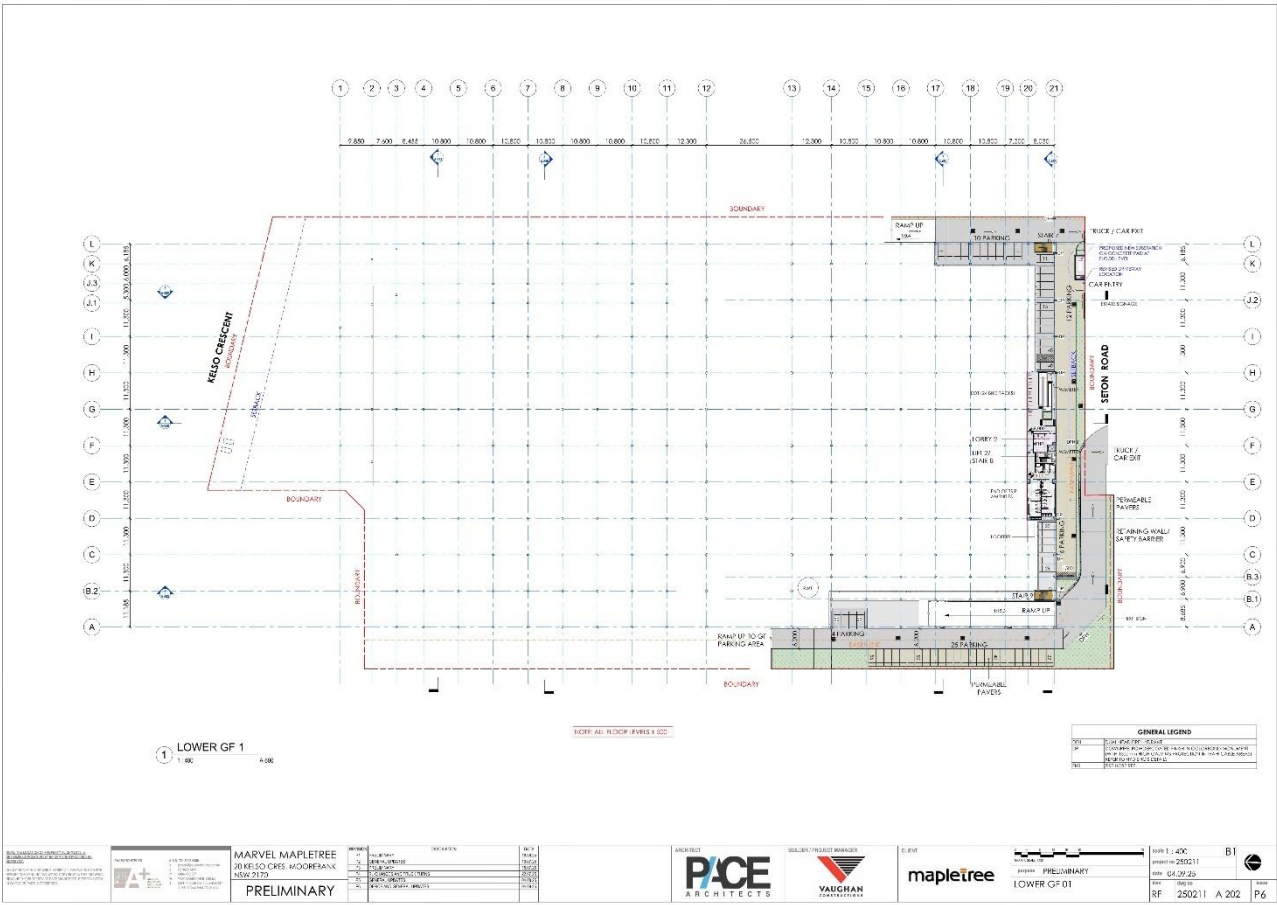
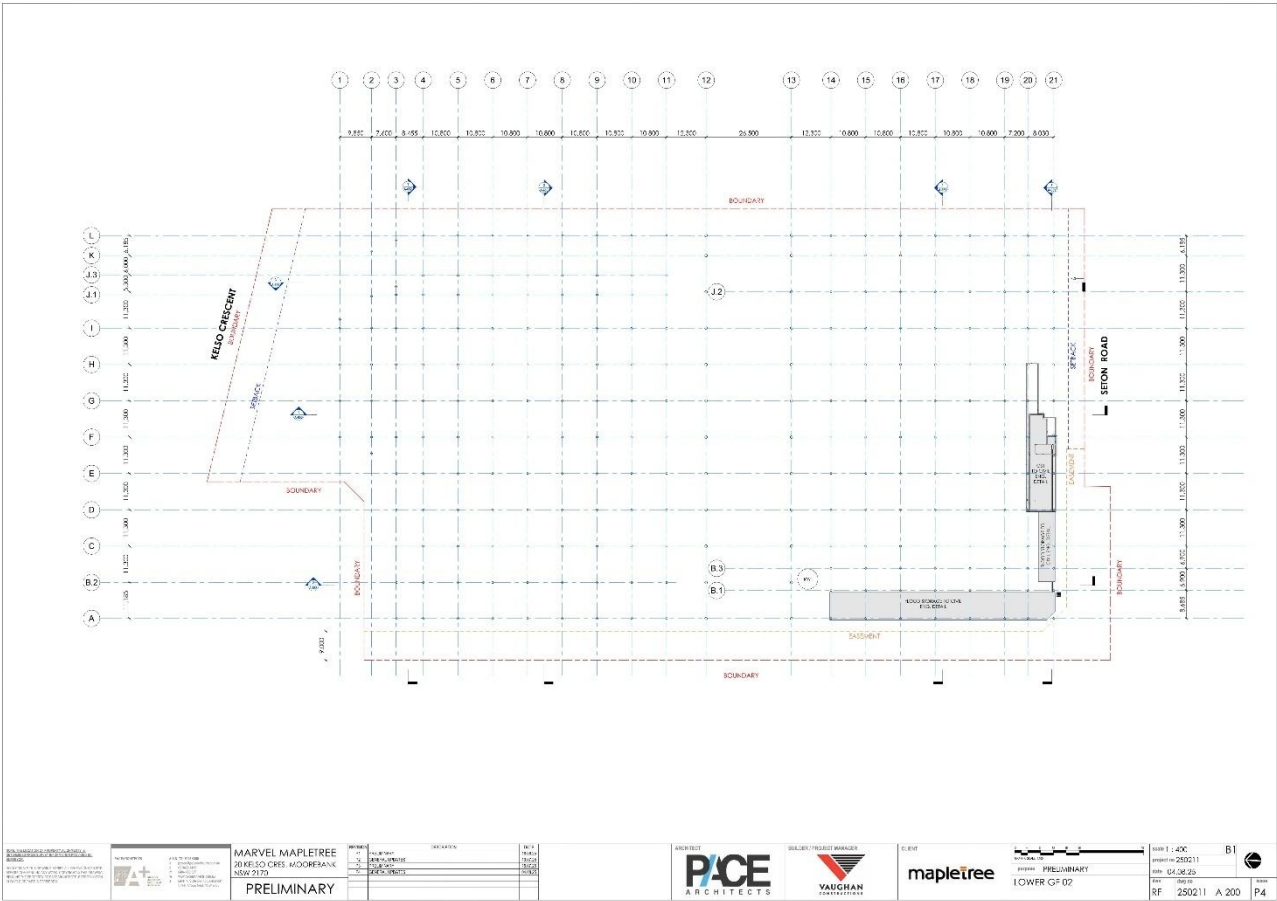


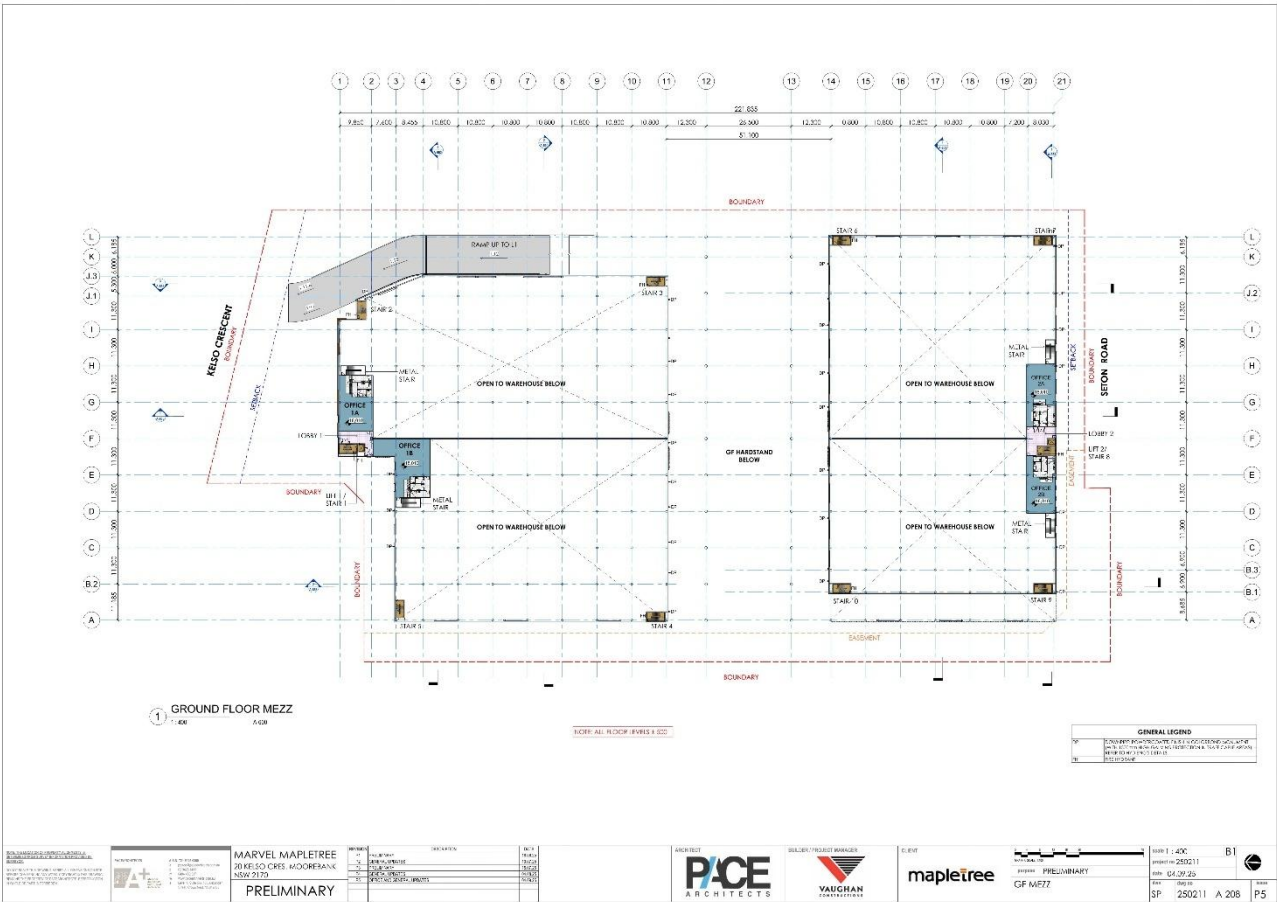
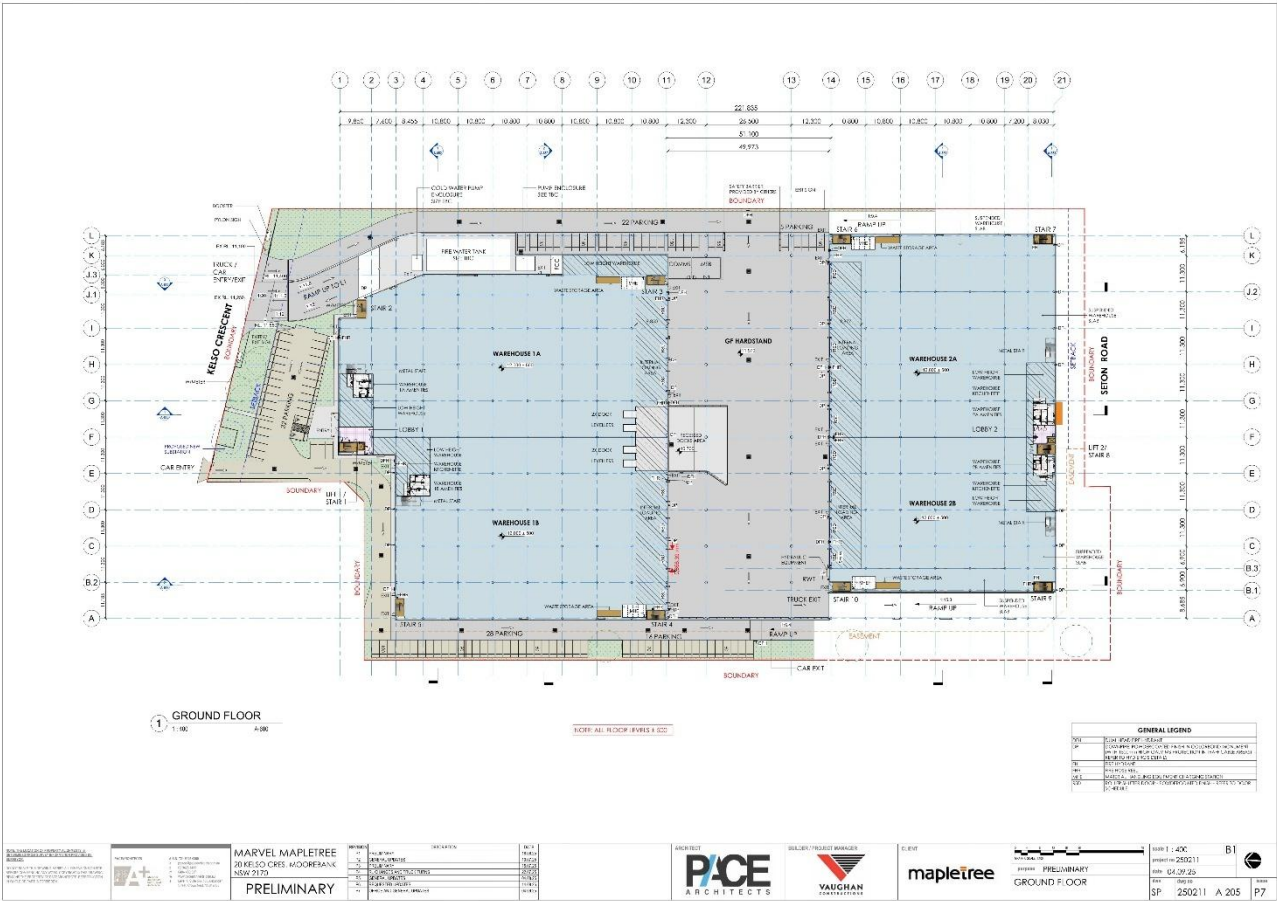
Marco Scoca
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BEng (Civil Eng. Hons)
GradDipEngSc (Mechanical Eng.)
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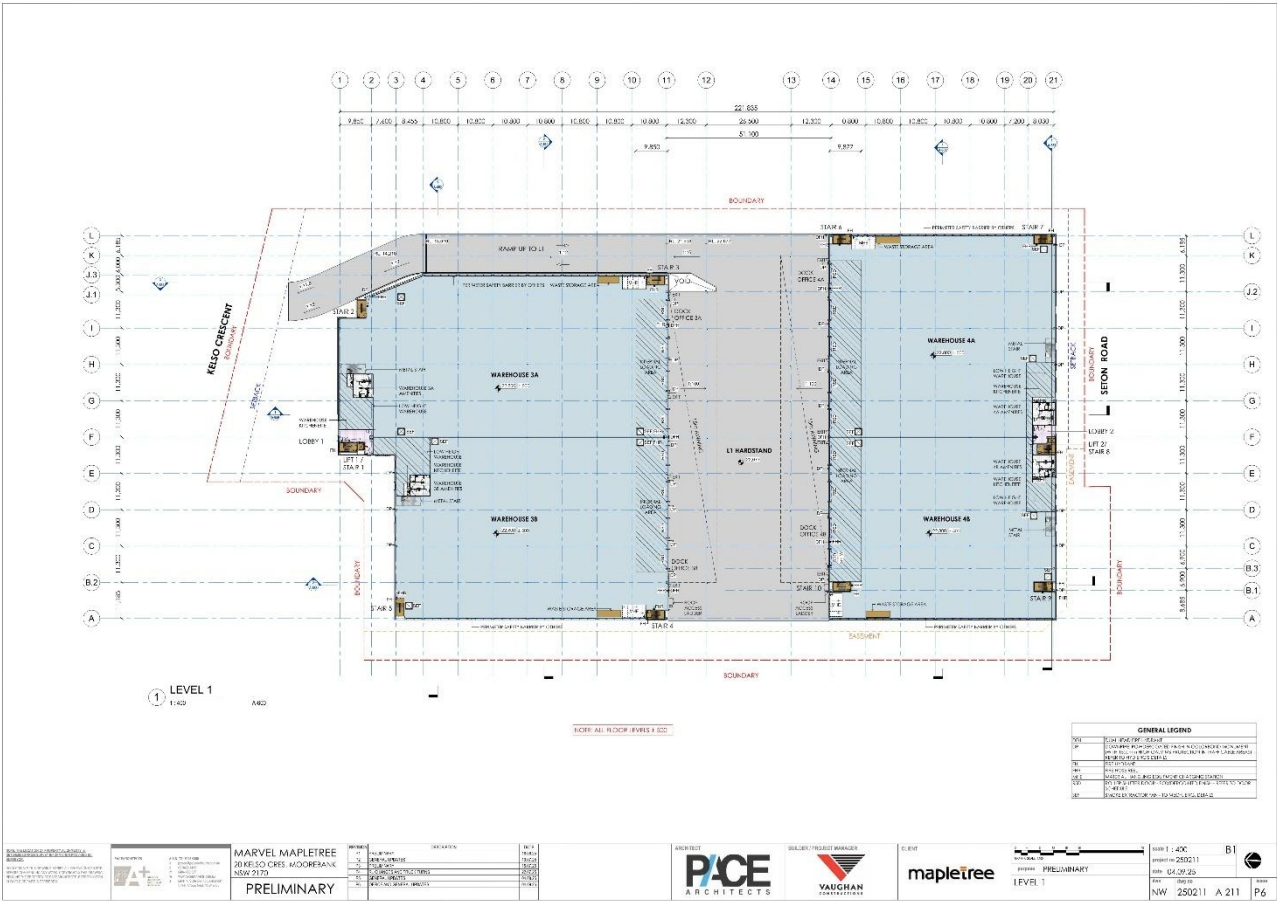
13. Appendices

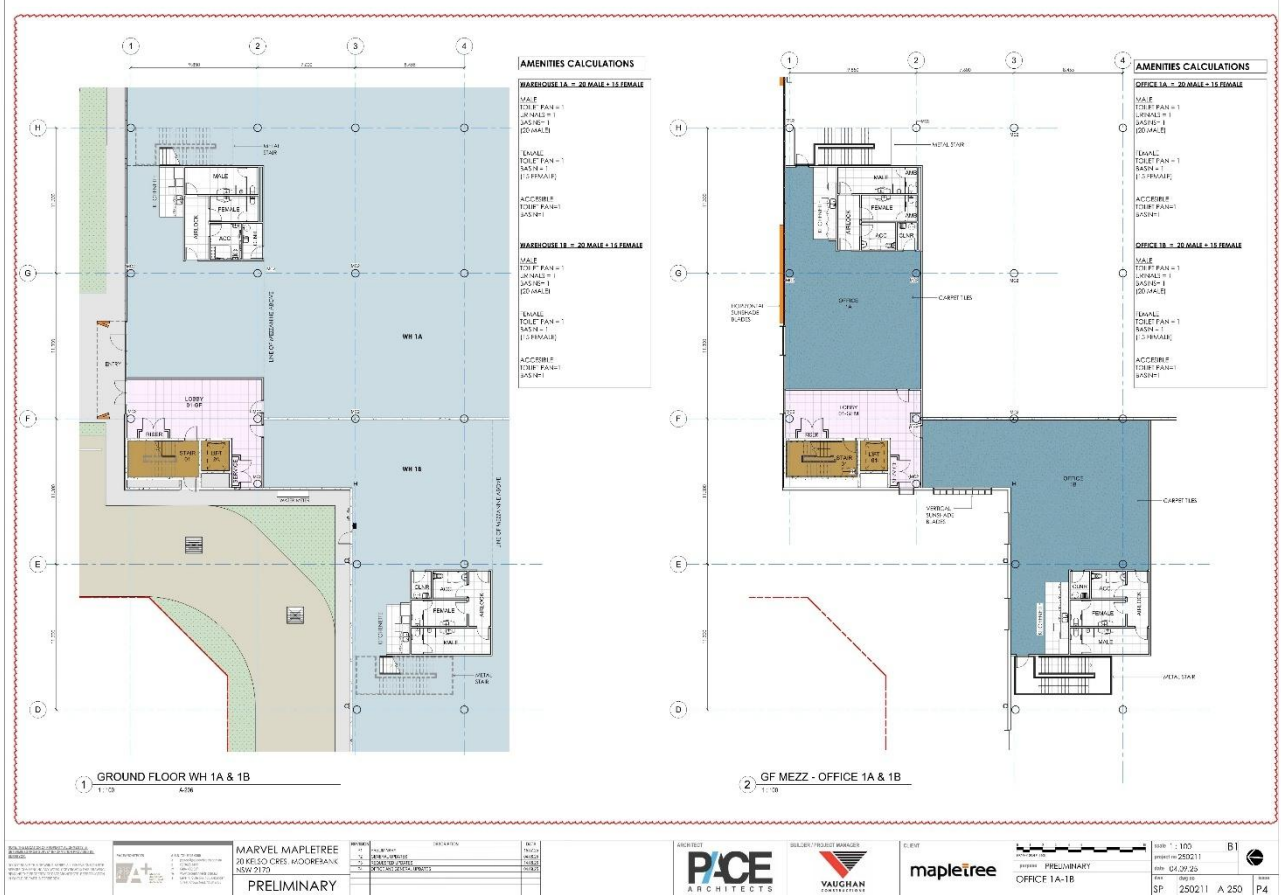
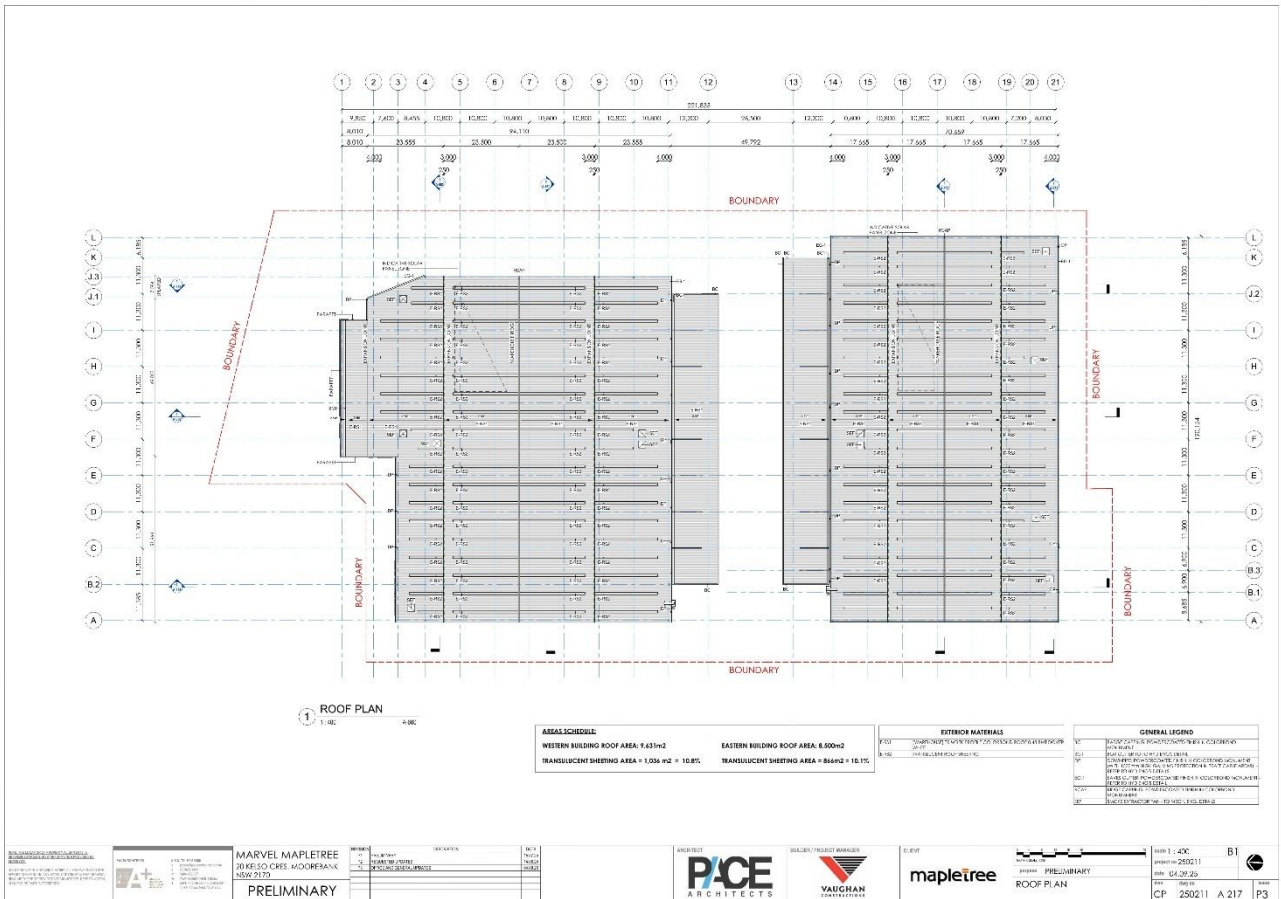
13.1 Development Plans

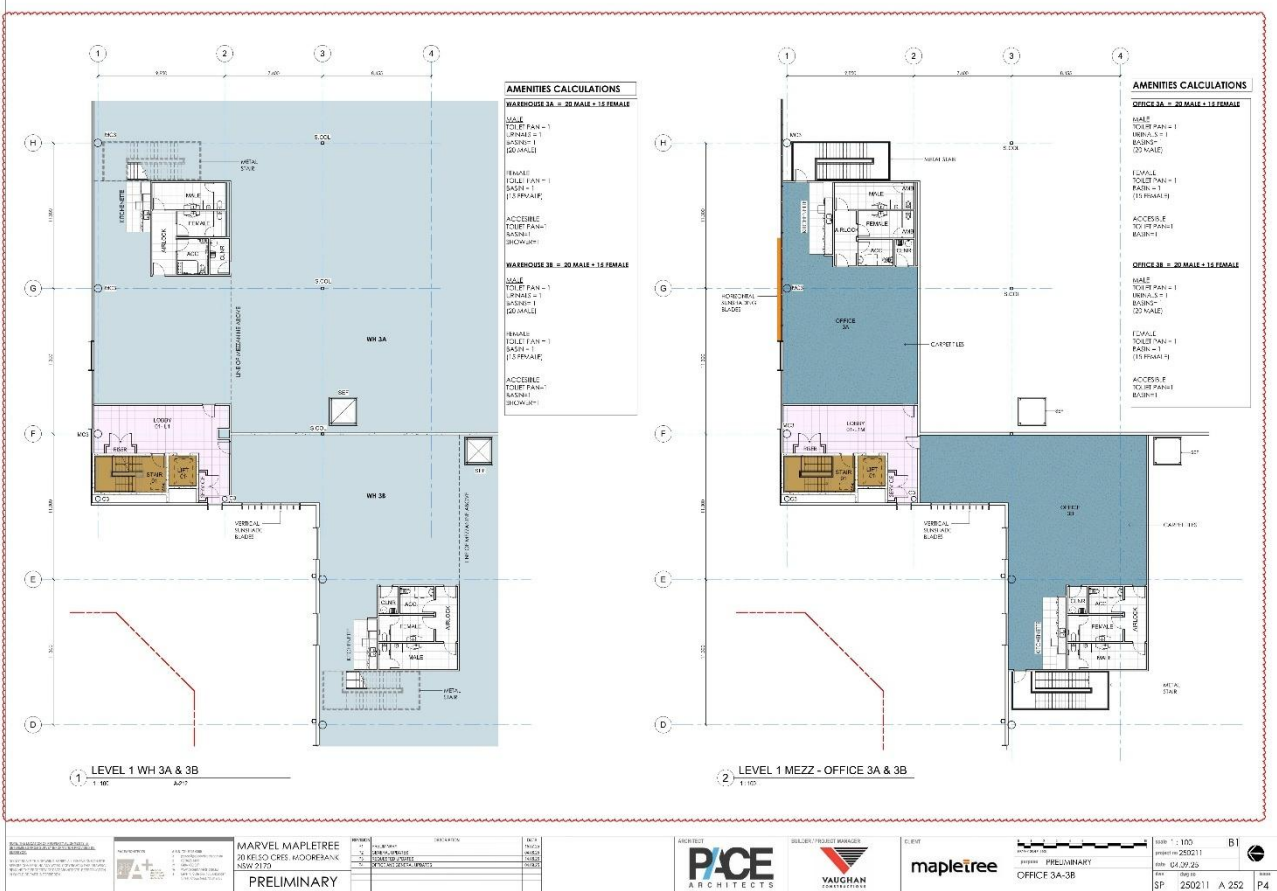


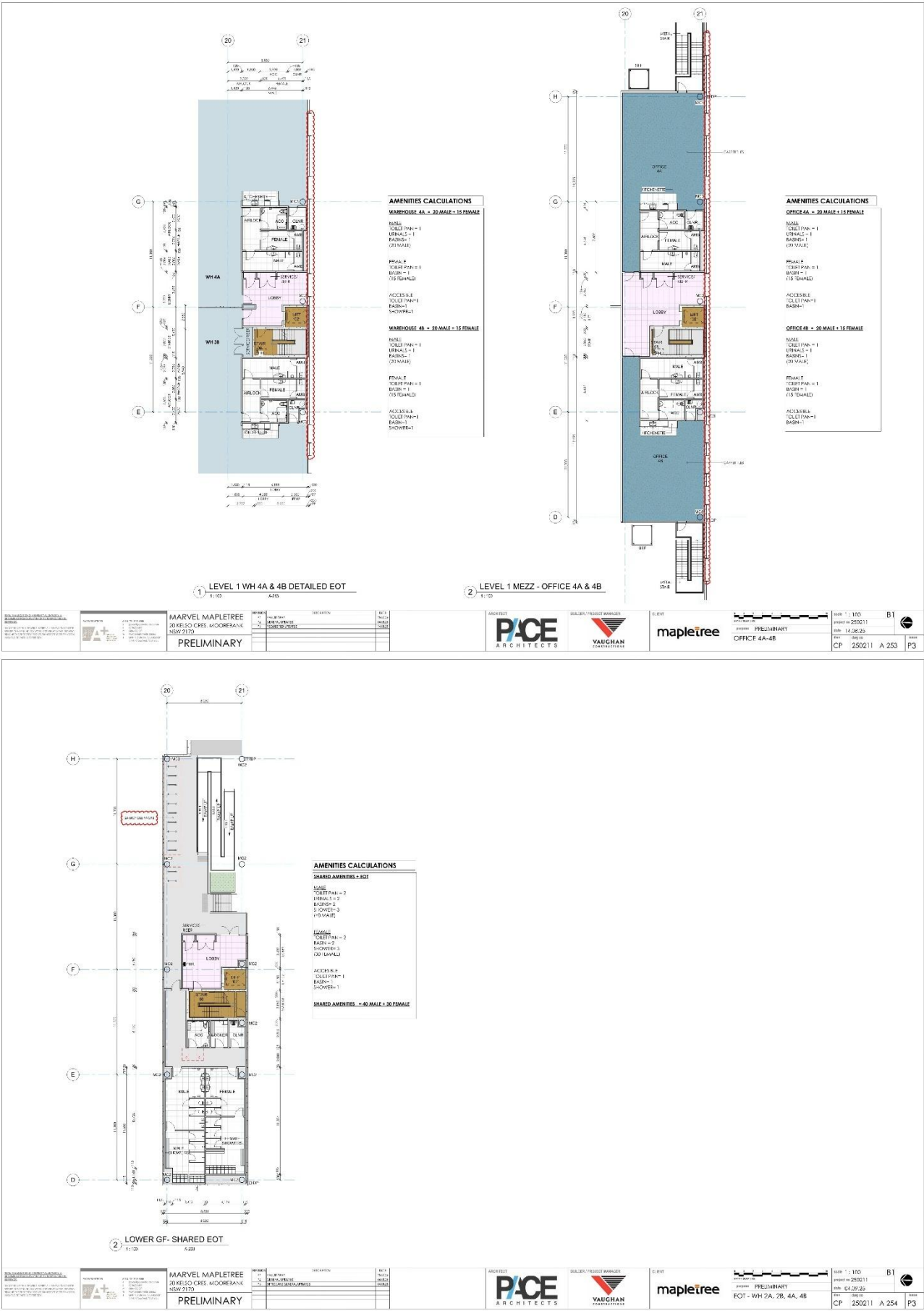


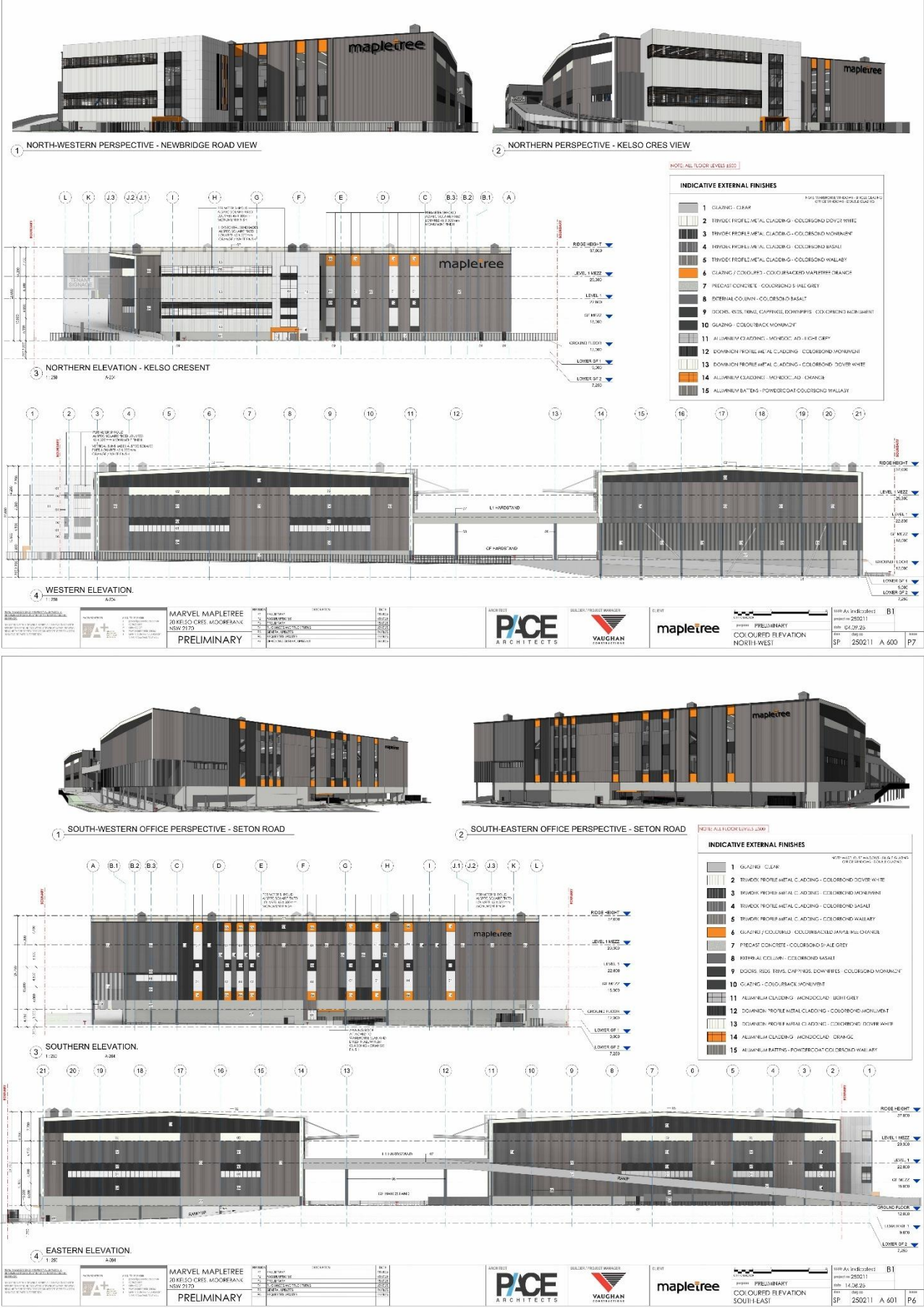


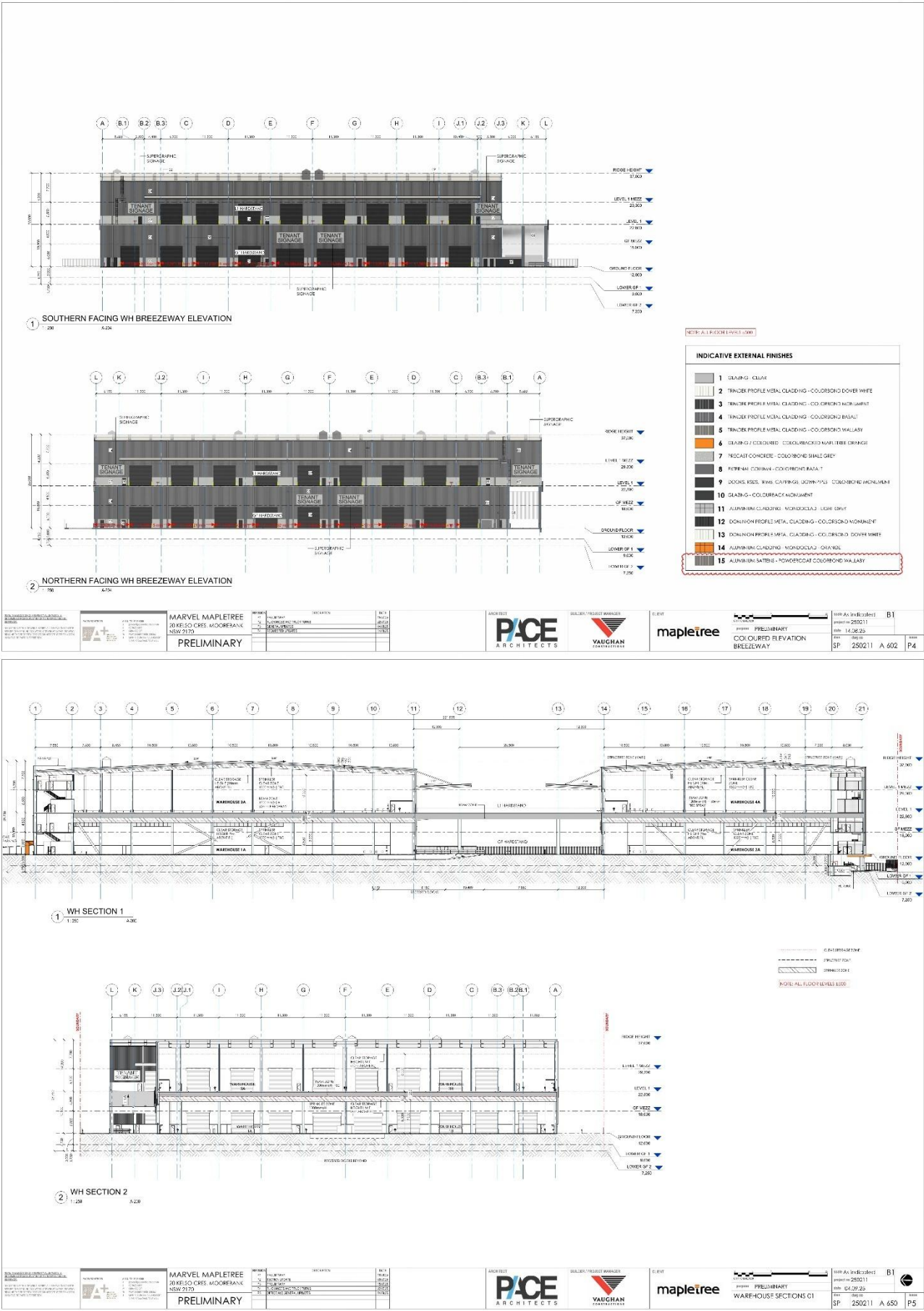


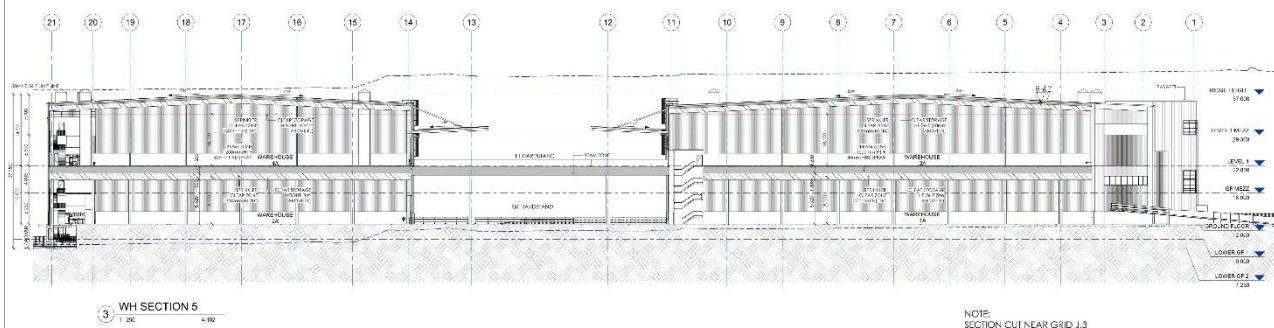
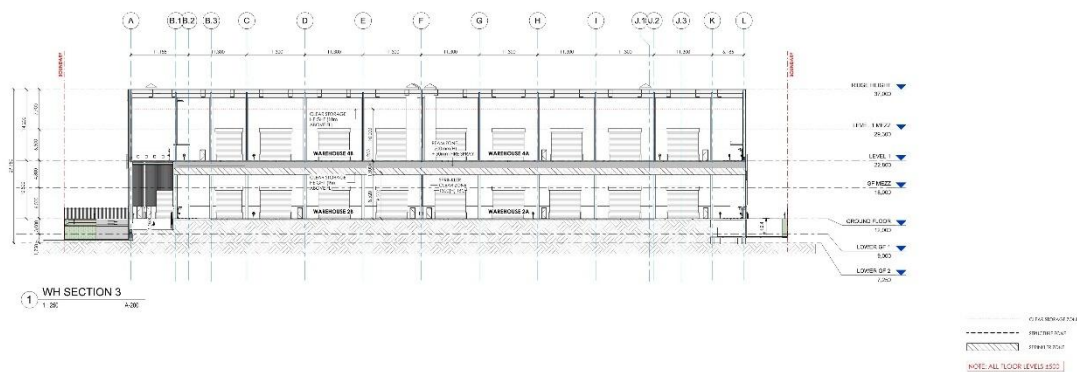


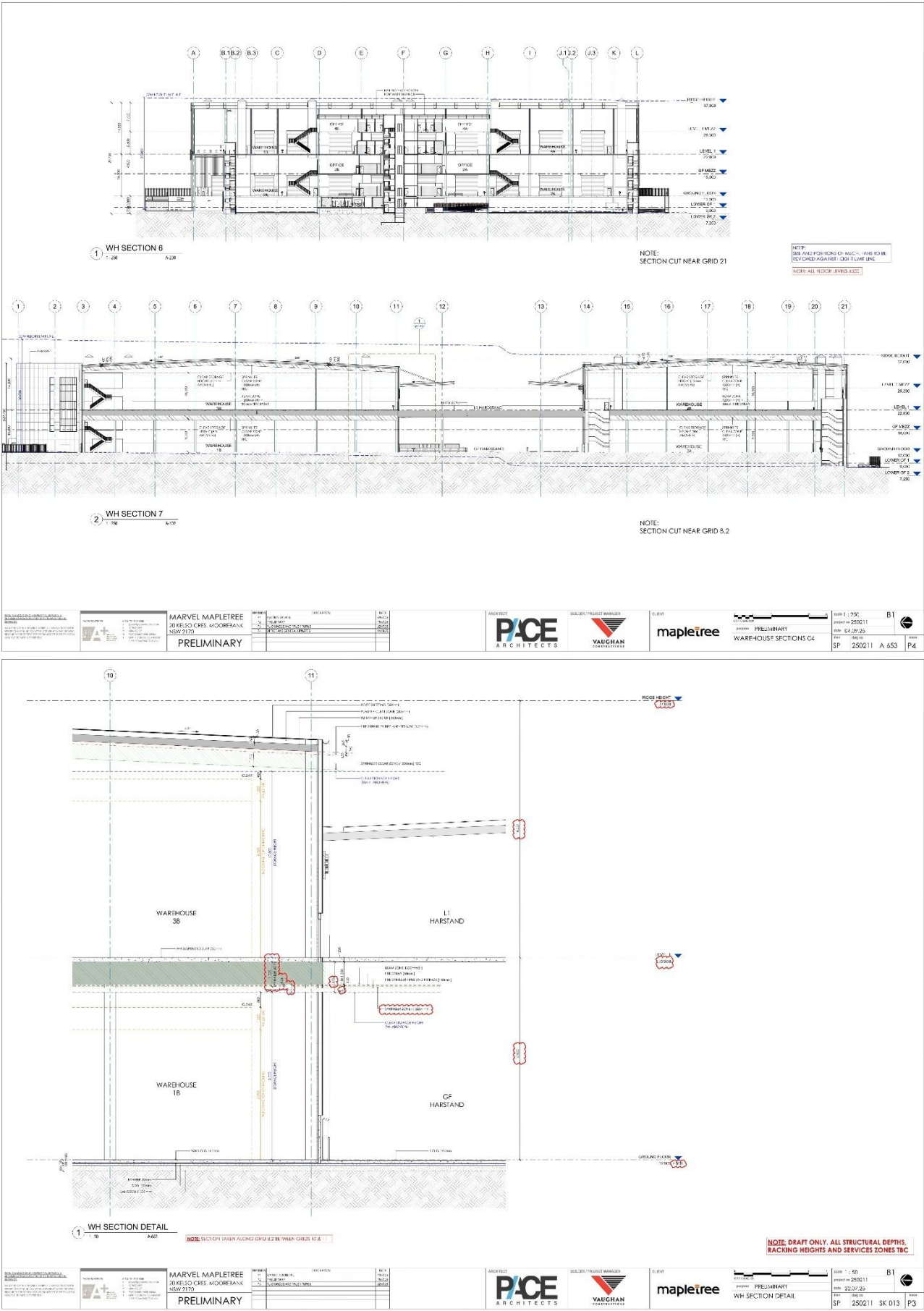






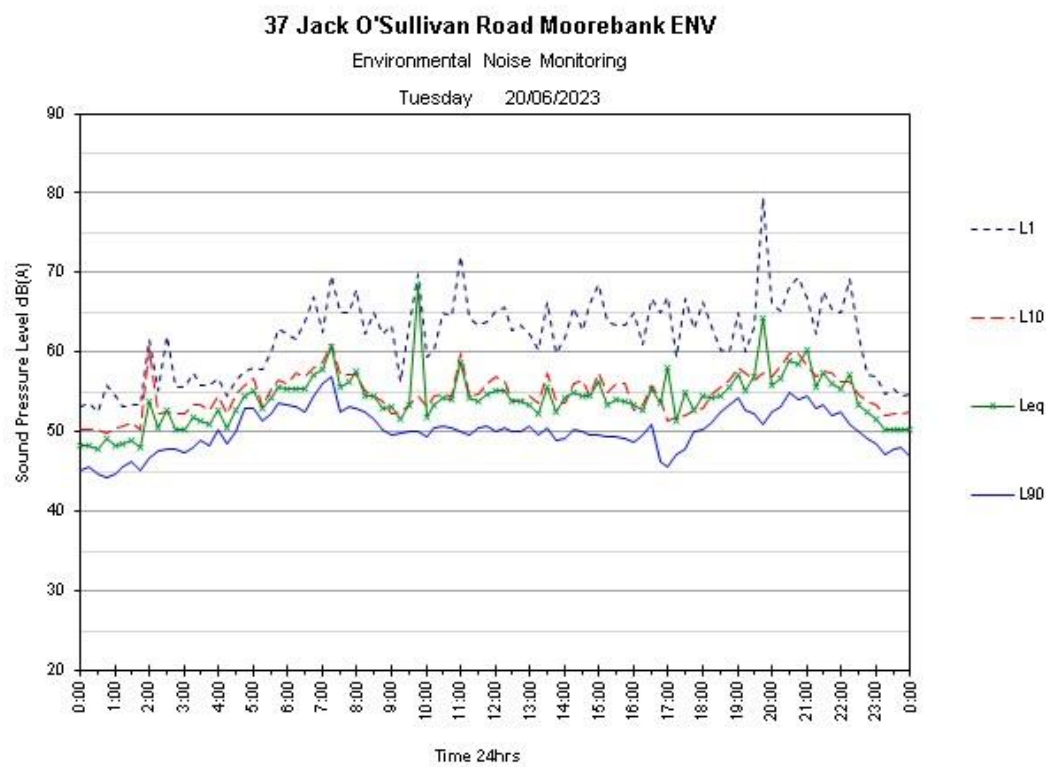
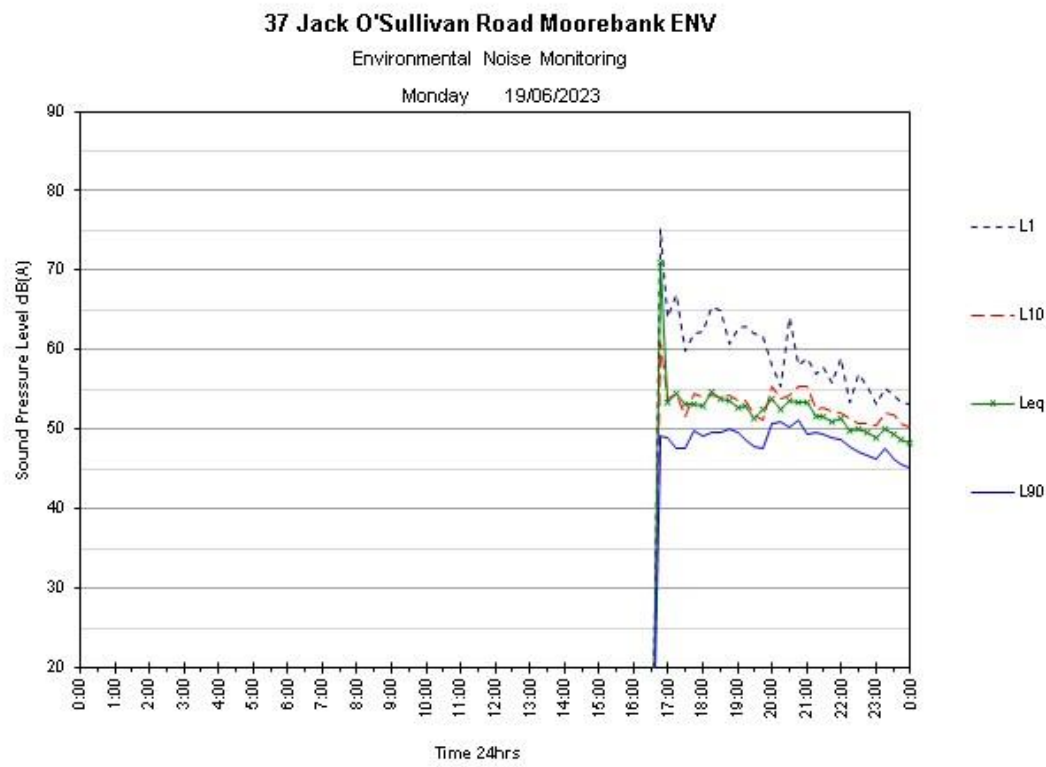


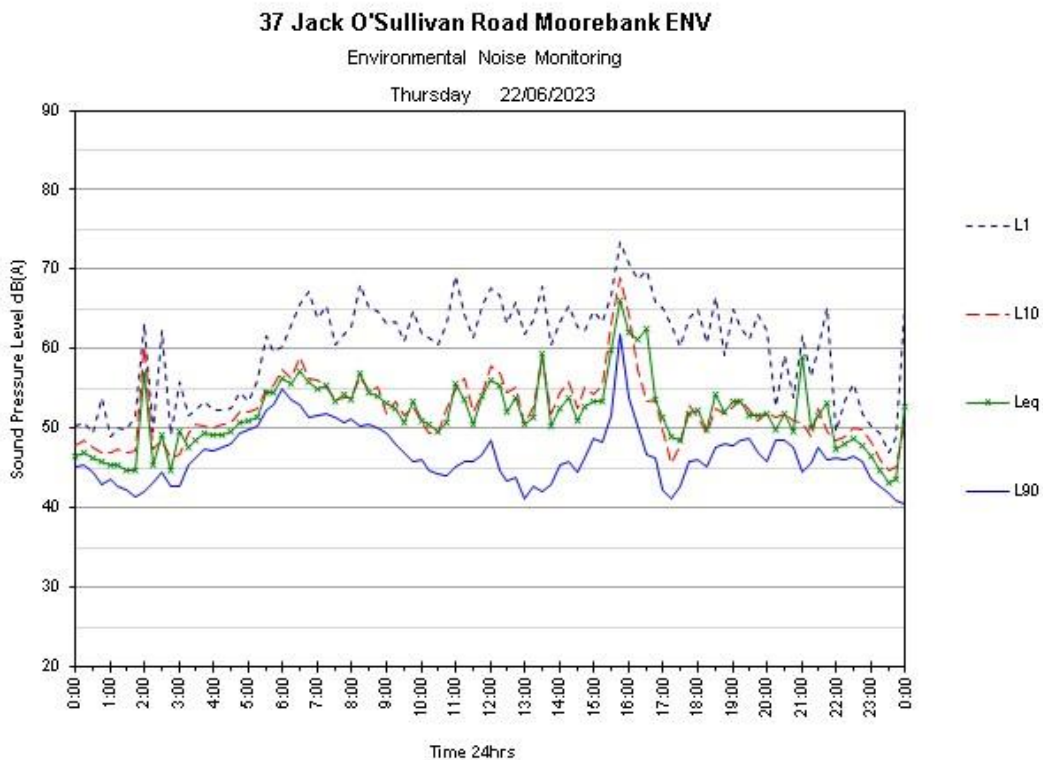
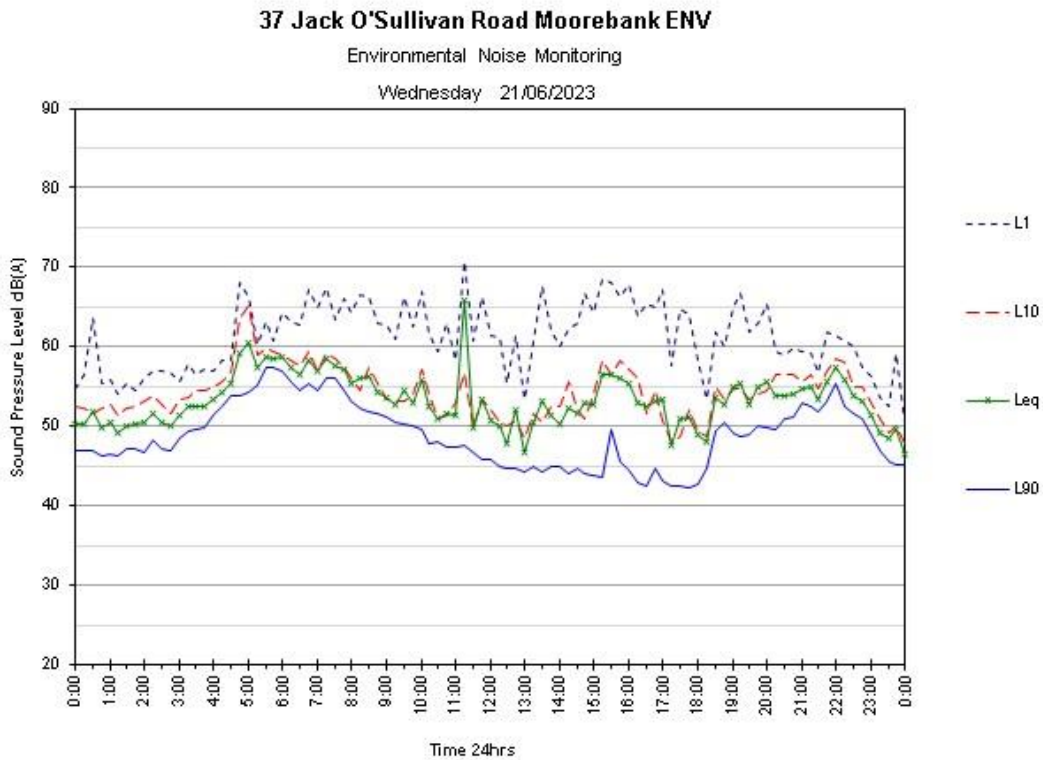


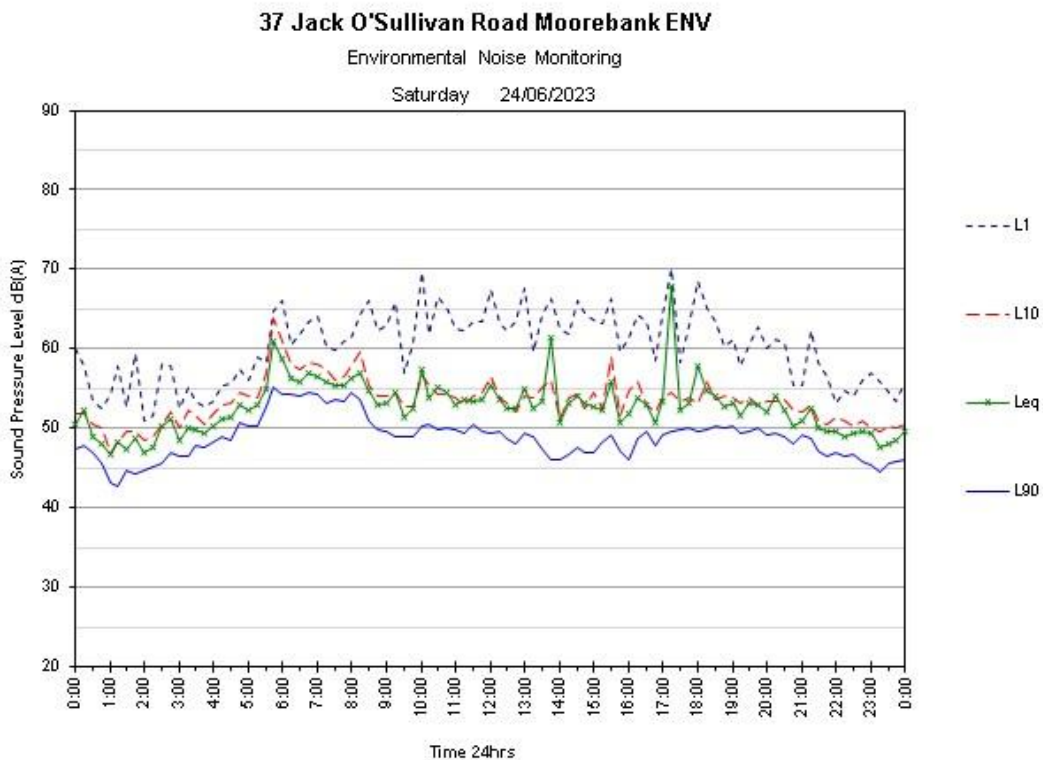
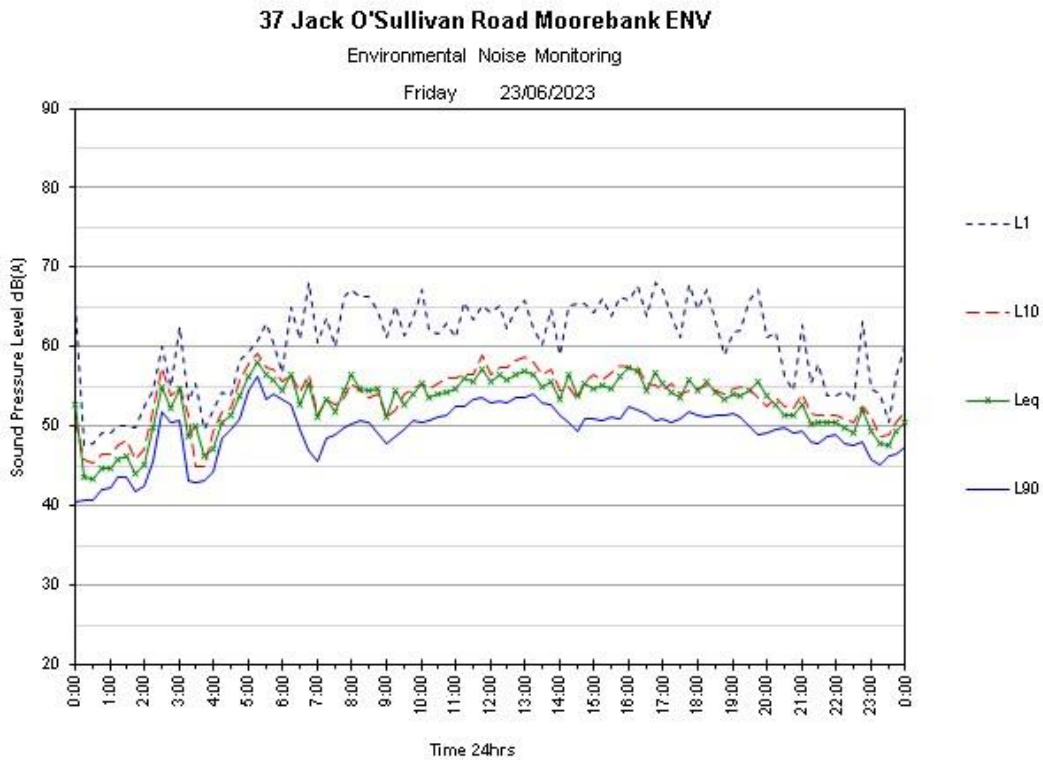


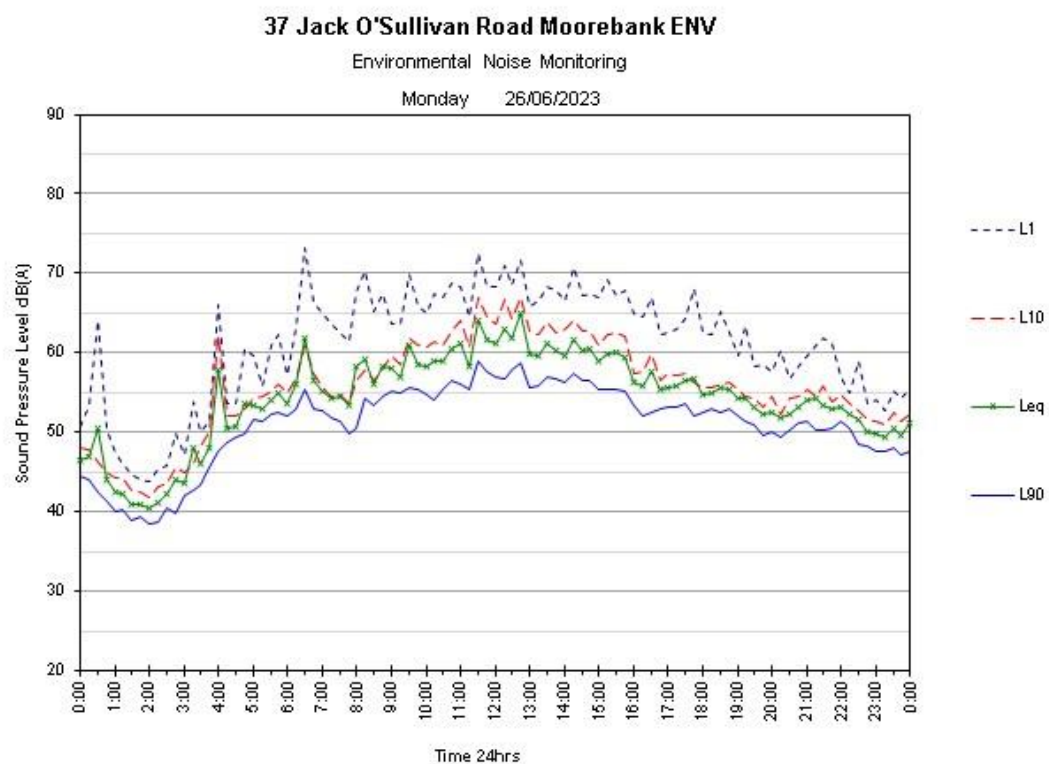
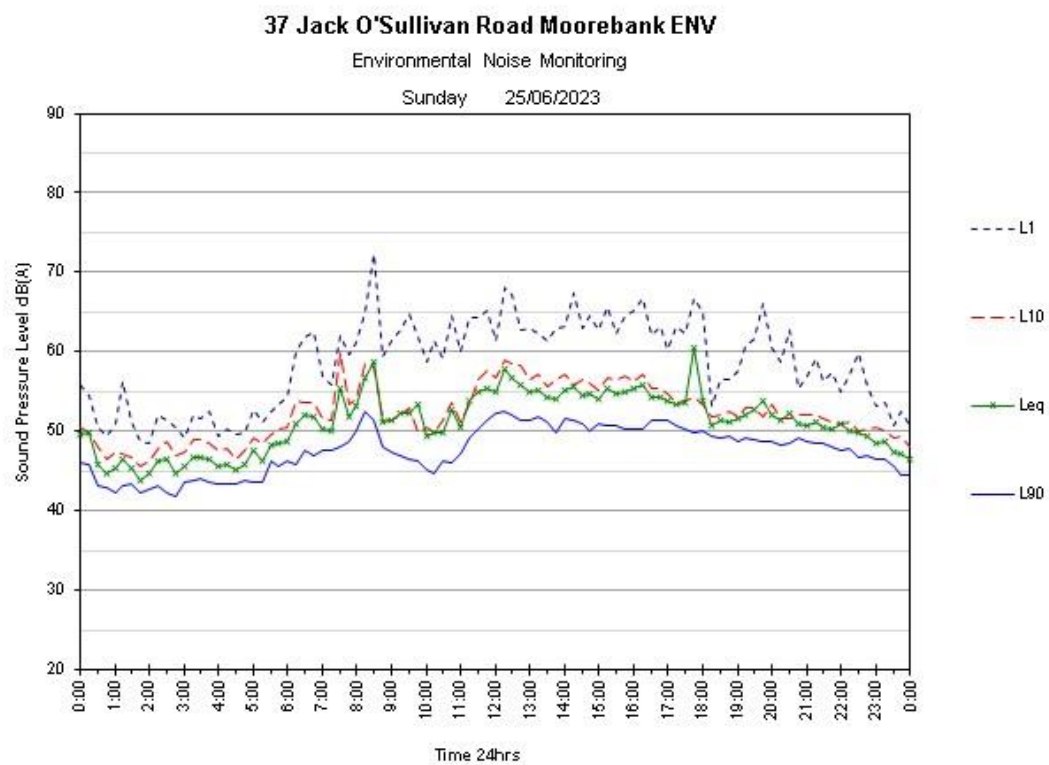
13.2 Noise Monitoring Charts

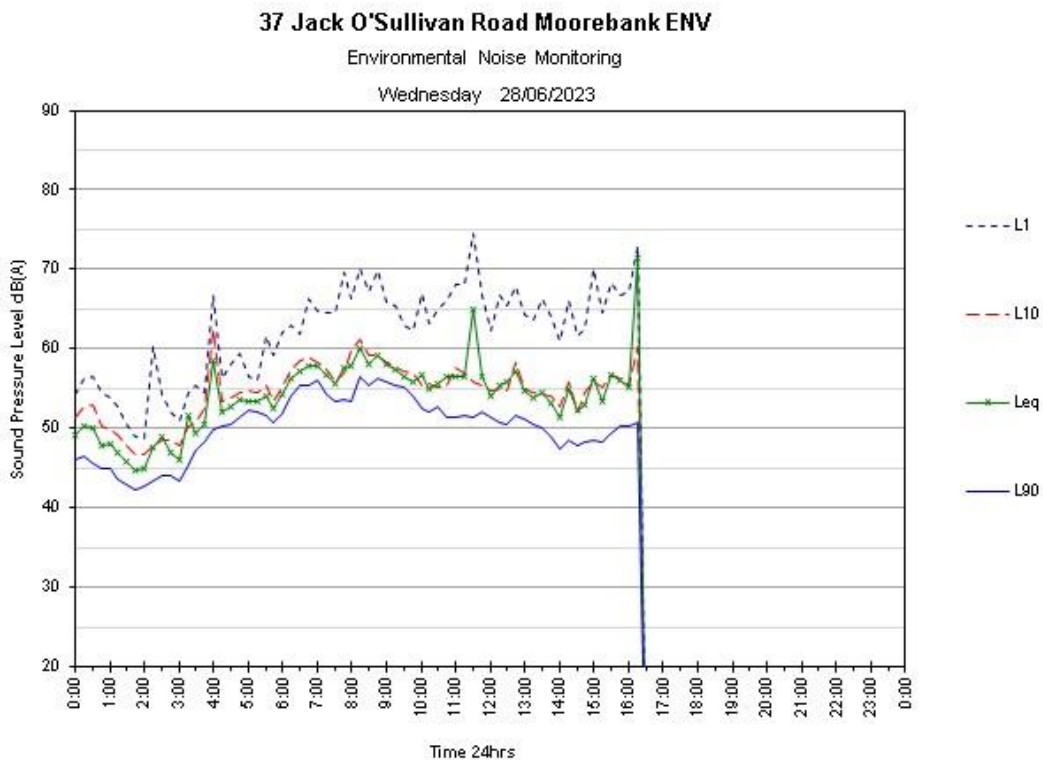
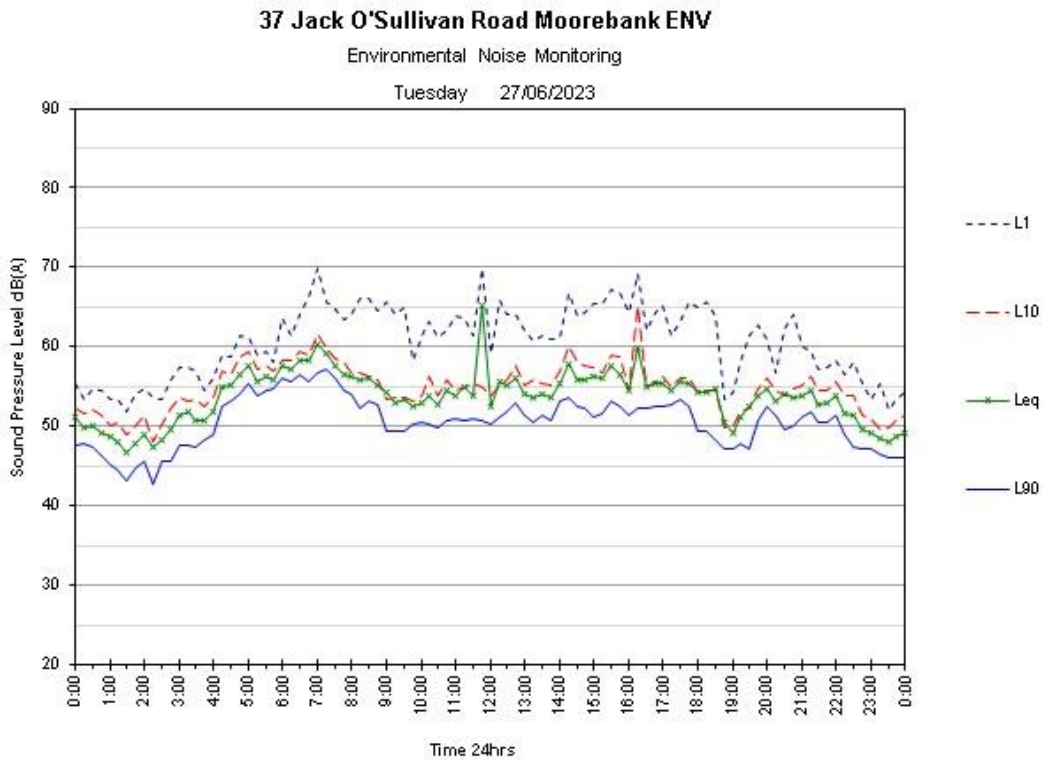
13.2.1 Ambient noise monitoring – Monitor A



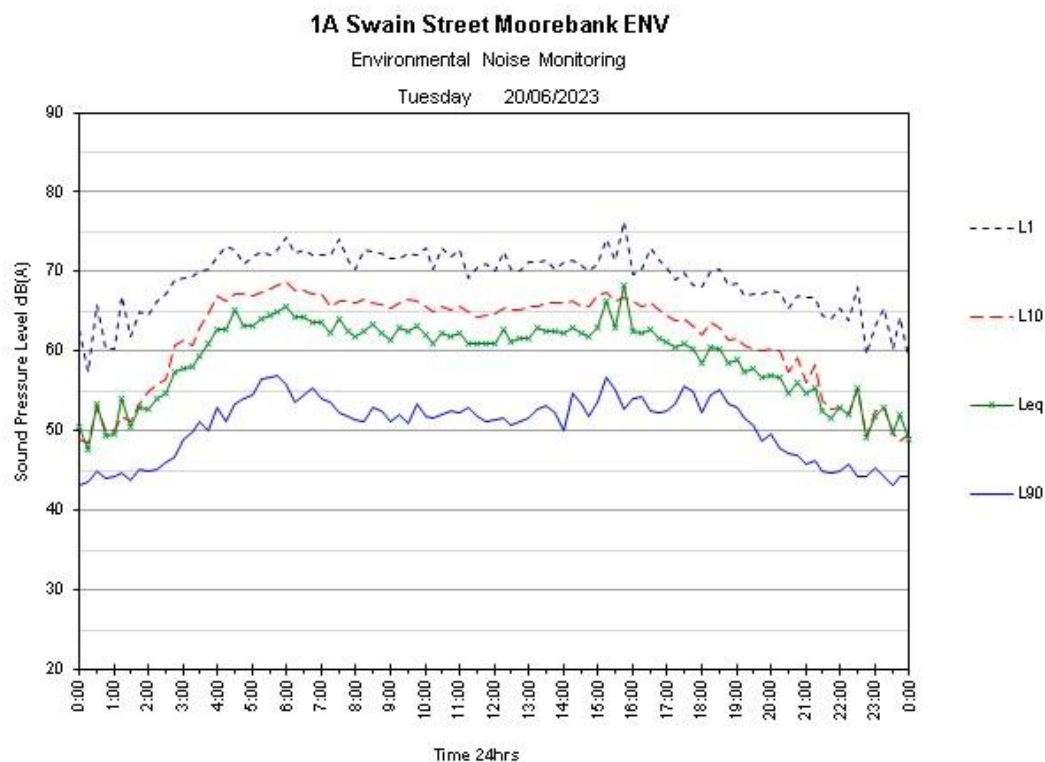
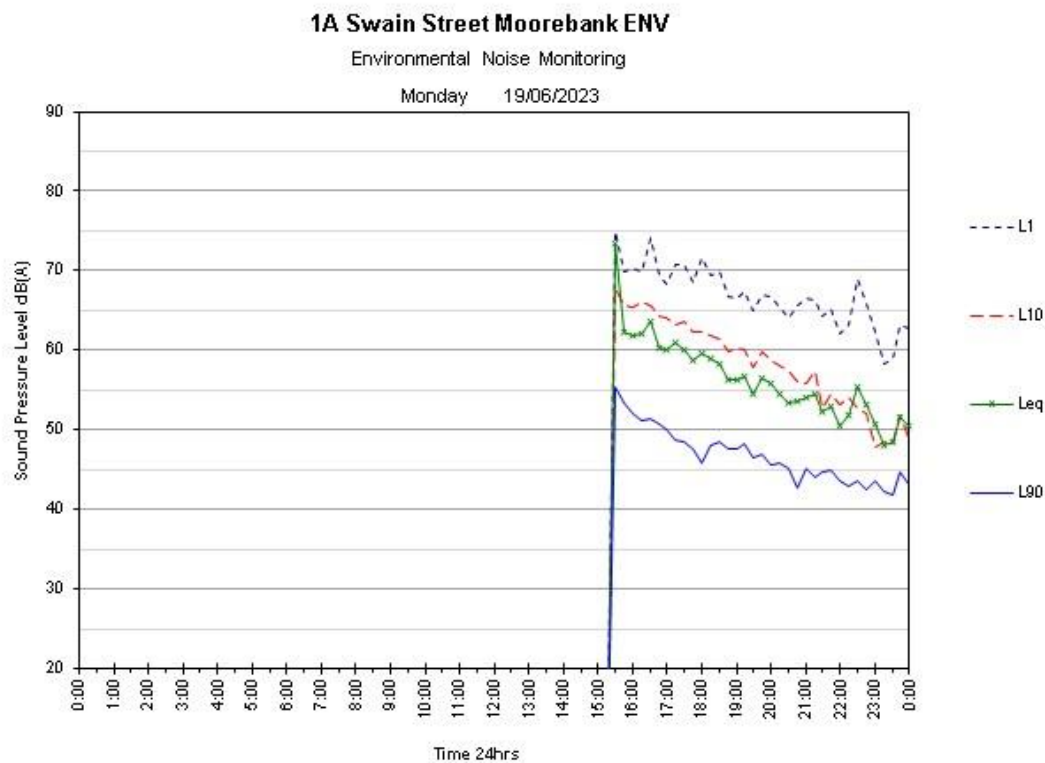


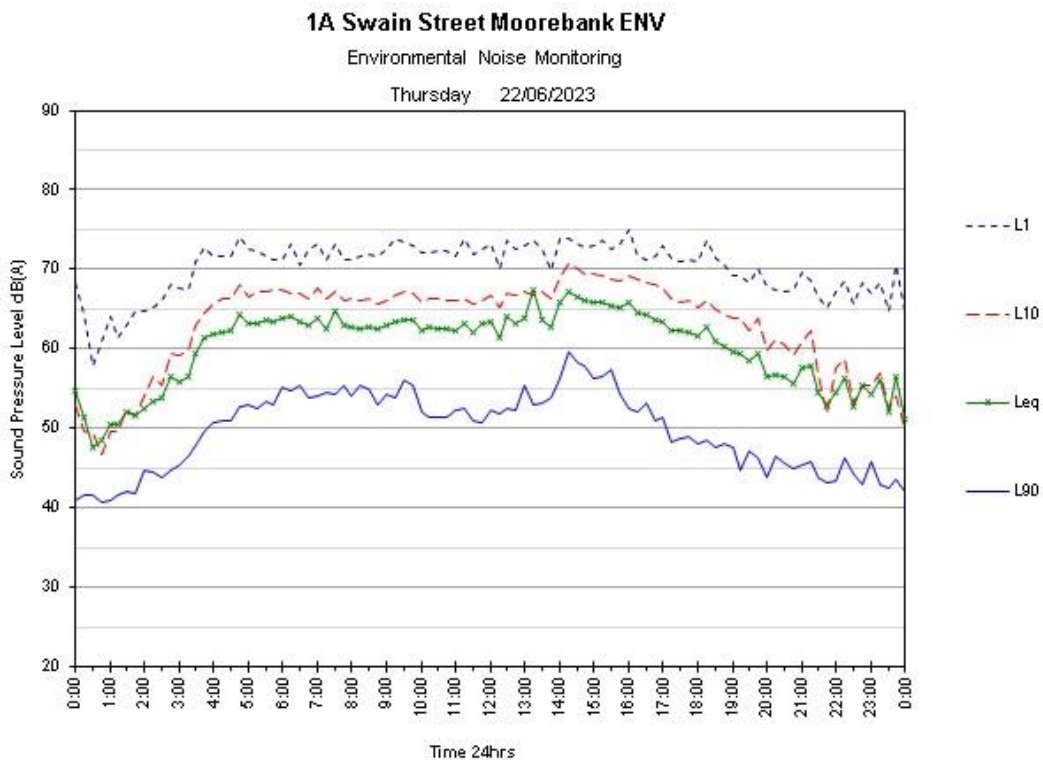
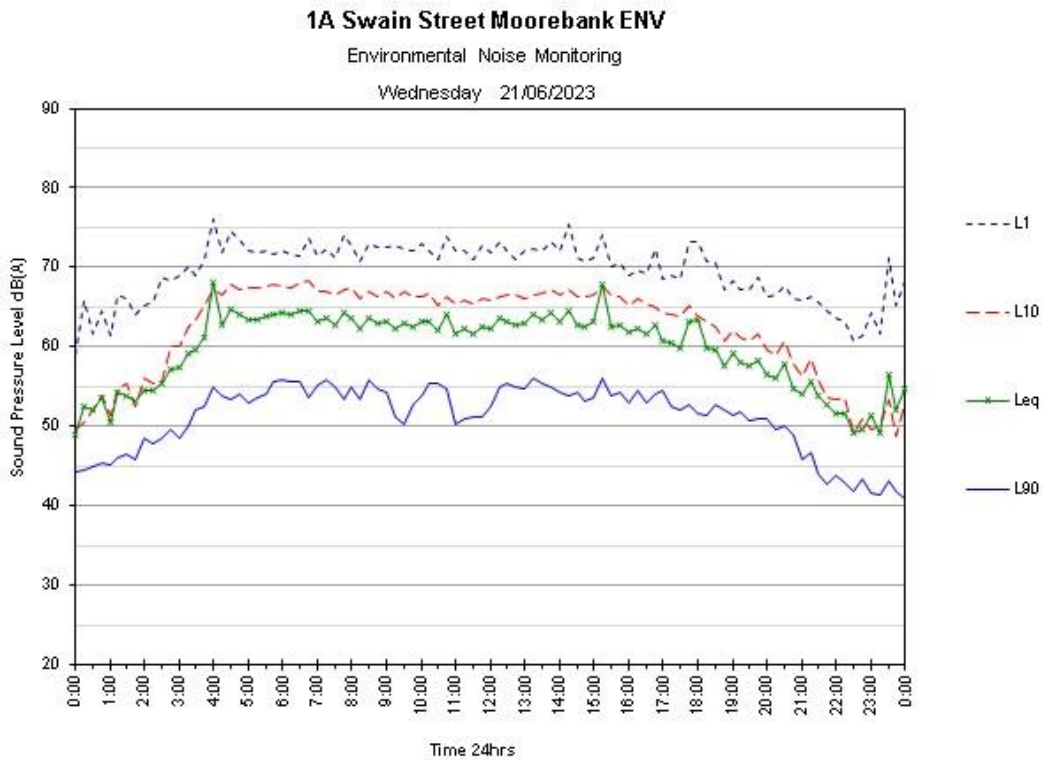


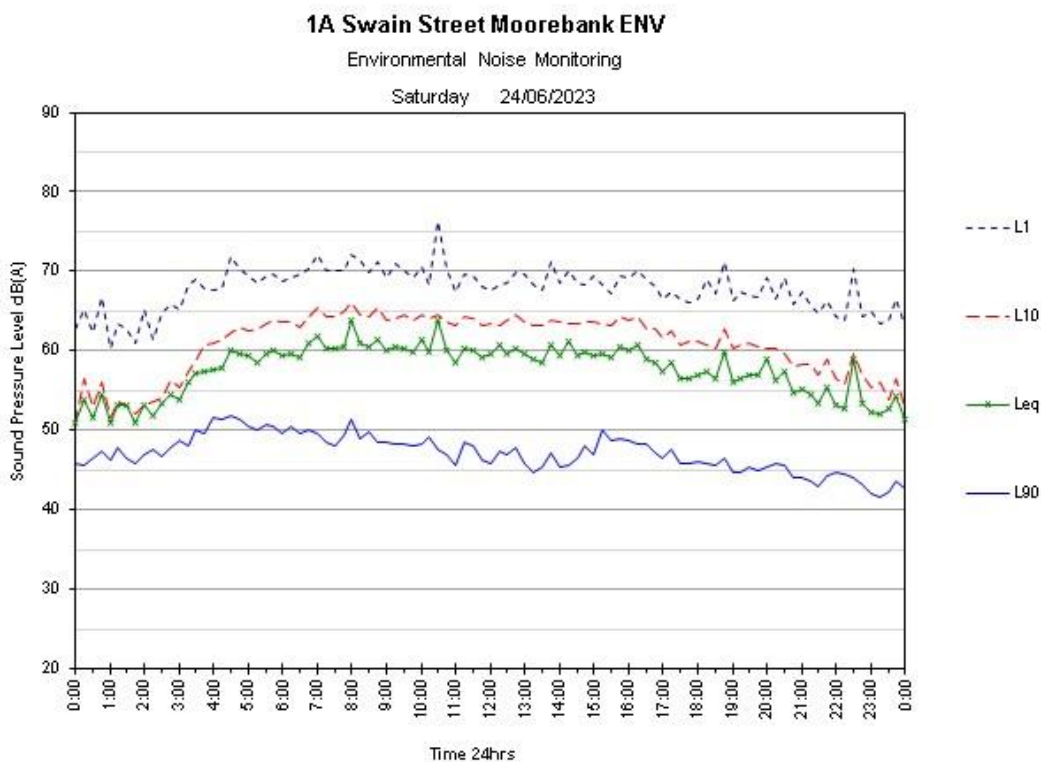
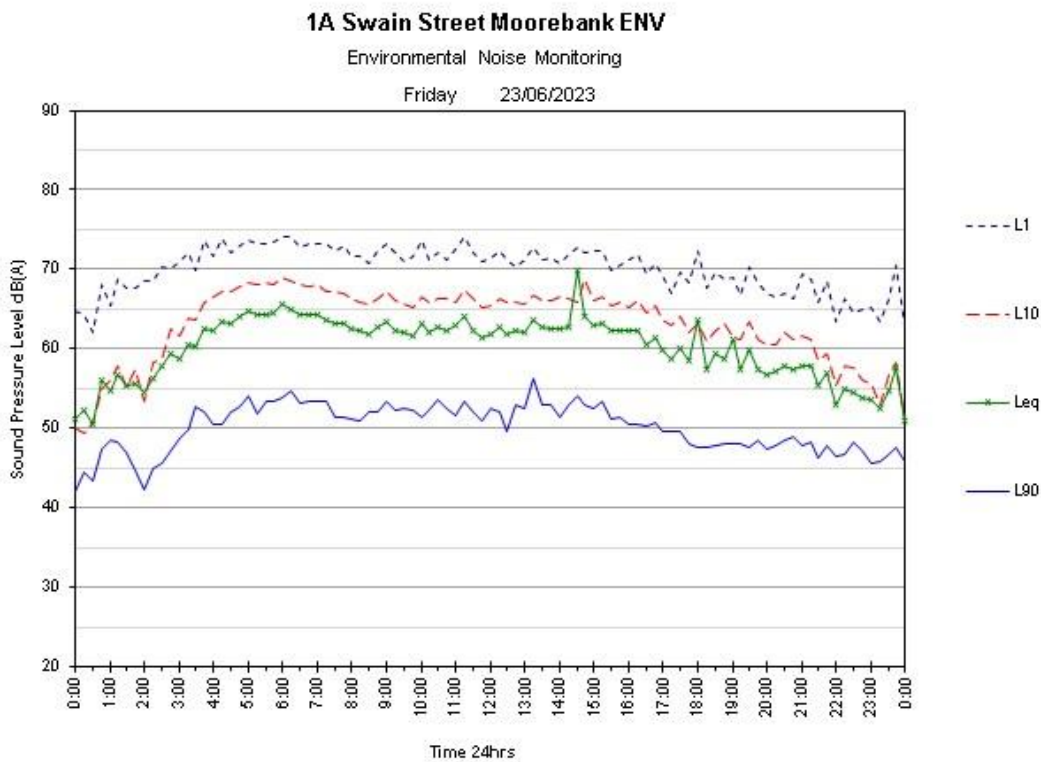


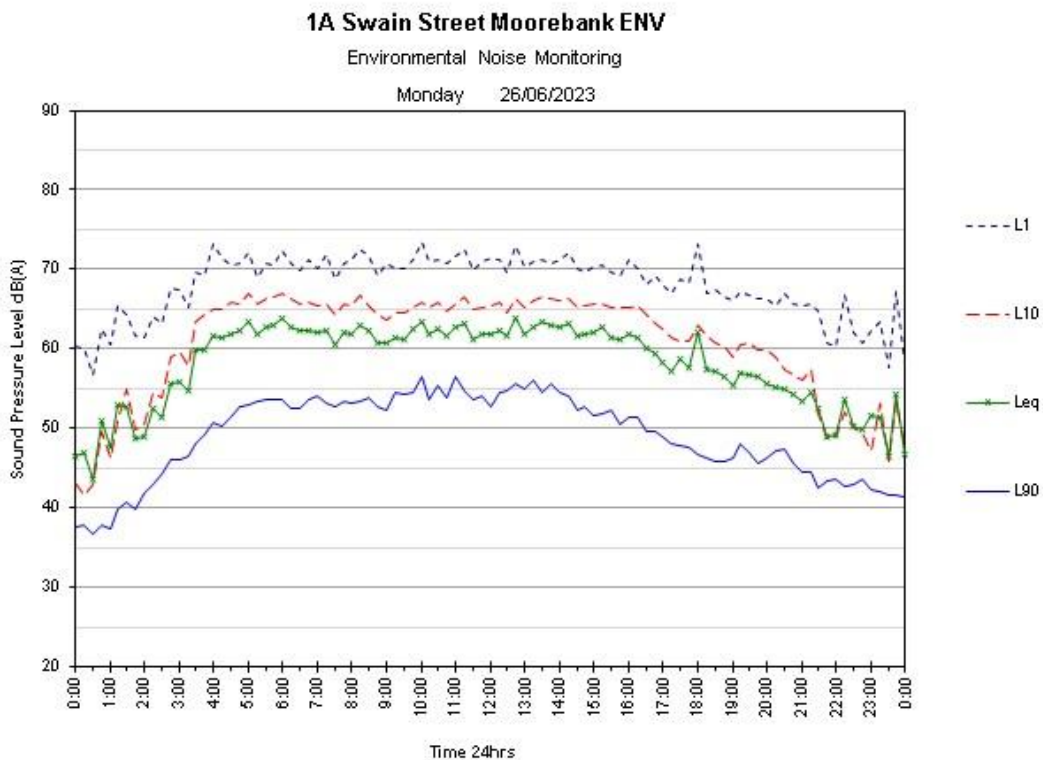
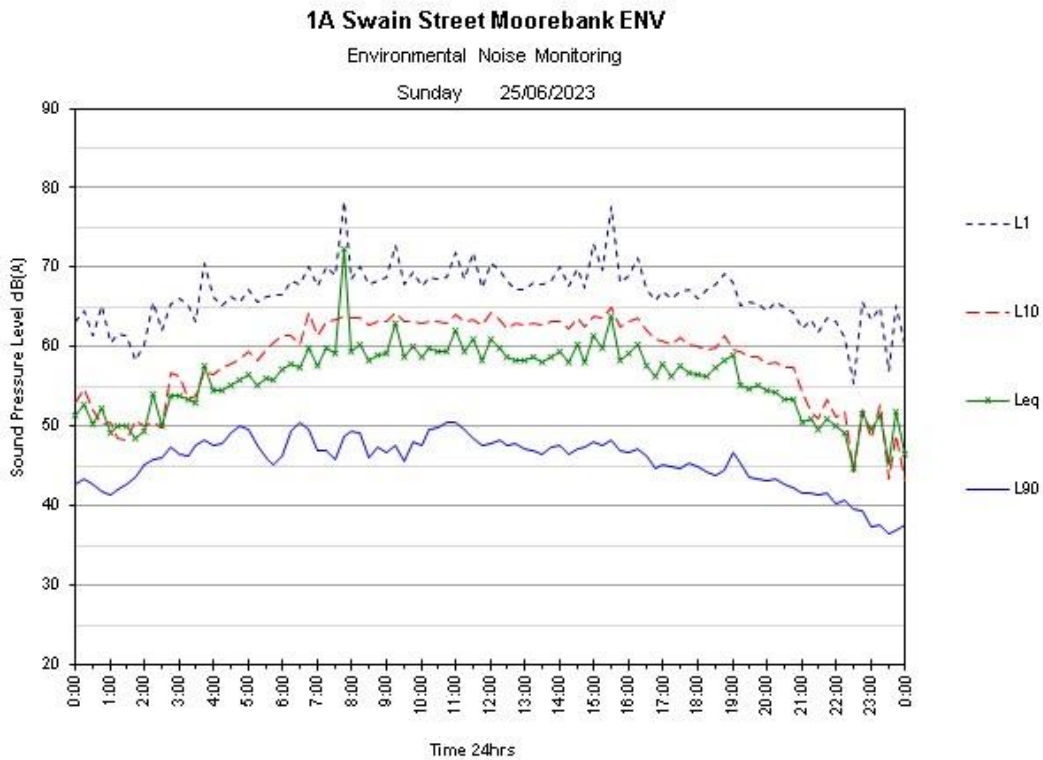


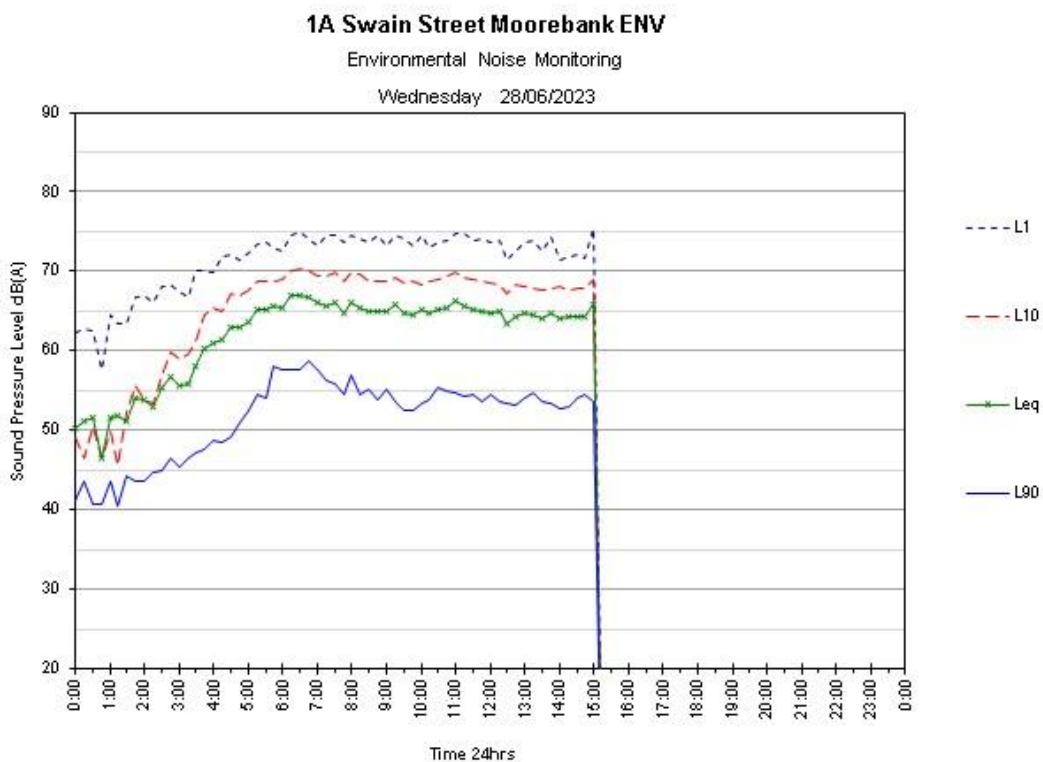
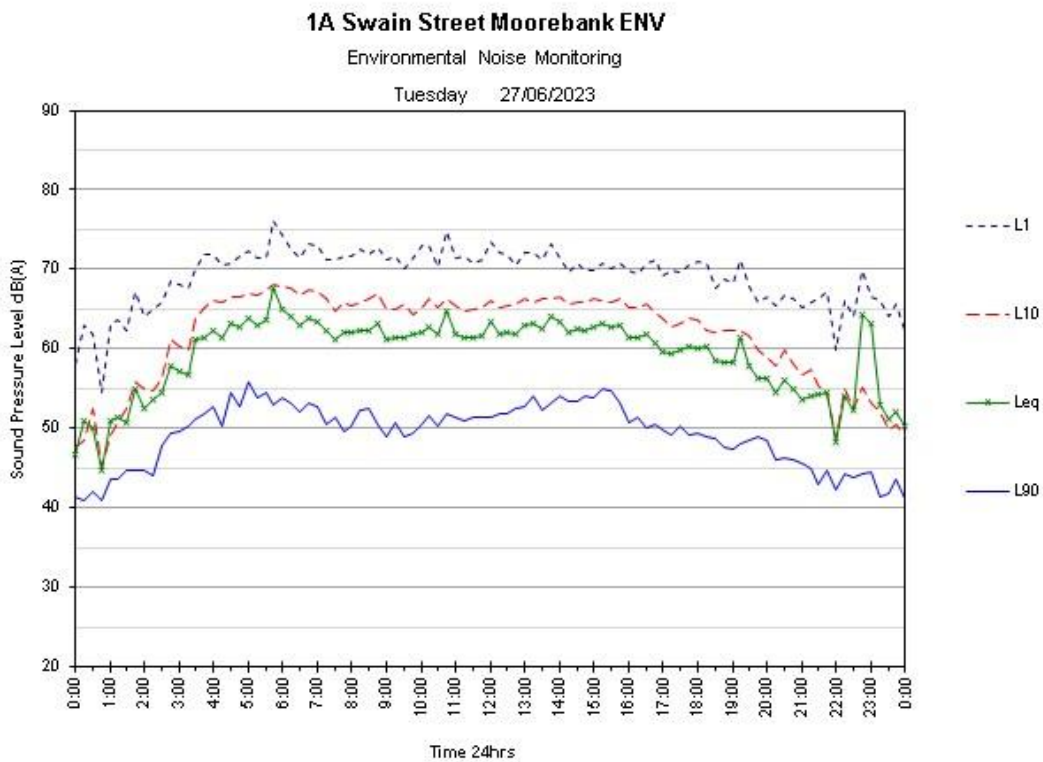
13.2.2 Ambient noise monitoring – Monitor B











13.3 Source Locations

